SITE PLANS FOR:

FedEx Freight®

PENDER COUNTY BUSINESS PARK
CORPORATE DRIVE
WILMINGTON, NC 28405

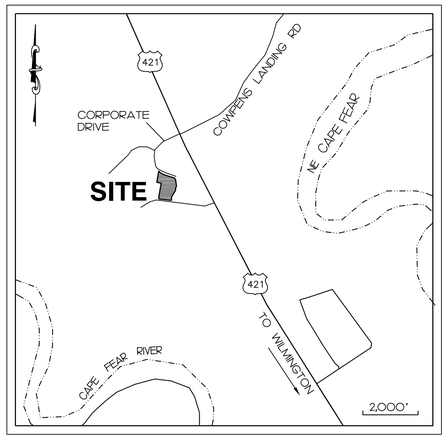
PREPARED FOR:

SETZER PROPERTIES
SETZER PROPERTIES WMN, LLC
354 WALLER AVENUE, STE 200
LEXINGTON , KY 40504
CONTACT: ROBBIE McATEE
(859) 514-7767
FAX: (859) 281-6335

PREPARED BY:

CAMPBELL
E & A, INC.
Civil Engineering and Land Planning

31 Boland Court
Greenville, SC 29615
(864) 335-4090
Fax: (864) 335-4095



LOCATION MAP

N.T.S.

SHEET INDEX

NORTH CAROLINA PROFESSIONAL SEAL 28622 ENGINEER TIMOTHY W. CAMPBELL 2/23/18

CONSULTANTS:

GEOTECHNICAL ENGINEER:

S&ME, INC.
3006 HALL WATERS DRIVE
SUITE 100
WILMINGTON, NC 28405
CONTACT: KEITH BROWN
PHONE: (910) 799-9945
FAX: (910) 799-9958

ARCHITECT:

BILL THOMAS DESIGN
PO BOX 23755
STANLEY, KS 66283
CONTACT: BILL THOMAS
PHONE: (913) 742-4081

GOVERNMENT/UTILITY OFFICIALS:

PLANNING AND ZONING DEPT.

PENDER COUNTY PLANNING AND COMMUNITY DEVELOPMENT
805 S. WALKER STREET
BURGAW, NC 28425
CONTACT: KYLE BREUER
(910) 259-1529
FAX: (910) 259-1259

LAND DISTURBANCE:

NCDEQ
127 CARDINAL DRIVE EXTENSION
WILMINGTON, NC 28405
CONTACT: RHONDA HALL
(910) 796-7312

STORMWATER:

NCDEQ
127 CARDINAL DRIVE EXTENSION
WILMINGTON, NC 28405
CONTACT: CHRISTINE HALL
(910) 796-7215

WATER & SEWER DEPT.:

PENDER COUNTY UTILITIES
605 E FREMONT STREET
BURGAW, NC 28425
CONTACT: BRYAN McCABE
(910) 259-1570

POWER:

DUKE ENERGY
CONTACT: HEIDI CARLSON
(910) 602-4402

FIRE MARSHALL:

PENDER COUNTY EMERGENCY MANAGEMENT
805 RIDGEWOOD AVENUE
BURGAW, NC 28425
CONTACT: TOMMY BATSON
(910) 259-0210
FAX: (910) 259-1409

GAS:

PIEDMONT NATURAL GAS
1321 S 10th STREET
WILMINGTON, NC 28401
CONTACT: JOSH REEVES
(910) 251-2802

PHONE:

AT&T
102 NORTH 4TH STREET
WILMINGTON, NC 28401
CONTACT: CHRISSY COSTON
(910) 341-7664

SITE DEVELOPMENT DATA

ZONING: GI (GENERAL INDUSTRIAL)

TAX MAP: 2291-77-6009-0000

PROPERTY SIZE: ±12.5 AC.

JURISDICTION: PENDER COUNTY

SETBACKS:
FRONT = 50'
SIDE = 25'
REAR = 25'

PARKING REQUIREMENTS:
-SPACES REQUIRED (PER 5.3.12.E.6.a),
3 SPACES FOR PER 4 EMPLOYEES ON LARGEST SHIFT + ADDITIONAL SPACES FOR VEHICLES PERMANENTLY USED, THEREFORE BASED ON 14 EMPLOYEES ON LARGEST SHIFT = 3 / 4 = 0.75 x 14 EMPLOYEES = 11 SPACES REQUIRED
-SPACES PROVIDED = 40 SPACES INC. VISITOR, SEE FOR PERMANENT SPACES
HANDICAP SPACES REQUIRED = 2
HANDICAP SPACES PROVIDED = 3
VAN ACCESSIBLE SPACES REQUIRED = 1
VAN ACCESSIBLE SPACES PROVIDED = 2

SERVICE CENTER: ±10,220 SF
GENERAL OFFICE: ±4,850 SF
TOTAL AREA: ±15,070 SF

POTENTIAL FUTURE EXPANSION: ±4,970

SITE LAYOUT SUMMARY BASED ON NTP DATED: 08.24.17

ITEM	PROPOSED REQ'D.	PROPOSED PROV.	FULL EXPAN. REQ'D.	FULL EXPAN. PROV.
BUILDING (S.F. AREA)				
SERVICE CENTER		10,220		15,190
OFFICE	4,850	4,850	4,850	4,850
POD TOTAL	0	0	0	0
TOTAL	X	15,070	X	20,040
REVENUE DOOR	23	22	34	34
FLEET MAINTENANCE BAY	NO	NO	NO	NO
DRIVE THRU DOOR	0	0	0	0
SHOP	NO	NO	NO	NO
DEADLINE TRACTOR	0	0	0	0
DEADLINE TRAILER	0	0	0	0
LUBE SHED	NO	NO	NO	NO
FUEL CANOPY	NO	NO	NO	NO
20K UST	NO	NO	NO	NO
GUARD SHACK	NO	NO	NO	NO
SNOW SCRAPER	NO	NO	NO	NO
AXLE SCALE	YES	YES	YES	YES
STORM SHELTER	NO	NO	NO	NO
PARKING (SPACES)				
AUTOMOBILE TOTAL	23	35	11	35
PUP/ PARKING	26	88	13	88
VAN PARKING	17	31	8	31
TRACTOR	18	31	9	31
DOLLY STORAGE	0	0	0	0
RELAY PARKING	6	16	3	11
TRIPLES PARKING	0	0	0	0

REVISIONS:

NO.	DATE	DESCRIPTION
9		
8		
7		
6		
5		
4		
3		
2		
1		
0	02/23/18	FOR CONSTRUCTION

CERTIFICATE OF OWNERSHIP, DEDICATION AND JURISDICTION

I (WE) HEREBY CERTIFY THAT I AM (WE ARE) THE OWNER(S) OF THE PROPERTY SHOWN AND DESCRIBED HEREON AND THAT I (WE) HEREBY ADOPT THIS PLAN OF SUBDIVISION WITH MY (OUR) OWN FREE CONSENT AND DEDICATE ALL STREETS, ALLEYS, WALKS, PARKS, CONSERVATION SPACE AND OTHER AREAS TO PUBLIC OR PRIVATE USE AS NOTED. FURTHER, I (WE) CERTIFY THE LAND AS SHOWN HEREON IS LOCATED WITHIN THE SUBDIVISION JURISDICTION OF PENDER COUNTY.

OWNER _____ DATE _____

OWNER _____ DATE _____

PENDER COUNTY, NORTH CAROLINA

FILED FOR REGISTRATION ON THE _____DAY OF

_____ 20_____ AT A.M./P.M. AND DULY

RECORDED IN BOOK_____AT PAGE_____, SLIDE _____.

REGISTER OF DEEDS

PARCEL IDENTIFIER CERTIFICATE

PARCEL IDENTIFIERS HAVE BEEN ISSUED FOR ALL PARCELS SHOWN ON THIS PLAT.

TAX SUPERVISOR DATE

PCP 911 CERTIFICATION

I CERTIFY THAT THE ROAD NAMES SHOWN HEREON HAVE BEEN APPROVED.

PENDER COUNTY ADDRESSING COORDINATOR: DATE

CERTIFICATE OF DISCLOSURE: PRIVATE ROADS

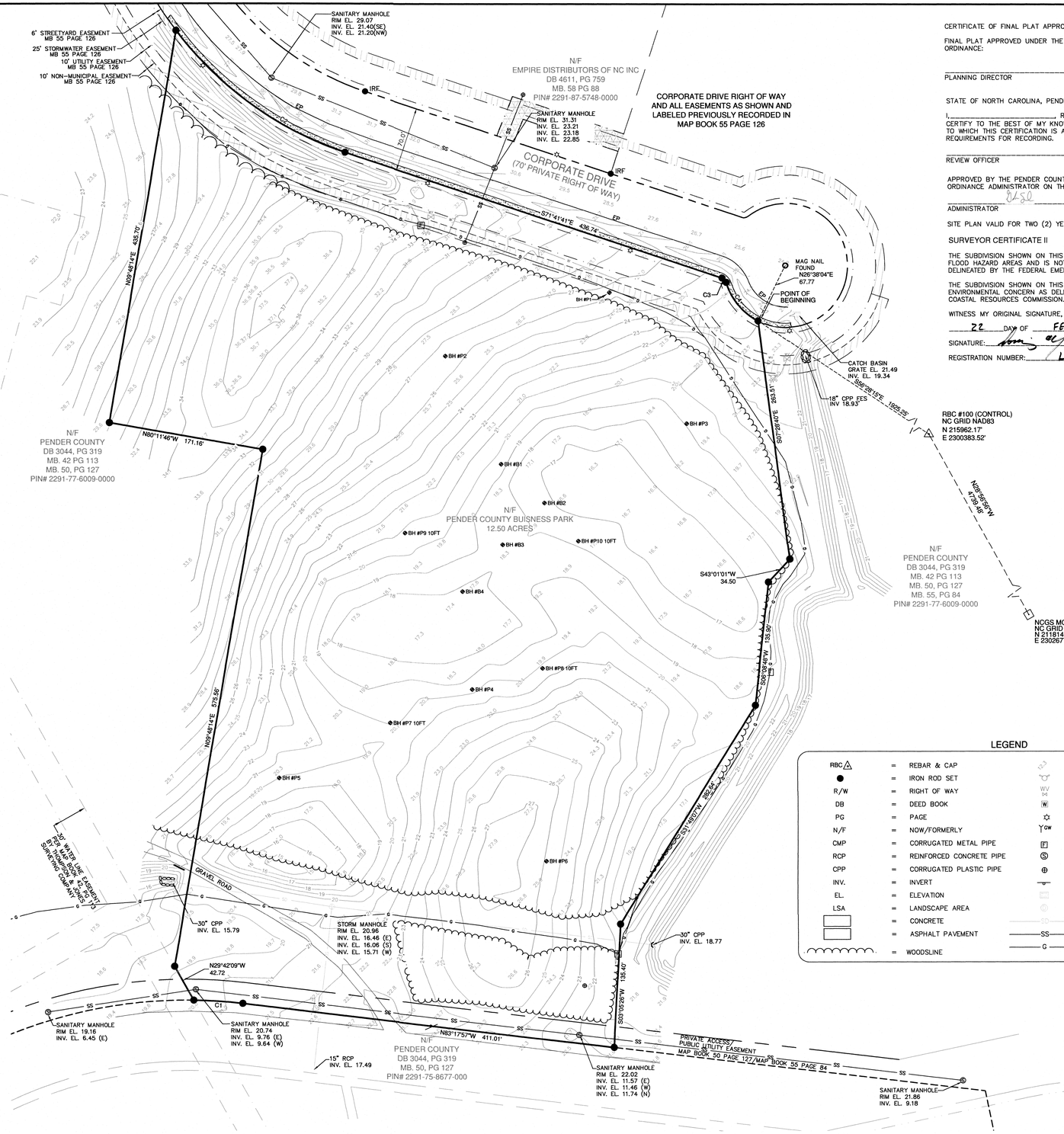
I (WE) THE DEVELOPERS OF PENDER COMMERCE LOT 9 SUBDIVISION LOCATED IN THE UNINCORPORATED AREA OF PENDER COUNTY UNDERSTAND THAT THE ROADS IN SAID SUBDIVISION ARE DESIGNATED PRIVATE. I UNDERSTAND THAT OWNERSHIP AND MAINTENANCE OF THE ROADS WILL BE THE RESPONSIBILITY OF THE DEVELOPER UNTIL SUCH TIME THAT THE DEVELOPER DESIGNATES THE RESPONSIBILITY TO THE PROPERTY OWNERS' ASSOCIATION. RESPONSIBILITIES MUST BE ACCEPTED BY PROPERTY OWNERS' ASSOCIATION AS SPECIFIED IN THE RESTRICTIVE COVENANTS FOR SAID SUBDIVISION. THE PRIVATE ROADS IN SAID SUBDIVISION ARE TO BE CONSTRUCTED IN ACCORDANCE WITH THIS UDO AND ALL APPLICABLE COUNTY CODES WHICH INCLUDES THE DESIGN, INSTALLATION, INSPECTION, AND APPROVAL BY A LICENSED PROFESSIONAL ENGINEER (PE) RECOGNIZED IN THE STATE OF NORTH CAROLINA PRIOR TO FINAL PLAT APPROVAL FOR ALL OR A PORTION OF THE SUBDIVISION. IF ALL OR A PORTION OF THE ROAD INFRASTRUCTURE SYSTEM WITHIN THE SUBDIVISION IS BONDED THROUGH A SURETY, PERFORMANCE BOND, OR CASH ESCROW, NO BOND SHALL BE RELEASED UNTIL ALL ROAD CONSTRUCTION IMPROVEMENTS ARE COMPLETE AND CERTIFIED BY THE PROFESSIONAL ENGINEER.

IT SHALL BE DISCLOSED TO THE PROSPECTIVE BUYER OF A LOT OR LOTS WITHIN THE SUBDIVISION THAT ROAD MAINTENANCE SHALL RUN THROUGH THE PROPERTY OWNERS ASSOCIATION IN PERPETUITY AFTER ACCEPTANCE FROM THE DEVELOPER UNTIL SUCH TIME THAT THE ROADS ARE RE-PLATTED AS PUBLICLY DESIGNATED ROADS AND TAKEN OVER FOR MAINTENANCE THROUGH THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION (NCDOT)

COMMITMENT NUMBER: NCS-835763-CHI2
DATED: DECEMBER 7, 2017
SCHEDULE B - SECTION II EXCEPTIONS

SCHEDULE B OF THE POLICY OR POLICIES TO BE ISSUED WILL CONTAIN EXCEPTIONS TO THE FOLLOWING MATTERS UNLESS THE SAME ARE DISPOSED OF TO THE SATISFACTION OF THE COMPANY:

1. DEFECTS, LIENS, ENCUMBRANCES, ADVERSE CLAIMS OR OTHER MATTERS, IF ANY, CREATED, FIRST APPEARING IN THE PUBLIC RECORDS OR ATTACHING SUBSEQUENT TO THE EFFECTIVE DATE HEREOF BUT PRIOR TO THE DATE THE PROPOSED INSURED ACQUIRES FOR VALUE OF RECORD THE ESTATE OR INTEREST OR MORTGAGE THEREON COVERED BY THIS COMMITMENT.
–NOT A SURVEY MATTER–
2. TAXES FOR THE YEAR 2017, WHICH ARE A LIEN, NOT YET DUE AND PAYABLE, AND ALL SUBSEQUENT YEARS.
–NOT A SURVEY MATTER–
3. TERMS, PROVISIONS, COVENANTS, CONDITIONS, EASEMENTS AND RESTRICTIONS AS PROVIDED IN RESTRICTIVE COVENANTS, RECORDED IN BOOK 3639, PAGE 59; BOOK 3852, PAGE 178; BOOK 4401, PAGE 159; BOOK 4611, PAGE 756; ADMINISTRATIVE CORRECTION NOTICE RECORDED OCTOBER 27, 2009 IN BOOK 3699, PAGE 26, PENDER COUNTY REGISTRY; THOSE RESTRICTIONS LISTED IN DEED DATED SEPTEMBER 1, 2006 AND RECORDED SEPTEMBER 7, 2006 IN BOOK 3044, PAGE 319, PENDER COUNTY REGISTRY.
4. EASEMENTS AND ANY OTHER FACTS AS SHOWN ON PLAT RECORDED IN BOOK 42, PAGE 113; BOOK 19, PAGE 79; BOOK 50, PAGE 125–127; BOOK 55, PAGE 84–86; BOOK 55, PAGE 126; BOOK 58, PAGE 88, PENDER COUNTY REGISTRY.
–AS SHOWN ON SURVEY–
5. EASEMENT TO BELLSOUTH TELECOMMUNICATIONS, INC. RECORDED APRIL 28, 2010 IN BOOK 3765, PAGE 216, PENDER COUNTY REGISTRY.
–DOES NOT AFFECT PROPERTY–
6. EASEMENT TO DUKE ENERGY PROGRESS, INC. RECORDED MARCH 17, 2014 IN BOOK 4389, PAGE 307 (BLANKET), AND MARCH 17, 2014 IN BOOK 4389, PAGE 316, PENDER COUNTY REGISTRY.
–BOTH ARE EASEMENT BLANKET IN NATURE–
7. EASEMENT TO CAROLINA POWER AND LIGHT COMPANY RECORDED IN BOOK 444, PAGE 83 CANNOT FINE; BOOK 326, PAGE 285 NOT A PART; BOOK 648, PAGE 244 –BLANKET NEED TO PLOT EASEMENTS–; BOOK 946, PAGE 207 –DOES NOT AFFECT– AND BOOK 3863, PAGE 122 – BLANKET EASEMENT AFFECT PROPERTY, PENDER COUNTY REGISTRY.
8. RIGHT(S) OF WAY OF US HIGHWAY 421 AND SR 1109.
– DOES NOT AFFECT PROPERTY–
9. THIS COMPANY DOES NOT INSURE TITLE TO ANY PORTION OF SUBJECT PROPERTY LOCATED IN NEW HANOVER COUNTY.
–DOES NOT FALL INTO NEW HANOVER COUNTY–
10. RIGHTS OF PARTIES IN POSSESSION AS TENANTS ONLY, UNDER UNRECORDED LEASES(S) OR RENTAL AGREEMENT(S).
–NOT A SURVEY MATTER–
11. ENCROACHMENTS, OVERLAPS, BOUNDARY LINE DISPUTES, DEFICIENCY IN AMOUNT OF AREA, RIGHTS, EASEMENTS, DITCHES, CARTWAYS, SETBACKS, RIGHTS OF PARTIES IN POSSESSION, INTERESTS OR CLAIMS WHICH WOULD BE REVEALED BY A CURRENT AND ACCURATE SURVEY AND INSPECTION OF THE LAND.
–AS SHOWN, IF ANY, ON THE SURVEY MAP–



CURVE TABLE						
CURVE	RADIUS	LENGTH	TANGENT	BEARING	CHORD	DELTA Δ
C1	525.00'	54.14'	27.10'	N86°15'21"W	54.12'	5°54'33"
C2	385.00'	232.27'	119.79'	S54°24'43"E	228.76'	34°33'57"
C3	7.00'	6.83'	3.72'	S43°43'22"E	6.57'	55°56'39"
C4	68.00'	56.28'	29.86'	S39°27'33"E	54.68'	47°25'02"

CERTIFICATE OF FINAL PLAT APPROVAL

FINAL PLAT APPROVED UNDER THE PENDER COUNTY UNIFIED DEVELOPMENT ORDINANCE:

PLANNING DIRECTOR DATE

STATE OF NORTH CAROLINA, PENDER COUNTY

I,_____, REVIEW OFFICER OF PENDER COUNTY, CERTIFY TO THE BEST OF MY KNOWLEDGE AND BELIEF THE MAP/PLAT TO WHICH THIS CERTIFICATION IS AFFIXED MEETS THE STATUTORY REQUIREMENTS FOR RECORDING.

REVIEW OFFICER DATE

APPROVED BY THE PENDER COUNTY UNIFIED DEVELOPMENT ORDINANCE ADMINISTRATOR ON THIS 26 DAY OF March 2018

ADMINISTRATOR

SITE PLAN VALID FOR TWO (2) YEARS FROM APPROVAL DATE.

SURVEYOR CERTIFICATE II

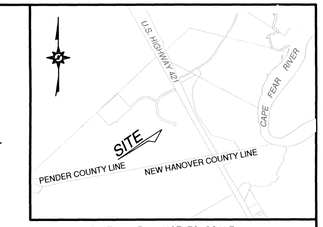
THE SUBDIVISION SHOWN ON THIS PLAT DOES NOT CONTAIN SPECIAL FLOOD HAZARD AREAS AND IS NOT LOCATED IN A FLOODWAY AS DELINEATED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY.

THE SUBDIVISION SHOWN ON THIS PLAT DOES NOT CONTAIN AREAS OF ENVIRONMENTAL CONCERN AS DELINEATED BY THE NORTH CAROLINA COASTAL RESOURCES COMMISSION.

WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER AND SEAL THIS 22 DAY OF FEBRUARY A.D. 2018.

SIGNATURE:

REGISTRATION NUMBER: L-4831



VICINITY MAP – NOT TO SCALE

SURVEYOR'S NOTES:

1. ALL DISTANCES ARE HORIZONTAL GROUND IN U.S. SURVEY FEET UNLESS OTHERWISE SHOWN.
2. BEARINGS BASED ON NC GRID NAD 83 (2001).
3. REFERENCES: AS SHOWN ON MAP
4. TITLE COMMITMENT SCHEDULE B SECTION II AS PROVIDED BY FIRST AMERICAN TITLE INSURANCE COMPANY, 30 NORTH LASALLE STREET, SUITE 2700, CHICAGO, IL, 60602.
5. SUBSURFACE AND ENVIRONMENTAL CONDITIONS WERE NOT EXAMINED OR CONSIDERED AS A PART OF THIS SURVEY. NO STATEMENT IS MADE CONCERNING THE EXISTENCE OF UNDERGROUND OR OVERHEAD CONTAINERS OR FACILITIES THAT MAY AFFECT THE USE OR DEVELOPMENT OF THIS TRACT.
6. THE WETLANDS FROM APPROVED WETLANDS SURVEY DOES NOT AFFECT SUBJECT PROPERTY.
7. SUBJECT TO ALL EASEMENTS, RIGHT OF WAYS, AND OR ENCUMBRANCES THAT MAY EFFECT THIS PROPERTY, AS RECORDED IN MAP BOOK 55 PAGE 126 AND MAP BOOK 50 PAGE 127.
8. PORTIONS OF THIS PROPERTY LIES IN ZONE X (AREAS OUTSIDE THE 2% ANNUAL CHANCE FLOODPLAIN), ALL AS SCALED FROM FIRM MAP PANEL 2291 MAP NUMBER 3720229100L EFFECTIVE DATE FEBRUARY 16, 2007, AND FIRM MAP PANEL 3201 MAP NUMBER 3720320100K, EFFECTIVE DATE FEBRUARY 16, 2007.
9. THE GRID COORDINATES SHOWN ON THIS MAP WERE DERIVED BY VRS (VIRTUAL REFERENCE STATION) GPS USING A DUAL FREQUENCY RECEIVER. THIS METHOD RESULTS IN NAD83 2007 POSITIONS AND NAVD88 ELEVATIONS USING THE CONTINUOUSLY OPERATING REFERENCE STATIONS MAINTAINED BY NORTH CAROLINA GEODETIC SURVEY. TOTAL COMBINED FACTOR: 1.0000035
10. BEARINGS ARE REFERENCED TO CENTERLINE AND RIGHT OF WAY OF ROAD, EASEMENTS ARE OFFSETS AS SHOWN FROM RIGHT OF WAY.
11. BUILDING SET BACKS: AS PER RESTRICTIVE COVENANTS RECORDED IN DEED BOOK 3639 PAGE 059

    FRONT 50'
    SIDE 25'
    CORNER YARD 50'
    BUILDING HEIGHT 50'
12. THIS LOT IS SUBJECT TO THE RESTRICTIVE COVENANTS RECORDED IN DEED BOOK 3639 PAGE 059 AND AS AMENDED IN DEED BOOK 3852 PAGE 178 OF THE PENDER COUNTY REGISTER OF DEEDS.
13. THIS AREA IS ZONED GI (GENERAL INDUSTRIAL)
14. THIS PARCEL EXEMPT FROM SUBDIVISION REGULATIONS AS IT IS GREATER THAN 10 ACRES.
15. IRONS SET AT BACK OF SIDEWALK ARE FOR REFERENCE, ACTUAL BOUNDARY LINE IS THE BACK EDGE OF SIDEWALK.

SURVEYOR'S CERTIFICATION:

TO FEDEX FREIGHT, INC.
SETZER PROPERTIES, LLC ISAOA
FISCHER & COMPANY
FIRST AMERICAN TITLE INSURANCE COMPANY

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE 2016 MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/NSPS LAND TITLE SURVEYS, JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND NSPS, AND INCLUDES ITEMS 0 OF TABLE A THEREOF.

THE FIELD WORK WAS COMPLETED ON JANUARY 3, 2018

I, DOMINIQUE E MIGUEZ PLS L-4831, CERTIFY THAT THIS PLAT WAS DRAWN UNDER MY SUPERVISION FROM AN ACTUAL SURVEY MADE UNDER MY SUPERVISION (DEED DESCRIPTION RECORDED IN BOOK 20 PAGE 94); THAT THE BOUNDARY LINES NOT SURVEYED ARE INDICATED WITH DASHED LINES AS DRAWN FROM INFORMATION IN BOOK 50 PAGE 32 OR OTHER REFERENCE SOURCE; THAT THE RATIO OF PRECISION 1:39,170; THAT THIS PLAT WAS PREPARED IN ACCORDANCE WITH G.S. 47–30 AS AMENDED.

THAT THE GPS SURVEY MADE WAS UNDER MY SUPERVISION AND THE FOLLOWING INFORMATION WAS USED TO PERFORM THIS SURVEY.

CLASS OF SURVEY: "C" – BOUNDARY
POSITIONAL ACCURACY: 0.015 @ 95% CONFIDENCE
TYPE OF GPS FIELD PROCEDURE: VRS
DATES OF SURVEY: MARCH 30, 2017/JANUARY 3, 2018
DATUM/EPOCH: NC GRID NAD83/2011
PUBLISHED/FIXED–CONTROL USED: NCGS MONUMENT "FESCUE"
GEOID MODEL: GEOID 12A
COMBINED GRID FACTOR: 1.0000035
UNITS: U.S. SURVEY FEET

THIS SURVEY CREATES A SUBDIVISION OF LAND WITHIN THE AREA OF A COUNTY OR MUNICIPALITY THAT HAS AN ORDINANCE THAT REGULATES PARCELS OF LAND.

WITNESS MY ORIGINAL SIGNATURE, LICENSE NUMBER, AND SEAL THIS 22 DAY OF FEBRUARY, AD 2018.

DOMINIQUE E MIGUEZ
PROFESSIONAL LAND SURVEYOR L–4831

NORTH CAROLINA PROFESSIONAL SEAL L-4831 LAND SURVEYOR DOMINIQUE E MIGUEZ

LEGEND

RBC △	=	REBAR & CAP	12.3	=	GROUND SHOT ELEVATION
●	=	IRON ROD SET		=	FIRE HYDRANT
R/W	=	RIGHT OF WAY	WV	=	WATER VALVE
DB	=	DEED BOOK	W	=	WATER METER
PG	=	PAGE		=	LIGHT POLE
N/F	=	NOW/FORMERLY	GW	=	GUY WIRE
CMP	=	CORRUGATED METAL PIPE	F	=	GAS FINK
RCP	=	REINFORCED CONCRETE PIPE	S	=	SANITARY SEWER MANHOLE
CPP	=	CORRUGATED PLASTIC PIPE		=	CLEANOUT
INV.	=	INVERT		=	SIGN
EL.	=	ELEVATION		=	CATCH BASIN
LSA	=	LANDSCAPE AREA		=	STORM DRAIN MANHOLE
	=	CONCRETE	——S——	=	UNDERGROUND STORM LINE
	=	ASPHALT PAVEMENT	——SS——	=	UNDERGROUND SANITARY LINE
	=	WOODSLINE	——G——	=	UNDERGROUND SANITARY LINE

SCALE: 1" = 60'
0 30 60 120 180

McKIM&CREED
243 NORTH FRONT STREET
WILMINGTON, NORTH CAROLINA 28401
TELEPHONE: (910) 343-1048
FAX: (910) 251-8282
NORTH CAROLINA FIRM LICENSE NUMBER: F-1222

ALTA/NSPS LAND TITLE SURVEY
FOR
PENDER COUNTY BUSINESS PARK
12.50 ACRES
CLIENT: CAMPBELL ENGINEERING & ASSOCIATES, INC.
GRADY TOWNSHIP, PENDER COUNTY, NORTH CAROLINA
JANUARY 3, 2018

JOB NUMBER:	07230–0001
SCALE:	1" = 60'
CAD NUMBER:	vs101–072300001_alta
PLS:	DEM
PARTY CHIEF:	PS
CAD TECH:	ACS
FIELD BOOK/PAGE:	NA
DRAWING NUMBER:	2017-0

SHEET 1 OF 1

DEMOLITION NOTES

1. THE CONTRACTOR IS RESPONSIBLE FOR THE DEMOLITION, REMOVAL, AND DISPOSING IN A LOCATION APPROVED BY ALL GOVERNING AUTHORITIES, OF ALL STRUCTURES, PADS, WALLS, FLUMES, FOUNDATIONS, PARKING, DRIVES, DRAINAGE, STRUCTURES, UTILITIES, ETC., SUCH THAT THE IMPROVEMENTS SHOWN ON THE REMAINING PLANS CAN BE CONSTRUCTED. ALL FACILITIES TO BE REMOVED SHALL BE UNDERCUT TO SUITABLE MATERIAL AND BROUGHT TO GRADE WITH SUITABLE COMPACTED FILL MATERIAL PER GEOGRAPHICAL RECOMMENDATIONS.
2. THE CONTRACTOR IS RESPONSIBLE FOR REMOVING ALL DEBRIS FROM THE SITE AND DISPOSING THE DEBRIS IN A LAWFULL MANNER. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL PERMITS REQUIRED FOR DEMOLITION AND DISPOSAL.
3. THE CONTRACTOR SHALL COORDINATE WITH THE RESPECTIVE UTILITY COMPANIES PRIOR TO THE REMOVAL AND/OR RELOCATION OF UTILITIES. THE CONTRACTOR SHALL COORDINATE WITH THE UTILITY COMPANY CONCERNING PORTIONS OF WORK WHICH MAY BE PERFORMED BY THE UTILITY COMPANY'S FORCES AND ANY FEES WHICH ARE NOT TO BE PAID TO THE UTILITY COMPANY FOR THEIR SERVICES. THE CONTRACTOR IS RESPONSIBLE FOR PAYING ALL FEES AND CHARGES.
4. THE LOCATIONS OF ALL EXISTING UTILITIES SHOWN ON THE PLAN HAVE BEEN DETERMINED FROM THE BEST INFORMATION AVAILABLE AND ARE GIVEN FOR THE CONVENIENCE OF THE CONTRACTOR. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR THEIR ACCURACY. PRIOR TO THE START OF ANY DEMOLITION ACTIVITY, THE CONTRACTOR SHALL NOTIFY THE UTILITY COMPANIES FOR ONSITE LOCATIONS OF EXISTING UTILITIES.
5. ALL EXISTING SEWERS, PIPING AND UTILITIES SHOWN ARE NOT TO BE INTERPRETED AS THE EXACT LOCATION, OR AS THE ONLY OBSTACLES THAT MAY OCCUR ON THE SITE. VERIFY EXISTING CONDITIONS AND PROCEED WITH CAUTION AROUND ANY ANTICIPATED FEATURES. GIVE NOTICE TO ALL UTILITY COMPANIES REGARDING DESTRUCTION AND REMOVAL OF ALL SERVICE LINES AND CAP ALL LINES BEFORE PROCEEDING WITH THE WORK. UTILITIES DETERMINED TO BE ABANDONED AND LEFT IN PLACE SHALL BE GROUTED IF UNDER BUILDING.
6. ELECTRICAL, TELEPHONE, CABLE, WATER, FIBER OPTIC CABLE AND/OR GAS LINES NEEDING TO BE REMOVED OR RELOCATED SHALL BE COORDINATED WITH THE AFFECTED UTILITY COMPANY. ADEQUATE TIME SHALL BE PROVIDED FOR RELOCATION. CONTRACTOR SHALL PAY CLOSE ATTENTION TO EXISTING UTILITIES WITHIN ANY ROAD RIGHT OF WAY DURING CONSTRUCTION.
7. CONTRACTOR MUST PROTECT THE PUBLIC AT ALL TIMES WITH FENCING, BARRICADES, ENCLOSURES, ETC., TO THE BEST PRACTICES. CONTRACTOR TO COMPLY WITH DOT REQUIREMENTS AND HAVE THE CONTRACTOR PROVIDE 'SIDEWALK CLOSED' SIGNS CONSISTENT WITH THE MUTED REQUIREMENTS.
8. PRIOR TO DEMOLITION OCCURING, ALL EROSION CONTROL DEVICES ARE TO BE INSTALLED.
9. SHOULD REMOVAL AND/OR RELOCATION ACTIVITIES DAMAGE FENCING, LIGHTING AND/OR STORM INLET STRUCTURES, THEN THE CONTRACTOR SHALL PROVIDE NEW MATERIALS/STRUCTURES. EXCEPT FOR MATERIALS DESIGNED TO BE RELOCATED ON THIS PLAN, ALL OTHER CONSTRUCTION MATERIALS SHALL BE NEW.
10. CONTRACTOR MAY LIMIT SAW-CUT & PAVEMENT REMOVAL TO ONLY THOSE AREAS WHERE IT IS REQUIRED AS SHOWN ON THESE CONSTRUCTION PLANS BUT IF ANY DAMAGE IS INCURRED ON ANY OF THE SURROUNDING PAVEMENT, ETC. THE CONTRACTOR SHALL BE RESPONSIBLE FOR IT'S REMOVAL AND REPAIR.
11. THE CONTRACTOR SHALL COORDINATE WATER MAIN WORK WITH THE FIRE DEPT. AND THE CITY/COUNTY UTILITY DEPARTMENT TO PLAN PROPOSED IMPROVEMENTS AND TO ENSURE ADEQUATE FIRE PROTECTION IS AVAILABLE TO THE SITE THROUGH OUT THIS SPECIFIC WORK AND THROUGH ALL PHASES OF CONSTRUCTION. CONTRACTOR WILL BE RESPONSIBLE FOR ARRANGING/PROVIDING ANY REQUIRED WATER MAIN SHUT OFF WITH THE CITY/COUNTY DURING CONSTRUCTION. ANY COSTS ASSOCIATED WITH WATER MAIN SHUT OFF WILL BE THE RESPONSIBILITY OF THE CONTRACTOR AND NO EXTRA COMPENSATION WILL BE PROVIDED.
12. DAMAGE TO ALL EXISTING CONDITIONS TO REMAIN WILL BE REPLACED AT CONTRACTOR'S EXPENSE.

NOTE TO GENERAL CONTRACTOR:

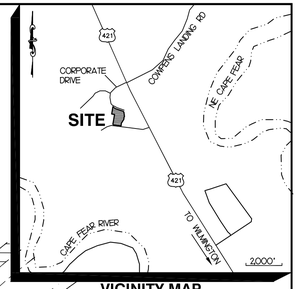
COORDINATE ALL DEMOLITION OPERATIONS WITH EROSION AND SEDIMENTATION CONTROL PLANS. SEE SEQUENCE OF CONSTRUCTION BEFORE ANY DEMOLITION CAN TAKE PLACE.

NOTE TO GENERAL CONTRACTOR:

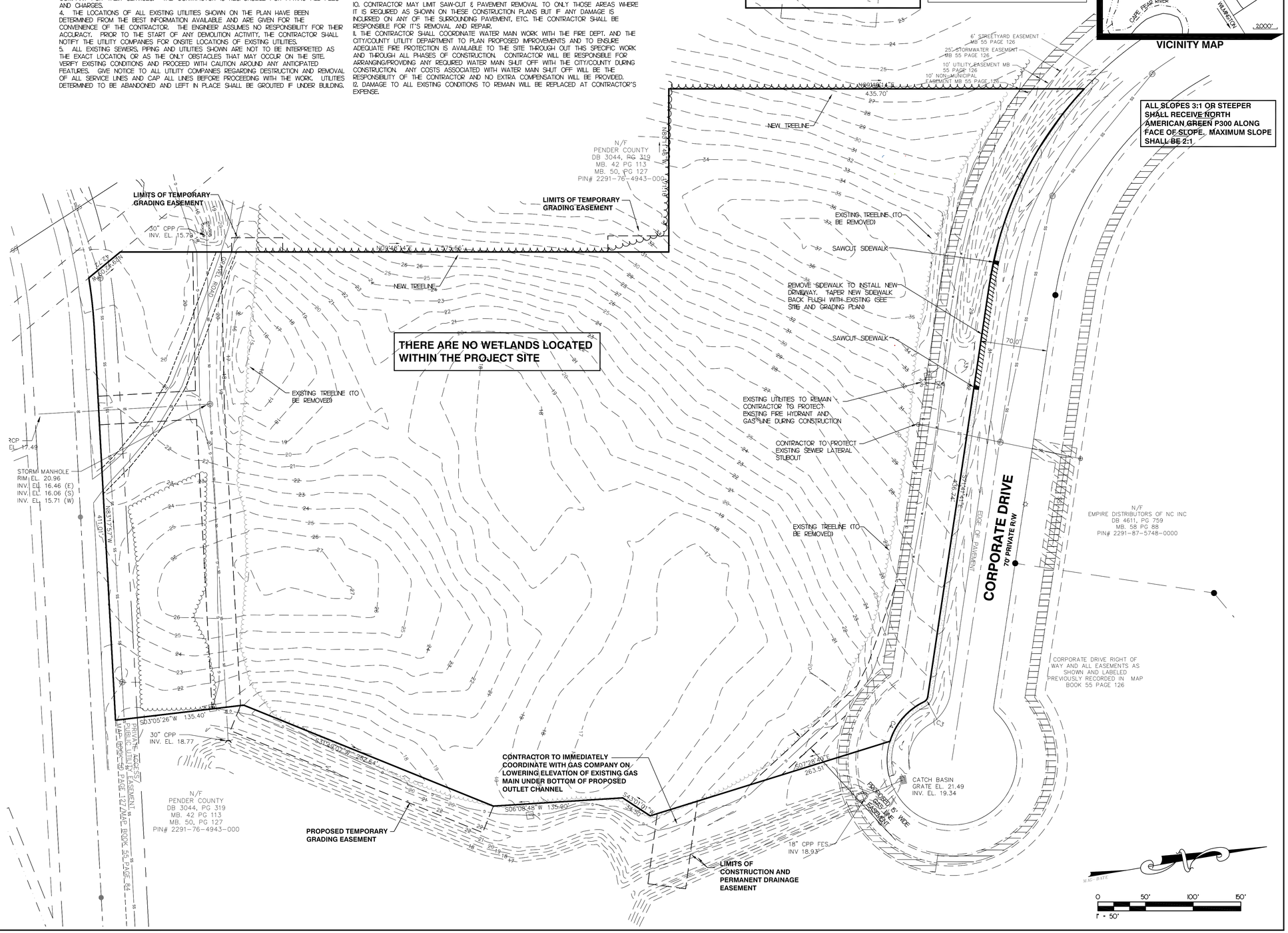
REMOVE ALL EXISTING STRUCTURES, UTILITIES, TREES, ETC. IN ORDER TO CONSTRUCT THE PROPOSED DEVELOPMENT. IF CONFLICT EXISTS, PLEASE NOTIFY ENGINEER

LEGEND

- ITEMS TO BE REMOVED
- SAWCUT
- OLD TREELINE
- NEW TREELINE



VICINITY MAP



ALL SLOPES 3:1 OR STEEPER SHALL RECEIVE NORTH AMERICAN GREEN P300 ALONG FACE OF SLOPE. MAXIMUM SLOPE SHALL BE 2:1

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

PLANS PREPARED BY:

CAMPBELL E & A, INC.
Civil Engineering and Land Planning
31 Boland Court
Greenville, SC 29615
(864) 335-4090
Fax: (864) 335-4095

SEAL:

NORTH CAROLINA PROFESSIONAL SEAL 28622 ENGINEER TIMOTHY W. CAMPBELL 2/23/18

FedEx Freight
PENDER COUNTY BUSINESS PARK
CORPORATE DRIVE
WILMINGTON, NC 28405

DEVELOPER:
SETZER PROPERTIES
SETZER PROPERTIES WMN, LLC
354 WALLER AVENUE, STE 200
LEXINGTON , KY 40504
CONTACT: ROBBIE McATEE
(859) 514-7767
FAX: (859) 281-6335

REVISIONS:

FOR CONSTRUCTION	02/23/18

CHECKED BY:	TWC
DRAWING BY:	FSE
DATE:	01/16/18
JOB NUMBER:	-

TITLE:
EXISTING CONDITIONS/ DEMOLITION PLAN

SHEET NUMBER:
C-3.0

COMMENTS:

KEYED NOTES - SITE

KEY NOTE SYMBOL — SOME KEY NOTES MAY NOT APPLY

1. 8" WIDE MONOLITHIC CURB, SEE DTL 5/C-4.1
2. 6' WIDE CONCRETE CURB/GUTTER, TYPICAL (SEE DTL 7/C-4.1)
3. NOT USED
4. NOT USED
5. DUCTILECRETE CONCRETE PAVEMENT DESIGNED BY CONTRACTOR
6. DUCTILECRETE CONCRETE PAVEMENT DESIGNED BY CONTRACTOR • TRUCK ENTRANCE
7. 5/8" SMOOTH DOWEL, 16" LONG • 18" O.C. 150'-0" MAX. SPACING
8. SAW CUT MAX. OF 15'-0" JOINT SPACING EACH WAY
9. 5" THICK CONC. SIDEWALK W/ SAWCUT CONTROL JOINTS • 5' O.C.
10. THREE (3) ELECTRIC CAR CHARGING STATION (SEE DTL 6/C-4.1)
11. 60'-0" CONCRETE FORKLIFT RAMP SLOPE TO FINISHED GRADE
12. DUCTILECRETE CONCRETE PAVEMENT DESIGNED BY CONTRACTOR
13. NOT USED
14. 4" WIDE PAINTED STRIPE (TYP.).
15. 4" CROSSWALK STRIPES, HANDICAPPED STRIPES/SYMBOL, NO PARKING
16. 6' HIGH SECURITY FENCE PLUS 3 STRANDS BARB-WIRE ABOVE RAIL, OFFSET 1'-0" INSIDE PROPERTY LINE, OR AS SHOWN
17. 6' HIGH SECURITY FENCE W/ NO BARB-WIRE, TYPICAL BETWEEN OFFICE & EMPLOYEE PARKING
18. MOTORIZED CANTILEVERED SLIDE GATES • EMPLOYEE VEHICLE ENTRANCE w/ CARD ACCESS IN/ CARD ACCESS OUT & VIDEO INTERCOM EACH SIDE, SEE DTL 1/C-4.3. PROVIDE 8" MAX. CLEAR FROM BOTTOM RAIL TO TOP OF PAVEMENT. PROVIDE LEVEL GRADES FULL LENGTH OF OPEN GATE SECTION.
19. YARD CARD ACCESS, SEE SHT C-4.3, SIM.
20. MOTORIZED CANTILEVERED SLIDE GATE • TRUCK ENTRANCE W/ CARD ACCESS IN/ CARD ACCESS OUT & VIDEO INTERCOM EACH SIDE, SEE DETAIL 1/C-4.3 & 2/SD2.02. PROVIDE 8" MAX. CLEAR FROM BOTTOM OF RAIL TO TOP OF PAVEMENT. PROVIDE LEVEL GRADES FULL LENGTH OF OPEN GATE SECTION.
21. HANDICAP GATE W/CBM & CARD READER , SEE DTL 3/C-4.2
22. HANDICAP GATE & TURNSTILE W/CBM & CARD READER, SEE SHEET C-4.2
23. OPEN DUMPSTER SUPPLIED BY OTHERS
24. TYPE 1 DIRECTIONAL ADA RAMP (SEE DETAIL SHEET C-4.4)
25. 35' SECURITY LIGHT W/BASE SEE DTL 4/C-4.1, TYP. LIGHT BASE TO BE LOCATED (8 FT FOR PUPS & 13 FT FOR VANS) FROM BACK OF CURB TO CENTER LINE OF POLE AND CENTERED ON PARKING STALL STRIPE. LOCATIONS SHOWN ARE NOT BY DESIGN & REQUIRE PHOTOMETRIC LAYOUT TO DETERMINE EXACT LOCATIONS & LIGHT LEVEL REQUIREMENTS TO MEET SPECIFICATIONS
26. FLAG POLE, 3/4" C. W/PWR TO BASE LIGHT, SEE DTL 3/C-4.1
27. FEDEX FREIGHT MONUMENT SIGN, 3/4" POWER CONDUIT w/20 AMP CIRCUIT (SEE DTL 2/C-4.1), TYPE 1
28. SCOREBOARD/ INDICATOR, 1 1/4" CONDUIT TO SCALE. POLE MOUNTED PER DETAIL ON AXLE SCALE SHT UNLESS INDICATED TO BE MOUNTED ON DOCK, SHOP, OR FUEL CANOPY
29. 3/4" POWER CONDUIT TO SCOREBOARD (SEE SHEETS AS1.01 & AS1.02)
30. GRATED SIDEWALK TRENCH DRAIN (SEE SHT C-6.1)
31. 16"X16"X12" MIN WATER-TIGHT JUNCTION BOX OR WATER-TIGHT YARD ELECT PULL BOX, AT FINISH GRADE WITH CONDUITS AS REQ'D FOR TURNSTILE & H.C. SECURITY GATES
32. ADA RAMP (SEE NCDOT 848.06 - DETAIL SHEET C-4.4)
33. TYPE 1A DIRECTIONAL ADA RAMP (SEE DETAIL SHEET C-4.4)
34. FOUR (4) REMOVABLE GRAINGER ITEM #49ZZ226 RUBBER CAR STOPS, 6 FT x 4" x 6" BLACK/YELLOW SPACED 18" APART ALONG EDGE OF GENERATOR CONCRETE AREA.
35. NOT USED
36. 4' x 4' x 4" CONCRETE PAD FOR FUTURE DROP BOX BY OTHERS• COORDINATE WITH FXF PROJECT MANAGER.
37. NOT USED.
38. NOT USED
39. SCALE PIT WITH DRAIN TO DAYLIGHT OR STORM SEWER, SEE DTL 1/AS1.01 & 1/AS1.02
40. NOT USED
41. NOT USED
42. NOT USED
43. NOT USED
44. NOT USED
45. DOCK DOOR NUMBER, SEE DETAILS 9/A3.10 AND 10/A3.10
46. NOT USED
47. EXIT EGRESS LOCATION
48. LANDSCAPED AREA WITH IRRIGATION SYSTEM AS REQUIRED BY LOCAL CLIMATE CONDITIONS
49. NOT USED.
50. TRANSFORMER
51. NOT USED
52. NOT USED.
53. NOT USED.
54. FIV LOCATION PROTECTED BY TWO (2) FLEXIBLE BOLLARDS (SEE FXF SPECS) SPACED AS REQUIRED BY FIRE MARSHAL
55. FIRE HYDRANT LOCATION
56. (1) - CONDUIT FROM ELECTRICAL RM FOR POWER, (1) - CONDUIT FROM TELCO RM FOR CONTROL WIRING, ROUTED TO SEPARATE PULL BOXES.
57. NOT USED
58. NOT USED
59. MAILBOX BY DEVELOPER/G.C. VERIFY LOCATION WITH LOCAL POSTMASTER, SEE SPEC FOR MAILBOX SIZE
60. NOT USED
61. NOT USED
62. CONDUITS FROM JUNCTION BOX TO ISLAND PULL BOX AT YARD ENTRY ISLAND, SEE DETAIL 1/C-4.3
63. CONDUITS FROM JUNCTION BOX TO ISLAND PULL BOX AT EMPLOYEE PARKING ISLAND, SEE SHEET C-4.3
64. NOT USED
65. NOT USED
66. NOT USED.
67. FUTURE YARD EXPANSION AREA SHALL BE GRADED AS REQUIRED TO RECEIVE FUTURE SUB-BASE AND PAVEMENT.
68. NOT USED
69. NOT USED
70. NOT USED
71. NOT USED
72. NOT USED
73. NOT USED
74. NOT USED
75. NOT USED
76. NOT USED
77. NOT USED
78. NOT USED.
79. NOT USED
80. LIGHT DUTY PAVEMENT ON STABILIZED BASE, DESIGN THICKNESS AS PER SPECIFICATIONS
81. 6' DIA. SCH. 40 STEEL PIPE BOLLARD, SEE DTL. 8/C-4.1
82. NOT USED
83. NOT USED
84. NOT USED.
85. NOT USED.
86. NOT USED

SITE LAYOUT SUMMARY BASED ON NTP DATED: 08.24.17

ITEM	PROPOSED REQ'D.	PROPOSED PROV.	FULL EXPAN. REQ'D.	FULL EXPAN. PROV.
BUILDING (S.F. AREA)				
SERVICE CENTER		10,220		15,190
OFFICE	4,850	4,850	4,850	4,850
POD TOTAL	0	0	0	0
TOTAL	X	15,070	X	20,040
REVENUE DOOR	23	22	34	34
FLEET MAINTENANCE BAY	NO	NO	NO	NO
DRIVE THRU DOOR	0	0	0	0
SHOP	NO	NO	NO	NO
DEADLINE TRACTOR	0	0	0	0
DEADLINE TRAILER	0	0	0	0
LUBE SHED	NO	NO	NO	NO
FUEL CANOPY	NO	NO	NO	NO
20K LIST	NO	NO	NO	NO
GUARD SHACK	NO	NO	NO	NO
SNOW SCRAPER	NO	NO	NO	NO
AXLE SCALE	YES	YES	YES	YES
STORM SHELTER	NO	NO	NO	NO
PARKING (SPACES)				
AUTOMOBILE TOTAL	23	35	11	35
PUP/ PARKING	26	88	13	88
VAN PARKING	17	31	8	31
TRACTOR	18	31	9	31
DOLLY STORAGE	0	0	0	0
RELAY PARKING	6	16	3	11
TRIPLES PARKING	0	0	0	0

SITE DEVELOPMENT DATA

ZONING: GI (GENERAL INDUSTRIAL)

TAX MAP: 2291-77-6009-0000

PROPERTY SIZE: ±12.5 AC.

JURISDICTION: PENDER COUNTY

APPROVED BY THE PENDER COUNTY UNIFIED DEVELOPMENT ORDINANCE ADMINISTRATOR ON THIS 26 DAY OF March 2018

ADMINISTRATOR

SITE PLAN VALID FOR TWO (2) YEARS FROM APPROVAL DATE.

SETBACKS:
FRONT = 50'
SIDE = 25'
REAR = 25'

PARKING REQUIREMENTS:
-SPACES REQUIRED (PER 5.3.12.E.6.a).
3 SPACES FOR PER 4 EMPLOYEES ON LARGEST SHIFT
+ ADDITIONAL SPACES FOR VEHICLES PERMANENTLY USED, THEREFORE BASED ON 14 EMPLOYEES ON LARGEST SHIFT = 3 / 4 = 0.75 x 14 EMPLOYEES
= 11 SPACES REQUIRED
-SPACES PROVIDED = 40 SPACES INC. VISITOR, SEE FOR PERMANENT SPACES
HANDICAP SPACES REQUIRED = 2
HANDICAP SPACES PROVIDED = 3
VAN ACCESSIBLE SPACES REQUIRED = 1
VAN ACCESSIBLE SPACES PROVIDED = 2

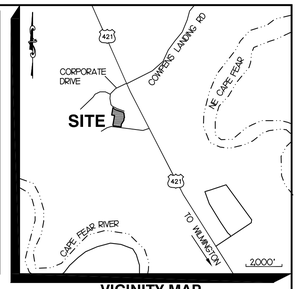
SERVICE CENTER: ±10,220 SF
GENERAL OFFICE: ±4,850 SF
TOTAL AREA: ±15,070 SF

POTENTIAL FUTURE EXPANSION: ±4,970

SEE SHEET C-4.1 FOR ADDITIONAL SITE NOTES

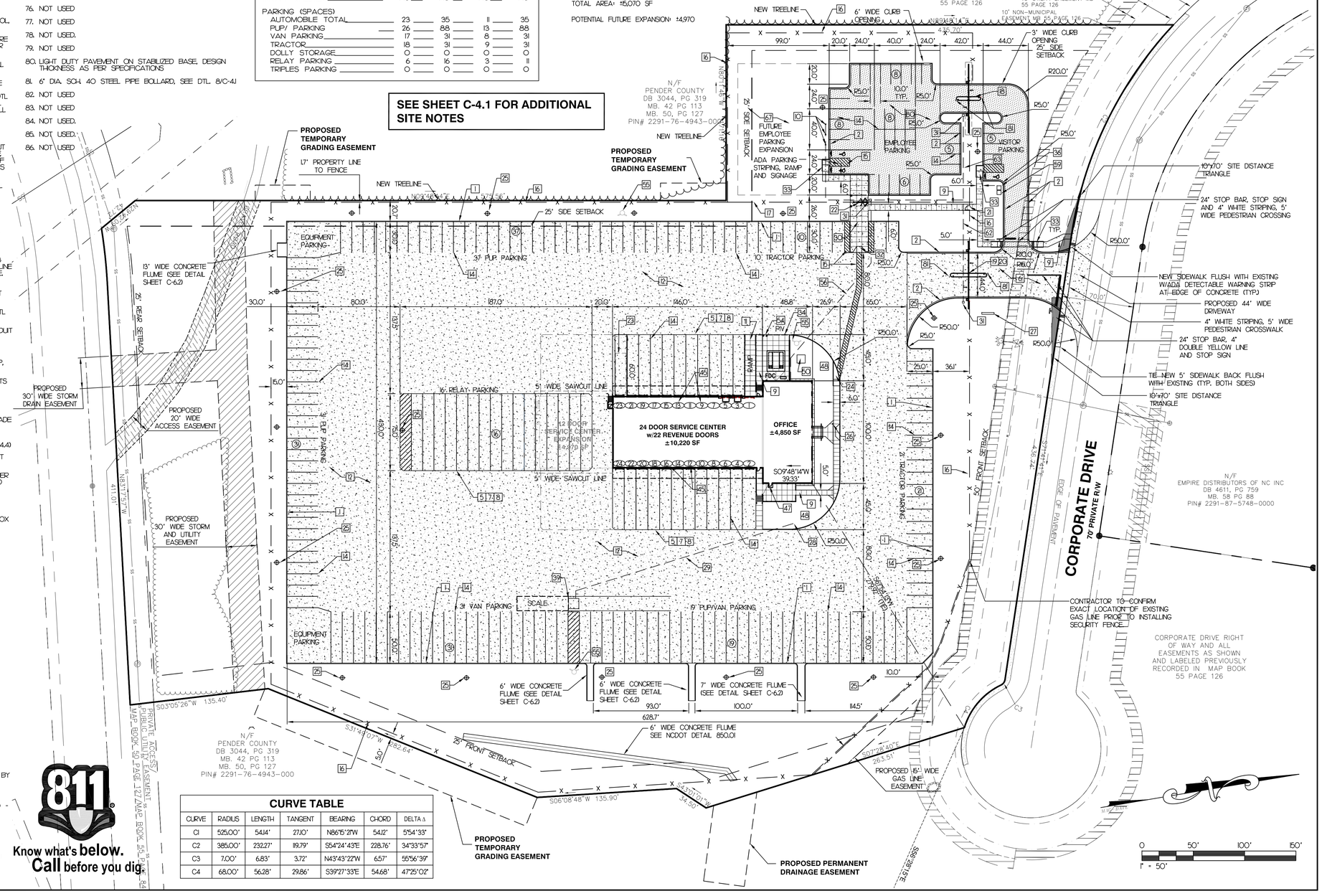
LEGEND

PROPOSED	DESCRIPTION
—x—	FENCE
	HANDICAP SYMBOL
	PAINTED STOP BAR
	HEAVY DUTY DUCTILCRETE CONCRETE (DESIGN BY CONTRACTOR)
	LIGHT DUTY ASPHALT PAVEMENT (SEE SHEET G-1.0)
	18" CURB AND GUTTER
	8" MONOLITHIC CURB
	35' HIGH SECURITY LIGHT (RE: ARCH. PLANS)



VICINITY MAP

NOTE:
SEE ARCHITECTURAL PLANS FOR EXACT BUILDING DIMENSIONS, UTILITY ENTRY POINTS, DOOR LOCATIONS, ETC.



CURVE TABLE

CURVE	RADIUS	LENGTH	TANGENT	BEARING	CHORD	DELTA Δ
C1	525.00'	54.14'	27.10'	N86°15'21"W	54.12'	5°54'33"
C2	385.00'	232.27'	119.79'	S54°24'43"E	228.76'	34°33'57"
C3	7.00'	6.83'	3.72'	N43°43'22"W	6.57'	55°56'39"
C4	68.00'	56.28'	29.86'	S39°27'33"E	54.68'	47°25'02"

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

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CAMPBELL E & A, INC.
Civil Engineering and Land Planning
31 Boland Court
Greenville, SC 29615
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Fax: (864) 335-1095

SEAL:
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28622 TIMOTHY W. CAMPBELL 2/23/18

FedEx Freight
PENDER COUNTY BUSINESS PARK
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WILMINGTON, NC 28405

DEVELOPER:
SETZER PROPERTIES
SETZER PROPERTIES WMN, LLC
354 WALLER AVENUE, STE 200
LEXINGTON , KY 40504
CONTACT: ROBBIE McATEE
(859) 514-7767
FAX: (859) 281-6335

REVISIONS:

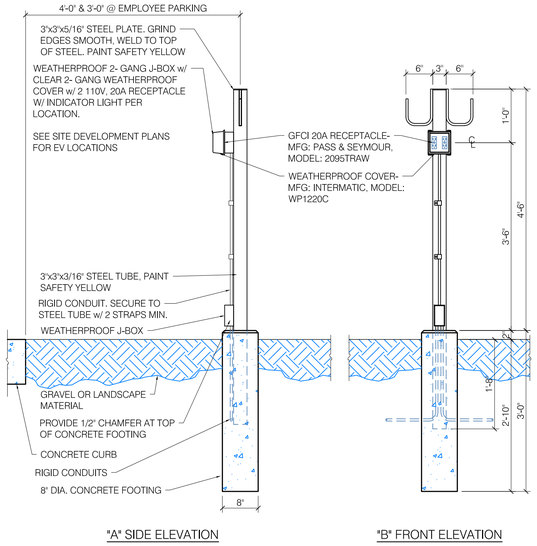
FOR CONSTRUCTION	02/23/18

CHECKED BY:	TWC
DRAWING BY:	FSE
DATE:	01/16/18
JOB NUMBER:	-

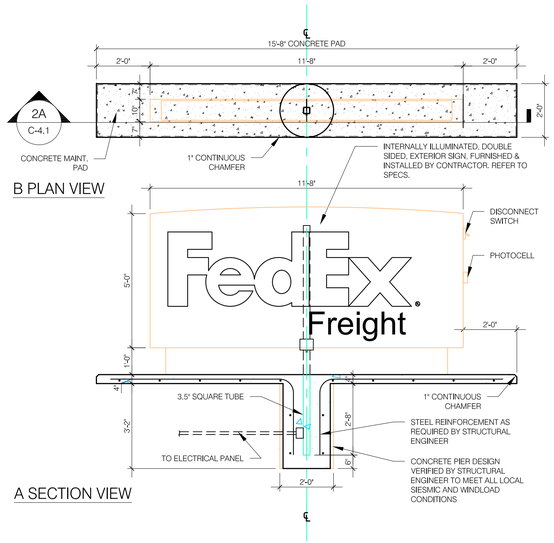
TITLE:
SITE AND DIMENSIONING PLAN

SHEET NUMBER:
C-4.0

COMMENTS:



1 **DETAIL:** EV CHARGING STATION
(WHERE NOTED ON SITE PLAN) SCALE: 3/4"=1'-0" OR AS NOTED



2 **DETAIL:** FEDEX SIGNAGE- TYPE "1"
SCALE: 3/8"=1'-0"

SIGN SPECIFICATIONS:

SIGN SIZE:
AREA:.....58.5 SQ. FT.
ACTUAL SIZE:.....60-1/2"x140-1/2"
APPROXIMATE WEIGHT:.....600 LB.
DESIGNED WIND LOAD:.....30 PSF

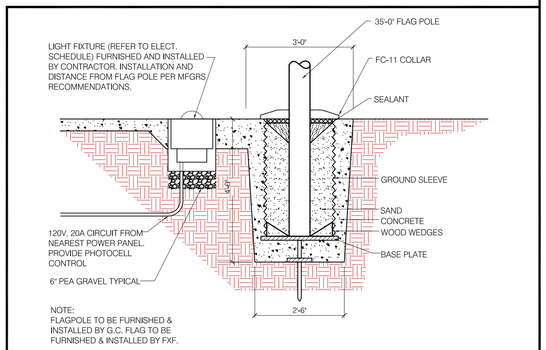
ELECTRICAL:
AMPS:.....13.7 TOTAL AMPS
CIRCUITS:.....(1) 20 AMP

SUPPORT:
WEIGHT:.....70 LB.

FOUNDATION:
SIZE:.....24" DIA.x42" DEEP
VOLUME:.....0.41 CU. YD. OF CONCRETE

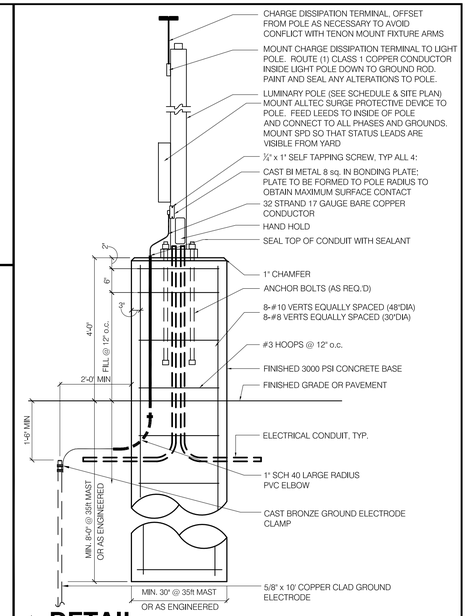
COLORS:
PAINT ALL EXPOSED PANELS, PIPE & PLATE.....WHITE #50A-5612

NOTES:
1. ALL CONCRETE TO DEVELOP 3000 PSI COMPRESSIVE STRENGTH AT 28TH DAY.
2. ALL REINFORCING BARS SHALL HAVE A MINIMUM YIELD STRENGTH OF 600,000 PSI. REINFORCING BARS SHALL BE PLACED IN ACCORDANCE WITH THE LATEST VERSION OF THE ACI 318 CODE.
3. ALL PIPE SHALL MEET THE STRUCTURAL REQUIREMENTS OF ASTM A-53 GRADE B.
4. ALL STEEL TUBE SHALL BE ASTM A-500 GRADE B.
5. ALL OTHER STEEL STRUCTURAL SHAPES AND PLATE SHALL BE ASTM A-36.
6. THIS IS ONLY A SUGGESTED TYPICAL SUPPORT PIER FOR 3000 PSF SOIL BEARING OR HIGHER LOCATIONS. PLEASE CHECK LOCAL CODES FOR FINAL DESIGN SHOULD BE APPROVED BY LOCAL ENGINEER.



NOTE:
FLAGPOLE TO BE FURNISHED & INSTALLED BY G.C. FLAG TO BE FURNISHED & INSTALLED BY FXF.

3 **DETAIL:** FLAGPOLE INSTALLATION
SCALE: 1/2"=1'-0"



4 **DETAIL:** LIGHT POLE BASE
SCALE: 1/2"=1'-0"

SITE NOTES:

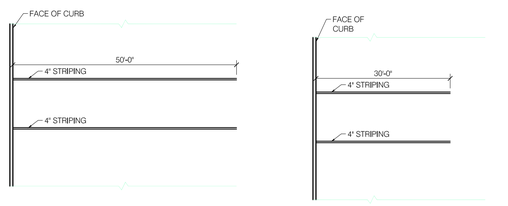
1. PROPERTY BOUNDARY INFORMATION SHOWN HERON IS TAKEN FROM AN ALTA/NSPS LAND TITLE SURVEY FOR PENDER COUNTY BUSINESS PARK, DATED JANUARY 8, 2018 BY McKIM & CREED. CONTRACTOR IS RESPONSIBLE FOR PROTECTION OF ALL PROPERTY CORNERS.
2. CONTRACTOR SHALL MATCH PROPOSED CURB AND GUTTER, CONCRETE, AND PAVEMENT TO EXISTING IN GRADE AND ALIGNMENT.
3. CONTRACTOR SHALL REMOVE PAVEMENT & CONCRETE IN ACCORDANCE WITH SPECIFICATIONS OF ALL GOVERNING AGENCIES.
4. GENERAL CONTRACTOR IS TO COORDINATE WITH APPROPRIATE UTILITY COMPANIES PRIOR TO CONSTRUCTIONS, ADJUSTMENT, OR RELOCATION OF EXISTING UTILITIES AS DESIGNATED ON PLANS.
5. CONTRACTOR IS RESPONSIBLE FOR REPAIRING THE DAMAGE DONE TO ANY EXISTING ITEM DURING CONSTRUCTION, SUCH AS, BUT NOT LIMITED TO, DRAINAGE, UTILITIES, PAVEMENT, STRIPING, CURB, ETC. REPAIRS SHALL BE EQUAL TO, OR BETTER THAN, EXISTING CONDITIONS. CONTRACTOR IS RESPONSIBLE TO DOCUMENT ALL EXISTING DAMAGE AND NOTIFY CONSTRUCTION MANAGER PRIOR TO CONSTRUCTION START.
6. CONTRACTOR TO REMOVE OR RELOCATE, WHEN APPLICABLE, ALL EXISTING DRAIN PIPES, SANITARY SEWER PIPES, POWER POLES, AND GUY WIRES, WATER METERS AND WATER LINES, WELL, SIDEWALKS, SIGN POLES, UNDERGROUND GAS, AND ASPHALT, SHOWN AND NOT SHOWN, WITHIN CONSTRUCTION LIMITS AND WHERE NEEDED, TO ALLOW FOR NEW CONSTRUCTION AS SHOWN.
7. CONTRACTOR SHALL FOLLOW ALL LOCAL, STATE, AND FEDERAL REGULATIONS IN DISPOSING OF DEMOLISHED MATERIALS REMOVED FROM THIS SITE.
8. DIMENSIONS SHOWN ARE TO FACE OF CURB, FACE OF BUILDING, OR CENTERLINE OF PARKING BAY UNLESS NOTED OTHERWISE.
9. SEE SITE GEOTECHNICAL RECOMMENDATIONS SHEET G-1.0 AND REPORT FOR SUBSURFACE EXPLORATION BY S&ME FOR PAVEMENT SPECS.
10. BUILDING AND CANOPY EXCAVATION AND FOUNDATIONS, BUILDING ENTRANCE PLATFORMS, SIDEWALKS, ADJACENT TO THE BUILDING, AND LOADING DOCK RAMP/CURBS/RETAINING WALLS ARE DETAILED AND SPECIFIED ON THE ARCHITECTURAL DRAWINGS.
11. PROVIDE EXPANSION JOINTS AT ALL RADIUS POINTS IN CONCRETE CURB AND GUTTER AND AS SHOWN ON THE DETAILS, OR AS DIRECTED BY THE OWNER'S REPRESENTATIVE.
12. THE CONTRACTOR IS TO PROVIDE RECEPTACLES FOR USE OF SUBCONTRACTORS AND THEIR EMPLOYEES. ALL DUMPSTERS SHOULD BE LOCATED OFF STREETS AND RIGHT OF WAYS. BLOCKING PERMITS ARE REQUIRED FOR ANY USE OF THE STREET RIGHT OF WAYS.
13. PROVIDE CONTAINERS FOR GARBAGE AND MINOR TRASH IN EATING AREAS, IN PARKING LOTS, AND ALONG WALKWAYS.
14. SERVICE CONTAINERS ADEQUATELY.
15. KEEP STREETS AND AREAS ADJACENT TO THE JOB SITE CLEAN AND FREE OF TRASH AND MUD ORIGINATING FROM THE SITE.
16. REQUIRE ALL WASTE HAULERS TO COVER TRUCKS BEFORE LEAVING THE SITE.
17. CONTRACTOR IS RESPONSIBLE TO ANY DAMAGE TO STREETS, SIDEWALKS, CURBS, GUTTERS OR ANY OTHER PUBLIC PROPERTY. DAMAGE MUST BE REPAIRED OR REPLACED PRIOR TO FINAL INSPECTIONS.

AUTHORITY AND RESPONSIBILITY:

THE ENGINEER, AS REPRESENTATIVE OF THE OWNER, SHALL NOT GUARANTEE THE WORK OF ANY CONTRACTOR OR SUBCONTRACTOR, SHALL HAVE NO AUTHORITY TO STOP WORK, SHALL HAVE NO SUPERVISION OR CONTROL AS TO THE WORK OR PERSONS DOING THE WORK, SHALL NOT HAVE CHARGE OF THE WORK, SHALL NOT BE RESPONSIBLE FOR SAFETY IN, ON, OR ABOUT THE JOB SITE OR HAVE ANY CONTROL OF THE SAFETY OR ADEQUACY OF ANY EQUIPMENT, BUILDING COMPONENT, SCAFFOLDING, SUPPORTS, FORMS, OR OTHER WORK AIDS, AND SHALL HAVE NO DUTIES OR RESPONSIBILITIES IMPOSED BY THE STRUCTURAL WORK ACT.

PERMITS, BONDS, AND INSPECTIONS:

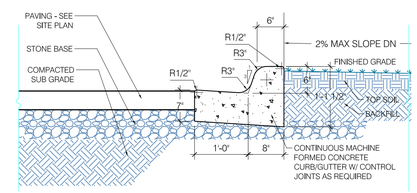
THE CONTRACTOR SHALL BE RESPONSIBLE TO INSURE THAT ALL NECESSARY INSPECTIONS AND/OR CERTIFICATIONS REQUIRED BY CODES AND/OR UTILITY SERVICE COMPANIES SHALL BE PERFORMED PRIOR TO THE ANNOUNCED BUILDING POSSESSION AND THE FINAL CONNECTION OF SERVICES. THIS SHALL INCLUDE THE HIRING OF A PROFESSIONAL ENGINEER TO CONDUCT INSPECTIONS AND PROVIDE CERTIFICATIONS, AS MAY BE REQUIRED.



B – PLAN VIEW VAN PARKING
SCALE: 1/16"=1'-0"

C – PLAN VIEW PUP PARKING
SCALE: 1/16"=1'-0"

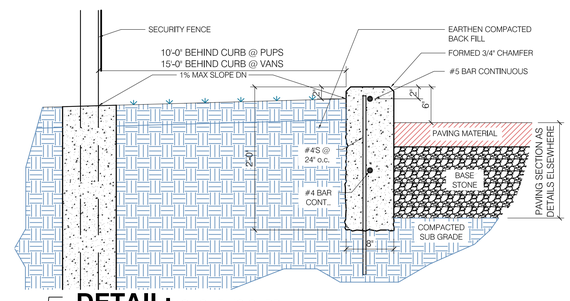
6 **DETAIL:** PARKING LAYOUT
(WHERE NOTED ON SITE PLAN) SCALE: 3/4"=1'-0" OR AS NOTED



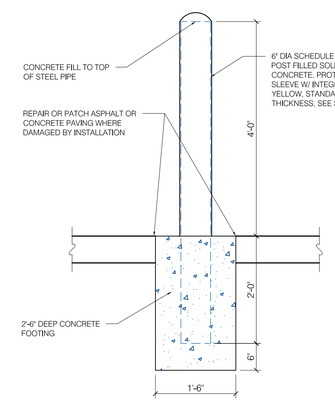
7 **DETAIL:** CURB AND GUTTER
SCALE: 3/4"=1'-0"

GENERAL NOTES:

1. INFORMATION CONCERNING UNDERGROUND UTILITIES WAS OBTAINED FROM AVAILABLE RECORDS AND FIELD CONDITIONS WHEN POSSIBLE, BUT THE CONTRACTOR MUST DETERMINE THE EXACT LOCATION AND ELEVATION OF ALL EXISTING UTILITIES BY DIGGING TEST PITS BY HAND AT ALL UTILITY CROSSING WELL IN ADVANCE OF TRENCHING. IF THE CLEARANCES ARE LESS THAN SPECIFIED ON THE PLANS OR 12", WHICHEVER IS LESS, CONTACT CAMPBELL ENGINEERING & ASSOCIATES, INC. AT 864-335-4090.
2. THE CONTRACTOR SHALL INCLUDE IN THE CONTRACT PRICE THE REMOVAL AND DISPOSAL OF ANY EXCESS TOPSOIL THAT IS NOT REQUIRED TO PERFORM THE FINAL GRADING AND LANDSCAPING OPERATIONS.
3. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN AND IMPLEMENTATION OF ALL REQUIRED/NECESSARY SHEETING, SHORING, AND SPECIAL EXCAVATION MEASURED REQUIRED ON THE PROJECT TO MEET OSHA, FEDERAL, STATE AND LOCAL REGULATIONS PURSUANT TO THE INSTALLATION OF THE WORK INDICATED ON THE DRAWINGS. CAMPBELL ENGINEERING & ASSOCIATES, INC. ACCEPT NO RESPONSIBILITY FOR THE DESIGN TO INSTALL SAID ITEMS.
4. CALL BEFORE YOU DIG AT 8-1-1.
5. ALL WORK SHALL CONFORM TO FEDERAL, STATE, COUNTY, AND/OR LOCAL STANDARDS, WHICHEVER IS MORE RESTRICTIVE.
6. ALL CURB/HANDICAP RAMP DESIGNS SHALL CONFORM TO ADA STANDARDS OR PENDER COUNTY, WHICHEVER IS MORE RESTRICTIVE.
7. THE CONTRACTOR SHALL REFER TO THE ARCHITECTURAL PLANS FOR THE EXACT LOCATION OF THE UTILITY ENTRANCE POINTS, TRANSFORMER, SLOPED PAVING, TRUCK DOCKS, RAMPS, SITE LIGHTING PANELS, EXIT PORCHES, VESTIBULE, PRECISE BUILDING DIMENSIONS, ETC.
8. THE CONTRACTOR SHALL INCLUDE IN THE CONTRACT PRICE DAILY RECORD KEEPING OF THE AS-BUILT CONDITIONS OF ALL OF THE UNDERGROUND UTILITIES, STORM DRAIN AND CONSTRUCTION STAKEOUTS ASSOCIATED WITH THE PROJECT. THE CONTRACTOR SHALL HAVE A LICENSED SURVEYOR PREPARE THE REQUIRED AS-BUILT INFORMATION FOR SUBMITTAL TO GOVERNING AGENCIES AND ALL OTHER INFORMATION REQUIRED IN CONNECTION WITH RELEASE OF BONDS.
9. THE CONTRACTOR IS RESPONSIBLE FOR CONTACTING THE LOCAL POST OFFICE TO DETERMINE IF A FREE STANDING MAILBOX IS REQUIRED. IF SO REQUIRED, THE CONTRACTOR SHALL INCLUDE IN HIS CONTRACT PRICE THE INSTALLATION OF A 4" X 4" PRESSURE TREATED POST SET IN CONCRETE WITH A METAL MAILBOX AT A LOCATION ACCEPTABLE TO THE POST OFFICE AND THE OWNER.
10. THE CONTRACTOR SHALL INCLUDE IN THE CONTRACT PRICE ALL MATERIAL AND LABOR ASSOCIATED WITH THE TESTING OF THE WATER AND SEWER LINES AS REQUIRED.
11. THE CONTRACTOR SHALL INCLUDE IN THE CONTRACT PRICE ANY DE-WATERING NECESSARY TO CONSTRUCT THE PROJECT AS SHOWN ON THESE PLANS.
12. THE CONTRACTOR SHALL INCLUDE IN THE PRICE ANY AND ALL COSTS ASSOCIATED WITH PROVIDING A PROFESSIONAL ENGINEER ON SITE IF REQUIRED, DURING THE CONSTRUCTION OF THE STORM WATER MANAGEMENT FACILITIES, UNDERGROUND UTILITIES, ETC. AS REQUIRED FOR AS-BUILT CERTIFICATION.



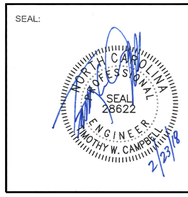
5 **DETAIL:** MONOLITHIC CURB
SCALE: 1/2"=1'-0"



8 **DETAIL:** BOLLARD DETAIL (OR APPROVED EQUAL)
SCALE: 3/8"=1'-0"

PLANS PREPARED BY:
CAMPBELL
E & A, INC.
Civil Engineering and Land Planning
31 Boland Court
Greenville, SC 29615
(864) 335-4090
Fax: (864) 335-4095

SEAL:



FedEx Freight
PENDER COUNTY BUSINESS PARK
CORPORATE DRIVE
WILMINGTON, NC 28405

DEVELOPER:
SETZER PROPERTIES
SETZER PROPERTIES WMN, LLC
354 WALLER AVENUE, STE 200
LEXINGTON , KY 40504
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(859) 514-7767
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REVISIONS:

FOR CONSTRUCTION	02/23/18

CHECKED BY:	TWC
DRAWING BY:	FSE
DATE:	01/16/18
JOB NUMBER:	-

TITLE:
SITE NOTES & DETAILS

SHEET NUMBER:
C-4.1

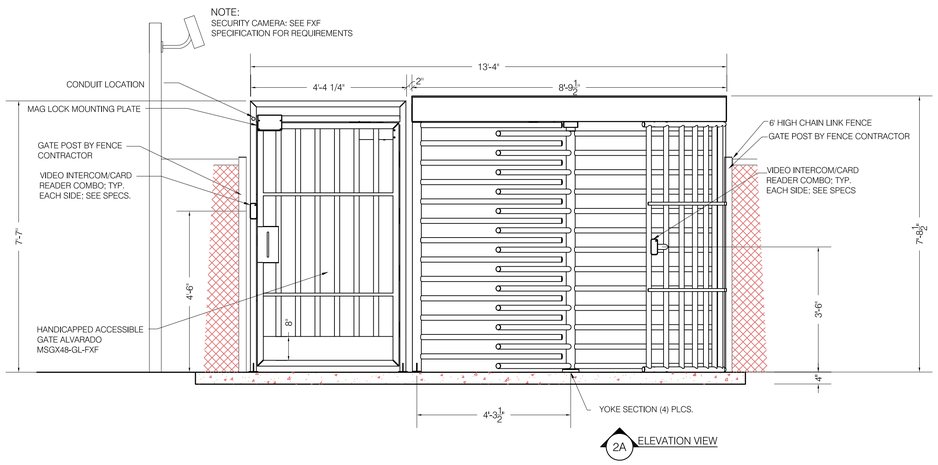
COMMENTS:

GENERAL NOTES:

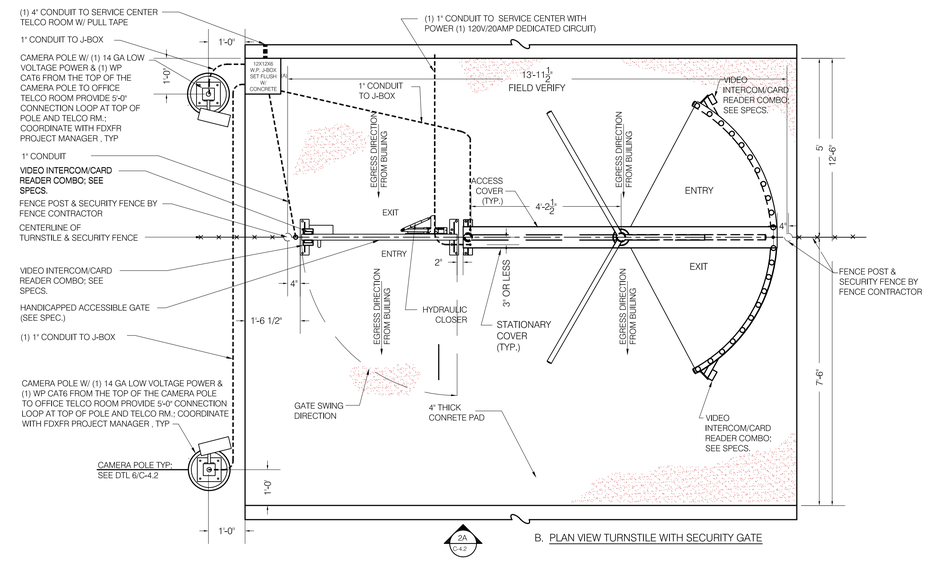
1. CONTRACTOR TO VERIFY ALL TYPES 'U' SECURITY GATES TO BE INSTALLED WITH CURRENT MANUFACTURERS DATA. REFER TO SITE PLAN AND SPECS
2. TURNSTILE: MFG- ALVARADO, MODEL- MST47-6XGL-FXF. SEE SPEC FOR ADDITIONAL INFO
3. HANDICAP GATE: MFG- ALVARADO, MODEL- MSGX48-GL-FXF. SEE SPEC FOR ADDITIONAL INFO
4. PROVIDE 10'-0" x 8'-6" CONCRETE PAD WHERE TURNSTILE ONLY IS REQUIRED.
5. PROVIDE 12'-6" x 15'-6" CONCRETE PAD WHERE TURNSTILE & HANDICAPPED ACCESSIBLE GATES ARE REQUIRED.
6. PROVIDE 6'-0" x 11'-0" CONCRETE PAD WHERE HANDICAPPED ACCESSIBLE GATE ONLY IS REQUIRED, WITH TWO CAMERA POLES, CONDUITS, INTERCOM & CARD READER.
7. VERIFY ALL DIMENSIONS FROM MANUFACTURER & ADAPT CONCRETE WALK AS REQUIRED FOR PROPER INSTALLATION OF TURNSTILE & GATE TO MEET ALL CODES.
8. ALL CARD READERS TO HAVE 1" THICK POLYCARBONATE BACK PLATES

CONDUIT NOTES:

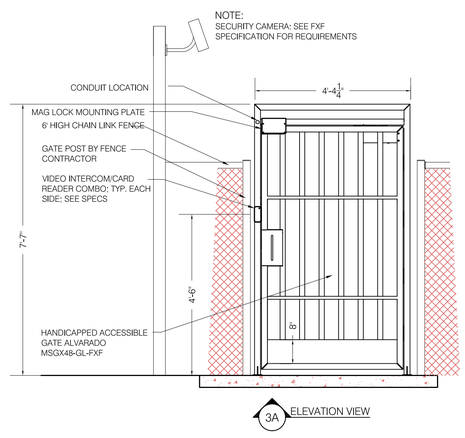
(A) - 12"x12"x6" WATERPROOF JUNCTION BOX FLUSH MOUNTED IN CONCRETE PAD
(B) - ALL CONDUITS TO BE 3/4" UNLESS NOTED OTHERWISE
(C) - ALL CONDUITS TO BE STUBBED-UP 6" BEYOND TOP OF CONCRETE PAD
(D) - ALL CONDUIT TURNS OR BENDS WITH SWEEPS, TYPICAL



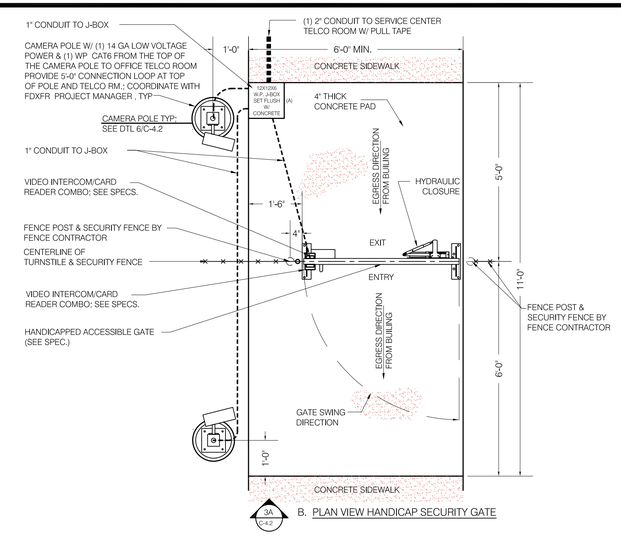
2 TURNSTILE AND HANDICAPPED SECURITY GATE
SCALE: 1/2" = 1'-0"



B. PLAN VIEW TURNSTILE WITH SECURITY GATE



3 HANDICAPPED SECURITY GATE
SCALE: 1/2" = 1'-0"



B. PLAN VIEW HANDICAP SECURITY GATE

PLANS PREPARED BY:
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SEAL:

NORTH CAROLINA PROFESSIONAL SEAL 28622 ENGINEER TIMOTHY W. CAMPBELL 2/23/18

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REVISIONS:

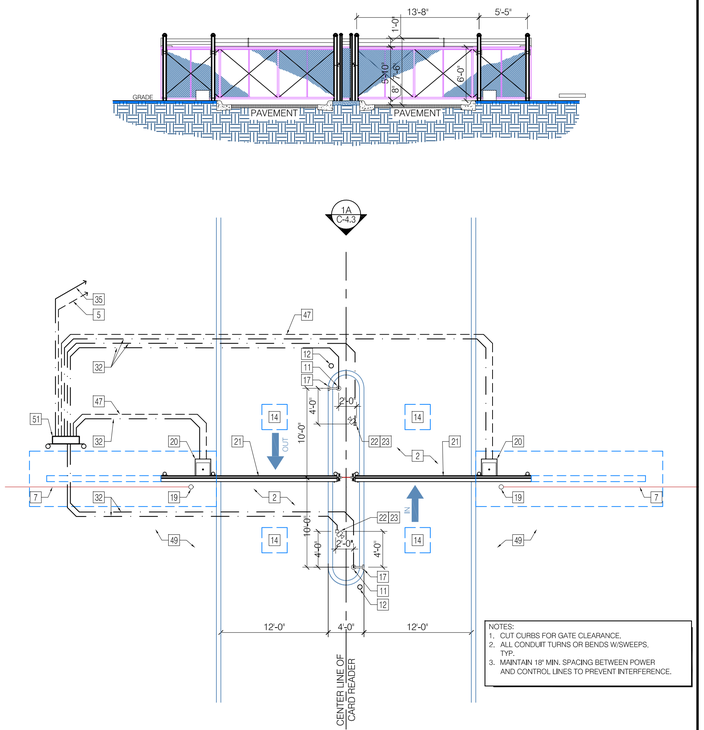
FOR CONSTRUCTION	02/23/18

CHECKED BY:	TWC
DRAWING BY:	FSE
DATE:	01/16/18
JOB NUMBER:	-

TITLE:
SITE DETAILS

SHEET NUMBER:
C-4.2

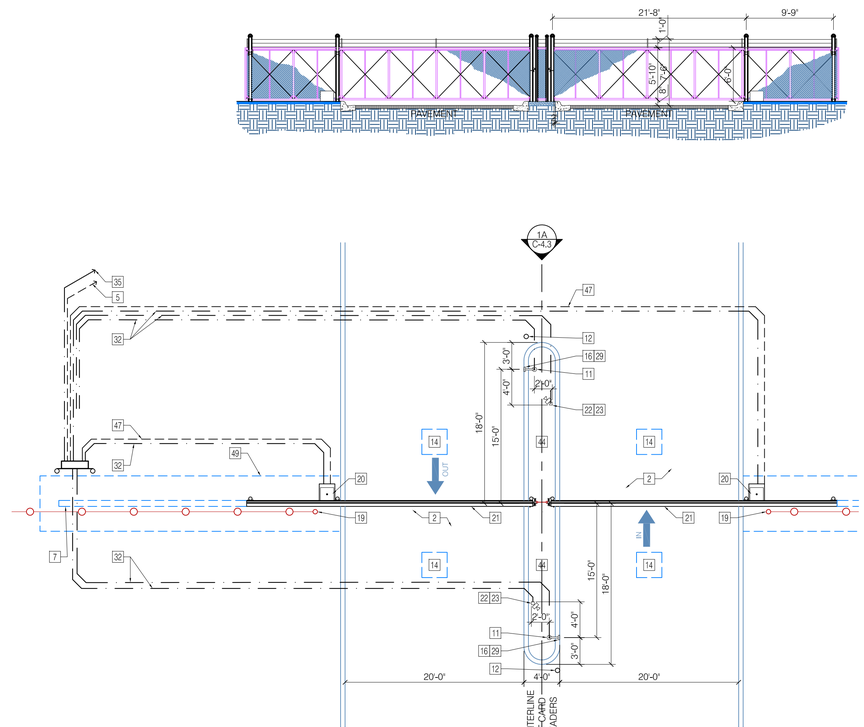
COMMENTS:



NOTES:
1. CUT CURBS FOR GATE CLEARANCE.
2. ALL CONDUIT TURNS OR BENDS W/SWEEPS, TYP.
3. MAINTAIN 18" MIN. SPACING BETWEEN POWER AND CONTROL LINES TO PREVENT INTERFERENCE.

1 **DETAIL:** EMPLOYEE VEHICLE ENTRANCE WITH CANTILEVER SLIDING GATES

SCALE: 1/8"=1'-0"



2 **DETAIL:** YARD ACCESS- CANTILEVER TRUCK ENTRANCE

SCALE: 1/8"=1'-0"

NOTES:
1. CUT CURBS FOR GATE CLEARANCE.
2. ALL CONDUIT TURNS OR BENDS W/SWEEPS, TYP.
3. MAINTAIN 18" MIN. SPACING BETWEEN POWER AND CONTROL LINES TO PREVENT INTERFERENCE.

NOTES:
1. OTHER CONDUITS AS REQUIRED TO COMPLETE INSTALLATION TO BE COORDINATED WITH FXF PROJECT MANAGER.
2. PROVIDE SEPARATE CONDUIT & PULL BOXES FOR LOW VOLTAGE CABLES & POWER CABLES, TYPICAL

KEYED NOTES - SITE SECURITY

1 KEY NOTE SYMBOL

SOME KEY NOTES MAY NOT APPLY

1. GUARD SHACK, SEE SHEET A191 FOR DETAILS
2. 8" MAX. CLEAR, LEVEL PAVEMENT FOR PROPER GATE OPERATION
3. PAINTED HANDICAP PARKING STALL WITH INTERNATIONAL SYMBOL OF ACCESS
4. PAINTED STRIPES - YELLOW (4")
5. 4" CONDUIT OFFICE ELECTRICAL ROOM FOR POWER, W/ PULL TAPE
6. CONCRETE WALK
7. CHAIN LINK SECURITY FENCE, SEE SITE PLAN
8. BI-FOLD SECURITY GATES. REFER TO MANUFACTURER SHOP DRAWINGS FOR COLUMN FOUNDATION SPECIFICATIONS.
9. 4" CONDUIT FROM OFFICE ELECTRICAL ROOM FOR POWER
10. 2" CONDUIT FOR ELECTRICAL POWER FROM OFFICE ELECTRIC ROOM, W/ PULL TAPE; STUB-UP + CAP
11. CONC BASE FOR READERS
12. PIPE BOLLARDS FILLED W/ CONCRETE, (SEE DTL 8/C-4.1)
13. 1 1/4" CONDUIT FOR DATA W/ PULL TAPE
14. VEHICLE DETECTION SAFETY LOOP
15. TURNSTILE GATE (MODEL-SEE SPEC) W. H.C. GATE (MODEL-SEE SPEC)
16. TRUCK ENTRANCE PROXIMITY CARD READER + VIDEO INTERCOM, (SEE DTL 6B/C-4.3),SEE SPEC
17. VEHICLE ENTRANCE PROXIMITY CARD READER + VIDEO INTERCOM, (SEE DTL 6C/C-4.3) SEE SPEC
18. 3/4" CONDUIT W/ PULL TAPE TO GUARD HOUSE FOR CONTROL CABLING
19. FENCE POSTS AS REQUIRED BY FENCE MANUFACTURER
20. MOTORIZED OPERATOR FOR CANTILEVER SECURITY GATE
21. CANTILEVER SECURITY GATE; MAINTAIN MAX. 8" CLEAR + BOTTOM RAIL.
22. COLOR CAMERA FURNISHED + INSTALLED BY FEDEX, HOUSING W/ HEATER AND BLOWER CABLING AND CONDUIT BY CONTRACTOR (SEE SPEC)
23. CAMERA POLE W/ (1) 2 CONDUCTOR 14 GA LOW VOLTAGE POWER + (1) CAT 6E, WATERPROOF CABLES WITH NO SPLICES, FROM TOP OF CAMERA POLE TO GATE AREA NEMA ENCLOSURE; PROVIDE 5'-0" CONNECTION LOOP AT TOP OF POLE AND NEMA ENCLOSURE; COORDINATE WITH FXF PROJECT MANAGER , TYP. SEE DTL. 6A/C-4.3
24. (2) 4" FROM ELECTRICAL RM.
25. 3/4" CONDUIT TO GUARD HOUSE FOR ELECTRICAL POWER
26. (2) - 2" CONDUIT FOR POWER FROM CONTROLLER TO PRIMARY AND SECOND COLUMN AS SHOWN ON DRAWINGS
27. CONDUITS BY CONTRACTOR;EXTEND A MIN. 2' ABOVE GRADE + A MIN. 2' APART. COORDINATE WITH FXF PROJECT MANAGER
28. 2-3/8 GALV. FENCE POST
29. VIDEO / INTERCOM SUBSTATION W/ CALL BUTTON, MOUNT ON CARD READER POST.
30. MASTER VIDEO / INTERCOM STATION W/ GATE RELEASE. COORDINATE LOCATION W/ FEDEX FREIGHT PROJECT MANAGER.
31. 30" X 30" NEMA ENCLOSURE FOR HOUSING OF ELECTRICAL CONTROLLERS, POWER REQUIREMENTS - 208/240V SINGLE PHASE, 20 AMP
32. 3/4" CONDUIT FOR CONTROL WIRING W/ PULL TAPE
33. 12" x 12" WP PULL BOX FLUSH WITH SURFACE
34. 6" x 6" WP PULL BOX FLUSH WITH SURFACE
35. 4" CONDUIT FROM OFFICE TELCO ROOM FOR FIBER OPTIC CABLING W/ PULL TAPE
36. 12" X 12" X 6" WP PULL BOX, SURFACE MOUNTED TO GUARD HOUSE
37. 2" EMPTY CONDUIT W/ CALIBRATED PULL TAPE, CONDUIT TO TELCO ROOM
38. 2" CONDUIT TO ELECT. ROOM, PROVIDE 208/240v SINGLE PHASE 20A SERVICE
39. 6" CURBED CONCRETE ISLAND WITH LANDSCAPE, SHRUBS, AND MULCH
40. DOUBLE GATE TERMINATION POST AS REQUIRED BY GATE MANUFACTURER
41. SWING GATE CENTER LOOP VEHICLE DETECTION
42. REFER TO DTL. 2/A190 FOR CONDUIT SIZE AND AMOUNT
43. 6" CURB WITH GRAVEL INFILL
44. 6" CURBED CONCRETE ISLAND WITH CONCRETE INFILL SURFACE
45. 4" EMPTY CONDUIT W/ CALIBRATED PULL TAPE, CONDUIT TO TELCO ROOM
46. 4" CONDUIT BACK TO BLD. ELECTRICAL
47. 3/4" CONDUIT FOR POWER W/ PULL TAPE
48. SWING GATE OPERATOR. OPERATOR TO BE LOCATED INSIDE THE PROVIDE A FRAMED, SLOTTED OPENING (MINIMUM SIZE REQUIRED) THRU THE FENCE TO ALLOW THE OPERATOR ARM TO PROTRUDE THRU AND FUNCTION PROPERLY.
49. FLAT GRADE REQUIRED FOR PROPER OPERATION OF GATE
50. SWING SECURITY GATE; MAINTAIN 8" MAX. + BOTTOM RAIL.
51. 36"x48" NEMA ENCLOSURE, SEE GATE DETAILS FOR MOUNTING LOCATION, SEE DETAIL X/SD103

KEYED NOTES - SITE SECURITY

1 KEY NOTE SYMBOL

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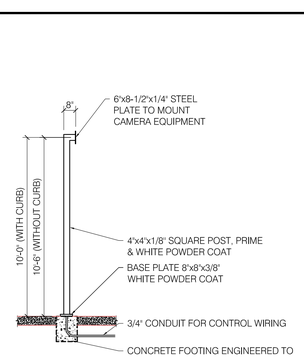
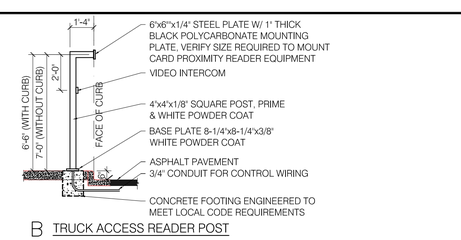
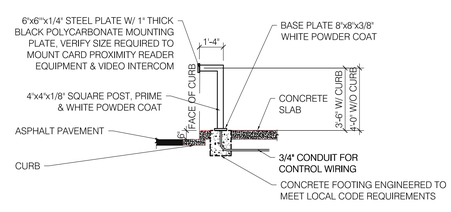


A CAMERA POSTS



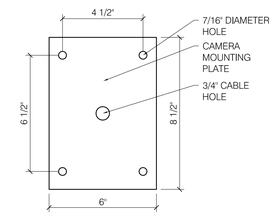
B TRUCK ACCESS READER POST



C EMPLOYEE PARKING ACCESS READER POST

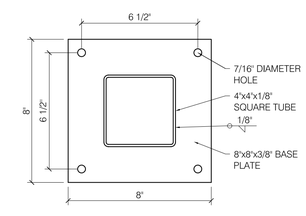
6 **DETAIL:** SECURITY POST

SCALE: 1/4"=1'-0"



CAMERA MOUNTING PLATE

SCALE: 3" = 1'-0"



POST BASE PLATE

SCALE: 3" = 1'-0"

PLANS PREPARED BY:

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NORTH CAROLINA PROFESSIONAL SEAL 28622 ENGINEER TIMOTHY W. CAMPBELL 2/23/18

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CHECKED BY:	TWC
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JOB NUMBER:	-

TITLE:
SITE DETAILS

SHEET NUMBER:
C-4.3

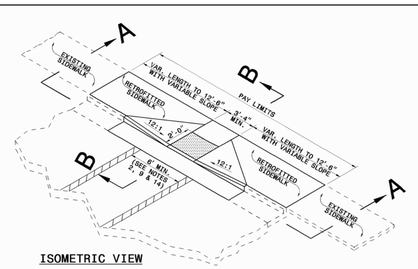
COMMENTS:

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

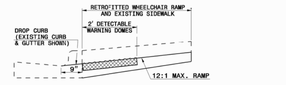
7-06

ENGLISH STANDARD DRAWING FOR
WHEELCHAIR RAMP AND EXISTING SIDEWALK ADJACENT TO CURB
CURB CUT

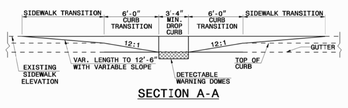
SHEET 2 OF 5
848.06



ISOMETRIC VIEW

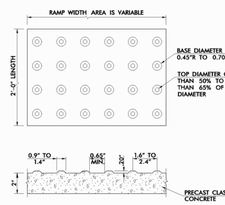


SECTION B-B

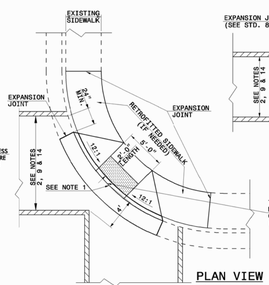


SECTION A-A

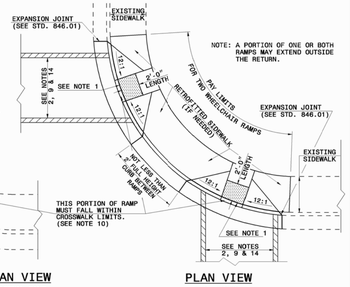
NOTES:
1. DETECTABLE WARNING DOMES SHALL COVER 2'-0" LENGTH AND FULL WIDTH OF THE RAMP FLOOR AS SHOWN ON THE DETAILS.
2. OBTAIN 70% CONTRAST VISIBILITY WITH ADJOINING SURFACE, EITHER LIGHT-ON-DARK, OR DARK-ON-LIGHT SEQUENCE COVERING THE ENTIRE RAMP.



DETECTABLE WARNING DOMES



PLAN VIEW
DIAGONAL RAMP
MAX. 25' RADII
(60" MIN. FLOOR WIDTH)



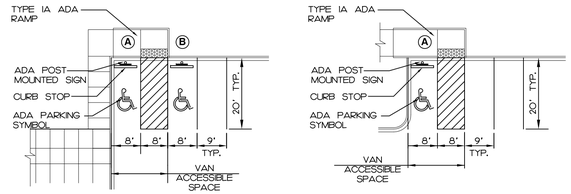
PLAN VIEW
DUAL RAMPS
ANY RADII
(40" MIN. FLOOR WIDTH)

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

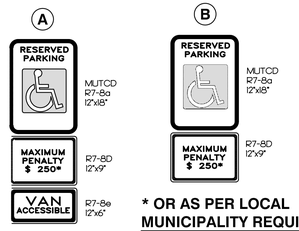
7-06

ENGLISH STANDARD DRAWING FOR
WHEELCHAIR RAMP AND EXISTING SIDEWALK ADJACENT TO CURB
CURB CUT

SHEET 2 OF 5
848.06



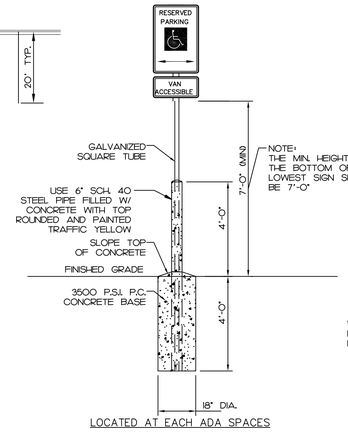
PARKING SPACE PAVEMENT MARKINGS



*** OR AS PER LOCAL MUNICIPALITY REQUIREMENTS**

NOTES:
1. ALL 12"x18" ACCESSIBLE SIGNS (R7-8a & R7-1) SHALL BE MOUNTED AT 7 FEET FROM GRADE TO BOTTOM EDGE OF SIGN FACE (MUTCD). MOUNTING HEIGHT CAN BE REDUCED TO 5 FEET IF PLACED IN AN AREA BETWEEN SIDEWALK AND BUILDING FACE IN WHICH PEDESTRIANS ARE NOT EXPECTED TO USE.
2. SIGNS SHALL HAVE WHITE LETTERING AND BLUE BACKGROUND.
3. SIGNS SHALL BE 0.080 ALUMINUM WITH BAKED ENAMEL FINISHED.
4. REFER TO MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, (MUTCD) U.S. DEPARTMENT OF TRANSPORTATION AND STATE DEPARTMENT OF TRANSPORTATION SUPPLEMENT.
5. IF ACCESSIBLE ROUTE IS A RAISED SIDEWALK AREA, THEN RAMPS ARE REQUIRED AT LOADING ZONE AREA.

ADA SIGNAGE DETAILS
(N.T.S.)

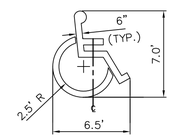


LOCATED AT EACH ADA SPACES
SINGLE POST
N.T.S.

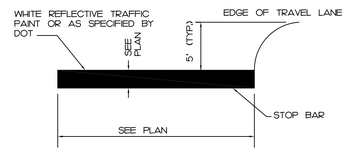
NOTES:
1. ALL SIGNS SHALL COMPLY WITH U.S. DEPARTMENT OF TRANSPORTATION, FEDERAL HIGHWAY ADMINISTRATION'S "MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES", LOCAL CODES AND AS SPECIFIED. MOUNT SIGNS TO POST IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
2. GALVANIZED SQUARE TUBE

POST TUBES – 2"x2"x3/16" 14ga
POST TUBE SHALL MEET ASTM A101 GRADE 50.
POST TUBE GALVANIZED AS PER ASTM A653 GRADE 90.

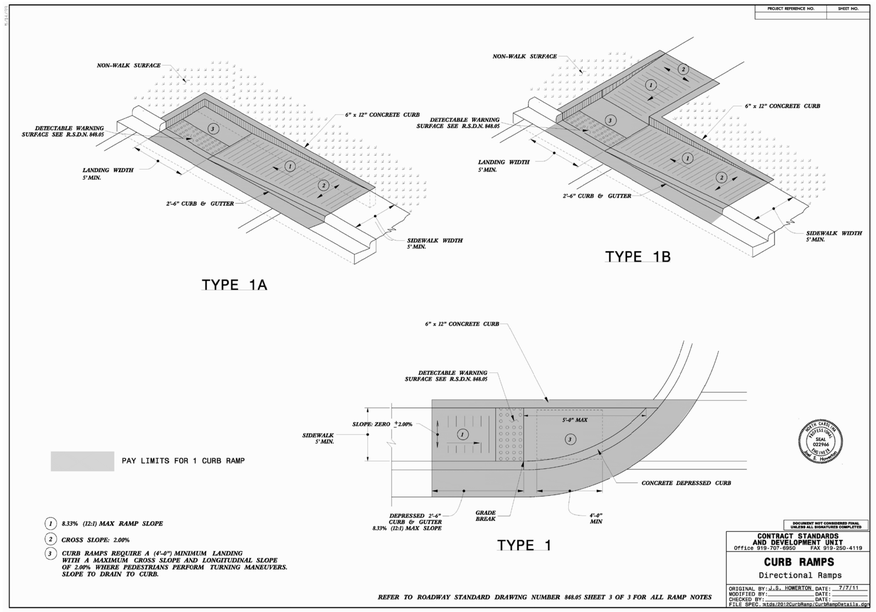
ADA POST MOUNTED SIGNAGE
(N.T.S.)

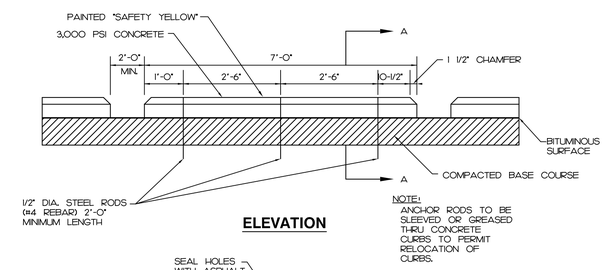


ACCESSIBLE PARKING SYMBOL
LOCATE AT EDGE OF PARKING SPACES UNLESS ACCOMPANIED BY "VAN" LETTERING

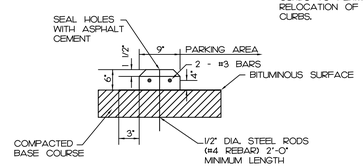


STOP BAR DETAIL
(N.T.S.)





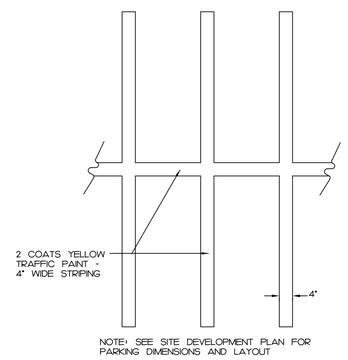
ELEVATION



SECTION A-A

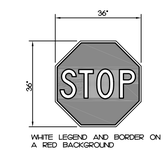
CURB STOP DETAIL
(N.T.S.)

NOTE: TRAFFIC PAINT SHALL BE CHLORINATED RUBBER BASE, FACTORY MIXED, QUICK DRYING AND NON-BLEEDING CONFORMING TO FS TT-P-115, TYPE III VEHICLE, COLOR -YELLOW



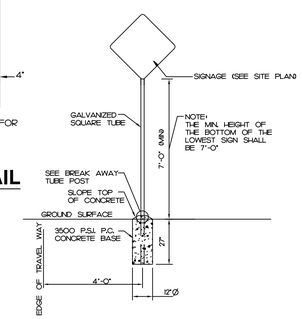
NOTE: SEE SITE DEVELOPMENT PLAN FOR PARKING DIMENSIONS AND LAYOUT

PARKING STRIPING DETAIL
(N.T.S.)



WHITE LEGEND AND BORDER ON A RED BACKGROUND
R1-1

36"X36" "STOP" SIGN
(N.T.S.)



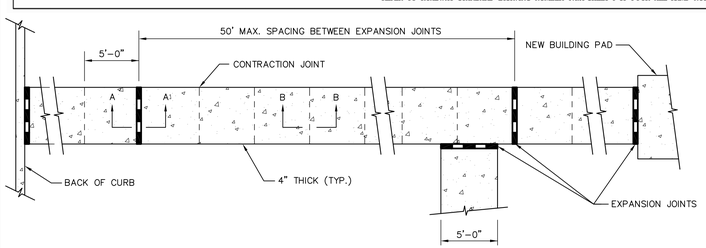
SINGLE SIGN POST
N.T.S.

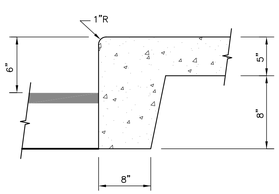
NOTES:
1. ALL SIGNS SHALL COMPLY WITH U.S. DEPARTMENT OF TRANSPORTATION, FEDERAL HIGHWAY ADMINISTRATION'S "MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES", LOCAL CODES AND AS SPECIFIED. MOUNT SIGNS TO POST IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
2. GALVANIZED SQUARE TUBE

POST TUBES - 2"x2"x3/16" 14ga
POST TUBE SHALL MEET ASTM A101 GRADE 50.
POST TUBE GALVANIZED AS PER ASTM A653 GRADE 90.

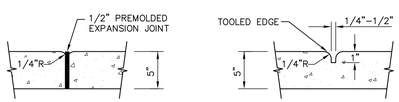
ANCHOR TUBE - 2-1/4"x2-1/4"x3/16" 14ga
HEAVY DUTY ANCHOR TUBE SHALL MEET ASTM A500 GRADE B, STRUCTURAL TUBE AND STEEL SHALL BE HOT DIP GALVANIZED PER ASTM A123.

THE UPPER SIGN POST SHALL TELESCOPE INSIDE THE ANCHOR TUBE A MINIMUM OF 12". THE ANCHOR TUBE SHALL BE A MINIMUM 27" DEEP WITH 3" MIN. 4" MAX. EXPOSED ABOVE FINISH GRADE.



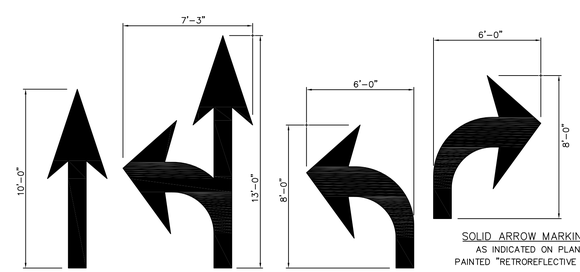


TYPICAL THICKENED EDGE AT PARKING LOT



SECTION A-A SECTION B-B

CONCRETE SIDEWALK DETAIL
(N.T.S.)



SOLID ARROW MARKINGS
AS INDICATED ON PLANS
PAINTED "RETROREFLECTIVE WHITE"

DIRECTIONAL PAVEMENT MARKINGS
(N.T.S.)

PLANS PREPARED BY:
CAMPBELL E & A, INC.
Civil Engineering and Land Planning
31 Boland Court
Greenville, SC 29615
(864) 335-1090
Fax: (864) 335-1095

SEAL:

FedEx Freight

PENDER COUNTY BUSINESS PARK
CORPORATE DRIVE
WILMINGTON, NC 28405

DEVELOPER:
SETZER PROPERTIES
SETZER PROPERTIES WMN, LLC
354 WALLER AVENUE, STE 200
LEXINGTON , KY 40504
CONTACT: ROBBIE McATEE
(859) 514-7767
FAX: (859) 281-6335

REVISIONS:

FOR CONSTRUCTION	02/23/18

CHECKED BY:	TWC
DRAWING BY:	FSE
DATE:	01/16/18
JOB NUMBER:	-

TITLE:
SITE DETAILS

SHEET NUMBER:
C-4.4

COMMENTS:

UTILITY NOTES:

1. THE EXISTING UTILITIES AND OBSTRUCTIONS SHOWN ARE FROM THE BEST AVAILABLE RECORDS AND SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. NECESSARY PRECAUTIONS SHALL BE TAKEN BY THE CONTRACTOR TO PROTECT EXISTING SERVICES AND MAINS, AND ANY DAMAGE TO THEM SHALL BE REPAIRED IMMEDIATELY AT THE CONTRACTOR'S EXPENSE.
2. THE CONTRACTOR SHALL CONFORM WITH ALL LOCAL CITY, STATE, COUNTY, AND FEDERAL ORDINANCES AND REGULATIONS RELATING TO THE INSTALLATION OF ALL UTILITIES.
3. THE CONTRACTOR SHALL COORDINATE THE EXACT LOCATIONS AND INSTALLATIONS OF PROPOSED UTILITIES WITH THE APPROPRIATE COMPANY.
4. THE GAS AND ELECTRIC LINE LOCATIONS SHOWN HERON ARE SCHEMATIC. THE CONTRACTOR SHALL COORDINATE WITH THE ARCHITECTURAL PLANS AND THE LOCAL UTILITY COMPANY REGARDING THE ACTUAL LOCATION AND INSTALLATION OF THESE LINES.
5. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING THE INSTALLATION OF THE TELEPHONE SERVICE TO THE BUILDING.
6. REFER TO ELECTRICAL DRAWINGS BY THE SITE LIGHTING DESIGNER FOR DETAILS OF LIGHT POLES, FIXTURES, AND OTHER LIGHTING EQUIPMENT.
7. THE CONTRACTOR IS RESPONSIBLE FOR PAYING ANY FEES ASSOCIATED WITH UTILITY SERVICE CONNECTIONS. THE CONTRACTOR SHALL THOROUGHLY INVESTIGATE THE LIMITS OF WORK TO BE PERFORMED BY UTILITY COMPANY FORCES AND THE ASSOCIATED FEES PRIOR TO SUBMITTING THE BID. ALL FEES SHALL BE INCLUDED IN THE CONTRACTOR'S BID PRICE.
8. MINIMUM TRENCH WIDTH SHALL BE 2 FEET UNLESS OTHERWISE NOTED BY UTILITY COMPANY.
9. ALL FILL MATERIAL IS TO BE IN PLACE, AND COMPACTED BEFORE INSTALLATION OF PROPOSED UTILITIES.
10. CONTRACTOR SHALL NOTIFY THE UTILITY AUTHORITIES INSPECTORS 72 HOURS BEFORE CONNECTING TO ANY EXISTING LINE OR AS REQUIRED BY UTILITY COMPANY.
11. SANITARY SEWER PIPE: SANITARY SEWER PIPE SHALL BE POLYVINYL CHLORIDE (PVC). PVC SHALL BE BELL AND SPIGOT PIPE, SHALL BE IN LENGTHS NOT EXCEEDING 12-1/2 FEET LAYING LENGTH AND SHALL HAVE A MINIMUM WALL THICKNESS CONFORMING TO ASTM D 3034 UNDER THE CLASSIFICATION FOR DR 35 PIPE. PVC PIPE SHALL BE MARKED AT INTERVALS OF 5 FEET OR LESS INCLUDING MANUFACTURERS NAME OR TRADE MARK, DATE OF MANUFACTURE, NOMINAL PIPE SIZE, PVC CELL CLASSIFICATION, THE LEGEND "TYPE PSM DR 35 PVC SEWER PIPE, AND ASTM DESIGNATION D3034. ALL PIPES SHALL HAVE ELASTOMERIC JOINTS WITH AN INTEGRAL BELLED GASKET COUPLER. RUBBER GASKETS SHALL COMPLY WITH THE PHYSICAL REQUIREMENT SPECIFIED IN THE LATEST REVISION OF ASTM F 477, AS AMENDED TO DATE. JOINTS SHALL MEET THE REQUIREMENTS SPECIFIED IN ASTM D3212, AS AMENDED TO DATE.
12. WATER LINES 6" AND LARGER SHALL BE AS FOLLOWS OR AS REQUIRED BY PENDER COUNTY UTILITIES: POLYVINYL CHLORIDE (PVC) PIPE. PVC SHALL CONFORM TO REQUIREMENTS OF AWWA C900 DR 18. PIPE AND COUPLINGS SHALL BEAR IDENTIFICATION MARKINGS IN ACCORDANCE WITH AWWA C900.
SERVICE CONNECTIONS SHALL BE TYPE K COPPER OR POLYVINYL CHLORIDE (PVC) AS REQUIRED BY PENDER COUNTY UTILITIES.
13. ALL FIRE HYDRANTS SHALL BE MEET THE REQUIREMENTS OF AWWA C502, AS AMENDED TO DATE, AND THE STANDARDS OF THE OWNER. FIRE HYDRANTS MUST BE M. AND H. TRAFFIC MODEL 129, AMERICAN DARLING, MUELLER, CLOW OR EQUAL WITH 5 1/4 INCH AND TWO (2) 2 1/2 INCH FOR CONNECTIONS.
14. ALL UTILITIES SHOULD BE KEPT TEN (10') APART (PARALLEL) OR WHEN CROSSING 18" VERTICAL CLEARANCE (OUTSIDE EDGE OF PIPE TO OUTSIDE EDGE OF PIPE).
15. CONTRACTOR SHALL MAINTAIN A MINIMUM OF 3'-0" COVER ON ALL WATERLINES.
16. IN THE EVENT OF A VERTICAL CONFLICT BETWEEN WATER LINES, SANITARY LINES, STORM LINES AND GAS LINES (EXISTING AND PROPOSED), THE SANITARY LINE SHALL BE DUCTILE IRON PIPE WITH MECHANICAL JOINTS AT LEAST 10 FEET ON BOTH SIDES OF CROSSING, THE WATER LINE SHALL HAVE MECHANICAL JOINTS WITH APPROPRIATE THRUST BLOCKING AS REQUIRED TO PROVIDE A MINIMUM OF 18" CLEARANCE. MEETING REQUIREMENTS OF ANSI A21.10 OR ANSI 21.11 (AWWA C-151 (CLASS 50). ALL WATER LINES SHALL HAVE THRUST BLOCKING AT ALL CHANGES IN DIRECTION.
17. LINES UNDERGROUND SHALL BE INSTALLED, INSPECTED AND APPROVED BEFORE BACKFILLING.
18. TOPS OF EXISTING MANHOLES SHALL BE RAISED AS NECESSARY TO BE FLUSH WITH PROPOSED PAVEMENT ELEVATIONS, AND TO BE ONE FOOT ABOVE FINISHED GROUND ELEVATIONS IN UNPAVED AREAS WITH WATER TIGHT LIDS.
19. ALL CONCRETE FOR ENCASEMENTS SHALL HAVE A MINIMUM 28 DAY COMPRESSION STRENGTH AT 3000 P.S.I.
20. EXISTING UTILITIES SHALL BE VERIFIED IN FIELD PRIOR TO INSTALLATION OF ANY NEW LINES.
21. REFER TO INTERIOR PLUMBING DRAWINGS FOR TIE-IN OF ALL UTILITIES.
22. CONTRACTOR IS RESPONSIBLE FOR COMPLYING TO THE SPECIFICATIONS OF THE LOCAL AUTHORITIES (ANY CITY) WITH REGARDS TO MATERIALS AND INSTALLATION OF THE WATER AND SEWER LINES.
23. THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES, AND WHERE POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE APPROPRIATE UTILITY COMPANIES AT LEAST 72 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATION OF UTILITIES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL EXISTING UTILITIES WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS.
24. CONTRACTOR IS RESPONSIBLE FOR ALL NECESSARY INSPECTIONS AND/OR CERTIFICATIONS REQUIRED BY CODES AND/OR UTILITY SERVICE COMPANIES. THIS AND THE FINAL CONNECTIONS OF THE SERVICE SHALL BE COMPLETED 30 DAYS PRIOR TO STORE POSSESSION.
25. CONTRACTOR SHALL COORDINATE WITH ALL UTILITY COMPANIES FOR INSTALLATION REQUIREMENTS AND SPECIFICATIONS.

THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ENGINEER AN AS-BUILT SURVEY OF ALL NEW WATER AND SEWER LINES IMMEDIATELY AFTER INSTALLATION OF SYSTEM. AS-BUILT SHALL BE USED FOR SUBMITTAL TO LOCAL JURISDICTION AND REVIEW BY ENGINEER.

CONTRACTOR MUST USE PENDER COUNTY APPROVED METER BOXES

FIRE LINE REDUCED PRESSURE TESTABLE BACKFLOW DEVICE TO BE LOCATED INSIDE INSULATED ENCLOSURE AT R/W

ALL BACKFLOW DEVICES SHALL BE USE OR ASSE APPROVED

RESTRAIN JOINT PIPE IS REQUIRED ON ALL VERTICAL AND HORIZONTAL CHANGES IN DIRECTION.

UTILITY LEGEND:

EXISTING	PROPOSED	DESCRIPTION
	FH	FIRE HYDRANT
WM		WATER METER
WV		WATER VALVE
	PIV	POST INDICATOR VALVE (PIV)
W		WATER LINE
S		SANITARY MANHOLE
SS		SANITARY SEWERLINE
		POWER POLE
		35' SECURITY LIGHT (RE: ARCH)
		GUY WIRE
F		GAS FINK
OHE	OHE	OVERHEAD ELECTRIC
UGE	UGE	UNDERGROUND ELECTRIC
G	G	UNDERGROUND GAS
UGT	UGT	UNDERGROUND TELEPHONE
	OHT	OVERHEAD TELEPHONE
T		TELEPHONE PEDESTAL
E		ELECTRIC PEDESTAL
SD		STORM DRAIN

UTILITY CONTACTS:

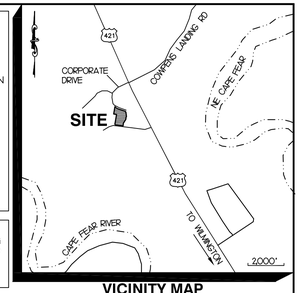
WATER AND SEWER:
PENDER COUNTY UTILITIES
605 E FREMONT STREET
BURGAW, NC 28425
CONTACT: BRYAN McCABE
(910) 259-1570

TELEPHONE:
AT&T
102 NORTH 4TH STREET
WILMINGTON, NC 28401
CONTACT: CHRISSY COSTON
(910) 341-7664

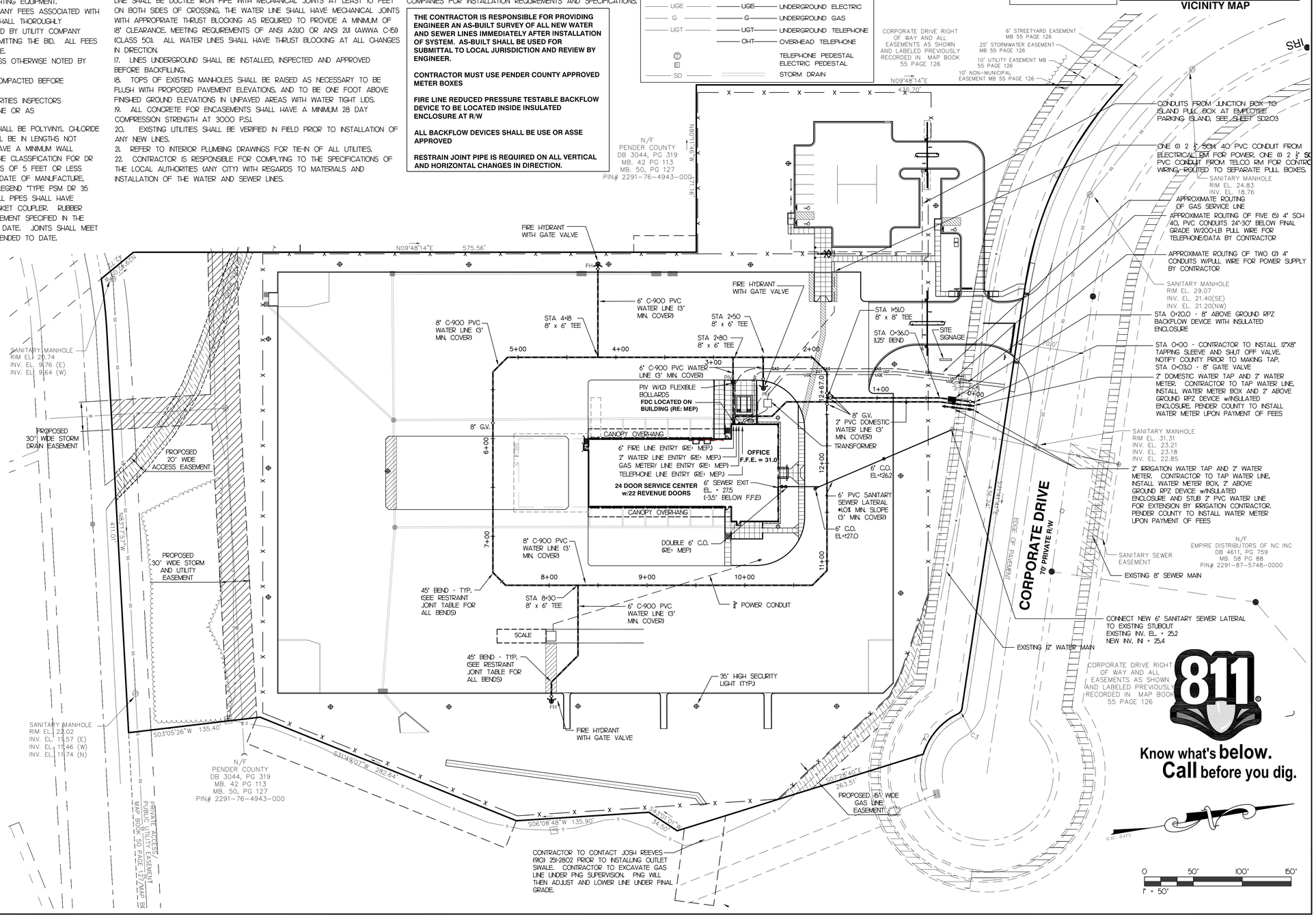
POWER:
DUKE ENERGY
CONTACT: HEIDI CARLSON
(910) 602-4402

GAS:
PIEDMONT NATURAL GAS
1321 S 10th STREET
WILMINGTON, NC 28401
CONTACT: JOSH REEVES
(910) 251-2802

NOTE: SEE ARCHITECTURAL PLANS FOR EXACT BUILDING DIMENSIONS, UTILITY ENTRY POINTS, DOOR LOCATIONS, ETC.



VICINITY MAP



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

PLANS PREPARED BY:

CAMPBELL
E & A, INC.
Civil Engineering and Land Planning
31 Boland Court
Greenville, SC 29615
(864) 335-1090
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SEAL:

NORTH CAROLINA PROFESSIONAL SEAL 28622 ENGINEER TIMOTHY W. CAMPBELL 2/23/18

FedEx® Freight
PENDER COUNTY BUSINESS PARK
CORPORATE DRIVE
WILMINGTON, NC 28405

DEVELOPER:
SETZER PROPERTIES
SETZER PROPERTIES WMN, LLC
354 WALLER AVENUE, STE 200
LEXINGTON , KY 40504
CONTACT: ROBBIE McATEE
(859) 514-7767
FAX: (859) 281-6335

REVISIONS:

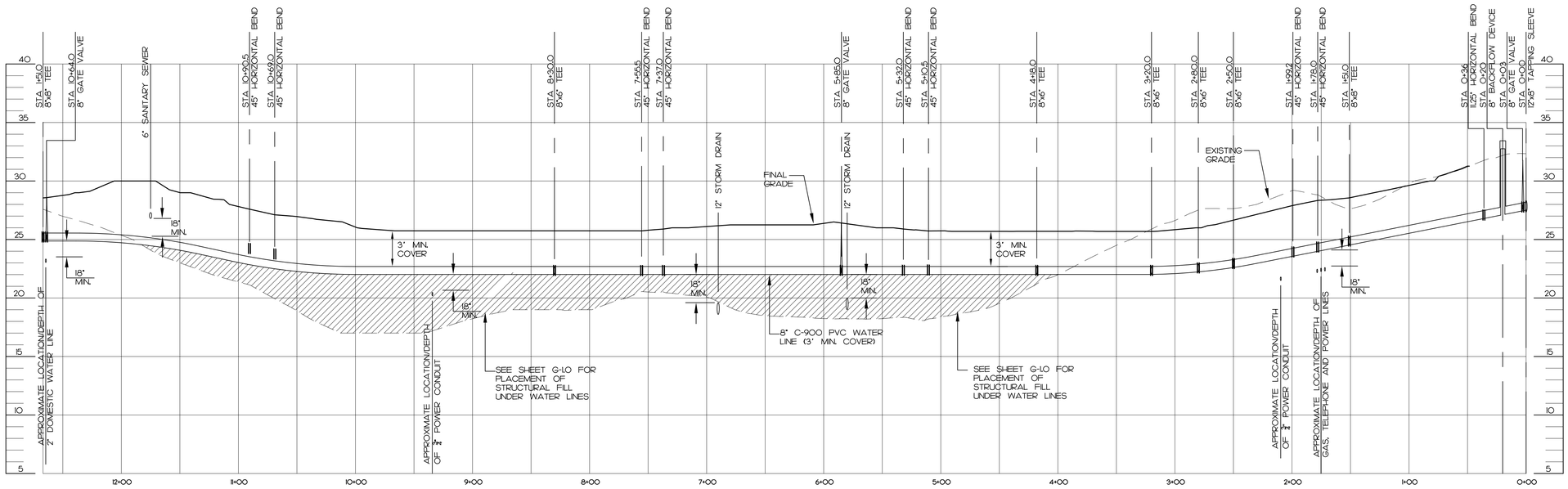
FOR CONSTRUCTION	**02/23/18**

CHECKED BY:	TWC
DRAWING BY:	FSE
DATE:	01/16/18
JOB NUMBER:	-

TITLE:
UTILITY PLAN

SHEET NUMBER:
C-5.0

COMMENTS:



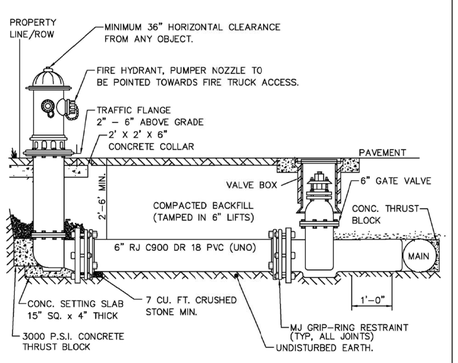
WATER LINE PROFILE

SCALE: HORIZONTAL 1" = 50'
VERTICAL 1" = 5'

RESTRAINED JOINT PIPE IS REQUIRED ON ALL VERTICAL AND HORIZONTAL CHANGES IN DIRECTION.

SEE RESTRAINED JOINT TABLE BELOW FOR ALL BENDS

NOTE:
MAINTAIN 18" VERTICAL SEPARATION BETWEEN STORM DRAIN AND ALL OTHER PROPOSED/EXISTING UTILITIES.



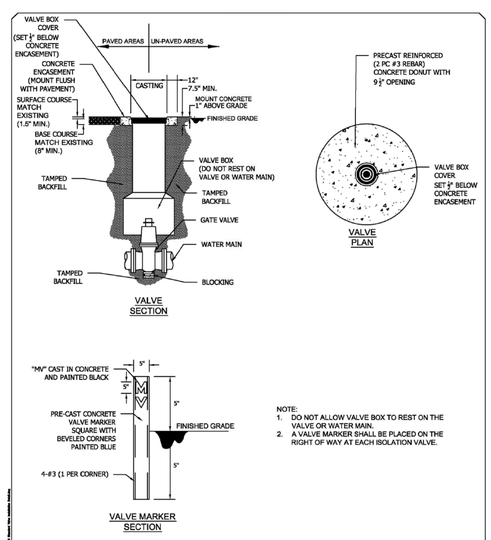
NOTES:

1. FIRE HYDRANTS WILL BE INSTALLED IN TRUE VERTICAL POSITION.
2. FIRE HYDRANTS TO BE LOCATED IN RIGHT-OF-WAY.
3. INSTALL WITH BURY LINE FLUSH TO FINAL GRADE.
4. HYDRANTS TO BE AVK SERIES 2780, MUELLER SUPER CENTURION A473 W/PENDER CO. OPTIONS 981, OR CLOW MEDALLION WITH STAINLESS STEEL STEMS. HYDRANTS SHALL BE NOSTALGIC STYLE DRY BARREL.
5. HYDRANTS TO BE RED WITH SILVER CAPS AND BONNET.

FIRE HYDRANT ASSEMBLY DETAIL
NOT TO SCALE

PENDER COUNTY UTILITIES
605 EAST FREMONT STREET
BURGAW, NC 28425

FIRE HYDRANT ASSEMBLY
STANDARD DETAIL
VERSION #2 - APRIL 2016



NOTE:
1. DO NOT ALLOW VALVE BOX TO REST ON THE VALVE OR WATER MAIN.
2. A VALVE MARKER SHALL BE PLACED ON THE RIGHT OF WAY AT EACH ISOLATION VALVE.

VALVE INSTALLATION DETAIL
NOT TO SCALE

PENDER COUNTY UTILITIES
605 EAST FREMONT STREET
BURGAW, NC 28425

VALVE INSTALLATION
STANDARD DETAIL
VERSION #3 - JUNE 2016

Restrained Length In Feet Each Side of Fitting Joint

PIPE DIAMETER (INCHES)	D. I. P. 90°	D. I. P. 45°	D. I. P. 22 1/2°	D. I. P. 11 1/4°	P. V. C. 90°	P. V. C. 45°	P. V. C. 22 1/2°	P. V. C. 11 1/4°
3"	30'	15'	10'	5'	40'	20'	10'	5'
4"	35'	15'	10'	5'	50'	25'	15'	10'
6"	55'	25'	10'	5'	80'	35'	20'	10'
8"	65'	30'	15'	10'	90'	40'	20'	10'
10"	80'	35'	20'	10'	110'	50'	25'	15'
12"	95'	40'	20'	10'	130'	55'	30'	15'
16"	120'	50'	25'	15'	165'	70'	35'	20'
20"	150'	60'	30'	15'	200'	80'	40'	20'
24"	180'	70'	35'	20'	210'	90'	45'	25'
30"	190'	80'	40'	20'	250'	100'	50'	25'
36"	220'	90'	45'	25'	0	0	0	0
42"	245'	100'	50'	25'	0	0	0	0
48"	260'	120'	60'	30'	0	0	0	0

Restrained lengths for valves, dead ends and branches from tees shall be the same as for 90° (degree) bends

Restrained Length In Feet For Reducer

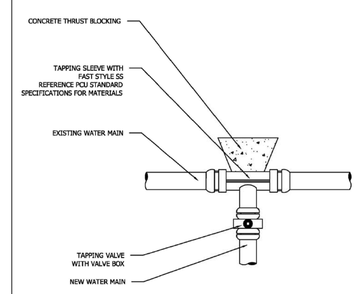
PIPE DIAMETER (INCHES)	3"	4"	6"	8"	10"	12"	16"	20"	24"	30"
3"	0	0	0	0	0	0	0	0	0	0
4"	40'	0	0	0	0	0	0	0	0	0
6"	50'	40'	0	0	0	0	0	0	0	0
8"	75'	70'	40'	0	0	0	0	0	0	0
10"	95'	90'	70'	40'	0	0	0	0	0	0
12"	120'	110'	100'	75'	40'	0	0	0	0	0
16"	160'	155'	140'	125'	100'	70'	0	0	0	0
20"	200'	195'	185'	170'	155'	130'	75'	0	0	0
24"	160'	155'	150'	140'	135'	120'	90'	50'	0	0
30"	190'	190'	185'	180'	170'	160'	130'	100'	70'	0
36"	225'	220'	215'	210'	200'	190'	180'	150'	120'	70'
42"	245'	240'	235'	230'	225'	220'	205'	180'	150'	100'
48"	255'	250'	245'	240'	235'	230'	215'	190'	170'	125'

Length of restrained joint for larger diameter pipe

NOTES:
1. PENDER COUNTY STANDARD RESTRAINT METHOD IS MJ "GRIP RING" TYPE. ALL RJ TO BE MJ "GRIP RING" TYPE, UNLESS SPECIFICALLY APPROVED BY PCU IN WRITING.
2. ALL FITTINGS AND JOINTS SHALL BE RESTRAINED JOINT.
3. "L" ABOVE IS GIVEN IN FEET FROM FITTING JOINT.

PENDER COUNTY UTILITIES
605 EAST FREMONT STREET
BURGAW, NC 28425

RESTRAINED JOINT TABLE
STANDARD DETAIL
VERSION #1 - OCTOBER 2015



TAPPING SLEEVE AND VALVE ASSEMBLY DETAIL
NOT TO SCALE

PENDER COUNTY UTILITIES
605 EAST FREMONT STREET
BURGAW, NC 28425

TAPPING SLEEVE AND VALVE ASSEMBLY
STANDARD DETAIL
VERSION #3 - FEB 2016

PLANS PREPARED BY:
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E & A, INC.
Civil Engineering and Land Planning
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SEAL:

NORTH CAROLINA PROFESSIONAL SEAL 28622 ENGINEER TIMOTHY W. CAMPBELL 2/23/18

FedEx Freight

PENDER COUNTY BUSINESS PARK
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WILMINGTON, NC 28405

DEVELOPER:
SETZER PROPERTIES
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REVISIONS:

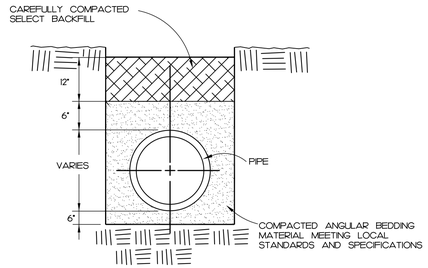
FOR CONSTRUCTION	02/23/18

CHECKED BY:	TWC
DRAWING BY:	FSE
DATE:	01/16/18
JOB NUMBER:	-

TITLE: **WATER LINE PROFILE & DETAILS**

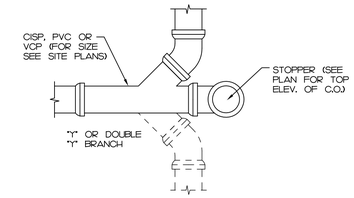
SHEET NUMBER: **C-5.1**

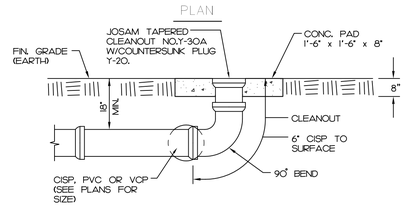
COMMENTS:



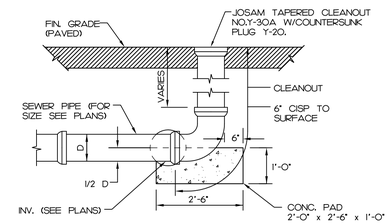
SANITARY SEWER BEDDING DETAILS

(N.T.S.)





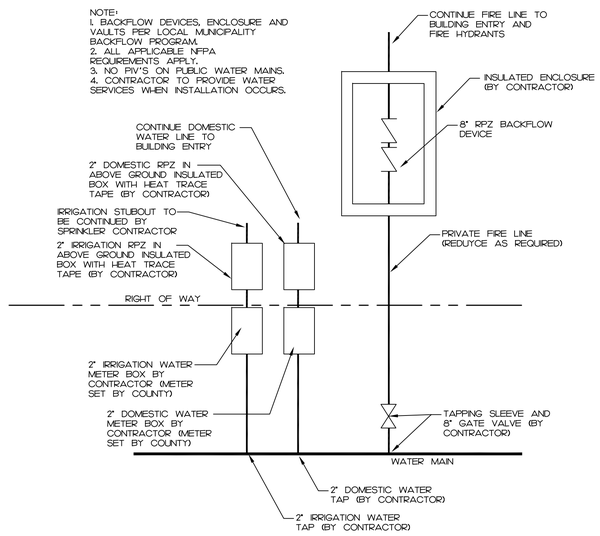
ELEVATION-CLEANOUT IN EARTH AREAS



ELEVATION-CLEANOUT IN PAVED AREAS

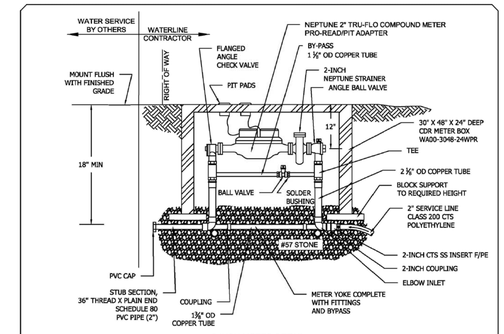
TYPICAL CLEANOUT

(N.T.S.)



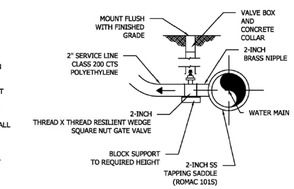
FIRE, DOMESTIC & IRRIGATION SERVICE DETAIL

(N.T.S.)



2-INCH METER DETAIL

NOTE:
1. CONTRACTOR SHALL PLACE METER BOX IN NON-TRAFFIC AREA ONLY.
2. CONTRACTOR SHALL CENTER METER YOKE IN METER BOX AS REQUIRED TO PROPERLY FIT METER.
3. BOX TO BE ADJUSTED VERTICALLY TO ACCEPT COUNTY'S STANDARD SERVICE METER AND STRAINER. (NEPTUNE 2" TRU-FLO COMPOUND METER PRO-READ/PIT ADAPTER)
4. TAPS ON WATER MAINS LARGER THAN 16" SHALL BE MADE WITH DUAL WIDE BAND, STAINLESS STEEL TAPPING SADDLES (ROMAC 202S).
5. ANY TAP LARGER THAN 2-INCHES SHALL BE MADE WITH A TAPPING SLEEVE AND VALVE. A STRAINER AND BY-PASS SHALL ALSO BE PROVIDED.



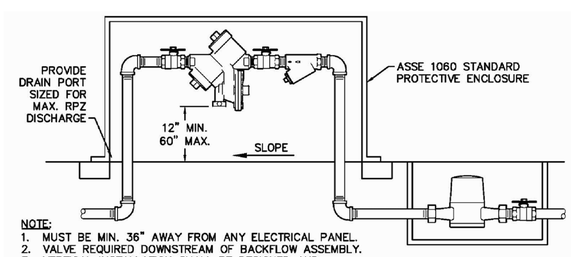
2-INCH TAP DETAIL

STANDARD 2-INCH WATER SERVICE DETAIL

NOT TO SCALE

PENDER COUNTY UTILITIES
605 EAST FREMONT STREET
BURGAW, NC 28425

2-INCH WATER SERVICE
STANDARD DETAIL
VERSION #1 - AUGUST 2010



NOTE:
1. MUST BE MIN. 36" AWAY FROM ANY ELECTRICAL PANEL.
2. VALVE REQUIRED DOWNSTREAM OF BACKFLOW ASSEMBLY.
3. VERTICAL INSTALLATION SHALL BE DESIGNED AND SUBMITTED TO CFPUA ESMD FOR APPROVAL.

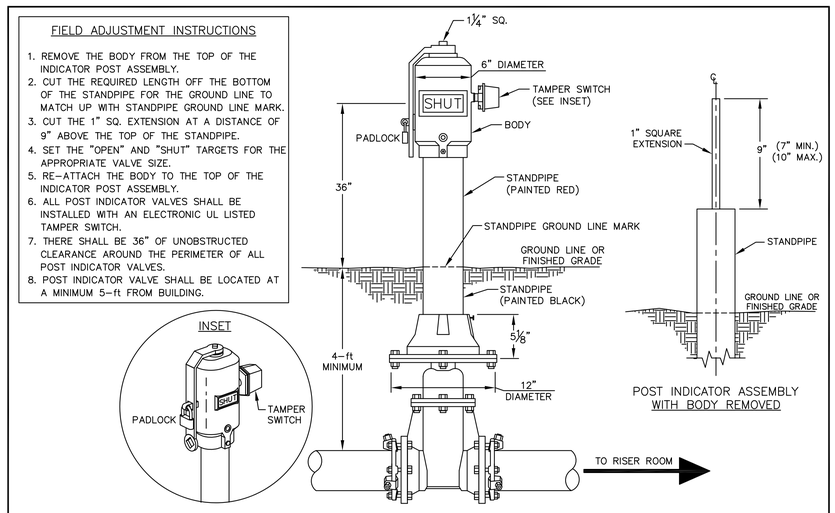
OUTDOOR HORIZONTAL INSTALLATION

REDUCED PRESSURE PRINCIPLE ASSEMBLY

NOT TO SCALE

FIELD ADJUSTMENT INSTRUCTIONS

1. REMOVE THE BODY FROM THE TOP OF THE INDICATOR POST ASSEMBLY.
2. CUT THE REQUIRED LENGTH OFF THE BOTTOM OF THE STANDPIPE FOR THE GROUND LINE TO MATCH UP WITH STANDPIPE GROUND LINE MARK.
3. CUT THE 1" SQ. EXTENSION AT A DISTANCE OF 9" ABOVE THE TOP OF THE STANDPIPE.
4. SET THE "OPEN" AND "SHUT" TARGETS FOR THE APPROPRIATE VALVE SIZE.
5. RE-ATTACH THE BODY TO THE TOP OF THE INDICATOR POST ASSEMBLY.
6. ALL POST INDICATOR VALVES SHALL BE INSTALLED WITH AN ELECTRONIC UL LISTED TAMPER SWITCH.
7. THERE SHALL BE 36" OF UNOBSTRUCTED CLEARANCE AROUND THE PERIMETER OF ALL POST INDICATOR VALVES.
8. POST INDICATOR VALVE SHALL BE LOCATED AT A MINIMUM 5-ft FROM BUILDING.



STANDARD POST INDICATOR VALVE

DETAIL No. 06000.19

PLANS PREPARED BY:

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SEAL:

NORTH CAROLINA PROFESSIONAL SEAL 28622 ENGINEER TIMOTHY W. CAMPBELL 2/23/18

FedEx® Freight
PENDER COUNTY BUSINESS PARK
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WILMINGTON, NC 28405

DEVELOPER:
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SETZER PROPERTIES WMN, LLC
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(859) 514-7767
FAX: (859) 281-6335

REVISIONS:

FOR CONSTRUCTION	02/23/18

CHECKED BY:	TWC
DRAWING BY:	FSE
DATE:	01/16/18
JOB NUMBER:	-

TITLE:

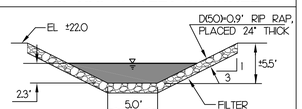
UTILITY DETAILS

SHEET NUMBER:

C-5.2

COMMENTS:

RIP RAP OUTLET CHANNEL



BOTTOM WIDTH: 5 FT.
SIDE SLOPES, 3:1, 3:1
TOTAL DEPTH: 6.0 FT.
SLOPE = 0.3% MIN.
MANNINGS: 0.04
(RIP RAP)
Q(25) = 70.0 CFS

RESULTS:
DEPTH = 2.3 FT.
VELOCITY = 2.5 FPS

DIVERSION SWALE "A-A"

BOTTOM WIDTH: 5 FT.
SIDE SLOPES, 3:1, 3:1
TOTAL DEPTH: 2.0 FT.
SLOPE = 2.0% MIN.
MANNINGS: 0.15
(SHORT GRASS)
Q(25) = 3.0 CFS

RESULTS:
DEPTH = 0.6 FT.
VELOCITY = 0.8 FPS

RIP RAP APRON SCHEDULE

*FILTER FABRIC TO BE INSTALLED UNDER ALL RIP RAP APRONS

OUTFALL STR. #	PIPE DIA. D(o)	FLUME WIDTH	AVG. STONE DIAMETER* (±50)	STONE DEPTH (D)	APRON LENGTH (FT.) (L(a))	APRON WIDTH AT HEADWALL (FT.) W(1)	DOWNSTREAM WIDTH (FT.) W(2)
I-W #3	48"	-	1.0'	2.7'	26	12.0	30.0
APRON #1	-	6'	0.5'	9"	10	12.0	13.0
APRON #2	-	6'	0.5'	9"	10	7.0	13.0
APRON #3	-	7'	0.5'	9"	10	8.0	15.0

SEE OUTLET PROTECTION DETAIL ON EROSION & SEDIMENT CONTROL DETAIL SHEET)

THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ENGINEER AN AS-BUILT SURVEY OF THE PROJECT AREA, INCLUDING BUT NOT LIMITED TO SLOPE CONTOURS, TOP AND BOTTOM SPOT ELEVATIONS, CONCRETE FLUMES, NEW STORM DRAIN STRUCTURE AND PIPE ELEVATIONS AND TYPE, ETC.

CONTRACTOR TO REVIEW GEOTECHNICAL EXPLORATION REPORT REGARDING EXISTING ON-SITE SOILS PRIOR TO BIDDING

UPON IMPLEMENTATION AND INSTALLATION OF THE FOLLOWING AREAS: TRAILER, PARKING, LAY DOWN, PORTA-POTTY, WHEEL WASH, CONCRETE WASHOUT, MASON'S AREA, FUEL AND MATERIAL STORAGE AREAS/CONTAINERS, SOLID WASTE CONTAINERS, ETC., IMMEDIATELY DENOTE THEM ON THE SITE MAPS AND NOTE ANY CHANGES IN LOCATION AS THEY OCCUR THROUGHOUT THE CONSTRUCTION PROCESS. IN ADDITION, NOTE ALL AREAS WHERE FILL IS IMPORTED FROM OR SOIL IS EXPORTED TO ON THE SITE MAPS.

SEE STORM DRAIN PROFILE SHEETS FOR ALL STORM DRAIN STRUCTURE THROAT/RIM/INVERT ELEVATIONS PIPE SIZE, LENGTH AND SLOPE INFORMATION

STORMWATER CALCULATIONS:

OFF-SITE STORMWATER QUANTITY AND QUALITY MEASURES ARE IN PLACE TO CONTROL AND TREAT STORMWATER RUNOFF FOR THIS SITE. THE OFF-SITE WET DETENTION POND AND INFILTRATION BASIN MEASURES HAVE BEEN DESIGNED FOR 60% BUILT UPON AREA FOR SITES WITHIN THE BUSINESS PARK.

OF THE 12.5 ACRES FOR THIS SITE:
±1.64 AC. ON-SITE DRAINAGE TO OFF-SITE WET POND #1
0.0 AC. OFF-SITE DRAINAGE
±0.78 ACRES ON-SITE IMPERVIOUS; ON-SITE B.U.A. IS ±48% (<60%).

±10.86 AC. ON-SITE DRAINAGE TO OFF-SITE INFILTRATION BASIN #1
±6.29 AC. ON-SITE IMPERVIOUS; ON-SITE B.U.A. IS 58% (<60%).
INCLUDING ±1.20 AC. OFF-SITE DRAINS TO INFILTRATION BASIN #1: ±6.29 AC./ ±12.06 AC. = 52% B.U.A. (<60%)

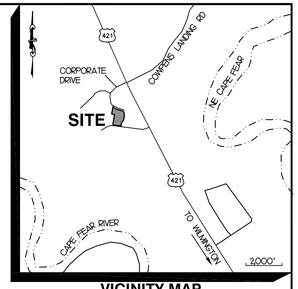
ALL SLOPES STEEPER THAN 3:1 SHALL RECEIVE NORTH AMERICAN GREEN P300 ALONG FACE OF SLOPE. MAXIMUM SLOPE SHALL BE 2:1

NOTE: SEE ARCH. PLANS FOR EXACT BUILDING DIMENSIONS, UTILITY ENTRY POINTS, DOOR LOCATIONS, ETC.

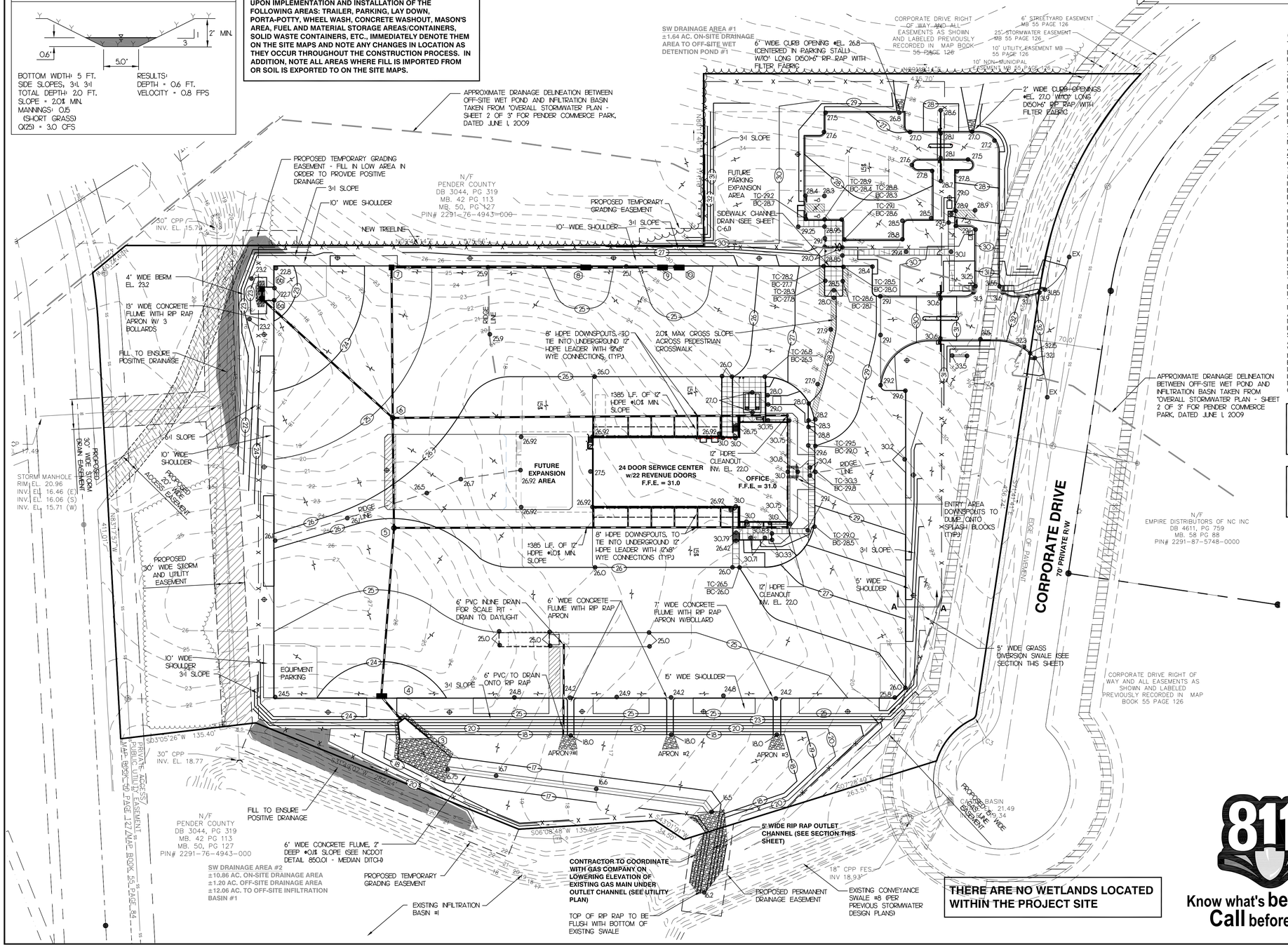
CONTRACTOR TO INSTALL GROUNDCOVER ON ALL EXPOSED PERIMETER SLOPES AND SLOPES STEEPER THAN 3:1 WITHIN 7 CALENDAR DAYS FOLLOWING COMPLETION OF ANY PHASE OF GRADING, GROUNDCOVER FOR ALL REMAINING DISTURBED AREAS SHALL BE INSTALLED WITHIN 14 DAYS.

LEGEND

EXISTING	PROPOSED	DESCRIPTION
22	22	CONTOUR LINE
22.3	22.3	SPOT ELEVATION
		STORM DRAIN PIPE
		CATCH BASIN
		MANHOLE
		STORM DRAIN CLEANOUT
		RIP RAP WITH FILTER FABRIC
		STORM DRAIN STRUCTURE #
		FLOW ARROW



VICINITY MAP



THERE ARE NO WETLANDS LOCATED WITHIN THE PROJECT SITE

GRADING NOTES

1. CONTRACTOR IS RESPONSIBLE FOR DEMOLITION OF EXISTING STRUCTURES INCLUDING REMOVAL OF ANY EXISTING UTILITIES SERVING THE STRUCTURE. UTILITIES ARE TO BE REMOVED TO THE RIGHT-OF-WAY.
2. THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES, AND WHERE POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE APPROPRIATE UTILITY COMPANIES AT LEAST 72 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATION OF UTILITIES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL EXISTING UTILITIES WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS.
3. ALL CUT OR FILL SLOPES SHALL BE 3:1 OR FLATTER UNLESS OTHERWISE NOTED.
4. PRECAST STRUCTURES MAY BE USED AT CONTRACTORS OPTION.
5. EXISTING PIPES TO BE CLEANED OUT TO REMOVE ALL SILT AND DEBRIS.
6. EXISTING GRADE CONTOUR INTERVALS SHOWN AT 1 FOOT.
7. PROPOSED GRADE CONTOUR INTERVALS SHOWN AT 1 FOOT INTERVALS.
8. IF ANY EXISTING STRUCTURES TO REMAIN ARE DAMAGED DURING CONSTRUCTION IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO REPAIR AND/OR REPLACE THE EXISTING STRUCTURE AS NECESSARY TO RETURN IT TO EXISTING CONDITIONS OR BETTER.
9. ALL STORM PIPE ENTERING STRUCTURES SHALL BE GROUTED TO ASSURE CONNECTION AT STRUCTURE IS WATERTIGHT.
10. ALL STORM SEWER MANHOLES IN PAVED AREAS SHALL BE FLUSH WITH PAVEMENT, AND SHALL HAVE TRAFFIC BEARING RING & COVERS. MANHOLES IN UNPAVED AREAS SHALL BE 6" ABOVE FINISH GRADE. LIDS SHALL BE LABELED "STORM SEWER".
10. ALL STORM SEWER MANHOLES IN PAVED AREAS SHALL BE FLUSH WITH PAVEMENT, AND SHALL HAVE TRAFFIC BEARING RING & COVERS. MANHOLES IN UNPAVED AREAS SHALL BE 6" ABOVE FINISH GRADE. LIDS SHALL BE LABELED "STORM SEWER".
11. THE CONTRACTOR SHALL ADHERE TO ALL TERMS & CONDITIONS AS OUTLINED IN THE EPA OR APPLICABLE STATE GENERAL N.P.D.E.S. PERMIT FOR STORM WATER DISCHARGE ASSOCIATED WITH CONSTRUCTION ACTIVITIES.
12. CONTRACTOR SHALL ADJUST AND/OR CUT EXISTING PAVEMENT AS NECESSARY TO ASSURE A SMOOTH FIT AND CONTINUOUS GRADE.
13. CONTRACTOR SHALL ASSURE POSITIVE DRAINAGE AWAY FROM BUILDINGS FOR ALL NATURAL AND PAVED AREAS.
14. ALL UNSURFACED AREAS DISTURBED BY GRADING OPERATION SHALL RECEIVE 4 INCHES OF TOPSOIL. CONTRACTOR SHALL APPLY STABILIZATION FABRIC TO ALL SLOPES 3:1(4V OR STEEPER). CONTRACTOR SHALL STABILIZE DISTURBED AREAS IN ACCORDANCE WITH GOVERNING SPECIFICATIONS UNTIL A HEALTHY STAND OF VEGETATION IS OBTAINED.
15. CONSTRUCTION SHALL COMPLY WITH ALL APPLICABLE GOVERNING CODES AND BE CONSTRUCTED TO SAME.
16. ALL STORM STRUCTURES SHALL HAVE A SMOOTH UNIFORM POURED MORTAR INVERT FROM INVERT IN TO INVERT OUT.
17. UNLESS OTHERWISE NOTED, ALL SPOT ELEVATIONS SHOWN ARE BOTTOM FACE OF CURB.

CONTRACTOR TO ENSURE THAT ANY OFF-SITE RELATED BORROW OR WASTE AREAS RELATED TO THIS PROJECT ARE PROPERTY PERMITTED UNDER THE NPDES GENERAL PERMIT OR NCDEQ WATER QUALITY DIVISION.

EXISTING PENDER COUNTY COMMERCE PARK HAS BEEN PREVIOUSLY PERMITTED UNDER SW8 090801 MOD. SITE WILL BE TREATED BY USE OF AN EXISTING OFF-SITE WET POND AND INFILTRATION AREA.

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

0 50' 100' 150'
1" = 50'

PLANS PREPARED BY:
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SEAL:

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28622 TIMOTHY W. CAMPBELL 2/23/18

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REVISIONS:

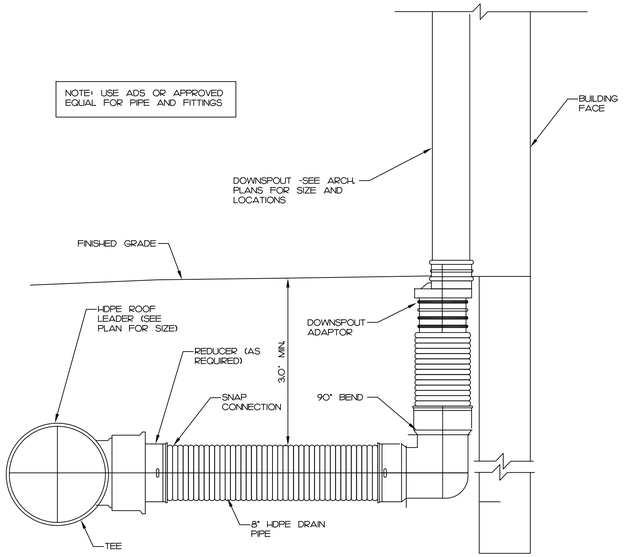
FOR CONSTRUCTION	02/23/18

CHECKED BY:	TWC
DRAWING BY:	FSE
DATE:	01/16/18
JOB NUMBER:	-

TITLE:
GRADING & DRAINAGE PLAN

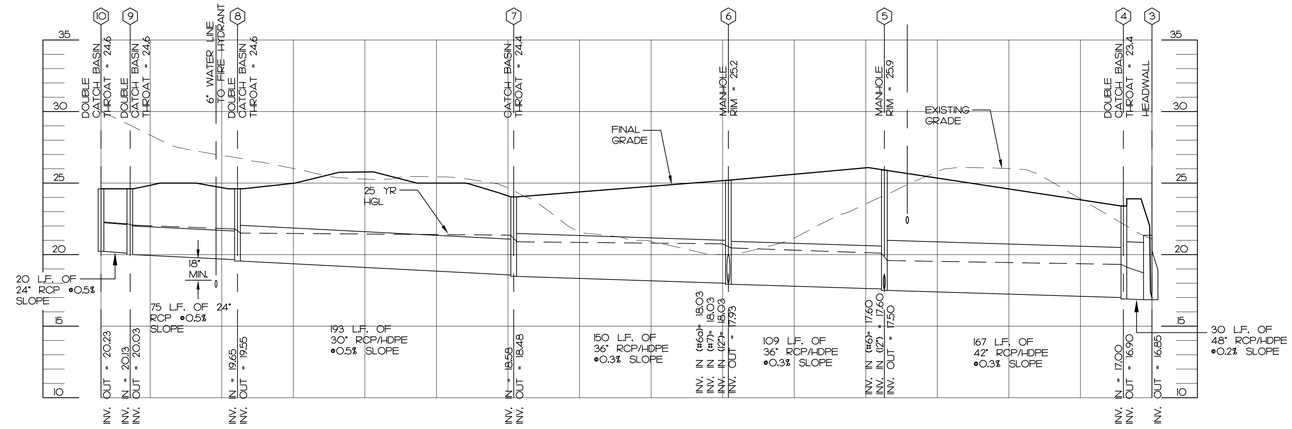
SHEET NUMBER:
C-6.0

COMMENTS:



ROOF DRAIN PIPING

(N.T.S.)



STORM DRAIN PROFILE; STR. #3 - #10

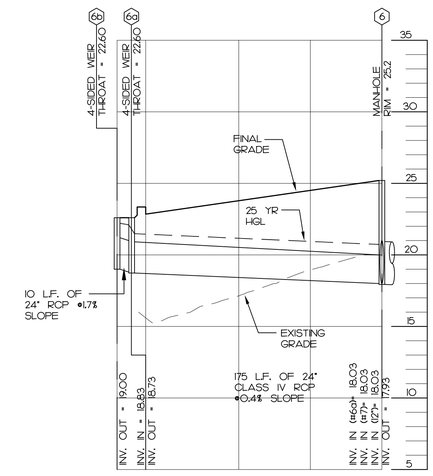
SCALE: HORIZONTAL 1" = 50'
VERTICAL 1" = 5'

STORM STRUCTURE TABLE (UNLESS OTHERWISE NOTED)
CATCH BASIN - SEE NCDOT 840.02 / 840.03
4-SIDED WEIR - SEE DETAIL SHEET C-6.2
MANHOLE - SEE NCDOT 840.52
HEADWALL - SEE NCDOT 838.80
SEE DETAIL SHEET C-6.2

Storm Sewer Tabulation

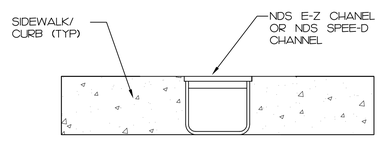
Page 1

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	30.000	0.92	5.60	0.90	0.83	4.64	5.0	9.0	9.1	42.10	58.64	6.54	48	0.17	16.85	16.90	18.77	19.08	0.00	23.40	3-4
2	1	167.000	0.00	4.68	0.00	0.00	3.81	0.0	8.0	9.4	35.82	55.05	5.49	42	0.30	17.00	17.50	19.36	19.64	23.40	25.90	4-5
3	2	109.000	0.00	4.49	0.00	0.00	3.64	0.0	7.4	9.6	35.04	36.70	5.50	36	0.30	17.60	17.93	20.17	20.43	25.90	25.20	5-6
4	3	150.000	0.30	2.90	0.75	0.23	2.21	5.0	6.6	10.0	21.99	36.53	3.29	36	0.30	18.03	18.48	20.91	21.03	25.20	24.40	6-7
5	4	193.000	1.00	2.60	0.70	0.70	1.98	5.0	5.5	10.4	20.68	29.07	4.38	30	0.50	18.58	19.55	21.31	21.73	24.40	24.60	7-8
6	5	75.000	0.80	1.60	0.80	0.64	1.28	5.0	5.1	10.6	13.62	16.10	4.34	24	0.51	19.65	20.03	21.89	22.16	24.60	24.60	8-9
7	6	20.000	0.80	0.80	0.80	0.64	0.64	5.0	5.0	10.7	6.85	15.99	2.18	24	0.50	20.13	20.23	22.31	22.33	24.60	24.60	9-10
8	3	175.000	0.70	1.40	0.90	0.63	1.26	5.0	5.1	10.7	13.45	14.30	4.28	24	0.40	18.03	18.73	20.91	21.53	25.20	22.60	6-6a
9	8	10.000	0.70	0.70	0.90	0.63	0.63	5.0	5.0	10.7	6.74	29.49	2.15	24	1.70	18.83	19.00	21.91	21.92	22.60	22.60	6a-6b
10	2	385.000	0.19	0.19	0.90	0.17	0.17	5.0	5.0	10.7	1.83	3.81	3.13	12	1.14	17.60	22.00	20.17	22.57	25.90	30.00	5-Roof 1
11	3	385.000	0.19	0.19	0.90	0.17	0.17	5.0	5.0	10.7	1.83	3.62	3.12	12	1.03	18.03	22.00	20.91	22.58	25.20	30.00	6-Roof 2



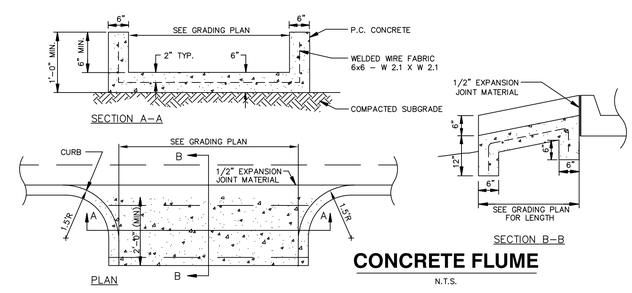
STORM DRAIN PROFILE; STR. #6 - #6b

SCALE: HORIZONTAL 1" = 50'
VERTICAL 1" = 5'



SIDEWALK CHANNEL OPENING

(N.T.S.)



CONCRETE FLUME

N.T.S.

PLANS PREPARED BY:
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WILMINGTON, NC 28405

DEVELOPER:
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SETZER PROPERTIES WMN, LLC
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LEXINGTON , KY 40504
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FAX: (859) 281-6335

REVISIONS:

FOR CONSTRUCTION	**02/23/18**

CHECKED BY:	TWC
DRAWING BY:	FSE
DATE:	01/16/18
JOB NUMBER:	-

TITLE:
STORM DRAIN PROFILES & DETAILS

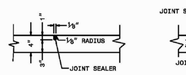
SHEET NUMBER:
C-6.1

COMMENTS:

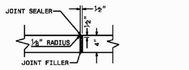
GENERAL NOTES:
IN THE 4" CONC. PAVED DITCHES, PLACE ½" EXPANSION JOINTS AT 30' INTERVALS AND AT ALL OTHER POINTS WHERE PROPOSED DITCHES ABUT RIGID OBJECTS. PLACED GROOVED JOINTS 1" DEEP AT 10' INTERVALS BETWEEN EXPANSION JOINTS.

CONSTRUCT WIDTH AND SHAPE OF PROPOSED 4" CONCRETE PAVED DITCHES AS SHOWN OR AS DIRECTED BY THE ENGINEER.

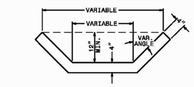
FOR DITCH GRADES ABOVE 2% EROSION CONTROL, INSTALL MATTING ON BOTH SIDES OF THE PAVING FOR A MINIMUM WIDTH OF 36" OR AS DIRECTED BY THE ENGINEER.



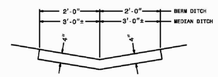
SHOWING GROOVED JOINT



SHOWING EXPANSION JOINT



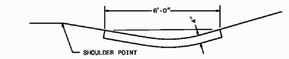
BASE DITCH OR BERM DRAINAGE OUTLET DITCH



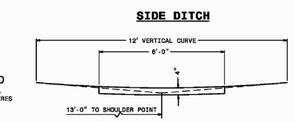
MEDIAN OR BERM DITCH

PART LONGITUDINAL SECTION OF PAVED DITCH
SHOWING 1'-6" CURTAIN WALL REQUIRED AT EACH END

* WHEN CURTAIN WALL FOR PAVED DITCH IS LOCATED ADJACENT TO A DRAINAGE STRUCTURE AND THE PIPE FROM THE STRUCTURE INTERFERES WITH THE 1'-6" DEPTH, THE DEPTH OF THE CURTAIN WALL MAY BE REDUCED BELOW 1'-6" TO CLEAR THE TOP OF THE PIPE.



SIDE DITCH



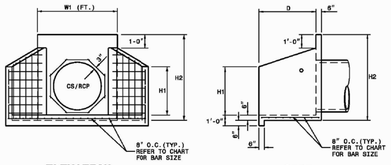
12' V.C. ROADWAY DITCH

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

L-18

ROADWAY STANDARD DRAWING FOR
CONCRETE PAVED DITCHES

SHEET 1 OF 1
850.01



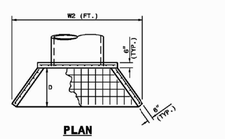
ELEVATION

SIDE

NOTES:

- THIS PRECAST ENDWALL MAY BE USED FOR THE FOLLOWING STANDARDS: 838.01, 838.11, 838.21, 838.27, 838.33, 838.39, 838.51, 838.57, 838.63 AND 838.69.
- 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

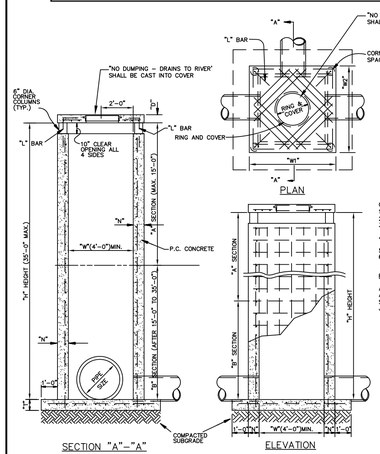
FT.	MINIMUM	MIN./MAX.	MIN./MAX.	MIN./MAX.	MIN./MAX.	MIN./MAX.
PIPE DIA.	BAR SIZE	H1(FT.)	H2(FT.)	D (FT.)	W1	W2
1.0	#5 @ 8"	1.25/2.00	2.00/3.75	1.25/1.75	3.00/3.75	5.50/6.00
1.25	#5 @ 8"	1.25/2.00	3.00/3.75	1.25/2.00	3.50/3.75	6.50/6.75
1.50	#5 @ 8"	1.25/2.00	3.00/4.25	1.50/2.50	3.50/3.75	6.50/6.75
2.0	#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	7.50/8.50	3.25/4.00	7.25/9.25	15.75/15.75
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

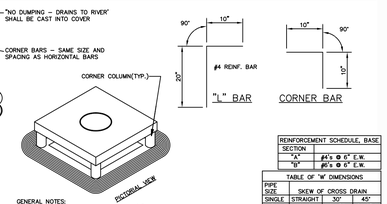
STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

L-18

ROADWAY STANDARD DRAWING FOR
PRECAST CONCRETE ENDWALL
FOR SINGLE 12" THRU 72" PIPE - 90° SKEW

SHEET 1 OF 1
838.80





GENERAL NOTES:
1. ALL EXPOSED CORNERS TO HAVE 3/4" CHAMFER
2. ALL REINFORCING BARS TO HAVE 2" COVER.
3. SEE GRADING AND DRAINAGE PLAN FOR PIPE SIZES, LOCATIONS, AND FLOW LINES.
4. PIPES SHALL CONNECT TO THE ENDS OR SIDES OF THE INLET.
5. ALL REINFORCING BARS TO BE MADE CONTINUOUS AROUND CORNERS OF BOX.
6. ALL REINFORCING BARS TO BE GRADE 60.
7. PRECAST MANHOLE MAY BE USED UNLESS OTHERWISE NOTED OR DIRECTED BY THE ENGINEER.

PRECAST MANHOLE SPECIFICATIONS

ASTM C478 – PRECAST REINFORCED CONCRETE MANHOLE SECTIONS
ASTM C913 – PRECAST CONCRETE WATER AND WASTEWATER STRUCTURESCONCRETE: 4000 PSI AT (MIN.)
JOINT: WATERTIGHT RUBBER GASKET

REINFORCEMENT SCHEDULE, BASE	
SECTION	
"A"	#4's @ 6" E.W.
"B"	#5's @ 6" E.W.

TABLE OF "W" DIMENSIONS

PIPE SIZE	SKEW OF CROSS DRAIN			
SINGLE	STRAIGHT	30°	45°
24"	4'–0"	4'–0"	4'–10"
30"	4'–0"	4'–7"	5'–8"
36"	4'–0"	5'–3"	6'–5"
42"	5'–3"	5'–11"	7'–3"
48"	5'–10"	6'–7"	8'–0"
60"	7'–0"	7'–10"	9'–8"
DOUBLE	FOR "A" SECTION ONLY		
24"	7'–0"	7'–10"	9'–5"
30"	8'–2"	9'–2"	11'–0"
36"	9'–4"	10'–6"	12'–6"
42"	10'–6"	11'–10"	14'–2"
48"	11'–8"	13'–2"	15'–10"

REINFORCEMENT SCHEDULE, WALLS			
SECTION	WIDTH ("W")	HOR.	VERT.
"A"	4'	#4's @ 9"	#4's @ 10"
	BETWEEN 4' & 7'	#5's @ 9"	#4's @ 10"
	GREATER THAN 7'	#5's @ 4 1/2"	#4's @ 10"
"B"	4'	#4's @ 6"	#4's @ 10"
	BETWEEN 4' & 7'	#5's @ 6"	#4's @ 10"

TABLE OF "F" & "K" DIMENSIONS

SECTION	WIDTH ("W")	"F"	"K"	"O"
"A"	BETWEEN 4' & 7'	6" + PIPE THICKNESS	8"	6"
	GREATER THAN 7'	6" + PIPE THICKNESS	8"	8"
"B"	4'	6" + PIPE THICKNESS	8"	8"
	BETWEEN 4' & 7'	6" + PIPE THICKNESS	10"	8"

REINFORCEMENT SCHEDULE, TOP		
DIMENSIONS	STEEL	SPECIAL PATTERN
W1 = 7' OR LESS	#4's @ 8" E.W.	DIAGONAL @ COVER
W2 = 7' OR LESS	#4's @ 8" E.W.	DIAGONAL @ COVER
W1 = 7' OR LESS	#4's @ 6" E.W.	DIAGONAL @ COVER
W2 = 7' OR GREATER	#4'S @ 6" E.W.	DIAGONAL @ COVER
W1 = 7' OR GREATER	#4's @ 6" E.W.	DIAGONAL @ COVER
W2 = 7' OR GREATER	#4's @ 6" E.W.	DIAGONAL @ COVER

4 SIDED WEIR INLET

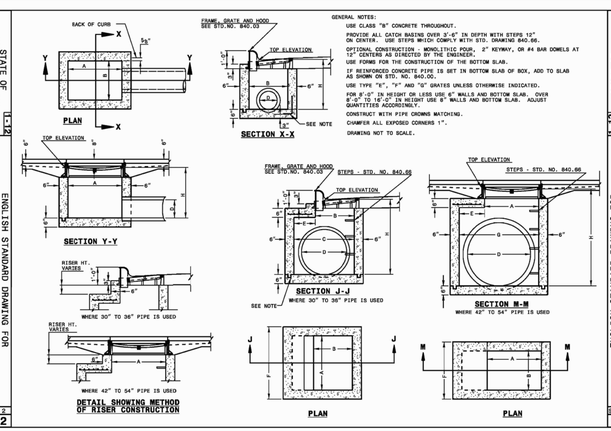
N.T.S.

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

L-12

ENGLISH STANDARD DRAWING FOR
CONCRETE CATCH BASIN
12" THRU 54" PIPE

SHEET 1 OF 2
840.02



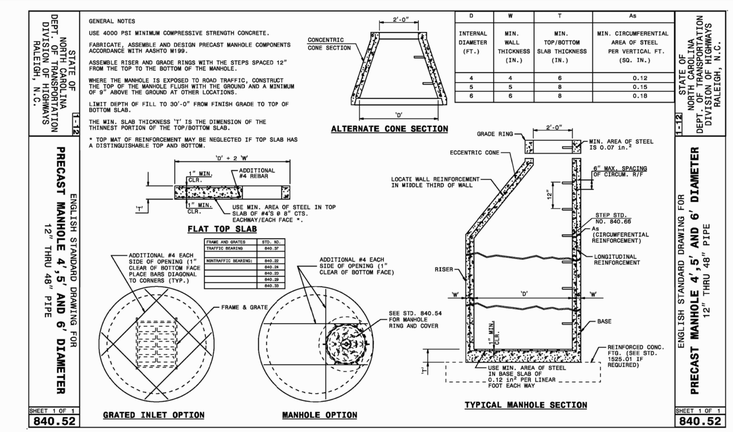
GENERAL NOTES:
USE CLASS "B" CONCRETE THROUGHOUT.
PROVIDE ALL CATCH BASINS OVER 3'-6" IN DEPTH WITH STEPS 12" ON CENTER. USE STEPS WHICH COMPLY WITH STD. DRAWING 840.66.
OPTIONAL CONSTRUCTION - MONOLITHIC POUR, 2" KEYWAY, OR #4 BAR DOWELS AT 12" CENTERS AS DIRECTED BY THE ENGINEER.
USE FORMS FOR THE CONSTRUCTION OF THE BOTTOM SLAB.
IF REINFORCED CONCRETE PIPE IS SET IN BOTTOM SLAB OF BOX, ADD TO SLAB AS SHOWN ON STD. NO. 840.00.
USE TYPE "A", "F" AND "G" GRATES UNLESS OTHERWISE INDICATED.
FOR 9'-0" IN HEIGHT OR LESS USE 6" WALLS AND BOTTOM SLAB. OVER 9'-0" USE 12" IN HEIGHT USE 8" WALLS AND BOTTOM SLAB. ADJUST QUANTITIES ACCORDINGLY.
CONSTRUCT WITH PIPE CROWN MATCHING.
CHAMFER ALL EXPOSED CORNERS 1".
DRAWING NOT TO SCALE.

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

L-12

ENGLISH STANDARD DRAWING FOR
CONCRETE CATCH BASIN
12" THRU 54" PIPE

SHEET 1 OF 2
840.02



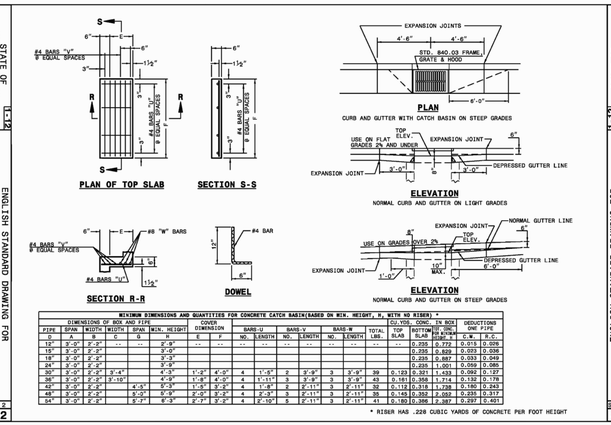
D	W	T	As
INTERNAL DIAMETER (FT.)	MIN. WALL THICKNESS (IN.)	MIN. TOP/BOTTOM SLAB THICKNESS (IN.)	MIN. CIRCUMFERENTIAL AREA OF STEEL PER VERTICAL FT. (SQ. IN.)
4	4	6	0.12
5	5	8	0.15
6	6	8	0.18

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

L-12

ENGLISH STANDARD DRAWING FOR
PRECAST MANHOLE 4'.5' AND 6' DIAMETER
12" THRU 48" PIPE

SHEET 1 OF 1
840.52



MINIMUM DIMENSIONS AND QUANTITIES FOR CONCRETE CATCH BASIN(BASED ON MIN. HEIGHT, H, WITH NO RISER) *

DIMENSIONS OF BOX AND PIPE							COVER DIMENSION		BARS-U		BARS-V		BARS-W		TOTAL LBS.	TOP SLAB	CU. YDS. CONC. IN BOX		DEDUCTIONS FOR PIPE	
PIPE	SPAN	WIDTH	WIDTH	SPAN	MIN. HEIGHT		E	F	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH			MINUS PIPE	PLUS TOP SLAB	C.Y.	K.G.
D	A	B	C	G	H															
12"	3'-0"	2'-6"	---	---	2'-6"		---	---	---	---	---	---	---	---	---	---	0.255	0.772	0.015	0.926
15"	3'-0"	2'-6"			3'-0"												0.255	0.829	0.023	0.036
18"	3'-0"	2'-6"			3'-3"												0.255	0.887	0.033	0.049
24"	3'-0"	2'-6"			3'-9"												0.255	1.001	0.059	0.085
30"	3'-0"	2'-6"	3'-4"		4'-3"		1'-3"	4'-0"	4	1'-5"	2	3'-9"	3	3'-9"	39	0.123	0.321	1.433	0.082	0.127
36"	3'-0"	2'-6"	3'-10"		4'-9"		1'-8"	4'-0"	4	1'-11"	3	3'-9"	3	3'-9"	43	0.161	0.358	1.714	0.132	0.178
42"	3'-0"	2'-6"		4'-5"	5'-3"		1'-5"	5'-3"	4	1'-8"	2	2'-11"	3	2'-11"	32	0.118	0.318	1.728	0.160	0.243
48"	3'-0"	2'-6"		5'-0"	5'-9"		2'-0"	5'-9"	4	2'-3"	3	2'-11"	3	2'-11"	35	0.145	0.352	2.052	0.235	0.317
54"	3'-0"	2'-6"		5'-7"	6'-3"		2'-7"	6'-3"	4	2'-10"	3	2'-11"	3	2'-11"	41	0.180	0.386	2.387	0.297	0.401

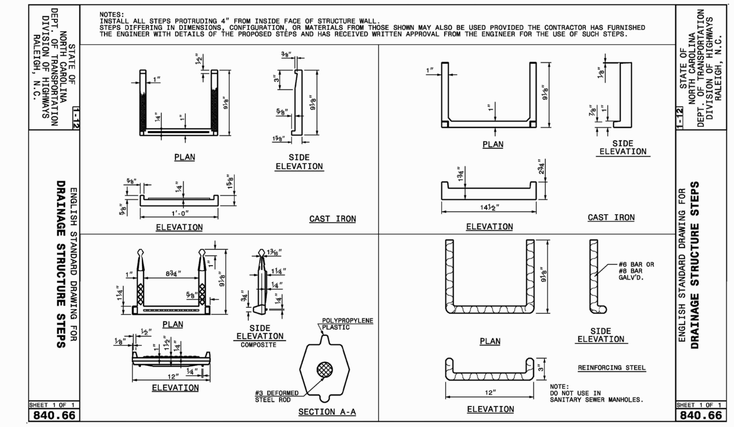
* RISER HAS .228 CUBIC YARDS OF CONCRETE PER FOOT HEIGHT

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

L-12

ENGLISH STANDARD DRAWING FOR
CONCRETE CATCH BASIN
12" THRU 54" PIPE

SHEET 2 OF 2
840.02

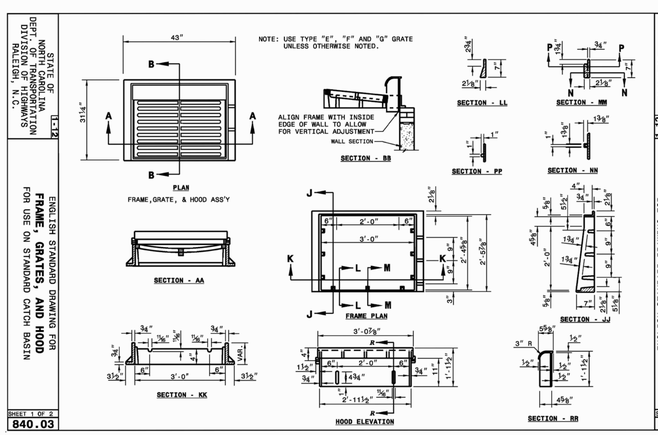


STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

L-12

ENGLISH STANDARD DRAWING FOR
DRAINAGE STRUCTURE STEPS

SHEET 1 OF 1
840.66

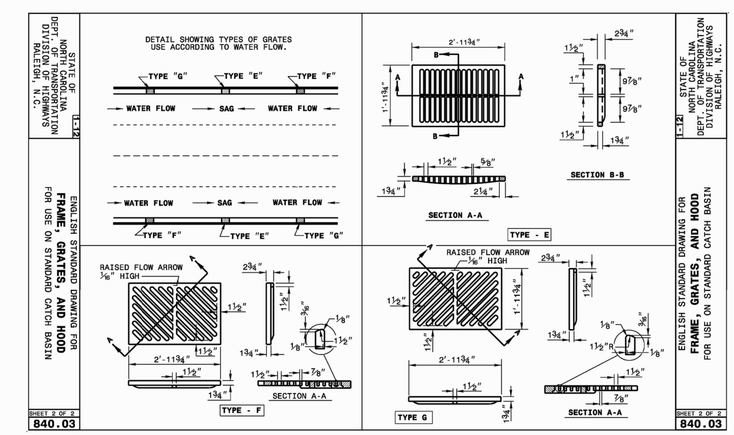


STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

L-12

ENGLISH STANDARD DRAWING FOR
FRAME, GRATES, AND HOOD
FOR USE ON STANDARD CATCH BASIN

SHEET 1 OF 2
840.03



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

L-12

ENGLISH STANDARD DRAWING FOR
FRAME, GRATES, AND HOOD
FOR USE ON STANDARD CATCH BASIN

SHEET 2 OF 2
840.03

PLANS PREPARED BY:

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NORTH CAROLINA PROFESSIONAL SEAL 28622 ENGINEER TIMOTHY W. CAMPBELL 2/23/18

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DEVELOPER:
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SETZER PROPERTIES WMN, LLC
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REVISIONS:
FOR CONSTRUCTION 02/23/18

CHECKED BY: TWC
DRAWING BY: FSE
DATE: 01/16/18
JOB NUMBER: -

TITLE:
STORM DRAIN DETAILS

SHEET NUMBER:
C-6.2

COMMENTS:

EROSION CONTROL NOTES:

1. IF NECESSARY, SLOPES, WHICH EXCEED EIGHT (8) VERTICAL FEET SHOULD BE STABILIZED WITH SYNTHETIC OR VEGETATIVE MATS. IN ADDITION TO HYDROSEEDING, IT MAY BE NECESSARY TO INSTALL TEMPORARY SLOPE DRAINS DURING CONSTRUCTION. TEMPORARY BERMS MAY BE NEEDED UNTIL THE SLOPE IS BROUGHT TO GRADE.
2. ALL SEDIMENT AND EROSION CONTROL DEVICES SHALL BE INSPECTED EVERY SEVEN (7) DAYS. IF SITE INSPECTIONS IDENTIFY BMPS THAT ARE DAMAGED OR ARE NOT OPERATING EFFECTIVELY, MAINTENANCE MUST BE PERFORMED AS SOON AS PRACTICAL OR AS REASONABLY POSSIBLE AND BEFORE THE NEXT STORM EVENT WHENEVER PRACTICABLE.
3. PROVIDE SILT FENCE AND/OR OTHER CONTROL DEVICES, AS MAY BE REQUIRED, TO CONTROL SOIL EROSION DURING UTILITY CONSTRUCTION. ALL DISTURBED AREAS SHALL BE CLEANED, GRADED, AND STABILIZED WITH GRASSING IMMEDIATELY AFTER THE UTILITY INSTALLATION. FILL COVER, AND TEMPORARY SEEDING AT THE END OF EACH DAY ARE RECOMMENDED. IF WATER IS ENCOUNTERED WHILE TRENCHING, THE WATER SHOULD BE FILTERED TO REMOVE ANY SEDIMENTS BEFORE BEING PUMPED BACK INTO ANY WATER OF THE STATE.
4. ALL EROSION CONTROL DEVICES SHALL BE PROPERLY MAINTAINED DURING ALL PHASES OF CONSTRUCTION UNTIL THE COMPLETION OF ALL CONSTRUCTION ACTIVITIES AND ALL DISTURBED AREAS HAVE BEEN STABILIZED. ADDITIONAL CONTROL DEVICES MAY BE REQUIRED DURING CONSTRUCTION IN ORDER TO CONTROL EROSION AND/OR OFFSITE SEDIMENTATION. ALL TEMPORARY CONTROL DEVICES SHALL BE REMOVED ONCE CONSTRUCTION IS COMPLETE AND THE SITE IS STABILIZED.
5. THE CONTRACTOR MUST TAKE NECESSARY ACTION TO MINIMIZE THE TRACKING OF MUD ONTO PAVED ROADWAYS(S) FROM CONSTRUCTION AREAS AND THE GENERATION OF DUST. THE CONTRACTOR SHALL DAILY REMOVE MUD/SOIL FROM PAVEMENT, AS MAY BE REQUIRED.
6. TEMPORARY DIVERSION BERMS AND/OR DITCHES WILL BE PROVIDED AS NEEDED DURING CONSTRUCTION TO PROTECT WORK AREAS FROM UPSLOPE RUNOFF AND/OR TO DIVERT SEDIMENT-LADEN WATER TO APPROPRIATE TRAPS OR STABLE OUTLETS.
7. LITTER, CONSTRUCTION DEBRIS, OILS, FUELS, AND BUILDING PRODUCTS WITH SIGNIFICANT POTENTIAL FOR IMPACT (SUCH AS STOCKPILES OF FRESHLY TREATED LUMBER) AND CONSTRUCTION CHEMICALS THAT COULD BE EXPOSED TO STORM WATER MUST BE PREVENTED FROM BECOMING A POLLUTANT SOURCE IN STORM WATER DISCHARGES.
8. THE CONTRACTOR SHALL INSPECT, REPAIR, AND ADD STONE TO THE STONE CONSTRUCTION ENTRANCE WHEN IT BECOMES SATURATED WITH MUD TO INSURE THAT IT WORKS AS INTENDED.
9. THE TOPSOIL STOCKPILE SHALL BE GRADED TO DRAIN, AND SEEDED WITH THE TEMPORARY SEED MIX.
10. SILT REMOVED FROM THE INLET PROTECTION AND FROM BEHIND THE SILT FENCES SHALL BE PLACED ON THE TOPSOIL STOCKPILE.
11. TEMPORARY SEDIMENT CONTROL MEASURES (SILT FENCE, DIVERSIONS, CONSTRUCTION ENTRANCE, ETC) SHALL BE MAINTAINED UNTIL ALL CONTRIBUTING AREAS ARE GRADED AND STABILIZED.
12. ALL SLOPES 3:1 OR STEEPER SHALL RECEIVE AN EROSION CONTROL BLANKET AND SEEDING. BLANKET SHALL BE NORTH AMERICAN GREEN P300 OR APPROVED EQUAL.
13. ADDITIONAL CONTROL DEVICES MAY BE REQUIRED DURING CONSTRUCTION IN ORDER TO CONTROL EROSION AND/OR OFFSITE SEDIMENTATION.
14. EROSION CONTROL MEASURES WILL BE MAINTAINED AT ALL TIMES, IF FULL IMPLEMENTATION OF THE APPROVED PLAN DOES NOT PROVIDE EFFECTIVE EROSION CONTROL, ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE IMPLEMENTED TO CONTROL OR TREAT THE SEDIMENT SOURCE.
15. GROUND STABILIZATION SHALL BE IN PLACE WITHIN 7 DAYS ON PERIMETER AREAS (INCLUDING DIKES, SWALES, DITCHES), HIGH QUALITY WATER (HQW) ZONES - (NONE ON THIS SITE), AND SLOPES THAT ARE GREATER THAN 3:1. GROUND STABILIZATION SHALL BE IN PLACE WITHIN 14 DAYS ON ALL SLOPES FLATTER THAN 3:1 AND ALL OTHER DISTURBED AREAS. ALL GROUND STABILIZATION SHALL BE INSTALLED AS SOON AS PRACTICAL AN WITHIN THE TIME FRAME LISTED.
16. SELF INSPECTIONS TO BE MADE TO MEET NCDEQ LAND QUALITY REQUIREMENTS.
17. SITE INSPECTIONS TO BE MADE TO MEET NPDES PERMIT REQUIREMENTS.

NCDEQ SELF INSPECTION PROGRAM

THE SELF-INSPECTION PROGRAM IS SEPARATE FROM THE WEEKLY SELF-MONITORING PROGRAM OF THE NPDES STORMWATER PERMIT FOR CONSTRUCTION ACTIVITIES. THE FOCUS OF THE SELF-INSPECTION REPORT IS THE INSTALLATION AND MAINTENANCE OF EROSION AND SEDIMENTATION CONTROL MEASURES ACCORDING TO THE APPROVED PLAN.

THE INSPECTIONS SHOULD BE CONDUCTED AFTER EACH PHASE OF THE PROJECT, AND CONTINUED UNTIL PERMANENT GROUND COVER IS ESTABLISHED. THE SELF INSPECTION SHALL BE DONE BY THE CONTRACTOR WHO IS CONSTRUCTING AND MAINTAINING THE EROSION CONTROL MEASURES DURING THE PROJECT. ALL OF THE EROSION AND SEDIMENTATION CONTROL MEASURES, INCLUDING SEDIMENTATION CONTROL BASINS, TEMPORARY DIVERSIONS, CHECK DAMS, SEDIMENT FENCE, ALL FORMS OF INLET PROTECTION, STORM DRAINAGE FACILITIES, ENERGY DISSIPATERS, STABILIZATION METHODS OF OPEN CHANNELS, ETC. MUST BE INSPECTED.

THE NEED FOR GROUND COVER SHOULD BE CHECKED. TEMPORARY OR PERMANENT GROUND COVER MUST BE PROVIDED ON EXPOSED GRADED SLOPES AND FILLS WITHIN 21 CALENDAR DAYS OF THE COMPLETION OF A PHASE OF GRADING. PERMANENT GROUND COVER MUST BE PROVIDED WITHIN 15 WORKING DAYS (OR 90 CALENDAR DAYS 60 DAYS IN HQW ZONES), WHICHEVER TERM IS SHORTER, UPON THE COMPLETION OF CONSTRUCTION. A SELF-INSPECTION REPORT FOR LAND DISTURBING ACTIVITY MUST BE COMPLETED AND KEPT ON SITE.

FORMS MUST BE FILLED OUT AS STATED IN THE PROGRAM INSTRUCTIONS. DURING WEEKLY INSPECTIONS THE FORMS WILL BE REQUESTED TO BE REVIEWED AND MUST BE PROVIDED. THE FORMS MUST REMAIN ON SITE IN THE CONSTRUCTION TRAILER OR CONSTRUCTION BOX WITH THE PERMIT AND APPROVED PLANS.

MAINTENANCE PLAN:

1. ALL EROSION AND SEDIMENT CONTROL PRACTICES WILL BE CHECKED FOR STABILITY AND OPERATION FOLLOWING EVERY RUNOFF PRODUCING RAINFALL BUT IN NO CASE LESS THAN ONCE EVERY WEEK. ANY NEEDED REPAIRS WILL BE MADE IMMEDIATELY TO MAINTAIN ALL PRACTICES AS DESIGNED.
2. SEDIMENT WILL BE REMOVED FROM THE BLOCK AND GRAVEL INLET PROTECTION DEVICE WHEN STORAGE CAPACITY HAS BEEN APPROXIMATELY 50% FILLED. GRAVEL WILL BE CLEANED OR REPLACED WHEN THE SEDIMENT POOL NO LONGER DRAINS PROPERLY.
3. SEDIMENT AND EROSION CONTROL DEVICES ARE TO BE INSPECTED AND MAINTAINED DAILY. ANY DAMAGE IS TO BE REPAIRED IMMEDIATELY. SEDIMENT WILL BE REMOVED FROM BEHIND THE SEDIMENT FENCE WHEN IT REACHES 1/2 THE HEIGHT OF THE FENCE. THE SEDIMENT FENCE WILL BE REPAIRED AS NECESSARY TO MAINTAIN AN EFFECTIVE BARRIER.
4. ALL SEEDED AREAS WILL BE FERTILIZED, RESEEDED AS NECESSARY, AND MULCHED ACCORDING TO SPECIFICATIONS IN THE VEGETATIVE PLAN TO MAINTAIN A VIGOROUS, DENSE VEGETATIVE COVER.
5. THE SEDIMENT BASIN SHALL BE MAINTAINED IN GOOD OPERATIONAL ORDER AT ALL TIMES. SEDIMENT SHALL BE REMOVED FROM THE SEDIMENT BASIN WHEN THE DESIGN CAPACITY HAS BEEN REDUCED BY 50%.
6. CONTRACTOR KEEP PARKING LOT CLEAN OF MUD AND DEBRIS FROM CONSTRUCTION ACTIVITES.

SEQUENCE OF CONSTRUCTION

PHASE 1:

1. OBTAIN DEQ APPROVAL. CONTRACTOR TO CONDUCT PRE-CONSTRUCTION MEETING WITH COUNTY/DEQ AND LAND DISTURBING CONTRACTORS.
2. STAKE/FLAG THE LIMITS OF DISTURBANCE (LOD) (WHERE STAKING IS NOT POSSIBLE/PRACTICAL, THE LOD MUST BE CONSPICUOUSLY, AND PROMINENTLY, MARKED TO DENOTE THE BOUNDARY). LOD MUST REMAIN CONSPICUOUSLY MARKED THROUGHOUT THE ENTIRE CONSTRUCTION PROJECT.
3. INSTALL SILT FENCE AND CLEAR AND GRADE ONLY THOSE AREAS NEEDED TO INSTALL CONSTRUCTION EXIT, INSTALL SILT FENCE IN THE VICINITY OF, AND DOWN GRADIENT FROM, THE LOCATION OF THE PLANNED CONSTRUCTION EXIT, CONSTRUCTION OFFICE TRAILER, TOP SOIL STOCKPILE AND TEMPORARY PARKING AND STORAGE AREAS. CLEAR ONLY THE MINIMUM AREA ABSOLUTELY NECESSARY TO INSTALL THESE PERIMETER CONTROL BMPS.
4. CLEAR ONLY AREAS NEEDED TO ACCESS AND EXCAVATE SEDIMENT BASIN PER PLAN AND DETAIL SHEETS.
5. COORDINATE WITH GAS COMPANY AND LOWER GAS LINE IN EXISTING BERM TO BELOW BOTTOM ELEVATION OF OUTLET SWALE.
6. ONCE GAS LINE LOWERED, CONSTRUCT TEMPORARY BERM AROUND OUTLET AREA AND INSTALL SEDIMENT SKIMMER DEVICE AND PIPE THROUGH TEMPORARY BERM PER DETAILS. CONSTRUCT RIP RAP EMERGENCY SPILLWAY OVER TEMPORARY BERM. STABILIZE AND DISTURBED SLOPES OF BASIN IMMEDIATELY UPON COMPLETION. INSTALL POROUS BAFFLES.
7. INSTALL SEDIMENT TRAP, ROCK SPILLWAY, BAFFLES AND TEMPORARY SEEDING.
8. INSTALL REMAINING PERIMETER SEDIMENT CONTROL BMPS, AS SHOWN ON THE PHASE 1 PLAN INCLUDING ROCK CHECK DAM. CLEAR ONLY THE MINIMUM AREA NECESSARY TO INSTALL PERIMETER CONTROL BMPS.
9. PREPARE TEMPORARY PARKING AND STORAGE AREA AND INSTALL INLET PROTECTION AT ALL EXISTING INLETS WITHIN THE LIMITS OF DISTURBANCE.
10. UTILIZE TEMPORARY DIVERSION SWALE ALONG SOUTH-EAST LOT LINE TO DIRECT RUNOFF TO BASIN AS AREA IS FILLED.
11. BEGIN CLEARING TREES AND INSTALL TEMPORARY STOCK PILE AREA.
12. CONTRACTOR TO PERFORM SELF SITE INSPECTION AS REQUIRED BY NCDEQ LAND QUALITY SECTION.

SOIL TYPE LEGEND

CODE	DESCRIPTION
AnB	ALPINE FINE SAND

SEDIMENT TRAP #1 - PHASE 1

TOP OF TRAP = 630.5
BOTTOM OF TRAP = 625.5
BOTTOM ROCK OUTFALL EL. = 627.0
(SEE DETAIL C-7.4 FOR ADDITIONAL INFO)

DRAINAGE AREA TO TRAP = 10.7 AC.

REQUIRED TRAP VOLUME =
3,600 CF/AC X 0.7 AC = 12,520 CF
PROVIDED TRAP VOLUME = 16,555 CF

REQUIRED SURFACE AREA=
435 SF X 4.0 CFS = 1,740 SF
OR
(0.0) + (0.6)(5 in)(10.7) = 4.0 cfs
+(0) + (.5)(5.0) = 2.5

PROVIDED SURFACE AREA AT 6' WIDE WEIR
EL. 629.0 = 13,060 SF MIN (STONE SPILLWAY)

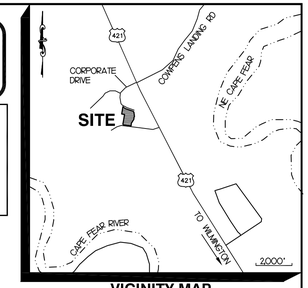
ALL SLOPES STEEPER THAN 3:1 SHALL RECEIVE NORTH AMERICAN GREEN P300 ALONG FACE OF SLOPE. MAXIMUM SLOPE SHALL BE 2:1

PH. 1 DISTURBED AREA ±6.0 ACRES TOTAL DISTURBED AREA = ±12.0 ACRES

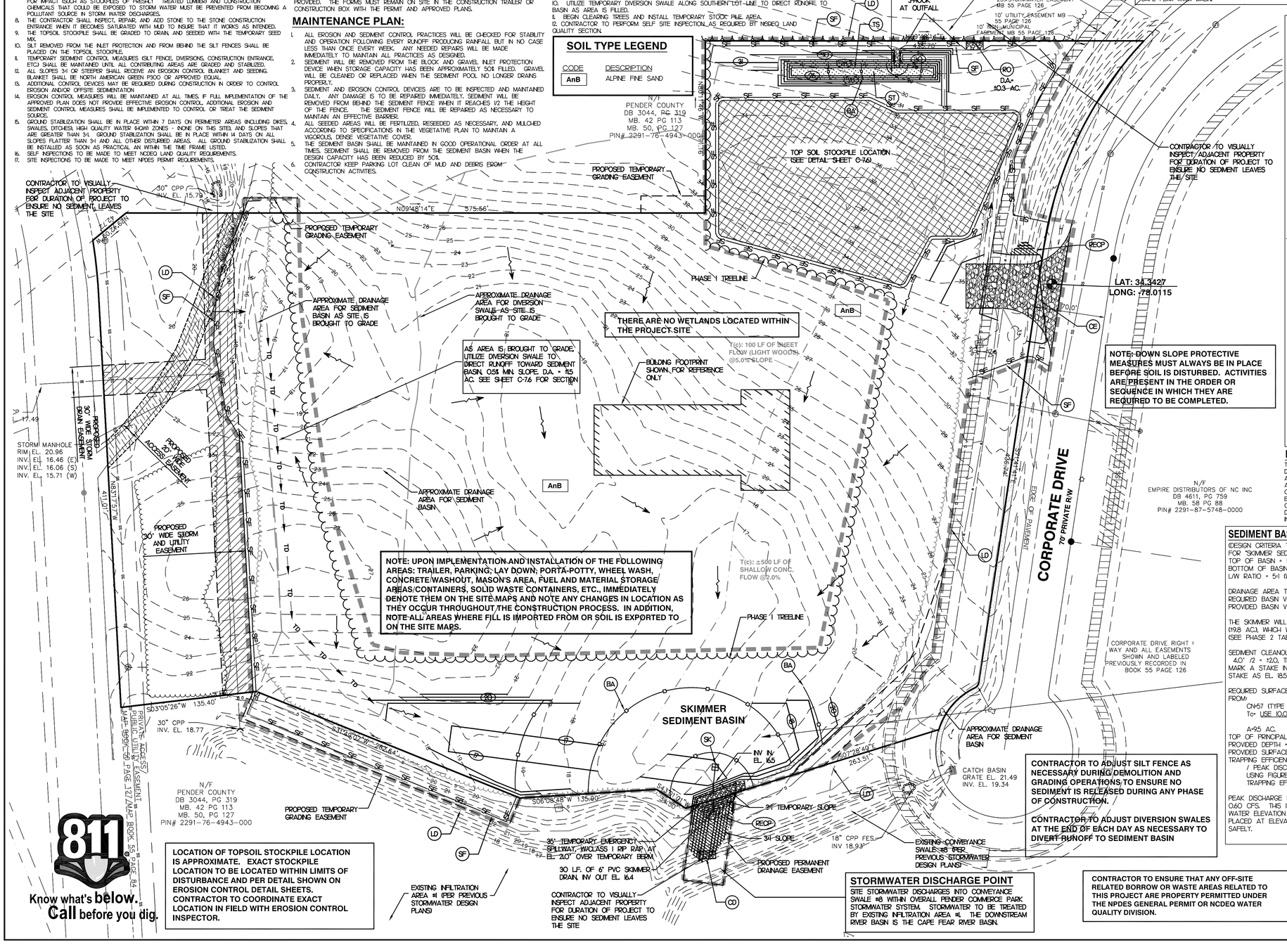
CONTRACTOR TO INSTALL GROUNDCOVER ON ALL EXPOSED PERIMETER SLOPES AND SLOPES STEEPER THAN 3:1 WITHIN 7 CALENDAR DAYS FOLLOWING COMPLETION OF ANY PHASE OF GRADING, GROUNDCOVER FOR ALL REMAINING DISTURBED AREAS SHALL BE INSTALLED WITHIN 14 DAYS.

STORMWATER DISCHARGE POINT

SITE STORMWATER DISCHARGES INTO CONVEYANCE SWALE "D-1" WITHIN OVERALL PENDER COMMERCE PARK STORMWATER SYSTEM. STORMWATER QUALITY AND QUANTITY TO BE TREATED BY POND #1. THE DOWNSTREAM RIVER BASIN IS THE CAPE FEAR RIVER BASIN.



VICINITY MAP



CONTRACTOR TO ADJUST SILT FENCE AS NECESSARY DURING DEMOLITION AND GRADING OPERATIONS TO ENSURE NO SEDIMENT IS RELEASED DURING ANY PHASE OF CONSTRUCTION.

CONTRACTOR TO ADJUST DIVERSION SWALES AT THE END OF EACH DAY AS NECESSARY TO DIVERT RUNOFF TO SEDIMENT BASIN

LOCATION OF TOPSOIL STOCKPILE LOCATION IS APPROXIMATE. EXACT STOCKPILE LOCATION TO BE LOCATED WITHIN LIMITS OF DISTURBANCE AND PER DETAIL SHOWN ON EROSION CONTROL DETAIL SHEETS. CONTRACTOR TO COORDINATE EXACT LOCATION IN FIELD WITH EROSION CONTROL INSPECTOR.

STORMWATER DISCHARGE POINT

SITE STORMWATER DISCHARGES INTO CONVEYANCE SWALE #8 WITHIN OVERALL PENDER COMMERCE PARK STORMWATER SYSTEM. STORMWATER TO BE TREATED BY EXISTING INFILTRATION AREA #1. THE DOWNSTREAM RIVER BASIN IS THE CAPE FEAR RIVER BASIN.

CONTRACTOR TO ENSURE THAT ANY OFF-SITE RELATED BORROW OR WASTE AREAS RELATED TO THIS PROJECT ARE PROPERTY PERMITTED UNDER THE NPDES GENERAL PERMIT OR NCDEQ WATER QUALITY DIVISION.

EROSION/SEDIMENT CONTROL LEGEND

SYMBOL	DESCRIPTION
	(LD) LIMITS OF CONSTRUCTION
	DRAINAGE AREA BOUNDARY
— SF —	(SF) SILT FENCE (SEE DETAIL 6.62)
	(OP) OUTLET STABILIZATION STRUCTURE (SEE DETAIL 6.41)
	(IP1) DOMED INLET PROTECTION (SEE DETAIL SHEET C-7.5)
	(IP2) CURB INLET PROTECTION (SEE DETAIL SHEET C-7.5)
	(CE) STONE CONSTRUCTION ENTRANCE/EXIT (SEE DETAIL 6.06)
	(CD) STONE CHECK DAMS (SEE DETAIL 6.63)
— SF —	(RO) STONE CHECK DAMS AT SILT FENCE OUTFALL (SEE DETAIL SHEET C-7.5)
— TD —	(TD) TEMPORARY DIVERSION (SEE DETAIL 6.20)
	(TS) TEMPORARY SEEDING (SEE DETAIL 6.10)
	(PS) PERMANENT SEEDING (SEE DETAIL 6.11)
	(RECP) ROLLED EROSION CONTROL MATTING (SEE DETAIL 6.17)
	(SK) SKIMMER DEVICE (SEE DETAIL C-7.4)
	(BA) POROUS BAFFLES (SEE DETAIL 6.65)
	FLOW ARROW
	(RR) RIP RAP (SEE DETAIL SHEET)

PROJECT NARRATIVE:

THE PURPOSE OF THIS PROJECT IS TO CONSTRUCT A FED EX FREIGHT DISTRIBUTION FACILITY THAT CONTAINS APPROXIMATELY 10,200 SF OF SERVICE AREA AND 4,800 SF OF OFFICE AREA WITH LOADING/UNLOADING DOCKS AND ASSOCIATED PARKING AREAS. THE SITE IS PART OF THE EXISTING PENDER COUNTY COMMERCE PARK AND THIS PARTICULAR LOT IS CURRENTLY WOODED. EXISTING STORMWATER QUANTITY AND QUALITY MEASURES ARE IN PLACE AND IN COMPLIANCE WITH THE ISSUED PERMIT PER PENDER COUNTY. STORMWATER WILL DISCHARGE INTO CONVEYANCE SWALE #8 AND WILL BE TREATED FOR QUALITY IN INFILTRATION POND #1 AND FOR STORMWATER QUANTITY IN DETENTION POND #1.

SEDIMENT BASIN - PHASE 1

(DESIGN CRITERIA TAKEN FROM SECTION 6.64 OF NC ESC PLANNING MANUAL)
FOR "SKIMMER SEDIMENT BASIN"
TOP OF BASIN = 122.0 (EXISTING)
BOTTOM OF BASIN = 16.5
L/W RATIO = 5:1 (WITHIN 2:1 - 6:1 ALLOWABLE RANGE)

DRAINAGE AREA TO BASIN = ±9.5 AC.
REQUIRED BASIN VOLUME = 1800 CF/AC X 9.0 = 17,100 CF
PROVIDED BASIN VOLUME @ EL. 21.0 = ±290,000 CF

THE SKIMMER WILL BE DESIGNED FOR THE LARGER PHASE 2 DRAINAGE AREA (19.8 AC.), WHICH WILL UTILIZE A 6' FAIRCLOTH SKIMMER WITH A 5' HEAD (SEE PHASE 2 TABULATION).

SEDIMENT CLEANOUT STAKE = SKIMMER EL. = 20.5 / BOTTOM EL. 16.5 = 4.0'
4.0' /2 = 12.0, THEREFORE 16.5' + 2.0' = 18.5' (USE 19.0') (CONTRACTOR TO MARK A STAKE IN THE BASIN AT ELEVATION 18.5' - DO NOT USE TOP OF STAKE AS EL. 18.5)

REQUIRED SURFACE AREA: 325 SF X 19 CFS = 6,175 SF, 19 CFS DERIVED FROM:
CN=57 (TYPE A SOILS - 5.5 AC NEWLY GRADED/4 AC. LIGHT WOODS)
Tc= USE 10.0 MIN. (100 LF SHEET FLOW = 12.5 MIN)
(500 LF SHALLOW CONC. = 3.5 MIN) = 16.0 MIN
A=9.5 AC.
TOP OF PRINCIPAL SPILLWAY/SKIMMER = EL. 21.0
PROVIDED DEPTH = 4.5'
PROVIDED SURFACE AREA AT EL. 21.0 = 95,000 SF
TRAPPING EFFICIENCY = SURFACE AREA = 95,000 SF (2.2 AC.)
/ PEAK DISCHARGE (Q CFS) = 1.8
USING FIGURE 6.61a (AC/CFS = 1.8 & SILT LOAM)
TRAPPING EFFICIENCY = 99%

PEAK DISCHARGE IS BASED ON THE SKIMMER DE-WATERING 51,840 CF/DAY, OR 0.60 CFS. THIS IS THEN ROUTED THROUGH THE BASIN TO YIELD A 10-YEAR WATER ELEVATION = 17.9 (1' FREEBOARD). A 35' WIDE EMERGENCY SPILLWAY PLACED AT ELEVATION 21.0 WILL ENSURE THE 100-YEAR EVENT WILL PASS SAFELY.

MAG-DATE
0 50' 100' 150'
1" = 50'

Know what's below. Call before you dig.

PLANS PREPARED BY:
CAMPBELL
E & A, INC.
Civil Engineering and Land Planning
31 Boland Court
Greenville, SC 29615
Tel: (864) 335-4090
Fax: (864) 335-4095

SEAL:

NORTH CAROLINA PROFESSIONAL SEAL 28622 ENGINEER TIMOTHY W. CAMPBELL 2/23/18

FedEx Freight
PENDER COUNTY BUSINESS PARK
CORPORATE DRIVE
WILMINGTON, NC 28405

DEVELOPER:
SETZER PROPERTIES
SETZER PROPERTIES WMN, LLC
354 WALLER AVENUE, STE 200
LEXINGTON , KY 40504
CONTACT: ROBBIE McATEE
(859) 514-7767
FAX: (859) 281-6335

REVISIONS:

FOR CONSTRUCTION	02/23/18

CHECKED BY:	TWC
DRAWING BY:	FSE
DATE:	01/16/18
JOB NUMBER:	-

TITLE:
EROSION & SEDIMENT CONTROL PLAN - PH 1

SHEET NUMBER:
C-7.0

COMMENTS:

EROSION CONTROL NOTES:

1. IF NECESSARY, SLOPES, WHICH EXCEED EIGHT (8) VERTICAL FEET SHOULD BE STABILIZED WITH SYNTHETIC OR VEGETATIVE MATS. IN ADDITION TO HYDROSEEDING, IT MAY BE NECESSARY TO INSTALL TEMPORARY SLOPE DRAINS DURING CONSTRUCTION. TEMPORARY BERMS MAY BE NEEDED UNTIL THE SLOPE IS BROUGHT TO GRADE.
2. ALL SEDIMENT AND EROSION CONTROL DEVICES SHALL BE INSPECTED EVERY SEVEN (7) DAYS. IF SITE INSPECTIONS IDENTIFY BMPS THAT ARE DAMAGED OR ARE NOT OPERATING EFFECTIVELY, MAINTENANCE MUST BE PERFORMED AS SOON AS PRACTICAL OR AS REASONABLY POSSIBLE AND BEFORE THE NEXT STORM EVENT WHENEVER PRACTICABLE.
3. PROVIDE SILT FENCE AND/OR OTHER CONTROL DEVICES, AS MAY BE REQUIRED, TO CONTROL SOIL EROSION DURING UTILITY CONSTRUCTION. ALL DISTURBED AREAS SHALL BE CLEANED, GRADED, AND STABILIZED WITH GRASSING IMMEDIATELY AFTER THE UTILITY INSTALLATION. FILL COVER, AND TEMPORARY SEEDING AT THE END OF EACH DAY ARE RECOMMENDED. IF WATER IS ENCOUNTERED WHILE TRENCHING, THE WATER SHOULD BE FILTERED TO REMOVE ANY SEDIMENTS BEFORE BEING PUMPED BACK INTO ANY WATER OF THE STATE.
4. ALL EROSION CONTROL DEVICES SHALL BE PROPERLY MAINTAINED DURING ALL PHASES OF CONSTRUCTION UNTIL THE COMPLETION OF ALL CONSTRUCTION ACTIVITIES AND ALL DISTURBED AREAS HAVE BEEN STABILIZED. ADDITIONAL CONTROL DEVICES MAY BE REQUIRED DURING CONSTRUCTION IN ORDER TO CONTROL EROSION AND/OR OFFSITE SEDIMENTATION. ALL TEMPORARY CONTROL DEVICES SHALL BE REMOVED ONCE CONSTRUCTION IS COMPLETE AND THE SITE IS STABILIZED.
5. THE CONTRACTOR MUST TAKE NECESSARY ACTION TO MINIMIZE THE TRACKING OF MUD ONTO PAVED ROADWAYS(S) FROM CONSTRUCTION AREAS AND THE GENERATION OF DUST. THE CONTRACTOR SHALL DAILY REMOVE MUD/SOIL FROM PAVEMENT, AS MAY BE REQUIRED.
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FORMS MUST BE FILLED OUT AS STATED IN THE PROGRAM INSTRUCTIONS. DURING WEEKLY INSPECTIONS THE FORMS WILL BE REQUESTED TO BE REVIEWED AND MUST BE PROVIDED. THE FORMS MUST REMAIN ON SITE IN THE CONSTRUCTION TRAILER OR CONSTRUCTION BOX WITH THE PERMIT AND APPROVED PLANS.

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4. ALL SEEDED AREAS WILL BE FERTILIZED, RESEEDED AS NECESSARY, AND MULCHED ACCORDING TO SPECIFICATIONS IN THE VEGETATIVE PLAN TO MAINTAIN A VIGOROUS, DENSE VEGETATIVE COVER.
5. THE SEDIMENT BASIN SHALL BE MAINTAINED IN GOOD OPERATIONAL ORDER AT ALL TIMES. SEDIMENT SHALL BE REMOVED FROM THE SEDIMENT BASIN WHEN THE DESIGN CAPACITY HAS BEEN REDUCED BY 50%.
6. CONTRACTOR KEEP PARKING LOT CLEAN OF MUD AND DEBRIS FROM CONSTRUCTION ACTIVITES.

SEQUENCE OF CONSTRUCTION PHASE 2:

1. BEGIN CLEARING, GRUBBING, AND STRIPPING THE SITE. (PHASE CLEARING AND GRUBBING TO THE EXTENT PRACTICAL TO MINIMIZE THE AMOUNT OF AREA DISTURBED AT ANY POINT IN TIME). ADJUST AND INSTALL SILT FENCE AS NECESSARY TO PROTECT DISTURBED AREAS.
2. BRING SEDIMENT BASIN TO PHASE 2 GRADES AS SHOWN ON THIS PLAN, ADJUST POROUS BAFFLES AND INSTALL TEMPORARY SEEDING ON BASIN BOTTOM AND SLOPES GREATER THAN 3:1. INSTALL MATTING ON ALL OTHER SLOPES AND INSIDE SWALES.
3. PREPARE BUILDING PAD PER GEOTECHNICAL ENGINEER RECOMMENDATIONS AND SHEET G-1.0.
4. GRADE IN SWALE ON NORTHERN LOT LINE TO BASIN AND LINE WITH MATTING AND INSTALL CHECK DAMS. AS SOUTHERN LOT LINE IS BROUGHT TO GRADE, CONSTRUCT TEMPORARY DIVERSION SWALE TO SOUTHERN PORTION OF SEDIMENT BASIN.
5. BEGIN INSTALLING STORM DRAIN PIPES PER GRADING PLAN. INSTALL INLET PROTECTION IMMEDIATELY UPON COMPLETION OF NEW INLETS AND RIP RAP/FILTER FABRIC AT NEW HEADWALL LOCATION.
6. CONSTRUCT CONCRETE FLUME FROM FROM HEADWALL TO SKIMMER DEVICE.
7. AS EMPLOYEE PARKING AREA IS BROUGHT TO GRADE, INSTALL CHECK DAMS AT SILT FENCE AS SHOWN ON PLANS AND DETAIL.
8. AS SITE IS BROUGHT TO GRADE, FILL IN LOW AREAS AS NOTED ON GRADING PLAN TO ENSURE POSITIVE DRAINAGE. CONTRACTOR TO ADJUST SILT FENCE AS NEEDED TO PROTECT DOWNSTREAM PROPERTY FROM ANY SEDIMENT RELEASE.
9. TEMPORARILY STABILIZE THROUGHOUT CONSTRUCTION IMMEDIATELY FOLLOWING THE COMPLETION OF THE MOST RECENT LAND DISTURBING/GRADING ACTIVITY, ANY DISTURBED AREAS, INCLUDING MATERIAL STOCKPILES THAT ARE SCHEDULED OR LIKELY TO REMAIN INACTIVE FOR 14 DAYS OR MORE. EXPOSED PERIMETER SLOPES AND ANY SLOPES STEEPER THAN 3:1 SHALL BE STABILIZED WITHIN 7 CALENDAR DAYS FOLLOWING COMPLETION OF GRADING.
10. CONTRACTOR TO PERFORM SELF SITE INSPECTION AS REQUIRED BY NCDEQ LAND QUALITY SECTION.

ALL SLOPES STEEPER THAN 3:1 SHALL RECEIVE NORTH AMERICAN GREEN P300 ALONG FACE OF SLOPE. MAXIMUM SLOPE SHALL BE 2:1

SEDIMENT TRAP #1 - PHASE 2

TOP OF TRAP = 630.5
BOTTOM OF TRAP = 625.5
BOTTOM ROCK OUTFALL EL. = 627.0
(SEE DETAIL C-7.4 FOR ADDITIONAL INFO)

DRAINAGE AREA TO TRAP = 10.9 AC.

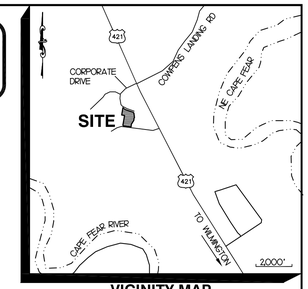
REQUIRED TRAP VOLUME =
3,600 CF/AC X 0.9 AC = 13,240 CF
PROVIDED TRAP VOLUME = 16,515 CF

REQUIRED SURFACE AREA=
435 SF X 51 CFS = 2220 SF
0.10) = (0.4)(9.5 in/hr)(0.9) = 51 cfs
=(cfs) = 5.0 min.
PROVIDED SURFACE AREA AT 6' WIDE WEIR
EL. 629.0 = 13,060 SF MIN (STONE SPILLWAY)

PH. 2 DISTURBED AREA ±12.0 ACRES TOTAL DISTURBED AREA = ±12.0 ACRES

STORMWATER DISCHARGE POINT

SITE STORMWATER DISCHARGES INTO CONVEYANCE SWALE "D-1" WITHIN OVERALL PENDER COMMERCE PARK STORMWATER SYSTEM. STORMWATER QUALITY AND QUANTITY TO BE TREATED BY POND #1. THE DOWNSTREAM RIVER BASIN IS THE CAPE FEAR RIVER BASIN.

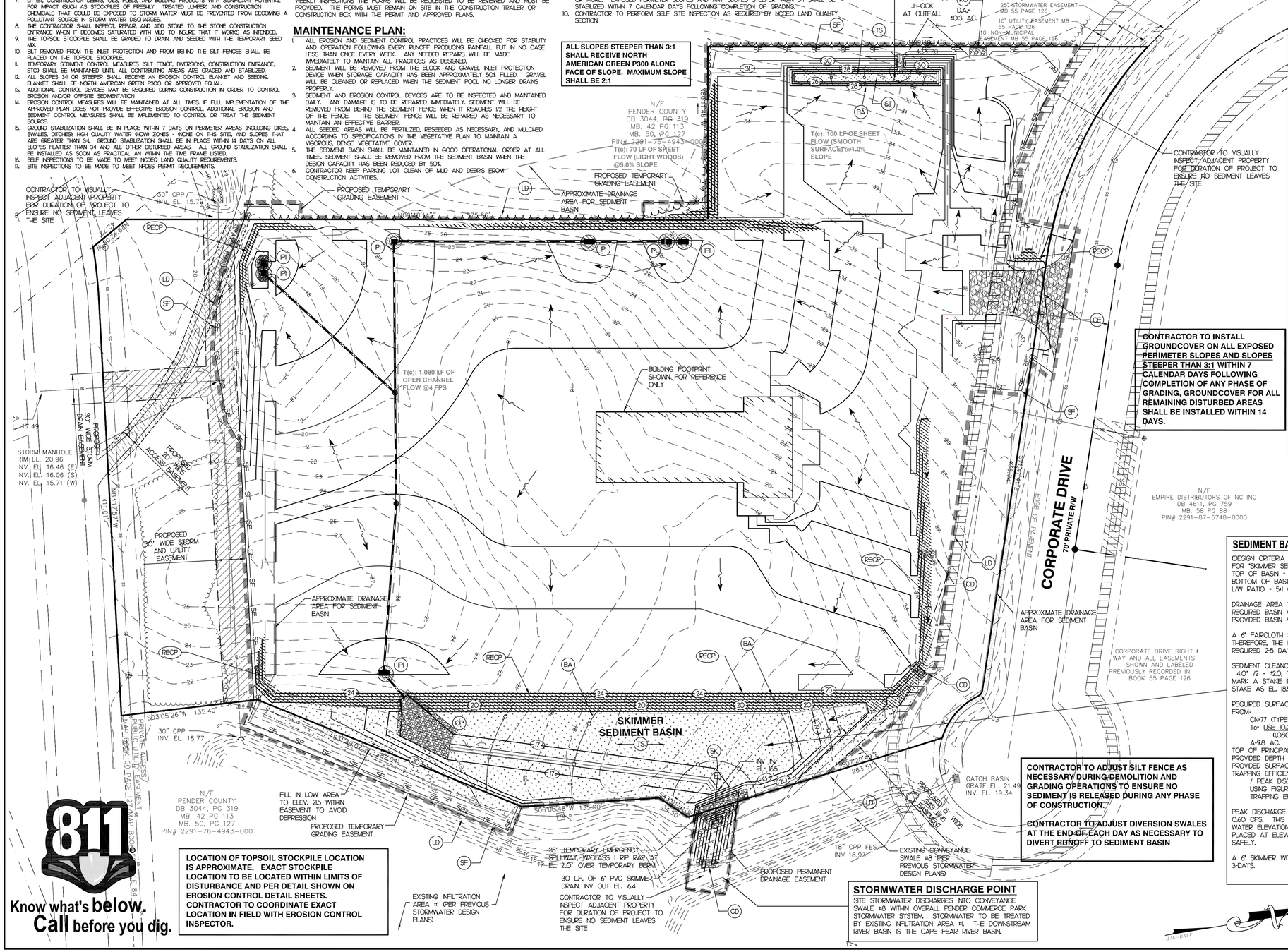


VICINITY MAP

EROSION/SEDIMENT CONTROL LEGEND

SYMBOL	DESCRIPTION
	(LD) LIMITS OF CONSTRUCTION
	DRAINAGE AREA BOUNDARY
—— SF ——	(SF) SILT FENCE (SEE DETAIL 6.62)
	(OP) OUTLET STABILIZATION STRUCTURE (SEE DETAIL 6.41)
	(IP1) DOMED INLET PROTECTION (SEE DETAIL SHEET C-7.5)
	(IP2) CURB INLET PROTECTION (SEE DETAIL SHEET C-7.5)
	(CE) STONE CONSTRUCTION ENTRANCE/EXIT (SEE DETAIL 6.06)
	(CD) STONE CHECK DAMS (SEE DETAIL 6.83)
— SF — — SF —	(RC) STONE CHECK DAMS AT SILT FENCE OUTFALL (SEE DETAIL SHEET C-7.5)
→ TD →	(TD) TEMPORARY DIVERSION (SEE DETAIL 6.20)
	(TS) TEMPORARY SEEDING (SEE DETAIL 6.10)
	(PS) PERMANENT SEEDING (SEE DETAIL 6.11)
	(RECP) ROLLED EROSION CONTROL MATTING (SEE DETAIL 6.17)
	(SK) SKIMMER DEVICE (SEE DETAIL C-7.4)
	(BA) POROUS BAFFLES (SEE DETAIL 6.65)
	FLOW ARROW
	(RR) RIP RAP (SEE DETAIL SHEET)

CONTRACTOR TO ENSURE THAT ANY OFF-SITE RELATED BORROW OR WASTE AREAS RELATED TO THIS PROJECT ARE PROPERTY PERMITTED UNDER THE NPDES GENERAL PERMIT OR NCDEQ WATER QUALITY DIVISION.



CONTRACTOR TO INSTALL GROUNDCOVER ON ALL EXPOSED PERIMETER SLOPES AND SLOPES STEEPER THAN 3:1 WITHIN 7 CALENDAR DAYS FOLLOWING COMPLETION OF ANY PHASE OF GRADING, GROUNDCOVER FOR ALL REMAINING DISTURBED AREAS SHALL BE INSTALLED WITHIN 14 DAYS.

CONTRACTOR TO ADJUST SILT FENCE AS NECESSARY DURING DEMOLITION AND GRADING OPERATIONS TO ENSURE NO SEDIMENT IS RELEASED DURING ANY PHASE OF CONSTRUCTION.

CONTRACTOR TO ADJUST DIVERSION SWALES AT THE END OF EACH DAY AS NECESSARY TO DIVERT RUNOFF TO SEDIMENT BASIN

SEDIMENT BASIN - PHASE 2

(DESIGN CRITERIA TAKEN FROM SECTION 6.64 OF NC ESC PLANNING MANUAL)
FOR "SKIMMER SEDIMENT BASIN"
TOP OF BASIN = 122.0 (EXISTING)
BOTTOM OF BASIN = 16.5
L/W RATIO = 5:1 (WITHIN 2:1 - 6:1 ALLOWABLE RANGE)

DRAINAGE AREA TO BASIN = 19.8 AC.
REQUIRED BASIN VOLUME = 1800 CF/AC X 9.8 = 117,640 CF
PROVIDED BASIN VOLUME = 121.0 = 143,310 CF

A 6" FAIRCLOTH SKIMMER WITH A 5" HEAD CAN DRAIN 155,520 CF IN 3 DAYS. THEREFORE, THE DE-WATERING TIME IS APPROXIMATELY 2.8 DAYS. WITHIN THE REQUIRED 2-5 DAY DE-WATERING TIME FRAME.

SEDIMENT CLEANOUT STAKE = SKIMMER EL. = 20.5 / BOTTOM EL. 16.5 = 4.0'
4.0' /2 = 12.0, THEREFORE 16.5' + 2.0' = 18.5' (USE 19.0') (CONTRACTOR TO MARK A STAKE IN THE BASIN AT ELEVATION 18.5' - DO NOT USE TOP OF STAKE AS EL. 18.5)

REQUIRED SURFACE AREA: 325 SF X 42 CFS = 13,650 SF, 42 CFS DERIVED FROM:
CN=77 (TYPE A SOILS, 9.8 AC. NEWLY GRADED)
Tc= USE 10.0 MIN. (70 LF SHEET FLOW = 9.5 MIN)
(1,080 LF OPEN CHANNEL = 4.5 MIN) = 14.0 MIN.
A=9.8 AC.
TOP OF PRINCIPAL SPILLWAY/SKIMMER = EL. 21.0
PROVIDED DEPTH = 4.5'
PROVIDED SURFACE AREA AT EL. 21.0 = 48,822 SF
TRAPPING EFFICIENCY = SURFACE AREA = 154,724 SF (13 AC.)
/ PEAK DISCHARGE (1.4 CFS) = 0.9
USING FIGURE 6.6a (AC/CFS = 0.9 & SILT LOAM)
TRAPPING EFFICIENCY = 97%

PEAK DISCHARGE IS BASED ON THE SKIMMER DE-WATERING 51,840 CF/DAY, OR 0.60 CFS. THIS IS THEN ROUTED THROUGH THE BASIN TO YIELD A 10-YEAR WATER ELEVATION = 20.2 (1' FREEBOARD). A 35' WIDE EMERGENCY SPILLWAY PLACED AT ELEVATION 21.0 WILL ENSURE THE 100-YEAR EVENT WILL PASS SAFELY.

A 6" SKIMMER WITH A 5" HEAD WILL DRAIN THE 10-YEAR STORM EVENT WITHIN 3-DAYS.

LOCATION OF TOPSOIL STOCKPILE LOCATION IS APPROXIMATE. EXACT STOCKPILE LOCATION TO BE LOCATED WITHIN LIMITS OF DISTURBANCE AND PER DETAIL SHOWN ON EROSION CONTROL DETAIL SHEETS. CONTRACTOR TO COORDINATE EXACT LOCATION IN FIELD WITH EROSION CONTROL INSPECTOR.

STORMWATER DISCHARGE POINT

SITE STORMWATER DISCHARGES INTO CONVEYANCE SWALE #8 WITHIN OVERALL PENDER COMMERCE PARK STORMWATER SYSTEM. STORMWATER TO BE TREATED BY EXISTING INFILTRATION AREA #1. THE DOWNSTREAM RIVER BASIN IS THE CAPE FEAR RIVER BASIN.

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

PLANS PREPARED BY:
CAMPBELL
E & A, INC.
Civil Engineering and Land Planning
31 Boland Court
Greenville, SC 29615
(864) 335-4090
Fax: (864) 335-4095

SEAL:

NORTH CAROLINA PROFESSIONAL SEAL 28622 ENGINEER TIMOTHY W. CAMPBELL 2/23/18

FedEx Freight
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CORPORATE DRIVE
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DEVELOPER:
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SETZER PROPERTIES WMN, LLC
354 WALLER AVENUE, STE 200
LEXINGTON , KY 40504
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(859) 514-7767
FAX: (859) 281-6335

REVISIONS:	
FOR CONSTRUCTION	02/23/18
CHECKED BY:	TWC
DRAWING BY:	FSE
DATE:	01/16/18
JOB NUMBER:	-

TITLE:
EROSION & SEDIMENT CONTROL PLAN - PH 2

SHEET NUMBER:
C-7.1

COMMENTS:

EROSION CONTROL NOTES:

1. IF NECESSARY, SLOPES, WHICH EXCEED EIGHT (8) VERTICAL FEET SHOULD BE STABILIZED WITH SYNTHETIC OR VEGETATIVE MATS, IN ADDITION TO HYDROSEEDING. IT MAY BE NECESSARY TO INSTALL TEMPORARY SLOPE DRAINS DURING CONSTRUCTION. TEMPORARY BERMS MAY BE NEEDED UNTIL THE SLOPE IS BROUGHT TO GRADE.
2. ALL SEDIMENT AND EROSION CONTROL DEVICES SHALL BE INSPECTED EVERY SEVEN (7) DAYS. IF SITE INSPECTIONS IDENTIFY BMPS THAT ARE DAMAGED OR ARE NOT OPERATING EFFECTIVELY, MAINTENANCE MUST BE PERFORMED AS SOON AS PRACTICAL OR AS REASONABLY POSSIBLE AND BEFORE THE NEXT STORM EVENT WHENEVER PRACTICABLE.
3. PROVIDE SILT FENCE AND/OR OTHER CONTROL DEVICES, AS MAY BE REQUIRED, TO CONTROL SOIL EROSION DURING UTILITY CONSTRUCTION. ALL DISTURBED AREAS SHALL BE CLEANED, GRADED, AND STABILIZED WITH GRASSING IMMEDIATELY AFTER THE UTILITY INSTALLATION. FILL COVER, AND TEMPORARY SEEDING AT THE END OF EACH DAY ARE RECOMMENDED. IF WATER IS ENCOUNTERED WHILE TRENCHING, THE WATER SHOULD BE FILTERED TO REMOVE ANY SEDIMENTS BEFORE BEING PUMPED BACK INTO ANY WATER OF THE STATE.
4. ALL EROSION CONTROL DEVICES SHALL BE PROPERLY MAINTAINED DURING ALL PHASES OF CONSTRUCTION UNTIL THE COMPLETION OF ALL CONSTRUCTION ACTIVITIES AND ALL DISTURBED AREAS HAVE BEEN STABILIZED. ADDITIONAL CONTROL DEVICES MAY BE REQUIRED DURING CONSTRUCTION IN ORDER TO CONTROL EROSION AND/OR OFFSITE SEDIMENTATION. ALL TEMPORARY CONTROL DEVICES SHALL BE REMOVED ONCE CONSTRUCTION IS COMPLETE AND THE SITE IS STABILIZED.
5. THE CONTRACTOR MUST TAKE NECESSARY ACTION TO MINIMIZE THE TRACKING OF MUD ONTO PAVED ROADWAYS(S) FROM CONSTRUCTION AREAS AND THE GENERATION OF DUST. THE CONTRACTOR SHALL DAILY REMOVE MUD/SOIL FROM PAVEMENT, AS MAY BE REQUIRED.
6. TEMPORARY DIVERSION BERMS AND/OR DITCHES WILL BE PROVIDED AS NEEDED DURING CONSTRUCTION TO PROTECT WORK AREAS FROM UPSLOPE RUNOFF AND/OR TO DIVERT SEDIMENT-LADEN WATER TO APPROPRIATE TRAPS OR STABLE OUTLETS.
7. LITTER, CONSTRUCTION DEBRIS, OILS, FUELS, AND BUILDING PRODUCTS WITH SIGNIFICANT POTENTIAL FOR IMPACT (SUCH AS STOCKPILES OF FRESHLY TREATED LUMBER) AND CONSTRUCTION CHEMICALS THAT COULD BE EXPOSED TO STORM WATER MUST BE PREVENTED FROM BECOMING A POLLUTANT SOURCE IN STORM WATER DISCHARGES.
8. THE CONTRACTOR SHALL INSPECT, REPAIR, AND ADD STONE TO THE STONE CONSTRUCTION ENTRANCE WHEN IT BECOMES SATURATED WITH MUD TO INSURE THAT IT WORKS AS INTENDED.
9. THE TOPSOIL STOCKPILE SHALL BE GRADED TO DRAIN, AND SEEDED WITH THE TEMPORARY SEED MIX.
10. SILT REMOVED FROM THE INLET PROTECTION AND FROM BEHIND THE SILT FENCES SHALL BE PLACED ON THE TOPSOIL STOCKPILE.
11. TEMPORARY SEDIMENT CONTROL MEASURES (SILT FENCE, DIVERSIONS, CONSTRUCTION ENTRANCE, ETC) SHALL BE MAINTAINED UNTIL ALL CONTRIBUTING AREAS ARE GRADED AND STABILIZED.
12. ALL SLOPES 3:1 OR STEEPER SHALL RECEIVE AN EROSION CONTROL BLANKET AND SEEDING. BLANKET SHALL BE NORTH AMERICAN GREEN P300 OR APPROVED EQUAL.
13. ADDITIONAL CONTROL DEVICES MAY BE REQUIRED DURING CONSTRUCTION IN ORDER TO CONTROL EROSION AND/OR OFFSITE SEDIMENTATION.
14. EROSION CONTROL MEASURES WILL BE MAINTAINED AT ALL TIMES. IF FULL IMPLEMENTATION OF THE APPROVED PLAN DOES NOT PROVIDE EFFECTIVE EROSION CONTROL, ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE IMPLEMENTED TO CONTROL OR TREAT THE SEDIMENT SOURCE.
15. GROUND STABILIZATION SHALL BE IN PLACE WITHIN 7 DAYS ON PERIMETER AREAS (INCLUDING DIKES, SWALES, DITCHES), HIGH QUALITY WATER (HQW) ZONES - (NONE ON THIS SITE), AND SLOPES THAT ARE GREATER THAN 3:1. GROUND STABILIZATION SHALL BE IN PLACE WITHIN 14 DAYS ON ALL SLOPES FLATTER THAN 3:1 AND ALL OTHER DISTURBED AREAS. ALL GROUND STABILIZATION SHALL BE INSTALLED AS SOON AS PRACTICAL AN WITHIN THE TIME FRAME LISTED.
16. SELF INSPECTIONS TO BE MADE TO MEET NCDEQ LAND QUALITY REQUIREMENTS.
17. SITE INSPECTIONS TO BE MADE TO MEET NPDES PERMIT REQUIREMENTS.

NCDEQ SELF INSPECTION PROGRAM

THE SELF-INSPECTION PROGRAM IS SEPARATE FROM THE WEEKLY SELF-MONITORING PROGRAM OF THE NPDES STORMWATER PERMIT FOR CONSTRUCTION ACTIVITIES. THE FOCUS OF THE SELF-INSPECTION REPORT IS THE INSTALLATION AND MAINTENANCE OF EROSION AND SEDIMENTATION CONTROL MEASURES ACCORDING TO THE APPROVED PLAN.

THE INSPECTIONS SHOULD BE CONDUCTED AFTER EACH PHASE OF THE PROJECT, AND CONTINUED UNTIL PERMANENT GROUND COVER IS ESTABLISHED. THE SELF INSPECTION SHALL BE DONE BY THE CONTRACTOR WHO IS CONSTRUCTING AND MAINTAINING THE EROSION CONTROL MEASURES DURING THE PROJECT. ALL OF THE EROSION AND SEDIMENTATION CONTROL MEASURES, INCLUDING SEDIMENTATION CONTROL BASINS, TEMPORARY DIVERSIONS, CHECK DAMS, SEDIMENT FENCE, ALL FORMS OF INLET PROTECTION, STORM DRAINAGE FACILITIES, ENERGY DISSIPATERS, STABILIZATION METHODS OF OPEN CHANNELS, ETC. MUST BE INSPECTED.

THE NEED FOR GROUND COVER SHOULD BE CHECKED. TEMPORARY OR PERMANENT GROUND COVER MUST BE PROVIDED ON EXPOSED GRADED SLOPES AND FILLS WITHIN 21 CALENDAR DAYS OF THE COMPLETION OF A PHASE OF GRADING. PERMANENT GROUND COVER MUST BE PROVIDED WITHIN 15 WORKING DAYS (OR 90 CALENDAR DAYS (60 DAYS IN HQW ZONES), WHICHEVER TERM IS SHORTER, UPON THE COMPLETION OF CONSTRUCTION. A SELF-INSPECTION REPORT FOR LAND DISTURBING ACTIVITY MUST BE COMPLETED AND KEPT ON SITE.

FORMS MUST BE FILLED OUT AS STATED IN THE PROGRAM INSTRUCTIONS. DURING WEEKLY INSPECTIONS THE FORMS WILL BE REQUESTED TO BE REVIEWED AND MUST BE PROVIDED. THE FORMS MUST REMAIN ON SITE IN THE CONSTRUCTION TRAILER OR CONSTRUCTION BOX WITH THE PERMIT AND APPROVED PLANS.

MAINTENANCE PLAN:

1. ALL EROSION AND SEDIMENT CONTROL PRACTICES WILL BE CHECKED FOR STABILITY AND OPERATION FOLLOWING EVERY RUNOFF PRODUCING RAINFALL BUT IN NO CASE LESS THAN ONCE EVERY WEEK. ANY NEEDED REPAIRS WILL BE MADE IMMEDIATELY TO MAINTAIN ALL PRACTICES AS DESIGNED.
2. SEDIMENT WILL BE REMOVED FROM THE BLOCK AND GRAVEL INLET PROTECTION DEVICE WHEN STORAGE CAPACITY HAS BEEN APPROXIMATELY 50% FILLED. GRAVEL WILL BE CLEANED OR REPLACED WHEN THE SEDIMENT POOL NO LONGER DRAINS PROPERLY.
3. SEDIMENT AND EROSION CONTROL DEVICES ARE TO BE INSPECTED AND MAINTAINED DAILY. ANY DAMAGE IS TO BE REPAIRED IMMEDIATELY. SEDIMENT WILL BE REMOVED FROM BEHIND THE SEDIMENT FENCE WHEN IT REACHES 1/2 THE HEIGHT OF THE FENCE. THE SEDIMENT FENCE WILL BE REPAIRED AS NECESSARY TO MAINTAIN AN EFFECTIVE BARRIER.
4. ALL SEEDED AREAS WILL BE FERTILIZED, RESEEDED AS NECESSARY, AND MULCHED ACCORDING TO SPECIFICATIONS IN THE VEGETATIVE PLAN TO MAINTAIN A VIGOROUS, DENSE VEGETATIVE COVER.
5. THE SEDIMENT BASIN SHALL BE MAINTAINED IN GOOD OPERATIONAL ORDER AT ALL TIMES. SEDIMENT SHALL BE REMOVED FROM THE SEDIMENT BASIN WHEN THE DESIGN CAPACITY HAS BEEN REDUCED BY 50%.
6. CONTRACTOR KEEP PARKING LOT CLEAN OF MUD AND DEBRIS FROM CONSTRUCTION ACTIVITES.

SEQUENCE OF CONSTRUCTION PHASE 3:

1. FINISH BUILDING CONSTRUCTION.
2. INSTALL WATER LINE EXTENSION, SEWER LATERAL AND REMAINING UTILITY CONNECTIONS TO BUILDING.
3. COMPLETE FINE GRADING.
4. INSTALL SIDEWALKS, IRRIGATION SLEEVES, CURB, GUTTER, CONCRETE FLUMES AND PAVEMENT BASE. IMMEDIATELY INSTALL RIP RAP/FILTER FABRIC AT DOWNSTREAM LOCATIONS OF ALL CURB OPENINGS AND CONCRETE FLUMES.
5. PAVE SITE PARKING AND DRIVEWAY AREAS.
6. INSTALL FENCING AND GATES PER SITE PLAN.
7. FINE GRADE REMAINING DISTURBED AREAS AND INSTALL PERMANENT SEEDING PER SCHEDULE ON EROSION CONTROL DETAIL SHEET.
8. INSTALL LANDSCAPING AS SHOWN ON LANDSCAPE PLAN AND MULCH, SEED AND SOD AS SHOWN.
9. UPON APPROVAL OF EROSION CONTROL INSPECTOR REGARDING STABILIZATION OF THE SITE, CONTRACTOR TO REMOVE SKIMMER DEVICE AND EXACAVATE EXISTING BERM FOR RIP RAP OUTLET CHANNEL PER GRADING PLAN. COORDINATE WITH GAS COMPANY FOR LOWERING EXISTING GAS LINE UNDER SWALE BOTTOM. CONTRACTOR TO ENSURE NO SEDIMENT OR DEBRIS ARE RELEASED INTO DOWNSTREAM INFILTRATION AREA.
10. PERFORM GENERAL CLEANUP OF SITE. ONCE SITE IS STABILIZED AS DETERMINED BY THE EROSION CONTROL INSPECTOR, CLEANOUT SILT FROM BEHIND SILT FENCING AND SEED/SOD REMAINING AREAS.
11. CONTRACTOR TO COORDINATE WITH PENDER COUNTY/DEQ EROSION CONTROL INSPECTOR REGARDING THE FILING OF THE NOTICE OF TERMINATION.

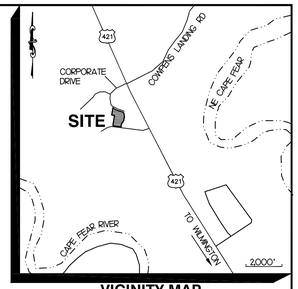
CONTRACTOR TO ADJUST SILT FENCE AS NECESSARY DURING DEMOLITION AND GRADING OPERATIONS TO ENSURE NO SEDIMENT IS RELEASED DURING ANY PHASE OF CONSTRUCTION.

CONTRACTOR TO ADJUST DIVERSION SWALES AT THE END OF EACH DAY AS NECESSARY TO DIVERT RUNOFF TO SEDIMENT BASIN

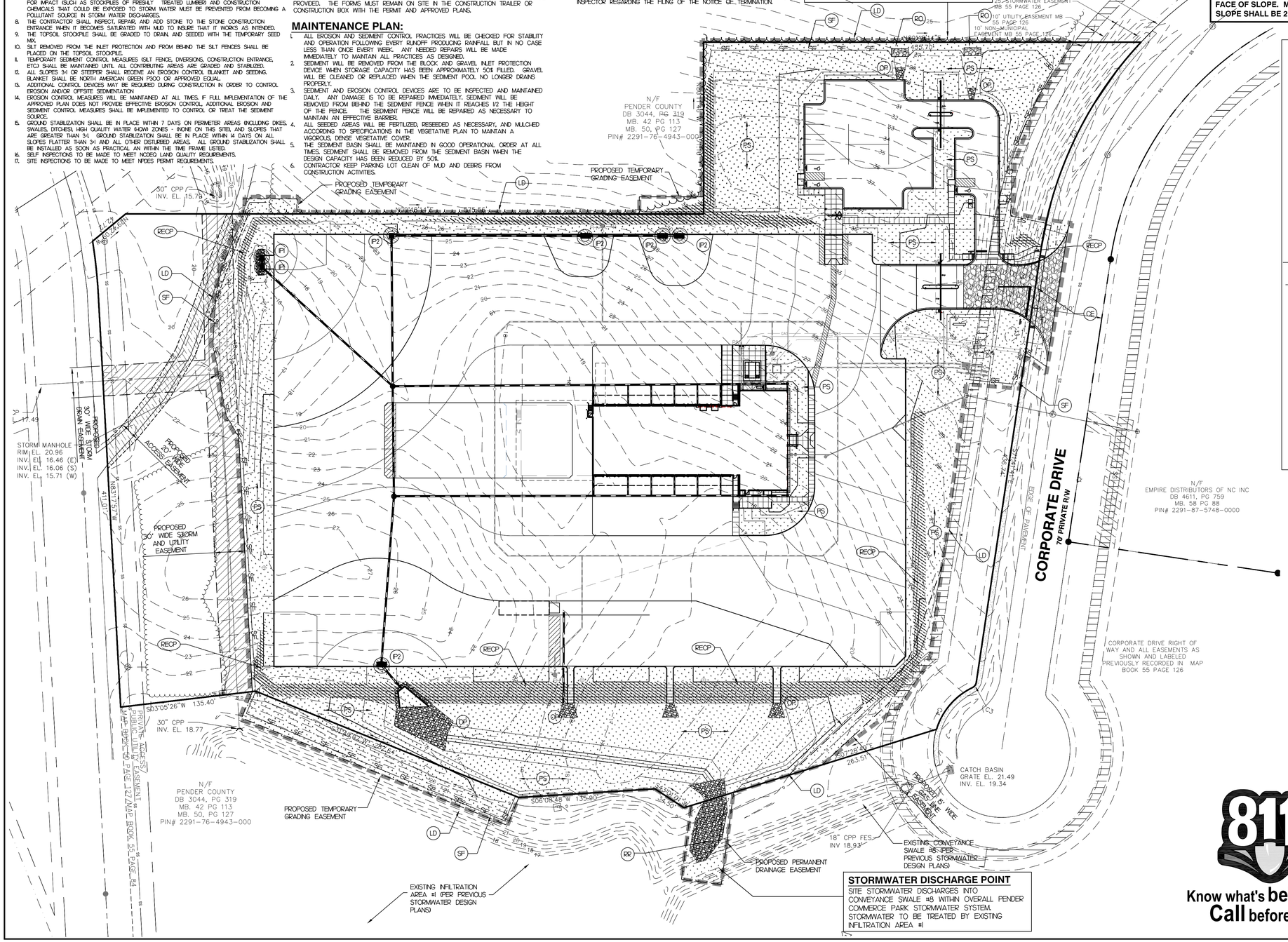
PH. 3 DISTURBED AREA ±12.0 ACRES
TOTAL DISTURBED AREA = ±12.0 ACRES

CONTRACTOR TO INSTALL GROUNDCOVER ON ALL EXPOSED PERIMETER SLOPES AND SLOPES STEEPER THAN 3:1 WITHIN 7 CALENDAR DAYS FOLLOWING COMPLETION OF ANY PHASE OF GRADING, GROUNDCOVER FOR ALL REMAINING DISTURBED AREAS SHALL BE INSTALLED WITHIN 14 DAYS.

ALL SLOPES STEEPER THAN 3:1 SHALL RECEIVE NORTH AMERICAN GREEN P300 ALONG FACE OF SLOPE. MAXIMUM SLOPE SHALL BE 2:1



VICINITY MAP



EROSION/SEDIMENT CONTROL LEGEND

SYMBOL	DESCRIPTION
	(LD) LIMITS OF CONSTRUCTION
	DRAINAGE AREA BOUNDARY
SF	(SF) SILT FENCE (SEE DETAIL 6.62)
	(OP) OUTLET STABILIZATION STRUCTURE (SEE DETAIL 6.41)
	(IP1) DOMED INLET PROTECTION (SEE DETAIL SHEET C-7.5)
	(IP2) CURB INLET PROTECTION (SEE DETAIL SHEET C-7.5)
	(CE) STONE CONSTRUCTION ENTRANCE/EXIT (SEE DETAIL 6.06)
	(CD) STONE CHECK DAMS (SEE DETAIL 6.83)
SF	(RO) STONE CHECK DAMS AT SILT FENCE OUTFALL (SEE DETAIL SHEET C-7.5)
TD	(TD) TEMPORARY DIVERSION (SEE DETAIL 6.20)
	(TS) TEMPORARY SEEDING (SEE DETAIL 6.10)
	(PS) PERMANENT SEEDING (SEE DETAIL 6.11)
	(RECP) ROLLED EROSION CONTROL MATTING (SEE DETAIL 6.17)
	(SK) SKIMMER DEVICE (SEE DETAIL C-7.4)
	(BA) POROUS BAFFLES (SEE DETAIL 6.65)
	FLOW ARROW
	(RR) RIP RAP (SEE DETAIL SHEET)

CONTRACTOR TO ENSURE THAT ANY OFF-SITE RELATED BORROW OR WASTE AREAS RELATED TO THIS PROJECT ARE PROPERTY PERMITTED UNDER THE NPDES GENERAL PERMIT OR NCDEQ WATER QUALITY DIVISION.

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

M.S. DAVIS

0 50' 100' 150'
1" = 50'

PLANS PREPARED BY:
CAMPBELL
E & A, INC.
Civil Engineering and Land Planning
31 Boland Court
Greenville, SC 29615
(864) 335-4090
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SEAL:

NORTH CAROLINA PROFESSIONAL SEAL 28622 ENGINEER TIMOTHY W. CAMPBELL 2/23/18

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REVISIONS:

FOR CONSTRUCTION	**02/23/18**

CHECKED BY:	TWC
DRAWING BY:	FSE
DATE:	01/16/18
JOB NUMBER:	-

TITLE:
EROSION & SEDIMENT CONTROL PLAN - PH 3

SHEET NUMBER:
C-7.2

COMMENTS:

6.10

TS

TEMPORARY SEEDING

Definition Planting rapid-growing annual grasses, small grains, or legumes to provide initial, temporary cover for erosion control on disturbed areas.

Purpose To temporarily stabilize denuded areas that will not be brought to final grade for a period of more than 21 calendar days.

Temporary seeding controls runoff and erosion until permanent vegetation or other erosion control measures can be established. In addition, it provides residue for soil protection and seedbed preparation, and reduces problems of mud and dust production from bare soil surfaces during construction.

Conditions Where Practice Applies On any cleared, unvegetated, or sparsely vegetated soil surface where vegetative cover is needed for less than 1 year. Applications of this practice include diversions, dams, temporary sediment basins, temporary road banks, and topsoil stockpiles.

Planning Considerations Annual plants, which sprout and grow rapidly and survive for only one season, are suitable for establishing initial or temporary vegetative cover. Temporary seeding preserves the integrity of earthen sediment cortrol structures such as dikes, diversions, and the banks of dams and sediment basins. It can also reduce the amount of maintenance associated with these devices. For example, the frequency of sediment basin cleanouts will be reduced if watershed areas, outside the active construction zone, are stabilized.

Proper seedbed preparation, selection of appropriate species, and use of quality seed are as important in this Practice as in Practice 6.11, *Permanent Seeding*. Failure to follow established guidelines and recommendations carefully may result in an inadequate or short-lived stand of vegetation that will not control erosion.

Temporary seeding provides protection for no more than 1 year, during which time permanent stabilization should be initiated.

Specifications Complete grading before preparing seedbeds, and install all necessary erosion control practices such as, dikes, waterways, and basins. Minimize steep slopes because they make seedbed preparation difficult and increase the erosion hazard. If soils become compacted during grading, loosen them to a depth of 6-8 inches using a ripper, harrow, or chisel plow.

SEEDBED PREPARATION
Good seedbed preparation is essential to successful plant establishment. A good seedbed is well-pulverized, loose, and uniform. Where hydroseeding methods are used, the surface may be left with a more irregular surface of large clods and stones.

Liming—Apply lime according to soil test recommendations. If the pH (acidity) of the soil is not known, an application of ground agricultural limestone at the rate of 1 to 1 1/2 tons/acre on coarse-textured soils and 2-3 tons/acre on fine-textured soils is usually sufficient. Apply limestone uniformly and incorporate into the top 4-6 inches of soil. Soils with a pH of 6 or higher need not be limed.

Fertilizer—Base application rates on soil tests. When these are not possible, apply a 10-10-10 grade fertilizer at 700-1,000 lb/acre. Both fertilizer and lime should be incorporated into the top 4-6 inches of soil. If a hydraulic seeder is used, do not mix seed and fertilizer more than 30 minutes before application.

Surface roughening—If recent tillage operations have resulted in a loose surface, additional roughening may not be required, except to break up large clods. If rainfall causes the surface to become sealed or crusted, loosen it just prior to seeding by disking, raking, harrowing, or other suitable methods. Groove or furrow slopes steeper than 3:1 on the contour before seeding (Practice 6.03, *Surface Roughening*).

PLANT SELECTION
Select an appropriate species or species mixture from Table 6.10a for seeding in late winter and early spring, Table 6.10b for summer, and Table 6.10c for fall.

In the Mountains, December and January seedings have poor chances of success. When it is necessary to plant at these times, use recommendations for fall and a securely tacked mulch.

SEEDING
Evenly apply seed using a cyclone seeder (broadcast), drill, cultipacker seeder, or hydroseeder. Use seeding rates given in Tables 6.10a-6.10c. Broadcast seeding and hydroseeding are appropriate for steep slopes where equipment cannot be driven. Hand broadcasting is not recommended because of the difficulty in achieving a uniform distribution.

Small grains should be planted no more than 1 inch deep, and grasses and legumes no more than 1/2 inch. Broadcast seed must be covered by raking or chain dragging, and then lightly firmed with a roller or cultipacker. Hydroseeded mixtures should include a wood fiber (cellulose) mulch.

MULCHING
The use of an appropriate mulch will help ensure establishment under normal conditions, and is essential to seeding success under harsh site conditions (Practice 6.14, *Mulching*). Harsh site conditions include:

- seeding in fall for winter cover (wood fiber mulches are not considered adequate for this use),
- slopes steeper than 3:1,
- excessively hot or dry weather,
- adverse soils (shallow, rocky, or high in clay or sand), and
- areas receiving concentrated flow.

If the area to be mulched is subject to concentrated waterflow, as in channels, anchor mulch with netting (Practice 6.14, *Mulching*).

Maintenance Reseed and mulch areas where seedling emergence is poor, or where erosion occurs, as soon as possible. Do not mow. Protect from traffic as much as possible.

Table 6.10a Temporary Seeding Recommendations for Late Winter and Early Spring

Seeding mixture

Species	Rate (lb/acre)
Rye (grain)	120
Annual lespedeza (Kobe in Piedmont and Coastal Plain, Korean in Mountains)	50

Omit annual lespedeza when duration of temporary cover is not to extend beyond June.

Seeding dates
Mountains—Above 2500 feet: Feb. 15 - May 15
Below 2500 feet: Feb. 1- May 1
Piedmont—Jan. 1 - May 1
Coastal Plain—Dec. 1 - Apr. 15

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

Mulch
Apply 4,000 lb/acre straw. Anchor 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
Refertilize if growth is not fully adequate. Reseed, refertilize and mulch immediately following erosion or other damage.

Table 6.10b Temporary Seeding Recommendations for Summer

Seeding mixture

Species	Rate (lb/acre)
German millet	40

In the Piedmont and Mountains, a small-stemmed Sudangrass may be substituted at a rate of 50 lb/acre.

Seeding dates
Mountains—May 15 - Aug. 15
Piedmont—May 1 - Aug. 15
Coastal Plain—Apr. 15 - Aug. 15

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

Mulch
Apply 4,000 lb/acre straw. Anchor 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
Refertilize if growth is not fully adequate. Reseed, refertilize and mulch immediately following erosion or other damage.

Table 6.10c Temporary Seeding Recommendations for Fall

Seeding mixture

Species	Rate (lb/acre)
Rye (grain)	120

Seeding dates
Mountains—Aug. 15 - Dec. 15
Coastal Plain and Piedmont—Aug. 15 - Dec. 30

Soil amendments
Follow soil tests or apply 2,000 lb/acre ground agricultural limestone and 1,000 lb/acre 10-10-10 fertilizer.

Mulch
Apply 4,000 lb/acre 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
Repair and refertilize damaged areas immediately. Topdress with 50 lb/acre of nitrogen in March. If it is necessary to extent temporary cover beyond June 15, overseed with 50 lb/acre Kobe (Piedmont and Coastal Plain) or Korean (Mountains) lespedeza in late February or early March.

6.06

CE

TEMPORARY GRAVEL CONSTRUCTION ENTRANCE/EXIT

Definition A graveled area or pad located at points where vehicles enter and leave a construction site.

Purpose To provide a buffer area where vehicles can drop their mud and sediment to avoid transporting it onto public roads, to control erosion from surface runoff, and to help control dust.

Conditions Where Practice Applies Wherever traffic will be leaving a construction site and moving directly onto a public road or other paved off-site area. Construction plans should limit traffic to properly constructed entrances.

Design Criteria **Aggregate Size**—Use 2-3 inch washed stone.

Dimensions of gravel pad—
Thickness: 6 inches minimum
Width: 12-feet minimum or full width at all points of the vehicular entrance and exit area, whichever is greater
Length: 50-feet minimum

Location—Locate construction entrances and exits to limit sediment from leaving the site and to provide for maximum utility by all construction vehicles (Figure 6.06a). Avoid steep grades, and entrances at curves in public roads.

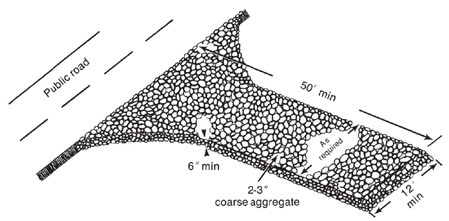


Figure 6.06a Gravel entrance/exit keeps sediment from leaving the construction site (modified from Va SWCC).

Washing—If conditions at the site are such that most of the mud and sediment are not removed by vehicles traveling over the gravel, the tires should be washed. Washing should be done on an area stabilized with crushed stone that drains into a sediment trap or other suitable disposal area. A wash rack may also be used to make washing more convenient and effective.

Construction Specifications

1. Clear the entrance and exit area of all vegetation, roots, and other objectionable material and properly grade it.
2. Place the gravel to the specific grade and dimensions shown on the plans, and smooth it.
3. Provide drainage to carry water to a sediment trap or other suitable outlet.
4. Use geotextile fabrics because they improve stability of the foundation in locations subject to seepage or high water table.

Maintenance Maintain the gravel pad in a condition to prevent mud or sediment from leaving the construction site. This may require periodic topdressing with 2-inch stone. After each rainfall, inspect any structure used to trap sediment and clean it out as necessary. Immediately remove all objectionable materials spilled, washed, or tracked onto public roadways.

6.62

SF

SEDIMENT FENCE

Definition A temporary sediment control measure consisting of fabric buried at the bottom, stretched, and supported by posts.

Purpose To retain sediment from small disturbed areas by reducing the velocity of sheet flows to allow sediment deposition.

Conditions Where Practice Applies Below small-disturbed areas that are less then ¼ acre per 100 feet of fence.

Where runoff can be stored behind the sediment fence without damaging the fence or the submerged area behind the fence.

Do not install sediment fences across streams, ditches, or waterways, or other areas of concentrated flow.

Sediment fence should be placed along topographic elevation contours, where it can intercept stormwater runoff that is in dispersed sheet flow. Sediment fence should not be used alone below graded slopes greater than 10 feet in height.

Planning Considerations A sediment fence is a system to retain sediment on the construction site. The fence retains sediment primarily by retarding flow and promoting deposition. In operation, generally the fence becomes clogged with fine particles, which reduce the flow rate. This causes a pond to develop behind the fence. The designer should anticipate ponding and provide sufficient storage areas and overflow outlets to prevent flows from overtopping the fence. Since sediment fences are not designed to withstand high water levels, locate them so that only shallow pools can form. Tie the ends of a sediment fence into higher ground to prevent flow around the end of the fence before the pool reaches design level. Curling each end of the fence uphill in a "J" pattern may be appropriate to prevent end flow. Provide stabilized outlets to protect the fence system and release storm flows that exceed the design storm.

Deposition occurs as the storage pool forms behind the fence. The designer can direct flows to specified deposition areas through appropriate positioning of the fence or by providing an excavated area behind the fence. Plan deposition areas at accessible points to promote routine cleanout and maintenance. Show deposition areas in the erosion and sedimentation control plan. A sediment fence acts as a diversion if placed slightly off the contour. A maximum slope of 2 percent is recommended. This technique may be used to control shallow, uniform flows from small disturbed areas and to deliver sediment-laden water to deposition areas. The anchoring of the toe of the fence should be reinforced with 12 inches of NC DOT #5 or #57 washed stone when flow will run parallel to the toe of the fence.

Sediment fences serve no function along ridges or near drainage divides where there is little movement of water. Confining or diverting runoff unnecessarily with a sediment fence may create erosion and sedimentation problems that would not otherwise occur.

Straw barriers have only a 0-20% trapping efficiency and are inadequate. Straw bales may not be used in place of sediment fence. Prefabricated sediment fence with the fabric already stapled to thin wooden posts does not meet minimum standards specified later in this section.

Anchoring of sediment fence is critical. The toe of the fabric must be anchored in a trench backfilled with compacted earth. Mechanical compaction must be provided in order for the fence to effectively pond runoff.

Construction Specifications

MATERIALS

1. Use a synthetic filter fabric of at least 95% by weight of polyolefins or polyester, which is certified by the manufacturer or supplier as conforming to the requirements in ASTM D 6461, which is shown in part in Table 6.62b.

Synthetic filter fabric should contain ultraviolet ray inhibitors and stabilizers to provide a minimum of 6 months of expected usable construction life at a temperature range of 0 to 120° F.

2. Ensure that posts for sediment fences are 1.33 lb/linear ft steel with a minimum length of 5 feet. Make sure that steel posts have projections to facilitate fastening the fabric.

3. For reinforcement of standard strength filter fabric, use wire fence with a minimum 14 gauge and a maximum mesh spacing of 6 inches.

Table 6.62b Specifications For Sediment Fence Fabric

Temporary Silt Fence Material Property Requirements					
	Test Material	Units	Supported[1] Silt Fence	Un-Supported[1] Silt Fence	Type of Value
Grab Strength	ASTM D 4632	N (lbs)			
Machine Direction			400	550	MARV
			(90)	(90)	
X-Machine Direction			400	450	MARV
			(90)	(90)	
Permittivity[2]	ASTM D 4491	sec-1	0.05	0.05	MARV
Appa'ent Opening Size[2]	ASTM D 4751	mm	0.60	0.60	Max. ARV[3]
		(US Sieve #)	(30)	(30)	
Ultraviolet Stability	ASTM D 4355	% Retained Strength	70% after 500h of exposure	70% after 500h of exposure	Typical

[1] Silt Fence support shall consist of 14 gage steel wire with a mesh spacing of 150 mm (6 inches), or prefabricated poylmer mesh of equivalent strength.
[2] These default values are based on empirical evidence with a variety of sediment. For environmentally sensitive areas, a review of previous experience and/or site or regionally specific geotextile tests in accordance with Test Method D 5141 should be performed by the agency to confirm suitability of these requirements.
[3] As measured in accordance with Test Method D 4632.

CONSTRUCTION

1. Construct the sediment barrier of standard strength or extra strength synthetic filter fabrics.

2. Ensure that the height of the sediment fence does not exceed 24 inches above the ground surface. (Higher fences may impound volumes of water sufficient to cause failure of the structure.)

3. Construct the filter fabric from a continuous roll cut to the length of the barrier to avoid joints. When joints are necessary, securely fasten the filter cloth only at a support post with 4 feet minimum overlap to the next post.

4. Support standard strength filter fabric by wire mesh fastened securely to the **upslope** side of the posts. Extend the wire mesh support to the bottom of the trench. Fasten the wire reinforcement, then fabric on the upslope side of the fence post. Wire or plastic zip ties should have minimum 50 pound tensile strength.

5. When a wire mesh support fence is used, space posts a maximum of 8 feet apart. Support posts should be driven securely into the ground a minimum of 24 inches.

6. Extra strength filter fabric with 6 feet post spacing does not require wire mesh support fence. Securely fasten the filter fabric directly to posts. Wire or plastic zip ties should have minimum 50 pound tensile strength.

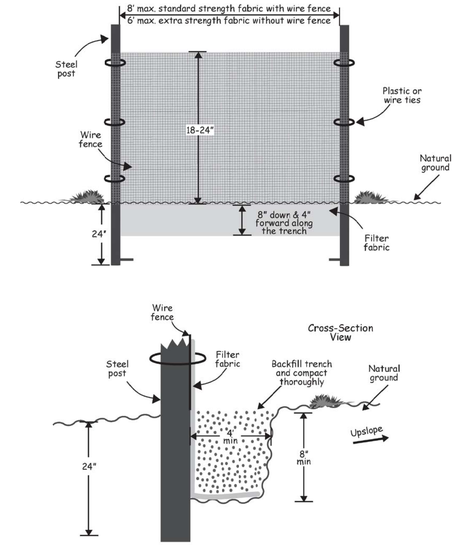
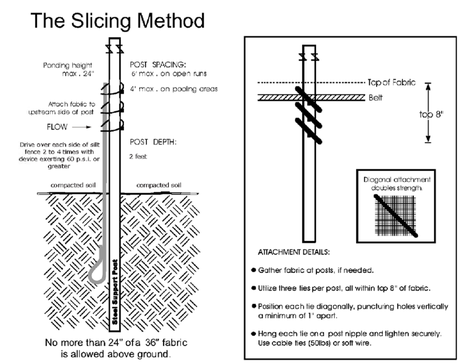


Figure 6.62a Installation detail of a sediment fence.



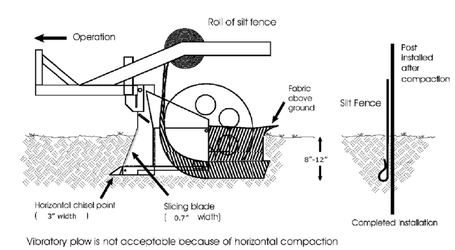


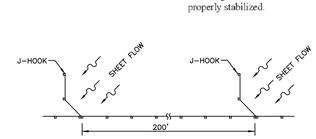
Figure 6.62b Schematics for using the slicing method to install a sediment fence. Adapted from *Silt Fence that Works*

Maintenance Inspect sediment fences at least once a week and after each rainfall. Make any required repairs immediately.

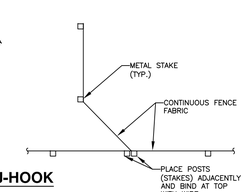
Should the fabric of a sediment fence collapse, tear, decompose or become ineffective, replace it promptly.

Remove sediment deposits as necessary to provide adequate storage volume for the next rain and to reduce pressure on the fence. Take care to avoid undermining the fence during cleanout.

Remove all fencing materials and unstable sediment deposits and bring the area to grade and stabilize it after the contributing drainage area has been properly stabilized.



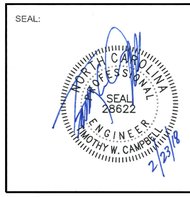
SILT FENCE J-HOOK PLACEMENT



J-HOOK

PLANS PREPARED BY:
CAMPBELL
E & A, INC.
Civil Engineering and Land Planning
31 Boland Court
Greenville, SC 29615
(864) 335-1090
Fax: (864) 335-1095

SEAL:



FedEx Freight
PENDER COUNTY BUSINESS PARK
CORPORATE DRIVE
WILMINGTON, NC 28405

DEVELOPER:
SETZER PROPERTIES
SETZER PROPERTIES WMN, LLC
354 WALLER AVENUE, STE 200
LEXINGTON , KY 40504
CONTACT: ROBBIE McATEE
(859) 514-7767
FAX: (859) 281-6335

REVISIONS:

FOR CONSTRUCTION	02/23/18

CHECKED BY:	TWC
DRAWING BY:	FSE
DATE:	01/16/18
JOB NUMBER:	-

TITLE:
EROSION & SEDIMENT CONTROL DETAILS

SHEET NUMBER:
C-7.3

COMMENTS:

6.64

SB SKIMMER SEDIMENT BASIN

Definition An earthen embankment suitably located to capture runoff, with a trapezoidal spillway lined with an impermeable geotextile or laminated plastic membrane, and equipped with a floating skimmer for dewatering.

Purpose Sediment basins are designed to provide an area for runoff to pool and settle out a portion of the sediment carried down gradient. Past designs used a perforated riser for dewatering, which allowed water to leave the basin from all depths. One way to improve the sediment capture rate is to have an outlet which dewaters the basin from the top of the water column where the water is cleanest. A skimmer is probably the most common method to dewater a sediment basin from the surface. The basic concept is that the skimmer does not dewater the basin as fast as runoff enters it, but instead allows the basin to fill and then slowly drain over hours or days. This process has two effects. First, the sediment in the runoff has more time to settle out prior to discharge. Second, a pool of water forms early in a storm event and this further increases sedimentation rates in the basin. Many of the storms will produce more volume than the typical sediment basin capacity and flow rates in excess of the skimmer capability, resulting in flow over the emergency spillway. This water is also coming from the top of the water column and has thereby been "treated" to remove sediment as much as possible. (Adapted from SoilFacts: Dewatering Sediment Basins Using Surface Outlets. N. C. State University, Soil Science Department.)

Conditions Where Practice Applies Skimmer sediment basins are needed where drainage areas are too large for temporary sediment traps. Do not locate the skimmer sediment basin in intermittent or perennial streams.

Planning Considerations Select locations for skimmer basins during initial site evaluation. Install skimmer sediment basins before any site grading takes place within the drainage area.

Select skimmer sediment basin sites to capture sediment from all areas that are not treated adequately by other sediment control measures. Always consider access for cleanout and disposal of the trapped sediment. Locations where a pond can be formed by constructing a low dam across a natural swale are generally preferred to sites that require excavation. Where practical, divert sediment-free runoff away from the basin.

A skimmer is a sedimentation basin dewatering control device that withdraws water from the basin's water surface, thus removing the highest quality water for delivery to the uncontrolled environment. A skimmer is shown in Figure 6.64a. By properly sizing the skimmer's control orifice, the skimmer can be made to dewater a design hydrologic event in a prescribed period. Because the spillway is actually used relatively frequently, it should be carefully stabilized using geotextiles, or rock if necessary, that can withstand the expected flows. The spillway should be placed as far from the inlet of the basin as possible to maximize sedimentation before discharge. The spillway should be located in natural groundcover to the greatest extent possible

The costs of using a skimmer system are similar, or occasionally less, than a conventional rock outlet or perforated riser. However, the basin is more efficient in removing sediment. Another advantage of the skimmer is that it can be reused on future projects. The main disadvantage of the skimmer is that it does require frequent maintenance, primarily in removing debris from the inlet.

A skimmer must dewater the basin from the top of the water surface. The rate of dewatering must be controlled. A dewatering time of 24 to 72 hours is required. **Any skimmer design that dewaters from the surface at a controlled rate is acceptable.**

Construction Specifications

1. Clear, grub, and strip the area under the embankment of all vegetation and root mat. Remove all surface soil containing high amounts of organic matter and stockpile or dispose of it properly. Haul all objectionable material to the designated disposal area. Place temporary sediment control measures below basin as needed

2. Ensure that fill material for the embankment is free of roots, woody vegetation, organic matter, and other objectionable material. Place the fill in lifts not to exceed 9 inches, and machine compact it. Over fill the embankment 6 inches to allow for settlement.

3. Shape the basin to the specified dimensions. Prevent the skimming device from settling into the mud by excavating a shallow pit under the skimmer or providing a low support under the skimmer of stone or timber.

4. Place the barrel (typically 4-inch Schedule 40 PVC pipe) on a firm, smooth foundation of impervious soil. Do not use pervious material such as sand, gravel, or crushed stone as backfill around the pipe. Place the fill material around the pipe spillway in 4-inch layers and compact it under and around the pipe to at least the same density as the adjacent embankment. Care must be taken not to raise the pipe from the firm contact with its foundation when compacting under the pipe haunches.

Place a minimum depth of 2 feet of compacted backfill over the pipe spillway before crossing it with construction equipment. In no case should the pipe conduit be installed by cutting a trench through the dam after the embankment is complete.

5. Assemble the skimmer following the manufacturers instructions, or as designed.

6. Lay the assembled skimmer on the bottom of the basin with the flexible joint at the inlet of the barrel pipe. Attach the flexible joint to the barrel pipe and position the skimmer over the excavated pit or support. Be sure to attach a rope to the skimmer and anchor it to the side of the basin. This will be used to pull the skimmer to the side for maintenance.

7. Earthen spillways—Install the spillway in undisturbed soil to the greatest extent possible. The achievement of planned elevations, grade, design width, and entrance and exit channel slopes are critical to the successful operation of the spillway. The spillway should be lined with laminated plastic or impermeable geotextile fabric. The fabric must be wide and long enough to cover the bottom and sides and extend onto the top of the dam for anchoring in a trench. The edges may be secured with 8-inch staples or pins. The fabric must be long enough to extend down the slope and exit onto stable ground. The width of the fabric must be one piece, not joined or spliced; otherwise water can get under the fabric. If the length of the fabric is insufficient for the entire length of the spillway, multiple sections, spanning the complete width, may be used. The upper section(s) should overlap the lower section(s) so that water cannot flow under the fabric. Secure the upper edge and sides of the fabric in a trench with staples or pins. (Adapted from "A Manual for Designing, Installing and Maintaining Skimmer Sediment Basins." February, 1999. J. W. Faircloth & Son.).

8. Inlets—Discharge water into the basin in a manner to prevent erosion. Use temporary slope drains or diversions with outlet protection to divert sediment-laden water to the upper end of the pool area to improve basin trap efficiency (References: *Runoff Control Measures and Outlet Protection*).

9. Erosion control—Construct the structure so that the disturbed area is minimized. Divert surface water away from bare areas. Complete the embankment before the area is cleared. Stabilize the emergency spillway embankment and all other disturbed areas above the crest of the principal spillway immediately after construction (References: *Surface Stabilization*).

10. Install porous baffles as specified in Practice 6.65, *Porous Baffles*.

11. After all the sediment-producing areas have been permanently stabilized, remove the structure and all the unstable sediment. Smooth the area to blend with the adjoining areas and stabilize properly (References: *Surface Stabilization*).

Maintenance Inspect skimmer sediment basins at least weekly and after each significant (one-half inch or greater) rainfall event and repair immediately. Remove sediment and restore the basin to its original dimensions when sediment accumulates to one-half the height of the first baffle. Pull the skimmer to one side so that the sediment underneath it can be excavated. Excavate the sediment from the entire basin, not just around the skimmer or the first cell. Make sure vegetation growing in the bottom of the basin does not hold down the skimmer.

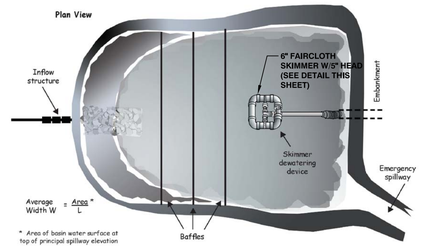
Repair the baffles if they are damaged. Re-anchor the baffles if water is flowing underneath or around them.

If the skimmer is clogged with trash and there is water in the basin, usually jerking on the rope will make the skimmer bob up and down and dislodge the debris and restore flow. If this does not work, pull the skimmer over to the side of the basin and remove the debris. Also check the orifice inside the skimmer to see if it is clogged; if so remove the debris.

If the skimmer arm or barrel pipe is clogged, the orifice can be removed and the obstruction cleared with a plumber's snake or by flushing with water. Be sure and replace the orifice before repositioning the skimmer.

Check the fabric lined spillway for damage and make any required repairs with fabric that spans the full width of the spillway. Check the embankment, spillways, and outlet for erosion damage, and inspect the embankment for piping and settlement. Make all necessary repairs immediately. Remove all trash and other debris from the skimmer and pool areas.

Freezing weather can result in ice forming in the basin. Some special precautions should be taken in the winter to prevent the skimmer from plugging with ice.



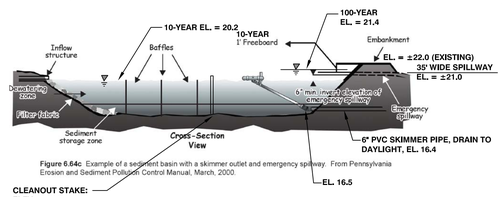
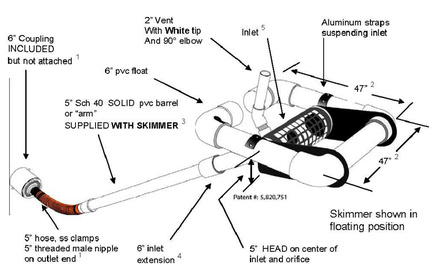


Figure 6.64c Example of a sediment basin with a skimmer outlet and emergency spillway. From Pennsylvania Erosion and Sediment Pollution Control Manual, March, 2000.

6" *Faircloth Skimmer®* Cut Sheet (SK) **SKIMMER**
J. W. Faircloth & Son, Inc.
www.FairclothSkimmer.com



1. Hose can be attached to outlet using the threaded 5" nipple. Typical methods used: on a metal structure a steel stubout welded on the side at the bottom with a 5" threaded coupling or reducers; on a concrete structure with a hole or orifice at the bottom, use a steel plate with a hole and coupling welded to it that will fit over the hole in the concrete and bolted to the structure with sealant.
2. Dimensions are approximate, not intended as plans for construction.
3. Barrel (solid, not foam core pipe) should be 1.4 times the depth of water with a minimum length of 8' so the inlet can be pulled to the side for maintenance. If more than 12' long weight may have to be added to inlet to counter the increased buoyancy.
4. Inlet tapers down from 6" maximum inlet to a 5" barrel and hose. Barrel is smaller to reduce buoyancy and tendency to lift inlet but is sufficient for flow through inlet because of slope. The inlet orifice can be reduced using the plug and cutter provided to control the outflow rate.
5. Inlet is 10" pipe between the straps with slots cut in the inlet and aluminum screen door (smaller than shown in illustration) for access to the 6" inlet and orifice inside.
6. **Capacity** 51,840 cubic feet per day maximum with 6" inlet and 5" head. Inlet can be reduced by installing a smaller orifice using the plug and cutter provided to adjust flow rate for the particular basin volume and drawdown time required.
7. Shipped assembled. User glues inlet extension and barrel, installs vent, cuts orifice in plug and attaches to outlet pipe or structure. Includes flexible hose, rope, orifice cutter, etc.

6.65

BA BAFFLES

Definition Porous barriers installed inside a temporary sediment trap, rock dam, skimmer basin, or sediment basin to reduce the velocity and turbulence of the water flowing through the measure, and facilitate the settling of sediment from the water before discharge.

Purpose Sediment traps and basins are designed to temporarily pool runoff water to allow sediment to settle before the water is discharged. Unfortunately, they are usually not very efficient due to high turbulence and "short-circuiting" flows which take runoff quickly to the outlet with little interaction with most of the basin. Baffles improve the rate of sediment retention by distributing the flow and reducing turbulence. This process can improve sediment retention.

Conditions Where Practice Applies This practice should be used in any temporary sediment trap, rock dam, skimmer basin or temporary sediment basin.

Planning Considerations Porous baffles effectively spread the flow across the entire width of a sediment basin or trap. Water flows through the baffle material, but is slowed sufficiently to back up the flow, causing it to spread across the entire width of the baffle (Figure 6.65a).

Spreading the flow in this manner utilizes the full cross section of the basin, which in turns reduces flow rates or velocity as much as possible. In addition, the turbulence is also greatly reduced. The combination increases sediment deposition and retention and also decreases the particle size of sediment captured.

The installation should be similar to a sediment fence (Figure 6.65b). Materials such as 700 g/m² coir erosion blanket (Figure 6.65d), coir mesh, or tree protection fence folded over to reduce pore size have been used successfully. Other similar materials could work as well. A support wire or rope across the top will help prevent excessive sagging if the material is attached to it with appropriate ties. Another option is to use a sawhorse type of support with the legs stabilized with rebar inserted into the basin floor. These structures work well and can be prefabricated off site and quickly installed. Another baffle system involves placing silt fence fabric in front of a wire fence (hog wire) backing, and slitting the fabric in alternating squares (Figure 6.65b). This permits flow through the silt fence similar to more porous materials.

Construction Specification

1. Grade the basin so that the bottom is level front to back and side to side.

2. Install posts or saw horses across the width of the sediment trap (Practice 6.62, *Sediment Fence*).

3. Steel posts should be driven to a depth of 24 inches, spaced a maximum of 4 feet apart, and installed up the sides of the basin as well. The top of the fabric should be 6 inches higher than the invert of the spillway. Tops of baffles should be 2 inches lower than the top of the berms.

4. Install at least three rows of baffles between the inlet and outlet discharge point. Basins less than 20 feet in length may use 2 baffles.

5. When using posts, add a support wire or rope across the top of the measure to prevent sagging.

6. Wrap porous material, like jute backed by coir material, over a sawhorse or the top wire. Hammer rebar into the sawhorse legs for anchoring. The fabric should have five to ten percent openings in the weave. Attach fabric to a rope and a support structure with zip ties, wire, or staples.

7. The bottom and sides of the fabric should be anchored in a trench or pinned with 8-inch erosion control matting staples.

8. Do not splice the fabric, but use a continuous piece across the basin.

Maintenance Inspect baffles at least once a week and after each rainfall. Make any required repairs immediately.

Be sure to maintain access to the baffles. Should the fabric of a baffle collapse, tear, decompose, or become ineffective, replace it promptly.

Remove sediment deposits when it reaches half full to provide adequate storage volume for the next rain and to reduce pressure on the baffles. Take care to avoid damaging the baffles during cleanout. Sediment depth should never exceed half the designed storage depth.

After the contributing drainage area has been properly stabilized, remove all baffle materials and unstable sediment deposits, bring the area to grade, and stabilize it.

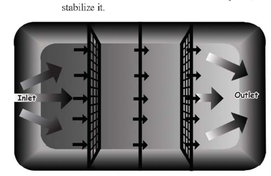


Figure 6.65a Porous baffles in a sediment basin. The flow is distributed evenly across the basin to reduce flow rates and turbulence, resulting in greater sediment retention.

Baffles need to be installed correctly in order fully provide their benefits. Refer to Figure 6.65b and the following key points:

- The baffle material needs to be secured at the bottom and sides using staples or by trenching as for silt fence.
- Most of the sediment will accumulate in the first bay, so this should be readily accessible for maintenance.

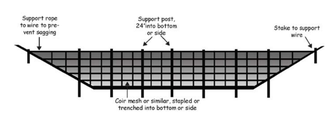


Figure 6.65b Cross-section of a porous baffle in a sediment basin. Note that there is no weir because the water flows through the baffle material.

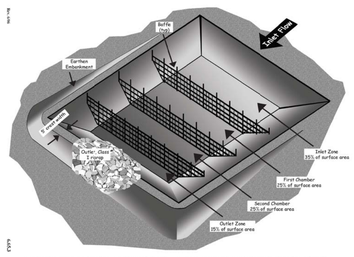


Figure 6.65c Example of porous baffle using silt fence with slits cut in each alternating space of wire backing fence. (City of High Point, NC detail.).

6.60

ST TEMPORARY SEDIMENT TRAP

Definition A small, temporary ponding basin formed by an embankment or excavation to capture sediment.

Purpose To detain sediment-laden runoff and trap the sediment to protect receiving streams, lakes, drainage systems, and protect adjacent property.

Conditions Where Practice Applies Specific criteria for installation of a temporary sediment trap are as follows:

- At the outlets of diversions, channels, slope drains, or other runoff conveyances that discharge sediment-laden water.
- Below areas that are draining 5 acres or less.
- Where access can be maintained for sediment removal and proper disposal.
- In the approach to a stormwater inlet located below a disturbed area as part of an inlet protection system.
- Structure life limited to 2 years.

A temporary sediment trap should not be located in an intermittent or perennial stream.

Planning Considerations Select locations for sediment traps during site evaluation. Note natural drainage divides and select trap sites so that runoff from potential sediment-producing areas can easily be diverted into the traps. Ensure the drainage areas for each trap does not exceed 5 acres. Install temporary sediment traps before land disturbing takes place within the drainage area.

Make traps readily accessible for periodic sediment removal and other necessary maintenance. Plan locations for sediment disposal as part of trap site selection. Clearly designate all disposal areas on the plans.

In preparing plans for sediment traps, it is important to consider provisions to protect the embankment from failure from storm runoff that exceeds the design capacity. Locate bypass outlets so that flow will not damage the embankment. Direct emergency bypasses to undisturbed natural, stable areas. If a bypass is not possible and failure would have severe consequences, consider alternative sites.

Sediment trapping is achieved primarily by settling within a pool formed by an embankment. The sediment pool may also be formed by excavation, or by a combination of excavation and embankment. Sediment-trapping efficiency is a function of surface area and inflow rate (Practice 6.61, *Sediment Basin*). Therefore, maximize the surface area in the design. Because porous baffles improve flow distribution across the basin, high length to width ratios are not necessary to reduce short-circuiting and to optimize efficiency.

Because well planned sediment traps are key measures to preventing off-site sedimentation, they should be installed in the first stages of project development.

Construction Specifications

1. Clear, grub, and strip the area under the embankment of all vegetation and root mat. Remove all surface soil containing high amounts of organic matter, and stockpile or dispose of it properly. Haul all objectionable material to the designated disposal area.

2. Ensure that fill material for the embankment is free of roots, woody vegetation, organic matter, and other objectionable material. Place the fill in lifts not to exceed 9 inches, and machine compact it. Over fill the embankment 6 inches to allow for settlement.

3. Construct the outlet section in the embankment. Protect the connection between the riprap and the soil from piping by using filter fabric or a keyway cutoff trench between the riprap structure and soil.

- Place the filter fabric between the riprap and the soil. Extend the fabric across the spillway foundation and sides to the top of the dam; or
- Excavate a keyway trench along the center line of the spillway foundation extending up the sides to the height of the dam. The trench should be at least 2 feet deep and 2 feet wide with 1:1 side slopes.

4. Clear the pond area below the elevation of the crest of the spillway to facilitate sediment cleanout.

5. All cut and fill slopes should be 2:1 or flatter.

6. Ensure that the stone (drainage) section of the embankment has a minimum bottom width of 3 feet and maximum side slopes of 1:1 that extend to the bottom of the spillway section.

7. Construct the minimum finished stone spillway bottom width, as shown on the plans, with 2:1 side slopes extending to the top of the over filled embankment. Keep the thickness of the sides of the spillway outlet structure at a minimum of 21 inches. **The weir must be level and constructed to grade to assure design capacity.**

8. Material used in the stone section should be a well-graded mixture of stone with a d_{50} size of 9 inches (class B erosion control stone is recommended) and a maximum stone size of 14 inches. The stone may be machine placed and the smaller stones worked into the voids of the larger stones. The stone should be hard, angular, and highly weather-resistant.

9. Discharge inlet water into the basin in a manner to prevent erosion. Use temporary slope drains or diversions with outlet protection to divert sediment-laden water to the upper end of the pool area to improve basin trap efficiency (*References: Runoff Control Measures and Outlet Protection*).

10. Ensure that the stone spillway outlet section extends downstream past the toe of the embankment until stable conditions are reached and outlet velocity is acceptable for the receiving stream. Keep the edges of the stone outlet section flush with the surrounding ground, and shape the center to confine the outflow stream (*References: Outlet Protection*).

11. Direct emergency bypass to natural, stable areas. Locate bypass outlets so that flow will not damage the embankment.

12. Stabilize the embankment and all disturbed areas above the sediment pool and downstream from the trap immediately after construction (*References: Surface Stabilization*).

13. Show the distance from the top of the spillway to the sediment cleanout level (1/2 the design depth) on the plans and mark it in the field.

14. Install porous baffles as specified in Practice 6.65, *Porous Baffles*.

Maintenance Inspect temporary sediment traps at least weekly and after each significant (½ inch or greater) rainfall event and repair immediately. Remove sediment, and restore the trap to its original dimensions when the sediment has accumulated to one-half the design depth of the trap. Place the sediment that is removed in the designated disposal area, and replace the part of the gravel facing that is impaired by sediment.

Check the structure for damage from erosion or piping. Periodically check the depth of the spillway to ensure it is a minimum of 1.5 feet below the low point of the embankment. Immediately fill any settlement of the embankment to slightly above design grade. **Any riprap displaced from the spillway must be replaced immediately.**

After all sediment-producing areas have been permanently stabilized, remove the structure and all unstable sediment. Smooth the area to blend with the adjoining areas, and stabilize properly (*References: Surface Stabilization*).

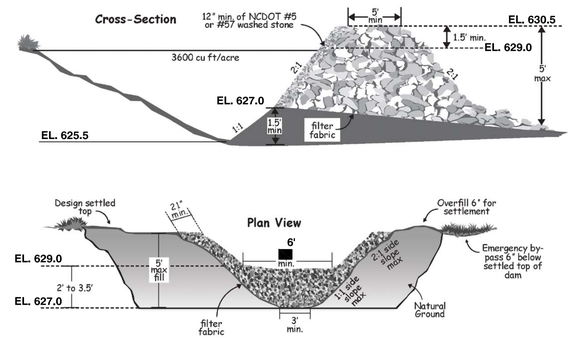
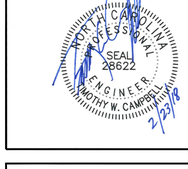


Figure 6.60a Plan view and cross-section view of a temporary sediment trap.

PLANS PREPARED BY:
CAMPBELL
E & A, INC.
Civil Engineering and Land Planning
31 Boland Court
Greenville, SC 29615
(864) 335-1090
Fax: (864) 335-1095

SEAL:



FedEx® Freight
PENDER COUNTY BUSINESS PARK
CORPORATE DRIVE
WILMINGTON, NC 28405

DEVELOPER:
SETZER PROPERTIES
SETZER PROPERTIES WMN, LLC
354 WALLER AVENUE, STE 200
LEXINGTON , KY 40504
CONTACT: ROBBIE McATEE
(859) 514-7767
FAX: (859) 281-6335

REVISIONS:

FOR CONSTRUCTION	02/23/18

CHECKED BY:	TWC
DRAWING BY:	FSE
DATE:	01/16/18
JOB NUMBER:	-

TITLE:
EROSION & SEDIMENT CONTROL DETAILS

SHEET NUMBER:
C-7.4

COMMENTS:

6.11

PS

PERMANENT SEEDING

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

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

Conditions Where Practice Applies Fine-graded areas on which permanent, long-lived vegetative cover is the most practical or most effective method of stabilizing the soil. Permanent seeding may also be used on rough-graded areas that will not be brought to final grade for a year or more.

Areas to be stabilized with permanent vegetation must be seeded or planted within 15 working days or 50 calendar days after final grade is reached, unless temporary stabilization is applied.

Specifications

SEEDBED REQUIREMENTS
Establishment of vegetation should not be attempted on sites that are unsuitable due to inappropriate soil texture (Table 6.11a), poor drainage, concentrated overland flow, or steepness of slope until measures have been taken to correct these problems.

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

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

If any of the above criteria are not met—i.e., if the existing soil is too coarse, dense, shallow, or acidic to foster vegetation—special amendments are required. The soil conditioners described below may be beneficial or, preferably, topsoil may be applied in accordance with Practice 6.04, *Topsoiling*.

SOIL CONDITIONERS
In order to improve the structure or drainage characteristics of a soil, the following materials may be added. These amendments should only be necessary where soils have limitations that make them poor for plant growth or for fine turf establishment (see *Chapter 3, Vegetative Considerations*).

Peat—Appropriate types are sphagnum moss peat, hypnum moss peat, reed-sedge peat, or peat humus, all from fresh-water sources. Peat should be shredded and conditioned in storage piles for at least 6 months after excavation.

Sand—clean and free of toxic materials.

Vermiculite—horticultural grade and free of toxic substances.

Rotted manure—stable or cattle manure not containing undue amounts of straw or other bedding materials.

Thoroughly rotted sawdust—free of stones and debris. Add 6 lb of nitrogen to each cubic yard.

Sludge—Treated sewage and industrial sludges are available in various forms; these should be used only in accordance with local, State, and Federal regulations.

SPECIES SELECTION
Use the *Key to Permanent Seeding Mixtures* (Table 6.11b) to select the most appropriate seeding mixture based on the general site and maintenance factors. A listing of species, including scientific names and characteristics, is given in *Appendix 8.02*.

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

Lime and fertilizer needs should be determined by soil tests. Soil testing is performed free of charge by the North Carolina Department of Agriculture soil testing laboratory. Directions, sample cartons, and information sheets are available through county Agricultural Extension offices or from NCDA. Because the NCDA soil testing lab requires 1–6 weeks for sample turn-around, sampling must be planned well in advance of final grading. Testing is also done by commercial laboratories.

When soil tests are not available, follow rates suggested on the individual specification sheet for the seeding mix chosen (Tables 6.11c through 6.11v). Application rates usually fall into the following ranges:

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

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

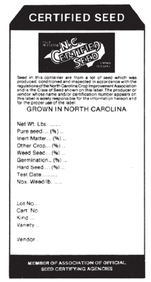
Roughen surfaces according to Practice 6.03, *Surface Roughening*.

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

SEEDING
Seeding dates given in the seeding mixture specifications (Table 6.11c through 6.11v) are designated as "best" or "possible". Seedings properly carried out within the "best" dates have a high probability of success. It is also possible to have satisfactory establishment when seeding outside these dates. However, as you deviate from them, the probability of failure increases rapidly. Seeding on the last date shown under "possible" may reduce chances of success by 30-50%. Always take this into account in scheduling land-disturbing activities.

Use certified seed for permanent seeding whenever possible. Certified seed is inspected by the North Carolina Crop Improvement Association. It meets published North Carolina Standards and should bear an official "Certified Seed" label (Figure 6.11b).

Figure 6.11b Label displayed on all North Carolina certified seed.



Labeling of non-certified seed is also required by law. Labels contain important information on seed purity, germination, and presence of weed seeds. Seed must meet State standards for content of noxious weeds. Do not accept seed containing "prohibited" noxious weed seed.

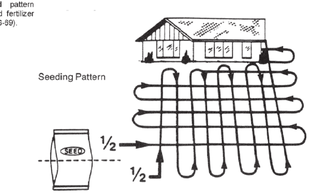
Inoculate legume seed with the *Rhizobium* bacteria appropriate to the species of legume (*Chapter 3, Vegetative Considerations*).

Apply seed uniformly with a cyclone seeder, drop-type spreader drill, cultipacker seeder, or hydroseeder on a firm, friable seedbed.

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

When using broadcast-seeding methods, subdivide the area into workable sections and determine the amount of seed needed for each section. Apply one-half the seed while moving back and forth across the area, making a uniform pattern; then apply the second half in the same way, but moving at right angles to the first pass (Figure 6.11c).

Figure 6.11c Suggested pattern for broadcasting seed and fertilizer (source: NCAES Bulletin AG-69).



Cover broadcast seed by raking or chain dragging; then firm the surface with a roller or cultipacker to provide good seed contact.

Mulch all plantings immediately after seeding (Practice 6.14, *Mulching*).

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

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

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

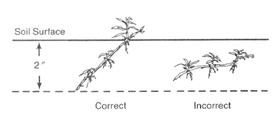
If a machinery breakdown of 1/2 to 2 hours occurs, add 50% more seed to the task, based on the proportion of the slurry remaining. This should compensate for damage to seed. Beyond 2 hours, a full rate of new seed may be necessary.

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

SPRIGGING
Hybrid Bermudagrass cannot be grown from seed and must be planted vegetatively. Vegetative methods of establishing common and hybrid Bermudagrass, centipedegrass, and Bahiagrass include sodding, plugging and sprigging (*Chapter 3, Vegetative Considerations*). Sprigs are fragments of horizontal stems which include at least one node (joint). They are normally sold by the bushel and can either be broadcast or planted in furrows using a tractor-drawn tobacco or vegetable transplanter.

Furrows should be 4-6 inches deep and 2 ft apart. Place sprigs about 2 ft apart in the row with one end at or above ground level (Figure 6.11d).

Figure 6.11d Proper placement of grass sprigs. Each sprig should have at least one node (modified from NCAES Bulletin AG-69).



Broadcast sprigs at the specified rate (Tables 6.11r and 6.11s). Press into the top 1/2-2 inches of soil with a cultipacker or with a disk set nearly straight so that the sprigs are not brought back to the surface.

IRRIGATION
Moisture is essential for seed germination and seedling establishment. Supplemental irrigation can be very helpful in assuring adequate stands in dry seasons or to speed development of full cover. It is a requirement for fine turf establishment and should be used elsewhere when feasible. However, irrigation is rarely critical for low-maintenance vegetation planted at the appropriate time of the year.

Water application rates must be carefully controlled to prevent runoff. Inadequate or excessive amounts of water can be more harmful than no supplemental water.

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

Reseeding—If a stand has inadequate cover, re-evaluate choice of plant materials and quantities of lime and fertilizer. Re-establish the stand after seedbed preparation or over-seed the stand. Consider seeding temporary, annual species if the time of year is not appropriate for permanent seeding (Practice 6.10, *Temporary Seeding*).

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

Fertilization—On the typical disturbed site, full establishment usually requires refertilization in the second growing season. Fine turf requires annual maintenance fertilization (Table 6.12b). Use soil tests if possible or follow the guidelines given for the specific seeding mixture. (Tables 6.11c through 6.11v).

Table 6.11d Seeding No. 2M for: Gentle to Steep Slopes, Stony, Dry Soils; Low Maintenance

Seeding mixture

Species[1]	Rate (lb/acre)
Tall fescue	40
Crown vetch	10
Korean lespedeza	10
Redtop	5

Seeding note
If occasional mowing is desired, substitute 20 lb/acre sericea lespedeza for crown vetch.

Nurse plants
Between May 1 and Aug. 15, add 10 lb/acre German millet or 15 lb/acre Sudangrass. Prior to May 1 or after Aug. 15, add 40 lb/acre rye (grain).

Seeding dates

	Best	Possible
Below 2500 ft:	Aug. 15 - Sept. 1	July 25 - Sept. 15
	Mar. 1 - Apr. 1	Mar. 1 - May 10
Above 2500 ft:	July 25 - Aug. 15	July 15 - Aug. 30
	Mar. 20 - Apr. 20	Mar. 5 - May 15

Complete seeding earlier in fall, and start later in spring on north- and east-facing slopes.

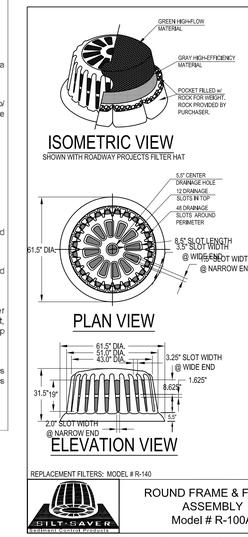
Soil amendments
Follow recommendations of soil tests, or apply 4,000 lb/acre ground agricultural limestone and 1,000 lb/acre 5-10-10 fertilizer.

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

Maintenance
Do not mow crown vetch. Refertilize in the second year unless growth is fully adequate. Reseed, fertilize and mulch damaged areas immediately.

[1]Refer to *Appendix 8.02* for botanical names.

IP1 DOMED INLET - INLET PROTECTION



FILTER OPTIONS
FILTER HAT IS AVAILABLE IN THREE OPTIONS:
1) ALL HIGH-FLOW MATERIAL
2) ALL HIGH-EFFICIENCY MATERIAL
3) HIGH-FLOW MATERIAL ON TOP HALF OF HAT, HIGH-EFFICIENCY MATERIAL ON BOTTOM HALF (THIS FILTER COVER IS RECOMMENDED FOR ALL ROADWAY PROJECTS.)
IT IS THE PURCHASERS RESPONSIBILITY TO PURCHASE APPROPRIATE FILTER HAT. PURCHASER SHALL PROVIDE ROCK FOR FILTER POCKETS.

FILTER HAT INSTALLATION
FILTER HAT SLIDES DIRECTLY OVER FILTER FRAME. TO KEEP FILTER FRAME IN PLACE OVER STORM STRUCTURE, ROCK POCKETS ARE SEWN DIRECTLY INTO FILTER HAT MATERIAL. EVERY FILTER HAT COMES IN ONE PIECE FOR EASY INSTALLATION.

MAINTENANCE
ALL TEMPORARY EROSION, SEDIMENTATION, & POLLUTION CONTROL PRACTICES SHOULD BE INSPECTED DAILY. CONTRACTOR SHALL REMOVE SEDIMENT AND DISPOSE OF IN A PROPER MANNER. INSPECT R-100A DAILY FOR CUTS, ABRASIONS, AND PROPER INSTALLATION. REPLACE OR REPOSITION AS NECESSARY.

SPECIFICATIONS
FILTER FABRIC SILT-SAVER HAT SHALL BE BASED ON DESIGN PROFESSIONAL'S SPECIFICATIONS.

FRAME & FILTER DISCHARGE ANALYSIS

HEAD (FT)	EQUATION USED	OPENING AREA (SF)	FRAME FLOW (CFS)	FILTER AREA (SF)	FILTERED FLOW (CFS)
0.5	Q	2.1	7	6	2
1.0	Q	3.8	19	12	3
1.5	Q	7.0	41	18	5
2.0	Q	8.0	54	24	7
2.5	Q	9.2	70	30	9
3.0	Q	9.2	77	—	77

DUE TO NARROW SLOT, A TRANSITION WILL OCCUR BETWEEN WEIR AND ORIFICE CONDITIONS. ORIFICE FLOW WILL PROVIDE A MORE CONSERVATIVE ESTIMATE OF FLOW, THEREFORE THE LESSER OF THE ORIFICE AND WEIR FLOWS WILL BE USED FOR EACH STAGE CALCULATION.

FILTER MATERIAL ALLOWS 129 gpm/SF OR 0.29cfs/SF
ORIFICE EQUATION (Q) = $C*0.6A(2gh)^{1/2}$
P = FEET PERIMETER
h = HEAD IN FEET
Q = CAPACITY IN cfs
A = FREE OPEN AREA OF FRAME
g = 32.2 FEET-PER-SECOND-SECOND

REPLACEMENT FILTERS: MODEL # R-140

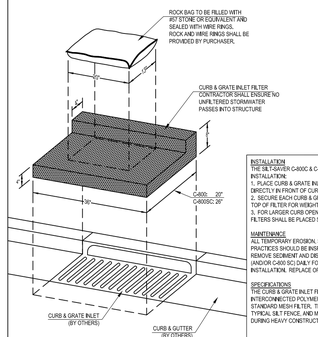
SILT-SAVER
INSTALL WITH CONFIDENCE

ROUND FRAME & FILTER ASSEMBLY
Model # R-100A

FRAME MATERIAL: BLACK 0.25" HMWPE
FILTER FABRIC MATERIAL: REFER TO SPEC
SCALE: NOT TO SCALE
LAST UPDATED: APRIL 2010

SILT-SAVER, INC. 1094 CULPEPPER DRIVE, CONYERS, GA 30094 PHONE: (770) 388-7818 FAX: (770) 388-7840 TOLL FREE: 1-888-392-SILT (7458) www.siltsaver.com

IP2 CURB INLET - INLET PROTECTION



INSTALLATION
THE SILT-SAVER C-800C & C-800SC ARE DESIGNED FOR EASY INSTALLATION:
1. PLACE CURB & GRATE INLET FILTER ON TOP OF GRATE AND DIRECTLY IN FRONT OF CURB OPENING.
2. SECURE EACH CURB & GRATE INLET FILTER WITH ROCK BAG ON TOP OF FILTER FOR WEIGHT.
3. FOR LARGER CURB OPENINGS, MULTIPLE CURB & GRATE INLET FILTERS SHALL BE PLACED SIDE-BY-SIDE.

MAINTENANCE
ALL TEMPORARY EROSION, SEDIMENTATION, & POLLUTION CONTROL PRACTICES SHOULD BE INSPECTED DAILY. CONTRACTOR SHALL REMOVE SEDIMENT AND DISPOSE OF IN A PROPER. INSPECT C-800 AND/OR C-800 SC DAILY FOR CUTS, ABRASIONS, AND PROPER INSTALLATION. REPLACE OR REPOSITION AS NECESSARY.

SPECIFICATIONS
THE CURB & GRATE INLET FILTER UTILIZES HEAVY DUTY INTERCONNECTED POLYMERIC COILS TO SUPPORT A VENTA TEX STANDARD MESH FILTER. THIS FILTER ALLOWS A HIGHER FLOW THAN TYPICAL SILT FENCE, AND MAINTAINS STRUCTURAL INTEGRITY, EVEN DURING HEAVY CONSTRUCTION ACTIVITY.

SILT-SAVER
INSTALL WITH CONFIDENCE

CURB & GRATE INLET FILTER
Model # C-800 (20"w)
& C-800SC (26"w)

FRAME MATERIAL: HDPE COILS
FILTER FABRIC MATERIAL: GREEN HIGH-FLOW
SCALE: NOT TO SCALE
LAST UPDATED: APRIL 2010

SILT-SAVER, INC. 1094 CULPEPPER DRIVE, CONYERS, GA 30094 PHONE: (770) 388-7818 FAX: (770) 388-7840 TOLL FREE: 1-888-392-SILT (7458) www.siltsaver.com

6.03

SURFACE ROUGHENING

Definition Roughening a bare soil surface with horizontal grooves running across the slope, stair stepping, or tracking with construction equipment.

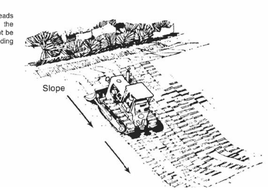
Purpose To aid the establishment of vegetative cover from seed, to reduce runoff velocity and increase infiltration, and to reduce erosion and provide for sediment trapping.

Conditions Where Practice Applies All construction slopes require surface roughening to facilitate stabilization with vegetation, particularly slopes steeper than 3:1.

Planning Considerations Rough slope surfaces are preferred because they aid the establishment of vegetation, improve water infiltration, and decrease runoff velocity. Graded areas with smooth, hard surfaces may be initially attractive, but such surfaces increase the potential for erosion. A rough, loose soil surface gives a mulching effect that protects lime, fertilizer, and seed. Nicks in the surface are cooler and provide more favorable moisture conditions than hard, smooth surfaces; this aids seed germination.

There are different methods for achieving a roughened soil surface on a slope, and the selection of an appropriate method depends upon the type of slope. Roughening methods include stair-step grading, grooving (Figure 6.03a), and tracking. Factors to be considered in choosing a method are slope steepness, mowing requirements, and whether the slope is formed by cutting or filling.

Figure 6.03a Bulldozer treads create grooves perpendicular to the slope. The slope face should not be back-bladed during the final grading operation (source: Va SWCC).



Construction Specifications

CUT SLOPE ROUGHENING FOR AREAS NOT TO BE MOWED
Stair-step grade or groove cut slopes with a gradient steeper than 3:1 (Figures 6.03b and 6.03c).

Use stair-step grading on any erodible material soft enough to be ripped with a bulldozer. Slopes consisting of soft rock with some subsoil are particularly suited to stair-step grading.

Make the vertical cut distance less than the horizontal distance, and slightly slope the horizontal position of the "step" in toward the vertical wall.

Do not make individual vertical cuts more than 2 feet in soft materials or more than 3 feet in rocky materials.

Grooving uses machinery to create a series of ridges and depressions that run across the slope (on the contour).

Groove using any appropriate implement that can be safely operated on the slope, such as disks, tillers, spring harrows, or the teeth on a front-end loader bucket. Do not make such grooves less than 3 inches deep nor more than 15 inches apart.

FILL SLOPE ROUGHENING FOR AREAS NOT TO BE MOWED
Place fill slopes with a gradient steeper than 3:1 in lifts not to exceed 9 inches, and make sure each lift is properly compacted. Ensure that the face of the slope consists of loose, uncompacted fill 4 to 6 inches deep. Use grooving, as described above, to roughen the face of the slopes, if necessary.

Do not blade or scrape the final slope face.

CUTS, FILLS, AND GRADED AREAS THAT WILL BE MOWED
Make mowed slopes **no steeper than 3:1**.

Roughen these areas to shallow grooves by normal tilling, disking, harrowing, or use of cultipacker-seeder. Make the final pass of any such tillage implement on the contour.

Make grooves, formed by such implements, close together (less than 10 inches) and not less than 1 inch deep.

Excessive roughness is undesirable where mowing is planned.

ROUGHENING WITH TRACKED MACHINERY
Limit roughening with tracked machinery to sandy soils to avoid undue compaction of the soil surface. Tracking is generally not as effective as the other roughening methods described.

Operate tracked machinery up and down the slope to leave horizontal depressions in the soil. Do not back-blade during the final grading operation.

Seeding—Immediately seed and mulch roughened areas to obtain optimum seed germination and growth.

Maintenance Periodically check the seeded slopes for rills and washes. Fill these areas slightly above the original grade, then reseed and mulch as soon as possible.

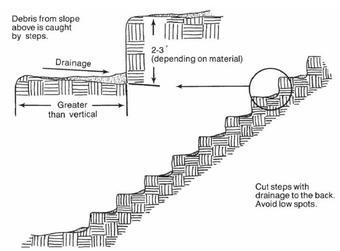


Figure 6.03b Stair stepping cut slopes (modified from Va SWCC).

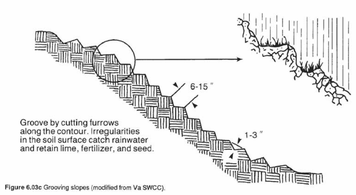
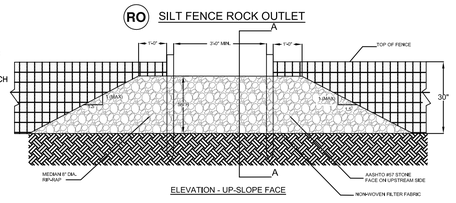


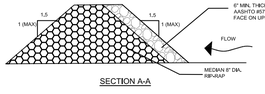
Figure 6.03c Grooving slopes (modified from Va SWCC).

Riprap

NOTES:

1. WASHED STONE (#57) TO BE REMOVED AND REPLACED ONCE IT BECOMES CLOGGED WITH SEDIMENT.
2. SEDIMENT TO BE REMOVED WHEN ACCUMULATIONS REACH 1/3 HEIGHT OF SILT FENCE
3. THE KEY TO FUNCTIONAL ROCK OUTLETS IS WEEKLY INSPECTIONS, ROUTINE MAINTENANCE, AND REGULAR SEDIMENT REMOVAL.





NON-WOVEN FILTER FABRIC SHALL BE INSTALLED UNDER ALL STONE

Plan Symbol

NON-WOVEN FILTER FABRIC SHALL BE INSTALLED UNDER ALL STONE

Description
Riprap is a permanent, erosion-resistant channel lining aggregate consisting of large, loose, angular stone with a filter fabric or granular underlining. The purpose of riprap is to:
- Protect the soil from the erosive force of concentrated runoff
- Slow runoff velocities while enhancing the potential for infiltration

The filter fabric or granular underlining prevents undermining of the riprap layer by the migration of soil particles under seepage forces through the riprap.

When and Where to Use It
The preferred method of slope and channel protection is the use of vegetation. If vegetation can not withstand the design flows, ECBs and TRMs are the preferred and suggested method of protection. When conditions are too severe for vegetation and TRMs, riprap may be used for erosion control and protection. Riprap is used, as appropriate, at storm drain outlets, on channel banks and/or bottoms, drop structures, at the toe of slopes, and in transitions from concrete channels to vegetated channels. Riprap sizes are designed by the diameter or by the weight of the stones. It is often misleading to think of riprap in terms of diameter, since the stones should be angular instead of spherical.

Installation
Place a lining of geotextile filter fabric or granular filter material between the riprap and the underlying soil surface to prevent soil movement into or through the riprap.

Inspection and Maintenance
- Once a riprap installation has been completed, it should require very little maintenance.
- It should, however, be inspected periodically to determine if high flows have caused scour beneath the riprap and filter fabric or dislodged any of the stone.
- Care must be taken to properly control sediment-laden construction runoff that may drain to the point of the new installation. If repairs are needed, they should be performed immediately.

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SETZER PROPERTIES WMN, LLC
354 WALLER AVENUE, STE 200
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REVISIONS:

FOR CONSTRUCTION	02/23/18

CHECKED BY:	TWC
DRAWING BY:	FSE
DATE:	01/16/18
JOB NUMBER:	-

TITLE:
EROSION & SEDIMENT CONTROL DETAILS

SHEET NUMBER:
C-7.5

COMMENTS:

6.17 ROLLED EROSION CONTROL PRODUCTS

RECP

Definition Rolled erosion control products are manufactured or fabricated into rolls designed to reduce soil erosion and assist in the growth, establishment and protection of vegetation. Examples of RECP's are blankets, nets, and matting.

Purpose Erosion control mats and blankets are intended to protect soil and hold seed and mulch in place on slopes and in channels so that vegetation can become well established. Turf reinforcement mats can be used to permanently reinforce grass in drainage ways during high flows. Nets are made of high tensile material woven into an open net which overlays mulch materials. Blankets are made of interlocking fibers, typically held together by a biodegradable or photodegradable netting (for example, excelsior or straw blankets). They generally have lower tensile strength than nets, but cover the ground more completely. Coir (coconut fiber) fabric comes as both nets and blankets.

Construction Specifications

Construction

Even if properly designed, if not properly installed, RECP's will probably not function as desired. Proper installation is imperative. Even if properly installed, if not properly timed and nourished, vegetation will probably not grow as desired. Proper seed/vegetation selection is also imperative.

Grade the surface of installation areas so that the ground is smooth and loose. When seeding prior to installation, follow the steps for seed bed preparation, soil amendments, and seeding in *Surface Stabilization*, 6.1. All gullies, rills, and any other disturbed areas must be fine graded prior to installation. Spread seed before RECP installation. **(Important**: Remove all large rocks, dirt clods, stumps, roots, grass clumps, trash, and other obstructions from the soil surface to allow for direct contact between the soil surface and the RECP.)

Terminal anchor trenches are required at RECP ends and intermittent trenches must be constructed across channels at 25-foot intervals. Terminal anchor trenches should be a minimum of 12 inches in depth and 6 inches in width, while intermittent trenches need be only 6 inches deep and 6 inches wide.

Installation for Slopes— Place the RECP 2-3 feet over the top of the slope and into an excavated end trench measuring approximately 12 inches deep by 6 inches wide. Pin the RECP at 1 foot intervals along the bottom of the trench, backfill, and compact. Unroll the RECP down (or along) the slope maintaining direct contact between the soil and the RECP. Overlap adjacent rolls a minimum of 3 inches. Pin the RECP to the ground using staples or pins in a 3 foot center-to-center pattern. Less frequent stapling/pinning is acceptable on moderate slopes.

Installation in Channels— Excavate terminal trenches (12 inches deep and 6 inches wide) across the channel at the upper and lower end of the lined channel sections. At 25-foot intervals along the channel, anchor the RECP across the channel either in 6 inch by 6 inch trenches or by installing two closely spaced rows of anchors. Excavate longitudinal trenches 6 inches deep and wide along channel edges (above water line) in which to bury the outside RECP edges. Place the first RECP at the downstream end of the channel. Place the end of the first RECP in the terminal trench and pin it at 1 foot intervals along the bottom of the trench.

Note: The RECP should be placed upside down in the trench with the roll on the downstream side of the bench.

Once pinned and backfilled, the RECP is deployed by wrapping over the top of the trench and unrolling upstream. If the channel is wider than the provided rolls, place ends of adjacent rolls in the terminal trench, overlapping the adjacent rolls a minimum of 3 inches. Pin at 1 foot intervals, backfill, and compact. Unroll the RECP in the upstream direction until reaching the first intermittent trench. Fold the RECP back over itself, positioning the roll on the downstream side of the trench, and allowing the mat to conform to the trench.

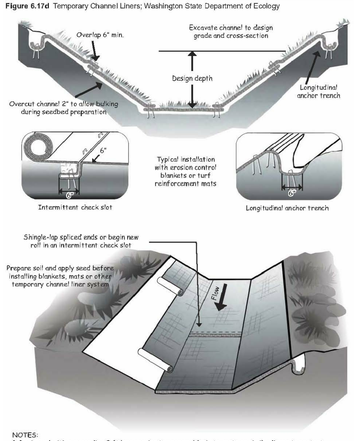
Tiers pin the RECP (two layers) to the bottom of the trench, backfill, and compact. Continue up the channel (wrapping over the top of the intermittent trench) repeating this step at other intermittent trenches, until reaching the upper terminal trench.

At the upper terminal trench, allow the RECP to conform to the trench, secure with pins or staples, backfill, compact and then bring the mat back over the top of the trench and onto the existing mat (2 to 3 feet overlap in the downstream direction), and pin at 1 foot intervals across the RECP. When starting installation of a new roll, begin in a trench or shingle-lap ends of rolls a minimum of 1 foot with upstream RECP on top to prevent uplifting. Place the outside edges of the RECP(s) in longitudinal trenches, pin, backfill, and compact.

Anchoring Devices—11 gauge, at least 6 inches length by 1 inch width staples or 12 inch minimum length wooden stakes are recommended for anchoring the RECP to the ground.

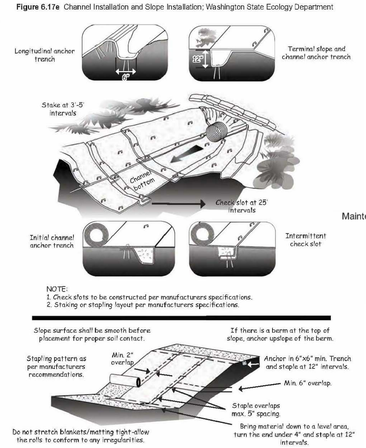
Drive staples or pins so that the top of the staple or pin is flush with the ground surface. Anchor each RECP every 3 feet along its center. Longitudinal overlaps must be sufficient to accommodate a row of anchors and uniform along the entire length of overlap and anchored every 3 feet along the overlap length. Roll ends may be spliced by overlapping 1 foot (in the direction of water flow), with the upstream/upslope mat placed on top of the downstream/downslope RECP. This overlap should be anchored at 1 foot spacing across the RECP. When installing multiple width mats heat seamed in the factory, all factory seams and field overlaps should be similarly anchored.

Figure 6.17d Temporary Channel Liners; Washington State Department of Ecology



NOTES:
1. Design velocities exceeding 2 ft/sec require temporary blankets, mats or similar liners to protect seed and soil until vegetation becomes established.
2. Grass-lined channels with design velocities exceeding 6 ft/sec should include turf reinforcement mats

Figure 6.17e Channel Installation and Slope Installation; Washington State Ecology Department



Maintenance

1. Inspect Rolled Erosion Control Products at least weekly and after each significant (1/2 inch or greater) rain fall event repair immediately.
2. Good contact with the ground must be maintained, and erosion must not occur beneath the RECP.
3. Any areas of the RECP that are damaged or not in close contact with the ground shall be repaired and stapled.
4. If erosion occurs due to poorly controlled drainage, the problem shall be fixed and the eroded area protected.
5. Monitor and repair the RECP as necessary until ground cover is established.

6.83 CHECK DAM

CD

Definition A small temporary stone dam constructed across a drainage way.

Purpose To reduce erosion in a drainage channel by reducing the velocity of flow.

Conditions Where Practice Applies This practice may be used as a temporary measure to limit erosion by reducing velocity in small open channels. When needed, they can be used in channels, roadside ditches, and temporary diversions.

Check dams may be used to:

- reduce velocity in small temporary channels that are degrading, but where permanent stabilization is impractical due to their short period of usefulness;
- reduce velocity in small eroding channels where construction delays or weather conditions prevent timely installation of nonerosive liners.

Do not use check dams in intermittent or perennial streams.

Planning Considerations Check dams are an expedient way to reduce gullying in the bottom of channels that will be filled or stabilized at a later date. The dams should only be used while permanent stabilization measures are being put into place.

Check dams installed in grass-lined channels may kill the vegetative lining if submergence after it rains is too long and/or silting is excessive. All stone and riprap must be removed if mowing is planned as part of vegetative maintenance.

Construction Specifications

1. Place stone to the lines and dimensions shown in the plan on a filter fabric foundation.
2. Keep the center stone section at least 9 inches below natural ground level where the dam abuts the channel banks.
3. Extend stone at least 1.5 feet beyond the ditch bank (Figure 6.83b) to keep water from cutting around the ends of the check dam.
4. Set spacing between dams to assure that the elevation at the top of the lower dam is the same as the toe elevation of the upper dam.
5. Protect the channel after the lowest check dam from heavy flow that could cause erosion.
6. Make sure that the channel reach above the most upstream dam is stable.
7. Ensure that other areas of the channel, such as culvert entrances below the check dams, are not subject to damage or blockage from displaced stones.

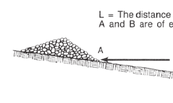


Figure 6.83a Space check dams in a channel so that the crest of downstream dam is at elevation of the toe of upstream dam.

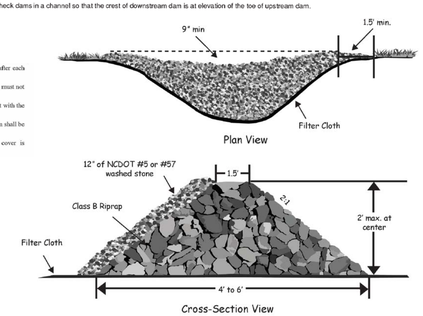
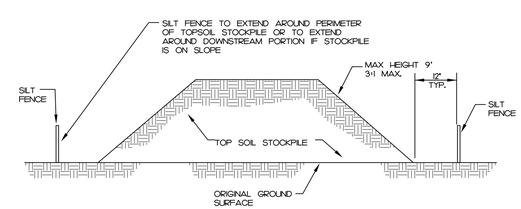


Figure 6.83b Stone check dam stone should be placed over the channel banks to keep water from cutting around the dam.

Maintenance Inspect check dams and channels at least weekly and after each significant (1/2 inch or greater) rainfall event and repair immediately. Clean out sediment, straw, limbs, or other debris that could clog the channel when needed.

Anticipate submergence and deposition above the check dam and erosion from high flows around the edges of the dam. Correct all damage immediately. If significant erosion occurs between dams, additional measures can be taken such as, installing a protective riprap liner in that portion of the channel (Practice 6.31, *Riprap-line and Paved Channels*).

Remove sediment accumulated behind the dams as needed to prevent damage to channel vegetation, allow the channel to drain through the stone check dam, and prevent large flows from carrying sediment over the dam. Add stones to dams as needed to maintain design height and cross section.



1. AN ON-SITE DRAINAGE SWALE SHALL BE LOCATED BETWEEN THE TOP SOIL STOCKPILE AND OFF-SITE PROPERTY.
2. REFERENCE IS MADE TO THE SILT FENCE DETAIL FOR MATERIALS AND INSTALLATION METHODS.
3. IF THE STOCKPILE IS TO REMAIN FOR MORE THAN 14 DAYS, IT SHALL BE STABILIZED WITH BURLAP MATTING OR SEEDED WITHIN 7 DAYS OF COMPLETEION TO MINIMIZE EROSION.
4. INSPECTION OF SILT FENCES SHALL BE AT LEAST ONCE PER WEEK AND AFTER RAIN EVENTS IN EXCESS OF ½" REPAIR OR REPLACEMENT SHALL BE MAKE PROMPTLY AS NEEDED.
5. SEDIMENT TRAPPED BY THE FENCES SHALL BE REMOVED AND PROPERTY DISPOSED OF WHENEVER SIGNIFICANT ACCUMULATION OCCURS (SEE SILT FENCE DETAIL).
6. SILT FENCES SHALL BE MAINTAINED IN PLACE UNTIL TOPSOIL STOCKPILE HAS BEEN ELIMINATED AND SHALL BE REMOVED ONLY WHEN DIRECTED BY THE EROSION CONTROL INSPECTOR.

TOPSOIL STOCKPILE DETAIL

N.T.S.

6.41 OUTLET STABILIZATION STRUCTURE

OP

Definition A structure designed to control erosion at the outlet of a channel or conduit.

Purpose To prevent erosion at the outlet of a channel or conduit by reducing the velocity of flow and dissipating energy.

Conditions Where Practice Applies This practice applies where the discharge velocity of a pipe, box culvert, diversion, open channel, or other water conveyance structure exceeds the permissible velocity of the receiving channel or disposal area.

Planning Considerations The outlets of channels, conduits, and other structures are points of high erosion potential because they frequently carry flows at velocities that exceed the allowable limit for the area downstream. To prevent scour and undermining, an outlet stabilization structure is needed to absorb the impact of the flow and reduce the velocity to non-erosive levels. A riprap-lined apron is the most commonly used practice for this purpose because of its relatively low cost and ease of installation. The riprap apron should be extended downstream until stable conditions are reached even though this may exceed the length calculated for design velocity control.

Riprap-stilling basins or plunge pools reduce flow velocity rapidly. They should be considered in lieu of aprons where pipe outlets are cantilevered or where high flows would require excessive apron length (Figure 6.41a). Consider other energy dissipaters such as concrete impact basins or paved outlet structures where site conditions warrant.

Alternative methods of energy dissipation can be found in Hydraulic Design of Energy Dissipaters for Culverts and Channels, Hydraulic Engineering Circular No. 14, U.S. Department of Transportation, Federal Highway Administration.

The installation of a culvert in a stream is subject to the conditions of a U.S. Army Corps of Engineers 404 Permit and a N.C. Division of Water Quality 401 Certification. These permit conditions may not allow the use of a riprap apron, and may require that the bottom of the culvert be buried below the natural stream bed elevation. A pre-formed scour pool or plunge pool should be considered in these situations. Plunge pool designs in streams should not use a cantilevered outlet because it would pose a barrier to migration of aquatic life through the culvert. Reducing the outlet velocity may require a combination of techniques, including a culvert with a flat bottom, a downstream cross vane to create tail-water at the pipe outlet, and/or a preformed scour pool.

Construction Specifications

1. Ensure that the subgrade for the filter and riprap follows the required lines and grades shown in the plan. Compact any fill required in the subgrade to the density of the surrounding undisturbed material. Low areas in the subgrade on undisturbed soil may also be filled by increasing the riprap thickness.
2. The riprap and gravel filter must conform to the specified grading limits shown on the plans.
3. Filter cloth, when used, must meet design requirements and be properly protected from punching or tearing during installation. Repair any damage by removing the riprap and placing another piece of filter cloth over the damaged area. All connecting joints should overlap so the top layer is above the downstream layer a minimum of 1 foot. If the damage is extensive, replace the entire filter cloth.
4. Riprap may be placed by equipment, but take care to avoid damaging the filter.
5. The minimum thickness of the riprap should be 1.5 times the maximum stone diameter.
6. Riprap may be field stone or rough quarry stone. It should be hard, angular, highly weather-resistant and well graded.
7. Construct the apron on zero grade with no overfill at the end. Make the top of the riprap at the downstream end level with the receiving area or slightly below it.
8. Ensure that the apron is properly aligned with the receiving stream and preferably straight throughout its length. If a curve is needed to fit site conditions, place it in the upper section of the apron.
9. Immediately after construction, stabilize all disturbed areas with vegetation (Practices 6.10, *Temporary Seeding*, and 6.11, *Permanent Seeding*).

Maintenance Inspect riprap outlet structures weekly and after significant (1/2 inch or greater) rainfall events to see if any erosion around or below the riprap has taken place, or if stones have been dislodged. Immediately make all needed repairs to prevent further damage.

Notes

1. L_a is the length of the riprap apron.
2. d = 1.5 times the maximum stone diameter but not less than 6".
3. In a well-defined channel extend the apron up the channel banks to an elevation of 6" above the maximum tailwater depth or to the top of the bank, whichever is less.
4. A filter blanket or filter fabric should be installed between the riprap and soil foundation.

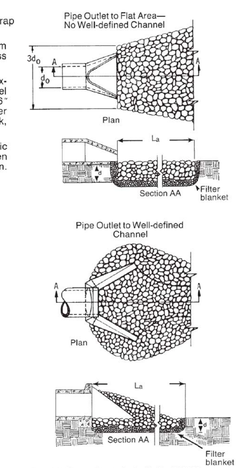


Figure 6.41c Riprap outlet protection (modified from Va SWCC).

6.20 TEMPORARY DIVERSIONS

TD

Definition A temporary ridge or excavated channel or combination ridge and channel constructed across sloping land on a predetermined grade.

Purpose To protect work areas from upslope runoff, and to divert sediment-laden water to appropriate traps or stable outlets.

Conditions Where Practice Applies This practice applies to construction areas where runoff can be diverted and disposed of properly to control erosion, sedimentation, or flood damage. Specific locations and conditions include:

- above disturbed existing slopes, and above cut or fill slopes to prevent runoff over the slope;
- across unprotected slopes, as slope breaks, to reduce slope length;
- below slopes to divert excess runoff to stabilized outlets;
- where needed to divert sediment-laden water to sediment traps;
- at or near the perimeter of the construction area to keep sediment from leaving the site; and
- above disturbed areas before stabilization to prevent erosion, and maintain acceptable working conditions.
- Temporary diversions may also serve as sediment traps when the site has been overexcavated on a flat grade; they may also be used in conjunction with a sediment fence.

Planning Considerations It is important that diversions are properly designed, constructed and maintained since they concentrate water flow and increase erosion potential (Figure 6.20a). Particular care must be taken in planning diversion grades. Too much slope can result in erosive velocity in the diversion channel or at the outlet. A change of slope from steeper grade to flatter may cause deposition to occur. The deposition reduces carrying capacity, and may cause overtopping and failure. Frequent inspection and timely maintenance are essential to the proper functioning of diversions.

Sufficient area must be available to construct and properly maintain diversions. It is usually less costly to excavate a channel and form a ridge or dike on the downhill side with the spoil than to build diversions by other methods. Where space is limited, it may be necessary to build the ridge by hauling in diking material, or using a silt fence to divert the flow. Use gravel to form the diversion dike when vehicles must cross frequently (Figure 6.20b).

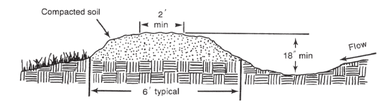


Figure 6.20a Temporary earthen diversion dike.

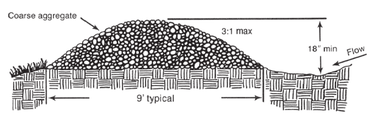


Figure 6.20b Temporary gravel diversion dike for vehicle crossing (modified from Va SWCC).

Plan temporary diversions to function 1 year or more, or they may be constructed anew at the end of each day's grading operation to protect new fill. Diversions that are to serve longer than 30 working days should be seeded and mulched as soon as they are constructed to preserve dike height and reduce maintenance.

Where design velocities exceed 2 ft/sec, a channel liner is usually necessary to prevent erosion (Table 8.05a, *Appendix 8.03*).

Temporary diversions may serve as in-place sediment traps if overexcavated 1 to 2 feet and placed on a nearly flat grade. The dike serves to divert water as the stage increases. A combination silt fence and diversion in which fill from the channel is used to stabilize the fence can trap sediment and divert runoff simultaneously.

Wherever feasible, build and stabilize diversions and outlets before initiating other land-disturbing activities.

Channel design— shape: parabolic, trapezoidal, or V-shaped
side slope: 2:1 or flatter
3:1 or flatter where vehicles cross

Grades— Either a uniform or a gradually increasing grade is preferred. Sudden decreases in grade accumulate sediment and should be expected to cause overtopping. A large increase in grade may erode.

Outlet—Design the outlet to accept flow from the diversion plus any other contributing areas. Divert sediment-laden runoff and release through a sediment-trapping device (Practice 6.60, *Temporary Sediment Trap* and Practice 6.61, *Sediment Basin*). Flow from undisturbed areas can be dispersed by a level spreader (Practice 6.40, *Level Spreader*).

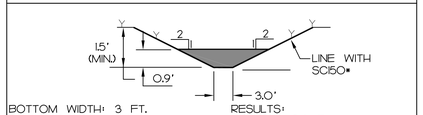
Small diversions—Where the diversion channel grade is between 0.2 and 3%, a permanent vegetative cover is required. A parabolic channel and ridge 1.5 feet deep and 12 feet wide may be used for diversions with flows up to 5 cfs. This depth does not include freeboard or settlement. Side slopes should be 3:1 or flatter, and the top of the dike must be at least 2 feet wide.

Construction Specifications

1. Remove and properly dispose of all trees, brush, stumps, and other objectionable material.
2. Ensure that the minimum constructed cross section meets all design requirements.
3. Ensure that the top of the dike is not lower at any point than the design elevation plus the specified settlement.
4. Provide sufficient room around diversions to permit machine regrading and cleanout.
5. Vegetate the ridge immediately after construction, unless it will remain in place less than 30 working days.

Maintenance Inspect temporary diversions once a week and after every rainfall. Immediately remove sediment from the flow area and repair the diversion ridge. Carefully check outlets and make timely repairs as needed. When the area protected is permanently stabilized, remove the ridge and the channel to blend with the natural ground level and appropriately stabilize it.

TEMPORARY DIVERSION SWALE #1



BOTTOM WIDTH: 3 FT.
SIDE SLOPES, 2:1, 2:1
TOTAL DEPTH: 1.5 FT. (MIN)
SLOPE = 0.5% MIN.
MANNINGS: 0.034*
(NORTH AMERICAN GREEN, SC150-DETAIL THIS SHEET)
Q(25) = 9.6 CFS

RESULTS:
DEPTH = 0.9 FT.
VELOCITY = 2.2 FPS

Q(25) = C x I x A WHERE:
C = 0.6 (PACKED SOILS)
I = 10.7 in/hr
A = 1.5 AC.
THEREFORE, Q(25) = 9.6 CFS

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DATE:	01/16/18
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TITLE:
EROSION & SEDIMENT CONTROL DETAILS

SHEET NUMBER:
C-7.6

COMMENTS:

GENERAL LANDSCAPE NOTES:

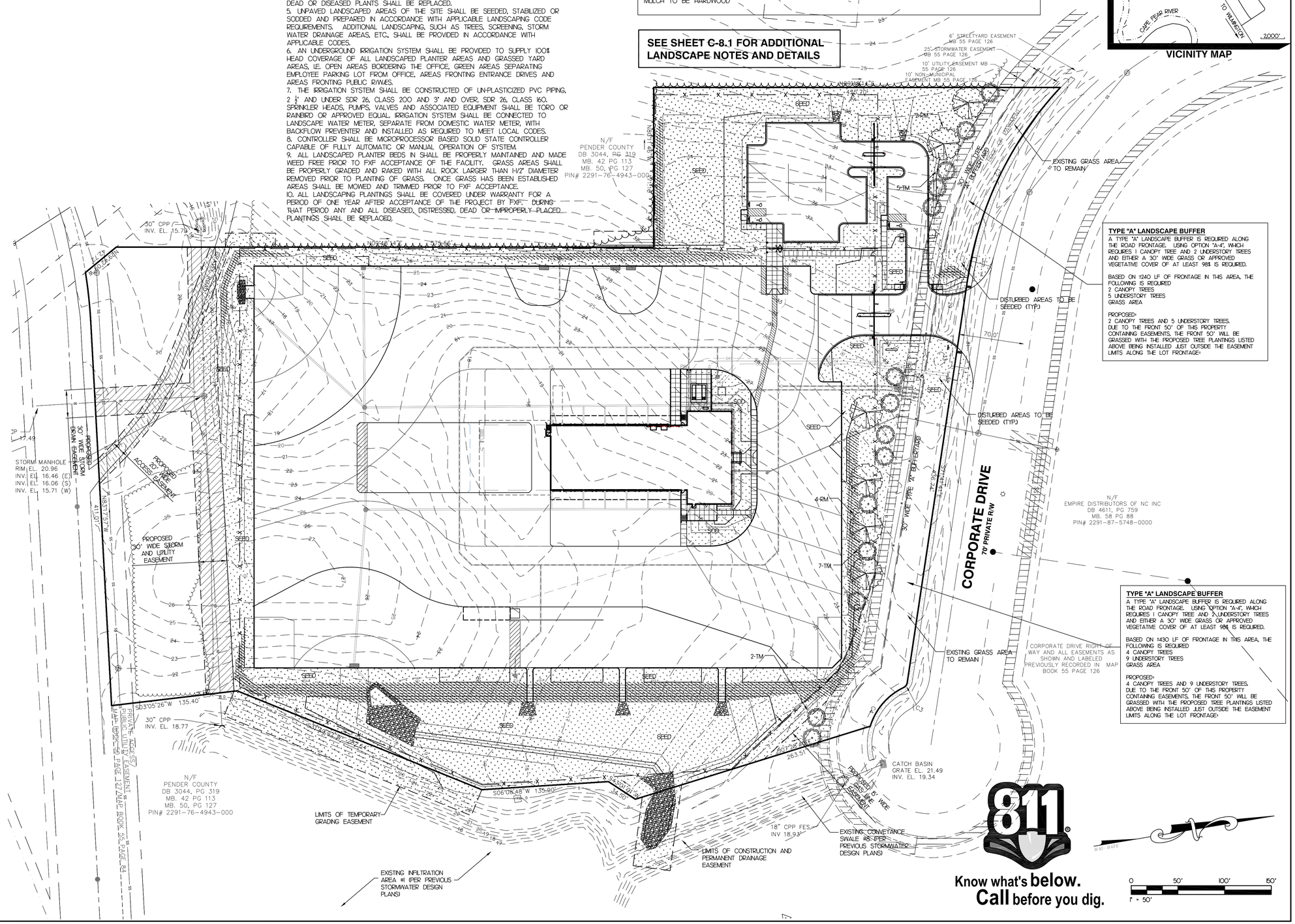
1. THERE SHALL BE A SUFFICIENT AMOUNT OF FERTILE TOPSOIL STOCKPILED ON-SITE IN ORDER TO PROVIDE A MINIMUM OF 6" THICK LAYER OF TOPSOIL AT ALL AREAS SCHEDULED OR SHOWN TO REMAIN GREEN ON SITE PLAN. SHOULD A SUFFICIENT AMOUNT OF TOPSOIL NOT BE AVAILABLE, TOPSOIL SHALL BE IMPORTED.
2. ALL PLANTER AREAS SHALL HAVE WEED BARRIER INSTALLED PRIOR TO INSTALLATION OF ROCK OR MULCH MATERIAL. WHEN PLACING MULCH IT SHALL BE PLACED AT A THICKNESS OF 6". ALL PLANTER AREAS SHALL BE SEPARATED FROM GRASS AREAS WITH METAL EDGING OR OTHER APPROVED EDGING MATERIALS.
3. ALL PLANTED TREES SHALL BE PROPERLY STAKED AND TIED.
4. LANDSCAPING TO BE DESIGNED WITH PLANT MATERIALS WHICH COMPLY WITH LOCAL CODES AND ORDINANCES, WHERE APPLICABLE, AND INSTALLED BY LOCAL NURSERYMEN. LANDSCAPING AND IRRIGATION IN FRONT OF AND ADJACENT TO SERVICE CENTER OFFICE IS REQUIRED. PLANT MATERIALS SHALL BE WARRANTED FOR A PERIOD OF ONE YEAR. DURING AND/OR PRIOR TO END OF WARRANTY PERIOD DEAD OR DISEASED PLANTS SHALL BE REPLACED.
5. UNPAVED LANDSCAPED AREAS OF THE SITE SHALL BE SEEDED, STABILIZED OR SODDED AND PREPARED IN ACCORDANCE WITH APPLICABLE LANDSCAPING CODE REQUIREMENTS. ADDITIONAL LANDSCAPING, SUCH AS TREES, SCREENING, STORM WATER DRAINAGE AREAS, ETC., SHALL BE PROVIDED IN ACCORDANCE WITH APPLICABLE CODES.
6. AN UNDERGROUND IRRIGATION SYSTEM SHALL BE PROVIDED TO SUPPLY 100% HEAD COVERAGE OF ALL LANDSCAPED PLANTER AREAS AND GRASSED YARD AREAS, I.E. OPEN AREAS BORDERING THE OFFICE, GREEN AREAS SEPARATING EMPLOYEE PARKING LOT FROM OFFICE, AREAS FRONTING ENTRANCE DRIVES AND AREAS FRONTING PUBLIC R/W.ES.
7. THE IRRIGATION SYSTEM SHALL BE CONSTRUCTED OF UN-PLASTICIZED PVC PIPING, 2 ½" AND UNDER SDR 26, CLASS 200 AND 3" AND OVER, SDR 26, CLASS 160. SPRINKLER HEADS, PUMPS, VALVES AND ASSOCIATED EQUIPMENT SHALL BE TORO OR RAINBIRD OR APPROVED EQUAL. IRRIGATION SYSTEM SHALL BE CONNECTED TO LANDSCAPE WATER METER, SEPARATE FROM DOMESTIC WATER METER, WITH BACKFLOW PREVENTER AND INSTALLED AS REQUIRED TO MEET LOCAL CODES.
8. CONTROLLER SHALL BE MICROPROCESSOR BASED SOLID STATE CONTROLLER CAPABLE OF FULLY AUTOMATIC OR MANUAL OPERATION OF SYSTEM.
9. ALL LANDSCAPED PLANTER BEDS IN SHALL BE PROPERLY MAINTAINED AND MADE WEED FREE PRIOR TO FXF ACCEPTANCE OF THE FACILITY. GRASS AREAS SHALL BE PROPERLY GRADED AND RAKED WITH ALL ROCK LARGER THAN 1½" DIAMETER REMOVED PRIOR TO PLANTING OF GRASS. ONCE GRASS HAS BEEN ESTABLISHED AREAS SHALL BE MOWED AND TRIMMED PRIOR TO FXF ACCEPTANCE.
10. ALL LANDSCAPING PLANTINGS SHALL BE COVERED UNDER WARRANTY FOR A PERIOD OF ONE YEAR AFTER ACCEPTANCE OF THE PROJECT BY FXF. DURING THAT PERIOD ANY AND ALL DISEASED, DISTRESSED, DEAD OR IMPROPERLY PLACED PLANTINGS SHALL BE REPLACED.

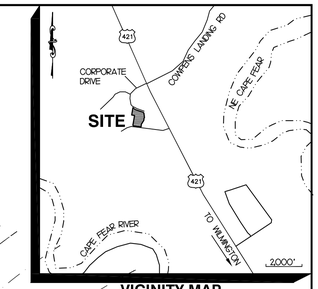
PLANT SCHEDULE

SYMBOL	KEY	QTY	COMMON NAME	BOTANICAL NAME	SIZE (@ PLANTING)
	RM	6	RED MAPLE	ACER RUBRUM	2.5" CALIPER 8-10' MIN. HT. • PLANTING
	TM	12	TRIDENT MAPLE	ACER BUERGERIANUM	2" CALIPER 8-10' MIN. HT. • PLANTING
			TURF REINFORCED MATTING (AMERICAN GREEN P300) SEE DETAIL SHEET	BERMUDA SEED	

MULCH TO BE HARDWOOD

SEE SHEET C-8.1 FOR ADDITIONAL LANDSCAPE NOTES AND DETAILS





VICINITY MAP

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TITLE:
LANDSCAPE PLAN

SHEET NUMBER:
C-8.0

COMMENTS:

GENERAL NOTES & SPECIFICATIONS:

LAWN INSTALLATION: LAWN AREAS SHALL BE FINE GRADED TO A SMOOTH, POSITIVELY DRAINING SLOPE, REMOVING ALL STONES OVER 3/4" . AGRICULTURAL LIMESTONE SHALL BE INCORPORATED INTO THE SOIL AT A RATE OF 50 POUNDS PER 1000 SQUARE FEET. APPLY SPECIFIED SEED AT RECOMMENDED RATE. STRAW MULCH OR HYDROMULCH SHALL BE USED AS DEEMED NECESSARY BY THE LANDSCAPE CONTRACTOR AND LANDSCAPE ARCHITECT. THE LANDSCAPE CONTRACTOR SHALL BE RESPONSIBLE TO ESTABLISH A FULL STAND OF GRASS AND WILL REPAIR ANY BARE SPOTS 1'- 0" SQUARE DUE TO UNEVEN SEED DISTRIBUTION, DROUGHT OR EROSION. SOD INSTALLATION: SODDED LAWN AREAS SHALL BE FINE GRADED TO A SMOOTH, POSITIVELY DRAINING SLOPE, REMOVING ALL STONES OVER 3/4" . SOD SHALL BE HEALTHY, THICK SOD PLACED SO THAT JOINTS ARE BUTT TIGHT. STAPLE AS NECESSARY. SOD SHALL BE TRIMMED TO MATCH BED LINES SHOWN ON PLAN. STARTUP FERTILIZER SHALL BE INCORPORATED INTO THE SOIL AT THE MANUFACTURER'S RECOMMENDED RATE. ANY AREA OF SOD THAT FAILS TO ROOT, SETTLES OR DIES WILL BE REPLACE BY THE LANDSCAPE CONTRACTOR.

UTILITY LOCATION: THE LANDSCAPE CONTRACTOR IS RESPONSIBLE FOR CONTACTING THE UTILITY LOCATOR SERVICE AND IS RESPONSIBLE FOR ANY DAMAGE DONE TO UTILITIES.

QUANTITIES PLANT QUANTITIES ARE SHOWN FOR THE CONTRACTOR'S CONVENIENCE ONLY. PLANTS SHALL BE INSTALLED AS SHOWN. CONTRACTOR IS RESPONSIBLE FOR CONFIRMING ALL QUANTITIES PRIOR TO BIDDING AND INSTALLATION.

BIDS IN ORDER TO KEEP ALL BIDS STANDARD, ALL BIDS ARE TO HAVE UNIT PRICES LISTED. THE OWNER HAS THE OPTION TO DELETE ANY PORTION OF THE CONTRACT PRIOR TO SIGNING THE CONTRACT OR BEGINNING WORK. THIS WILL BE A UNIT PRICE CONTRACT.

PLANT QUALITY ALL PLANTS SHALL BE NURSERY GROWN, HAVE A FULL HABIT OF GROWTH AS IS CHARACTERISTIC OF THAT SPECIES, AND SHALL BE FREE OF DISEASE OR INSECTS. GENERAL PLANT QUALITY SHALL BE AS SPECIFIED IN THE "USA STANDARD FOR NURSERY STOCK" (PUBLISHED BY THE AMERICAN ASSOCIATION OF NURSERYMEN). PLEASE CONTACT THE LANDSCAPE ARCHITECT IF THERE IS DIFFICULTY IN LOCATING A PARTICULAR PLANT. IF NECESSARY, A SUBSTITUTE PLANT WILL BE RECOMMENDED BY THE LANDSCAPE ARCHITECT.

PLANTING HOLES TREES AND SHRUBS: REMOVE ROCK AND CONSTRUCTION DEBRIS FROM PLANTING AREA. DIG HOLES TWO TO THREE TIMES AS WIDE AS THE ROOTBALL AND ONLY AS DEEP AS THE HEIGHT OF THE ROOT BALL. SOIL AT THE BOTTOM TO THE HOLE IS LEFT UNDISTURBED. SEE PLANTING DETAIL ADDITIONAL INFORMATION.

SETTING OF PLANTS THE ROOT BALL OF CONTAINER GROWN PLANTS SHALL BE SCARIFIED IN SEVERAL PLACES PRIOR TO PLANTING. PLANT SHRUBS AND TREES SO THAT THE TOP OF THE ROOT BALL WILL BE EVEN WITH OR SLIGHTLY ABOVE THE ADJACENT SOIL LINE. SINGLE PLANTING HOLE - BACKFILL BOTTOM HALF OF SPACE AROUND THE ROOTBALL WITH LOOSENED ORIGINAL SOIL (USE AMENDED SOIL ONLY WHEN NECESSARY FOR GOOD SOIL TILTH, (SEE ORGANIC AMENDMENTS). TAMP LIGHTLY. FINISH FILLING THE HOLE WITH LOOSE SOIL AND GENTLY TAMP AGAIN. SHRUB BEDS - BACKFILL BOTTOM HALF OF BED SURROUNDING SHRUBS WITH AMENDED BACKFILL (SEE ORGANIC AMENDMENTS), TAMP LIGHTLY AND WATER TO SETTLE SOIL FINISH FILLING HOLE WITH LOOSE AMENDED BACKFILL AND GENTLY TAMP AGAIN. WATER SHRUB BED TO SETTLE SOIL. PLANTINGS NOT DONE IN THIS MANNER SHALL BE REMOVED AND PROPERLY REPLANTED.

ORGANIC AMENDMENTS ORGANIC AMENDMENTS SHOULD BE ADDED TO BACKFILL FOR ALL SHRUB BEDS AND WHEN DEEMED NECESSARY TO IMPROVE SOIL TILTH OF SINGLE PLANTING HOLES. ORGANIC MATTER SHOULD COMPRISE APPROXIMATELY 10 TO 20 PERCENT OF THIS TOTAL SOIL VOLUME.

PREPARATION OF GROUND COVER AND SEASONAL COLOR BEDS : THE EXISTING SOIL IN GROUND COVER AND SEASONAL COLOR BEDS SHALL BE THOROUGHLY CULTIVATED 6 INCHES DEEP, TO A FINE TEXTURE (NO CLODS OVER 1/2") WITH A MECHANICAL TILLER. A PLANT MIX OF 60% SCREENED SHREDDED TOPSOIL, 20% SAND, AND 20% WELL ROTTED SAWDUST OR PEAT SHALL THEN BE THOROUGHLY INCORPORATED INTO THE EXISTING SOIL WITH THE TILLER SO THAT THE SOIL MIX (6" DEEP) IS 1/2 ORIGINAL SOIL AND 1/2 PLANT MIX. ALL GROUNDCOVER AND SEASONAL COLOR BEDS SHALL RECEIVE A 2" LAYER OF FINE TEXTURED, SCREENED, PINE BARK MULCH, OR EQUAL. PLANTINGS NOT DONE IN THIS MANNER SHALL BE REMOVED AND PROPERLY REPLANTED.

FERTILIZING UPON COMPLETION OF PLANTINGS, ALL SHRUBS SHALL RECEIVE 1/6 CUP OF 16-4-8 FERTILIZER (50% OF NITROGEN SLOW RELEASE) EVENLY BROADCAST AT THE BASE OF THE PLANTS. TREES SHALL RECEIVE 1/4 CUP OF 16-4-8 FERTILIZER (50% OF NITROGEN SLOW RELEASE) PER INCH OF CALIPER. GROUND COVER BEDS SHALL BE FERTILIZED AT THE RATE OF 20 POUNDS OF 16-4-8 (50% OF NITROGEN SLOW RELEASE) PER 1000 SQUARE FEET.

STAKING OF TREES TREES SHOULD ONLY BE STAKED IF NECESSARY, SUCH AS WHEN PLANTED IN AREAS OF HIGH WINDS OR STEEP SLOPES. UNDER CERTAIN CIRCUMSTANCES, OTHERS MAY BE STAKED AT THE DISCRETION OF THE LANDSCAPE CONTRACTOR OR LANDSCAPE ARCHITECT. THE LANDSCAPE CONTRACTOR IS RESPONSIBLE FOR ALL WIND DAMAGE TO TREES, (PROVIDED WINDS ARE LESS THAN 60 MPH) DURING THE GUARANTEE PERIOD, AND MAY STAKE OTHER TREES (FOR HIS OWN PROTECTION) AT HIS OPTION. LANDSCAPE CONTRACTOR WILL BE RESPONSIBLE FOR REMOVAL OF ALL STAKING MATERIAL ONE YEAR AFTER INSTALLATION.

TRANSPLANTS ALL PLANT MATERIAL TO BE TRANSPLANTED SHALL BE TRANSPLANTED ACCORDING TO GUIDELINES SET BY AAN STANDARDS. TRANSPLANTED MATERIAL WILL NOT BE GUARANTEED BY THE LANDSCAPE CONTRACTOR.

MULCHING AS SPECIFIED ON PLANTING LIST. HARDWOOD MULCH: ALL BEDS TO RECEIVE A 3" LAYER OF AGED HARDWOOD BARK MULCH (FREE OF WOOD CHIPS OR LARGE CHUNKS OF BARK). FRESH HARDWOOD BARK MULCH IS NOT RECOMMENDED TO BE USED, AS WATER RUN-OFF MAY CAUSE STAINING ON ADJACENT CONCRETE SURFACES. ALL DAMAGES INCURRED BY THE USE OF FRESH HARDWOOD MULCH SHALL BE THE RESPONSIBILITY OF THE LANDSCAPE CONTRACTOR.

PINESTRAW: ALL BEDS TO RECEIVE A 4" LAYER (PRIOR TO COMPACTION) OF PINESTRAW. AFTER NATURAL COMPACTION, PINESTRAW SHOULD HAVE A DEPTH OF 2". ALL TREES LOCATED IN LAWN AREAS SHALL RECEIVE A 3' DIAMETER RING OF MULCH. MULCH IN THESE AREAS IS TO FOLLOW THE ABOVE LISTED GUIDELINES.

GRADING ALL FINAL GRADING SHALL BE THE RESPONSIBILITY OF THE LANDSCAPE CONTRACTOR. THE RESPONSIBILITY FOR ANY ADDITIONAL GRADING (IF NEEDED) SHALL BE DETERMINED PRIOR TO BIDDING.

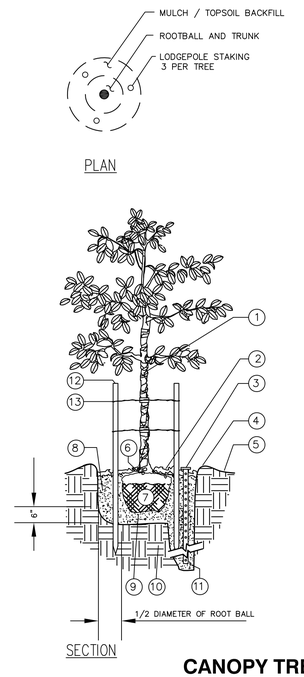
BACKFILL LANDSCAPE CONTRACTOR TO VERIFY ANY ADDITIONAL BACKFILL/TOPSOIL NEEDED PRIOR TO BEGINNING WORK. A UNIT PRICE FOR TOPSOIL SHALL BE INCLUDED IN ALL BID DOCUMENTS TO ALLOW FOR CIRCUMSTANCES THAT MIGHT ARISE DURING INSTALLATION.
CLEAN UP FINAL CLEAN UP OF ANY DISTURBANCES OCCURRING AS A RESULT OF LANDSCAPE OPERATIONS SHALL BE THE RESPONSIBILITY OF THE LANDSCAPE CONTRACTOR.

INSPECTION IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE FOR INSPECTION OF THE PLANT MATERIAL BY THE LANDSCAPE ARCHITECT PRIOR TO INSTALLATION. ALL PLANT MATERIAL WILL BE INSPECTED. PLANTS NOT CONFORMING PRECISELY TO THE PLANT LIST WILL NOT BE ACCEPTED AND SHALL BE REPLACED AT THE CONTRACTOR'S OWN EXPENSE.

LICENSES THE CONTRACTOR WILL BE RESPONSIBLE FOR OBTAINING ALL LICENSES NECESSARY TO COMPLETE THE WORK.

INSURANCE WITH THE SUBMITTAL OF BID DOCUMENTS, THE LANDSCAPE CONTRACTOR SHALL ALSO SUBMIT A CERTIFICATE OF INSURANCE FOR WORKMAN'S COMPENSATION AND A CONTRACTOR'S GENERAL LIABILITY. CONTRACTORS NOT PROVIDING EVIDENCE OF SUCH INSURANCE WILL BE INELIGIBLE TO RECEIVE THE CONTRACT FOR THE JOB

GUARANTEE ALL PLANT MATERIAL AND WORKMANSHIP TO BE GUARANTEED FOR ONE YEAR FROM THE DATE OF ACCEPTANCE BY THE OWNER. PLANT REPLACEMENT TO OCCUR ONLY ONCE. THE CONTRACTOR WILL NOT BE RESPONSIBLE FOR DEFECTS RESULTING FROM NEGLECT BY THE OWNER, ABUSE OR DAMAGE BY OTHERS, OR UNUSUAL PHENOMENA OR INCIDENTS BEYOND THE LANDSCAPE CONTRACTORS CONTROL WHICH RESULT FROM NATURAL CAUSES SUCH AS FLOODS, LIGHTNING, STORMS, FREEZING RAINS, OR WINDS OVER 60 MILES PER HOUR, FIRE, VANDALISM OR THEFT.

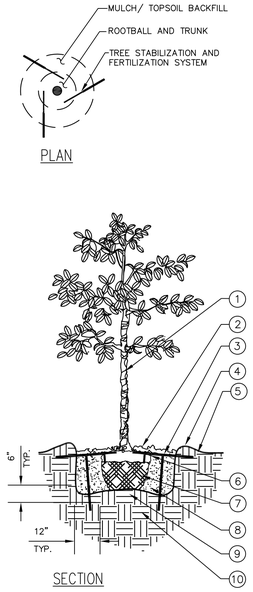


1. TREE WRAP
   SET TRUNK PLUMB / CENTER IN PIT
2. 4" MINIMUM OF HARDWOOD BARK MULCH COMPACTED OR AS SPECIFIED.
3. 4" ABS FILTER FABRIC WRAPPED PERFORATED STAND PIPE WITH REMOVABLE PVC CAP.
4. 3" HIGH SOIL BERM TO HOLD WATER.
5. FINISHED GRADE (SEE GRADING PLAN)
6. TOP OF ROOTBALL MIN. 1" ABOVE FINISHED GRADE
7. B & B OR CONTAINERIZED (SEE SPECIFICATIONS FOR ROOT BALL REQUIREMENTS).
8. PREPARED PLANTING SOIL AS SPECIFIED. REMOVE ROCKS 4" AND LARGER
9. ROOTBALLS GREATER THAN 24" DIAMETER SHALL BE PLACED ON MOUND OF UNDISTURBED SOIL TO PREVENT SETTLING ROOTBALLS SMALLER THAN 24" IN DIA. MAY SIT ON COMPACTED EARTH.
10. SET ROOTBALL IN UNDISTURBED NATIVE SOIL.
11. 3/4" GRAVEL, DEPTH OF PIPE
12. 2" DIA. LODGE POLE PINE STAKE, 3 EACH 10' MIN., 12' LONG FOR 24" BOX, 14' FOR 36" BOX. SET ONE STAKE PERPENDICULAR TO PREVAILING WIND. CUT STAKES 6" BELOW CANOPY.
13. "CINCH TIE" BY U.I.T. OR EQUAL

NOTES:

A. FINAL TREE STAKING DETAILS AND PLACEMENT TO BE APPROVED BY OWNER.
B. REMOVE BURLAP, WIRE AND STRAPS (ANYTHING THAT COULD GIRDLE TREE OR RESTRICT ROOT GROWTH) ON UPPER 1/3 OF ROOTBALL.
C. SEE LANDSCAPE NOTES FOR THE TYPE OF MULCH MATERIAL TO USE.
D. PRUNE TREE AS DIRECTED BY LANDSCAPE ARCHITECT.
E. BRANCHING HEIGHT TO A.A.N. STANDARDS.
F. INSTALL STAND PIPE AND GRAVEL AT BASE WITH SPECIMEN (24" BOX AND LARGER) TREE ONLY.

CANOPY TREE PLANTING
(N.T.S.)



1. TREE WRAP.
2. 4" MINIMUM OF HARDWOOD MULCH COMPACTED OR AS SPECIFIED.
3. STAKE SIZE SHALL BE ONE SIZE HIGHER THAN REQUIRED FOR SIZE OF TREE. REFER TO SITEWORK SPECIFICATIONS FOR APPROVED MATERIALS AND INSTALLATION REQUIREMENTS.
4. 3" HIGH SOIL BERM TO HOLD WATER.
5. FINISHED GRADE (SEE GRADING PLAN).
6. TOP OF ROOTBALL MIN. 1" ABOVE FINISHED GRADE.
7. B & B OR CONTAINERIZED (SEE SPECIFICATIONS FOR ROOT BALL REQUIREMENTS).
8. PREPARED PLANTING SOIL AS SPECIFIED.
9. ROOTBALLS GREATER THAN 24" DIAMETER SHALL BE PLACED ON MOUND OF UNDISTURBED SOIL TO PREVENT SETTLING ROOTBALLS SMALLER THAN 24" IN DIA. MAY SIT ON COMPACTED EARTH.
10. UNDISTURBED SUBSOIL.

NOTES:

A. FINAL TREE STAKING DETAILS AND PLACEMENT TO BE APPROVED BY OWNER.
B. REMOVE BURLAP, WIRE AND STRAPS (ANYTHING THAT COULD GIRDLE TREE OR RESTRICT ROOT GROWTH) ON UPPER 1/3 OF ROOTBALL.
C. SEE LANDSCAPE NOTES FOR THE TYPE OF MULCH MATERIAL TO USE.
D. PRUNE TREE AS DIRECTED BY LANDSCAPE ARCHITECT.
E. BRANCHING HEIGHT TO A.A.N. STANDARDS.

SMALL TREE PLANTING DETAIL
(N.T.S.)

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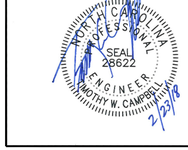

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TITLE:
LANDSCAPE DETAILS & NOTES

SHEET NUMBER:
C-8.1

COMMENTS:

GENERAL NOTES

A. Design data provided in electronic format is for information purposes only and should be used at your own risk, and is provided without representations and warranties. Any conflict between the information reflected on the latest revision of the sealed plan sheets and that provided via electronic format shall be resolved in favor of the sealed plan sheets.
B. Utilities: There may be additional existing utilities not shown on these plans. Existing utilities are shown in an approximate manner only and the Engineer assumes no responsibility for locations shown. Field verify the location of all existing utilities within the limits of construction. Notify the Owner and Engineer if discrepancies are found that will affect the construction project. Protect all existing utilities.
C. Temporary Provisions: Sequence the work and provide temporary measures as needed to maintain access to the site through all entrances at all times during construction. Temporary provisions may include, but are not limited to: barricades, flashing lights, flagman, temporary pavement, and directional signage.
D. Equipment Storage: Do not park equipment or store materials in state, county, or city right-of-way.
E. Notify the Engineer in writing of any discrepancies between the existing conditions in the field and the survey shown on the plans before proceeding with any new construction.
F. Obtain all required construction related permits, including demolition permit, before starting work. Retain copies of all permits at the project site at all times.
G. Approval of these plans does not constitute approval of any land disturbing activities within wetland areas. Contact the appropriate regulatory agency for approval of any wetland area disturbance.
H. Signs (location, number, and size) are not approved under the general development permit. A separate permit is required for onsite signage.
I. No certificate of occupancy will be issued until all site improvements have been completed on the site.
J. Comply with all applicable state, federal, and local building and utility installation codes. All materials and construction methods shall be in accordance with these plans and specifications unless Department of Transportation Standards or local municipal standards are more stringent.
K. Do not deviate from these plans and specifications without prior written approval from the Engineer of record.
L. Work within D.O.T. right-of-way:
   1. All pavement markings within D.O.T. right-of-way shall be thermoplastic and in accordance with D.O.T. specifications.
   2. Re-establish all right-of-way area, which is damaged or disturbed, to original condition or better.
   3. All work in D.O.T. right-of-way shall comply with D.O.T. specifications.
M. Arrange high intensity lighting to conceal the source of light from public view and prevent interference with traffic.
N. Ensure correct horizontal and vertical alignment of all ties between proposed and existing pavements, curb and gutter, sidewalks, walls, and utilities before beginning work. Notify Engineer if discrepancies exist.

TRAFFIC CONTROL

A. If Drawings do not indicate site specific traffic control measures, Contractor shall be responsible for providing a temporary traffic control plan in accordance with the Manual on Uniform Traffic Control Devices (MUTCD), latest edition.
B. All temporary traffic control signage and markings shall be installed prior to construction and maintained during construction in accordance with the MUTCD, latest edition.
C. Contact property owners to be affected by construction and coordinate temporary driveway closures and sequencing. Maintain access for all property owners during construction.
D. Control dust as necessary to prevent interference with traffic.
E. Inspect traffic control devices on a daily basis to ensure placement of barricades and function of lights is maintained throughout construction.
F. Coordinate all lane closures with the local jurisdiction having authority.

STRUCTURE & SITE DEMOLITION

A. Verify that utilities have been disconnected and capped before starting demolition operations.
B. Verify that hazardous materials have been remediated before proceeding with building demolition operations.
C. Environmental & Geotechnical: Review all project environmental and geotechnical reports an become familiar with all issues before demolition.
D. Existing Utilities: Locate, identify, disconnect, and seal or cap off indicated utilities serving buildings and structures to be demolished.
   1. Arrange to shut off indicated utilities with utility companies.
   2. If removal, relocation, or abandonment of utility services will affect adjacent occupied buildings, then provide temporary utilities that bypass buildings and structures to be demolished and that maintain continuity of service to other buildings and structures.
E. Do not commence demolition operations until temporary erosion and sediment control and plant-protection measures are in place.
F. Obtain the Demolition Permit from the local authority prior to starting demolition activities.
G. Existing Facilities: Protect adjacent walkways, loading docks, building entries, and other building facilities during demolition operations. Maintain exits from existing buildings. Promptly repair any facilities damaged by construction operations to owner's satisfaction at no additional cost to the owner.
H. Existing Utilities: Maintain utility services to remain and protect from damage during demolition operations.
I. Temporary Protection: Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction and as indicated.
J. Remove temporary barriers and protections where hazards no longer exist. Where open excavations or other hazardous conditions remain, leave temporary barriers and protections in place.
K. Remove demolition waste materials from Project site and legally dispose of them in an EPA-approved landfill acceptable to authorities having jurisdiction
L. Do not burn demolished materials unless special written permission is obtained from Owner and Engineer.
M. Clean adjacent structures and improvements of dust, dirt, and debris caused by building demolition operations. Return adjacent areas to condition existing before building demolition operations began.

FED EX STANDARD SPECIFICATIONS OR DETAILS WITHIN THIS CIVIL CONSTRUCTION DRAWING SET SHALL SUPERCEDE THESE SITEWORK SPECIFICATIONS

SITE CLEARING

1.1 PROJECT CONDITIONS
   A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
   B. Environmental & Geotechnical: Review all project environmental and geotechnical reports and become familiar with all issues before site clearing.
   C. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.
   D. Do not commence site clearing operations until temporary erosion- and sedimentation-control and plant-protection measures are in place.
1.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL
   A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.
   B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
   C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
   D. Remove erosion and sedimentation controls when site is stabilized and restore and stabilize areas disturbed during removal.
1.3 TREE AND PLANT PROTECTION
   Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Engineer.
1.4 EXISTING UTILITIES
   A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place. Arrange with utility companies to shut off indicated utilities.
   B. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
      1. Notify utility owner not less than two days in advance of proposed utility interruptions.
      2. Do not proceed with utility interruptions without utility owner's written permission.
   C. Pothole existing water lines, underground electrical lines, gas lines, underground telephone lines, fiber optic, and any other existing utility lines within the project limits during site clearing and demolition activities. Survey the existing utility elevations and provide the surveyed field locations and depths to the Engineer for review. These existing utilities may require relocation.
1.5 CLEARING AND GRUBBING
   Remove obstructions, concrete, asphalt, trees, shrubs, and other vegetation to permit installation of new construction.
   1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
   2. Grind down stumps and remove roots, obstructions, and debris to a depth of 12 inches below exposed subgrade.
   3. Use only hand methods for grubbing within protection zones.
   4. The subgrade to remain shall be compacted to 95% Standard Proctor maximum dry density following clearing and grubbing activities.
1.6 TOPSOIL STRIPPING
   A. Remove sod and grass before stripping topsoil.
   B. Strip topsoil in a manner to prevent intermingling with underlying subsoil or other waste materials.
   C. Stockpile topsoil away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.
   D. Dispose of surplus topsoil. Surplus topsoil is that which exceeds quantity indicated to be stockpiled or reused.

SITE WATER DISTRIBUTION

1.1 GENERAL
   A. Regulatory Requirements:
      1. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.
      2. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.
   B. Piping materials shall bear label, stamp, or other markings of specified testing agency.
   C. Interruption of Existing Water-Distribution Service: Notify Owner at least 2 days prior to interruption of existing water services.
   D. Coordinate with utility company for required inspections and for connection of water main and services before starting construction.
1.2 COPPER TUBE AND FITTINGS
   A. Soft Copper Tube: ASTM B 88, Type K , water tube, annealed temper.
      Copper, Pressure-Seal Fittings:
      1. NPS 2 and Smaller: Wrought-copper fitting with EPDM O-ring seal in each end.
      2. NPS 2-1/2 to NPS 4 : Bronze fitting with stainless-steel grip ring and EPDM O-ring seal in each end.
   B. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.
   C. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.
1.3 DUCTILE-IRON PIPE AND FITTINGS
   A. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.
      1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
      2. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.
   B. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint bell and plain spigot end unless grooved or flanged ends are indicated.
   C. Flanges: ASME 16.1, Class 125, cast iron.
1.4 PVC PIPE AND FITTINGS
   A. PVC, Schedule 40 Pipe: ASTM D 1785. PVC, Schedule 40 Socket Fittings: ASTM D 2466.
   B. PVC, AWWA Pipe: AWWA C900, Class 200, with bell end with gasket, and with spigot end.
   C. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
1.5 GATE VALVES
   AWWA, Cast-Iron Gate Valves: Nonrising-Stem, Resilient-Seated Gate Valves: Gray- or ductile-iron body and bonnet; with bronze or gray- or ductile-iron gate, resilient seats, bronze stem, and stem nut.
      1) Standard: AWWA C509.
      2) Minimum Pressure Rating: 200 psig .
      3) End Connections: Mechanical joint.
      4) Interior Coating: Complying with AWWA C550.
1.6 GATE VALVE ACCESSORIES AND SPECIALTIES
   A. Tapping-Sleeve Assemblies: Sleeve and valve compatible with drilling machine.
      1) Standard: MSS SP-60.
      2) Tapping Sleeve: Cast- or ductile-iron or stainless-steel, two-piece bolted sleeve with flanged outlet for new branch connection. Include sleeve matching size and type of pipe material being tapped and with recessed flange for branch valve.
      3) Valve: AWWA, cast-iron, nonrising-stem, resilient-seated gate valve with one raised face flange mating tapping-sleeve flange.
   B. Valve Boxes: Comply with AWWA M44 for cast-iron valve boxes. Include top section, adjustable extension of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over valve and with a barrel approximately 5 inches in diameter.
1.7 BACKFLOW PREVENTERS
   Double-Check, Detector-Assembly Backflow Preventers:
   1. Standards: ASSE 1048 and UL listed or FMG approved.
   2. Operation: Continuous-pressure applications.
   3. Pressure Loss: 5 psig maximum, through middle 1/3 of flow range.
   4. Body: Cast iron with interior lining complying with AWWA C550 or that is FDA approved.
   5. End Connections: Flanged.
   6. Configuration: Designed for horizontal, straight through flow.
1.8 WATER METER BOXES
   Description: Cast-iron body and cover for disc-type water meter, with lettering "WATER METER" in cover; and with slotted, open-bottom base section of length to fit over service piping.
1.9 CONCRETE VAULTS
   Description: Precast, reinforced-concrete vault, designed for A-16 load designation according to ASTM C 857 and made according to ASTM C 858.
   1. Ladder: ASTM A 36/A 36M, steel or polyethylene-encased steel steps.
   2. Manhole: ASTM A 48/A 48M Class No. 35A minimum tensile strength, gray-iron traffic frame and cover.
      a. Dimension: 24-inch minimum diameter, unless otherwise indicated.
   3. Drain: ASME A112.6.3, cast-iron floor drain with outlet of size indicated. Include body anchor flange, light-duty cast-iron grate, bottom outlet, and integral or field-installed bronze ball or clapper-type backwater valve.
1.10 FIRE HYDRANTS
   Dry-Barrel Fire Hydrants: Freestanding, with one NPS 4-1/2 and two NPS 2-1/2 outlets, 5-1/4-inch main valve, drain valve, and NPS 6 mechanical-joint inlet. Include interior coating according to AWWA C550. Hydrant shall have cast-iron body, compression-type valve opening against pressure and closing with pressure.
   1. Standard: AWWA C502.
   2. Pressure Rating: 250 psig .
1.11 FIRE DEPARTMENT CONNECTIONS
   Fire Department Connections: Freestanding, with cast-bronze body, thread inlets according to NFPA 1963 and matching local fire department hose threads, and threaded bottom outlet. Include lugged caps, gaskets, and chains; lugged swivel connection and drop clapper for each hose-connection inlet; 18-inch- high brass sleeve; and round escutcheon plate.
1.12 VALVE APPLICATIONS
   Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
   1. Underground Valves, NPS 3 and Larger: AWWA, cast-iron, nonrising-stem, resilient-seated gate valves with valve box.
   2. Use the following for valves in vaults and aboveground:
      a. Gate Valves, NPS 2 and Smaller: Bronze, nonrising stem.
      b. Gate Valves, NPS 3 and Larger: AWWA, cast iron, OS&Y rising stem, resilient seated.
      c. Check Valves: AWWA C508, swing type.
1.13 FIELD QUALITY CONTROL
   A. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.
   B. Hydrostatic Tests: Test at not less than one-and-one-half times working pressure for two hours. Increase pressure in 50-psig increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 0 psig . Slowly increase again to test pressure and hold for 1 more hour. Maximum allowable leakage is 2 quarts per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.
   C. Disinfection: Clean and disinfect potable water mains as directed by the local authority, or, if method is not prescribed by the local authority, use procedure described in AWWA C651.
   D. Prepare reports of testing activities and submit to the Engineer for approval.
1.14 IDENTIFICATION
   Install continuous underground detectable warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping.

SITE SANITARY SEWERS

1.1 PROJECT CONDITIONS
   A. Interruption of Existing Sanitary Sewerage Service: Coordinate as required with the local sanitary sewer authority before starting construction.
   B. Utility Locator Service: Notify utility locator service for area where Project is located before beginning sanitary sewer installation operations. Field verify all existing utilities shown on the Drawings by pot-holing the lines. Survey existing utilities and provide horizontal and vertical location information to the Engineer to determine of any utilities will conflict with the proposed design.
1.2 DUCTILE-IRON, GRAVITY SEWER PIPE AND FITTINGS
   A. Pipe: ASTM A 746, for push-on joints.
   B. Compact Fittings: AWWA C153, ductile iron, for push-on joints.
   C. Gaskets: AWWA C111, rubber.
1.3 PVC PIPE AND FITTINGS
   PVC Gravity Sewer Piping: ASTM F 679, T-1 wall thickness, PVC gravity sewer pipe with bell-and-spigot ends and with integral ASTM F 477, elastomeric seals for gasketed joints.
1.4 CLEANOUTS
   A. Cast-Iron Cleanouts:
      1. Description: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
      2. Top-Loading Classification: Traffic rated, Heavy Duty, in all paved areas and areas subject to vehicular traffic.
      3. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.
   B. PVC Cleanouts: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping. Use in Light Duty applications where there is pedestrian traffic only or in landscaped areas.
1.5 MANHOLES
   A. Standard Precast Concrete Manholes:
      1. Description: ASTM C 478 , precast, reinforced concrete, of depth indicated, with provision for sealant joints.
      2. Diameter: 48 inches minimum unless otherwise indicated.
      3. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.
      4. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section; with separate base slab or base section with integral floor.
      5. Riser Sections: 4-inch minimum thickness, of length to provide depth indicated.
      6. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated; with top of cone of size that matches grade rings.
      7. Joint Sealant: ASTM C 990 , bitumen or butyl rubber.
      8. Resilient Pipe Connectors: ASTM C 923 , cast or fitted into manhole walls, for each pipe connection.
      9. Steps: Individual FRP steps or FRP ladder, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of manhole to finished grade is less than 48 inches.
      10. Adjusting Rings: Interlocking HDPE rings, with level or sloped edge in thickness and diameter matching manhole frame and cover, and with height as required to adjust manhole frame and cover to indicated elevation and slope. Include sealant recommended by ring manufacturer.
      11. Grade Rings: Reinforced-concrete rings, 6- to 9-inch total thickness, with diameter matching manhole frame and cover, and with height as required to adjust manhole frame and cover to indicated elevation and slope.
   B. Manhole Frames and Covers:
      1. Description: Ferrous; 24-inch ID by 7- to 9-inch riser, with 4-inch-minimum-width flange and 26-inch- diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "SANITARY SEWER."
      2. Material: ASTM A 536, Grade 60-40-18 ductile iron unless otherwise indicated.
1.6 IDENTIFICATION
   Arrange for installation of green warning tapes directly over piping and at outside edges of underground manholes.
   1. Use warning tape or detectable warning tape over ferrous piping.
   2. Use detectable warning tape over nonferrous piping and over edges of underground manholes.
1.7 FIELD QUALITY CONTROL
   A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
      1. Defects requiring correction include the following:
         a. Alignment: Less than full diameter of inside of pipe is visible between structures.
         b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
         c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
         d. Infiltration: Water leakage into piping.
         e. Exfiltration: Water leakage from or around piping.
      2. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
      3. Reinspect and repeat procedure until results are satisfactory.
   B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
      1. Do not enclose, cover, or put into service before inspection and approval.
      2. Test completed piping systems according to requirements of authorities having jurisdiction.
      3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours advance notice.
      4. Submit a separate report for each test to the Engineer for approval.
      5. Air Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction, UNI-B-6, and the following:
         a. Test plastic gravity sewer piping according to ASTM F 1417.
      6. Manholes: Perform hydraulic test according to ASTM C 969 .
   C. Leaks and loss in test pressure constitute defects that must be repaired.
   D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

SITE STORM UTILITY DRAINAGE PIPING

1.1 PIPE AND FITTINGS- GENERAL
   1. All stormwater pipe, inlets, headwalls, and related appurtenances shall meet local D.O.T. standards.
   2. All stormwater pipe shall be installed in accordance with pipe manufacturers instructions.
1.2 STEEL PIPE AND FITTINGS
   Corrugated-Steel Pipe and Fittings: ASTM A 760/A 760M, Type I with fittings of similar form and construction as pipe.
   1. Standard-Joint Bands: Corrugated steel.
   2. Coating: Aluminum or Bituminous
1.3 PE PIPE AND FITTINGS
   1. Corrugated PE Drainage Pipe and Fittings NPS 3 to NPS 10 : AASHTO M 252M; NPS 12 to NPS 48 : AASHTO M 294M Type S, with smooth waterway for coupling joints.
   2. Silltight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with tube and fittings.
1.4 PVC CORRUGATED PIPE AND FITTINGS
   Corrugated PVC Drainage Pipe and Fittings NPS 4 to NPS 36: Smooth interior, ASTM F949, 46 PSI stiffness when tested in accordance with ASTM D2412. PVC compound having a minimum cell classification of 12454 as defined in ASTM D1784. Fittings: Smooth interior, ASTM F949, Section 5.2.3 or F794, Section 7.2.4. Joints shall be made with integrally-formed bell and spigot gasketed connections. Manufacturer shall provide documentation showing no leakage when gasketed pipe joints are tested in accordance with ASTM D3212. Elastomeric seals (gaskets) shall meet ASTM F477.
1.5 CONCRETE PIPE AND FITTINGS
   1. Reinforced-Concrete Sewer Pipe and Fittings: ASTM C 76 . Bell-and-spigot or tongue-and-groove ends and gasketed joints with ASTM C 443 , rubber gaskets or sealant joints with ASTM C 990 , bitumen or butyl-rubber sealant. Class III, Wall B.
   2. Cast-Iron Area Drains: ASME A112.6.3 gray-iron round body with anchor flange and round grate. Include bottom outlet with inside calk or spigot connection, of sizes indicated.
1.6 MANHOLES
   A. Standard Precast Concrete Manholes:
      1. Description: ASTM C 478 , precast, reinforced concrete, of depth indicated, with provision for sealant joints.
      2. Diameter: 48 inches minimum unless otherwise indicated.
      3. Ballast: Increase thickness of precast concrete sections or add concrete to base section as required to prevent flotation.
      4. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.
      5. Riser Sections: 4-inch minimum thickness, and lengths to provide depth indicated.
      6. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated, and top of cone of size that matches grade rings.
      7. Joint Sealant: ASTM C 990 , bitumen or butyl rubber.
      8. Steps: Individual FRP steps or FRP ladder, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of manhole to finished grade is less than 48 inches.
   B. Manhole Frames and Covers:
      1. Description: Ferrous; 24-inch ID by 7- to 9-inch riser with 4-inch-minimum width flange and 26-inch- diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "STORM SEWER."
      2. Material: ASTM A 536, Grade 60-40-18 ductile iron unless otherwise indicated.
1.7 INLET & JUNCTION BOXES
   Standard Precast Concrete:
   1. Description: ASTM C 478 , precast, reinforced concrete, of depth indicated, with provision for sealant joints.
   2. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.
   3. Riser Sections: 4-inch minimum thickness, 48-inch diameter, and lengths to provide depth indicated.
   4. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
   5. Joint Sealant: ASTM C 990 , bitumen or butyl rubber.
   6. Steps: Individual FRP steps or FRP ladder, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of catch basin to finished grade is less than 48 inches.
   7. Pipe Connectors: ASTM C 923 , resilient, of size required, for each pipe connecting to base section.
1.8 STORMWATER DETENTION STRUCTURES
   A. Cast-in-Place Concrete, Stormwater Detention Structures: Constructed of reinforced-concrete bottom, walls, and top; designed according to ASTM C 890 for A-16 (AASHTO HS20-44), heavy-traffic, structural loading; of depth, shape, dimensions, and appurtenances indicated.
      1. Ballast: Increase thickness of concrete as required to prevent flotation.
      2. Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch total thickness, that match 24-inch- diameter frame and cover.
      3. Steps: Individual FRP steps or FRP ladder, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of structure to finished grade is less than 48 inches.
      4. Form and cast wiers and pipe openings as indicated on Drawings.
   B. Manhole Frames and Covers: ASTM A 536, Grade 60-40-18, ductile-iron castings designed for heavy-duty service.
1.9 PIPE OUTLETS
   A. Pre-Cast Head Walls: Pre-Cast reinforced concrete, with apron and tapered sides.
   B. Slope Paved Head Walls: Cast-in-place reinforced concrete as shown on Drawings.
   C. Riprap Basins: Broken, irregularly sized and shaped, graded stone according to NSSGA's "Quarried Stone for Erosion and Sediment Control." Minimum stone size and dimensions as shown on Drawings.
1.10 PIPING INSTALLATION
   A. Install locator wire or tape 6-inches above all non-metallic piping.
   B. Install bedding and backfill in accordance with pipe manufacturers instructions.
   C. Begin installation at downstream piping connection to outfall point.
   D. Construct all headwalls flush with existing and proposed embankment slopes.
1.11 CLEANING
   A. Clean interior of piping of dirt and superfluous materials. Flush with potable water.
   B. Clean accumulated sediment from stormwater pipes, conveyance channels, and pond once site is stabilized with vegetation.

EARTH MOVING

1.1 PROJECT CONDITIONS
   A. Utility Locator Service: Notify utility locator service for area where Project is located before beginning earth moving operations.
   B. Do not commence earth moving operations until temporary erosion- and sedimentation-control measures, are in place.
   C. Do not commence earth moving operations until plant-protection measures are in place.
   D. Do not commence earth moving operations without reviewing and making provisions for all Geotechnical recommendations made in the project Geotechnical Report. Comply with recommendations in the geotechnical report regarding general site preparation, building pad preparation, pavement sections, fill, and excavation.
   E. Retain a copy of the project Geotechnical Report at the work site at all times. Any discrepancies between these specifications and the project Geotechnical Report shall be resolved in favor of the project Geotechnical Report.
   F. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.
   G. Protect and maintain erosion and sedimentation controls during earth moving operations.
1.2 DEWATERING
   A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
   B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
   C. Design and provide dewatering system using accepted and professional methods consistent with current industry practice. Provide dewatering system of sufficient size and capacity to control groundwater in a manner that preserves strength of foundation soils, does not cause instability or raveling of excavation slopes, and does not result in damage to existing structures. Lower water level in advance of excavation by utilizing wells, wellpoints, or similar positive control methods. Maintain the groundwater level to a minimum of two (2) feet below excavations. Provide piezometers as directed by the engineer to document that the groundwater level is being maintained.
   D. By acceptable means, contractor shall control all water regardless of source and is responsible for proper disposal of the water. No additional payment will be made for any supplemental measures to control seepage, groundwater, or artesian head.

PLANS PREPARED BY:
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NORTH CAROLINA PROFESSIONAL SEAL 28622 ENGINEER TIMOTHY W. CAMPBELL 2/23/18

FedEx Freight

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DEVELOPER:
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REVISIONS:

FOR CONSTRUCTION	02/23/18

CHECKED BY:	TWC
DRAWING BY:	FSE
DATE:	01/16/18
JOB NUMBER:	-

TITLE:
SITEWORK SPECIFICATIONS

SHEET NUMBER:
C-9.0

COMMENTS:

E. Open pumping with sumps and ditches shall be allowed, provided it does not result in boils, loss of fines, softening of the ground, or instability of slopes. Sumps shall be located outside of load bearing areas so the bearing surfaces will not be disturbed. Water containing silt in suspension shall not be pumped into sewer lines or adjacent water bodies. During normal pumping and upon development of well(s), levels of fine sand or silt in the discharge of water shall not exceed five (5) ppm.

F. Continuously maintain excavations in a dry condition with positive dewatering methods during preparation of subgrade, installation of pipe, and construction of structures until the critical period of construction and/or backfill is completed to prevent damage of subgrade support, piping, structure, side slopes, or adjacent facilities for flotation or other hydrostatic pressure imbalance.

G. When construction is complete, properly remove all dewatering equipment from the site, including wells and related temporary electrical service.

1.3 SUBGRADE

A. Notify Project Geotechnical Engineer when excavations have reached required subgrade.

B. If Project Geotechnical Engineer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

C. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired and loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Project Geotechnical Engineer, and replace with compacted backfill or fill as directed.

D. In heavy duty pavement areas, the gravel aggregate base shall be extended under the curb and gutter section to provide additional stability for truck travel.

1.4 UTILITY TRENCH BEDDING AND BACKFILL

A. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

B. Use Class B bedding under all PVC piping.

C. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit.

D. Backfill all utilities under roadways and traffic areas with crushed stone.

1.5 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure. Compact soil materials as indicated on drawings or as indicated in the project Geotechnical Report.

C. Provide construction phase monitoring and testing as recommended in the project Geotechnical Report. Provide test reports to the Engineer for review and approval.

1.6 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
   1. Provide a smooth transition between adjacent existing grades and new grades.
   2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Landscape Islands: Fill all curbed islands to top of curb with topsoil and apply seed and mulch unless drawings indicate otherwise.

C. Slopes: Do not create cut or fill slopes steeper than 2h:1v without obtaining special written permission from the Engineer of Record and project Geotechnical Engineer.

1.7 PROTECTION

Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris. See erosion and sediment control plan and notes for further information.

2.8 SECURITY FENCING

A. Provide and install security fencing where shown on drawings. Fencing shall be constructed so as to provide security from exterior intrusion.

B. Provide fencing entrance gates, passage, gates, fitting and fastening devices as required. Verify proper location prior to placement so to avoid extending over property lines and easements.

C. Materials
   1. No. 9 gauge fence fabric, 2 inch mesh, top and bottom selvages twisted and barbed.
   2. Corner, end and pull posts – 2.375 in. OD pipe.
   3. Line post – 1.90 in OD galvanized steel pipe.
   4. Top rail –1.66 in OD galvanized steel pipe.
   5. Tension wire – 7 gauge galvanized steel, located at bottom of fabric.
   6. Wire ties – 11 gauge.
   7. Port Brace – provide at corner end posts and pull posts.
   8. Stretcher bars – provide for each gate and at end post.
   9. Barb wire – 3 strands.
   10. Personnel / Maintenance Gates – For convenience of moving maintenance equipment provide swing gates of sizes as shown on the drawings complete with latches, stops, keepers, hinges and with three strains of barb wire on top. Provide fabric to match that as specified elsewhere.
   11. Gate posts – Provide post with the minimum size
       a. Gate with leaf width:
          6 ft or less 4.00 OD x .160
          6ft –13ft. 4.00 OD x .226
          13ft – 18ft. 6.625 OD x .280
          18ft – 23 ft 8.625 OD x .322
   12. Incorporate Security Turnstiles and Handicapped Gates within construction of security fencing as specified in Security Card Access Control Section of this Project Manual.
   13. Security Cantilevered Gates – cantilevered type gates, where indicated on drawings at employee parking and/or yard parking areas. Coordinate work for installation of cantilevered slide gates as specified elsewhere with security fencing as specified herein.
   14. Knox Boxes - Where local ordinances require the use of Knox Boxes or other devices, including remote electronic opening devices, all required devices shall be included in scope of work.

D. Type and Height
   1. Perimeter security fence – Provide 6' high fencing fabric with 3 strands of barb wire. Total fence height 7'-0". Maximum 2 inch clearance between finished grade and bottom fence fabric.
   2. Security between employee parking and equipment yard- Provide 6' high fencing fabric. No barb wire required. Maximum 2 inch clearance between finished grade and bottom fence fabric.

2.9 HEAVY DUTY CANTILEVERED SLIDE GATE

A. Provide and install Heavy Duty Cantilevered Slide Gate at truck entry and/or employee parking entry, where shown in drawings and as specified herein.

B. Provide structural columns, drive units, controller and gate panels equal to:

Alpha Gate with Kinetic gate operator as manufactured by:
Wallace International
Tele: 866-300-1110
Fax: 204-284-1868

Or:

Fortress Heavy Duty Cantilevered Slide Gate as manufactured by:
Tymetal Corp.
2549 State Road Route 40
Greenwich, NY 12834
Tele: 800-328-4283
Fax: 770-831-2102

C. Commercial slide gate operator (Fortress gate only), LiftMaster SL595, shall open and close cantilever, overhead, or track gates, to provide convenience and security. Gate operator shall be wired to operate gates using security card access system as specified elsewhere in this manual. The 1-hp operator utilizes 230 Volt AC three phase power. Control voltage in each case is 5 Volt DC. Operator shall be rated to open/close gates weighing 1,500 lbs to 2,500 lbs maximum.

D. Employee Parking: Provide three in-ground safety sensing loops per gate and provide UL325-5th edition compliant entrapment protection at each gate location.

E. Yard Parking: Provide two in-ground safety sensing loops per gate and provide UL325-2010 compliant entrapment protection at each gate location.

F. Operator shall be warranted by manufacturer to installer for a period of two (2) years from date of install against defects in materials or workmanship. Defective part(s) shall be repaired or replaced at no charge, at manufacturer's option.

G. Frame shall be fabricated from aluminum alloy extrusions with primary top and bottom members being rectangular in shape. Frame shall be supported from extruded track by two self-aligning, 4-wheeled, sealed lubricant, ball bearing truck assemblies. Bottoms of support posts equipped with two pairs of rubber glide wheels.

H. Gate shall be aluminum alloy with aluminized steel chain link fabric, 6 feet clear in height with anti-climb on top of each gate. Each gate shall have clear opening width as indicated on drawings up to 30 feet maximum. Finish shall be mill finish aluminum. Security clearance between bottom rail and pavement shall be 8" maximum.

I. Work shall be coordinated with electrical contractor for installation of required power and controller conduits. After installation is complete, gate system shall be inspected by Tymetal Field Technician to verify system is fully operation and functional, make all necessary adjustments, provide report to FXF Project Manager.

J. Where local ordinances require the use of Knox Boxes or other devices, including remote electronic opening devices, all required devices shall be included in scope of work.

10.4 FEDEX FREIGHT SIGNAGE

A. All FedEx Freight signage shall be supplied and installed by Developer/General Contractor. The General Contractors electrical sub-contractor will provide and connect service as required for the location identified on the drawings.

B. Exterior Signage:
   1. Type 1 - Exterior base mounted sign, rectangular monument @ main entry drive, **Purple & Orange** colored letters, shall be design FX-D402F as per the FedEx Comprehensive World Sign Manual, Size 60" x 140", internally LED illuminated.
   2. Type 2 - Exterior building mounted sign, outline **Purple & Orange** colored channel letters, shall be design FX-E501F as per the Comprehensive World Sign Manual, Size 56" x 122" internally LED illuminated.
   3. Type 3 - Exterior building mounted sign, rectangular **Purple & Orange** colored letters, shall be design FX-E122F as per the Comprehensive World Sign Manual, Size 42" x 98", internally LED illuminated.

C. The exterior signage shall be supplied by a pre-approved sign vendor as listed below. No other vendor will be allowed unless pre-approved in writing from FedEx Freight, Inc., in advance.

D. Interior Signage:
   1. Provide and install etched acrylic signage as detailed in the prototype drawings.

E. Approved Signage manufacturer:
   Velocity, Inc.
   Tim Walker – Primary Contact
   530 Vaiden Dr.
   Hernando, MS 38632
   Phone: 662-449-4026 ext 25
   Fax: 662-449-4029
   twalker@velocityid.com

F. Shop drawings of the proposed signage shall be submitted to FXF prior to acceptance of order and manufacturing of sign. Approval by FXF is mandatory.

G. Permitting: Developer/General Contractor shall be responsible for obtaining all necessary permits and/or variances as may be associated with the installation & operation of all signage. All illuminated signs for projects in Canada shall be certified by Canadian Underwriter's Laboratory (CUL) before shipping product to site.

16.7 SECURITY CARD ACCESS CONTROL

A. The Developer shall provide and install a complete and working security card access system to provide entry security into the Service Center Office and Dock. All card access control panels, Intercom CEU and power supplies shall be installed within the Telco room as per manufacturer recommendations and meeting industry standards. No splices allowed in cable runs between device and head end.

B. Security access into the facility will be controlled by electronic card access where shown on the proto-type drawings.

C. The installing contractor shall have a minimum of 5 years' experience in the installation of security card access systems and shall be certified by Honeywell Access Control for the installation of their system. Proof of certification shall be supplied to FXF during shop drawings submission of the security system components.

D. It shall be the Developer/General Contractors shall provide the necessary junction boxes, conduits for pulling of conductors and hardware as required for a complete and operational system. Cost for these items shall be included in the Developer's construction costs.

E. The card access system shall include, but not necessarily be limited to the following components:
   a. Control Panels
   b. Card Readers (Proximity)
   c. Magnetic locks
   d. Exit Buttons
   e. Free Egress devices (where required, will be wired to not cause a door forced alarm)
   f. Magnetic Lock Power Supplies
   g. Network devices
   h. Video Intercom (for main lobby door, handicap gate and parking lot gate where one or all of the previous mentioned exist.)
   i. Turnstiles and Handicapped gates
   j. Gate Operators
   k. Magnetic contracts to monitor door status and provide auto relock
   l. Card Reader cable shall be shielded
   m. Cable to outside devices shall be Direct Burial, run inside conduits
   n. Provide batteries for control panels and power supplies.

F. Products:
   1. Control Panel.
      a. Honeywell, Pro 3200 door access control panel with TCP/IP Connection. No substitutes.
      b. Panel shall be designed and installed to manufactures specification.
      c. The control panel power supply shall be by Northern.
   2. Card Readers
      a. HID MAXI Prox 24" range Card Reader (Truck and Employee Entrance).
      b. HID Prox-Pro Proximity reader. Model PR-P-PRO or,
      c. HID 5 Volt MiniProx Reader Model PR-MINI-PROX (for use on aluminum store front mullion).
   3. Magnetic Locks
      a. Securitron, Model 38D, 12v or 24v, 600 lb.
   4. Exit Buttons
      a. Securitron, Model PB22; one side wired to mag-lock; one side to egress input.
   5. Free Egress Device
      a. Securitron, Model XMS egress motion detector.
   6. Magnetic Lock Power Supplies
      a. Altronix, Model AL400ULM.
   7. Network devices
      a. Northern Computers, Model PRO22EN for TCP/IP Communications.
   8. Intercom
      a. Airphone Maser, Model #AX8MV with AX-16SW expander board and main CEU model #AX248C for audio and video from each location: Office Reception Areas and Office Dispatch Areas. Verify areas with drawings.
      b. Airphone Door Station, Model #AX DVFP W/SBX-DVF-P video door stations (for Handicapped Gates and Turnstiles). Provide video door station model #AX-DV at office lobby door, truck entrance and exit, employee parking entry and exit.
      c. Airphone outputs for door or gate release shall tie into inputs 5 & 6 on card reader board.
      d. Other components to make a complete operating system
         1. PS-2420UL 24vdc 2amp power supply.
         2. AX16SW call door add on as required.
         3. Door/Gate/Turnstile release.
   9. Turnstiles and Handicap gates
      a. As manufactured by Alvarado Manufacturing Company, 12660 Colony Street, Chino, CA. Phone (800) 423-4143, fax (909) 628-1403.
      b. Turnstile gate; shall be Alvarado Model MST47-6XGL-FXF Full Height Turnstile, galvanized, two-way electric lock w/ separate card reader and intercom controls for each direction and shall feature the following;
         1. Bi-directional momentary pulse relay.
         2. Bi-directional time delay relay (20 seconds)
         3. Bi-directional rotation feedback signal.
         4. Bi-directional push-to-test button.
         5. J-box with outlets inside top channel.
         6. Provide standard card reader and intercom mounting plates
         7. MST Key Override- each direction.
      c. Handicap gate; shall be Alvarado Model MSGX48-GL-FXF Full Height Security Gate, galvanized, 48" single direction gate with electric magnetic lock w/ separate card reader and intercom control for each side of gate. Unit shall feature the following;
         1. Card reader and intercom mounting plates.
   10. Security Gate Operators: use the proper type gate operator that applies to project site requirements; refer to Security Fencing specifications and proto-type drawings.
   11. Camera cabling - Provide camera cabling system at truck entrances, employee entrances and fuel islands as shown on drawings.
      a. 1 each CAT6 waterproof for video at each camera pole to Telco Room
      b. 1 each 2 conductor 14 gauge waterproof power cable at each camera pole to Telco Room.
   12. Card Reader post and Camera poles
      a. Provide locally constructed steel posts as detailed on the drawings or these items can be purchased from Wright Steel, Harrison AR. 72601, phone 800-814-7291, contact Steve Wright.

G. Programming System
   1. The access control contractor shall request a date and time for programming from the FedEx Freight, Inc. Project Manager four (4) weeks prior to the substantial completion of the project. All low voltage, fiber and other associated cables and devices shall be completely installed, terminated and ready for operation once programmed. At the same time the access control contractor shall provide the access point location within the access control panel for each of the supplied card readers.
   2. Vendor will install a data drop for connection to FedEx Freight network.
   3. Installation Company shall ensure proper communication with FedEx Freight card access server. Contact for this is Scott Bryan, telephone: 404-594-9813, email: scottbryan@fedex.com
   4. Downloading of the card access system will not be done until FedEx Freight Inc moves the network into the facility during the scheduled week FXF moves into the facility.
   5. Vendor will program the IP address and other required info into the LAN module.

10.2 BUILDING ACCESSORIES

A. Provide all material and equipment necessary and where shown in the drawings.

B. Flagpole – 35' exposed length aluminum pole. Pole shall be designed to withstand 90 mph of winds with 5' x 8' flag. Flagpole assembly to include gold anodized spun aluminum ball, cast aluminum revolving ball bearding track, two (2) swivel snaps, one (1) set of halyards, aluminum flashing collar, foundation sleeve and plate and ground spike. Lessee will furnish the flag.

C. Window Blinds – Provide and install 1" metal mini blinds on all windows and interior doors and/or sidelights located at all rooms serving as offices and conference rooms. Blinds shall be "equal to" Model CD80 1"x .008" mini aluminum blinds as manufactured by Hunter Douglas. Provide colors as required to match aluminum window frames.

D. Projection Screen - Provide and install where indicated in the proto-type drawings motorized electric projection screen(s) "equal to" Da-lite Cosmopolitan Electrol w/ High Contrast Matte White screen. Size; 69" high x 92" wide image area. Screen shall be recessed above the lay-in ceiling and shall be designed and constructed so as to allow for the screen to extend down below the ceiling as operated by wall switch.

E. Flexible Bollards – Install four units at each fire hydrant located in yard pavement areas and at other locations as noted in proto-type drawings. Provide BollardFlex System, impact resistant flexible bollards with 360 degree flexibility, Model BF-52C, 52"high x7"diameter polyethylene, red bollard with yellow reflective tape, 7ga steel base plate with torsion spring and concrete/asphalt fasteners, as manufactured by Innoplast, 10120 Gottschalk Parkway, Chagrin Falls, OH 44023, 800.516.9287, or approved equal.

F. Pipe Bollard Sleeves – At each pipe bollard provided and installed, provide standard duty, polyethylene thermoplastic (LDPE) tubes having ultra-violet resistance and anti-static properties, nominal thickness 0.250 inches "equal to" as those manufactured by **IDEAL SHIELD, 2525 Clark Street, Detroit, Michigan 48209-1355, Telephone: (877) 325-0769.** Color shall be OSHA yellow at all pipe bollard locations except at bollards locations on the dock where fire extinguishers are located at main frames, at these locations provide red bollard sleeves at each pipe bollard right and left of main frame, verify locations of fire extinguishers. Provide sleeve covers sized for pipe diameters and bollard lengths.
   Contact: Antonio Rivera
   (239)-368-7976

G. Ice machine(s): At each and every Break Room (Office) provide and install the number of Ice machines/Dispenser as shown in the proto-type drawings. Each of the required ice machines shall be furnished complete with the proper sized machine stand and water filter assembly as listed. When determining the number of ice machines required for this project, refer to the following table and proto-type drawings to determine the proper model numbers for use in each of the respected areas;
   1. Office Building Break Rooms - Scotsman HID540A + HST21-A Stand
   2. Water Filtration System: 3M/CUNO ICE125-S; Water filtration unit and one filter required for each ice machine provided.
   3. Replacement Filter: 3M/CUNO HF25-S Water Filter Cartridge
   4. Provide 115 volt, 20 amp single phase breaker, minimum. Verify all electrical and breaker requirements with manufacturer, install accordingly and coordinate with electrical.
   5. Provide 3/8" diameter water connector. Verify all water line requirements with manufacturer, install accordingly and coordinate with plumbing.
   6. FXF currently has pricing established with North Little Rock Wintemp Supply, PO Box 490, North Little Rock, AR 72115, phone 501-758-8830, attention Mike Henley. Verify costs with vendor prior to bidding. Developer/General Contractor shall not be bound to purchase this equipment from the listed vendor and is allowed to pursue competitive bids from other suppliers.

H. Mail Box: Outside site perimeter security fencing as located on site plan, provide and install black polymer mail box, 50"x11.5"x21.77", Gentry Model by Rubbermaid, with rear retrieval, post sleeve, newspaper holder. Install unit over 4x4 treated wood post set in concrete footing. Install as per US Postal Service standards.

I. Pipe Picket Railing: Provide heavy duty, non-welded, concealed mechanical fasteners and joints, aluminum pipe railing system for handrails, steps, ramps and patios in picket configuration as shown on drawings. Install Series 550 pipe picket railing system with 1.5" diameter Schedule 40 rails and posts formed from extruded 6063-T5 aluminum, 3/4" diameter pickets formed from extruded 6063-T5 aluminum, stainless steel or aluminum fasteners, post spacing not to exceed 4'-0" on-center, satin anodized aluminum finish, as manufactured by Superior Aluminum Products, Russia, OH 937-526-4065, or approved equal. Railing design shall meet ADA and all local code requirements as well as uniform and concentrated loading requirements.

FED EX STANDARD SPECIFICATIONS OR DETAILS WITHIN THIS CIVIL CONSTRUCTION DRAWING SET SHALL SUPERCEDE THESE SITEWORK SPECIFICATIONS

PLANS PREPARED BY:
CAMPBELL
E & A, INC.
Civil Engineering and Land Planning
31 Boland Court
Greenville, SC 29615
(864) 335-1090
Fax: (864) 335-1095

SEAL:

FedEx Freight

PENDER COUNTY BUSINESS PARK
CORPORATE DRIVE
WILMINGTON, NC 28405

DEVELOPER:
SETZER PROPERTIES
SETZER PROPERTIES WMN, LLC
354 WALLER AVENUE, STE 200
LEXINGTON , KY 40504
CONTACT: ROBBIE McATEE
(859) 514-7767
FAX: (859) 281-6335

REVISIONS:

FOR CONSTRUCTION	**02/23/18**

CHECKED BY:	TWC
DRAWING BY:	FSE
DATE:	01/16/18
JOB NUMBER:	-

TITLE:
SITEWORK SPECIFICATIONS

SHEET NUMBER:
C-9.1

COMMENTS:

General
The subsurface exploration indicates the site is adaptable for the proposed construction. The following paragraphs present more detailed comments and recommendations regarding site development.

Earthwork

The following recommendations are provided regarding site preparation and earthwork. Please note that these recommendations assume the site will have fill depths up to 15 feet to achieve the design subgrade elevation for the building pad.

Stripping

Site preparation should be initiated by clearing and stripping the proposed construction areas of any trees, shrubs, other plants, topsoil, roots, organics, and other unsuitable foundation supporting material. Topsoil thicknesses of approximately 1 inch were measured at hand auger and sounding locations. Typically, wooded sites in the project area have numerous roots (ie. rootmat). As such we recommend assuming a stripping depth of 8 inches. Lower lying areas can have deeper areas of topsoil and organics that will require removal during stripping.

Site Preparation

After the required initial site work has been completed, the exposed subgrade soils should be proofrolled under the observation of a geotechnical engineer or his representative with a 10-ton smooth-drum self-propelled roller operating in the static mode or a loaded dump truck to locate any areas of soft or otherwise unsuitable surface conditions. Proofrolling will help to define the limits of the very loose to loose (tip resistance of 20 to 40 tsf) soils encountered to a depths of about 2 to 5 feet across the site. These soils will need to be repaired. Any area that ruts or pumps should be disced, moisture conditioned to near the soil's optimum moisture content by drying or wetting, and recompacted with the 10 ton self-propelled vibratory roller. Areas that cannot be densified and stabilized by moisture-conditioning and compaction should be undercut and replaced with compacted structural fill.

Based on the soundings and our site observations, we anticipate rolling with the smooth drum vibratory roller will adequately densify the majority of the very loose to loose near surface soils. The total amount of undercut will depend on the design grades, effectiveness of the contractor's dewatering methods and the weather conditions at the time of grading. We recommend that the construction contract include an allowance for the undercutting of unstable or unsuitable soils and replacement with compacted structural fill.

Subgrade Repair and Improvement Methods

The exposed subgrade can deteriorate and lose support when exposed to construction traffic, improper moisture conditioning, and adverse weather conditions. Deterioration can occur in the form or rutting, pumping, freezing, or erosion. During construction, exposed subgrade surfaces should be moisture conditioned and sealed at the end of each day or when wet weather is forecast. Water should not be allowed to pond on exposed subgrades, however, areas that become dry may require additional moisture conditioning to keep the soils stable. Heavy rubber-tired construction equipment should not be allowed to operate on exposed subgrades during wet conditions.

Immediately prior to floor slab or pavement construction, exposed subgrade soils should be evaluated by proofrolling to determine their stability. Soils which rut, pump, or deflect under proofrolling should be repaired prior to ABC stone placement. Repair measures may include moisture conditioning of dry of optimum moisture content soils and recompacting, scarifying/drying/recompacting, undercutting, placement of geotextiles, use of chemical additives, or some combination of these measures. Actual repair measures will be influenced by project schedule and weather conditions and can only be determined in the field by the geotechnical engineer.

Excavation Considerations

Temporary construction slopes and excavation shoring should comply with local, state, and federal governing regulations, including OSHA (29 CFR Part 1926) excavation trench safety standards. Temporary excavations should be cut to a stable slope or the excavations should be temporarily braced, depending upon the excavation depth, nearby site features, and encountered subsurface conditions. The Contractor's Competent Person will need to determine the soil type(s) encountered in excavations and the appropriate excavation slope or bracing.

The responsibility for excavation safety, stability of temporary construction excavations, and deflections/settlement of existing site features lie solely with the contractor. This information is provided only as a service and under no circumstance should S&ME be assumed to be responsible for construction site safety, stability of temporary excavations, or the effectiveness of the contractor's excavation support system.

Management of Shallow Water

Cut areas are not anticipated to extend within 2 feet of observed groundwater levels. If significant changes to the grading plan are proposed, S&ME should be provided with a revised drawing to allow for us to review and provide comments. Utility excavations which extend near or below groundwater should be dewatered with the contractor prepared to maintain groundwater levels at least 2 feet below the excavation bottom at all times.

Potential groundwater control methods for the temporary construction excavations include open pumping, predrainage dewatering, and cutoff/exclusion. Open pumping utilizes submersible sump pumps in pits or trenches excavated below the bottom of the excavation and backfilled with No. 57 stone. Submersible sump pumps placed in perforated or slotted plastic pipe installed in angled pits backfilled with No. 57 stone below the bottom of the excavation, called "stingers", are another type of open pumping. Pumping can be performed on an intermittent basis to remove water from the construction excavation, but should be continuous (24 hours a day) to maintain excavation bottom stability. Predrainage dewatering requires the installation of temporary wells and/or wellpoints within or around the excavations, with continuous (24 hours a day) pumping both before excavation and while the excavations are in use to lower the groundwater adequately beneath the entire excavation areas. Cutoff or exclusion involves the installation of sheetpiling completely around the excavations and open pumping from inside the sheeting during excavation. Predrainage dewatering outside the sheeting can be implemented to reduce groundwater pressure on the sheetpiling and potential leakage of the sheeting at joints.

Based on our experience with similar subsurface conditions and similar projects in coastal North Carolina, predrainage dewatering or open pumping will be necessary for utility, stormwater basin, pipe, or structure construction that extends below the water table.

The responsibility for dewatering of construction excavations and preventing excessive settlement of existing structures and other site features due to dewatering should lie solely with the contractor. This information is provided only as a service and under no circumstance should S&ME be assumed to be responsible for the effectiveness of the construction dewatering method(s) selected by the contractor.

Structural Fill and Backfill

A significant amount of new structural fill will be required at this site to construct the building pad. Structural fill should have a Unified Soil Classification of GW, GP, GP-GM, GP-GC, GW-GM, GW-GC, GM, SW, SP, SP-SM, SP-SC, SW-SM, or SM be used be used. The fill should be free of organics and debris, be placed in 12-inch maximum loose lifts in open site areas (more than 10 feet wide and compacted with a 10-ton vibratory smooth drum roller) and 8-inch maximum loose lifts in trench areas (less than 10 feet wide and compacted with hand operated equipment).

Structural fill and structural backfill should be compacted to at least 95 percent of the standard Proctor maximum dry unit weight (ASTM D_698) at depths greater than 12 inches below finish subgrade elevations. The upper 12 inches of structural fill should be compacted to at least 98 percent of the material's standard Proctor maximum dry unit weight. The moisture content of the material should be within 3% of the material's standard Proctor optimum moisture content for most types of soils. The acceptable moisture content range can be increased to +/- 5% for sands and gravels with less than 20% fines, provided the recommended compaction is still achieved.

The contractor should protect the exposed soil fill and subgrades by smooth-rolling and grading the site to promote surface water runoff. Exposure to the environment and construction activities will likely weaken the exposed subgrade soils. If deterioration of the soil occurs during the construction process due to the contractor's failure to protect stable subgrades, then addition of water if dry soils are observed or discing and drying if the soils are wet, re-compaction, densification, and/or undercutting and replacement with structural fill may be necessary. This work should be performed by the contractor as recommended by the Geotechnical Engineer of his representative.

Even though silty sands (SM) are satisfactory for use as compacted structural fill and structural backfill, they are somewhat moisture sensitive and can be difficult to adequately dry and compact, especially during the wetter, cooler times of the year. Even if the specified compaction is achieved, the fill surface must be stable prior to placement of overlying lifts of fill, which can be difficult to achieve for these somewhat moisture-sensitive soils.

Please note that clean sand (SP) and slightly silty sand (SP-SM) with less than 12% fines have very little "binder" and can be difficult to compact and maintain a stable fill surface upon. The on-site soils and locally available soils are predominantly these soil types. Clean fine sands (SP) are common in the vicinity of the site and are locally known as "sugar sands". These soils typically require the addition of large amounts of water, even during wet, cool weather conditions, to achieve compaction. Also, the fill surfaces need to be covered with additional fill or ABC stone base immediately, as they will tend to degrade upon drying and rut under construction traffic. Alternatively, they can be moisture conditioned and re-compacted prior to subsequent fill or pavement material placement.

To confirm that the specified degree of compaction is being obtained, field compaction testing should be performed in each fill lift by the geotechnical engineer's representative. Compaction tests should be performed at a minimum frequency of one test per 2,500 square feet per lift in building areas, 5,000 square feet in pavement areas, and one test per 100 linear feet per lift of utility trench backfill in structural areas.

Construction of any cut or fill slopes should be no steeper than 3H: 1V. To prevent shallow surface failures on the exposed slope faces the soils exposed on all slope faces should be compacted with track-mounted equipment prior to final seeding and mulching. Surface water runoff should be directed away from the slopes. The preliminary grading plan noted several 2.5:1 slopes. Because of the relatively clean sandy soils encountered at the site which are likely to be present in the slopes, surface erosion control measures should be put in place immediately after slope construction to help reduce the potential for surface erosion and near surface slope failures.

Reuse of On-Site Soil as Structural Fill

The near-surface soils encountered in the shallow hand augers and CPT soundings are suitable for use as structural fill and backfill. Groundwater was encountered within 9.5 to 10.3 feet of the existing ground surface in the majority of the soundings. Soils excavated from below the water table will most likely require discing and drying prior to reuse as compacted structural fill. Any surficial grass, rootmat, and topsoil are unsuitable for reuse as structural fill.

Settlement Due to New Fill and Settlement Monitoring

Structural fill depths of 7 to 15 feet will be required to achieve design subgrade elevations. The new fill loading on the near surface very loose to loose sands and clay layer encountered 25 to 30 feet below existing ground in sounding B-2, B-3 and A-2 will induce settlement on the order of 2 to 3 inches. When added to the settlement due to foundation loads (0.7 to 1.0 inches), the total settlement will be greater than tolerable levels. We anticipate the settlement due to the fill loading will occur fairly quickly, within 30 days, however, to verify that this settlement has occurred prior to foundation construction, we recommend that fill settlement monitoring be implemented. We recommend that two settlement plates be installed by the contractor at the approximate locations shown on Figure 3. A settlement plate detail is given on Figure 4. The project surveyor should measure the elevations of the settlement plates and/or tops of the metal riser pipes prior to surcharge fill placement. (If only the elevations of the plates are measured, the installer of the settlement plates should measure the vertical distance from the plates to the tops of the riser pipes.). The settlement plate PVC outer protective pipe should be painted or flagged, and care should be taken to prevent damage to the settlement plates and pipes during surcharge fill placement.

The elevations of the tops of the metal riser pipes should be measured by the project surveyor every 2 days and the elevation measurements should be forwarded to S&ME for analysis. S&ME can determine when sufficient settlement has occurred and when the fill settlement is substantially complete.

Building Foundation Recommendations

Based on the CPT soundings and assumed structural loads, the building may be supported on shallow spread footings provided the site is prepared as recommended above and the settlement of the mass fill is substantially complete prior to footing construction (Section 5.5). The following sections provide our geotechnical conclusions and recommendations regarding building foundation support.

Bearing Pressure

Shallow foundations for the building may be designed using a net allowable soil bearing pressure of 3,000 pounds per square foot. All foundation excavations should be evaluated by the geotechnical engineer or his representative prior to concrete placement to confirm the suitability of underlying materials. This evaluation will include probing and shallow hand augering with dynamic cone penetrometer testing. If soft, loose or otherwise unsuitable soils are encountered, these soils may need to be overexcavated and backfilled with either washed stone (NCDOT No. 57), suitable structural fill, or lean concrete. Because the footings will be constructed within compacted structural fill, only minor footing repair is anticipated. The contractor should be prepared to densify the surface soils in all footing excavations prior to concrete placement.

If water collects in any excavations it should be removed promptly. Care should be exercised during construction of foundations in order not to disturb bearing soils and reduce their bearing strength. Concrete for the footings should be placed as soon as practical following excavation. If concrete placement is delayed, the soils can dry out or become wet due to unfavorable weather conditions. The placement of a concrete "mud mat" on exposed bearing soils should be considered.

Bearing Depth and Dimension

Footings should bear at least 18 inches below exterior grade to avoid frost penetration and develop the design bearing capacity. Continuous wall footings should be at least 18 inches wide and isolated column footings should be at least 24 inches wide. This recommendation is made to prevent a localized or "punching" shear failure condition which can occur with very narrow footings.

Settlement

Based on conditions encountered by this exploration, anticipated structural loads, and provided the site is prepared as recommended above, we expect that maximum total settlements beneath footings will be 1 inch or less. Differential settlements are expected to be ½ inch or less for footings bearing on similar materials.

Floor Slab

We recommend that at least 6 inches of compacted select granular material be placed beneath all ground floor slabs to provide a capillary break, provide more uniform slab support, and reduce damage to subgrade soils during construction. The select granular fill should classify as SP, SP-SM, SW, or SW-SM in accordance with the Unified Soil Classification System, which requires that these soils have less than 12 percent passing the No. 200 sieve. Manufactured materials such as aggregate base course (ABC), processed fill (i.e., screenings), or No. 57 washed stone meeting this specification can also be used. A modulus of subgrade reaction value of 180 psi/in may be used to design floor slab on subgrades consisting of these materials compacted to at least 98 percent of the soil's standard Proctor maximum dry density.

Exposure to the environment and construction activities will weaken the floor slab subgrade soils. Therefore, we recommend that subgrade soils in slab areas be evaluated prior to placement of the select granular fill. If near surface deterioration of the soils has occurred, undercutting or reworking of the fill may be necessary.

Based on the results of our exploration and the assumed finish floor elevation, the floor slab will not be below the exterior grade and will not be subjected to hydrostatic pressure from groundwater. However, water vapor transmission through the slab is still a design consideration. Evaluating the need for and design of a vapor retarder or vapor barrier for moisture control is outside our scope of services and should be determined by the project architect/structural engineer based on the planned floor coverings and the corresponding design constraints, as outlined in ACI 302.1R-04 Guide for Concrete Floor and Slab Construction. Further, health and environmental considerations with respect to any potentially harmful vapor transmission are also outside of our scope.

Seismic Site Classification

Seismic Site Class

Based on the shear wave velocities measured by the seismic CPT sounding (B-3A), a **Seismic Site Class D** designation is appropriate for seismic design in accordance with Section 1613 of the 2012 North Carolina Building Code.

Ground Motion Parameters

Based on Seismic Site Class D, the following ground motion parameters should be used for design.

Ground Motion Parameters

Site Class	SDS	SD1	PGA
D	0.309 g	0.157 g	0.12 g

Pavements

The pavement analysis was based on an initial serviceability index of 4.2 (4.5 for concrete), a terminal serviceability index of 2.0 and a 15-year asphalt design life. We have assumed a 25 year design life for the concrete pavement.

Asphalt Pavement

Based on the field and laboratory testing, and past experience, a design CBR value of 10 percent was used for pavement design. This CBR value is based on the subgrade soils consisting of sandy soils as described in section 5.4 and the top 12 inches being uniformly compacted to at least 98% of the soil's standard Proctor MDD. For the standard duty pavement an 18-kip equivalent single axle loads (ESAL) value of 30,000 was assumed. For heavy duty pavement an ESAL value of 550,000 was assumed.

Recommendations for the standard and heavy duty pavements are provided in the table below.

Recommended Asphalt Sections

Material Type	Standard Duty (Parking Stalls)	Heavy Duty
Asphalt Surface Course	2 inches SF-9.5A or S-9.5B	1.5 inch SF-9.5B
Asphalt Initial Course	-	2 inches I-19.0B
Aggregate Base Course	6 inches	8 inches

All materials and construction methods should conform to the 2012 edition of the NCDOT "Standard Specifications for Roads and Structures." The aggregate base course (ABC) stone should consist of stone meeting the requirements under Section 520. ABC stone should be compacted to at least 100 percent of the maximum dry density as determined by the modified Proctor compaction test, AASHTO T-180 as modified by NCDOT. To confirm that the base course stone has been uniformly compacted, in place density tests should be performed by a qualified soils technician and the area should be thoroughly proofrolled under his observation.

Asphaltic concrete should conform to Section 610 in the 2012 edition of the NCDOT "Standard Specifications for Roads and Structures." Sufficient testing and observation should be performed during pavement construction to confirm that the required thickness, density, and quality requirements of the specifications are achieved.

Although our analysis was based on traffic loading for a 25-year design life, our experience indicates that pavement maintenance is necessary due to normal weathering of the asphaltic concrete. Normal weathering (i.e., oxidation) causes asphalt to become more brittle resulting in loss of tensional strength. This loss in strength can cause minor cracking which provides access for water infiltration into the stone base and subgrade. As the degree of saturation of the subgrade increases, the strength of the subgrade decreases leading to pavement failure. Routine maintenance in the form of sealing, patching, and maintaining proper drainage is required to increase pavement life. It is not uncommon for overlays to be required after 10 to 12 years.

Below Grade Retaining Walls

General recommendations with respect to retaining wall design and construction are provided below along with specific recommendations for cast-in-place concrete and mechanically stabilized earth (MSE) walls. Once additional information is available, S&ME should be contacted for any additions or revisions to the recommendations that may be appropriate.

Retaining walls must be designed to resist lateral earth pressures from the backfill. In addition to the lateral stresses from backfill, the walls may be subjected to surcharge loading from adjacent traffic, stockpiled materials, or stresses from nearby footings or floor slabs. If present, these surcharge stresses should be resolved into appropriate lateral stress distributions and added to the earth pressures outlined below. External stability of the proposed retaining walls should be checked during design, including resistance to sliding and overturning. The wall designer should consider the impact adjacent utilities, ponds and slopes have on their design. The wall designer should consider the need for erosion protection at the wall toe, local bearing capacity issues, global stability issues and wall toe embedment along slopes.

A drainage medium, such as clean stone (NCDOT No. 57) wrapped in geotextile fabric or a prefabricated geocomposite drain (Miradrain TM 6000 or equivalent) should be placed immediately behind the wall. The drainage medium should be connected to a footing drain or weep holes to reduce potential buildup of hydrostatic pressure due to surface water, perched water, or utility leaks.

Backfill soils placed behind retaining walls should consist of on-site soils with USCS classifications of SW or SP or some combination of these. The retaining wall backfill should be compacted to at least 95 percent of the soil's standard Proctor maximum dry density (ASTM D 698) and be within 3 percent of optimum moisture. Operating heavy compaction equipment within 5 feet behind the retaining structures can create lateral earth pressures far in excess of those recommended for design. As such, we recommend that hand-operated equipment be used within 5 feet from walls.

Retaining wall foundations may be designed for an allowable bearing pressure of 3,000 pounds per square foot (psf).

The following soil parameters should be used for below grade wall design, provided that satisfactory structural backfill is placed and compacted against the walls:

Design Parameters for Below Grade Walls

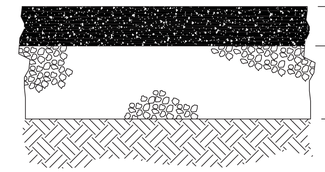
Parameter	Value
Soil Effective Friction Angle (phi', degrees)	33
Soil Effective Cohesion (c')	0 psf
At-Rest Earth Pressure Coefficient (Ko)	0.46
Active Earth Pressure Coefficient (Ka)	0.29
Passive Earth Pressure Coefficient (Kp)	3.39
Moist Unit Weight of Backfill	120 pcf
Friction Coefficient b/w Foundation and Bearing Soil	0.45
Allowable Bearing Pressure on Foundation Soil	3,000 psf

Cantilever retaining walls should be designed using the active lateral equivalent pressure coefficient given above. Fixed basement, pit, loading dock-height, or foundation walls should be designed using the at-rest lateral earth pressure coefficient given above. The backfill should be properly drained and meet other requirements given in this report.

Lateral loads applied to the retaining wall footings can be resisted by the friction between the footing concrete and the foundation bearing soil. To achieve the recommended friction coefficient, the bearing surface must be free of mud or loose soil at the time of concrete placement. In addition to the dead weight of the structure and footing concrete, the soil backfill above the footing may be included as dead weight in sliding and overturning analyses.

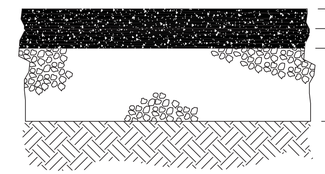
ASPHALT PAVEMENT DESIGN SECTIONS

STANDARD DUTY (PARKING STALLS)



THICKNESS	MATERIAL
2.0"	SURFACE COURSE – TYPE S-9.5B or SF-9.5A
6.0"	NCDOT ABC STONE
N/A	APPROVED SUBGRADE

HEAVY DUTY FLEXIBLE



THICKNESS	MATERIAL
1.5"	SURFACE COURSE – TYPE S-9.5B
2.0"	INITIAL COURSE – TYPE I-19.0B
8.0"	NCDOT ABC STONE
N/A	APPROVED SUBGRADE

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Keith Brown
Feb 23 2018 2:44 PM

NO.	DATE	DESCRIPTION	BY

GEOTECHNICAL SHEET
FEDEX FACILITY
HIGHWAY 421
WILMINGTON, NORTH CAROLINA

DRAWN BY: GG	CHECKED BY: KB
DESIGNED BY: KB	APPROVED BY: KB
PROJECT NUMBER: 1305-17-027	
SCALE: AS SHOWN	DATE: 5-22-2017

DRAWING: G-1.0