

October 17, 2014

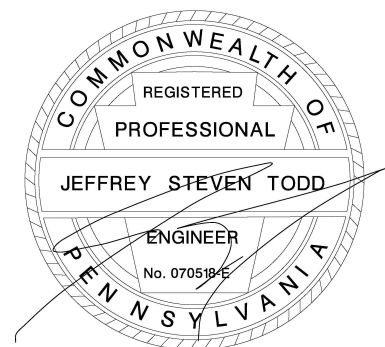
Access Improvements Associated with Ardrossan Farm  
Radnor Township, Delaware County  
Newtown Road (SR 1021)  
TPD Job # ESII.A.00001

## DRAINAGE NARRATIVE

Analyses have been performed for the spread of flow across Road B and Road C, two proposed accesses to Newtown Road (SR 1021). The enclosed drainage calculations indicate that the spread of flow at Road B meets PennDOT allowable criteria in accordance with Publication 13M Design Manual 2. The post-development spread at Road C represents a 27% reduction compared to pre-development conditions.

Attached are the calculations for the peak flow and spread of flow for the 10-year frequency storm with a 5-minute time of concentration as required by PennDOT. The drainage areas used for the computations can be found in attached plan sheets.

Gutter Spread Points of Interest	Pre-Dev. Spread (ft)	Post-Dev. Spread (ft)	Difference (ft)	Percent Change
P.O.I. #1 – Road C across from Abrahams Road STA 150+00.00 RT	21.60	15.75	-5.85	-27.08%





Job No: ESII.A.00001  
 Description: Ardrossan Farm  
 Traffic Planning & Design

Computed By: BF  
 Checked By: \_\_\_\_\_

Date: 10-21-14  
 Date: \_\_\_\_\_

### Pre-Development Weighted Runoff Factor and Peak Discharge Computation

Peak Discharge  
 $Q = (C) \times (I) \times (A)$

Runoff Factor "C"			
Concrete	0.95	Light Growth	0.30
Asphalt	0.90	Woods/Heavy Growth	0.25
Residential	0.55		

Design Storm =  
**10**

Area Number	Total Area	Concrete	Asphalt	Residential	Light Growth	Woods/Heavy Growth	Weighted "C" Value	Tc	Map	PA Region	Rainfall Intensity	Peak Discharge	Remarks
	(Ac.)	(Ac.)	(Ac.)	(Ac.)	(Ac.)	(Ac.)		minutes			(Inches/Hr.)	(cfs)	
DA Road C Spread	12.243	0.000	0.425	0.000	11.818	0.000	0.32	5.0	C	4.0	6.60	25.924	STA 150+00.00 RT

<b>Overall Total</b>	12.24	0.00	0.43	0.00	11.82	0.00						25.92	
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### Post-Development Weighted Runoff Factor and Peak Discharge Computation

Peak Discharge  
 $Q = (C) \times (I) \times (A)$

Runoff Factor "C"			
Concrete	0.95	Light Growth	0.30
Asphalt	0.90	Woods/Heavy Growth	0.25
Residential	0.55		

Design Storm =  
**10**

Area Number	Total Area	Concrete	Asphalt	Residential	Light Growth	Woods/Heavy Growth	Weighted "C" Value	Tc	Map	PA Region	Rainfall Intensity	Peak Discharge	Remarks
	(Ac.)	(Ac.)	(Ac.)	(Ac.)	(Ac.)	(Ac.)		minutes			(Inches/Hr.)	(cfs)	
DA Road B Spread	<b>0.003</b>	0.000	0.003	0.000	0.000	0.000	<b>0.90</b>	5.0	C	<b>4.0</b>	6.60	<b>0.018</b>	STA 163+40.01 RT
DA Road C Spread	<b>3.052</b>	0.000	0.399	0.000	2.653	0.000	<b>0.38</b>	5.0	C	<b>4.0</b>	6.60	<b>7.623</b>	STA 150+00.00 RT

<b>Overall Total</b>	<b>3.06</b>	0.00	0.40	0.00	2.65	0.00						<b>7.64</b>	
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# Channel Report

Hydraflow Express by Intelisolve

Tuesday, Oct 21 2014

## ESII.A.1 Road B Spread

### User-defined

Invert Elev (ft) = 429.72  
Slope (%) = 0.10  
N-Value = 0.015

### Highlighted

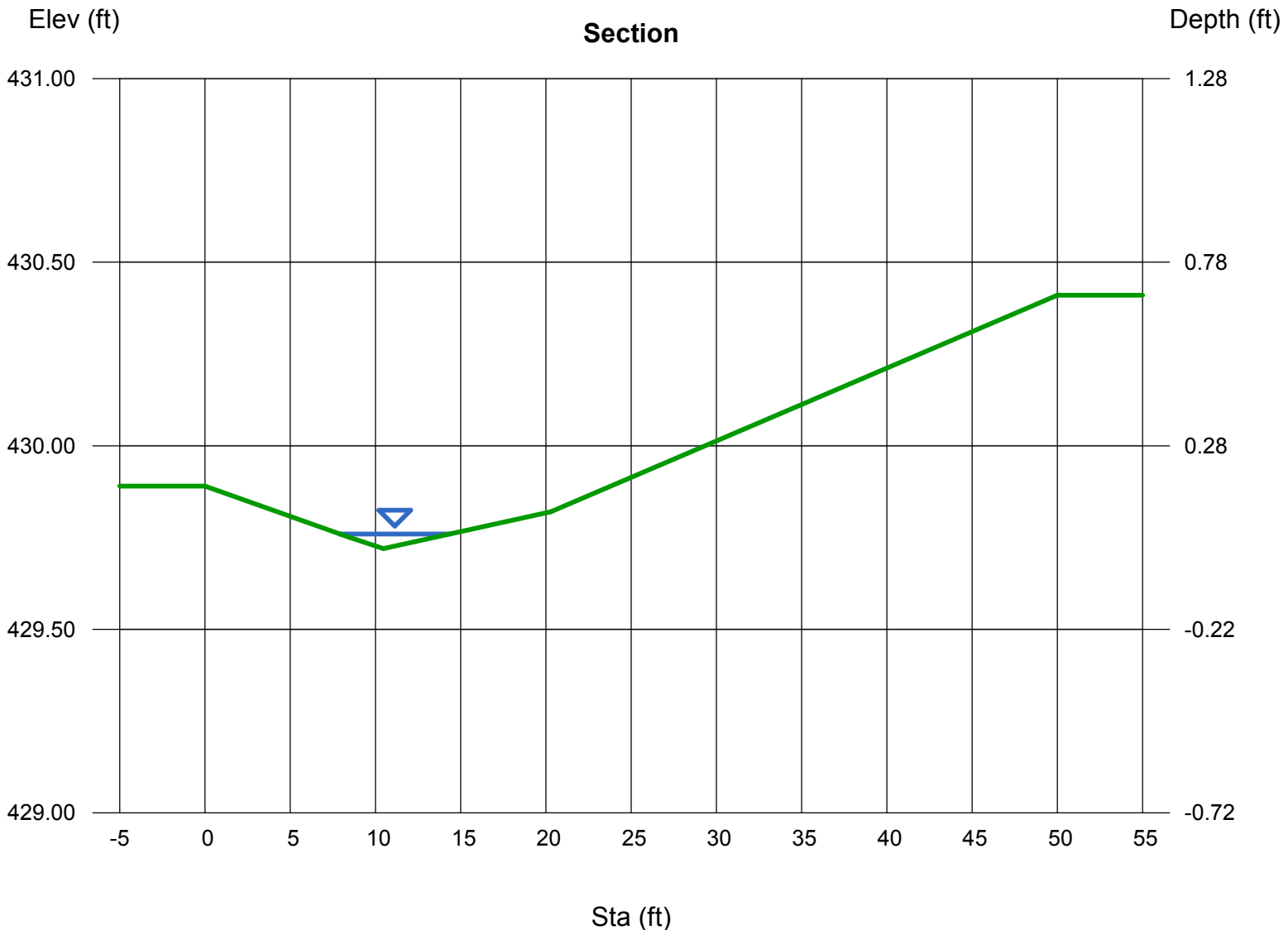
Depth (ft) = 0.04  
Q (cfs) = 0.020  
Area (sqft) = 0.13  
Velocity (ft/s) = 0.15  
Wetted Perim (ft) = 6.51  
Crit Depth, Yc (ft) = 0.03  
Top Width (ft) = 6.51  
EGL (ft) = 0.04

### Calculations

Compute by: Known Q  
Known Q (cfs) = 0.02

### (Sta, El, n)-(Sta, El, n)...

(0.00, 429.89)-(8.49, 429.75, 0.015)-(10.46, 429.72, 0.015)-(20.28, 429.82, 0.015)-(50.00, 430.41, 0.015)



# Channel Report

Hydraflow Express by Intelisolve

Tuesday, Oct 21 2014

## ESII.A.1 Existing Road C Spread

### User-defined

Invert Elev (ft) = 386.44  
Slope (%) = 1.46  
N-Value = 0.015

### Highlighted

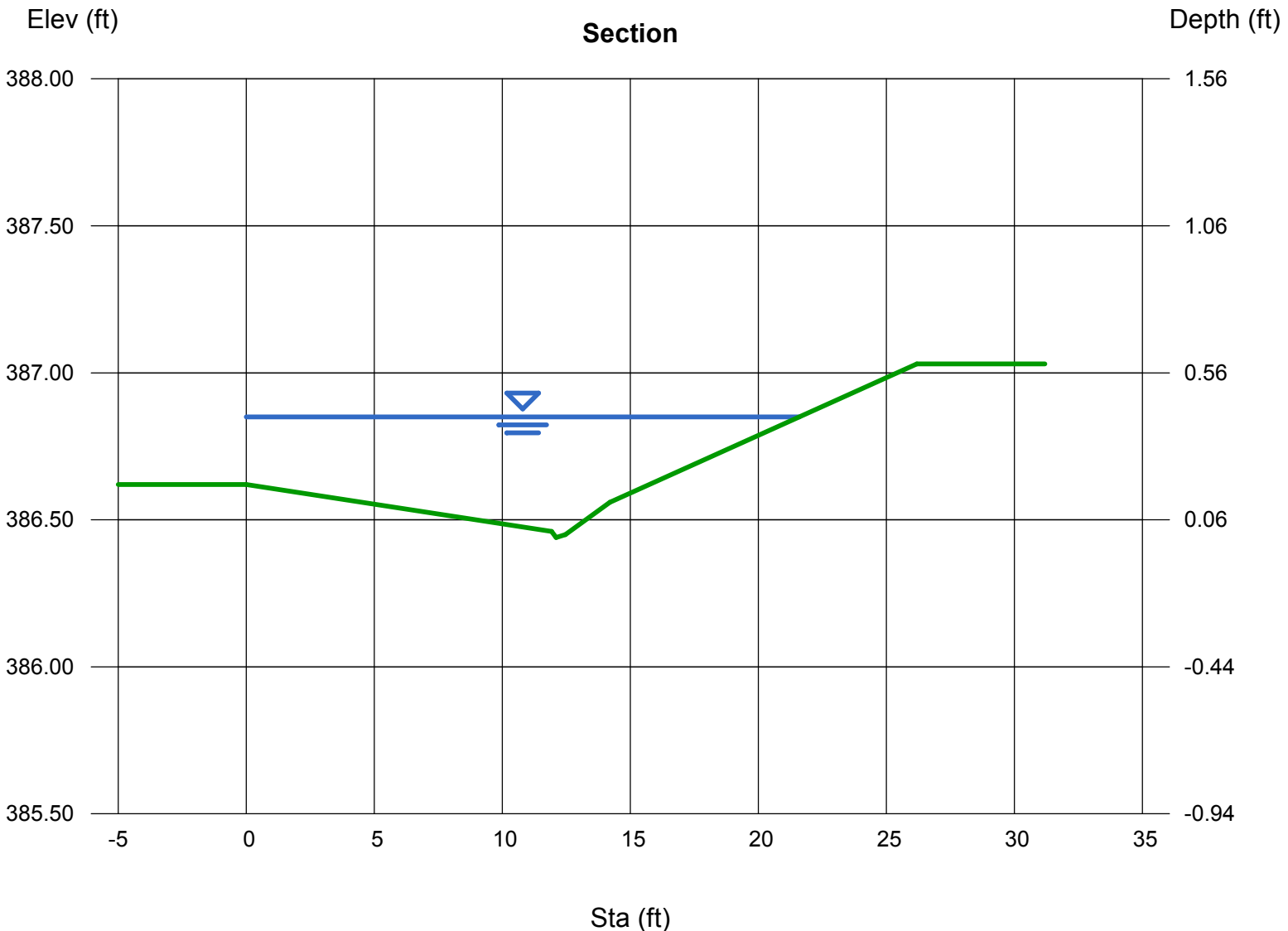
Depth (ft) = 0.41  
Q (cfs) = 25.92  
Area (sqft) = 5.59  
Velocity (ft/s) = 4.64  
Wetted Perim (ft) = 21.61  
Crit Depth, Yc (ft) = 0.52  
Top Width (ft) = 21.60  
EGL (ft) = 0.74

### Calculations

Compute by: Known Q  
Known Q (cfs) = 25.92

### (Sta, El, n)-(Sta, El, n)...

(0.00, 386.62)-(11.93, 386.46, 0.015)-(12.10, 386.44, 0.015)-(12.46, 386.45, 0.015)-(14.20, 386.56, 0.015)-(26.19, 387.03, 0.015)



# Channel Report

Hydraflow Express by Intelisolve

Tuesday, Oct 21 2014

## ESII.A.1 Road C Spread

### User-defined

Invert Elev (ft) = 386.47  
Slope (%) = 1.82  
N-Value = 0.015

### Calculations

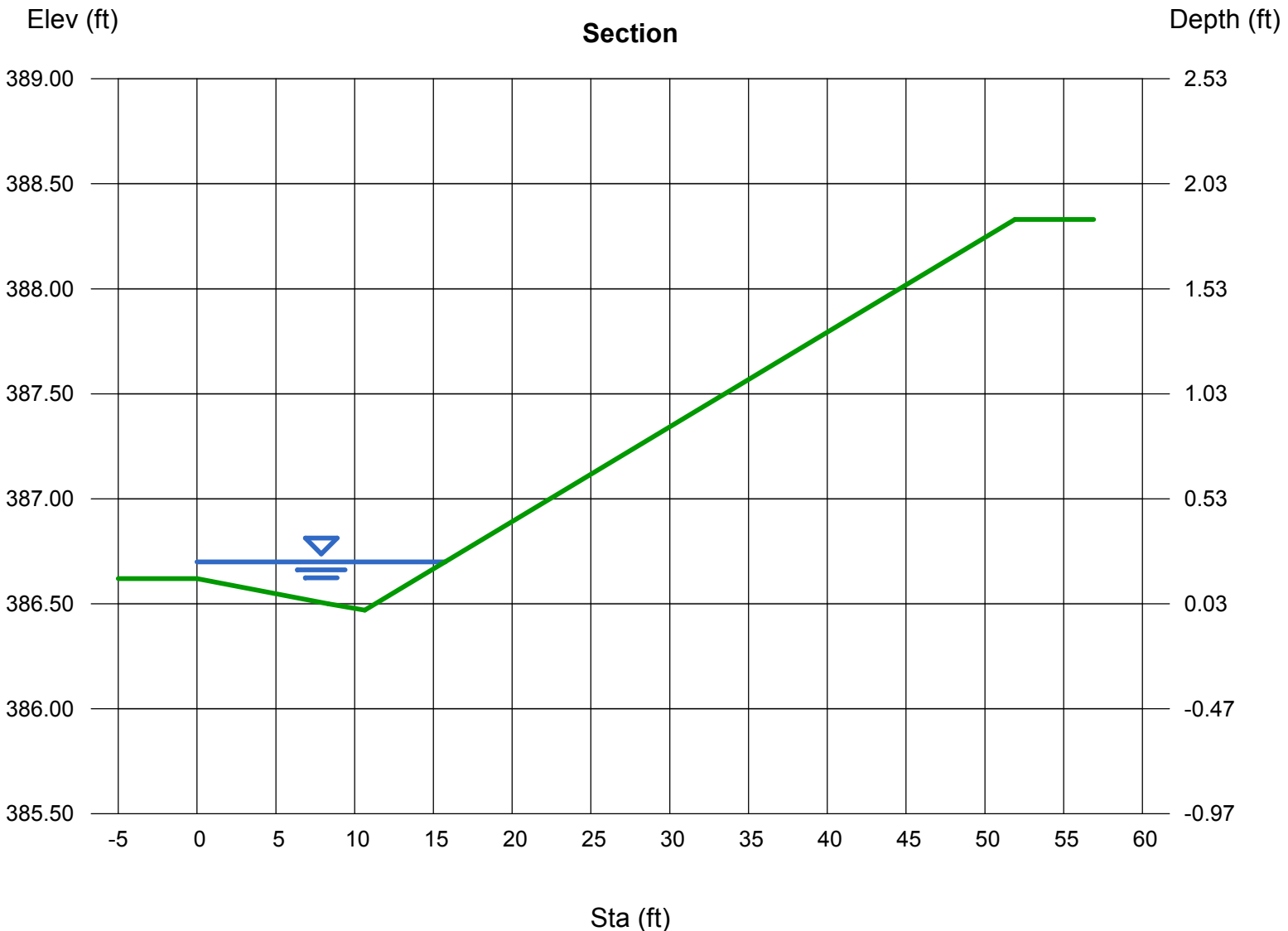
Compute by: Known Q  
Known Q (cfs) = 7.61

### Highlighted

Depth (ft) = 0.23  
Q (cfs) = 7.610  
Area (sqft) = 2.25  
Velocity (ft/s) = 3.38  
Wetted Perim (ft) = 15.76  
Crit Depth, Yc (ft) = 0.29  
Top Width (ft) = 15.75  
EGL (ft) = 0.41

### (Sta, El, n)-(Sta, El, n)...

(0.00, 386.62)-(8.32, 386.50, 0.015)-(10.65, 386.47, 0.015)-(51.91, 388.33, 0.015)

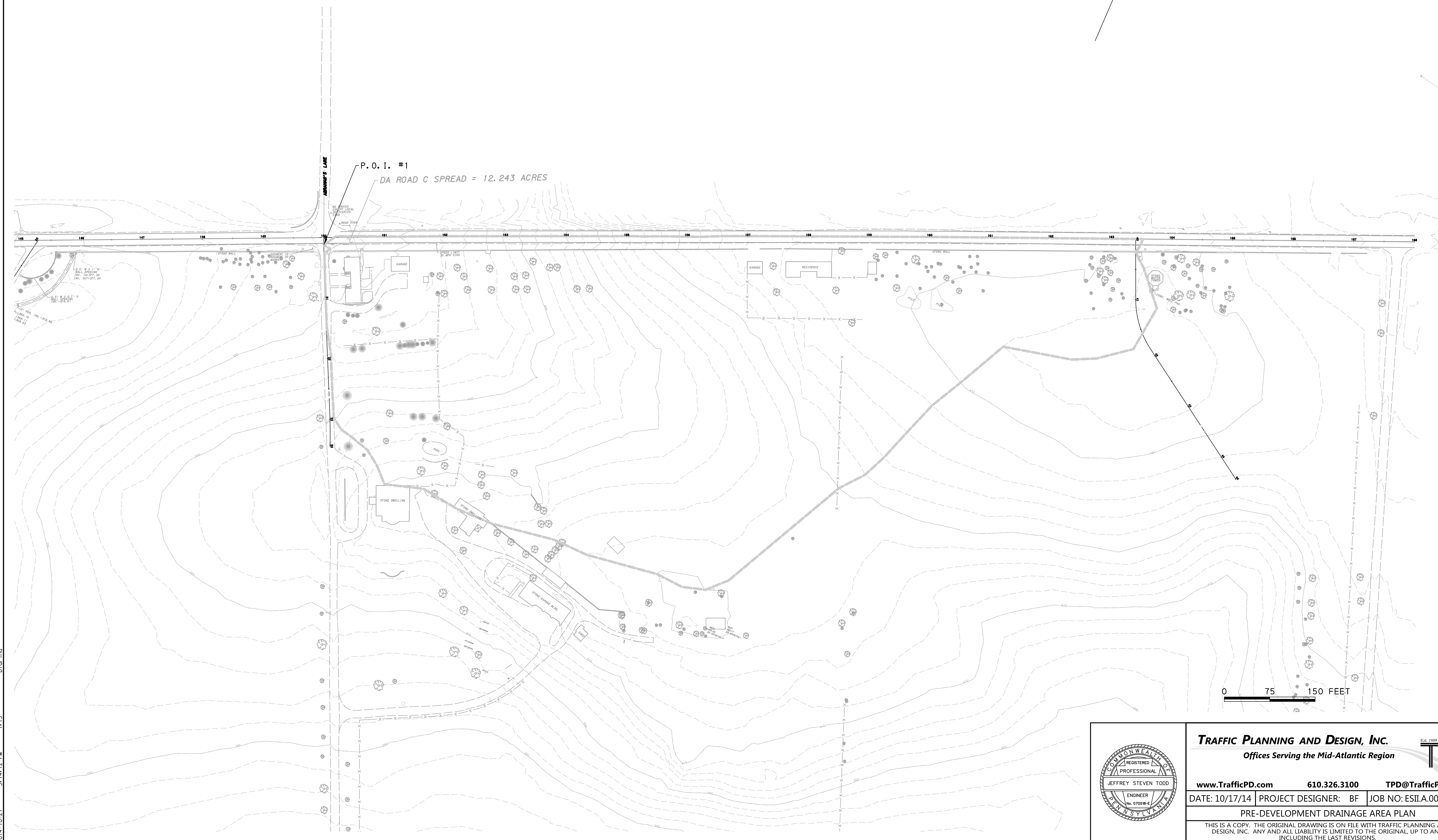
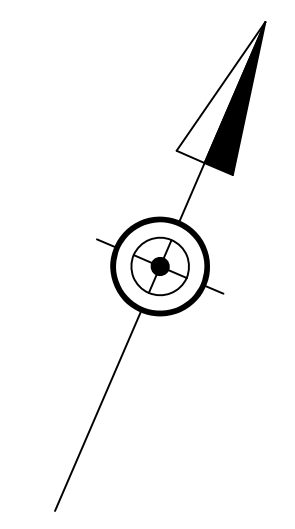


DISTRICT	COUNTY	ROUTE	SECTION	SHEET
6-0	DELAWARE	1021		1 OF 2
RADNOR TOWNSHIP				
REVISION NUMBER	REVISIONS			DATE BY

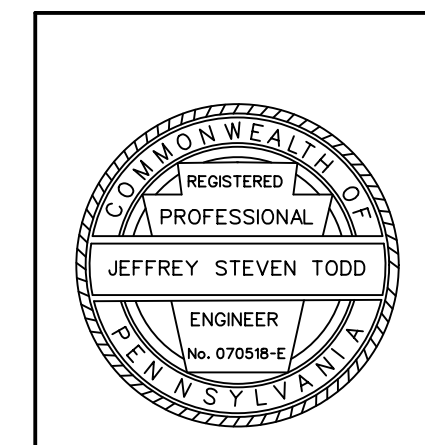
**LEGEND**

— DRAINAGE BOUNDARY

- - - SPREAD DRAINAGE BOUNDARY



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DATE: 10/17/14	PROJECT DESIGNER: BF	JOB NO: ESIIA.00001
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**PRE-DEVELOPMENT DRAINAGE AREA PLAN**

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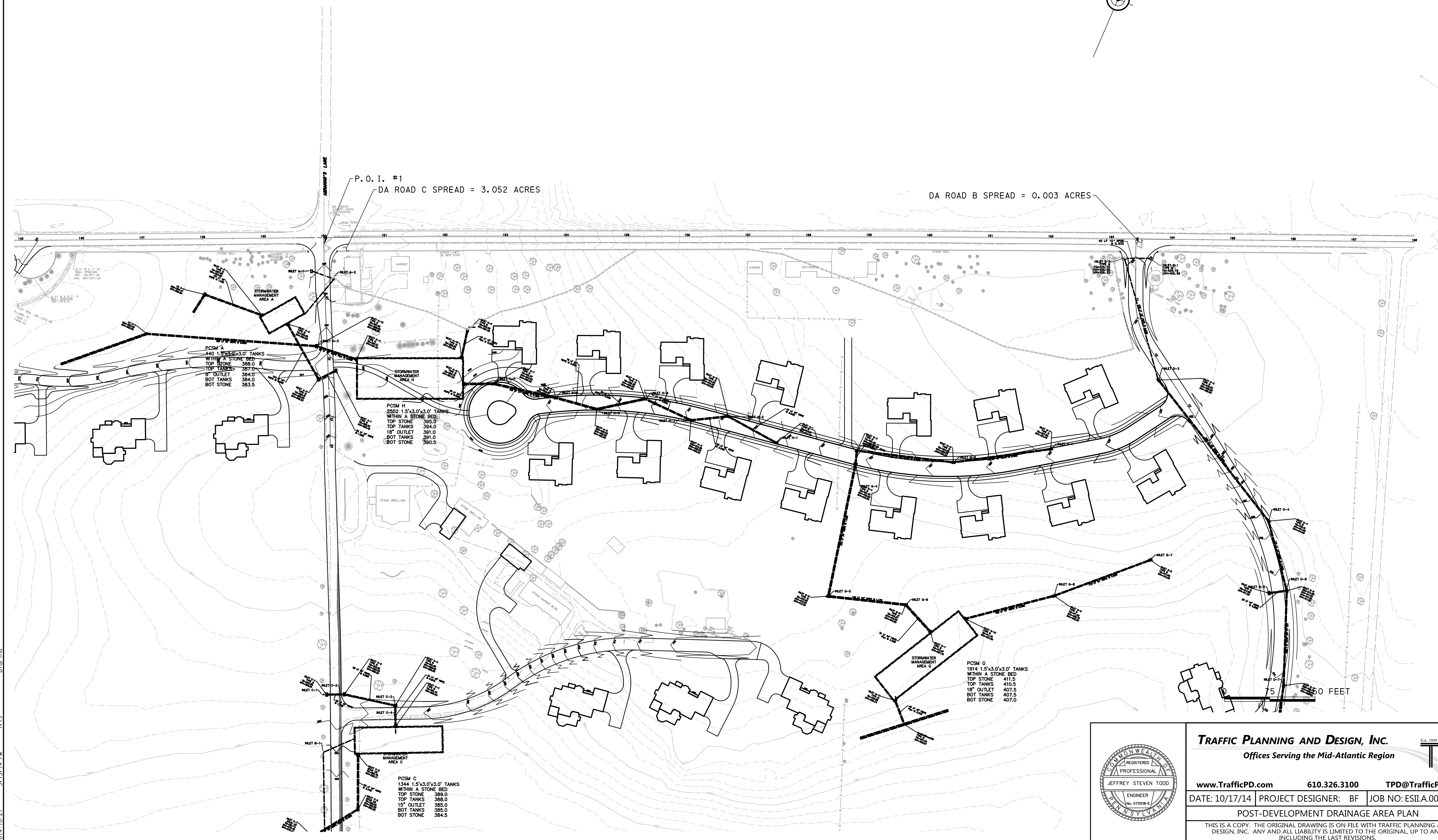
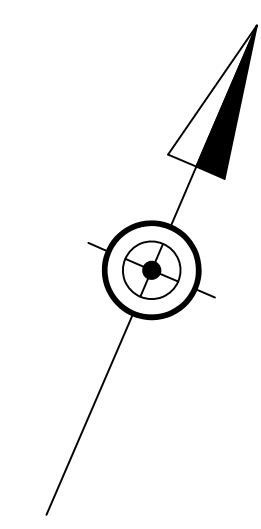
DRN BY: JLE

DISTRICT	COUNTY	ROUTE	SECTION	SHEET
6-0	DELAWARE	1021		2 OF 2
RADNOR TOWNSHIP				
REVISION NUMBER	REVISIONS	DATE	BY	

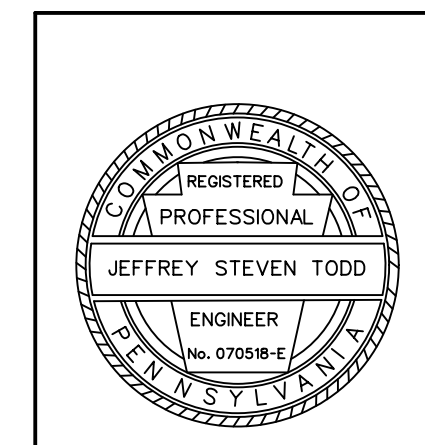
**LEGEND**

——— - DRAINAGE BOUNDARY

- - - - - SPREAD DRAINAGE BOUNDARY



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DATE: 10/17/14 PROJECT DESIGNER: BF JOB NO: ESIIA.00001

POST-DEVELOPMENT DRAINAGE AREA PLAN

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