Mitchell Environmental, P.A.

SEPTIC SYSTEM DESIGN

for

PRINCE PLACE SUBDIVISION- LOT 13

Fuquay-Varina, Harnett County, North Carolina

Submitted to:
Harnett County Health Department
307 Cornelius Harnett Blvd.
Lillington, NC 27546

Prepared for:
Triple A Homes, Inc.
PO Box 1117
Holly Springs, North Carolina 27540

Prepared by:
Scott Mitchell, PE, LSS
Adam Aycock, EI

DATE: January 12, 2022
PROJECT NO.: 4721

1501 Lakestone Village Lane, Suite 205
Fuquay-Varina, North Carolina 27526
919-669-0329

PRESSURE MANIFOLD DESIGN

Name: Triple A Homes **P.I.N. #:** 0633-77-6093 **D #:** N/A

Address: Royal Ella Court **Subdiv:** Prince Place **Lot#:** 13

# of BDR: 4 **Daily Flow:** 480 **gal/day** **L.T.A.R.:** 0.300 **gal/day/sq.ft**

Septic Tank: 1000 **gals (min.)** **Pump Tank:** 1200 **gals (min.)** **Sq. Foot:** 550 **Stone Depth:** N/A (Panel Block)

Number of Taps: 5 **Length of Trenches:** 55 **ft(See Tap Chart for Details)**

Depth of Trenches: see Harnett County Permit **Manifold Length:** 48 **in**

Manifold Diameter: 4 in sch 80pvc (minimum) **Tap Configuration: 6 in spacing** 1 **side(s) of manifold**

Supply Line: length: 200 **ft** **Diameter:** 2 **in sch 40pvc**

Friction Loss + Fitting Loss: 4.77 **ft(supply line length + 70' for fittings in pump tank)**

Design Head: 2.0 **ft** **Elevation Head:** 15.27 **ft**

Vent Hole Size: 3/16 **in** **Orifice Coefficient of Discharge:** 0.60

Orifice Coefficient of Contraction: 0.62 **Orifice Coefficient of Velocity:** 0.97

Maximum Head Supplied by Selected Pump(s) at Total Design Flowrate: 32 **ft**

Orifice / Vent Hole Flowrate: 2.35 **gpm** **Head Loss at Orifice / Vent Hole:** 2.03 **ft**

Total Head: 24.07 **ft** **Pump to Deliver:** 29.75 **gals/min at** 24.07 **ft head**

Dosing Volume: 250.25 **gals.**

Drawdown: 250.25 **gals divided by** 19 **gals/in =** 13.17 **inches**

SJE Rhombus Installer Friendly Series simplex control panel, or equivalent, required
A septic tank filter, or equal is required.
Possible pumps: **Hydromatic:** **Goulds:** **Myers:**
Zoeller: 153 **Other:**

TAP CHART

Bench Mark	1.45	is = 100.00	set at	Back Left property corner			**Design Head:**	2.0	
Pump tank elev.		11	90.45	**Pump elev.**	85.45		**Manifold elev.**	100.72	
line	**color**	**rod read**	**Elevation**	**length**	**hole size**	**flow/tap**	**gal/day**	**trench area**	**LINE LTAR**
1	Yellow	1.73	99.72	55	1/2in SCH 80	5.48	96.00	165	0.5818
2	Y - 8	3.11	98.34	55	1/2in SCH 80	5.48	96.00	165	0.5818
3	G - 4	4.54	96.91	55	1/2in SCH 80	5.48	96.00	165	0.5818
4	Lime	6.03	95.42	55	1/2in SCH 80	5.48	96.00	165	0.5818
5	L - 8	7.85	93.60	55	1/2in SCH 80	5.48	96.00	165	0.5818
		total	**feet =**	**275**	**gal/min =**	**27.4**		**LTAR =**	**0.3000**
% of Pipe Vol.		140		**Des. Flow**	480.00			**(ltar + 5%)**	0.3150
Dose Volume		250.25		**Pump Run=**	17.52			**(ltar W/ Panel Block)**	0.6000
Dose Pump Time		9.13		**Tank Gal/IN**	19			**(ltar W/ Panel Block + 5%)**	0.6300
Drawdown in Inches		13.17		**Elev. Head**	15.27				
Supply Line Length		200							

Comments: Staked on 12' centers

STB - 345 - Top Seam

Approval Date: 12 - 09 - 99

Liquid Capacity 1007 Gallons

Non Traffic Rated

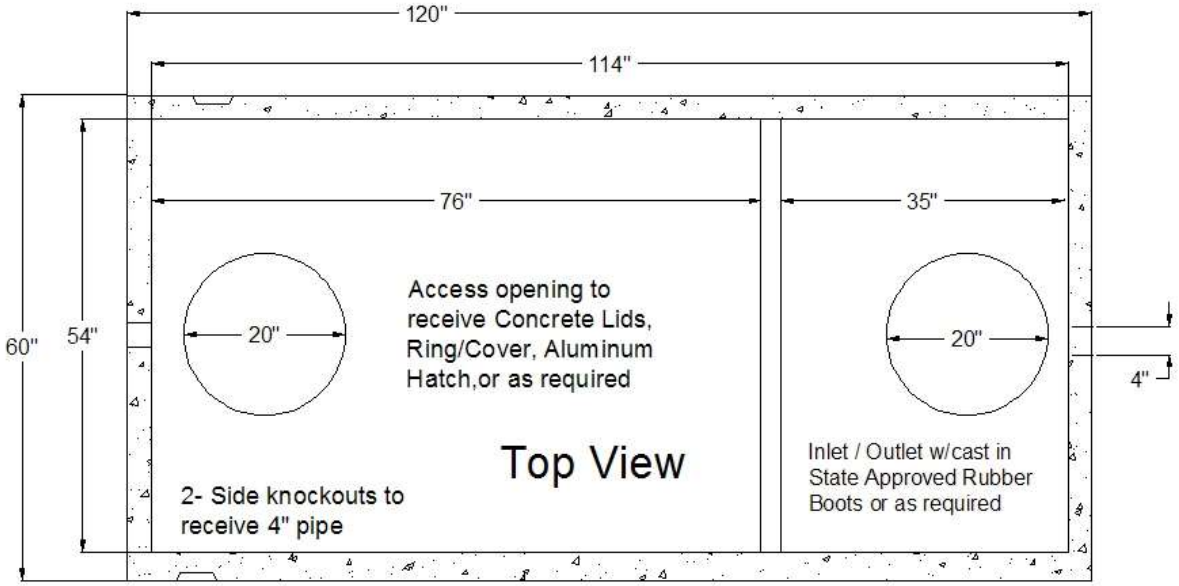
Reinforcing Schedule: # 3 Grade 60 Rebar

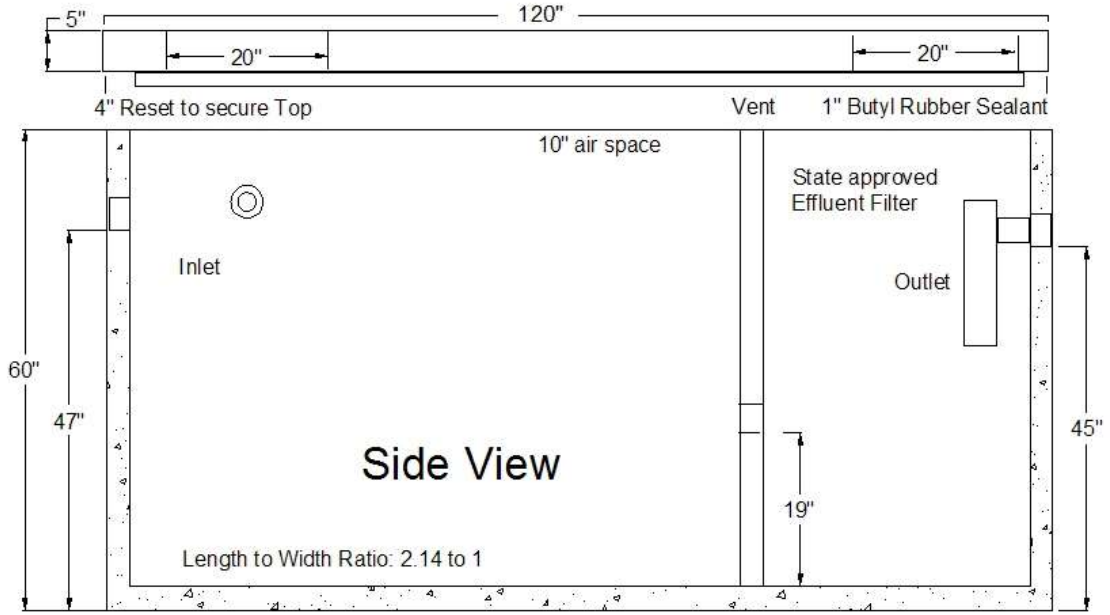
4500 PSI Concrete w/ State Approved Structural Fiber

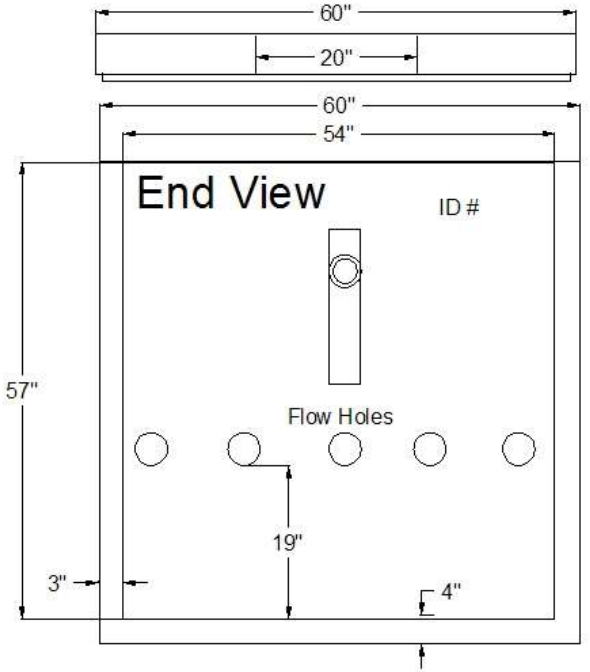
Est. Weight: 8,200 lbs.

Manufactured By:

GARNERS
Septic Tanks, Inc.
Eddie Garner, *President*
919-718-5181
121 Stanton Hill Road
Carthage, NC 28327
Fax 919-775-2229
Eddie@garnersseptictanks.com







POLYLOK™ Inc.
Innovations in Precast, Drainage & Wastewater Products
Zabel® A Division of Polylok Inc.

PL-68 Effluent Filter

PL-68 Filter and Tee

PL-68 is much more than just an effluent filter. The housing can also be used as an inlet baffle (tee) or an outlet baffle. The housing is designed to accept Polylok's snap in gas deflector to deflect gas bubbles away from the tee and to keep the solids in the tank.

Features:

- Offers 68 linear feet of 1/16" filter slots, which significantly extends time between cleaning.
- Accepts 3/4" PVC handle.
- Locks in any 360° position when used with PL-68 Tee.
- PL-68 Housing can be used as an inlet or outlet tee.
- Gasket prevents bypass.

PL-68 Installation:

Ideal for residential waste flows up to 800 gallons per day (GPD). Easily installs in any new or existing 4" outlet tee.

1. Locate the outlet of the septic tank.
2. Remove the tank cover and pump tank if necessary.
3. Glue the filter housing to the outlet pipe, or use a Polylok Extend & Lok if not enough pipe exists.
4. Insert the PL-68 filter into tee.
5. Replace and secure the septic tank cover.

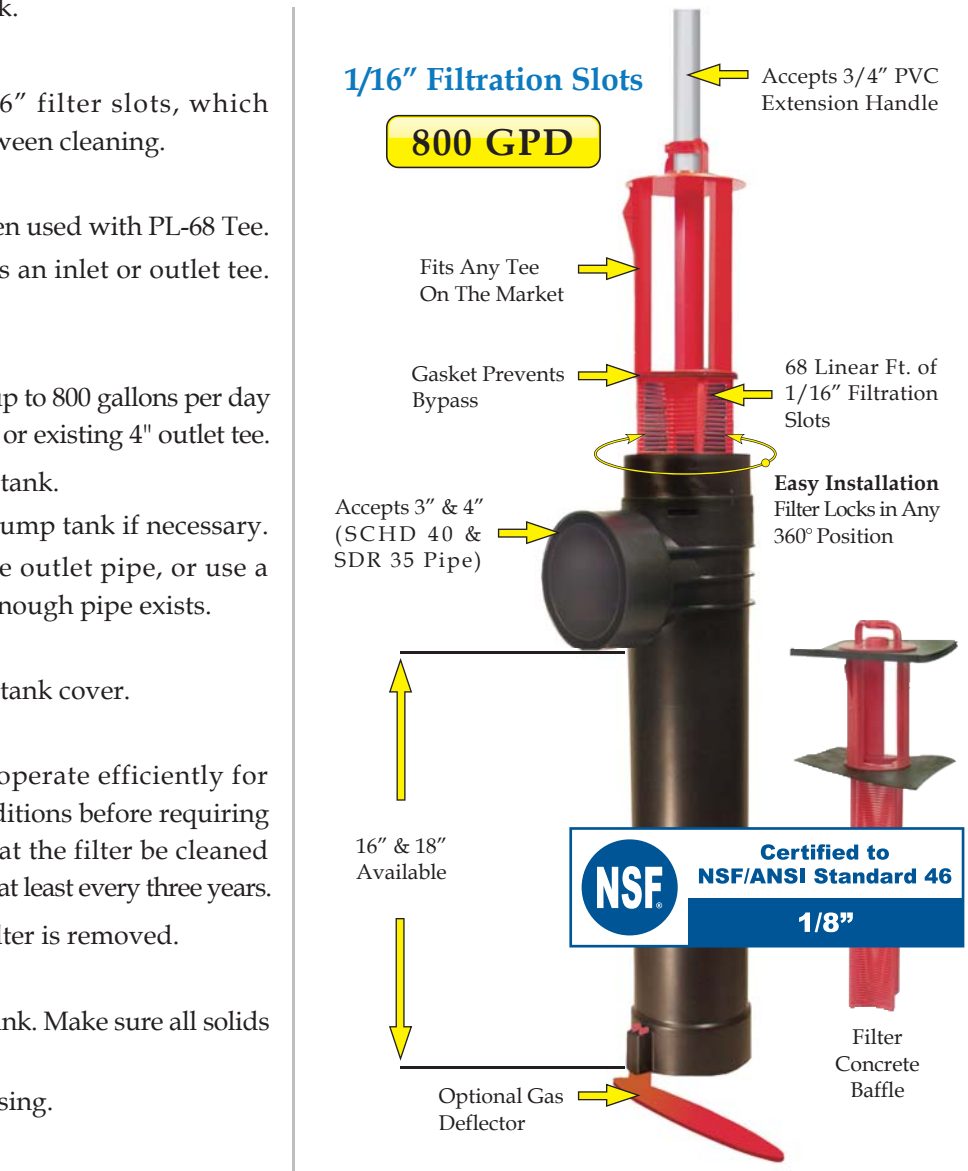
PL-68 Maintenance:

The PL-68 Effluent Filter will operate efficiently for several years under normal conditions before requiring cleaning. It is recommended that the filter be cleaned every time the tank is pumped, or at least every three years.

1. Do not use plumbing when filter is removed.
2. Pull PL-68 out of the tee.
3. Hose off filter over the septic tank. Make sure all solids fall back into septic tank.
4. Insert filter back into tee/housing.

Related Products:

PL-68 Filter Concrete Baffle
Extend & Lok™



Extend & Lok™
Easily installs into existing tanks.

Spacer Bushing 4" SCHD 40 to SDR 35

Spacer Bushing 4" SCHD 40 to 110mm Pipe

2" Extender

Crumpler's No-Rock™ Fabric Wrapped Large Diameter (LDP) Septic Pipe

Crumpler Plastic Pipe, Inc.

Manufacturers of Corrugated Plastic Drainage Pipe

Phone 910-525-4046 / (800) 334-5071

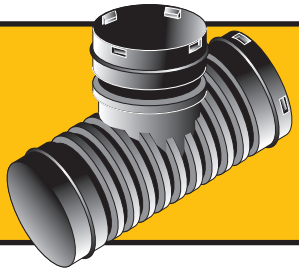
Post Office Box 2068
Roseboro, North Carolina 28382

Web Site: www.cpp-pipe.com

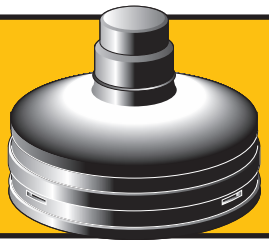
CPP-NR Rev. 9/18

Crumpler's No-Rock™ Fabric Wrapped Large Diameter (LDP) Septic Pipe

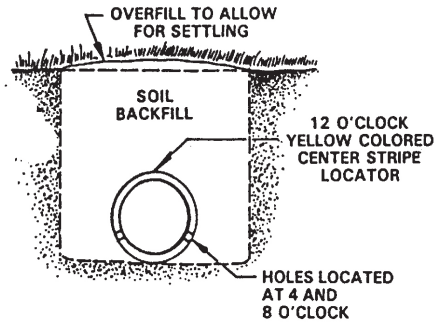
Blind Tee's

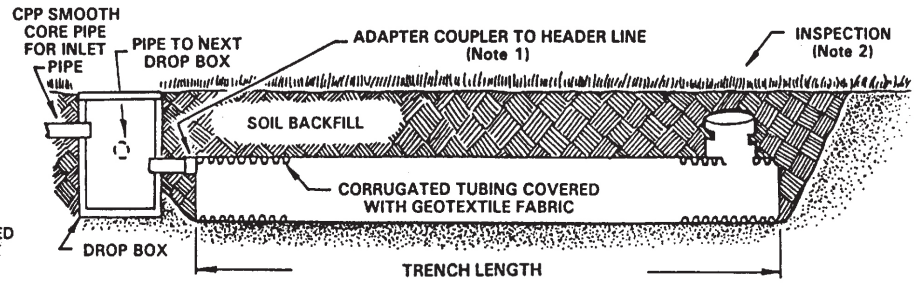


Snap Combo End Cap/4" Reducer/Adapter



CPP Gravelless LDP Trench Construction Details





Notes:

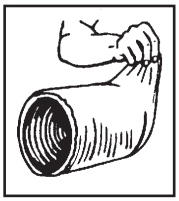
1. CPP ADAPTER TO 4" COUPLER USED TO CONNECT TO SOLID HEADERS. THE 4" ADAPTER IS ROTATED TO TOP OF PIPE.
2. CPP BLIND TEE USED FOR END-CAP. SNOUT PORT CAN BE CUT OUT FOR INSTALLING A CLEAN OUT ADAPTER THAT ALLOWS FOR POST INSTALLATION INSPECTION.

TYPE	SIZE	PART NO.	PACKAGE DESCRIPTION	PRICE
	8"	0830020B	CRUMPLER'S NO-ROCK™ SEPTIC - 20 ft. with filter wrap	
	10"	1030020B	CRUMPLER"S NO-ROCK™ SEPTIC - 20 ft. with filter wrap	

Large diameter (LDP) CPP GRAVELLESS septic tank trench systems use a filter wrap that allows for the installation of septic treatment pipes without gravel. The advantage in using CPP NO-ROCK is evident in areas where there is a shortage of inexpensive quality rock or where the shape and topography of a lot hinder the access of heavy construction equipment. Less equipment use means more trees can be saved, less lot grading is needed, and thus fuel and labor are saved. Additionally, narrow trenches for 8" and 10" CPP pipes create a reduced OC (On-Center) Spacing between parallel septic trenches. An 8" CPP pipe can fit in a 10" wide trench and a 10" CPP pipe in a 12" wide trench. Thus Lot space is saved for other uses.

- **Eliminates Rock**
- **Saves On Lot Grading**
- **Saves Trees On Lot**
- **Saves on Installation Labor**
- **Saves Fuel**
- **Increases Lot Value**

Crumpler's No-Rock™ Fabric Wrapped Large Diameter (LDP) Septic Pipe



TYPE	SIZE	PART NO.	PACKAGE DESCRIPTION	PRICE
	8"	0830020B	CRUMPLER'S NO-ROCK™ SEPTIC - 20 ft. with filter wrap	
	10"	1030020B	CRUMPLER"S NO-ROCK™ SEPTIC - 20 ft. with filter wrap	

Large diameter GRAVELLESS septic tank trench systems were developed as an alternative to 4" pipe systems in gravel-filled trenches for use in soils that most conventional 4" gravel would be allowed in. Organic Iron Ochre soils, however, are unsuitable For Filter Enclosed Gravelless Septic Pipes. The advantage in using the large diameter systems is evident in areas where there is a shortage of inexpensive quality rock, or where the shape and topography of a lot hinder the access of heavy construction equipment. The use of small trenchers for digging narrow trenches means more trees can be saved, less grading is needed, and thus fuel and labor are saved.

Crumpler's NO-ROCK™ septic systems include using either an 8" or a 10" corrugated HDPE pipe enclosed in a polypropylene filter wrap. ASTM-F-481 septic installation specification should be reviewed prior to installation. **Most states allow GRAVELLESS large diameter systems to be substituted for conventional systems in ANY SOIL TYPE deemed acceptable for a conventional system.** One should check with local septic inspectors for locally approved soils.

Crumpler's NO-ROCK™ septic system may be substituted for any conventional 4" pipe gravel trench system utilizing distribution devices, serial distribution, hillside or stepdowns. However, it should not be substituted for bed systems. It should also be limited to domestic sewage, and not used where there will be large amounts of grease or oil such as in restaurants unless designed by an engineer.

The 8" size pipe will equal to 2-foot wide conventional trench; and the 10" size will equal a 2.5 foot wide trench. To determine the required linear footage of either pipe size, first determine the square footage by dividing the design sewage flow by the appropriate soil's long term application rate. Then divide this total square footage area figure by either 2 feet (for 8") or 2.5 feet (for 10") to establish the linear footage amount. Per chart below, on center **(oc)** spacing will be determined by actual trench width.

Example: A 3-bedroom house on a loam soil
0.6 gpd/ft^2 = loam soil's long term application rate.

3BR x 120 gpd = 360 gpd
360 gpd ÷ 0.6 gpd/ft^2 = 600 ft.

600 ft^2 ÷ 2ft = 300 linear ft of 8" or
600 ft^2 ÷ 2.5 ft = 240 linear ft of 10"
600 ft^2 ÷ 3 ft = 200 ft for conventional 4" gravel

SUGGESTED INSTALLATION OF STANDARDS

Nitrification trench bottom minimum width for 8"..... 10"
Nitrification trench bottom minimum width for 10" ..... 12"
Nitrification line center spacing on 8" ..... 5' oc
Nitrification line center spacing on 10" ..... 6' oc
Nitrification trench bottom minimum depth ..... 18"
Nitrification trench bottom maximum depth (24" preferred) ..... 36"
Nitrification trench bottom slope.....level to 1" per 100 ft
Nitrification line minimum cover ..... 6"
Nitrification line maximum cover (12" preferred) ..... 24"

To eliminate voids and clods under pipes 15" - 18" trenches is recommended unless sand backfill is used.

The corrugated pipe used shall comply with ASTM-F-667. Also the installer should be careful to note that the filter wrap is light sensitive, and should not be exposed to sunlight for extended periods of time. The installer should also take care during installation to avoid tearing of the filter material. The protective plastic wrap that protects the filter should be disposed of off site.

Slope Correction Table

NOTE: Add the inches from Slope Table to the MSD[1] to determine the RSD[2]

PERCENT SLOPE	10" Trench	12" Trench	18" Trench	24" Trench	36" Trench
6	0.6	0.7	1.1	1.4	2.2
12	1.2	1.4	2.2	2.9	4.3
18	1.8	2.2	3.2	4.3	6.5
24	2.4	2.9	4.3	5.8	8.6
30	3	3.6	5.4	7.2	10.8
36	3.6	4.3	6.5	8.6	13.0
42	4.2	5.0	7.6	10.1	15.1
48	4.8	5.8	8.6	11.5	17.3
54	5.4	6.5	9.7	13.0	19.4
60	6	7.2	10.8	14.4	21.6

NOTE: For sloping sites a calcuation of the additional required soil depth is necessary using the table above or the following formula: RSD = MSD + (TW x .S)
Where; RSD = Required Soil Depth (inches),
MSD - Min. Soil Depth (Min. Soil Cover + Ht. of Sys. + Min. Separation) (in)
TW = Trench Width (inches), &
.S = Percent Slope (.00)

Example: Assume site for septic system dispersal field has a slope of 28% and the trench bottom is required to be 12 inches above a site limitation, such as, weathered rock or perched water table. Also, assume that the proposed site has a usable or acceptable soil depth of 38 inches. Further, a minimum soil cover of 6 inches is required over the dispersal system.

Trial 1: Conventional trench (36 inches wide, 12 inches gravel, 6 inches over) would require a usable soil depth of 40 inches. [40 inches RSD - 30 inches MSD + (36 inches TW x .28 S)] Thus, a conventional or 36 inch wide trench is unsuitable at this site.

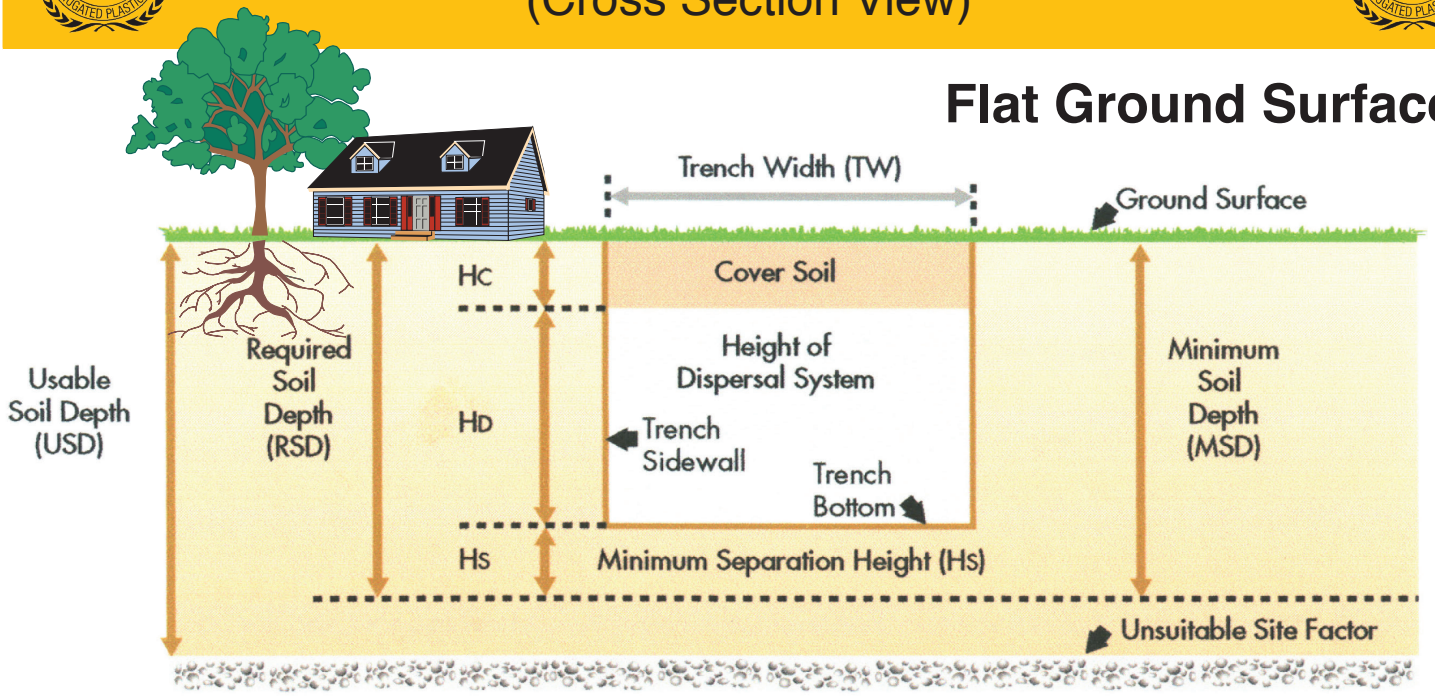
Trial 2: Crumpler NO ROCK™ 8 inch ID (10 in. OD) installed in a 12 inch wide trench would require a usable soil depth of 31.4 inches. [31.4 RSD = 28 inches MSD + (12 inches TW x .28 S)] Therefore, site is acceptable for Crumpler 8 in. NO ROCK™.

Trial 3: Crumpler NO ROCK™ 10 inch ID (12 in. OD) installed in an 18 inch wide trench would require a usable soil depth of 35 inches. [35 inches RSD = 30 inches MSD + (18 inches TW x .28 S)] Therefore, site is acceptable for Crumpler 10 inch NO ROCK™.

[1] **MSD** is the minimum soil depth at 0% slope and is the sum of the min. separation distance between trench bottom and limiting horizon (typ. 12 in), plus the system height, plus the min. soil cover (typ. 6 in.).
[2] **RSD** is the required soil depth to install a trench on a sloping site with the added inches to meet the minimum separation distance on the uphill side of the trench.

Septic Effluent Disposal Trenches on Sloping Sites
(Cross Section View)

Flat Ground Surface



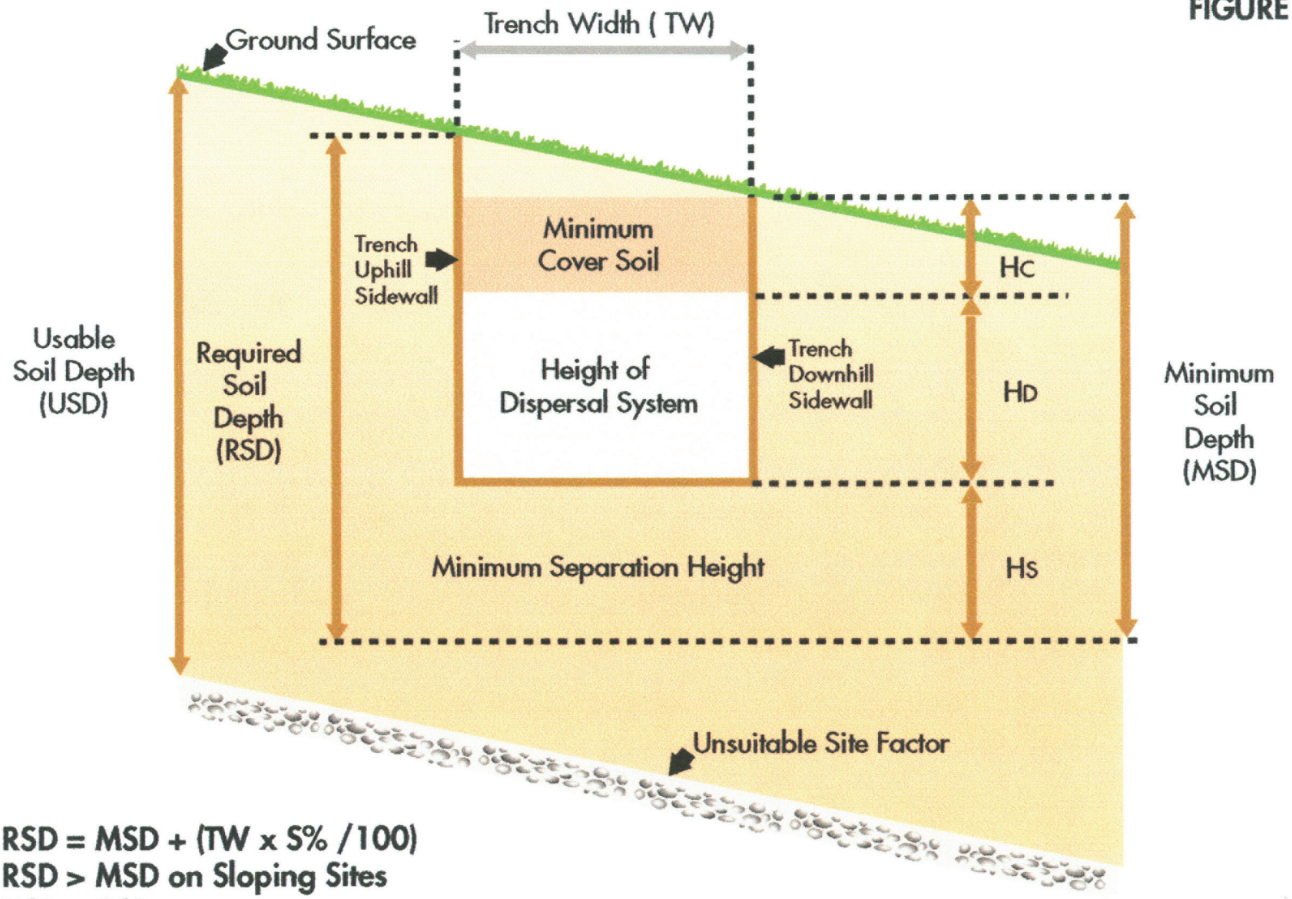
MSD = Hc + HD + Hs
MSD = RSD on Flat Sites

Not To Scale

FIGURE 1

Sloping ground Surface

FIGURE 2

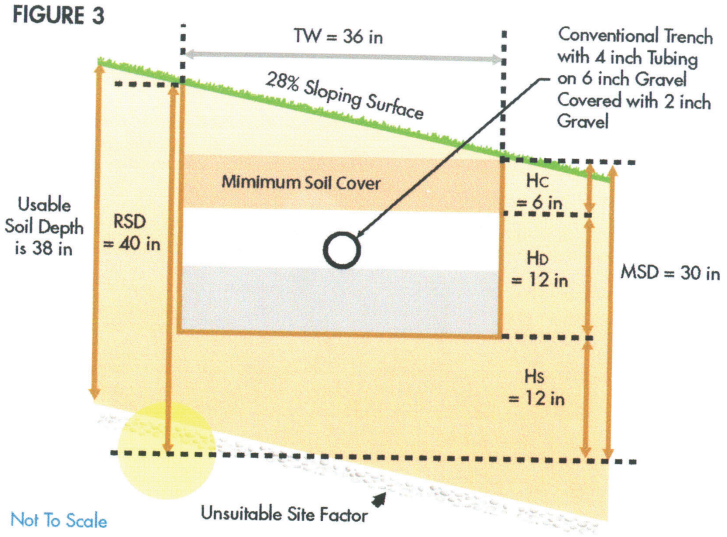


RSD = MSD + (TW x S% /100)
RSD > MSD on Sloping Sites
USD ≥ RSD

Not To Scale

Septic Effluent Disposal Trenches on Sloping Sites (Cross Section View)

FIGURE 3



Septic Effluent Disposal Trenches on Sloping Sites *(Cross Section)* Trial No. 1

Site has 28% slope and soil is 38 inches deep

Trial No. 1: Use 36 inch wide conventional trench system

MSD = 6 in + 12 in + 12 in = 30 inches

RSD = 30 in (36 in x 28%/100) = 40 inches

RSD (40 in) > USD (38 in)

Proposed System **Unsuitable** for Slope

Septic Effluent Disposal Trenches on Sloping Sites *(Cross Section)* Trial No. 2

Site has 28% slope and soil is 38 inches deep

Trial No. 2: Use CPP 8 inch NO-ROCK™ with 12 inch wide trench.

MSD = 6 in + 10 in + 12 in = 28 inches

RSD = 30 in (12 in x 28%/100) = 31.4 inches

USD (38 in) > RSD (31.4 in)

Proposed **CPP 8 inch NO-ROCK™ Suitable** for Slope

FIGURE 4

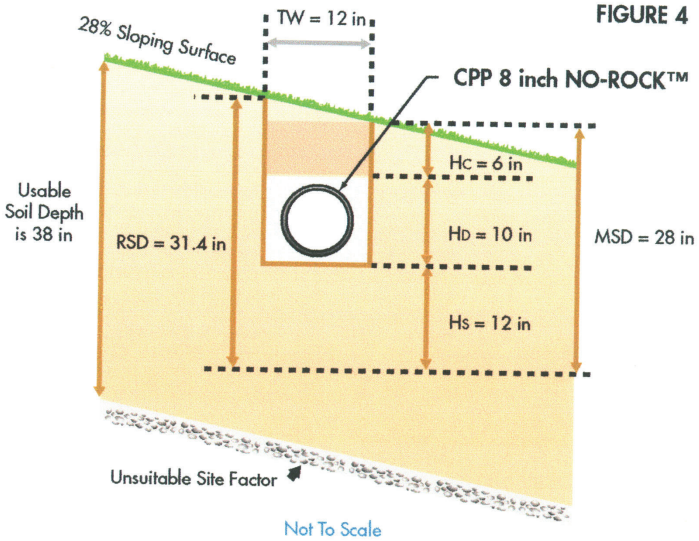
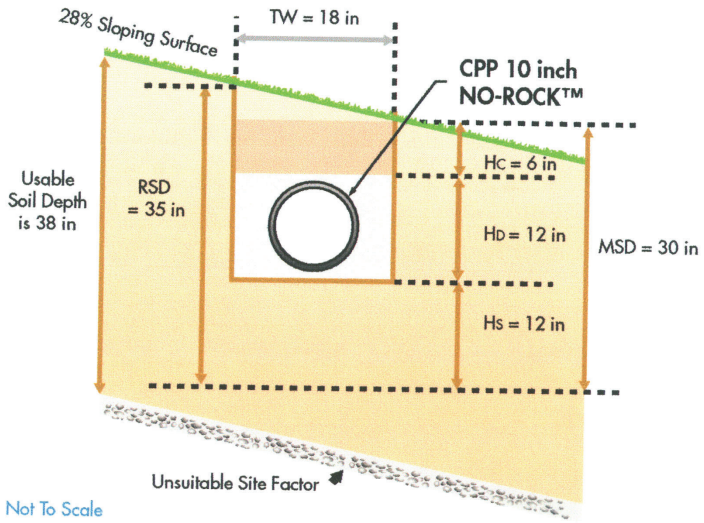


FIGURE 5



Septic Effluent Disposal Trenches on Sloping Sites *(Cross Section)* Trial No. 3

Site has 28% slope and soil is 38 inches deep

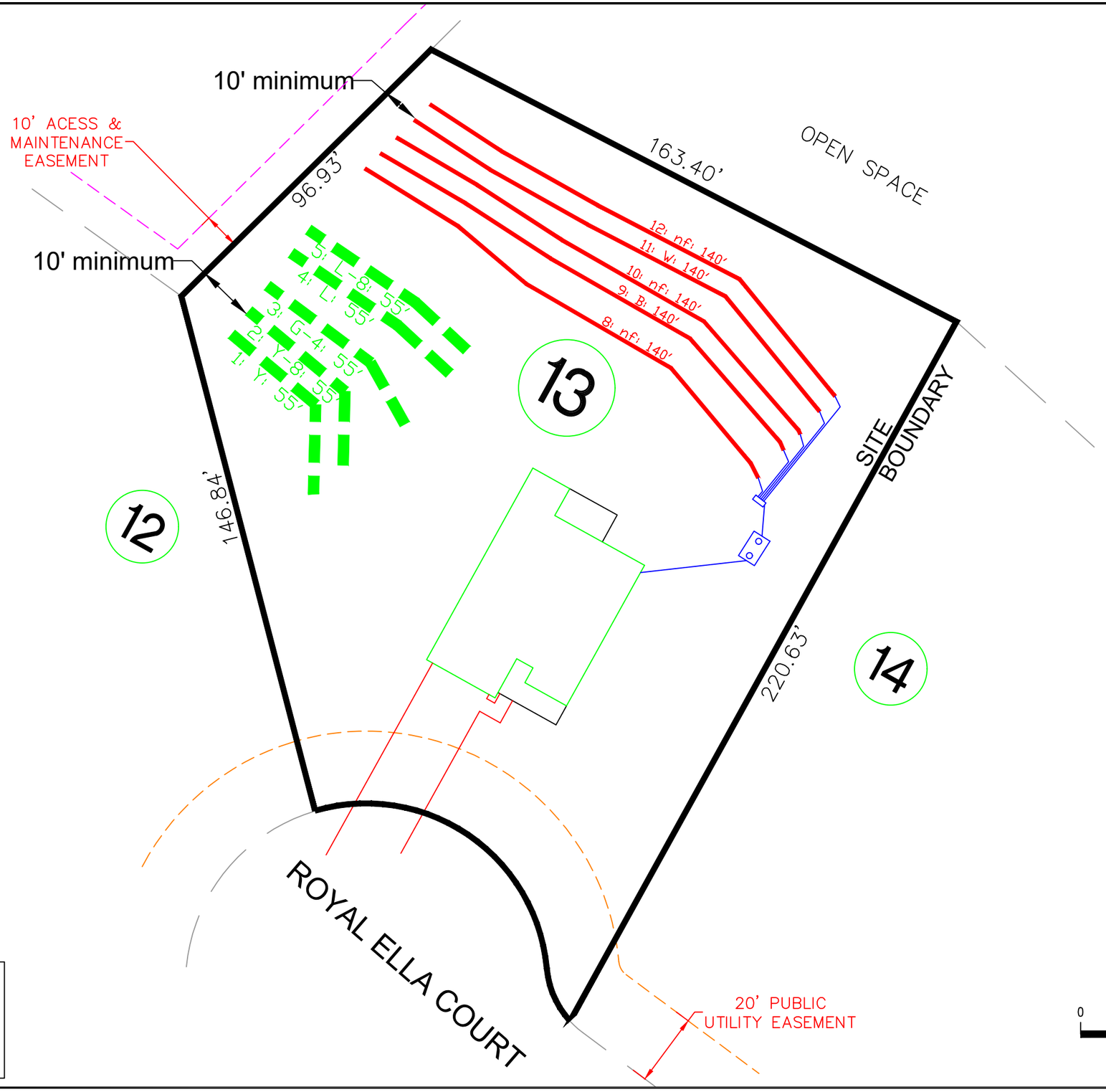
Trial No. 3: Use CPP 10 inch NO-ROCK™ with 18 inch wide trench.

MSD = 6 in + 12 in + 12 in = 30 inches

RSD = 30 in (18 in x 28%/100) = 35 inches

USD (38 in) > RSD (35 in)

Proposed **CPP 10 inch NO-ROCK™ Suitable** for Slope



4-Bedroom
LTAR: 0.3 gpd/ft^2
Initial: Gravity 10" Large Diameter Pipe utilizing lines 8-12 (700')
Repair: Pump-to-Vertical Panel Block utilizing lines 1-5 (275')

REVISION NO.	DATE
Original Submittal	January 11, 2022
Revision 1	-----
Revision 2	-----
Revision 3	-----
Master Set	-----

SHEET NUMBER
1 of 5

Prince Place
Lot 13
Overall Septic

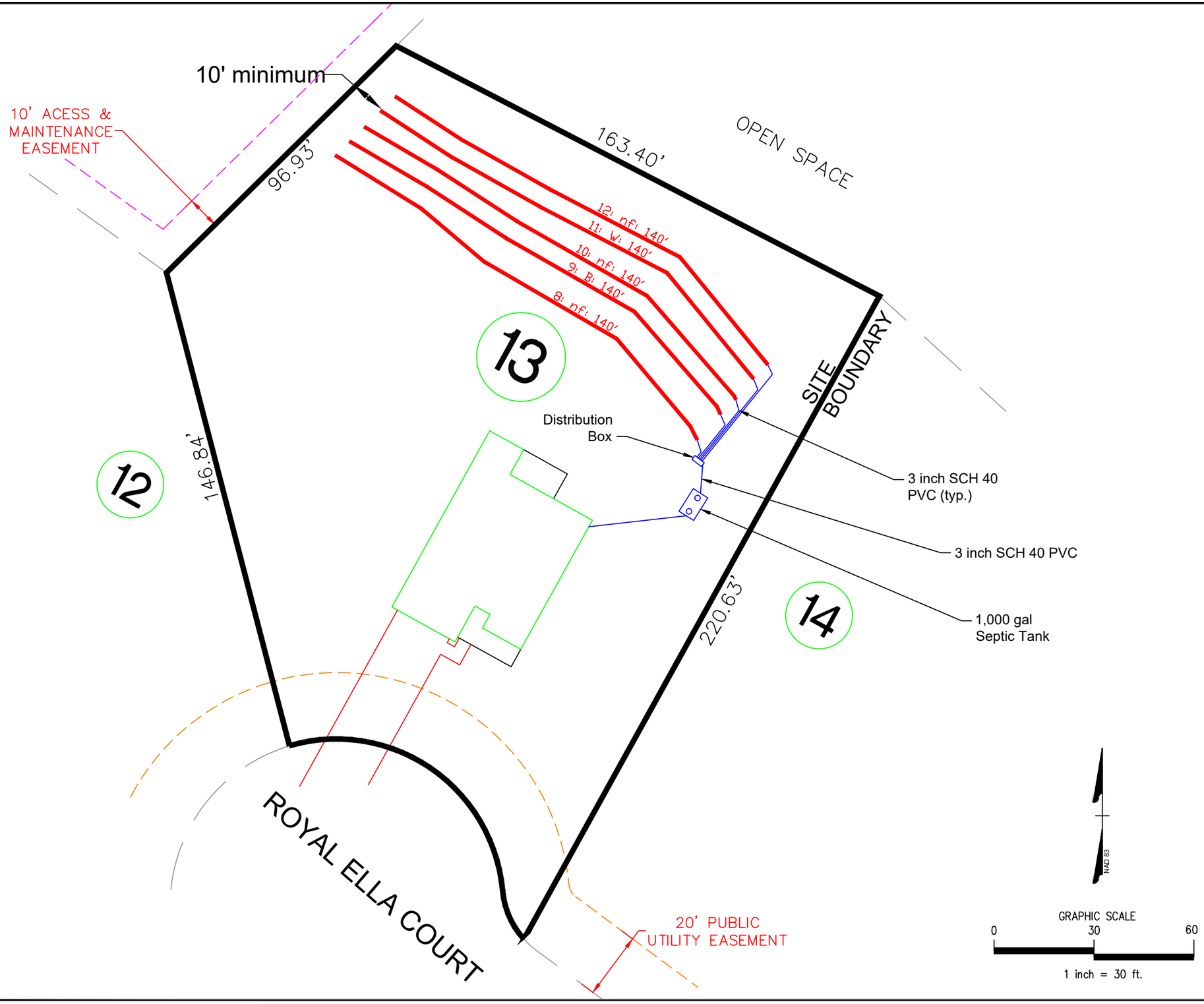
PREPARED FOR : Triple A Homes
PO Box 1117
Holly Springs, NC 27540

DATE : January 11, 2022

DESIGNER CONTACT:
ADAM AYCOCK, EI

DRAWN BY:
ADAM AYCOCK, EI

MITCHELL ENVIRONMENTAL, PA
C-2911
1501 LAKESTONE VILLAGE LANE
SUITE 205
FUQUAY VARINA, NC 27526



SHEET NUMBER	2 of 5

Prince Place
Lot 13
Initial Nitrification Field

REVISION NO.	DATE
Original Submittal	January 11, 2022
Revision 1	-----
Revision 2	-----
Revision 3	-----
Master Set	-----

PREPARED FOR : Triple A Homes
PO Box 1117
Holly Springs, NC 27540

DATE : January 11, 2022

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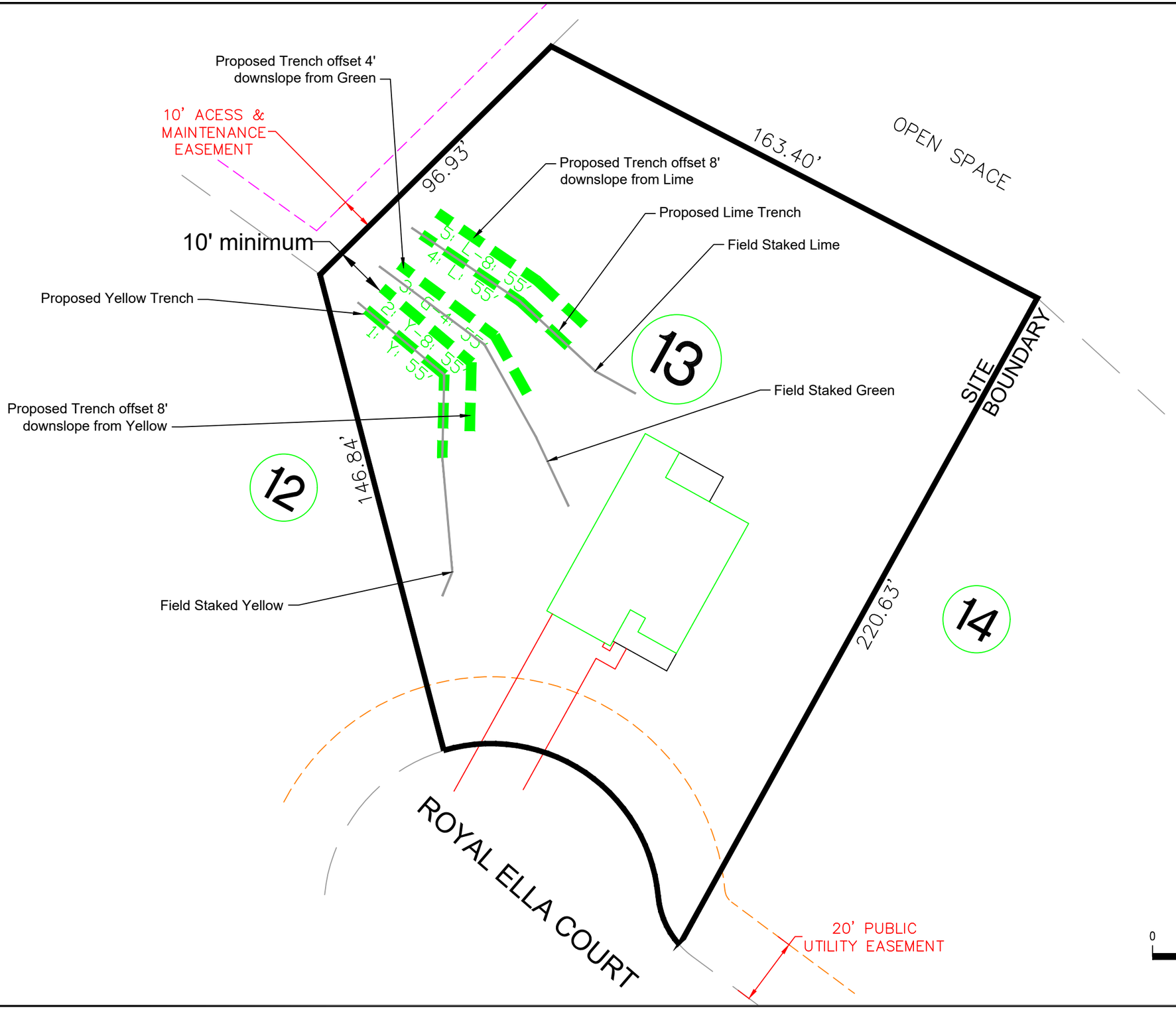

SHEET NUMBER

3 of 5

Prince Place
Lot 13
Repair Nitrification Field

REVISION NO.	DATE
Original Submittal	January 11, 2022
Revision 1	-----
Revision 2	-----
Revision 3	-----
Master Set	-----

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PO Box 1117
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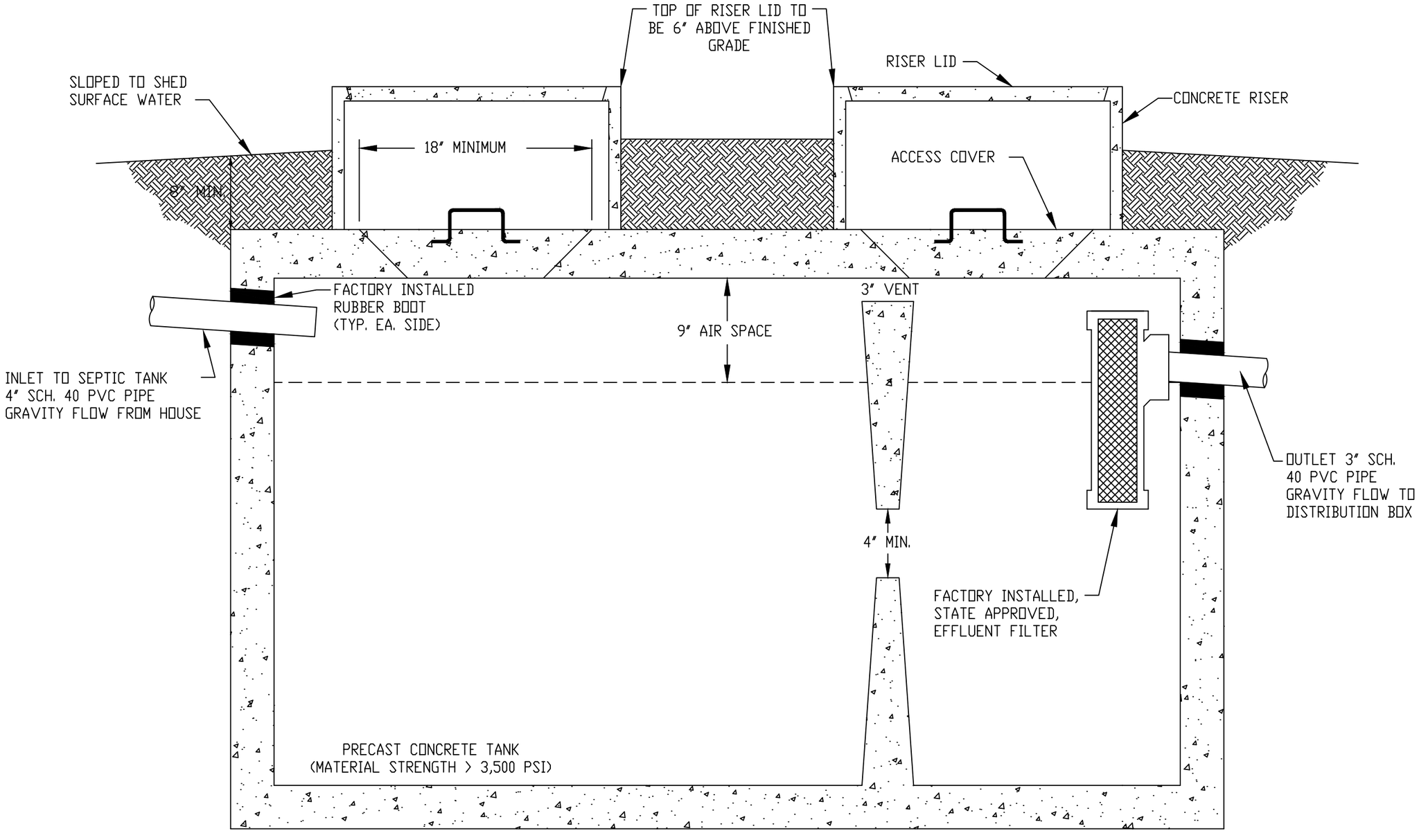

1,000 GALLON SEPTIC TANK

SEPTIC TANK DETAIL

N.T.S.

SHEET NUMBER 4 of 5

Prince Place
Lot 13
Septic Tank Detail

REVISION NO.	DATE
Original Submittal	January 11, 2022
Revision 1	-----
Revision 2	-----
Revision 3	-----
Master Set	-----

PREPARED FOR : Triple A Homes
PO Box 1117
Holly Springs, NC 27540

DATE : January 11, 2022

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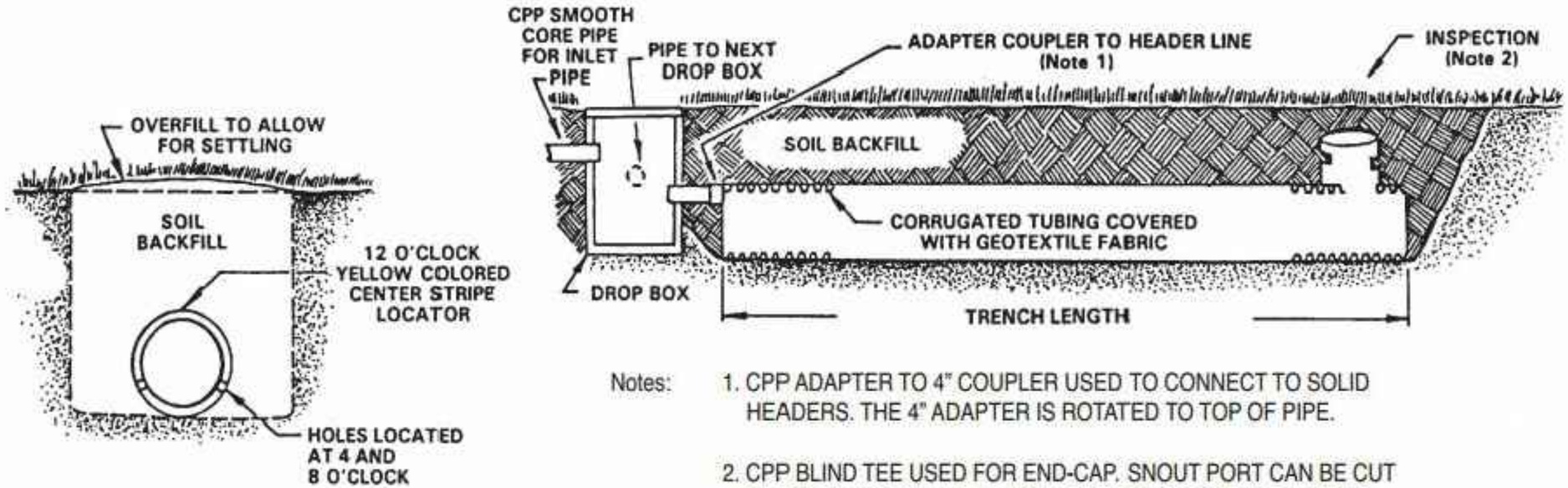
C-2911
1501 LAKESTONE VILLAGE LANE
SUITE 205
FUQUAY VARINA, NC 27526

CPP Gravelless LDP Trench Construction Details



Notes:

1. CPP ADAPTER TO 4" COUPLER USED TO CONNECT TO SOLID HEADERS. THE 4" ADAPTER IS ROTATED TO TOP OF PIPE.

2. CPP BLIND TEE USED FOR END-CAP. SNOUT PORT CAN BE CUT OUT FOR INSTALLING A CLEAN OUT ADAPTER THAT ALLOWS FOR POST INSTALLATION INSPECTION.

REVISION NO.	DATE
Original Submittal	January 11, 2022
Revision 1	-----
Revision 2	-----
Revision 3	-----
Master Set	-----

SHEET NUMBER

5 of 5

Prince Place
Lot 13
Large Diameter Pipe Detail

PREPARED FOR : Triple A Homes
PO Box 1117
Holly Springs, NC 27540

DATE : January 11, 2022

DESIGNER CONTACT:
Crumpler Plastic Pipe

DRAWN BY:
Crumpler Plastic Pipe

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