5/14/99

TOWN OF CLAYTON DETAILS

PREPARED IN THE OFFICE OF:

Wooten

120 North Boylan Avenue Raleigh NC 27603-1423
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License Number: F-0115

VERTICAL SCALE 5' 0 5' 10'

HORIZONTAL SCALE 25' 0 25' 50'

PROJECT REFERENCE NO.	SHEET NO.
U-6223	UC-3D
DESIGNED BY: CMG	
DRAWN BY: TK	
CHECKED BY: DGM	
APPROVED BY: CMG	
REVISED:	

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

UTILITIES ENGINEERING SEC.
PHONE: (919) 707-6690
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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL — Digitally signed by SEAL — DAVID G. MALTHANER — 06/17/2022

Document Not Considered Final Unless All Signatures Completed

UTILITY CONSTRUCTION PLANS ONLY

UTILITY CONSTRUCTION

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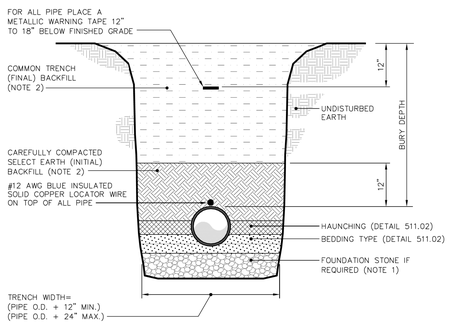

NOTES:

1. 8" deep No. 57 stone or equal wrapped in non-woven geotextile filter fabric lightly compacted. Overlap fabric by minimum one pipe O.D.
2. See specifications Section 02275, Part 2 – PRODUCTS for composition of Select Earth Backfill and Common Trench Backfill.

TOWN of CLAYTON
USE WITH THE TOWN of CLAYTON STANDARD SPECIFICATIONS ONLY

WATER MAIN PIPE LAYING CONDITIONS

SCALE: Not To Scale | DETAIL # 511.01 | REVISION DATE: July, 2010 | SHEET # 1 of 4

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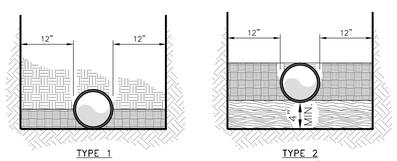

NOTES:

1. For normal pipe sizes 14 inch and larger, consideration should be given to the use of laying conditions other than Type 1.
2. Consideration of the pipe-zone embedment conditions included in this figure may be influenced by factors other than pipe strength. For additional information on pipe bedding and backfill, see ANSI/AWWA C600.
3. See detail 511.01 for unsuitable trench subgrade requirements.
4. See Specifications Section 02275, Section 2.1.2 for pipe bedding definitions.
5. Loose soil shall be either native soil excavated from trench or borrow, both conforming in composition to "Select Earth Backfill" as defined in Specifications Section 02275, Part 2 – PRODUCTS.

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WATER MAIN EMBEDMENT DETAILS

SCALE: Not To Scale | DETAIL # 511.02 | REVISION DATE: July, 2010 | SHEET # 1 of 4

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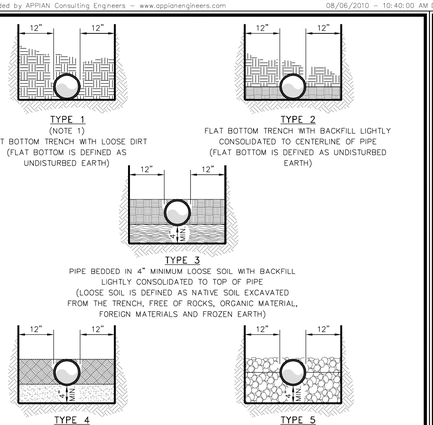

NOTES:

1. For normal water pipe sizes 14 inch and larger, consideration should be given to the use of laying conditions other than Type 1.
2. Consideration of the pipe-zone embedment conditions included in this figure may be influenced by factors other than pipe strength. For additional information on pipe bedding and backfill, see ANSI/AWWA C600.

TOWN of CLAYTON
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PIPE EMBEDMENT DETAILS

SCALE: Not To Scale | DETAIL # 511.02 | REVISION DATE: July, 2010 | SHEET # 2 of 4

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TABLE 10.7 – DESCRIPTION OF MATERIAL CLASSIFICATIONS AS DEFINED IN ASTM D 2321

Class	Type	Soil Symbol Group	Description ASTM D 2487	Percentage Passing Sieve Sizes 1.5 in (40 mm)	No. 4 (4.75 mm)	No. 200 (0.075 mm)	Atterberg Limits LL	PL	Uniformity Coefficient Cu	Coefficients Curvature Cc
IA	Manufactured Processed Aggregate (Crushed stone, gravel, sand)	None	Angular, crushed stone or rock, crushed gravel and sand; e.g. crushed stone or gravel, large void content, little or no fines	100	≤10%	<5	Non Plastic			
IB	Manufactured Processed Aggregate (Crushed stone, gravel, sand)	None	Angular, crushed stone (or other Class IA, processed aggregate) and natural sand and gravel mixtures; large void content, little or no fines	100	≤50%	<5	Non Plastic		>4	1 to 3
II	Coarse-Grained Soils, Clean	GW	Well-graded gravels and gravel-sand mixtures, little or no fines	100	<50% of Coarse Fraction	<5			<4	<1 or >3
		GP	Poorly graded gravels and gravel-sand mixtures, little or no fines						>6	1 to 3
		SW	Well-graded sands and gravelly sands, little or no fines		>50% of Coarse Fraction				<6	<1 or >3
		SP	Poorly graded sands or gravelly sands, little or no fines						>6	Same as for GW, GP, SW and SP
III	Coarse-Grained Soils with Fines	GM	Silty gravels, gravel-sand-silt mixtures	100	Varies	5% to 12%	Non Plastic			
		GC	Clayey gravels, gravel-sand-clay mixtures		>50% of Coarse Fraction	>12% to <50%	<4 or <7 Line			
		SM	Silty sands, sand-silt mixtures				<4 or <7 Line			
		SC	Clayey sands, sand-silt mixtures				>7 or >4 Line			
IV	Fine-Grained Soils (Inorganic)	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, silts with slight plasticity	100	100	>50	<50			
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays				<50	>7 or >4 Line		
IVB	Fine-Grained Soils (Inorganic)	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	100	>50		>50	<4 Line		
		CH	Inorganic clays of high plasticity, fat clays				>50	>4 Line		
V	Organic Soils	OL	Organic silts and organic silty clays of low plasticity	100	100	>50	<50	<4 or <7 Line		
		OH	Organic clays of medium to high plasticity, organic silts				>50	<4 Line		
	Highly Organic	PT	Peat and other high organic soils							

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PIPE EMBEDMENT DETAILS

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TABLE 10.8
RECOMMENDATIONS FOR PIPE INSTALLATION AND USE OF SOILS AND AGGREGATES FOR FOUNDATION, EMBEDMENT AND BACKFILL

	Soil Class (see Table 10.7)A			
	CLASS IA	CLASS IB	CLASS II	CLASS III
General Recommendations and Restrictions	Do not use where conditions may cause migration of fines from adjacent soils into the pipe zone. Suitable for replacement of unsuitable trench bottom and underdrain in rock cuts to provide a firm, stable foundation where subsidy grades.	Process materials as required to meet gradation requirements. Suitable for minimum migration of adjacent soils. Consult manufacturer for use as underdrain.	Where hydraulic gradient exists, use to minimize migration. Consult manufacturer for use as drainage blanket and underdrain.	Do not use where water conditions in trench may cause instability.
Foundation	Suitable as foundation and for replacing over-excavated and unstable trench bottom and compact in 6-in. maximum layers.	Suitable as foundation and for replacing over-excavated and unstable trench bottom and compact in 6-in. maximum layers.	Suitable as foundation and for replacing over-excavated and unstable trench bottom and compact in 6-in. maximum layers.	Suitable as foundation and for replacing over-excavated and unstable trench bottom and compact in 6-in. maximum layers. Use in rock cuts.
Bedding	Suitable as restricted above. Install and compact in 6-in. layers. Level final grade by hand. Minimum depth 6 in. (6 in. in rock cuts).	Suitable as restricted above. Install and compact in 6-in. layers. Level final grade by hand. Minimum depth 6 in. (6 in. in rock cuts).	Suitable as restricted above. Install and compact in 6-in. layers. Level final grade by hand. Minimum depth 6 in. (6 in. in rock cuts).	Suitable as restricted above. Install and compact in 6-in. layers. Level final grade by hand. Minimum depth 6 in. (6 in. in rock cuts).
Haunching	Suitable as restricted above. Install in 6-in. maximum layers. Work in materials by hand to provide uniform support.	Suitable as restricted above. Install and compact in 6-in. maximum layers. Work in materials by hand to provide uniform support.	Suitable as restricted above. Install and compact in 6-in. maximum layers. Work in materials by hand to provide uniform support.	Suitable as restricted above. Install and compact to a minimum of 6 in. above pipe.
Initial Backfill	Suitable as restricted above. Install to a minimum of 6 in. above pipe.	Suitable as restricted above. Install and compact to a minimum of 6 in. above pipe.	Suitable as restricted above. Install and compact to a minimum of 6 in. above pipe.	Suitable as restricted above. Install to a minimum of 6 in. above pipe.
Final Backfill	Compact as required by the Compact as required by the Compact as required by the Compact as required by the Compact as required by the			

TOWN of CLAYTON
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PIPE EMBEDMENT DETAILS

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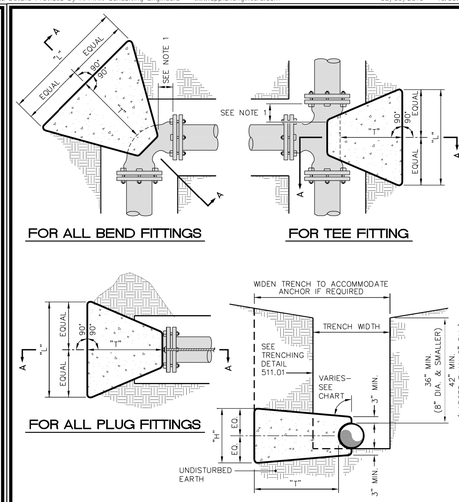

NOTES:

1. Concrete blocking is to be formed to ensure accessibility to fittings and poured against undisturbed earth.
2. Fittings are to be completely wrapped with plastic, prior to pouring concrete.
3. Concrete to be minimum 3,000 psi. @ 28 days.

TOWN of CLAYTON
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HORIZONTAL BLOCKING DETAIL for BENDS, TEE, & PLUG

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TEST PRESSURE = 150 P.S.I.

PIPE SIZE	TYPE FITTING	DIMENSIONS (Ft.) "L"	"H"	"T"	VOLUME CONCRETE CU. YD.
<4 INCHES	11 1/4°	----	----	----	----
	22 1/2°	1.00	1.00	1.50	0.06
	45°	1.00	1.00	1.50	0.06
	90°	1.00	1.00	2.00	0.09
	TEE / PLUG	1.00	1.00	2.00	0.07
4 INCHES	11 1/4°	1.00	1.00	2.50	0.09
	22 1/2°	1.00	1.00	2.50	0.09
	45°	1.00	1.00	2.50	0.09
	90°	1.50	1.50	2.50	0.15
	TEE / PLUG	1.50	1.50	2.00	0.12
6 INCHES	11 1/4°	1.50	1.50	2.50	0.15
	22 1/2°	1.50	1.50	2.50	0.15
	45°	1.50	1.50	2.50	0.15
	90°	2.00	2.00	3.00	0.28
	TEE / PLUG	2.00	2.00	2.50	0.23
8 INCHES	11 1/4°	2.00	2.00	2.50	0.23
	22 1/2°	2.00	2.00	2.50	0.23
	45°	2.00	2.00	2.75	0.25
	90°	3.00	2.00	3.00	0.39
	TEE / PLUG	3.00	2.00	2.50	0.32
12 INCHES	11 1/4°	2.00	2.00	3.00	0.28
	22 1/2°	2.00	2.00	3.00	0.28
	45°	3.00	2.50	3.00	0.47
	90°	4.50	3.00	3.50	0.94
	TEE / PLUG	4.50	3.00	3.00	0.81
16 INCHES	11 1/4°	2.00	2.00	3.00	0.28
	22 1/2°	3.00	2.00	3.00	0.39
	45°	4.00	3.00	3.50	0.84
	90°	6.50	3.50	3.50	1.54
	TEE / PLUG	6.50	3.50	3.00	1.32

TEST PRESSURE = 200 P.S.I.

PIPE SIZE	TYPE FITTING	DIMENSIONS (Ft.) "L"	"H"	"T"	VOLUME CONCRETE CU. YD.
<4 INCHES	11 1/4°	1.00	1.00	1.00	0.04
	22 1/2°	1.00	1.00	1.50	0.06
	45°	1.00	1.00	1.50	0.06
	90°	1.50	1.50	2.50	0.15
	TEE	1.50	1.50	2.00	0.12
4 INCHES	11 1/4°	1.00	1.00	2.50	0.09
	22 1/2°	1.00	1.00	2.50	0.09
	45°	1.50	1.50	2.50	0.15
	90°	1.50	1.50	2.50	0.15
	TEE	1.50	1.50	2.00	0.12
6 INCHES	11 1/4°	1.50	1.50	2.50	0.15
	22 1/2°	1.50	1.50	2.50	0.15
	45°	1.50	1.50	2.50	0.15
	90°	2.50	2.00	3.00	0.33
	TEE	2.50	2.00	2.50	0.28
8 INCHES	11 1/4°	2.00	2.00	2.50	0.23
	22 1/2°	2.00	2.00	2.50	0.23
	45°	2.00	2.00	2.50	0.23
	90°	4.00	2.00	3.00	0.50
	TEE	4.00	2.00	2.50	0.42
12 INCHES	11 1/4°	2.00	2.00	3.00	0.28
	22 1/2°	3.00	2.00	3.00	0.39
	45°	4.00	2.50	3.00	0.61
	90°	5.50	3.00	3.50	1.13
	TEE	5.50	3.00	3.00	0.97
16 INCHES	11 1/4°	2.00	2.00	3.00	0.28
	22 1/2°	4.00	2.00	3.00	0.50
	45°	5.50	3.00	3.50	1.13
	90°	7.50	4.00	3.50	2.01
	TEE	7.50	4.00	3.00	1.72

CHART NOTES:

1. If blocking excavation is in lightly compacted fill areas, or in areas where boulders or stumps have been removed, blocking size must be re-sized for the specific location/circumstance by a NC licensed Professional Engineer.
2. Blocking sizes shown in these tables assume the following:
   A. Blocking is constructed in residual soils as shown in detail.
   B. Soil bearing pressure = 2000 psf
   C. Velocity of flow = 15 fps.
3. This detail not applicable to reducing bends.
4. Neither the weight of the concrete blocking nor friction between concrete blocking and soil was added into blocking sizes computation. Therefore, blocking size is conservative.

TOWN of CLAYTON
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HORIZONTAL BLOCKING DETAIL for BENDS, TEE, & PLUG

SCALE: Not To Scale | DETAIL # 512-01 | REVISION DATE: July, 2010 | SHEET # 2 of 2

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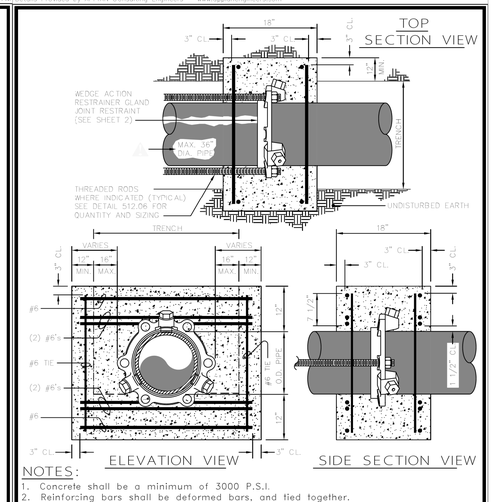

NOTES:

1. Concrete shall be a minimum of 3000 P.S.I.
2. Reinforcing bars shall be deformed bars, and tied together.
3. Trench bottom width in vicinity of thrust block(s) installation shall be the minimum width for placement of pipe (Max trench width = pipe O.D.+2 Ft.)
4. Backfill and compact in 6" layers.
5. Place thrust collar on one full joint of pipe.
6. Last joint of pipe with thrust collar to be mechanical joint pipe.
7. Place wedge action restrainer gland joint restraint 4 feet from plug end of pipe.

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THRUST COLLAR & BLOCKING with WEDGE ACTION RESTRAINER GLAND

SCALE: Not To Scale | DETAIL # 512-02 | REVISION DATE: April, 2010 | SHEET # 1 of 1