

Outdoor Lighting  
**Open Traditional LED Style M**

Designed to reduce light pollution, the Open Traditional LED fixture provides an energy-efficient installation with curb appeal. This coach light evokes the charm of New England and is an excellent choice for illuminating streetscapes and pedestrian areas.

**LED** (Light Emitting Diode) **50 watts**

Mounting heights **12', 13', 16'**

Color **Black**

Poles  
 Smooth round concrete  
 Fluted concrete  
 Fiberglass  
 Decorative aluminum

For additional information, visit us at [duke-energy.com/outdoorlighting](http://duke-energy.com/outdoorlighting) or call us toll free at 866-769-6417.

Outdoor Lighting  
**Open Traditional LED - Style M**

Light source: LED (white)

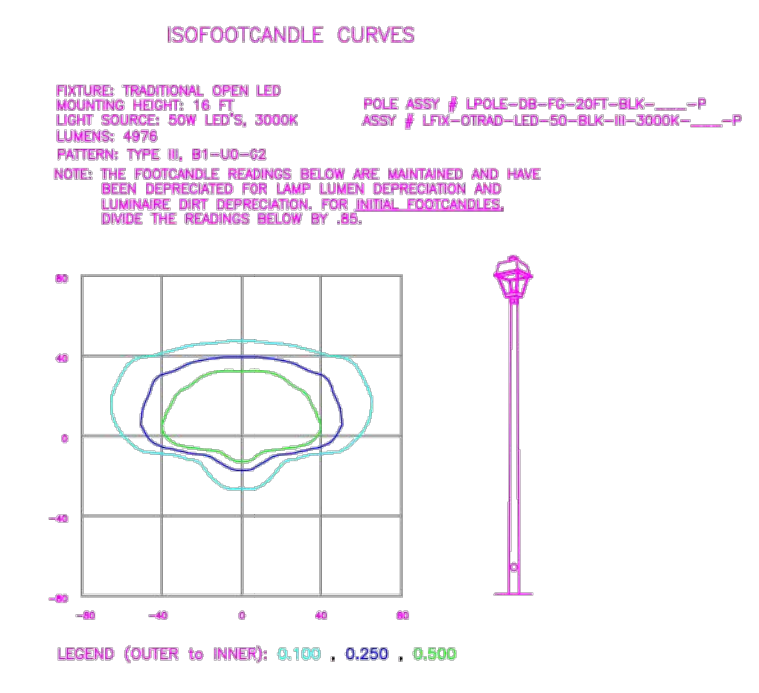
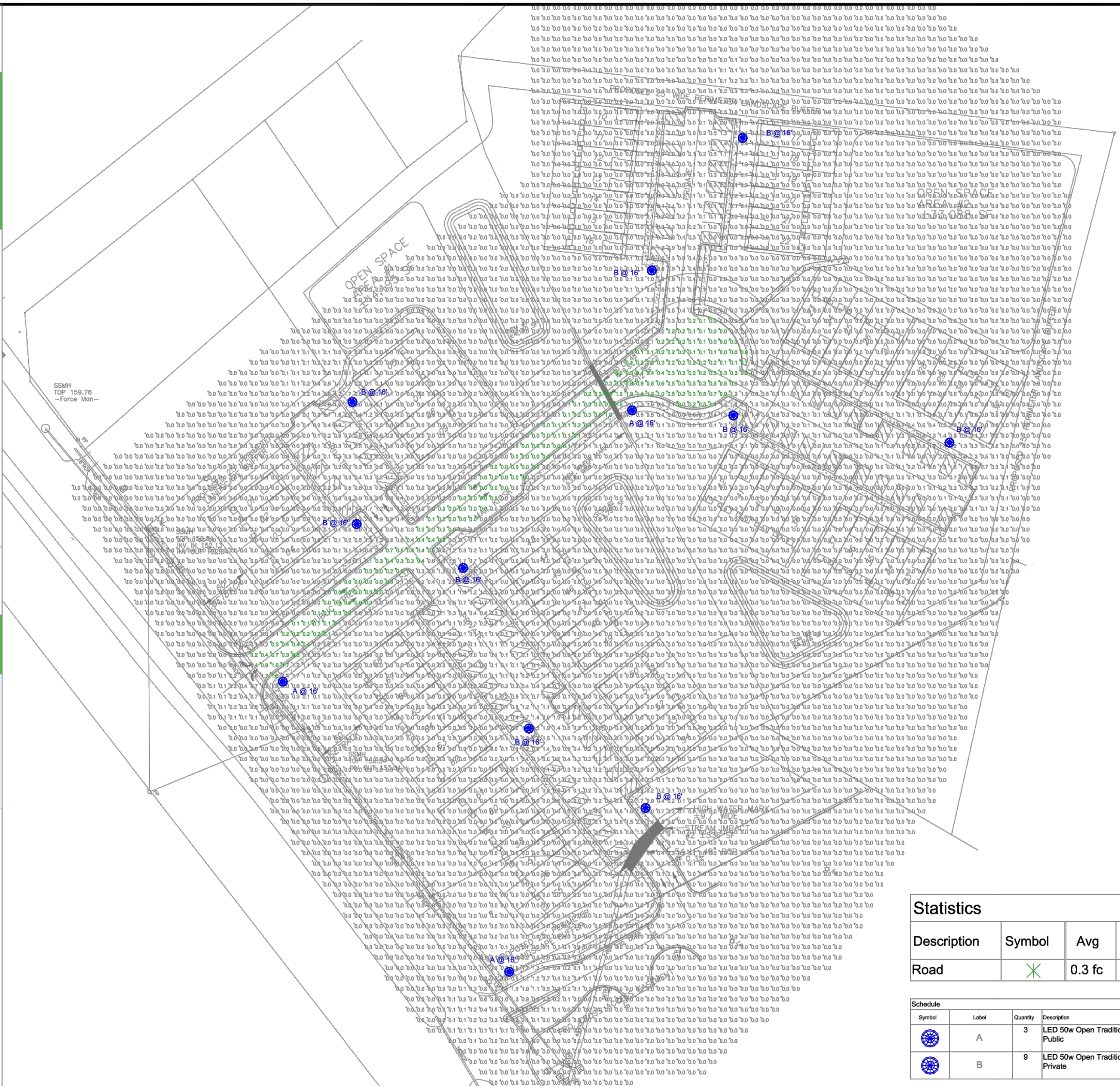
Wattage	BUG Rating	Light Pattern	Lumens	Color Temp
LED 50	B1-U0-G1	IES Type III (oval)	3,230	4,000K
LED 50	B3-U0-G1	IES Type V (circular)	5,385	4,000K

Poles available:

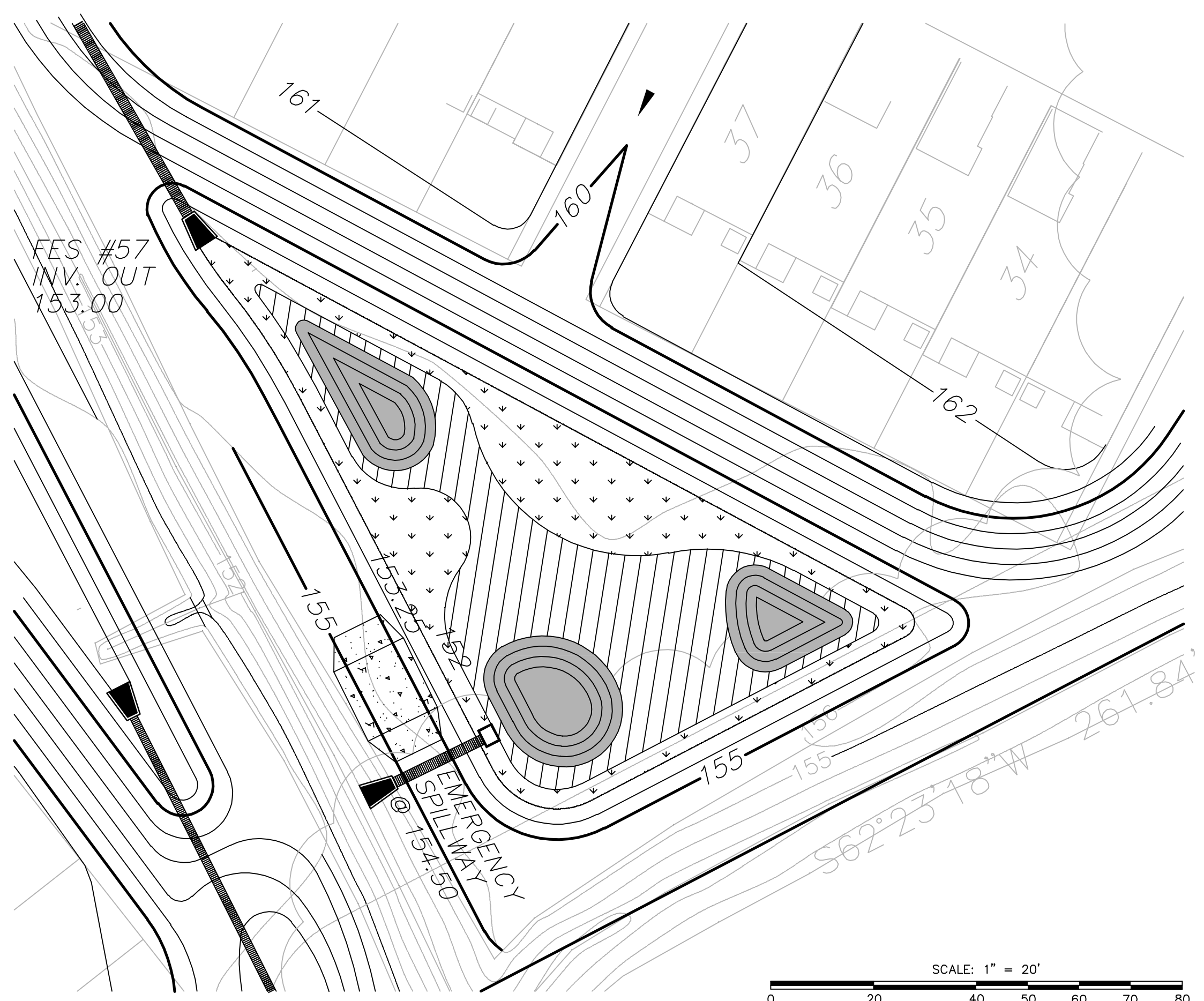
Name	Mounting height	Color
Smooth concrete	12', 16'	Black
Fluted concrete	13'	Black
Fiberglass	16'	Black
Decorative aluminum	12', 16'	Black

Features

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





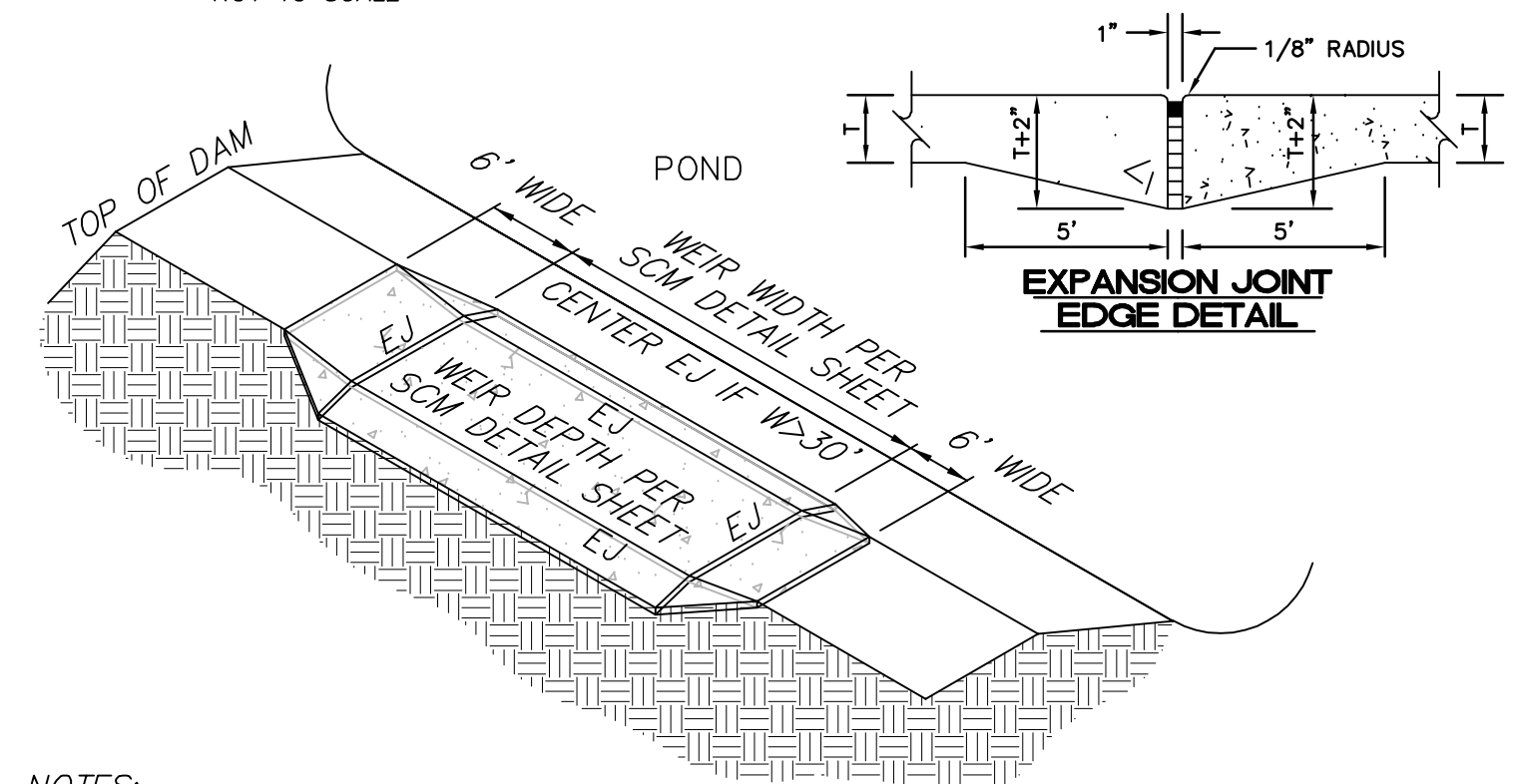


**WETLAND AREA**

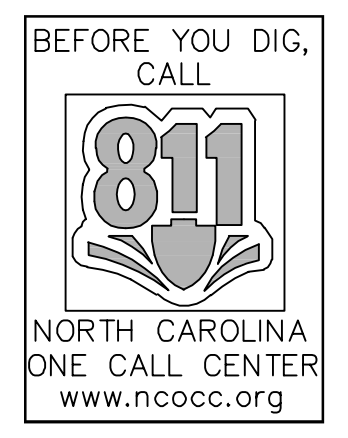
FOREBAY	744 S.F. (13%)
NON-FOREBAY	520 S.F. (9%)
SHALLOW WATER	2,323 S.F. (40%)
TEMP. INUNDATION ZONE	2,221 S.F. (38%)
<b>TOTAL</b>	<b>5,808 Sq. Ft.</b>

**CONCRETE EMERGENCY SPILLWAY**

NOT TO SCALE



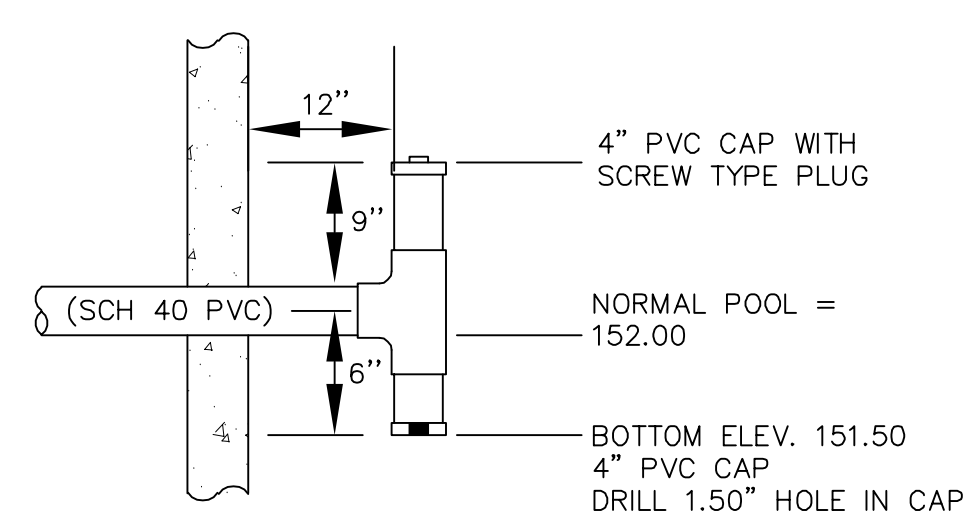
- NOTES:
1. CONCRETE SECTION TO BE 6" THICK, 4,000 PSI @ 28 DAYS, W/ 6"x6"6GA WELDED WIRE FABRIC.
  2. 18" OF CLASS B RIP RAP OVER GEOTEXTILE FABRIC FOR THE FULL WIDTH OF WEIR FROM THE EDGE OF CONCRETE TO THE TOE OF SLOPE.
  3. REFERENCE THE SCM DETAIL SHEET FOR WEIR WIDTH, DEPTH, AND ASSOCIATED ELEVATIONS.
  4. THICKEN ALL EDGES AND EXPANSION JOINT "THICKNESS +2". MINIMUM EDGE THICKNESS OF 8"



**STOCKS ENGINEERING**

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NASHVILLE, N.C. 27556  
WWW.STOCKSENGINEERING.COM

P.O. BOX 1108  
PHONE: (252) 459-8196



NOTE:  
CONTRACTOR TO COMPACT BOTTOM OF POND TO ENSURE INFILTRATION IS LESS THAN 0.01 IN./HR. OR IMPORT IMPERMEABLE CLAY AS NEEDED.

NOTE:  
A PORTABLE PUMP SHALL BE USED DURING MAINTENANCE AND EMERGENCIES. THE DRAWDOWN PUMP RATE SHOULD ALLOW FOR THE SCM TO BE DRAWN DOWN OVER A 3 DAY OF LONGER PERIOD TO PREVENT THE COLLAPSE OF THE SATURATED SIDE SLOPES.

**VEGETATED SHELF LANDSCAPE PLAN**

CHOOSE A MINIMUM OF 5 OF THE FOLLOWING SPECIES FOR EACH AREA W/NO MORE THAN 33% OF ANY SPECIES. PLANTS SHALL BE IN 4" CONTAINERS.

**SHALLOW WATER (BELOW PERM. POOL) (MIN. 581 PLANTS)**

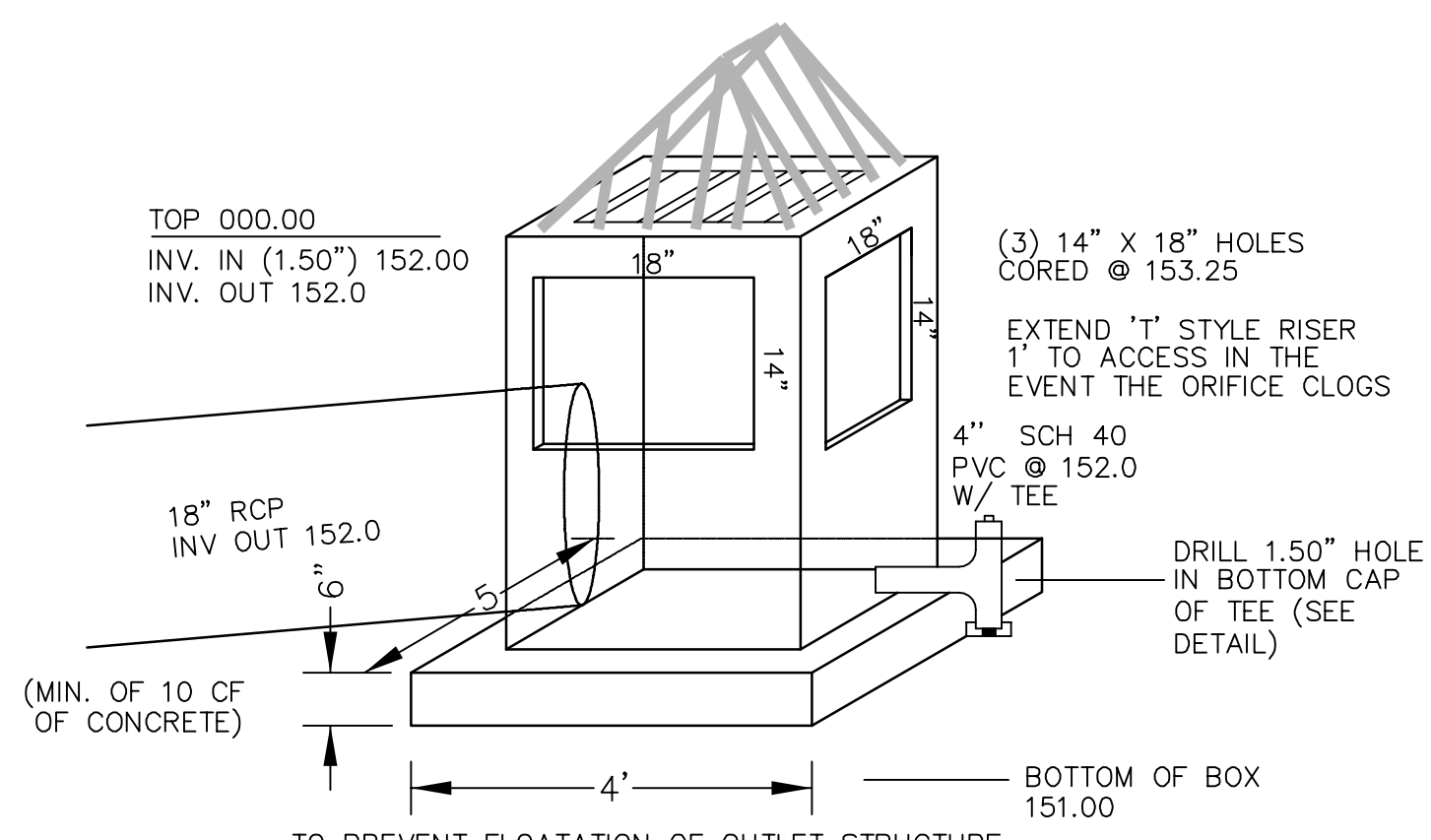
Botanical Name	Common Name
<i>Iris virginica</i>	Blue flag iris
<i>Ludwigia</i> spp.	Primrose willow
<i>Peltandra virginica</i>	Arrow arum
<i>Pontederia cordata</i>	Pickeralweed
<i>Sagittaria latifolia</i>	Duck Potato
<i>Sagittaria lancifolia</i>	Bulltongue

**SHALLOW LAND (ABOVE PERM. POOL) (MIN. 556 PLANTS)**

Botanical Name	Common Name
<i>Chelone glabra</i>	White Turtlehead
<i>Eupatoriadelphus dubius</i>	Dwarf Joe Pye Weed
<i>Kosteletzkya virginica</i>	Seashore Mallow
<i>Lobelia cardinalis</i>	Cardinal flower
<i>Lobelia siphilitica</i>	Great blue Lobelia
<i>Rhynchospora colorata</i>	Starrush whitetop

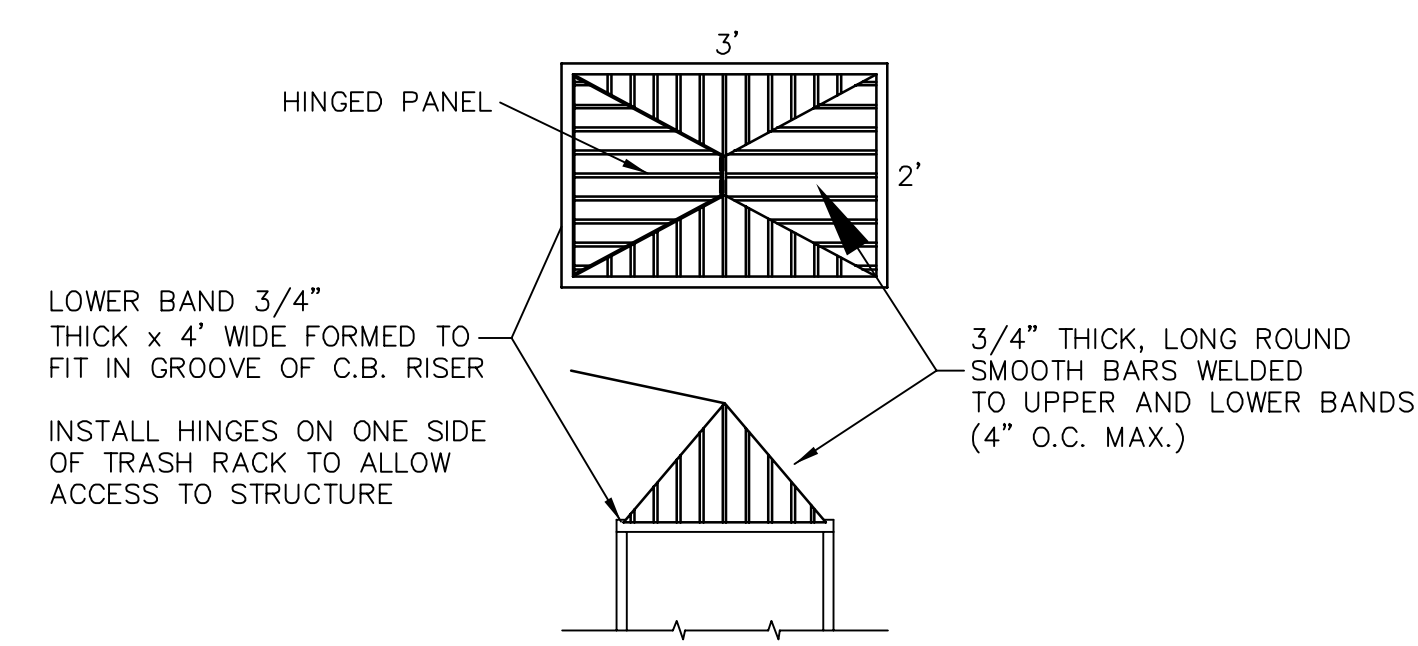
**STAGE/STORAGE TABLE**

STAGE	ELEVATION	CONTOUR AREA (SF)	INCREMENTAL STORAGE (CF)	TOTAL STORAGE (CF)
0	152.00	3,587	0	0
1.25	153.25	5,808	11,782	11,762
2.00	154.00	7,022	12,508	24,270
3.00	155.00	8,277	14,327	38,597



**2'x3' RISER STRUCTURE**  
W/ ALUMINUM TRASH RACK

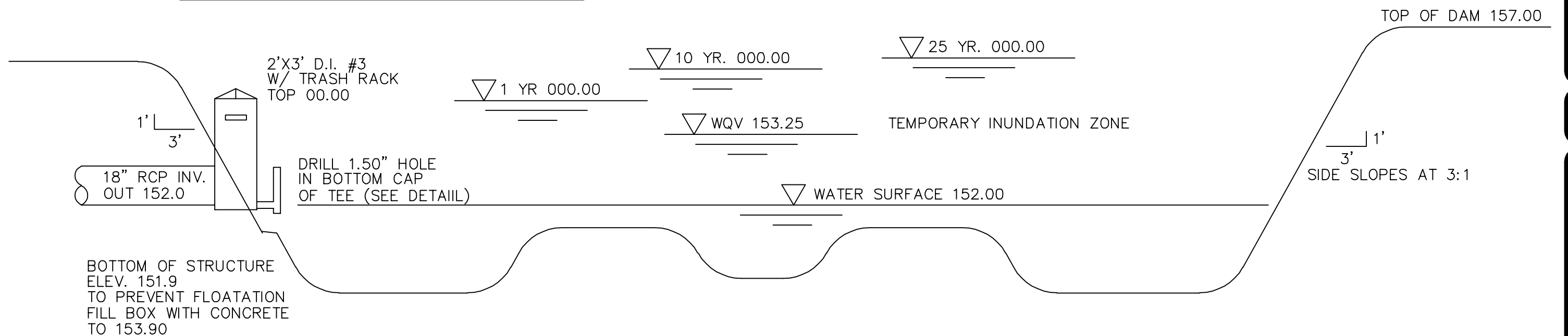
TO PREVENT FLOATATION OF OUTLET STRUCTURE FILL THE BOTTOM OF THE BOX WITH CONCRETE TO ELEV. 153.90 LEAVE SPACE AT OUTLET PIPE INVERT FOR INSTALLATION.



**TRASH GRATE DETAIL**  
TO BE CONSTRUCTED ALUMINUM  
N.T.S

PLANTING NOTE: PLANTINGS SHALL BE EVENLY SPACED TO COVER THE ENTIRE POND AREA EXCLUDING THE FOREBAY AND OUTLET DEEP POOL. ALL AREAS TO RECEIVE PLANTS SHALL HAVE 12" OF TOPSOIL.

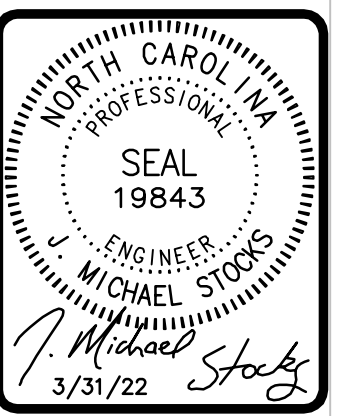
The pH, compaction, and other attributes of the first 12-inch depth of the soil shall be adjusted if necessary to promote plant establishment and growth.



**STORMWATER WETLAND PROFILE**  
NOT TO SCALE

BLN-C-1874

**WHITLEY TOWNES - 68 TOWNHOME UNITS  
SMITHFIELD, JOHNSTON COUNTY, NORTH CAROLINA**



SCM #2  
WETLAND DETAILS

REVISIONS

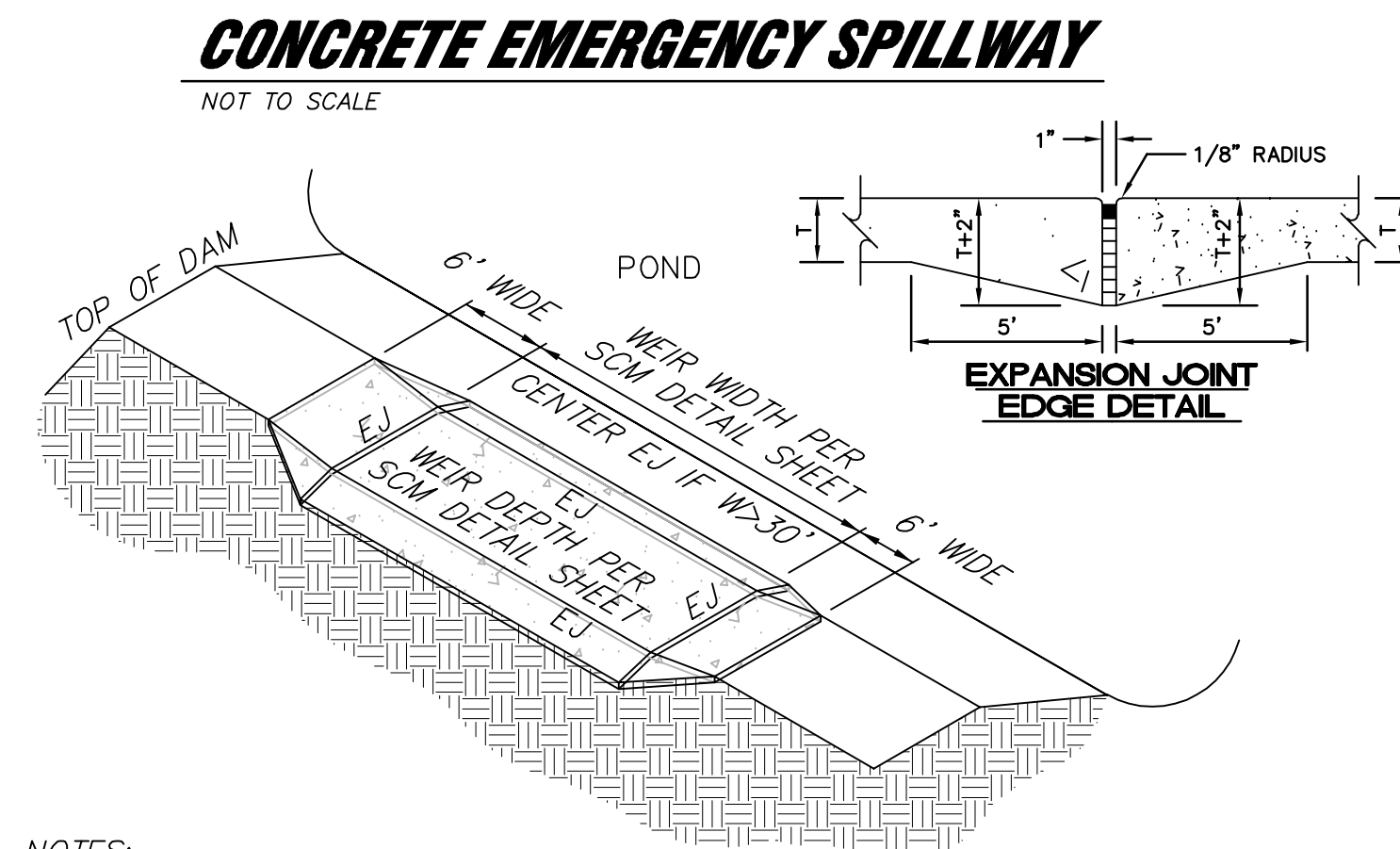
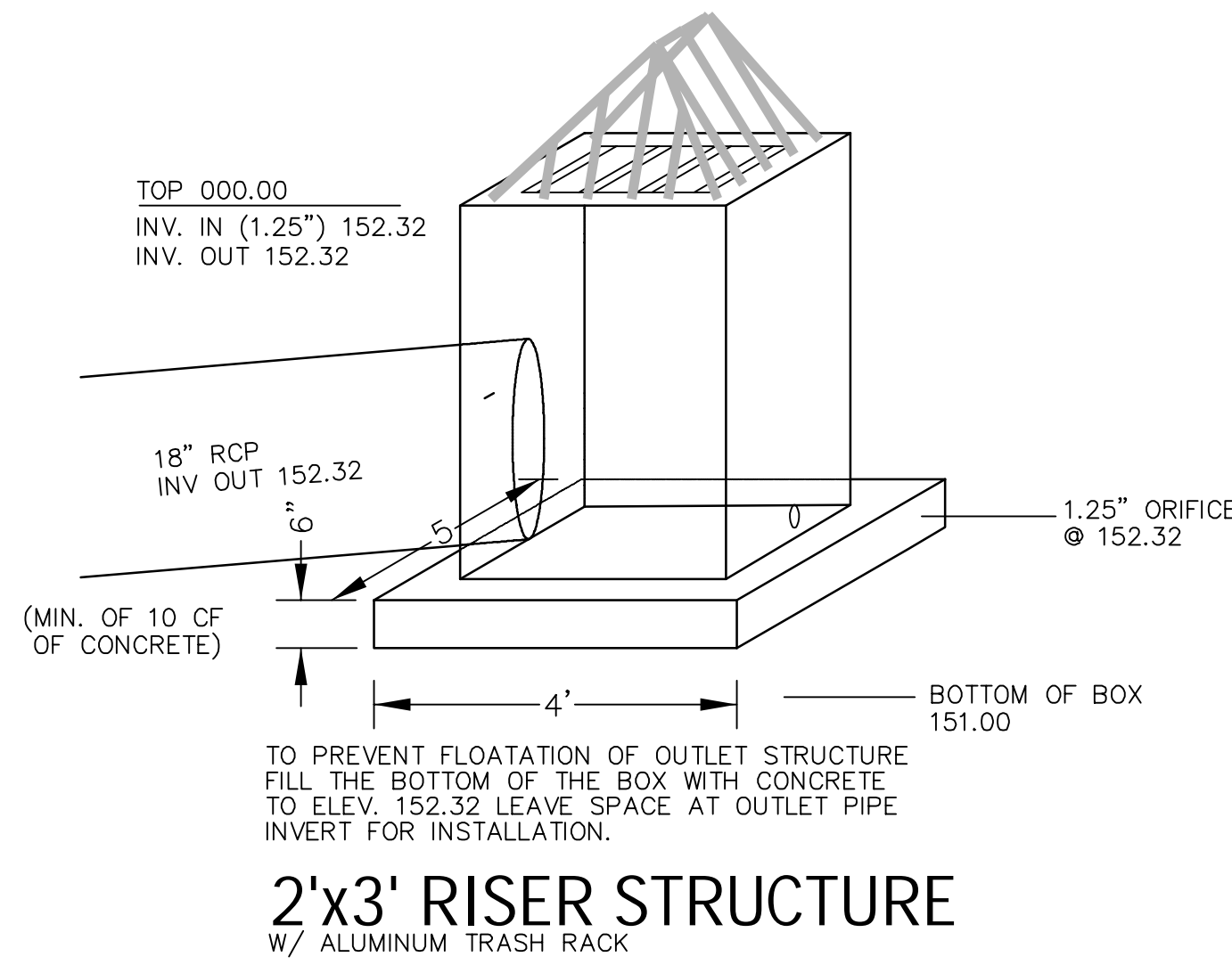
NO.	DATE	DESCRIPTION

FILE NO. 2021-001  
HORZ. SCALE: 1"=20'  
VERT. SCALE: NONE

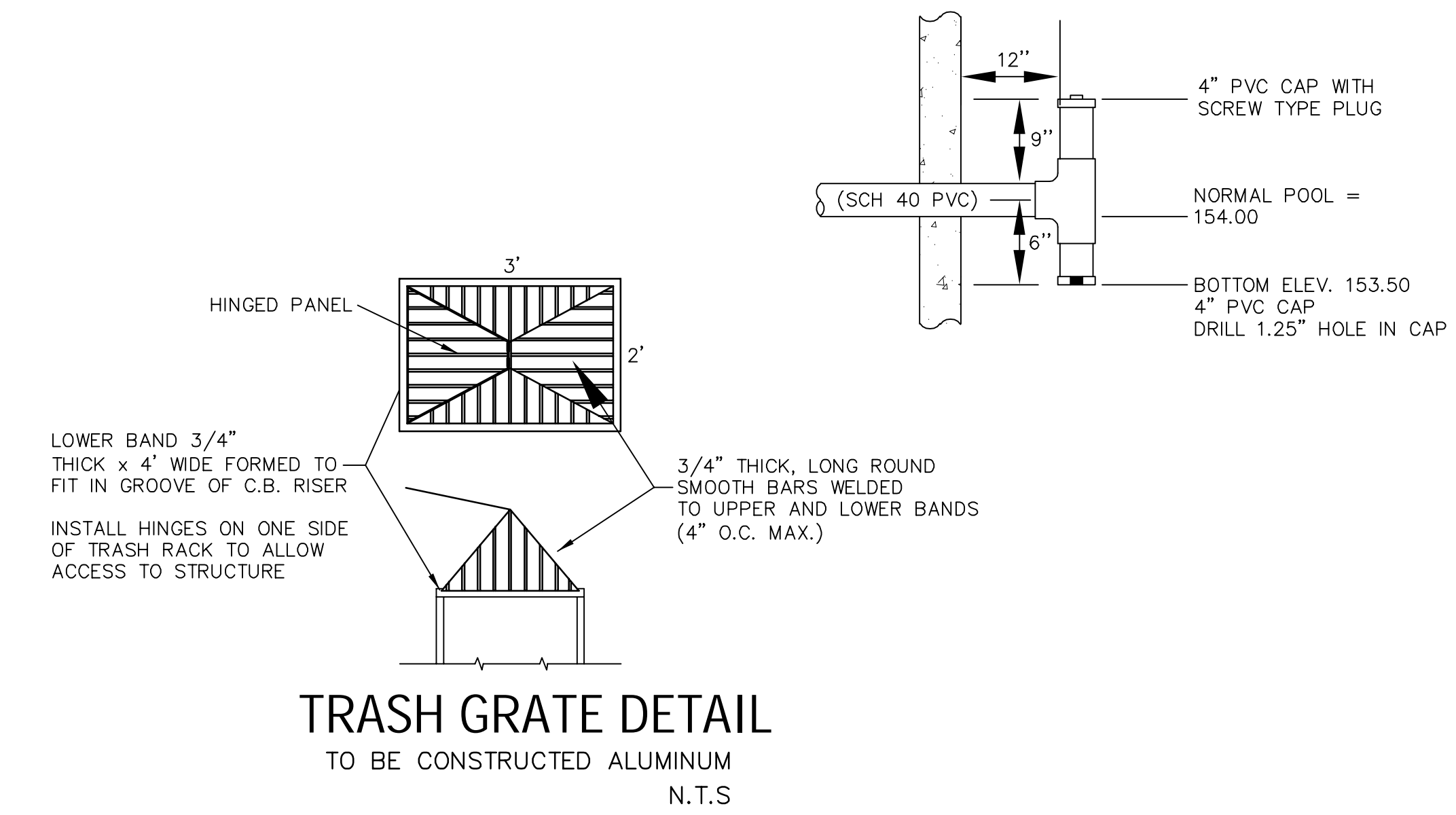


STAGE/STORAGE TABLE

STAGE	ELEVATION	CONTOUR AREA (SF)	INCREMENTAL STORAGE (CF)	TOTAL STORAGE (CF)
0	151.75	7,357	0	0
1.25	153.00	11,627	11,782	11,762
2.25	154.00	13,412	12,508	24,270
3.25	155.00	15,265	14,327	38,597
4.25	156.00	17,179	16,211	54,808



- NOTES:
1. CONCRETE SECTION TO BE 6" THICK, 4,000 PSI @ 28 DAYS, W/ 6"x6"6GA WELDED WIRE FABRIC.
  2. 18" OF CLASS B RIP RAP OVER GEOTEXTILE FABRIC FOR THE FULL WIDTH OF WEIR FROM THE EDGE OF CONCRETE TO THE TOE OF SLOPE.
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**BLN-C-1874**  
**WHITLEY TOWNES - 68 TOWNHOME UNITS**  
**SMITHFIELD, JOHNSTON COUNTY, NORTH CAROLINA**

NORTH CAROLINA PROFESSIONAL ENGINEER  
SEAL  
19843  
MICHAEL STOCK  
P. Michael Stock  
3/31/22

**SCM #3**  
**DRY DETENTION**

REVISIONS


FILE NO. 2021-001  
HORZ. SCALE: 1"=20'  
VERT. SCALE: NONE

**CE-12**





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

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

**SECTION E: GROUND STABILIZATION**

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

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

**GROUND STABILIZATION SPECIFICATION**

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

Temporary Stabilization	Permanent Stabilization
<ul style="list-style-type: none"> <li>Temporary grass seed covered with straw or other mulches and tackifiers</li> <li>Hydroseeding</li> <li>Rolled erosion control products with or without temporary grass seed</li> <li>Appropriately applied straw or other mulch</li> <li>Plastic sheeting</li> </ul>	<ul style="list-style-type: none"> <li>Permanent grass seed covered with straw or other mulches and tackifiers</li> <li>Geotextile fabrics such as permanent soil reinforcement matting</li> <li>Hydroseeding</li> <li>Shrubs or other permanent plantings covered with mulch</li> <li>Uniform and evenly distributed ground cover sufficient to restrain erosion</li> <li>Structural methods such as concrete, asphalt or retaining walls</li> <li>Rolled erosion control products with grass seed</li> </ul>

**POLYACRYLAMIDES (PAMS) AND FLOCCULANTS**

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

**EQUIPMENT AND VEHICLE MAINTENANCE**

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

**LITTER, BUILDING MATERIAL AND LAND CLEARING WASTE**

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

**PAINT AND OTHER LIQUID WASTE**

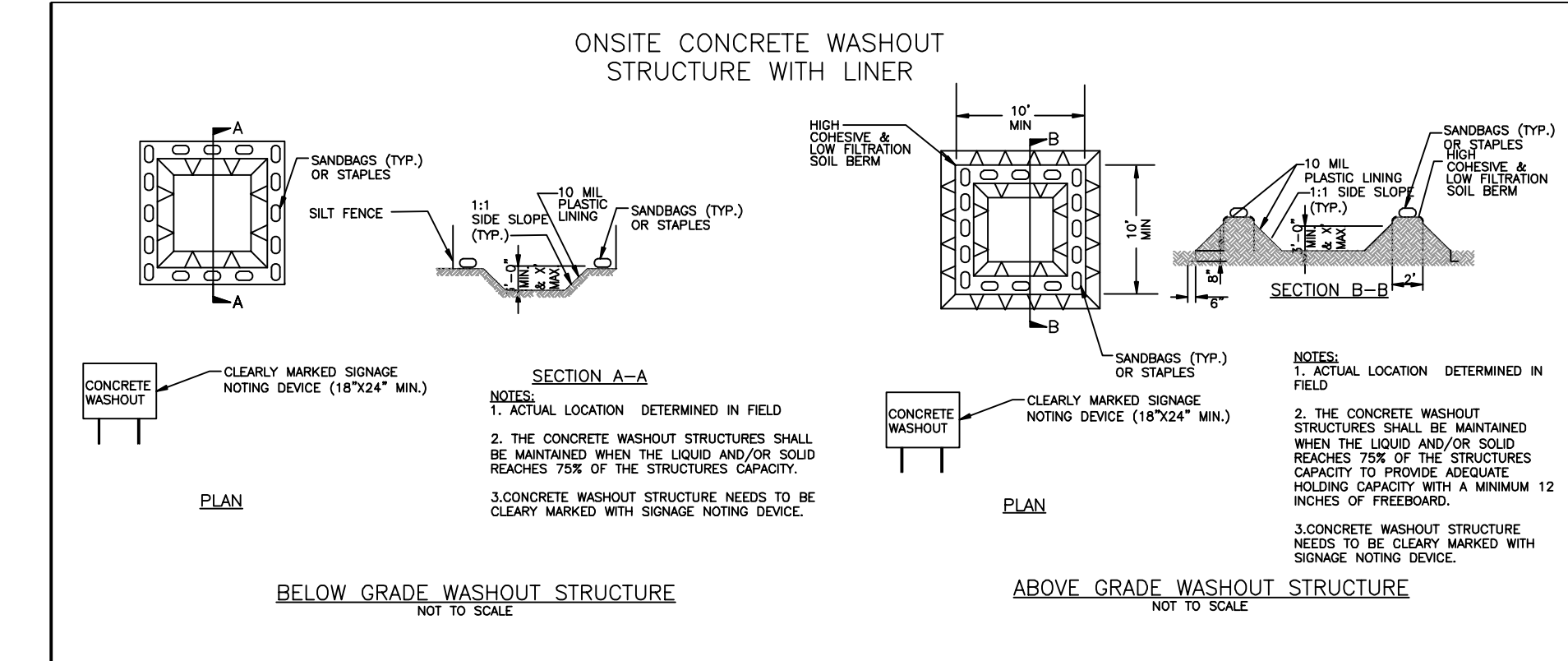
- Do not dump paint and other liquid waste into storm drains, streams or wetlands.
- Locate paint washouts at least 50 feet away from storm drain inlets and surface waters unless no other alternatives are reasonably available.
- Contain liquid wastes in a controlled area.
- Containment must be labeled,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

**PORTABLE TOILETS**

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

**EARTHEN STOCKPILE MANAGEMENT**

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



**CONCRETE WASHOUTS**

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

**HERBICIDES, PESTICIDES AND RODENTICIDES**

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

**HAZARDOUS AND TOXIC WASTE**

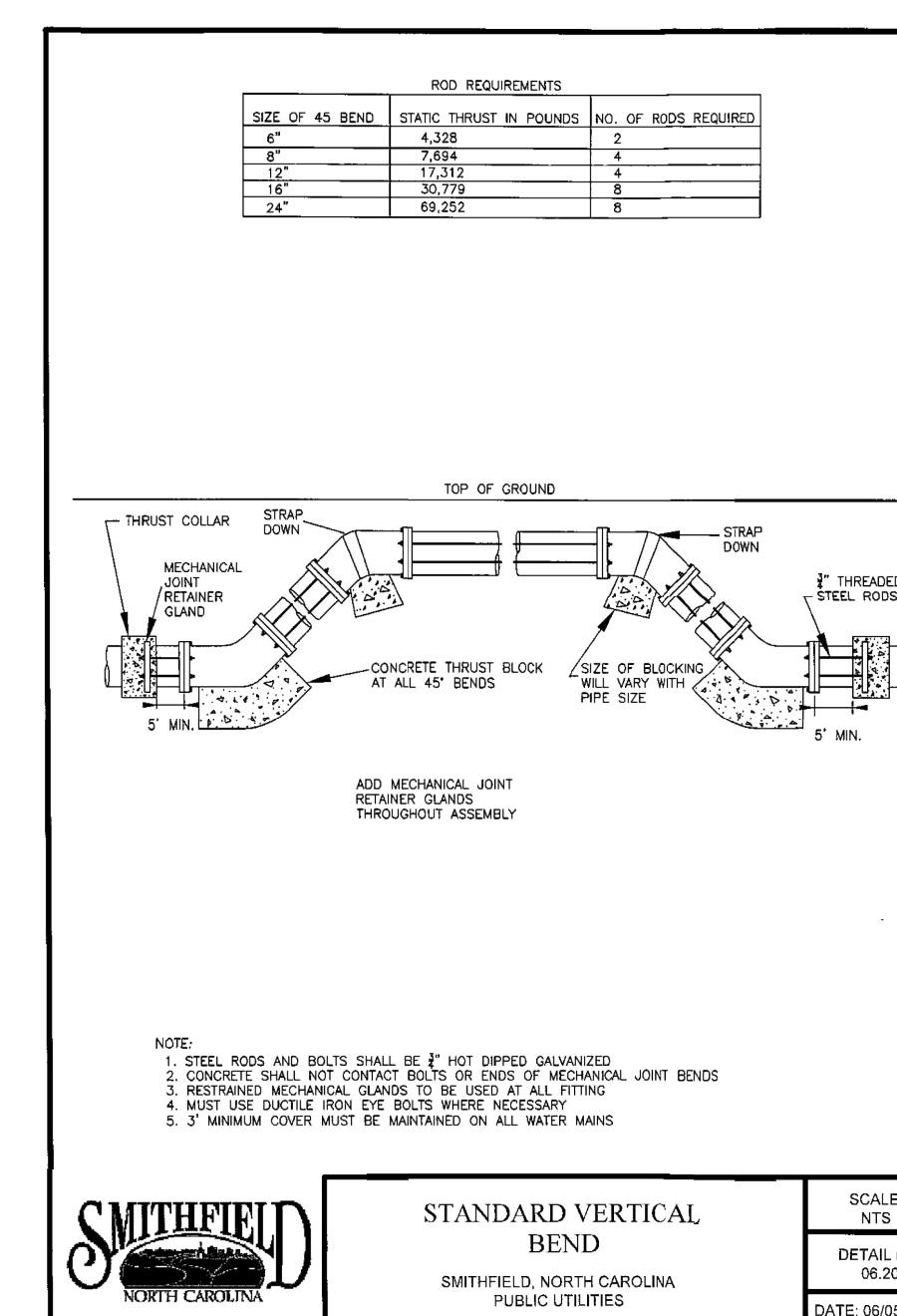
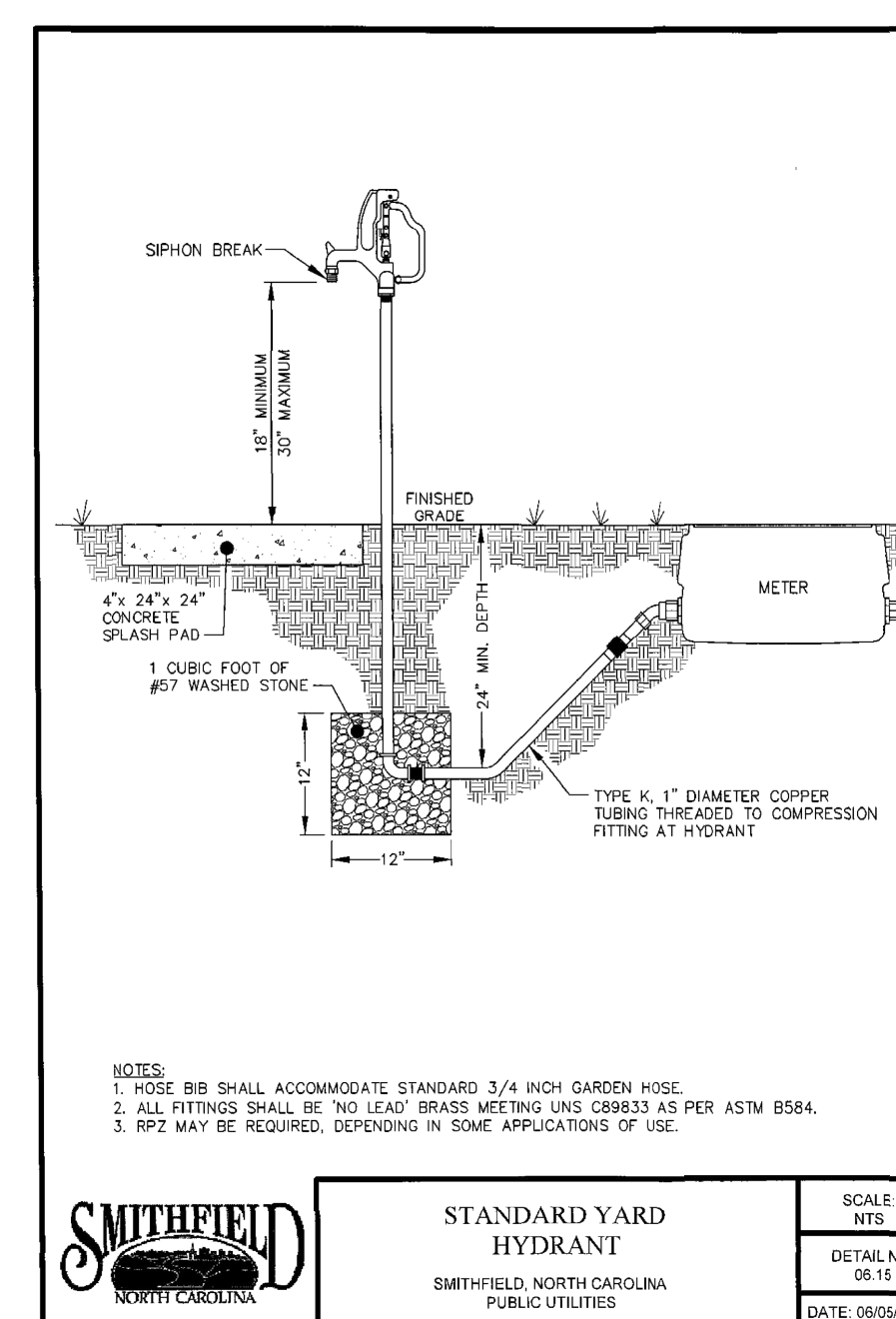
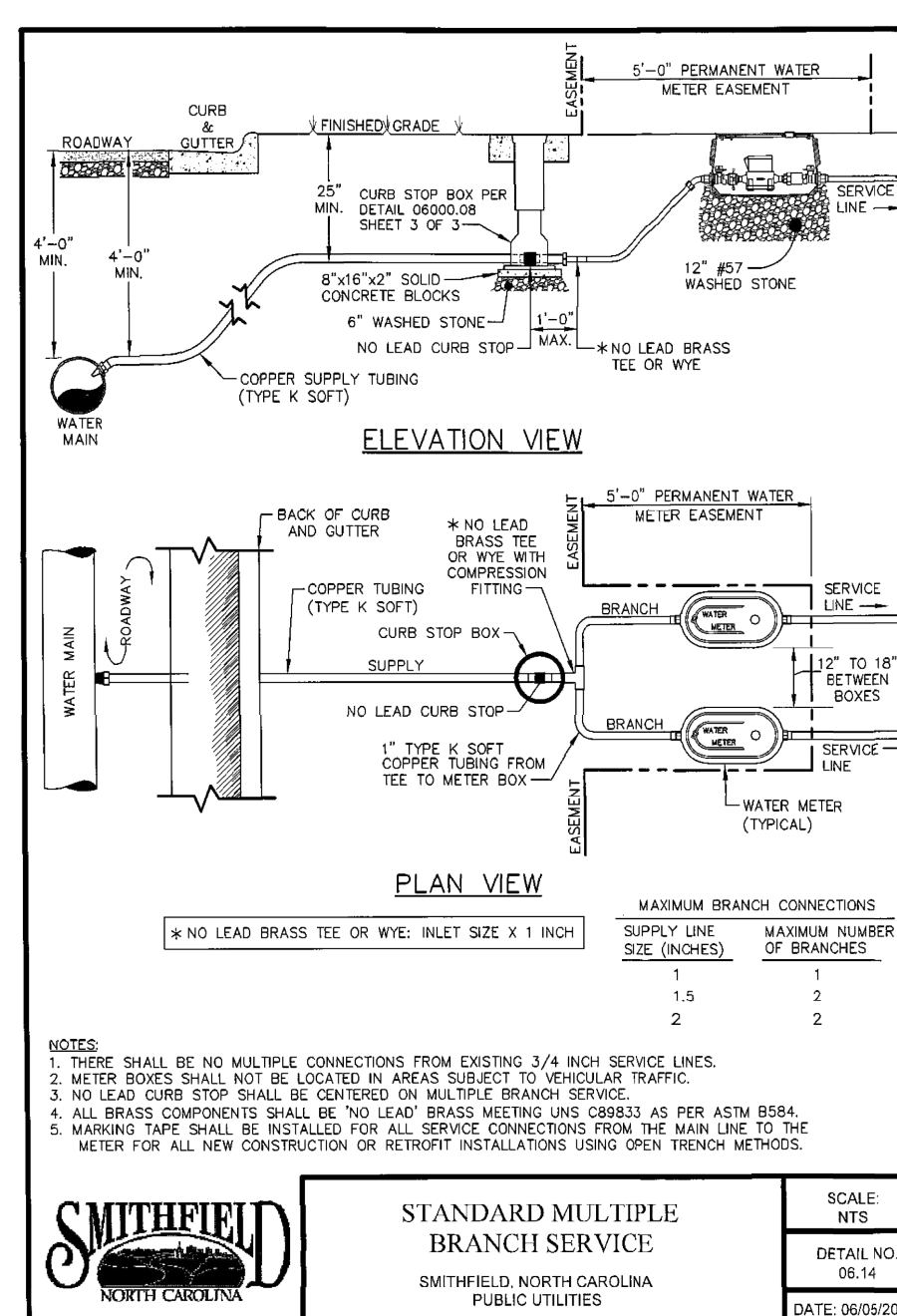
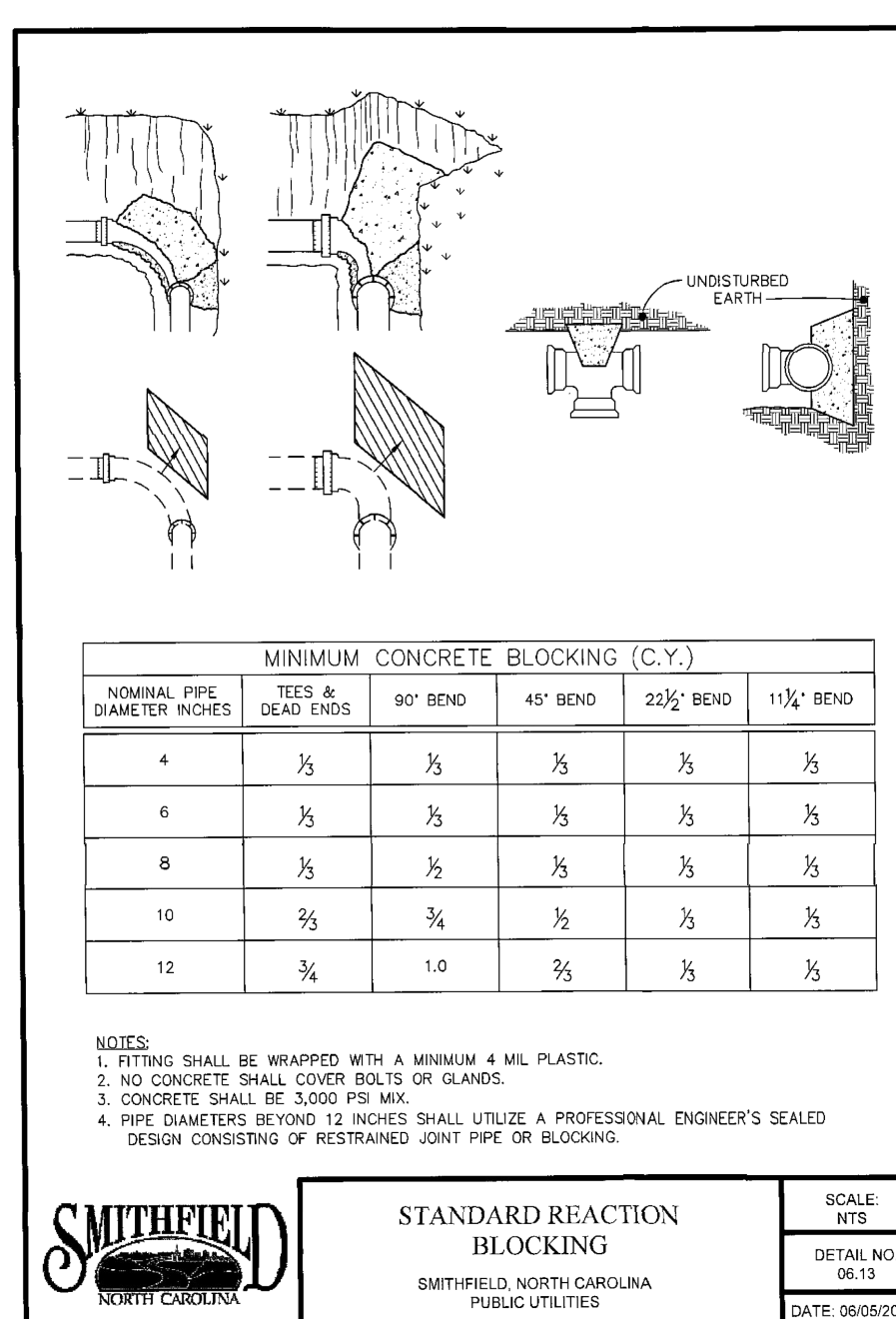
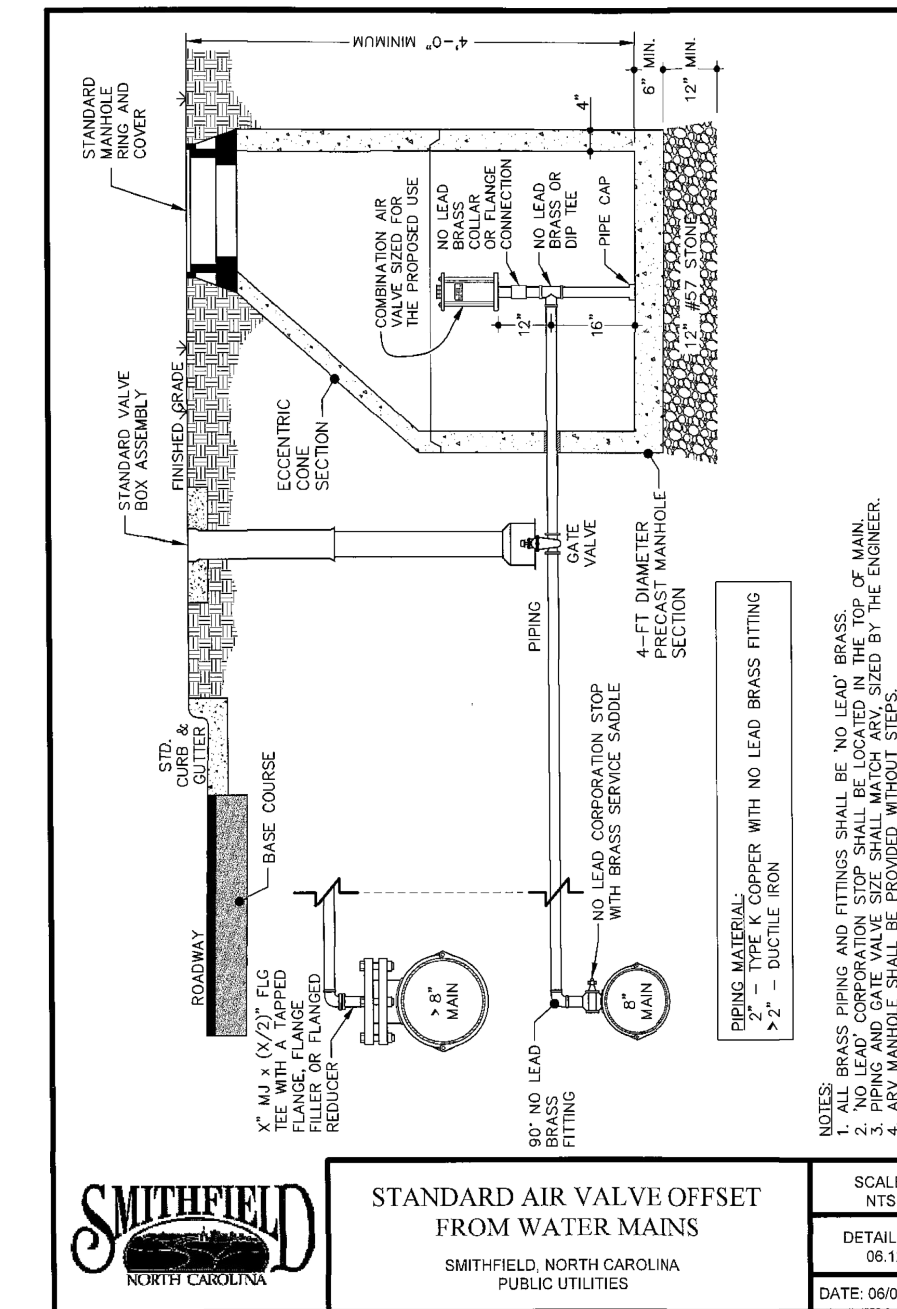
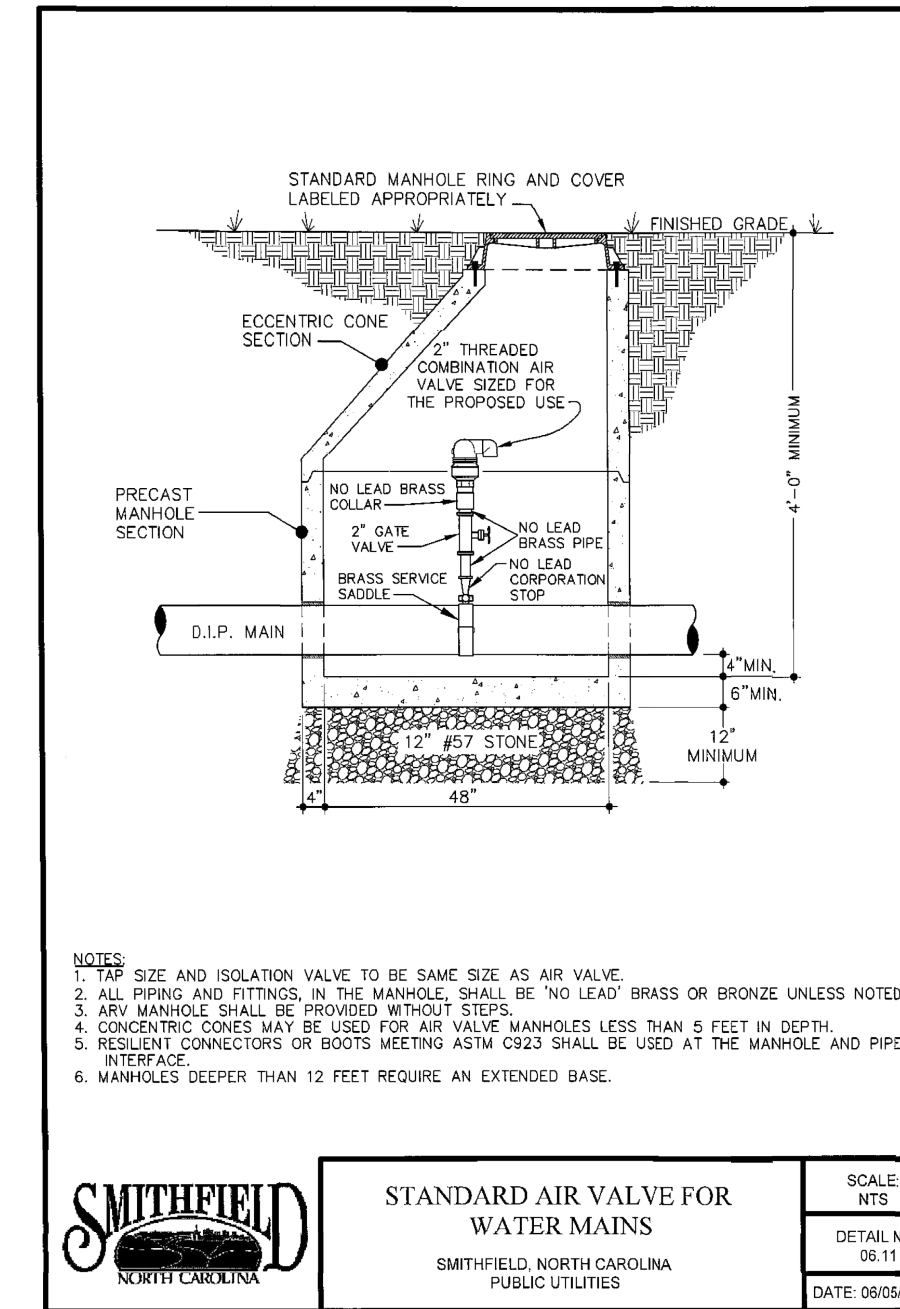
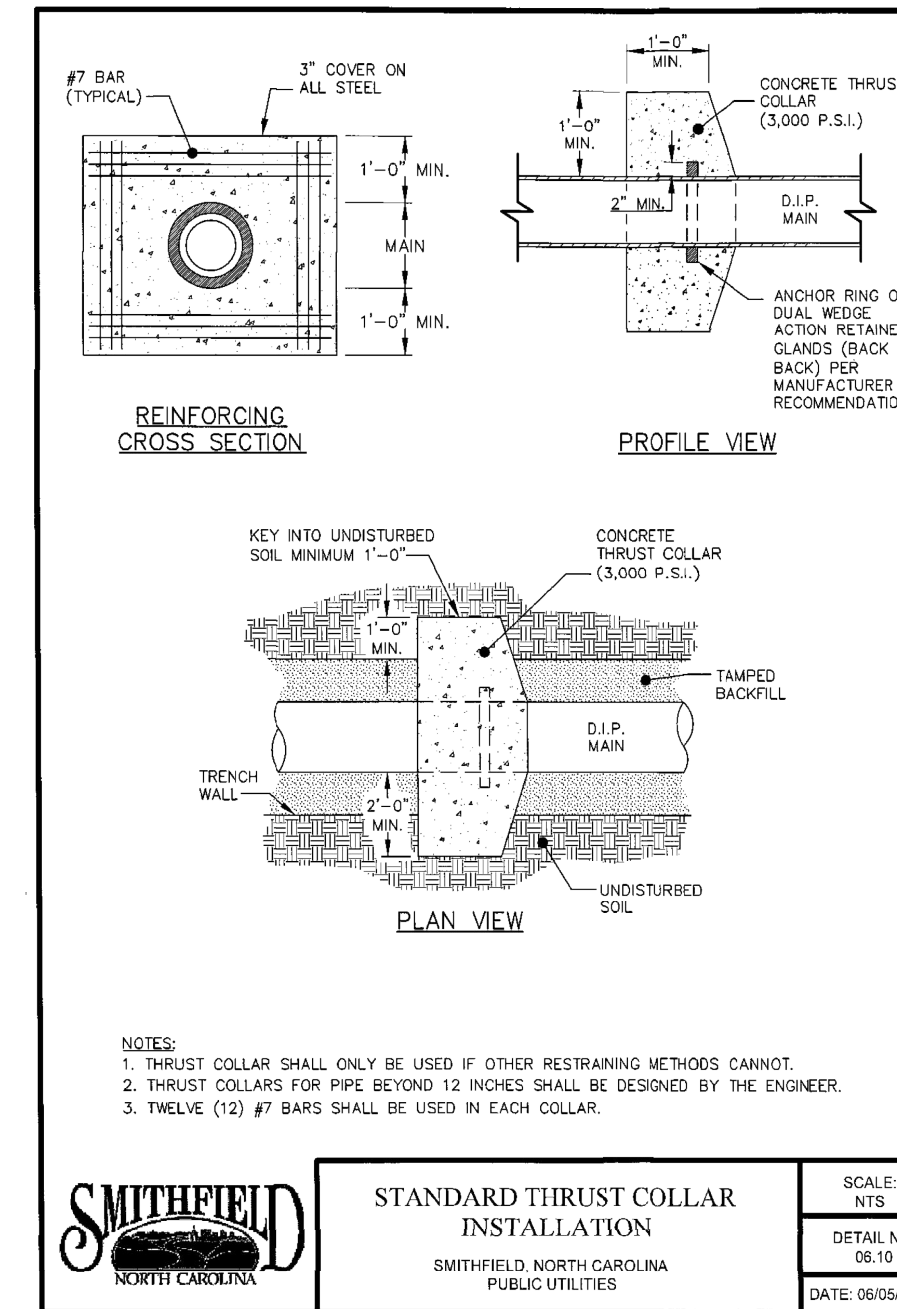
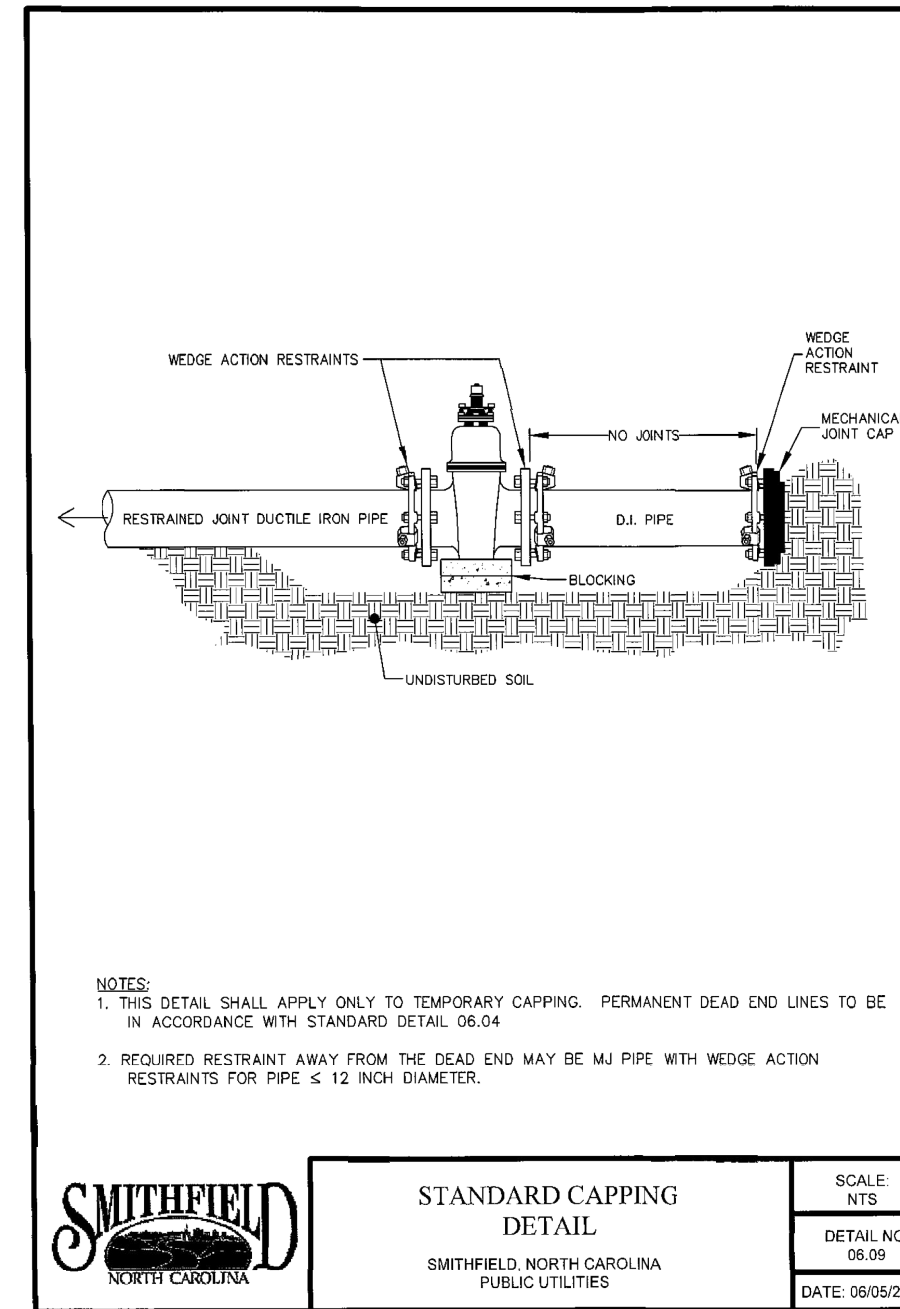
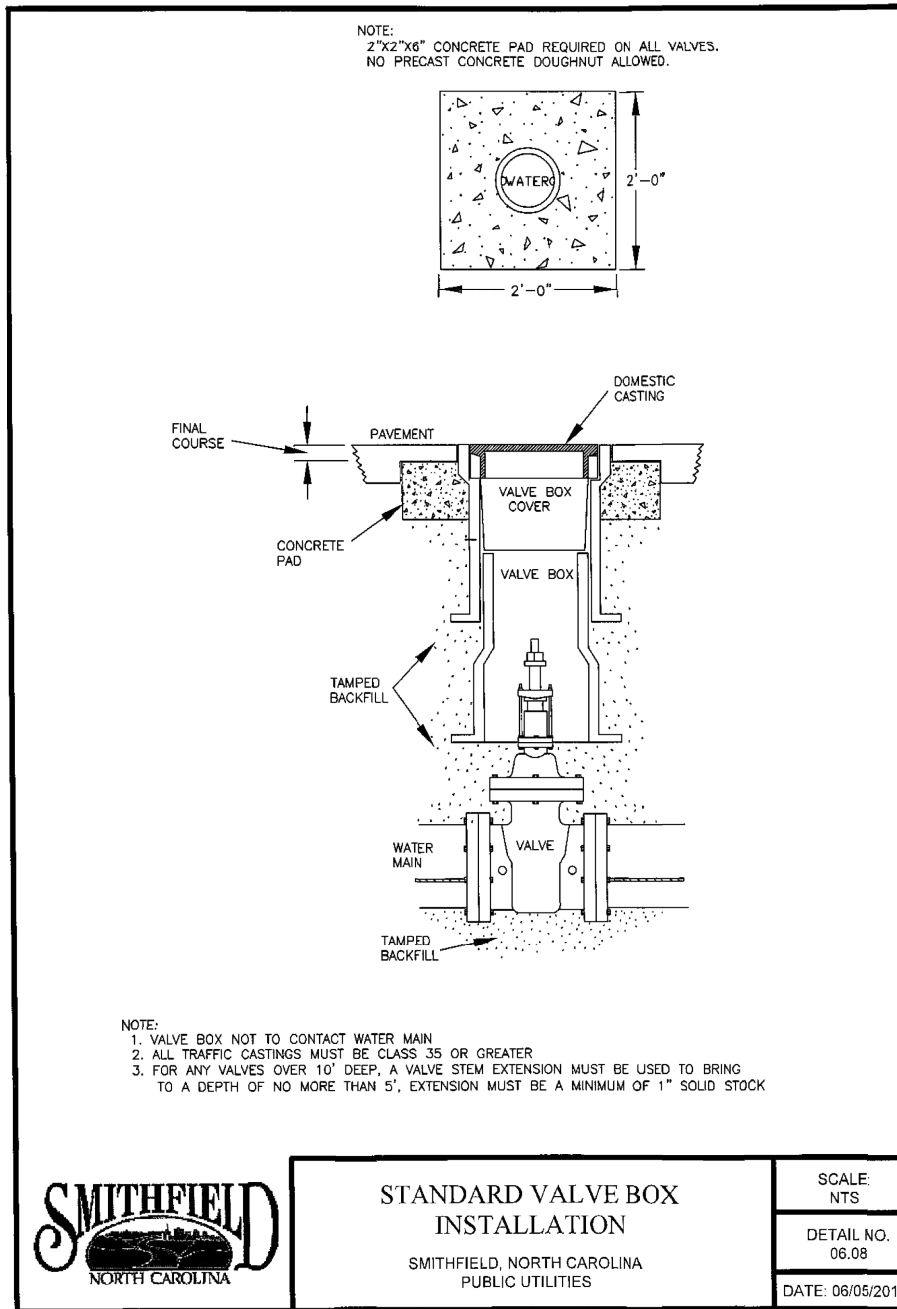
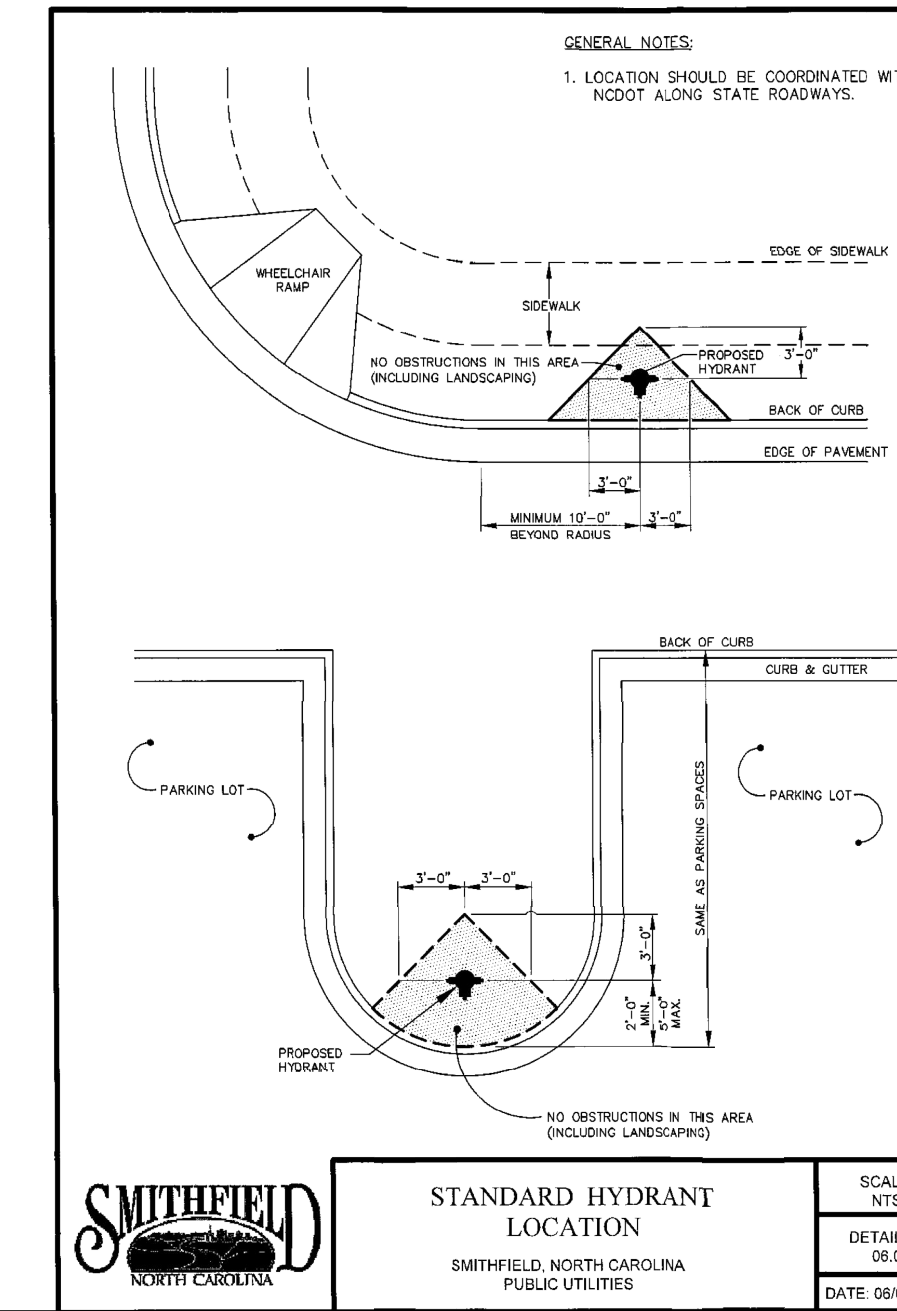
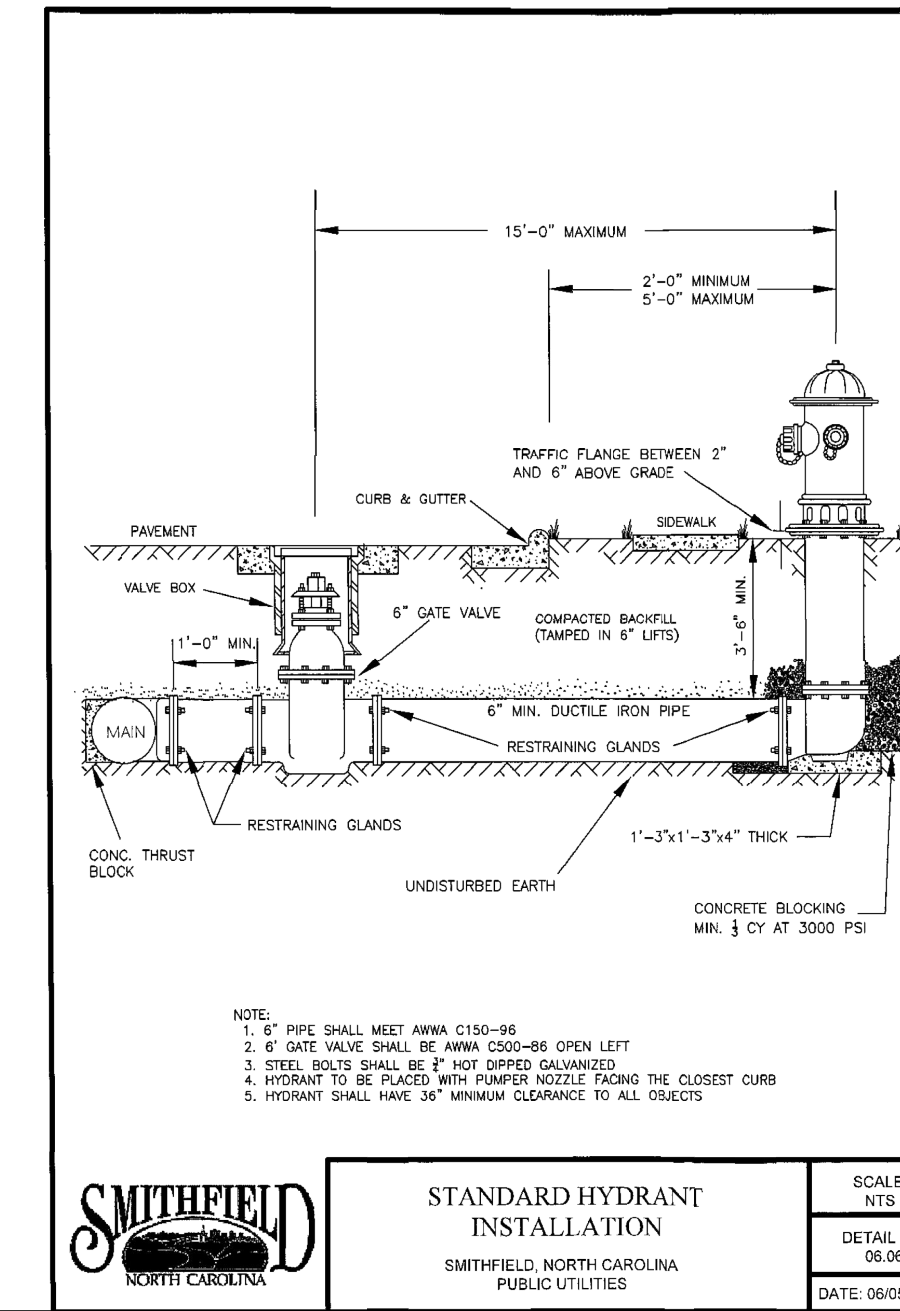
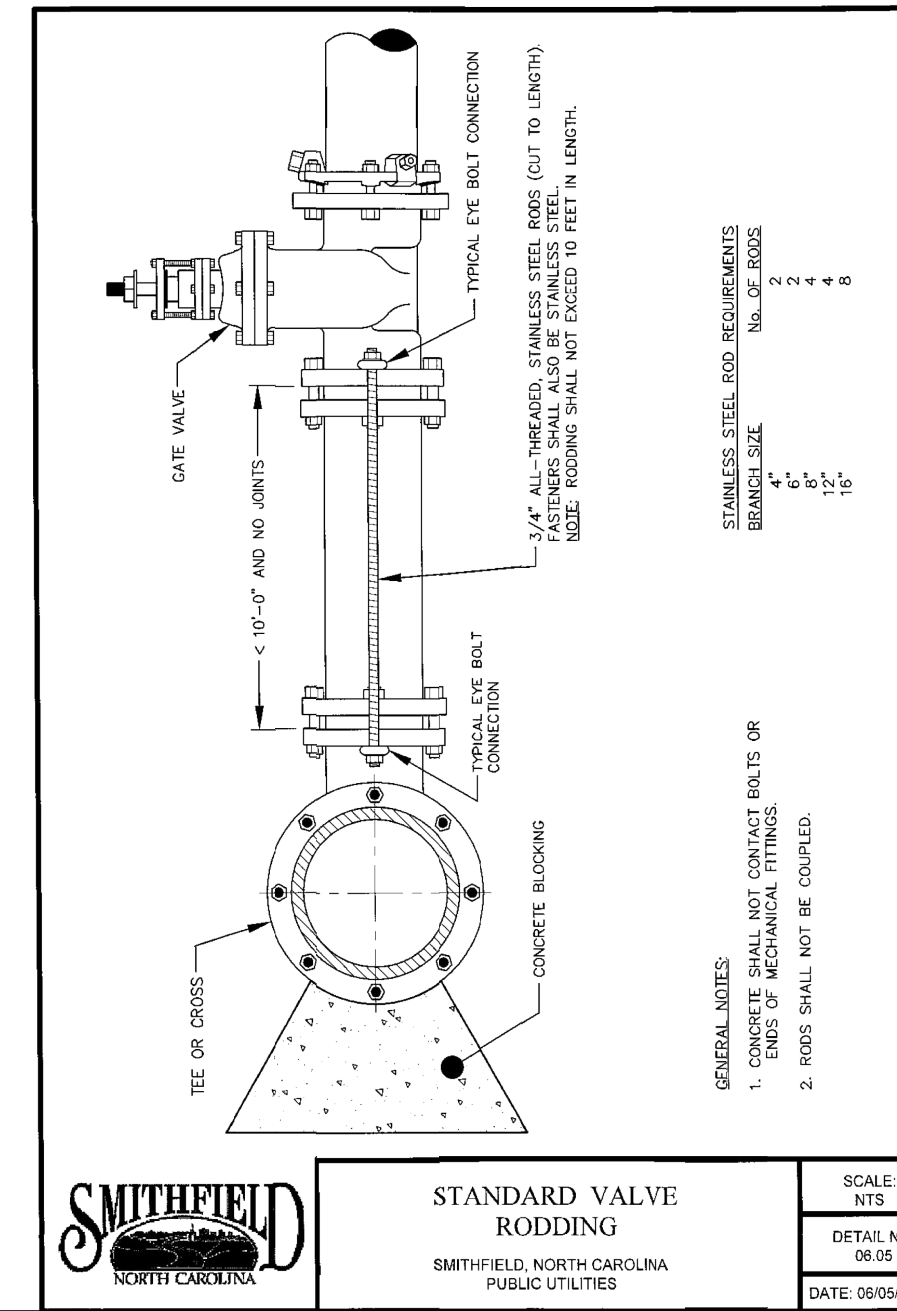
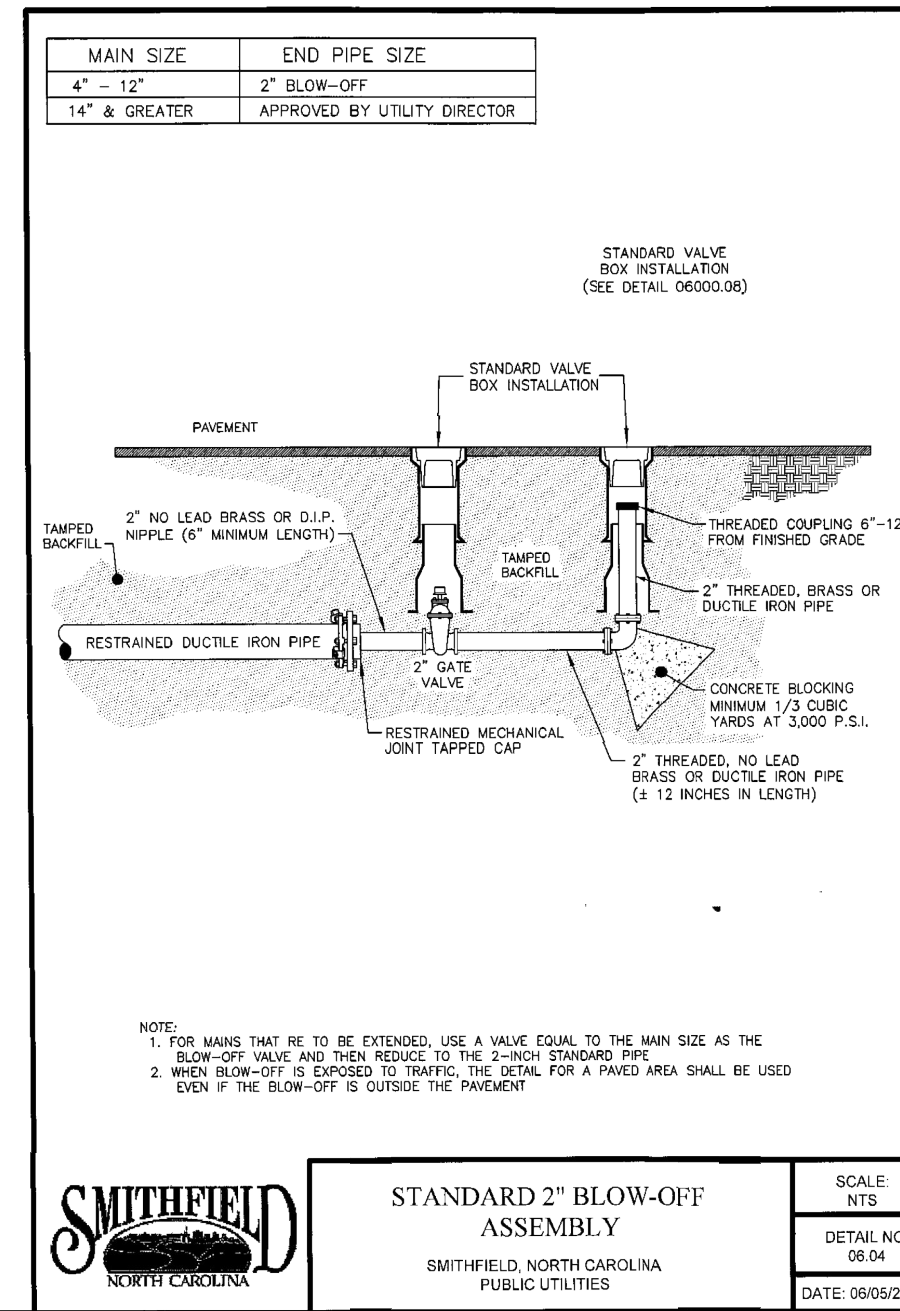
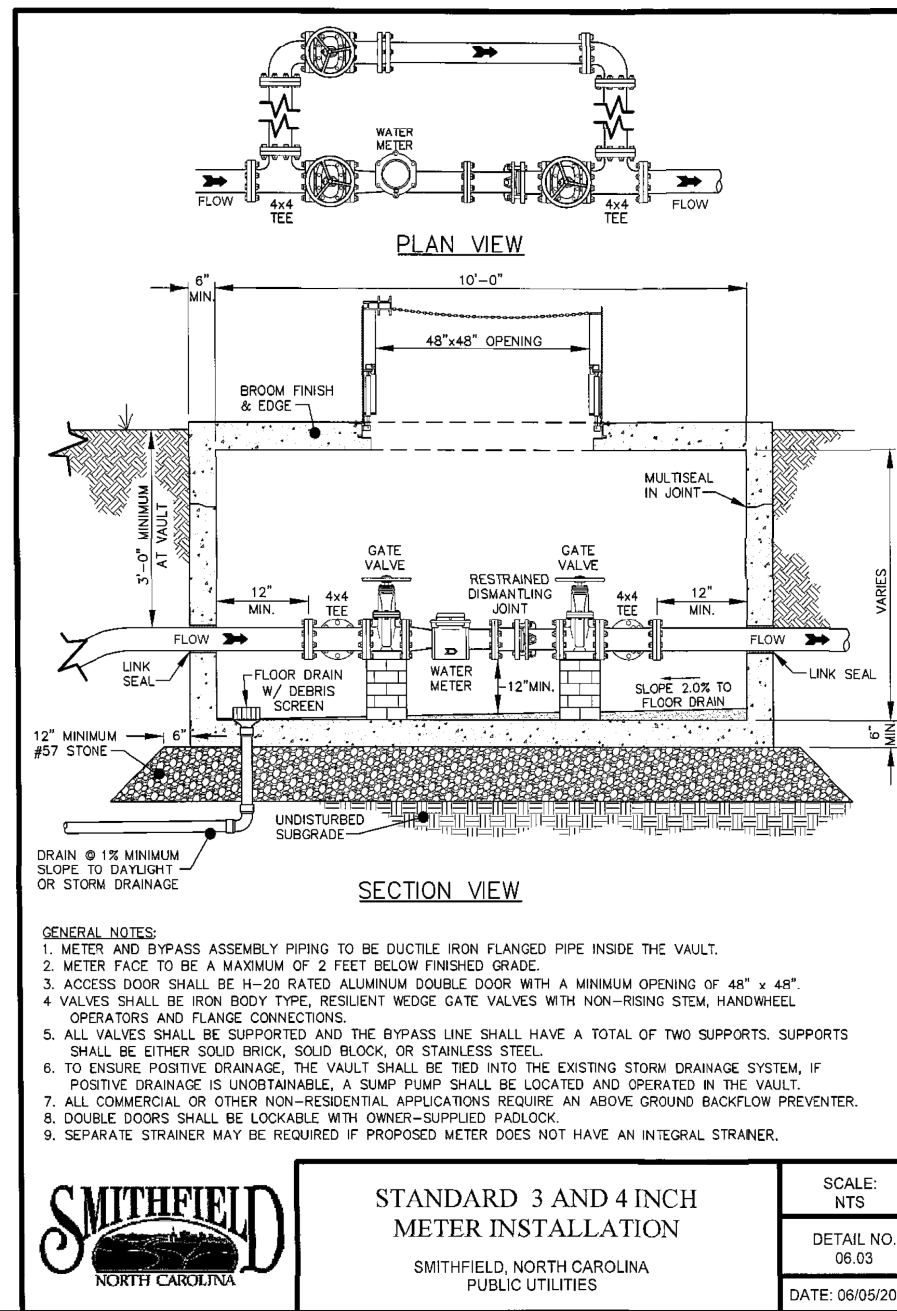
- Create designated hazardous waste collection areas on-site.
- Place hazardous waste containers under cover or in secondary containment.
- Do not store hazardous chemicals, drums or bagged materials directly on the ground.











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**WHITLEY TOWNES - 68 TOWNHOME UNITS**

**SMITHFIELD, JOHNSTON COUNTY, NORTH CAROLINA**

BLN-C-1874

**NORTH CAROLINA PROFESSIONAL ENGINEER**

SEAL 19843

ENGINEER: MICHAEL STOCK

3/31/22

**ENWANEISELSON AND ASSOCIATES**

REVISIONS

FILE NO. 2021-001  
HORZ. SCALE: 1"=20'  
VERT. SCALE: NONE

D-07

**SECTION 7.00  
SANITARY SEWER**

A. DESIGN

LOCATION

1. ALL PUBLIC SANITARY SEWER MAINS SHALL BE INSTALLED IN DEDICATED STREET RIGHT-OF-WAY OR IN DEDICATED UTILITY EASEMENTS. SANITARY SEWER MAINS INSTALLED IN TOWN OF SMITHFIELD MAINTAINED STREETS SHALL BE LOCATED IN THE CENTER OF THE PAVEMENT. MAINS LOCATED WITHIN RIGHT-OF-WAY SHALL BE PLACED OUTSIDE OF PAVEMENT LIMITS, IN ACCORDANCE WITH NCOTD STANDARDS.
2. MINIMUM DEPTHS OF PUBLIC SANITARY SEWER EASEMENTS SHALL BE 30 FEET FOR ALL MAIN SIZES UP TO 24" FOR SANITARY SEWER MAINS GREATER THAN 24" THE EASEMENT SHALL BE 40 FEET. SEE SECTION 2.10 FOR LANDSCAPE PLANTINGS WITHIN UTILITY EASEMENTS.
3. SEWER MAINS SHALL BE CENTERED WITHIN THEIR EASEMENTS UNLESS OTHERWISE DETERMINED BY THE TOWN ENGINEER.
4. PROPOSED SANITARY SEWER PARALLELING A CREEK SHALL BE DESIGNED TO A PROPER DEPTH TO ALLOW LATERAL CONNECTIONS SUCH THAT ALL CREEK CROSSINGS WILL BE BELOW STREAM BED ELEVATION UNLESS APPROVED BY THE TOWN ENGINEER. THE TOP OF THE SEWER MAIN SHALL HAVE AT LEAST THREE (3) FEET OF COVER BETWEEN THE MAIN AND THE STREAM BED. WHERE SUFFICIENT COVER CANNOT BE ACHIEVED, THE SEWER MAIN MUST BE MADE OF DUCTILE IRON PIPE WITH RESTRICTION JOINTS EQUIVALENT TO WATER MAIN STANDARDS. NO CROSSINGS WILL BE PERMITTED FOR LESS THAN ONE (1) FOOT OF COVER.
5. SANITARY SEWER MAINS SHALL NOT BE INSTALLED UNDER ANY PART OF WATER IMPROVEMENTS.
6. THE FOLLOWING MINIMUM SEPARATIONS MUST BE MAINTAINED:
  - a) ANY PRIVATE OF PUBLIC WATER SUPPLY SOURCE - 100 FEET
  - b) ANY OTHER STREAM, LAKE, OR IMPROVEMENT - 10 FEET
 WHERE THE REQUIRED MINIMUM SEPARATION CANNOT BE MAINTAINED, DUCTILE IRON PIPE WITH JOINTS EQUIVALENT TO WATER MAIN STANDARDS MUST BE USED. THE MINIMUM SEPARATIONS SHALL NOT BE LESS THAN 50 FEET FROM A PRIVATE WELL OR A PUBLIC WATER SUPPLY SOURCE.
7. SANITARY SEWER LINES SHALL BE EXTENDED ALONG NATURAL DRAINAGE COURSES TO THE ADJACENT PROPERTY LINES.

SMITHFIELD NORTH CAROLINA

STANDARD DETAIL AND SPECIFICATIONS MANUAL  
SMITHFIELD, NORTH CAROLINA  
PUBLIC UTILITIES

SCALE: NTS  
DETAIL NO: 07.01.P1  
DATE: 04/03/2018

SIZE

1. THE MINIMUM SIZE OF A PUBLIC GRAVITY SANITARY SEWER MAIN SHALL BE 8".

2. MAJOR INTERCEPTORS SHALL BE SIZED IN ACCORDANCE WITH THE MOST CURRENT TOWN OF SMITHFIELD LONG RANGE DEVELOPMENT PLAN. NEW SEWER SYSTEMS SHALL BE SIZED IN ACCORDANCE WITH THE FOLLOWING FLOW FACTORS:

LAND USE	FLOW FACTOR
RESIDENTIAL	120 GPD/BEDROOM (MINIMUM 2 BEDROOMS)
OFFICE & INSTITUTIONAL	0.09 GPD/SQ.FT. BLDG. SPACE
COMMERCIAL	0.12 GPD/SQ.FT. BLDG. SPACE
INDUSTRIAL	0.20 GPD/SQ.FT. BLDG. SPACE

FLOW FACTORS NOT LISTED HEREIN SHALL BE IN ACCORDANCE WITH THE FACTORS RECOMMENDED BY THE NCDCO.

THESE FIGURES COVER NORMAL INFILTRATION; HOWEVER, AN ADDITIONAL ALLOWANCE SHALL BE MADE WHERE CONDITIONS WARRANT.

3. FOR EXISTING SEWER SYSTEMS AN ADDITIONAL ALLOWANCE SHALL BE MADE TO THE ABOVE FLOW FACTORS WHERE THE EXISTING FLOW EXCEEDS THESE VALUES AND IMMEDIATE REMEDIAL MEASURES ARE NOT PROPOSED.

4. THE RATIO OF PEAK TO AVERAGE DAILY FLOW SHALL BE 2.5.

5. SANITARY SEWER MAINS SHALL BE DESIGNED TO CARRY THE PROPOSED PEAK FLOW AT NO MORE THAN 1/2 FULL. THE MINIMUM VELOCITY FOR SANITARY SEWER LINES IS 2.0 FPS.

6. THE MINIMUM GRADES FOR PUBLIC SANITARY SEWER SHALL BE AS FOLLOWS:

MAIN SIZE (IN)	MINIMUM SLOPE (%)
8"	0.50
10"	0.40
12"	0.28
15"	0.24
18"	0.12
21"	0.08
24"	0.08
30"	0.08

THE MINIMUM SLOPE FOR THE UPSTREAM REACH OF A SANITARY SEWER LINE SHALL BE 1.00%, REGARDLESS OF LINE SIZE.

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7. THE MAXIMUM GRADE FOR SANITARY SEWER SHALL BE 10% THE MAXIMUM VELOCITY IN SANITARY SEWERS IS 15 FT/SEC. THESE LIMITS MAY EXCEED WITH THE APPROVAL OF THE TOWN ENGINEER AND THE INCORPORATION OF THE FOLLOWING PROVISIONS:

- a. ALL SEWERS OF GREATER THAN 1% SLOPE SHALL BE DUCTILE IRON PIPE.
- b. CONCRETE ANCHORS SHALL BE INSTALLED ON ALL SEWERS OF GREATER THAN 10% SLOPE AT THE FOLLOWING SPACINGS:
  1. NOT OVER 36" CENTER TO CENTER ON GRADES FROM 10% TO 25%
  2. NOT OVER 24" CENTER TO CENTER ON GRADES FROM 25% TO 40%
  3. NOT OVER 16" CENTER TO CENTER ON GRADES OVER 40%
- c. SEWER EXTENSIONS SHOULD BE DESIGNED FOR PROJECTED FLOWS.
- d. PIPE DIAMETER CHANGES SHALL OCCUR IN A MANHOLE WITH AN INVERT OF THE LARGER PIPE LOWERED SUFFICIENTLY TO MAINTAIN THE SAME ENERGY GRADIENT.

8. ALL RESIDENTIAL SUBDIVISION LOTS SHALL BE SERVED BY GRAVITY SEWER UNLESS OTHERWISE APPROVED BY THE TOWN ENGINEER. IF A PUMP IS APPROVED, IT SHALL BE PRIVATE MAINS. PRIVATE MAINS SHALL BE INSTALLED WITHIN THE RESIDENTIAL LOT, AND MUST HAVE A NOTE ON THE RECORDED PLAN INDICATING A PRIVATE PUMP MAY BE REQUIRED TO SERVE THAT LOT WITH SANITARY SEWER SERVICE.

INSTALLATION

1. SANITARY SEWER MAINS SHALL BE DEEP ENOUGH TO SERVE THE ADJOINING PROPERTY AND ALLOW FOR SUFFICIENT SLOPE IN LATERAL LINES. ALL SANITARY SEWER MAINS SHALL HAVE THE FOLLOWING MINIMUM COVERS:
  - a. FOUR (4) FEET FROM THE TOP OF THE PIPE TO THE FINISHED SUBGRADE WHEN UNDER A ROADWAY.
  - b. THREE (3) FEET FROM THE TOP OF THE PIPE TO THE FINISHED GRADE OUTSIDE A ROADWAY.
 THE ABOVE REQUIREMENTS MAY BE WAIVED AT THE DISCRETION OF THE TOWN ENGINEER, IN WHICH CASE DUCTILE IRON PIPE SHALL BE INSTALLED.
2. ALL CONSTRUCTION RELATING TO THE UTILITY IMPROVEMENTS WHICH WILL MAINTAINED BY THE TOWN MUST BE PERFORMED BY A CONTRACTOR LICENSED FOR UTILITIES IN THE STATE OF NORTH CAROLINA.
3. SEWER MAINS FROM 14 TO 20 FEET DEEP SHALL REQUIRE SPECIAL BEDDING IN ACCORDANCE WITH STANDARD DETAILS.

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4. SEWERS OVER TWENTY (20) FEET DEEP SHALL REQUIRE DUCTILE IRON PIPE FOR THE ENTIRE RUN BETWEEN MANHOLES.

5. PIPE TRENCH EXCAVATION AND BACKFILLING SHALL BE PERFORMED IN ACCORDANCE WITH SECTION 5.03 OF THESE SPECIFICATIONS.

6. TRANSITIONS OF PIPE MATERIAL SHALL OCCUR ONLY AT MANHOLES.

7. SANITARY SEWERS SHALL BE LAID TEN (10) FEET LATERALLY EDGE TO EDGE FROM EXISTING OR PROPOSED WATER MAINS UNLESS THE TOP OF THE SEWER MAIN IS AT LEAST TWENTY (20) INCHES BELOW THE BOTTOM OF THE WATER MAIN AND THERE IS A HORIZONTAL SEPARATION OF AT LEAST THREE (3) FEET FROM THE CLOSEST EDGE OF THE PIPE.

8. WHERE SANITARY SEWERS CROSS BENEATH WATER MAINS WITH A VERTICAL SEPARATION OF FIFTEEN (15) INCHES, OR LESS, OR WHERE WATER MAINS CROSS UNDER SEWER MAINS, THE ENTIRE LEG OF SEWER LINE SHALL BE DUCTILE IRON PIPE. THE WATER LINE PIPE SHALL BE CENTERED AT THE POINT OF CROSSING AND SHALL CROSS SANITARY SEWER LINES AT AN APPROXIMATE NINETY (90) DEGREE ANGLE.

9. SANITARY SEWERS SHALL HAVE THE TOP OF THE PIPE AT LEAST TWELVE (12) INCHES BELOW THE BOTTOM OF THE STORM SEWER PIPE WITH THE VERTICAL SEPARATION BETWEEN THE CLOSEST EDGES OF THE TWO PIPES IS THREE (3) FEET OR LESS. WHERE SANITARY AND STORM SEWERS CROSS WITH A VERTICAL SEPARATION OF LESS THAN TWELVE (12) INCHES THE ENTIRE LEG OF SANITARY SEWER SHALL BE DUCTILE IRON PIPE WITH JOINTS EQUIVALENT TO WATER MAIN STANDARDS.

10. THERE SHALL BE A MINIMUM FIVE (5) FOOT HORIZONTAL SEPARATION BETWEEN PARALLEL GRAVITY AND/OR FORCE MAINS.

11. SEWER LINE EASEMENTS SHALL BE GRADED SMOOTH, FREE FROM ROCKS, BouldERS, ROOTS, STUMPS, AND OTHER DEBRIS AND SEEDS & MULCH-UPON THE COMPLETION OF CONSTRUCTION.

12. THE DOWNSTREAM MANHOLES OF A SANITARY SEWER LINE EXTENSION UNDER CONSTRUCTION SHALL BE PLUGGED TO PREVENT THE INTRUSION OF GROUNDWATER, RUNOFF AND SEDIMENT INTO THE SANITARY SEWER SYSTEM. ALL WATER UPSTREAM OF PLUG SHALL BE REMOVED FROM THE SANITARY SEWER LINE AND ALL SEDIMENT AND SOLIDS SHALL BE REMOVED AND PROPERLY DISPOSAL OF BY THE CONTRACTOR. PLUG SHALL NOT BE REMOVED UNTIL THE LINE HAS BEEN INSPECTED BY THE TOWN TO ENSURE THAT ALL POSSIBLE POINTS OF INFILTRATION OR SEEPAGE HAVE BEEN SECURED.

MANHOLES

1. ALL MANHOLE CONE SECTIONS SHALL BE THE ECCENTRIC TYPE.
2. MANHOLES SHALL BE SPACED AT A MAXIMUM DISTANCE OF 400 FEET APART FROM CENTER OF MANHOLE TO CENTER OF MANHOLE.
3. MANHOLES FOR SEWERS UNDER 21 INCHES IN DIAMETER SHALL BE A MINIMUM OF FOUR (4) FEET IN DIAMETER. MANHOLES FOR SEWERS LARGER THAN 21 INCHES IN DIAMETER SHALL BE FIVE (5) FEET IN DIAMETER. MANHOLES WITH INSIDE DROPS SHALL BE A MINIMUM OF FIVE (5) FEET IN DIAMETER.

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4. MANHOLES SHALL BE INSTALLED AT EACH DEFLECTION OF THE LINE AND/OR GRADE. IN SANITARY SEWERS, THE INVERT SHALL BE SMOOTH AND UNIFORM IN SHAPE CONFORM TO THE SHAPE AND SLOPE OF THE ENTERING SANITARY SEWER MAIN. CENTERLINE INVERTS OF THE PIPES IN MANHOLES SHALL BE PROVIDED WITH THE INVERT IN ELEVATION COMPUTED AS PER THE ENTERING SEWER LINE SLOPE. THERE SHALL BE A MINIMUM DROP OF 0.2" ACROSS THE MANHOLE TO THE ENTERING SEWER LINE OR THRU OUT ANY DEVIATION FROM THIS DESIGN. THE APPROVAL OF THE PUBLIC UTILITIES DIRECTOR.

MANHOLE FLOW PADS SHALL BE CONSTRUCTED OF SLICK SIDED RED BRICK OR PRECAST CONCRETE. THE INVERT SHALL BE SMOOTH AND UNIFORM IN SHAPE ALONG THE ENTIRE LENGTH. MANHOLES SHALL HAVE A MINIMUM OF FOUR (4) FEET IN DIAMETER, UNLESS THERE IS AN INSIDE DROP. FOR INSIDE DROP MANHOLES, A MINIMUM DIAMETER OF FIVE (5) FEET SHALL BE USED.

5. INSIDE DROP MANHOLES, THE LAST LEG OF THE INCOMING SEWER MAIN SHALL BE 100% IRON.

6. MANHOLES NOT LOCATED IN ROADWAYS SHALL HAVE A TOP ELEVATION BETWEEN 18" AND 36" ABOVE FINISHED GRADE.

7. MANHOLE TOPS SHALL BE ELATED TWO (2) FEET ABOVE THE FUTURE 500-YEAR FLOOD PLAN, PER INCODE REQUIREMENTS, OR IN AREAS WITH WATERHOOT FRAMES AND COVERS.

8. MANHOLES LOCATED WITHIN THE 100-YEAR FLOODPLAIN, OR IN EQUIPPED WITH HIGH GROUND WATER SHALL BE WATERPROOFED AT THE JOINTS.

B. MATERIALS

MATERIALS TO BE UTILIZED SHALL BE THOSE AS SPECIFIED HEREIN, UNLESS AN APPROVED EQUAL IS AUTHORIZED BY THE PUBLIC UTILITIES DIRECTOR.

EACH LENGTH OF PIPE TO BE USED SHALL HAVE PLAINLY AND PERMANENTLY MARKED THEREON THE FOLLOWING INFORMATION, AS WELL AS, ANY ADDITIONAL INFORMATION SPECIFICALLY NOTED IN THE SECTIONS BELOW:

- a) PIPE CLASS DESIGNATION
- b) MANUFACTURER'S NAME OR TRADEMARK
- c) NOMINAL PIPE SIZE

ALL NEW CONSTRUCTION FOR SEWER MAINS SHALL BE MADE OF EITHER DUCTILE IRON PIPE (DIP) OR POLYVINYL CHLORIDE PIPE (PVC). NO OTHER MATERIAL WILL BE ALLOWED WITHOUT WRITTEN APPROVAL FROM THE PUBLIC UTILITIES DIRECTOR.

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DUCTILE IRON PIPE (DIP)

DUCTILE IRON PIPE SHALL BE DESIGNED AND MANUFACTURED IN ACCORDANCE WITH AWWA C150 AND C151 FOR A LAYING CONDITION TYPE 2 AND A WORKING PRESSURE AS FOLLOWS:

3" - 12"	350 PSI
15" - 21"	250 PSI
24"	200 PSI
GREATER THAN 24"	150 PSI

PIPE JOINTS SHALL BE OF THE PUSH-ON TYPE AS PER AWWA C11. PIPE LINING SHALL BE EPXY COATED PROTECTO A01, OR APPROVED EQUIVALENT, IN ACCORDANCE WITH AWWA C104.

POLYVINYL CHLORIDE PIPE (PVC)

PVC PIPE SHALL BE MADE OF PVC PLASTIC HAVING A CELL CLASSIFICATION OF 12454-B, 12454-C, OR 12454-D WITH A MINIMUM DENSITY OF 90.0000 G/CM<sup>3</sup>. PVC PIPE SHALL HAVE INTEGRAL WALL BELL AND SPIGOT JOINTS FOR THE CONVEYANCE OF DOMESTIC SEWAGE. ALL FITTINGS SHALL BE MADE OF PVC. FITTINGS SHALL BE MANUFACTURED BY PIPE SUPPLIER, OR APPROVED EQUAL, AND HAVE BELL & SPIGOT CONFIGURATIONS COMPATIBLE WITH THAT OF THE PIPE.

ALL PIPE LESS THAN 18 INCHES IN DIAMETER SHALL HAVE A MINIMUM STANDARD DIMENSION RATIO (SDR) OF 35. WHERE LAYING CONDITIONS SO WARRANT, AND IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, LOWER SDR VALUES (STRONGER PIPE) MAY BE REQUIRED.

PVC PIPE 18 INCHES IN DIAMETER AND LARGER MUST BE SPRAL WOUND AS DEFINED IN ASTM F-794. SERIES 45 PIPE STRENGTH SHALL BE EQUAL TO OR EXCEED THAT REQUIRED FOR PIPE LESS THAN 18 INCHES IN SIZE.

INSTALLATION SHALL CONSIST OF CLASS 1 BEDDING MATERIAL PLACED 4 INCHES BELOW THE PIPE BARREL, AND CONTINUING TO A MINIMUM OF THE PIPE SPRING LINE, AS PER ASTM D3231. IN ADDITION, THE INVERT OF THE PIPE SHALL EXCEED A METRIC LOCATION STRIP BURIED IN THE BACKFILL, IN ACCORDANCE WITH STANDARD DETAILS.

C. ADDITIONAL REQUIREMENTS FOR SEMI-RIGID PIPE (PVC)

THE INSTALLATION SHALL SATISFY THE REQUIREMENTS OF THE MANUFACTURER, AND/OR THE FOLLOWING, WHICHEVER IS MORE STRINGENT:

- 1) INSTALLATION OF PVC PIPE SHALL FOLLOW THE RECOMMENDATIONS OF ASTM D-2221 UNDERBORING INSTALLATION OF FLEXIBLE THERMOPLASTIC SEWER PIPE. FOR SEMI-RIGID PIPES BEDDING MATERIAL SHALL BE CLASS 1 IN ANY AREA WHERE THE INVERT WILL BE INSTALLED BELOW EXISTING OR FUTURE GROUND WATER LEVELS, OR WHERE THE TRENCH COULD BE SUBJECT TO UNLOADING. ADDITIONAL CLASS 1 MATERIAL SHALL BE USED FOR BEDDING. REFER TO STANDARD DETAILS FOR EMBEDMENT REQUIREMENTS.

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2) THE MANUFACTURER'S SPECIFICATIONS OR OTHERWISE APPROVED METHOD SHALL BE USED IN DETERMINING THE STIFFNESS CLASS OF THE PIPE TO BE INSTALLED SO AS TO ATTAIN THE REQUIRED DEFLECTION CONTROL. THE CLASS OF THE PIPE MUST BE APPROVED BY THE PUBLIC UTILITIES DIRECTOR.

3) THE MAXIMUM ALLOWABLE DEFLECTION AFTER INSTALLATION SHALL BE LESS THAN 1/8" FOR SEMI-RIGID PIPE. A MANHOLE TEST ON TRUSS PIPE SHALL BE REQUIRED IF THE INSPECTOR FINDS A PROBLEM DURING VISUAL INSPECTION. THE MANHOLE (50%/NO-CO) DEFLECTION TEST MUST BE PERFORMED ON EACH LINE PRIOR TO ACCEPTANCE, AND NO LESS THAN 30 DAYS AFTER INSTALLATION. THE CONTRACTOR SHALL SUPPLY THE MANHOLE USED FOR THIS PERFORMANCE TEST. THE MANHOLE DEVICE SHALL BE CIRCULAR IN SHAPE HAVING NINE (9) POSSIBLE CONTACT POINTS WITH THE PIPE. THE MANHOLE'S LENGTH AND DIAMETER SHALL EQUAL THE DIMENSIONS IN THE FOLLOWING TABLE, AND SHALL BE SUBJECT TO THE INSPECTOR'S APPROVAL.

NOMINAL DIAMETER	MIN. LENGTH	DIAM. MANHOLE
8"	8"	7.50"
10"	10"	9.45"
12"	10"	11.40"
15"	12"	14.31"

4) FOR PVC PIPE, THE PIPE SHALL BE PRODUCED WITH BELL AND SPIGOT END CONSTRUCTION. JOINTING SHALL BE ACCOMPLISHED BY RUBBER GASKET, IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS, UNLESS OTHERWISE DIRECTED BY THE PUBLIC UTILITIES DIRECTOR. EACH PIPE LENGTH SHALL BE CLEARLY MARKED WITH INFORMATION INCLUDING PIPE SIZE, PROFILE NUMBER AND CLASS NUMBER.

5) A MINIMUM TRENCH WIDTH SHALL BE THREE (3) FEET.

6) THE BEDDING (6" MINIMUM) AND EMBEDMENT MATERIALS SHALL BE PER ASTM D3231. THE EMBEDMENT MATERIALS SHALL BE INSTALLED FROM TRENCH WALL TO TRENCH WALL AND FROM FOUR (4) INCHES ABOVE THE INVERT TO A MINIMUM OF SIX (6) INCHES ABOVE THE CROWN OF THE PIPE.

7) THE BEDDING AND EMBEDMENT MATERIAL SHALL BE COMPACTED TO A MINIMUM OF 90% STANDARD PROCTOR DENSITY FOR CLASS 1 MATERIALS.

8) IF HYDRAULIC JACK SHORING IS UTILIZED FOR TRENCH WALLS, WHERE SHORING IS USED, IT SHALL BE KEPT TO THE AREA JUST ABOVE THE TOP OF THE PIPE. THIS WILL ENSURE THE EMBEDMENT MATERIALS AND PIPE WILL NOT BE DISTURBED WHEN REMOVAL IS MADE.

BEDDING AND EMBEDMENT MATERIAL CLASSIFICATIONS SHALL BE DEFINED AS FOLLOWS:

CLASS 1 - ANGULAR, (1/4" TO 3/4") GRADED STONE, INCLUDING A NUMBER OF FILL MATERIALS THAT HAVE REGIONAL SIGNIFICANCE SUCH AS CRUSHED STONE AND CRUSHED GRAVEL.

CLASS 2 - COARSE SANDS AND GRAVEL WITH A MINIMUM PARTICLE SIZE OF 1/2 INCH, INCLUDING VARIOUSLY GRADED SANDS AND GRAVELS CONTAINING SMALL PERCENTAGES OF FINES, GENERALLY GRANULAR AND NON-COHESSIVE, EITHER WET OR DRY. SOIL TYPES GW, GP, SW AND SP ARE INCLUDED IN THIS CLASS.

7.02 FORCE SEWER MAINS

A. MATERIALS

DUCTILE IRON PIPE SHALL BE DESIGNED AND MANUFACTURED IN ACCORDANCE WITH AWWA C150 AND C151 FOR A LAYING CONDITION TYPE 2 AND A WORKING PRESSURE AS FOLLOWS:

3" - 12"	350 PSI
15" - 20" <td>250 PSI</td>	250 PSI
24" <td>200 PSI</td>	200 PSI
> 24" <td>150 PSI</td>	150 PSI

PIPE JOINTS SHALL BE PUSH-ON TYPE AS PER AWWA C11. PIPE LINING SHALL BE EPXY COATED PROTECTO A01 WITH A SEAL COAT OF BITUMINOUS MATERIAL, ALL IN ACCORDANCE WITH AWWA C104.

PVC PIPE SHALL MEET THE REQUIREMENTS OF AWWA C200. PIPE SHALL BE CLASS 150, SDR 10, INTEGRAL BELL WITH STRENGTH EQUAL TO THE PIPE WALL, CAST IRON C, 18 FOOT LENGTH, WITH A SOLID ELASTOMERIC RING.

PVC PIPE FOR FORCE MAINS WITH A DIAMETER OF THREE (3) INCHES OR LESS SHALL BE SDR 21 OF SCHEDULE 40 IN ACCORDANCE WITH ASTM D1785.

PVC PIPE FOR FORCE MAINS WITH A DIAMETER OF THREE (3) INCHES OR LESS SHALL BE SDR 21 OF SCHEDULE 40 IN ACCORDANCE WITH ASTM D1785.

THREE (3) INCH WIDE TAPE.

PVC PIPE WILL REQUIRE THE INSTALLATION OF A DETECTOR TAPE PLACED A MAXIMUM OF TWO (2) FEET BELOW THE COVERING SURFACE. THE DETECTOR TAPE SHALL BE THREE (3) INCH WIDE TAPE.

PIPE FITTINGS SHALL BE DUCTILE IRON DESIGNED AND MANUFACTURED AS PER AWWA C110. SIZES OF FITTINGS UP TO AND INCLUDING 12 INCH SHALL BE DESIGNED FOR AN INTERNAL PRESSURE OF 250 PSI. LARGER SIZE FITTINGS SHALL BE DESIGNED FOR AN INTERNAL PRESSURE OF 1500 PSI. JOINTS FOR FITTINGS SHALL BE MECHANICAL. JOINT AND LINES WITH CEMENT MORTAR WITH A SEAL COAT OF BITUMINOUS MATERIAL, ALL IN ACCORDANCE WITH AWWA C104.

B. INSTALLATION

REACTION BLOOMING FOR ALL FITTINGS OR COMPONENTS SUBJECT TO HYDROSTATIC THRUST SHALL BE SECURELY ANCHORED BY THE USE OF CONCRETE THRUST BLOCKS INSTALLED IN PLACE. THE REACTION AREAS ARE SHOWN IN STANDARD DETAILS. NO CONCRETE SHALL INTERFERE WITH THE REMOVAL OF FITTINGS. MATERIAL FOR REACTION BLOOMING SHALL BE 3000 PSI CONCRETE.

FORCE MAINS SHALL BE INSTALLED WITH A MINIMUM COVER OF THREE (3) FEET MEASURED FROM THE TOP OF THE PIPE TO THE FINISHED SUBGRADE.

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SEWER AIR RELEASE VALVES SHALL BE INSTALLED AT ALL HIGH POINTS OF THE FORCE MAINS IN ACCORDANCE WITH THE STANDARD DETAILS. MANHOLES CONTAINING AIR RELEASE VALVES SHALL BE INSTALLED AT ALL HIGH POINTS OF THE FORCE MAINS. THE THICKNESS OF THE COATING SHALL BE DETERMINED BY THE PUBLIC UTILITIES DIRECTOR.

SEWER FORCE MAINS SHALL BE INSTALLED IN DEDICATED PUBLIC RIGHTS-OF-WAY OR IN DEDICATED UTILITY EASEMENTS. SEE SECTION 2.10 FOR LANDSCAPE PLANTING REQUIREMENTS WITHIN EASEMENTS. THE EASEMENTS SHALL HAVE THE FOLLOWING DIMENSIONS:

LINE SIZE	MINIMUM EASEMENT WIDTH
12" AND UNDER	30'
OVER 12"	30'

FORCE MAIN VALVES SHALL BE SPACED AT APPROPRIATE INTERVALS AS DETERMINED BY THE PUBLIC UTILITIES DIRECTOR, AND SHALL HAVE BOX CAPS MARKED "SEWER". FORCE MAIN VALVES SHALL BE RESISTANT WEDGE GATE TYPE.

THE RECEIVING MANHOLE FOR A FORCE MAIN SHALL RECEIVE AN INTERIOR EPXY COATING WITH A THICKNESS OF 10 MILLS. THE FORCE MAIN SHALL DISCHARGE AT THE INVERT OF THE RECEIVING MANHOLE AND SHALL BE AS CLOSE AS POSSIBLE TO 180 DEGREES FROM THE OUTLET PIPE.

FORCE MAINS SHALL BE APPROPRIATELY IDENTIFIED UPON INSTALLATION SO THEY WILL NOT BE CONFUSED WITH POTABLE WATER LINES. THE PIPE MATERIAL SHALL BE DESIGNATED ON EACH JOINT OF PIPE AS "SEWER".

7.03 MANHOLES

MANHOLES SHALL BE PRECAST CONCRETE. ALL MANHOLES SHALL HAVE ECCENTRIC CONE SECTIONS.

PRECAST CONCRETE MANHOLES SHALL MEET ASTM C478 AS TO DESIGN AND MANUFACTURE. THE STANDARD JOINT SHALL BE SEALED WITH A PLASTIC CEMENT BUTTY MEETING FEDERAL SPECIFICATION. JOINTS SHALL BE SEALED WITH RAIN-NOK, OR A BUTTY RUBBER SEALANT. ALL LIFT HOLES MUST BE PLUGGED WITH NON-SHRINKING GROUT AFTER INSTALLATION. FOR PRECAST CONCRETE MANHOLES, SEE STANDARD DETAILS.

MANHOLE FRAMES AND COVERS SHALL BE CAST OR DUCTILE IRON WITH "SANITARY SEWER" STAMPED ON THE COVER AND TWO 1-INCH, PERFORATED HOLES. CASTINGS SHALL BE MACHINED TO GIVE EVEN AND CONTINUOUS BEARING TO THE FULL LENGTH OF THE FRAME. CASTINGS SHALL BE FREE OF POROSITY AND BLOW HOLES, AND SHALL RECEIVE ONE COAT OF EPXY PAINT. PAINT SHALL BE KEPT OFF OF BOLT THREADS AND SURFACES SHALL BE THOROUGHLY WIRE BRUSHED BEFORE PAINTING. MANHOLE FRAMES SHALL BE ENGAGED IN A CONCRETE COLLAR EIGHTEN (18) INCHES BY SIX (6) INCHES OF JAWED REINFORCING BARS. THE MANHOLE SHALL BE COVER FLUSH TO THE TOP OF THE PAVEMENT. PER STANDARD DETAILS, MANHOLES LOCATED OUTSIDE OF THE PAVEMENT SHALL BE AT LEAST TWELVE (12) INCHES ABOVE THE FINISHED GRADE.

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WATERHOOT MANHOLE FRAMES AND COVERS SHALL HAVE HEPBRENCE GASKET, BRONZE TIGHTENING BOLT, MACHINED BEARING SURFACES AND CHANNEL IRON LOCKING BAR. THE COVER SHALL BE STANCHIONED TO THE FRAME WITH STANCHIONS WHICH FULLY TIGHTENED BOLT HEAD IS FLUSH WITH THE TOP OF THE COVER. CASTINGS SHALL BE FREE OF POROSITY AND BLOW HOLES, AND SHALL RECEIVE ONE COAT OF EPXY PAINT. PAINT SHALL BE KEPT OFF OF BOLT THREADS AND SURFACES SHALL BE THOROUGHLY WIRE BRUSHED BEFORE PAINTING.

MANHOLE STEPS SHALL BE FURNISHED WITH THE PRECAST SECTIONS. STEPS SHALL BE POLYPROPYLENE MATERIAL, REINFORCED WITH A 1/2" REINFORCING ROD. MANHOLE STEPS SHALL BE DESIGNED FOR A VERTICAL LOAD OF 400 POUNDS AND A HORIZONTAL (OUT) LOAD OF 1,000 POUNDS. STEPS SHALL BE SET SIXTEEN (16) INCHES APART ON CENTER. HOLES FOR THE INSTALLATION OF MANHOLE STEPS SHALL NOT PROJECT THROUGH THE MANHOLE WALL. THERE SHALL BE A MINIMUM OF ONE (1) INCH WALL THICKNESS FROM THE DEEPEST PENETRATION OF THE STEP INSTALLATION HOLE AND THE OUTSIDE WALL. STEPS SHALL BE AT LEAST TEN (10) INCHES CLEAR WITHIN AND SHALL PROJECT AT LEAST FOUR (4) INCHES FROM THE WALL INTO WHICH IT IS EMBEDDED. STEPS SHALL NOT BE LOCATED OVER THE INFLUENT OR EFFLUENT PIPES AND SHALL BE INSTALLED ALONG A VERTICAL MANHOLE WALL FORM THE SHELVE TO THE TOP OF THE COVER.

ALL MANHOLES SHALL HAVE A MIN. 3,000 PSI CONCRETE BOTTOMS RESTING ON A MINIMUM OF 6 INCHES OF #7 STONE. SEWER MAINS SHALL ENTER AND EXIT MANHOLES THROUGH THE MANHOLES. INVERTS SHALL BE CONSTRUCTED WITH A WIDTH AND HEIGHT EQUAL TO 1/2 THAT OF THE EFFLUENT PIPE AND SHALL BE 50 BRUSHED AND TROWELED THAT A MINIMUM ENERGY LOSS OCCURS IN THE MANHOLE. AT EACH INLET AND OUTLET OF LINE, EIGHT (8) INCHES, OR GREATER, WATERSTOP LINES ARE TO BE CONNECTED TO THE MANHOLES BY MEANS OF COMPRESSION CONNECTIONS (FLEXIBLE SERVICES) CAST INTO THE MANHOLE SECTION. FLEXIBLE CONNECTIONS ARE TO BE MANUFACTURED OF HIGH QUALITY RUBBER OR SYNTHETIC RUBBER AND ALL STRAP CLAMP OR DRAW BOLTS ARE TO BE INSTALLED FROM STAINLESS STEEL.

7.03 SERVICE CONNECTIONS

A. MATERIALS

PVC PIPE SHALL BE SCHEDULE 40 OR GREATER SUPPLIED IN EIGHTEEN (18) FEET LENGTHS. THE BENT SHALL BE JOINED BY ELASTOMERIC COUPLERS.

DUCTILE IRON PIPE SHALL BE USED FOR SANITARY SEWER WITH SERVICES WITH LESS THAN THREE (3) FEET OF COVER OR WITH GREATER THAN FIFTEEN (15) FEET OF COVER.

SERVICE SADDLES FOR PVC SERVICES SHALL BE OF THE SAME MATERIAL AS THE MAIN. SOLVENT WELDED AND FASTENED WITH DOUBLE STAINLESS STEEL BANDS SHOWN IN THE STANDARD DETAILS.

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B. INSTALLATION

INDIVIDUALLY OWNED STRUCTURES SHALL REQUIRE INDIVIDUAL SEWER TAPS TO PUBLIC SEWER. ALL SERVICE CONNECTIONS TO EXISTING SANITARY SEWER MAINS SHALL BE MADE BY OR UNDER THE SUPERVISION OF THE TOWN OF SMITHFIELD PUBLIC UTILITIES DEPARTMENT. SERVICE CONNECTIONS TO NEW LINES ARE THE RESPONSIBILITY OF THE DEVELOPER/OWNER AND SHALL BE MADE BY A NORTH CAROLINA LICENSED UTILITY CONTRACTOR. SERVICE TAPS INTO MAINS SHALL BE MADE ON THE TOP QUARTER OF THE MAIN WITH THE WYE SADDLE ANGLED WITH THE DIRECTION OF FLOW IN THE MAIN.

SERVICE LINES BETWEEN THREE (3) AND TWELVE (12) FEET IN DEPTH DO NOT REQUIRE SPECIAL BEDDING. ALL SERVICE LINES BETWEEN TWELVE (12) AND FIFTEEN (15) FEET IN DEPTH SHALL REQUIRE CLASS 1 BEDDING FROM FOUR (4) INCHES BELOW THE PIPE TO FOUR (4) INCHES ABOVE THE PIPE. SERVICE LINES GREATER THAN FIFTEEN (15) FEET, OR LESS THAN THREE (3) FEET IN DEPTH SHALL BE DUCTILE IRON PIPE.

SERVICE CONNECTIONS TO THE MAIN LINES SHALL BE PERPENDICULAR TO THE MAIN LINE TO THE EDGE OF THE RIGHT-OF-WAY OR EASEMENT LINE. FOUR (4) INCH LINES SHALL HAVE A MINIMUM SLOPE OF 1.0 FT/100 FT. AND SIX (6) INCH LINES SHALL HAVE A MINIMUM SLOPE OF 0.60 FT/100 FT. CLEANOUTS SHALL BE REQUIRED ON ALL SEWER SERVICES WITH A MINIMUM SPACING OF 75 FEET ON FOUR (4) INCH SERVICES AND 100 FEET ON SIX (6) INCH SERVICES. A CLEANOUT SHALL BE PLACED ON ALL SERVICE LINES AT THE RIGHT-OF-WAY OR AT THE EDGE OF THE EASEMENT. ALL CLEANOUTS SHALL EXTEND A MINIMUM OF SIX (6) INCHES ABOVE FINISHED GRADE TO MEET THE OPTIONAL CLEANOUT METHOD REQUIREMENTS IN ACCORDANCE WITH STANDARD DETAILS. SEWER CLEANOUTS LOCATED IN PAVED AREAS MUST HAVE CAST IRON INSETS, CAST IRON FITTINGS AND BRASS CAPS.

ALL SIX (6) INCH OR GREATER SERVICE CONNECTIONS SHALL BE INTO A MANHOLE UNLESS OTHERWISE APPROVED BY THE PUBLIC UTILITIES DIRECTOR.

ALL SERVICE LINES WHICH ARE CONNECTED INTO MANHOLES SHALL BE INSTALLED ON THE MANHOLE BENCH, OR HAVE LESS THAN THIRTY (30) INCHES OF CLEARANCE TO THE INVERT OF THE FLOW LINE. SERVICE LINE CONNECTIONS SHALL NOT BE INSTALLED THROUGH MANHOLE CONE SECTIONS OR AT MANHOLE JOINTS. THE USE OF WYES IN THE LINE IS PREFERRED OVER THE USE OF SERVICE SADDLES.

7.05 TESTING AND INSPECTION

ALL MATERIALS USED MUST HAVE PRELIMINARY INSPECTION BY THE CONSTRUCTION INSPECTOR BEFORE MATERIALS ARE USED FOR THE CONSTRUCTION PURPOSES. REJECTION OF MATERIAL, NOT MEETING THESE SPECIFICATIONS WILL BE ORDERED AND SUCH MATERIALS SHALL BE IMMEDIATELY REMOVED FROM THE JOB.

SANITARY SEWER LINES SHALL BE FREE AND CLEAN FROM OBSTRUCTIONS AND SHALL BE VISUALLY INSPECTED FROM EVERY MANHOLE TO ENSURE ALL LINES EXHIBIT A FULLY CIRCULAR PATTER, LINES WHICH DO NOT EXHIBIT A TRUE LINE AND GRADE OR HAVE STRUCTURAL DEFECTS SHALL BE CORRECTED. SANITARY SEWER SERVICE CONNECTIONS SHALL BE VISUALLY INSPECTED PRIOR TO BACK FILLING.

SMITHFIELD NORTH CAROLINA

STANDARD DETAIL AND SPECIFICATIONS MANUAL  
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THE CONTRACTOR SHALL FURNISH ALL MATERIALS, LABOR, AND EQUIPMENT TO PERFORM ALL TESTING TO THE SATISFACTION OF THE CONSTRUCTION INSPECTOR. WATER FOR TESTING WILL BE PROVIDED BY THE TOWN OF SMITHFIELD.

SEE SECTION 7.01C FOR ADDITIONAL TESTING REQUIREMENTS FOR SEMI-RIGID PIPE.

THE LOW-PRESSURE AIR TESTING SHALL BE PERFORMED BEFORE ALL LATERALS OR STUBS ARE INSTALLED ON THE LINE AND AFTER THE MAIN HAS BEEN BACKFILLED TO FINISHED GRADE. PLUGS SHALL BE INSTALLED AT EACH MANHOLE TO SEAL OFF THE TEST SECTION. THE LINE WILL BE PRESURIZED WITH A SINGLE HOSE AND MONITORED BY A SEPARATE HOSE CONNECTION FROM THE PLUG. AIR THEN SHALL BE SLOWLY INTRODUCED INTO THE SEALED LINE UNTIL THE PRESSURE REACHES 4.0 PSIG. THE AIR PRESSURE SHALL THEN BE ALLOWED TO STABILIZE FOR A MINIMUM OF FIFTEEN (15) MINUTES AT NO LESS THAN 3.0 PSIG. WHEN THE PRESSURE REACHES 3.5 PSIG, THE TIME REQUIRED FOR THE PRESSURE TO DROP 1.0 PSI WILL BE OBSERVED AND RECORDED. THE LINE SHALL BE TORMED ACCORDING TO STANDARD DETAILS FOR AIR TEST RESULTS.

IF THE SECTION FAILS TO MEET THESE REQUIREMENTS, THE SOURCE OF LEAKAGE SHALL BE DETERMINED AND REPAIRED. THE PIPE SECTION SHALL BE RETESTED AND MEET THE SPECIFIED REQUIREMENTS.

7.06 REPAIR OF SANITARY SEWER LINES

THE REPAIR OF DAMAGED SANITARY SEWER LINES SHALL BE AS FOLLOWS:

VC PIPE - REPLACE DAMAGED SECTION WITH PVC PIPE AND INSTALL A FERNOCO COUPLING AT EACH END.

PVC PIPE - REPLACE DAMAGED SECTION WITH PVC PIPE AND INSTALL A FERNOCO COUPLING AT EACH END.

DIP PIPE - REPLACE DAMAGED SECTION WITH DIP PIPE AND INSTALL A FERNOCO COUPLING AT EACH END.

ALL OTHER TYPES OF PIPE SHALL BE REPLACED FROM MANHOLE TO MANHOLE (ENTIRE RUN) WHEN DAMAGE OCCURS. THE REPLACEMENT PIPE SHALL BE EITHER DIP OR PVC, AS CONDITIONS WARRANT.

ALL REPAIRS TO ABANDONED SANITARY SEWER LINES SHALL BE BACKFILLED WITH ABC STONE (CRUSHER RUN) TO A DENSITY OF 95 PERCENT STANDARD PROCTOR.

7.07 WASTEWATER PUMP STATIONS

SIZING, DESIGN AND APPROVED MANUFACTURERS OF WASTEWATER PUMP STATIONS WHICH ARE TO BE MAINTAINED BY THE TOWN SHALL BE AS DETERMINED BY THE PUBLIC UTILITIES DIRECTOR. ALL PUMP STATIONS THAT WILL BE PRIVATELY OPERATED AND MAINTAINED MUST MEET THE NORTH CAROLINA BUILDING CODE IN ADDITION TO ANY OTHER SPECIFICATIONS REQUIRED BY THE TOWN.

7.08 STEP SYSTEM

SERVICE TANK EFFLUENT PUMP SYSTEMS SHALL BE APPROVED ON A CASE BY CASE BASIS BY THE PUBLIC UTILITIES DIRECTOR.

END OF SECTION 7.00

SMITHFIELD NORTH CAROLINA

STANDARD DETAIL AND SPECIFICATIONS MANUAL  
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PVC SADDLE

SOLVENT CEMENT SEAL

SEWER MAIN FLOW

PVC PIPE

DOUBLE STAINLESS STEEL BANDS

DIP SADDLE

SPECIAL GASKET BY THE PIPE MANUFACTURER WITH SILICON SEALANT APPLIED TO BOTH SIDES

SEWER MAIN FLOW

DIP PIPE

NOTES:

1. IN LINE WYES TO BE USED WHERE POSSIBLE ON NEW CONSTRUCTION AND REPAIR PROJECTS
2. PVC SADDLE METHOD SHALL BE USED FOR PVC SADDLES
3. ALL BANDS SHALL BE STAINLESS STEEL

SMITHFIELD NORTH CAROLINA

STANDARD LATERAL CONNECTION  
SMITHFIELD, NORTH CAROLINA  
PUBLIC UTILITIES

SCALE: NTS  
DETAIL NO: 07.02.P1  
DATE: 04/03/2018

MANHOLE RING AND COVER (DETAIL 7.07)

MANHOLE STEP (DETAIL 7.04)

STEEL REINFORCEMENT (SEE NOTE 3)

RIM NOTES

1. RIM ELEVATIONS SHALL BE IN GRADE IN STREETS & FINISHED GRADE.
2. RIM ELEVATIONS ALONG OUTLAYS SHALL BE IN GRADE ON EXISTING FINISHED GRADE ELEVATION. IF THE OUTLAYS IS LOCATED BELOW FINISHED GRADE, ELEVATIONS SHALL BE 2" ABOVE THE EXISTING FINISHED GRADE ELEVATION. FINISHED GRADE ELEVATION SHALL BE NOTED ON THE CONSTRUCTION DRAWING.

GENERAL NOTES

1. ALL PRE CAST CONCRETE MANHOLES SHALL CONFORM TO THE LATEST REVISION OF ASTM C478.
2. STEEL SHALL BE 4000 PSI AT 28 DAYS MINIMUM.
3. REINFORCEMENT SHALL BE GRADE 60 BILLET STEEL CONFORMING TO THE LATEST REVISION OF ASTM-A-618 FOR WALL REINFORCEMENT. THE TOWN SHALL BE AS DETERMINED BY THE PUBLIC UTILITIES DIRECTOR.
4. STANDARD JOINTS SHALL BE SEALED WITH PUTTY TYPE PLASTIC CEMENT FOR FITS. SPEC. SS-C-153 OR AN O-RING OF THE LATEST REVISION OF ASTM-C-108.
5. MANHOLE INLETS AND OUTLETS SHALL BE CAST IN PLACE FLEXIBLE RUBBER SLIDERS PER THE LATEST REVISION OF ASTM-D2221.
6. INVERTS TO BE CONSTRUCTED OF BRICK WITH A CONCRETE BENCH (DETAIL 07.04).
7. THE MANHOLE SEPARATION OR INVERT IS TO INVERT OUT WITHIN A MANHOLE 6.000 FEET.
8. MANHOLES GREATER THAN 18 FEET IN DEPTH SHALL HAVE AN INSIDE DIAMETER OF 5'-0" FOR SANITARY SEWER MAINS GREATER THAN EIGHTEEN (18) INCHES IN DIAMETER. MANHOLES SHALL BE A MINIMUM OF 5'-0" IN DIAMETER.

SMITHFIELD NORTH CAROLINA

STANDARD SANITARY SEWER MANHOLE  
SMITHFIELD, NORTH CAROLINA  
PUBLIC UTILITIES

SCALE: NTS  
DETAIL NO: 07.02.P2  
DATE: 04/03/2018

MANHOLE RING AND COVER (DETAIL 7.07)

MANHOLE STEP (DETAIL 7.04)

STEEL REINFORCEMENT (SEE NOTE 3)

ISOMETRIC VIEW

CROSS-SECTION

NOTES:

1. MANHOLE TO BE SET ON CONCRETE BASE AND RAISE TO BE ONE POUND PER LINEAL FOOT ABOVE FINISHED GRADE.
2. JOINT FROM SEWER TO MANHOLE SHALL BE SEALED WITH PUTTY TYPE PLASTIC CEMENT FOR FITS.
3. FLEXIBLE RUBBER SLIDERS SHALL BE PROVIDED BY MANUFACTURER.
4. FLEXIBLE RUBBER SLIDERS SHALL BE 1/2" THICK AND 1/2" DIA.
5. MINIMUM OF 4000 PSI CONCRETE REQUIRED.
6. ALL MANHOLES SHALL BE FINISHED WITH #4 REINFORCING BARS AT STONE BASE.
7. INVERT TO BE SET FROM PROPOSED PIPE TO EFFLUENT PIPE, ACCORDING TO DETAIL ON INVERTS.

SMITHFIELD NORTH CAROLINA

DOGHOUSE MANHOLE INSTALLED OVER EXISTING SEWER MAIN  
SMITHFIELD, NORTH CAROLINA  
PUBLIC UTILITIES

SCALE: NTS  
DETAIL NO: 07.02.P3  
DATE: 04/03/2018

**STOCKS ENGINEERING**

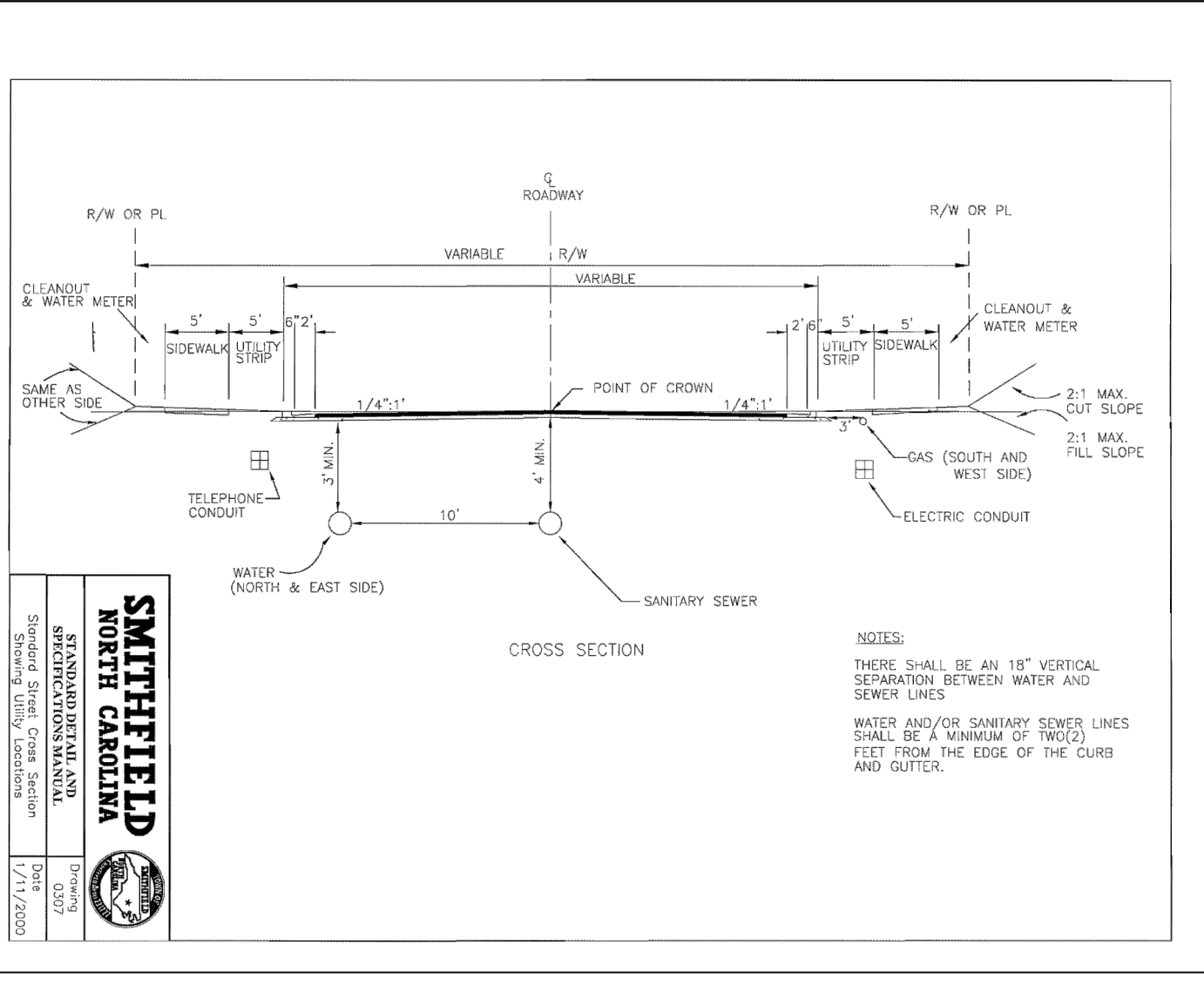
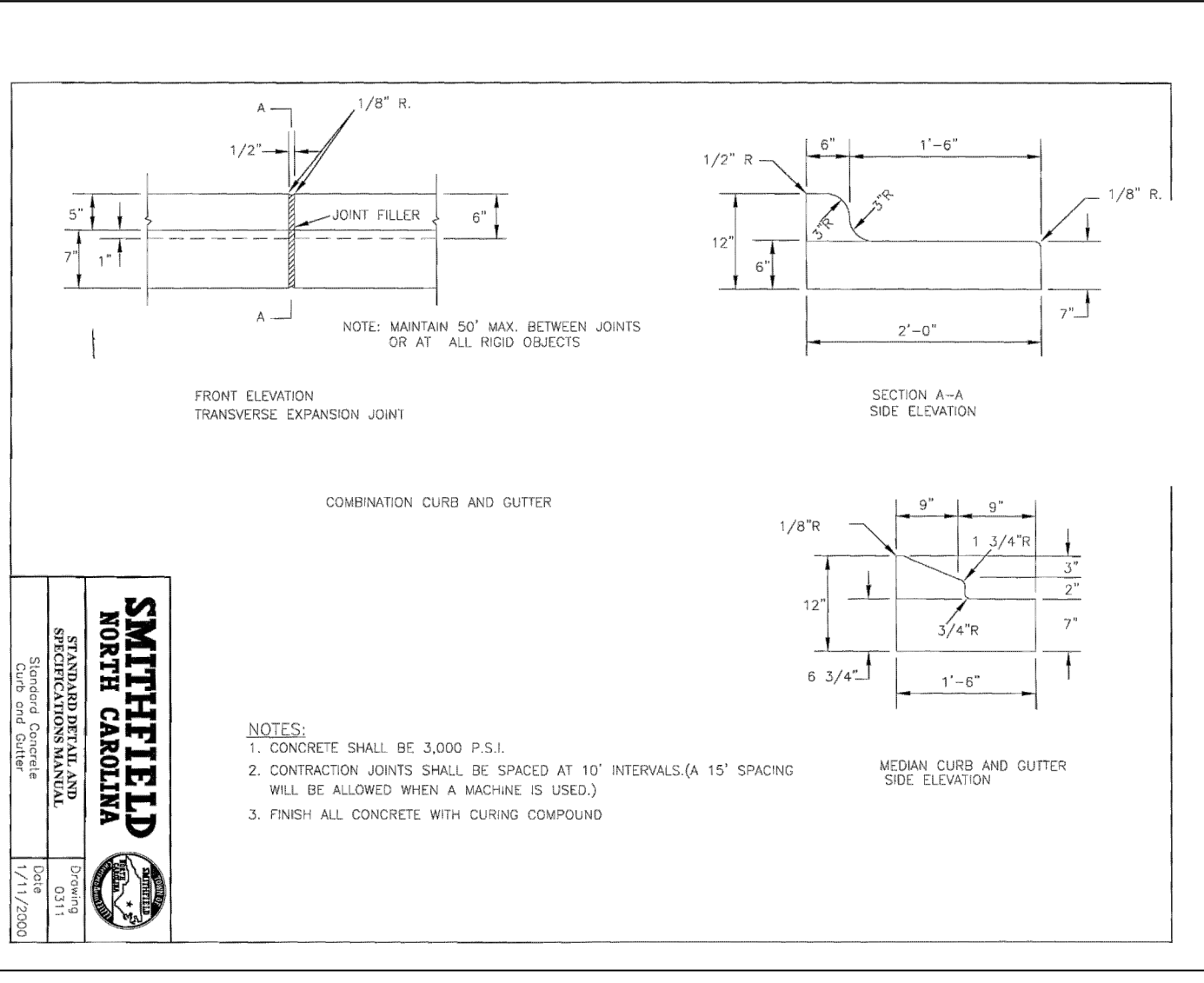
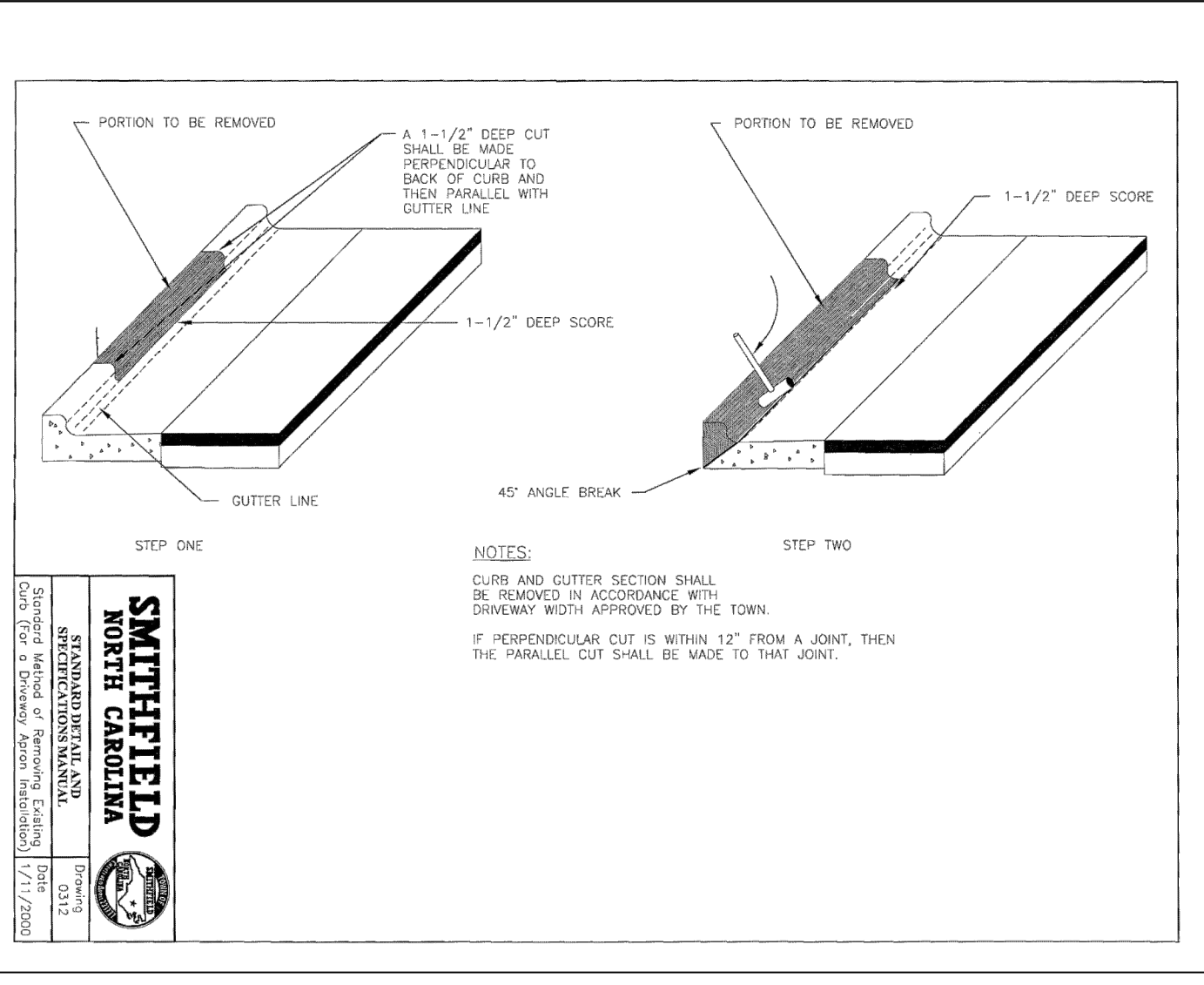
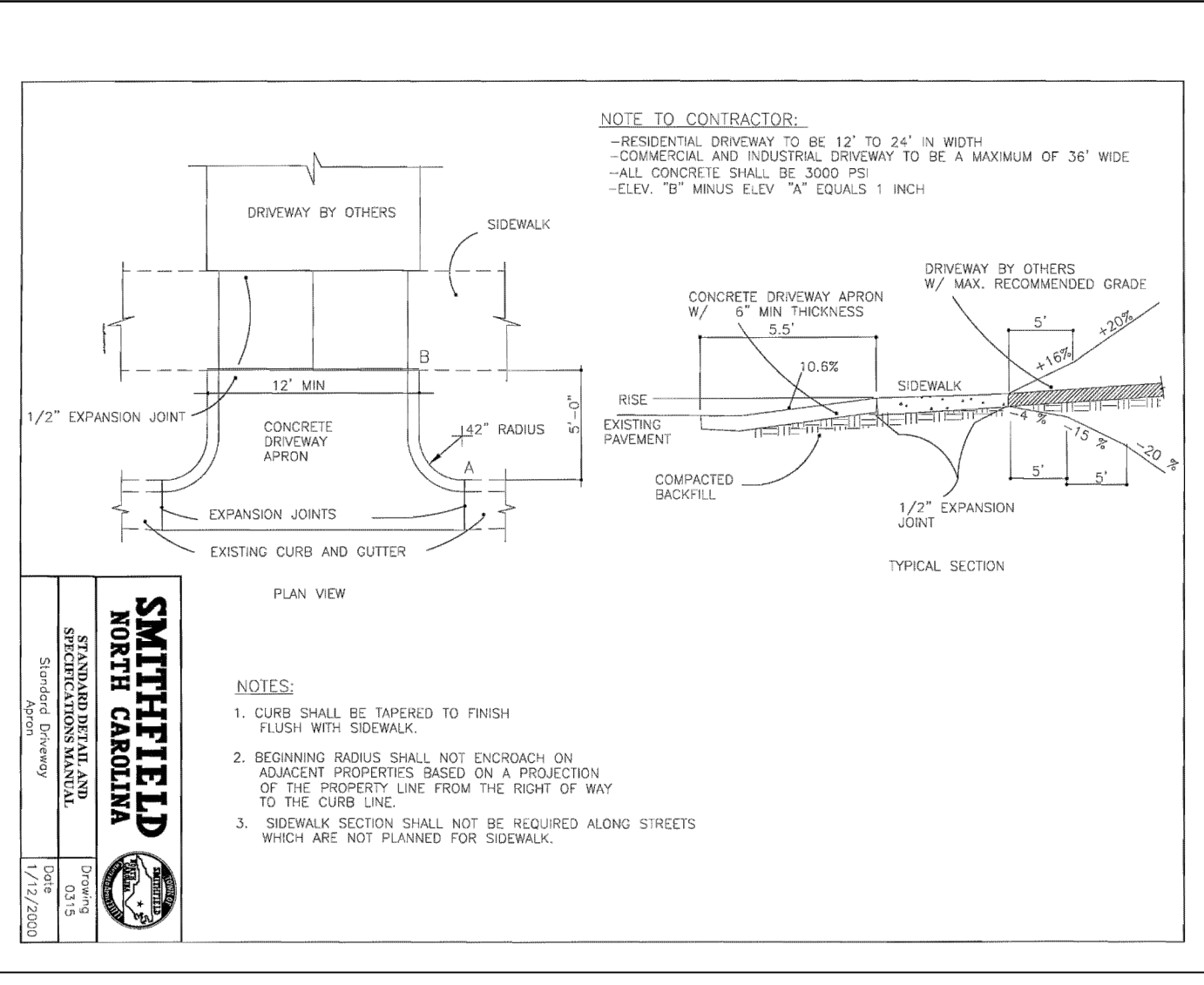
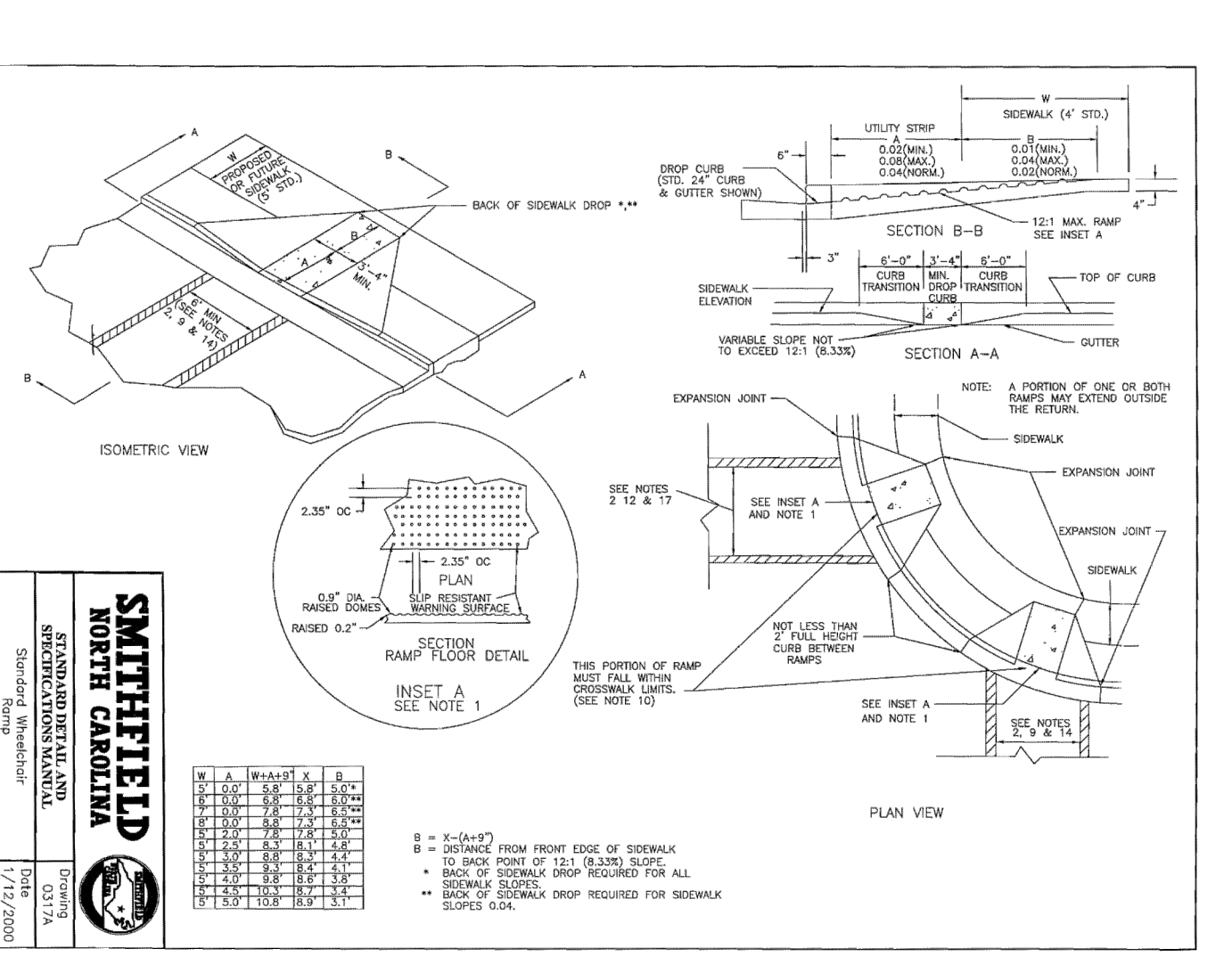
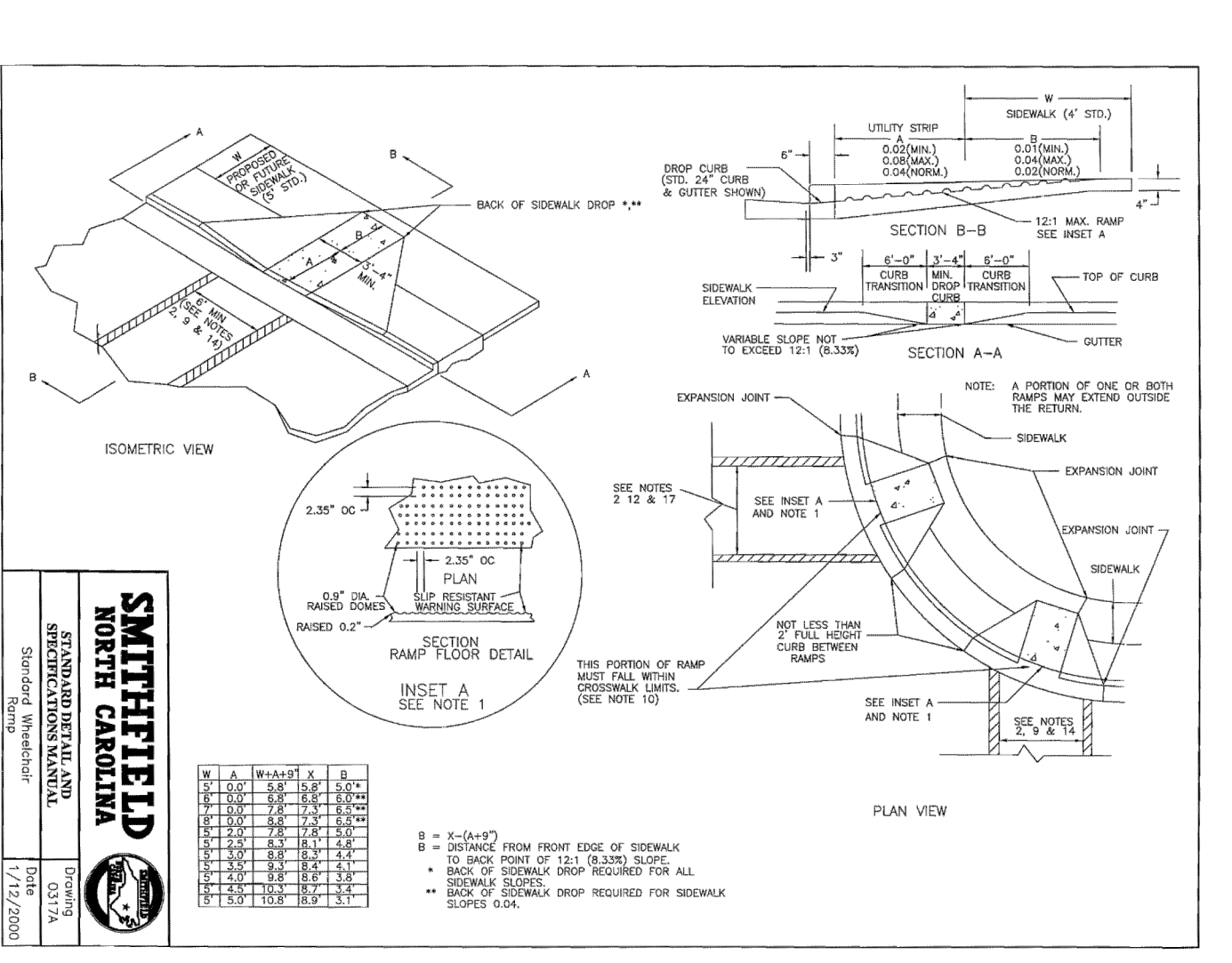
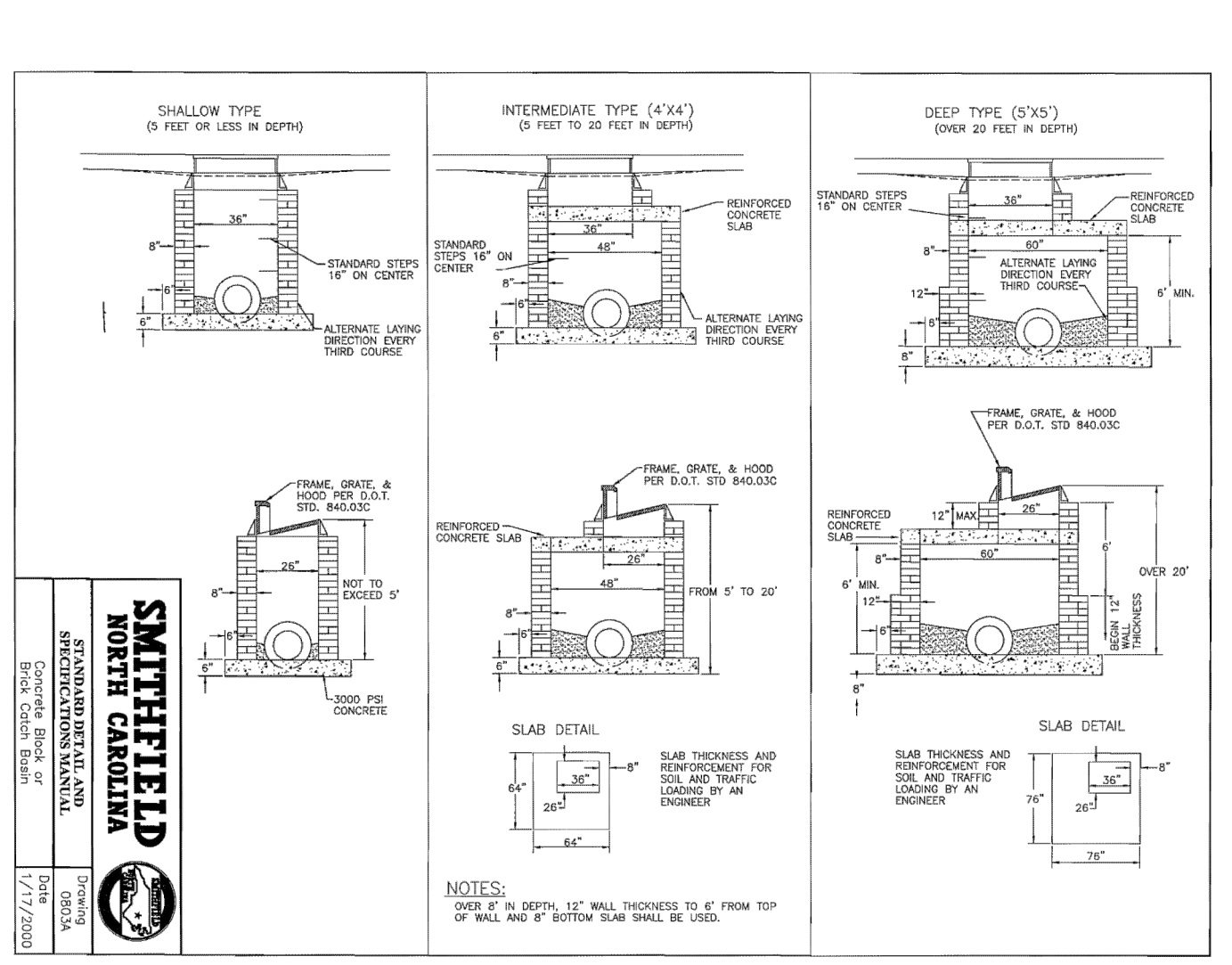
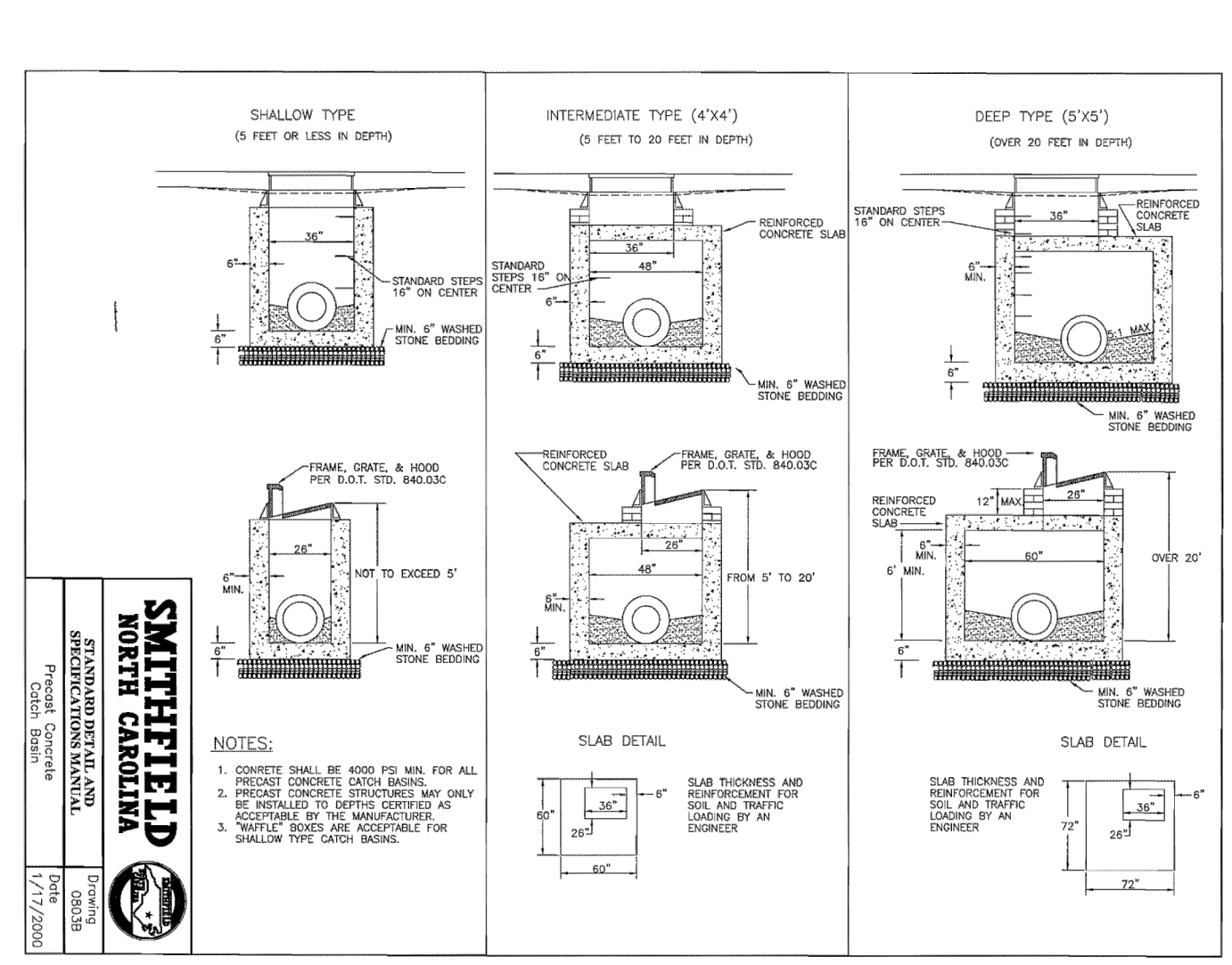
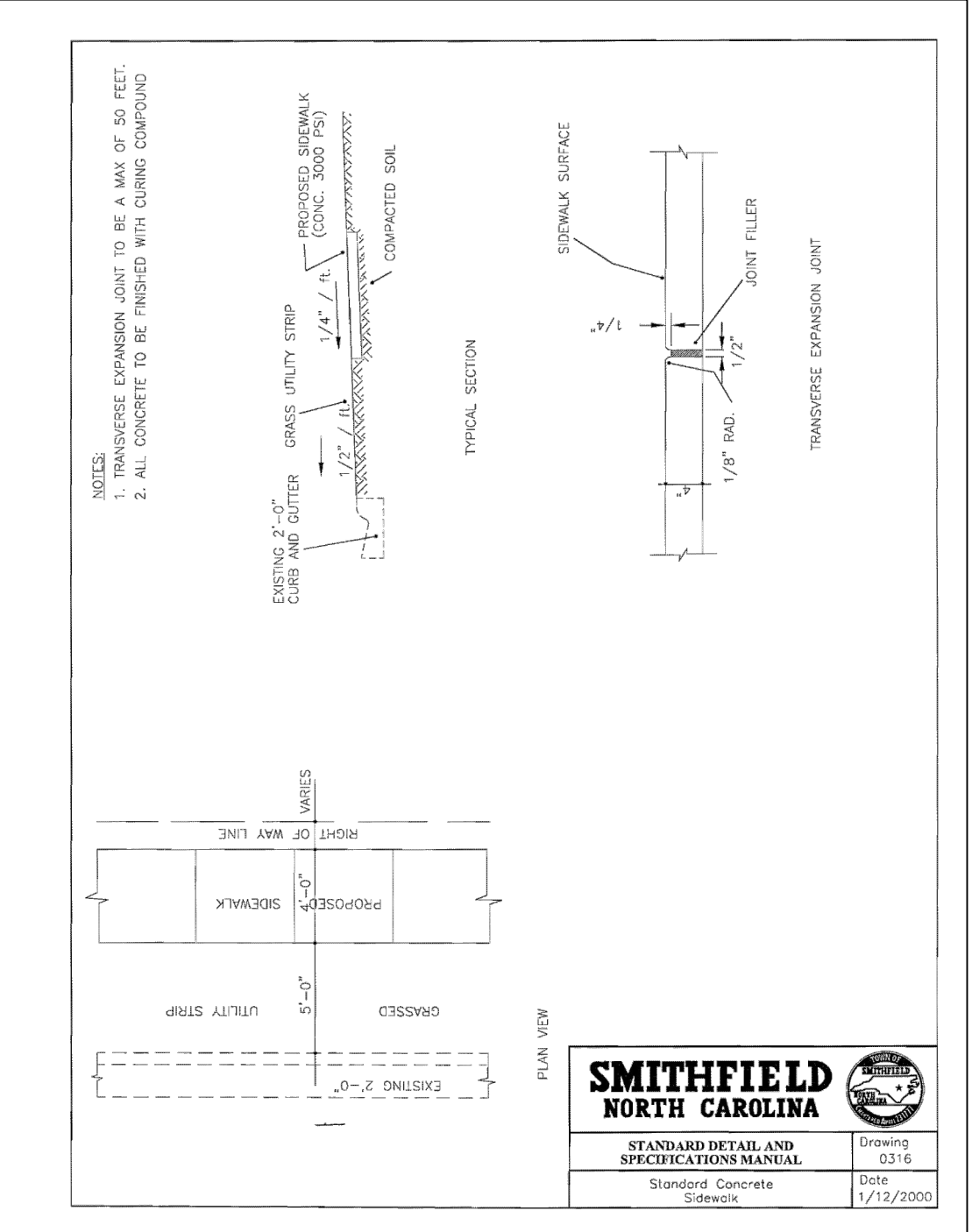
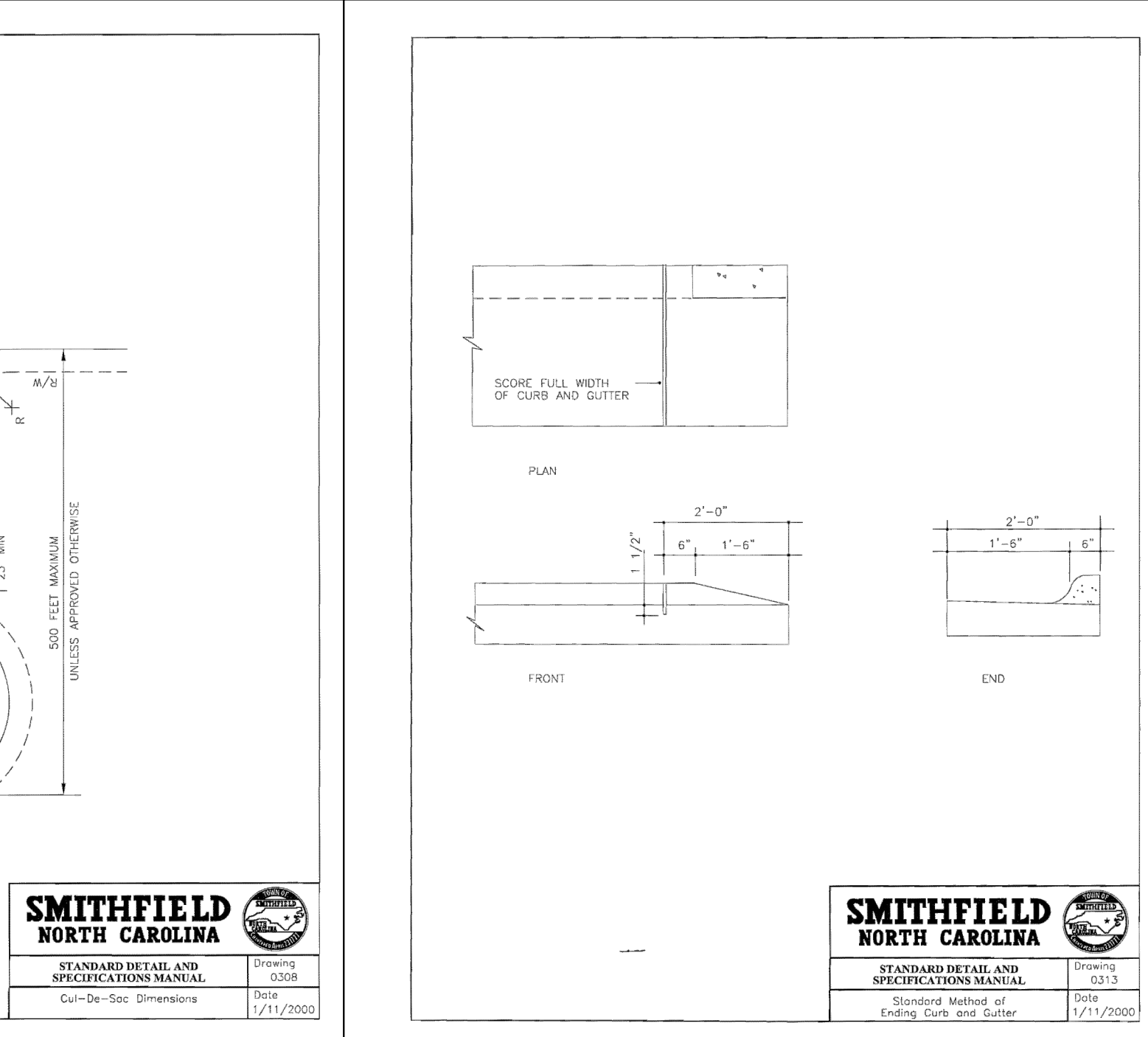
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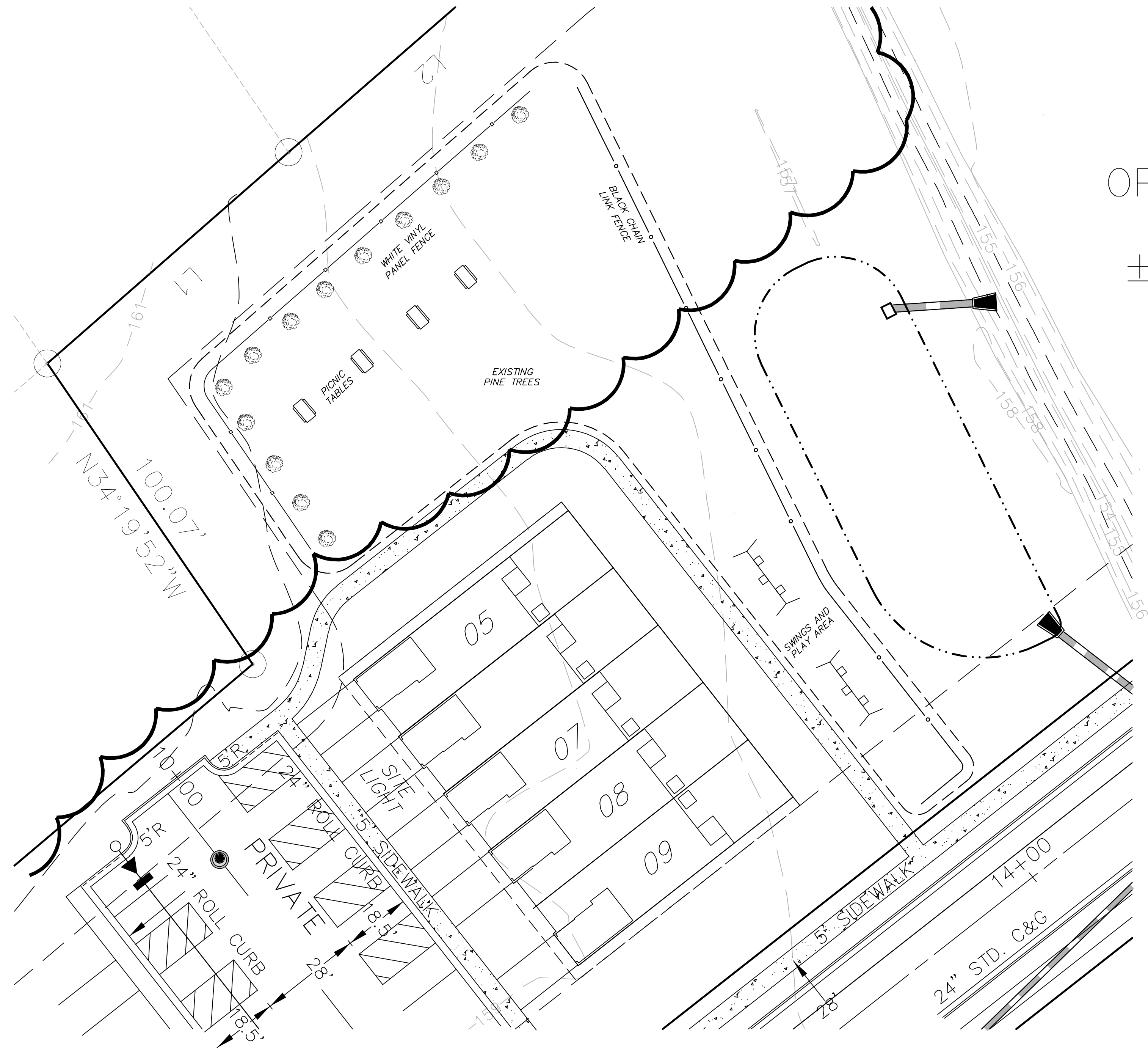






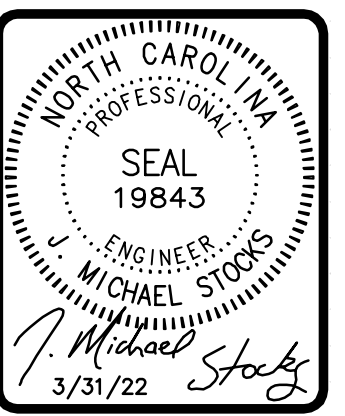






OPEN SPACE  
AREA #1  
±14,193 SF

NOTES:  
OPEN SPACE ELEMENTS SHOWN BELOW ARE REPRESENTATIVE IN NATURE  
AND MAY DIFFER FROM WHAT IS SHOWN HOWEVER THE CONCEPT BELOW  
REPRESENTS THE DEVELOPERS INTENT OF THIS OPEN SPACE AREA.



OPEN SPACE  
DETAIL

REVISIONS

FILE NO. 2021-001  
HORZ. SCALE: 1"=20'  
VERT. SCALE: NONE