

Engineering Services
Stormwater

Stormwater Regulations Update for Home Builders

September 30, 2024



Agenda

- | | |
|-------------|-------------------------------|
| 8:00 – 8:30 | Arrival, Bagels & Coffee |
| 8:30-10:00 | Presentation |
| 10:00-11:00 | Staff Available for Questions |

Presentation Topics

- Overview of changes
- Lot Grading Plan – New Requirement
- Impervious Limits Updates
- ESC Updates
- Stormwater Conveyance Permit – New Requirement
- Flood Studies Update

Raleigh Stormwater Plan Review Team

Supervisor:

- Sally Hoyt, PE

Senior Reviewers:

- Nathan Burdick, CFM*
- Sean Eggleston
- Kendall Kausler, PE, CFM
- Ross Keith
- Alan Reyes, PE

Reviewers:

- Lauren Poole
- Brian McHouell, CFM
- Molly Zahorian, EIT, CFM

Senior Specialist:

- Donnell Perry

**Part-Time*

Why Changes?

- Address frequent concerns
- Design Manual hadn't been changed since 2001
- Ensure quality infrastructure

Where to Find the Changes

- Google “Raleigh Stormwater Manual”
- <https://raleighnc.gov/stormwater/services/stormwater-design-manual>

New Design Manual

The City of Raleigh Stormwater Design Manual and associated UDO text changes will become effective on Saturday, November 2, 2024. Plans submitted after that date will be required to follow the new Manual and the revised UDO.

- [Stormwater Design Manual \(Dated September 3, 2024\)](#)
- [TC-1B-2024 Stormwater Design Manual Update UDO Related Changes](#)

Training for the new design manual will be hosted by Raleigh stormwater staff for home builders and designers. [Find more details for the training options and registration.](#)

Old Design Manuals

There are two manuals in effect in the City of Raleigh through November 1, 2024:

When?

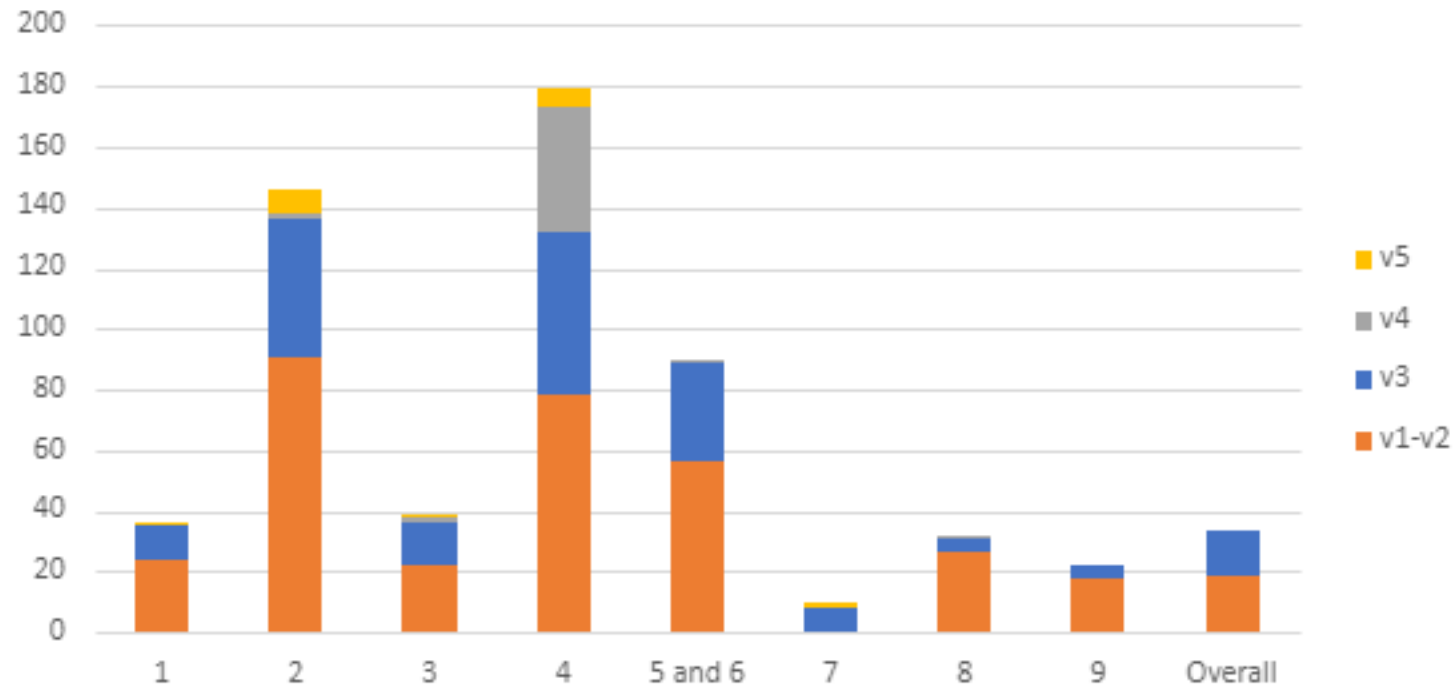
- Saturday, November 2, 2024, so effectively, submittals on Monday, November 4.
- Can choose new Manual/UDO even if submitted before that date.

Process

- Stakeholder meetings in 2019-2020
- Four drafts posted for informal comment (2020, 2021, 2023 x 2)
- Meetings upon request, including 4 with HBA in 2023
- Formal Comments in 2024
- Presented 2x to Text Change Committee and 1x Planning Commission
- Approved by Council on September 3, 2024

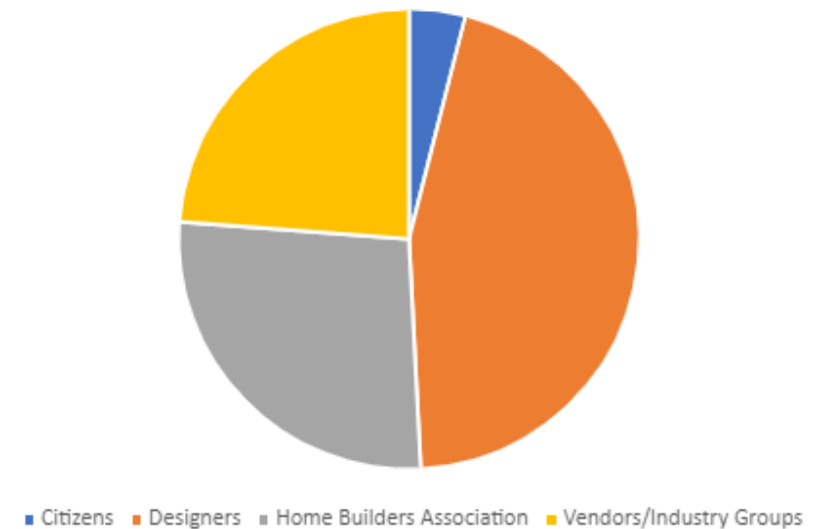
Comments Summary

Draft Design Manual Comments by Chapter



For v3-v5

Comments by Commenter Type



Total Public Comments > 600

Engineering Services
Stormwater Division

Lot Grading Plan Inspections

September 30, 2024



Raleigh



Lot Grading Plan – Plan Review

Lot Grading Plan

- Address most common complaints
- Options of how to discharge flow
- No new submittals to City
- Worked on options with HBA reps



Applicability

If a grandfathered lot under UDO 9.2.2.A:

- Less than or equal to 1 acre for 1 or 2 unit detached residential
- Less than or equal to 0.5 acre for all other development types
- Over 1 acre 1 or 2 unit detached residential with impervious <5%

AND

Adding >800 sf impervious area

Applicability

Doesn't apply to:

- Projects adding ≤ 800 sf impervious area
- Interior only projects
- Deck only projects
- Projects subject to the Full Stormwater Requirements (UDO Sections 9.2.2.B to H)

Applicability

If Lot Grading Plan is required, then

- Each point where flow is being newly concentrated.
- Concentrated means being combined into a channel, pipe, downspout.

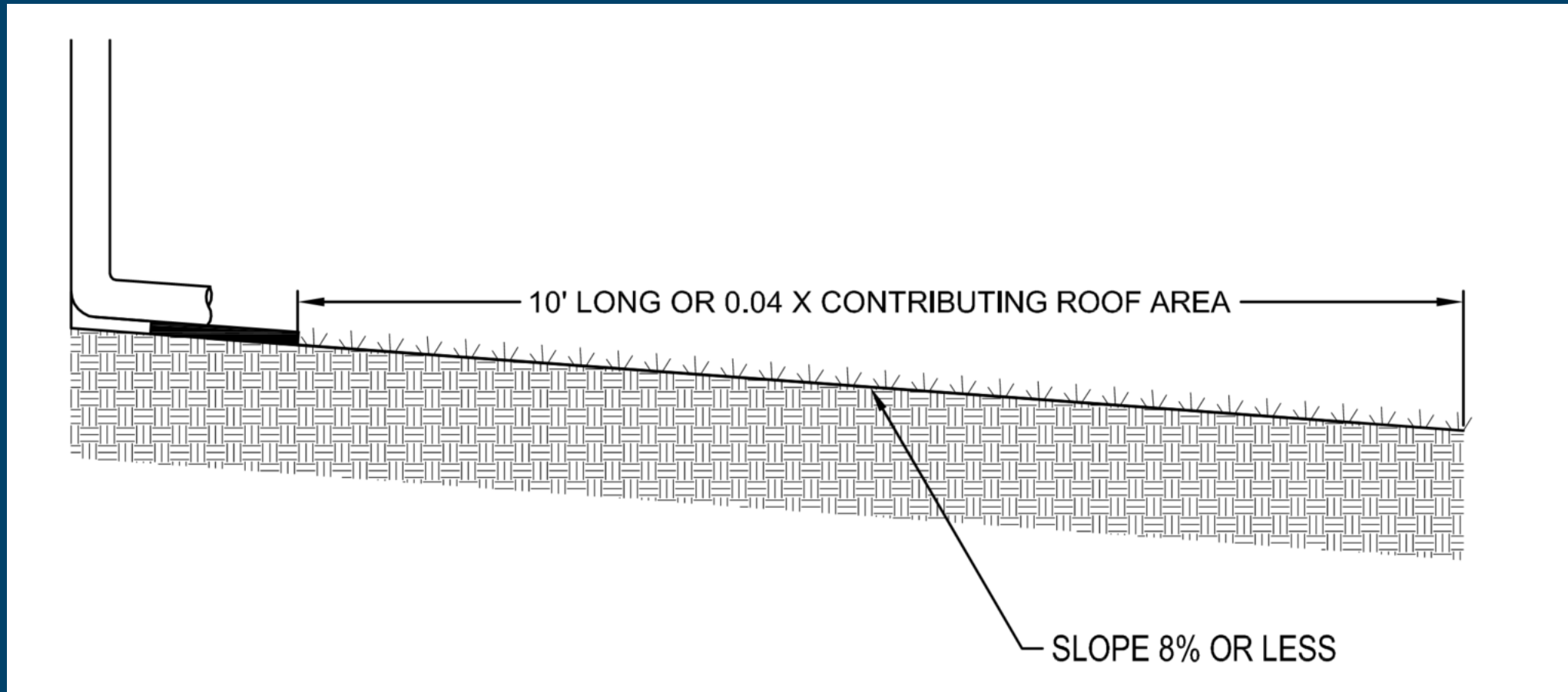


Options

Discharge to...

- ROW from up to 19,000 sf of impervious area.
- Existing pipe or swale in ROW
- Stream buffer (meeting buffer rules)
- Easement with permission from easement holder

Option – Vegetated Area

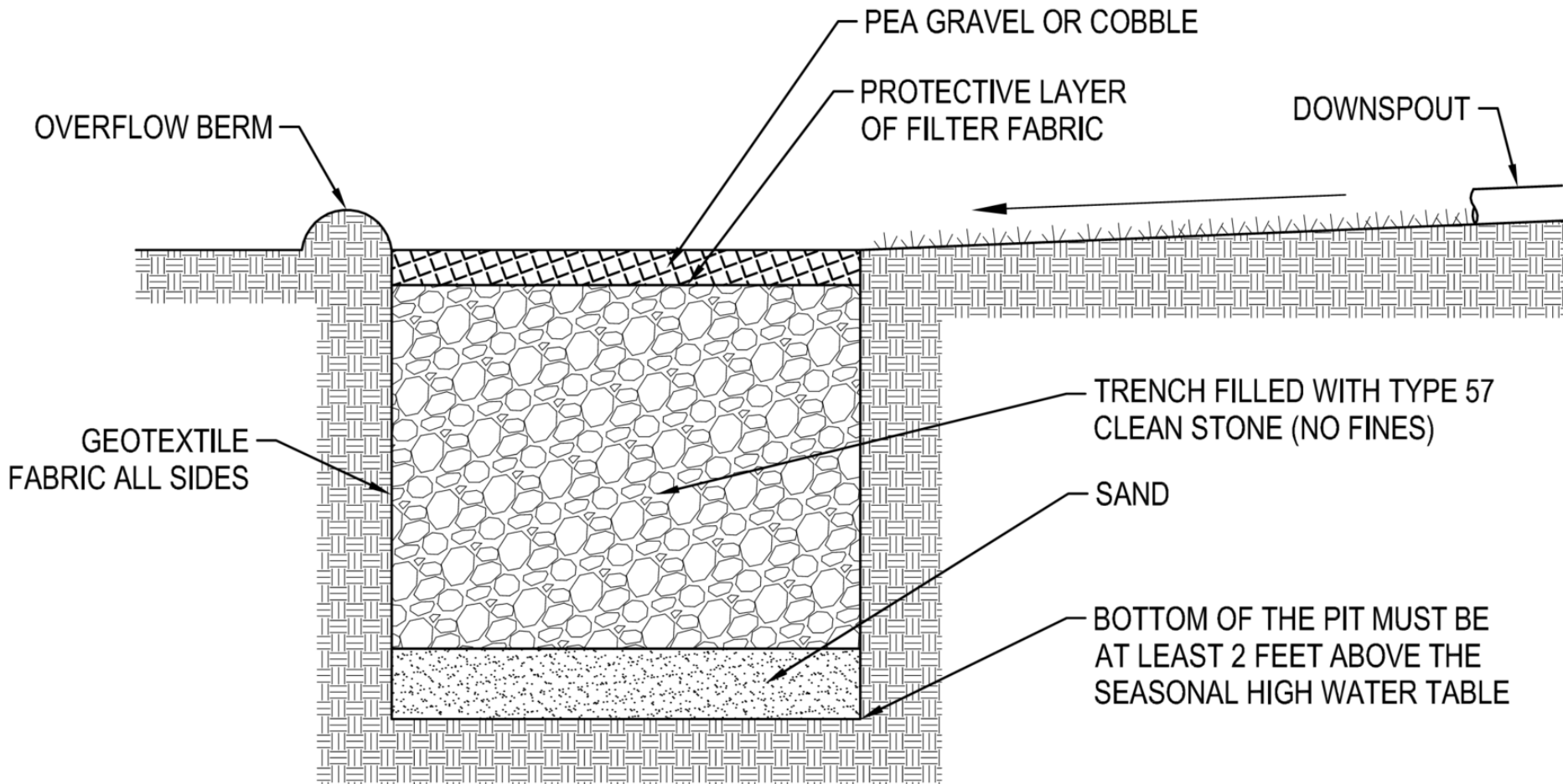


Option – Vegetated Area

Run into grassy area at low slope

- a. Length of receiving area min 10 ft or 0.04 times DA.
- b. Width $\frac{1}{2}$ of length.
- c. Slope of 8% or less.
- d. Vegetated with non-clumping grass or native plants.

Option – Surface Infiltration Pit



Option – Surface Infiltration Pit

Must avoid injection well requirements

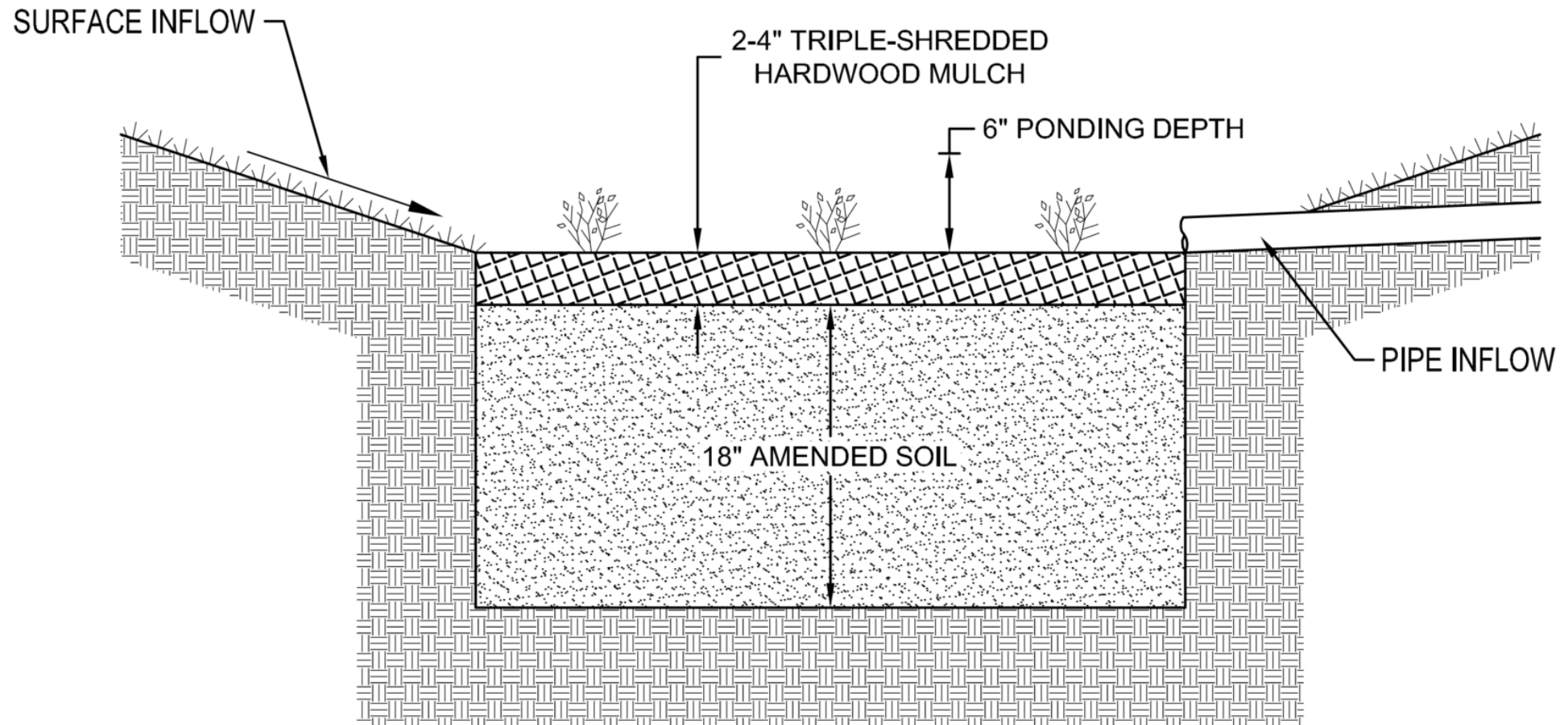
- See table for sizing or

<u>IMPERVIOUS SQUARE FOOTAGE (SF)</u>	<u>SURFACE INFILTRATION PIT SIZE (LENGTH X WIDTH X DEPTH IN FT)</u>
<= 100	3.5 X 3.5 X 2.5
GREATER THAN 100 AND <= 200	4 X 4 X 3.5
GREATER THAN 200 AND <=400	6 X 6 X 3.5
GREATER THAN 400 AND <=600	9 X 5 X 4
GREATER THAN 600 AND <=800	9 X 7 X 4
GREATER THAN 800 AND <=1000	9 X 9 X 4

$$\text{Volume (cf)} = 0.3 \times \text{Impervious Area (sf)}$$

- Downspouts/pipes must discharge to the surface (not piped into stone).
- One surface dimension must be greater than pit.
- Bottom of pit 2' above Seasonal High Water Table.

Option – Rain Garden



Option F – Rain Garden

- Dig a 1' hole to see if it drains in less than 36 hrs
- Sized per table or to capture 1" from the impervious area
- Amended soil 18" depth under ponding area
 - 50% Existing soil
 - 40% Sand
 - 10% Compost or other organic matter
- Mulched and planted (link for suggested plants)

Lot Grading Plan

Submittal Overview

Does NOT require

- soil tests
- engineering drawings
- submitted calculations
- easements
- as-builts
- annual inspections



Not a Stormwater
Control Measure!

Lot Grading Plan Submittal

Current requirements for plot plan

- Topo at min 2' intervals
- Top & bottom elevation for retaining walls
- First Floor Elevation if floodplain present
- Existing & proposed storm drainage
- Adjacent street and sidewalk elevations
- Locations of septic tanks and drainfields
- Drainage easements
- Floodplains, wetlands, streams, buffers

Lot Grading Plan Submittal

Additions to plot plan

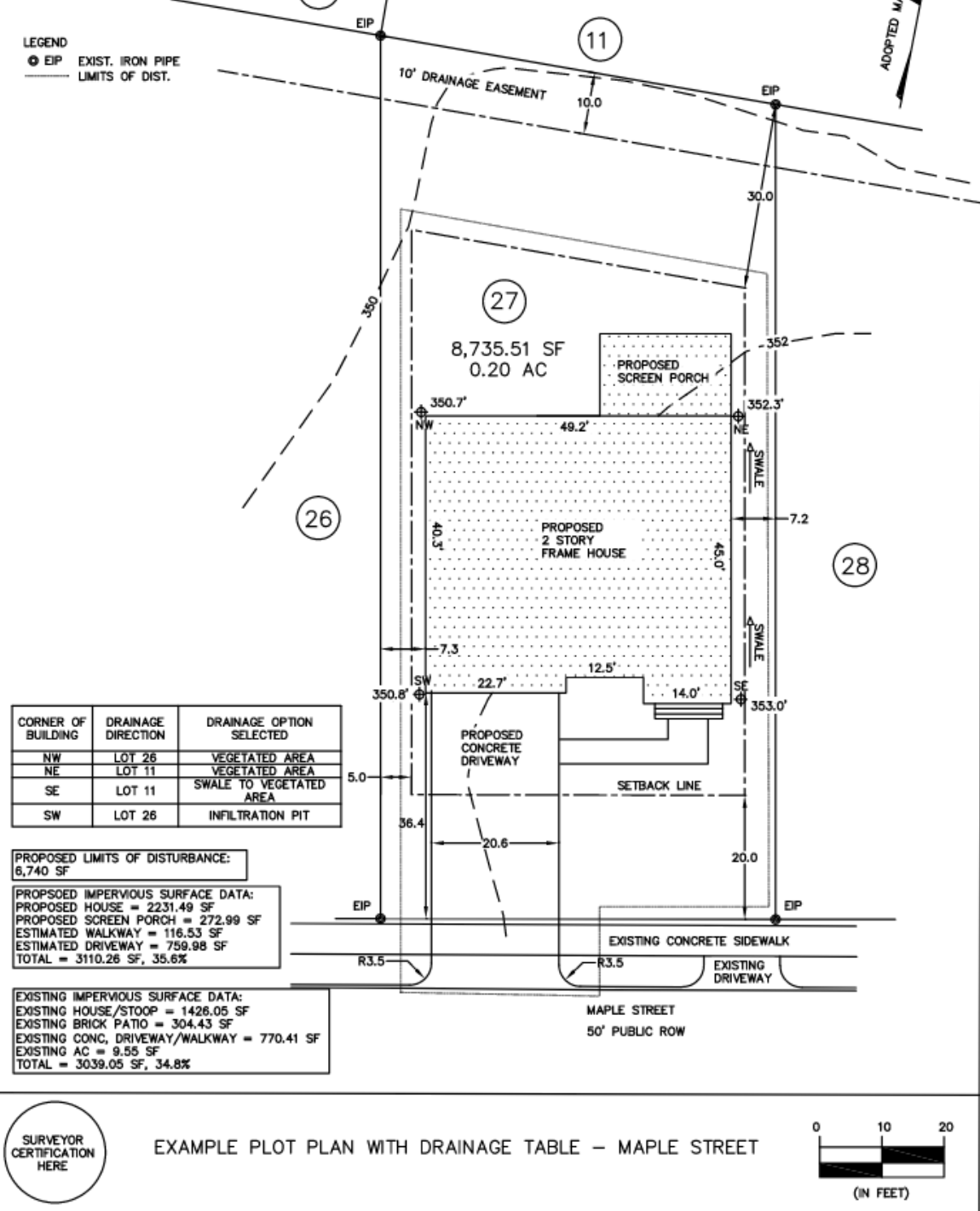
- Table stating flow direction at four points.
e.g. N, SE, etc OR "to Lot 17", "to ROW", etc
- Method(s) used to meet Section 2.1.2.1 (if applicable)
e.g. Vegetated Area, Rain Garden, Infiltration Pit, Drainage Easement,
Stream, ROW, Swale to _____
- Swale cross-section (if applicable)
- Detail (if applicable) for Vegetated Area, Surface Infiltration Pit, RainGarden

Lot Grading Plan

Examples

CORNER OF BUILDING	DRAINAGE DIRECTION	DRAINAGE OPTION SELECTED
NW	LOT 26	VEGETATED AREA
NE	LOT 11	VEGETATED AREA
SE	LOT 11	SWALE TO VEGETATED AREA
SW	LOT 26	INFILTRATION PIT

CORNER OF BUILDING	DRAINAGE DIRECTION	DRAINAGE OPTION SELECTED
A	NORTHWEST	VEGETATED AREA
B	NORTH	EX. DRAINAGE EASEMENT
C	SOUTH	RAIN GARGEN
D	WEST	VEGETATED AREA



Setting Up SC2 Permit

New Conditions

- Requirements for where flow must be discharged
- Requirements for proper installation
- Requirements for changing method

Lot Grading Plan – Inspections

Rain Garden

- Installed per City standard detail
- Size
- Plants
- Mulch
- Location



Surface Infiltration Pit

- Installed per City standard detail
- Size
- Stone
- Discharging at surface/not subsurface
- Location
- No standing water (SWHT)



Vegetated Area

- Length/width or area vs. DA
- Vegetation
 - Installed
 - Non-clumping
 - Stable



Stream/Buffer/Pipe

- State permits obtained
- Installed per plan
- Diffuse flow (buffer)



To Street

- ROW/SCON permit obtained (if applicable)
- Less than 3cfs (19,000 sf IA) (overland flow)
- Existing pipe in ROW



Downstream Easement

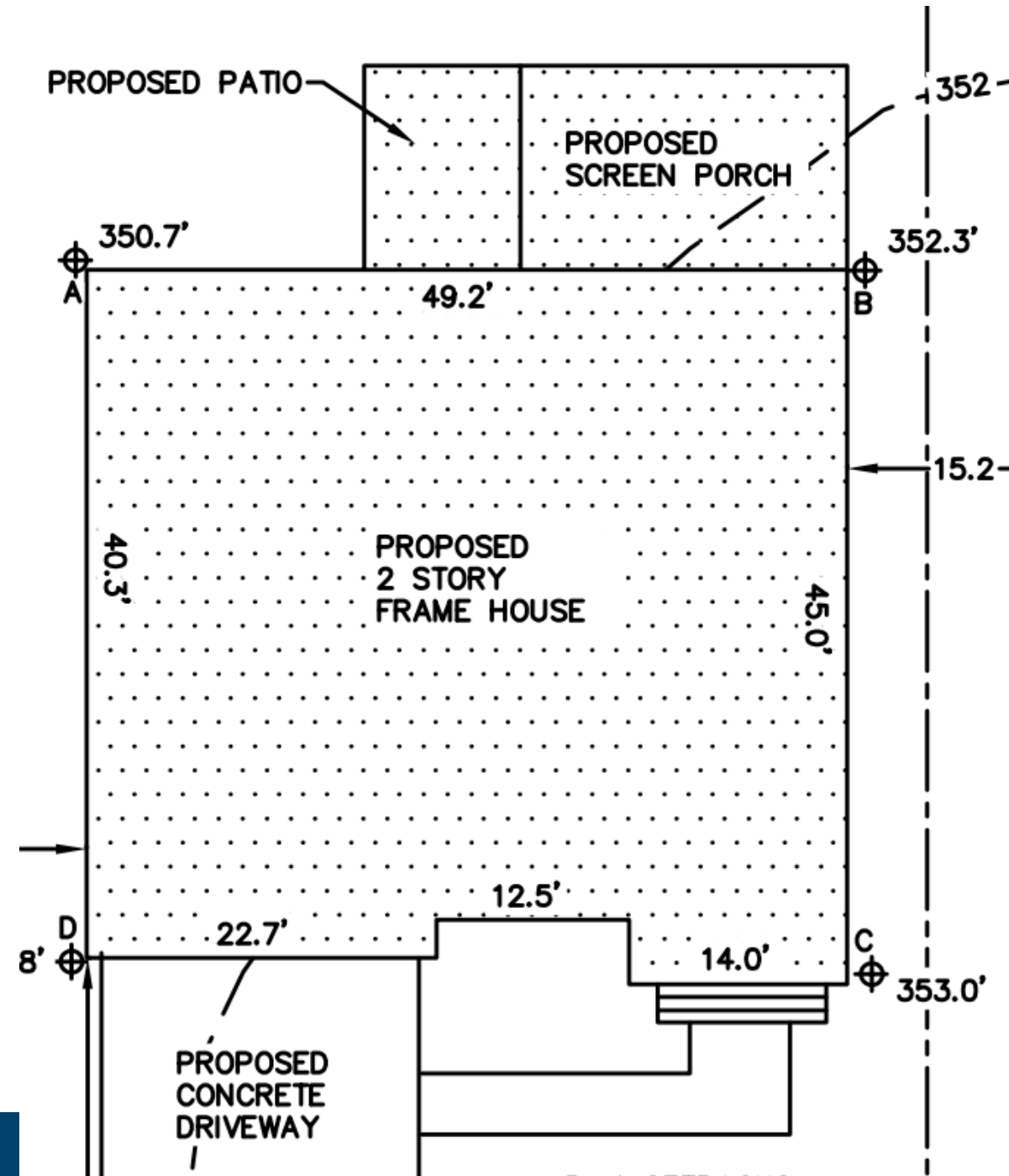
- Discharging per approved plan
- Recorded Drainage Easement




Match Plan?

- If drainage method is installed as identified on approved plan
 and
- Other permit conditions satisfied
- Schedule final SC permit inspection

CORNER OF BUILDING	DRAINAGE DIRECTION	DRAINAGE OPTION SELECTED
A	NORTHWEST	VEGETATED AREA
B	NORTH	EX. DRAINAGE EASEMENT
C	SOUTH	RAIN GARGEN
D	WEST	VEGETATED AREA

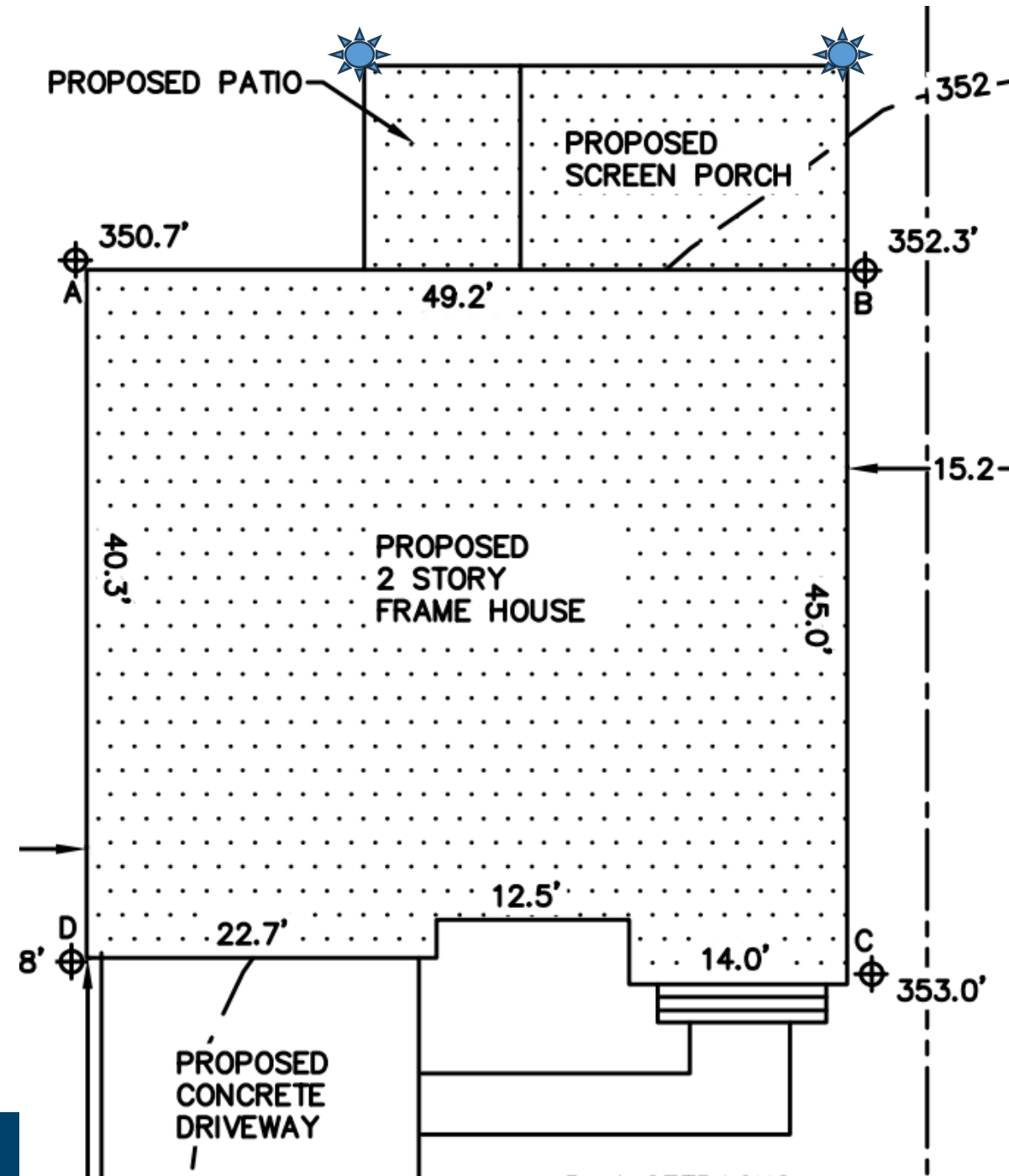


Match Plan?

What about areas of concentrated flow  not identified on plan?

- Require to install a drainage method all points of concentrated flow

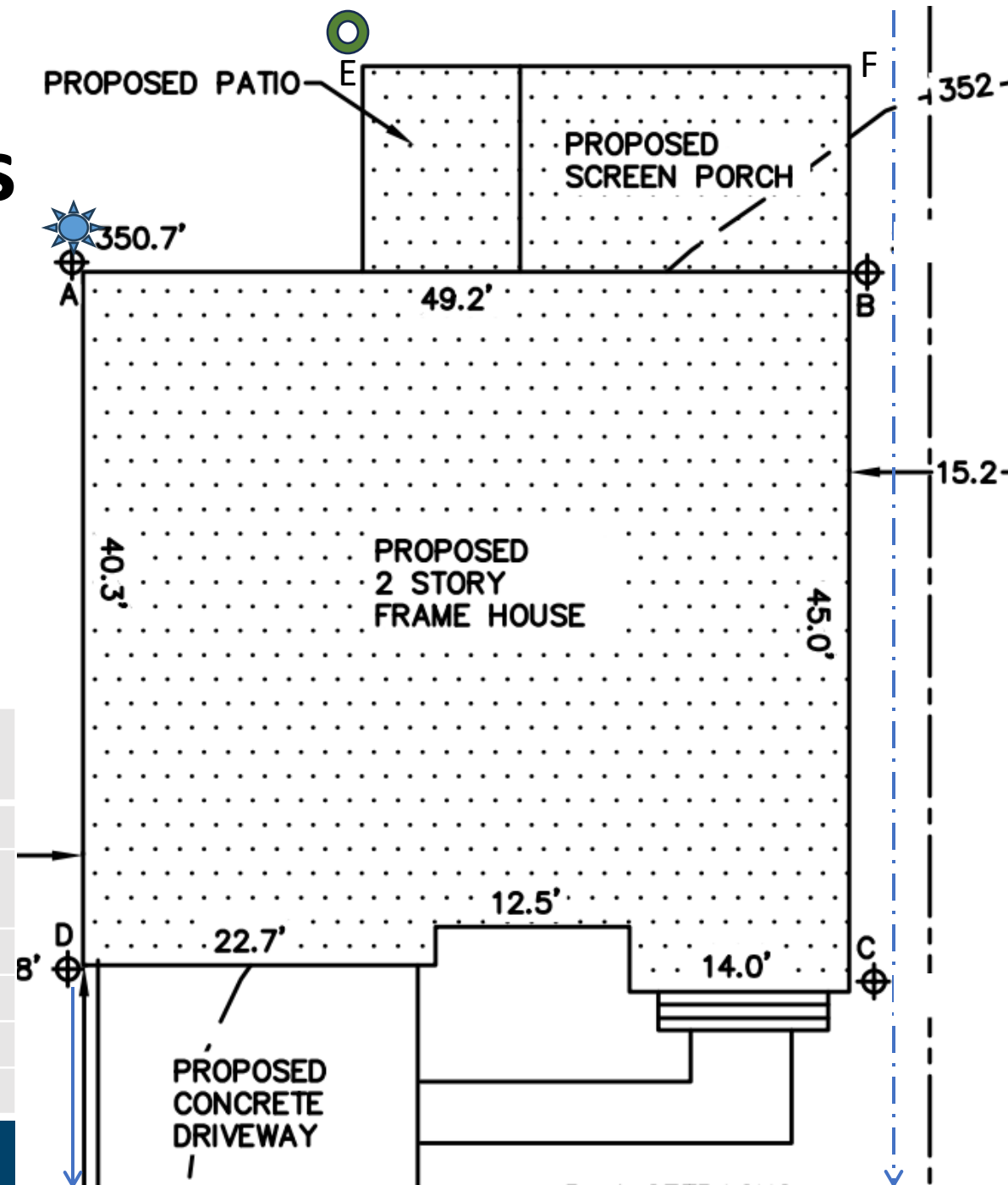
CORNER OF BUILDING	DRAINAGE DIRECTION	DRAINAGE OPTION SELECTED
A	NORTHWEST	VEGETATED AREA
B	NORTH	EX. DRAINAGE EASEMENT
C	SOUTH	RAIN GARGEN
D	WEST	VEGETATED AREA



Drainage Method Changes

- No Formal Plan Revision
- In the field changes
- Communicate with SW Inspector prior to scheduling final inspection

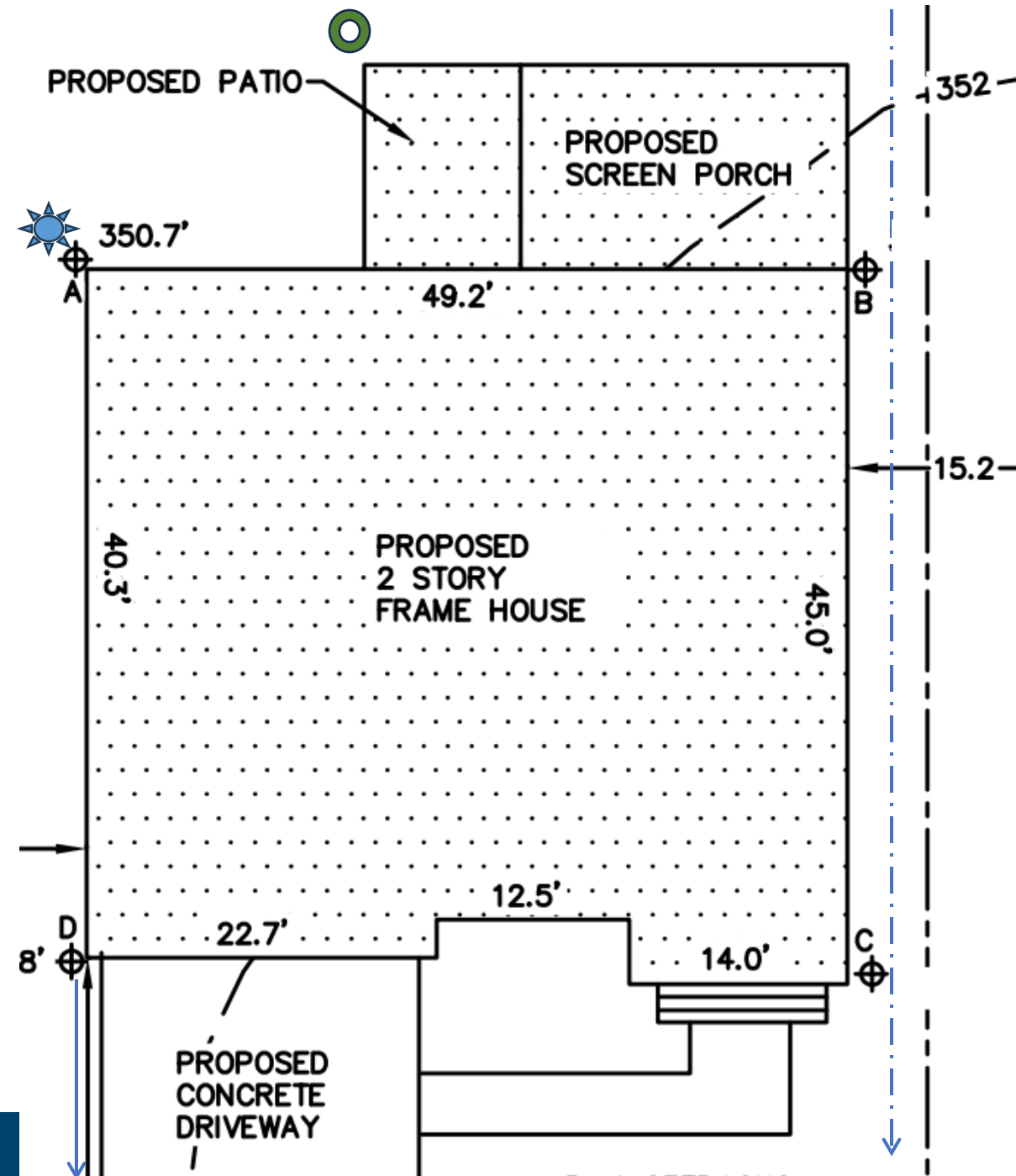
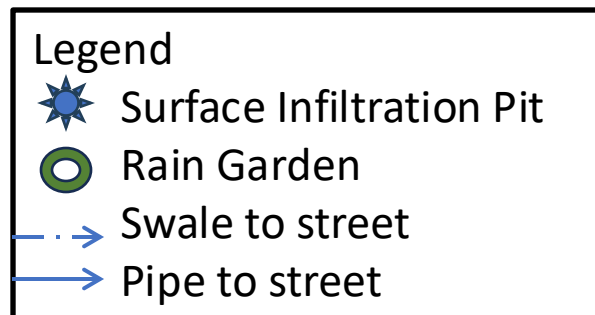
CORNER OF BUILDING	DRAINAGE DIRECTION	DRAINAGE OPTION SELECTED	FINAL DRAINAGE OPTION
A	NORTH	VEGETATED AREA	SURFACE INFILTRATION PIT
B	EAST	EX. DRAINAGE EASEMENT	SWALE TO STREET
C	SOUTH	RAIN GARDEN	SWALE TO STREET
D	WEST	VEGETATED AREA	PIPE TO STREET
E	NORTH		SURFACE INFILTRATION PIT
F	EAST		SWALE TO STREET



As-built

New Single-Family Houses

- Label As-built with drainage method utilized (surface infiltration pit, rain garden, vegetated area, swale to street, etc.)



Determining Impervious Surface Limits

- Check the plat
- If "Grandfathered," check the zoning
- Email Stormwater.Impervious@raleighnc.gov

Exceeding UDO 9.2.2.A.4 impervious limits

Three methods:

- Full nitrogen and runoff requirements
- Volume control
- ~~Downstream flood analysis~~ Peak discharge

Exceeding UDO 9.2.2.A.4 impervious limits

Full nitrogen and runoff requirements (UDO 9.2.2.A.4.a)

- Nitrogen reduction (UDO 9.2.2.B)
- Runoff limitation (UDO 9.2.2.E)

Exceeding UDO 9.2.2.A.4 impervious limits

Volume control (UDO 9.2.2.A.4.b.i)

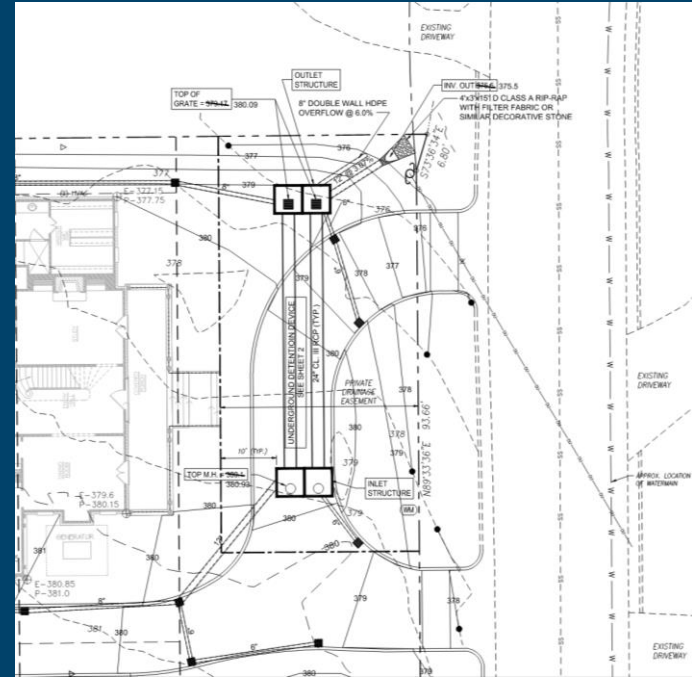
- Compares proposed conditions to maximum
- SCM to infiltrate the runoff generated by the excess impervious surface



Exceeding UDO 9.2.2.A.4 impervious limits

Peak discharge (UDO 9.2.2.A.4.b.ii)

- Replaces the "downstream flood analysis"
- Limit peak runoff to that expected of the maximum for the 2- and 10-year storms



If constructing a SCM:

All SCMs now require:

- O&M Manual
- Easement
- Surety
- Maintenance Covenant (shared) or Instrument (non-shared)
- Annual Inspection Reports

Residential Lots Greater than 1 Acre

- Changed 5/1/23 due to Neuse Nutrient Management Strategy
- Subject to nitrogen and runoff requirements when BUA added since 5/1/2001 exceeds 5%



Engineering Services
Stormwater Division

Sediment and Erosion Control Updates

September 30, 2024



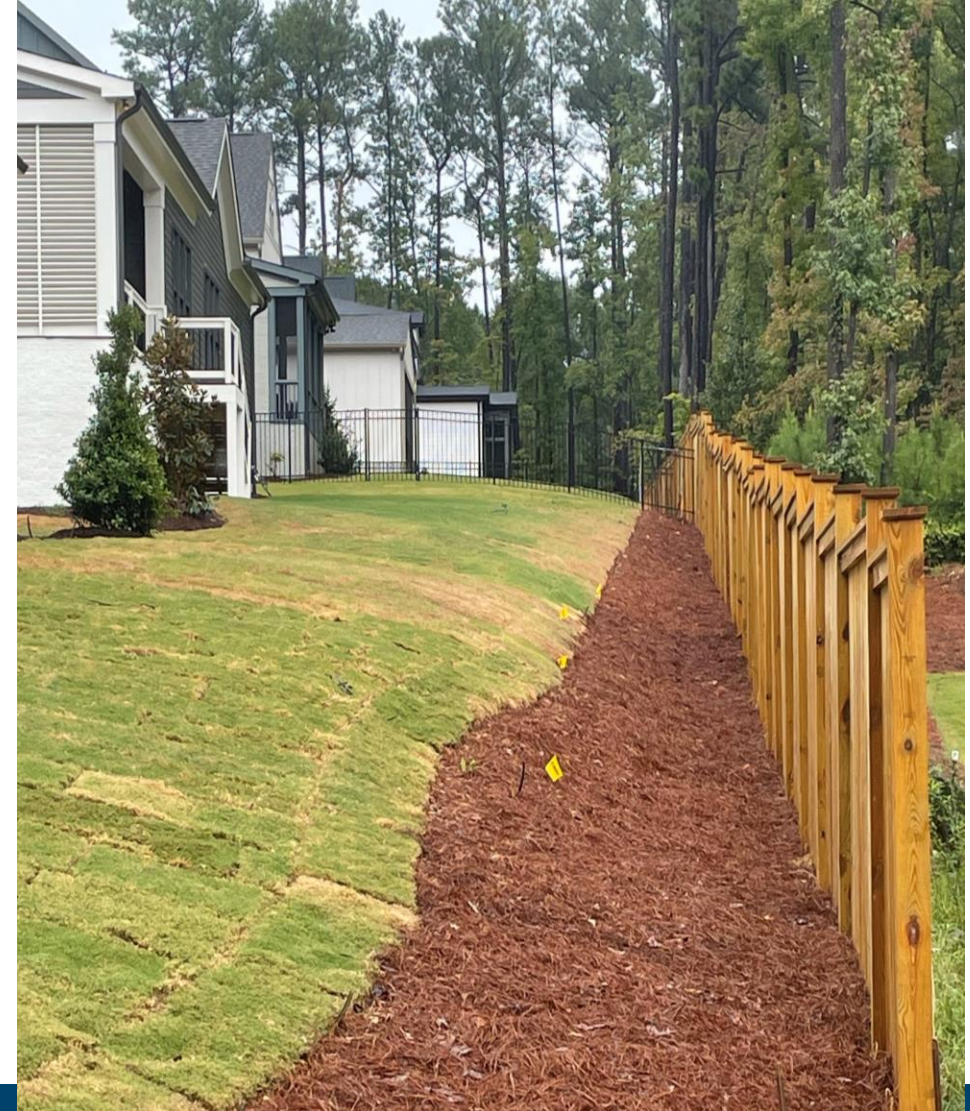
Raleigh



Land Disturbance Grading Permit

Required when LOD is $\geq 12,000$ SF

- Issued through:
 - Building permit / Demo Permit
 - or**
 - Mass Grading Plan
- <1 acre of land disturbance plan does not have to be designed/sealed by PE, PLS, RLS per SL 2021-121



Groundcover/Stabilization LOD<12,000 SF

- LOD <400 SF, permanent groundcover applied over 100% of disturbed area
- LOD \geq 400 SF, permanent stabilization must be achieved
- Hold Final SC Inspection which will hold CO



Groundcover vs. Stabilization

Groundcover

- Required to be applied when any portion of the site when land-disturbance has ceased (temporarily or permanent)

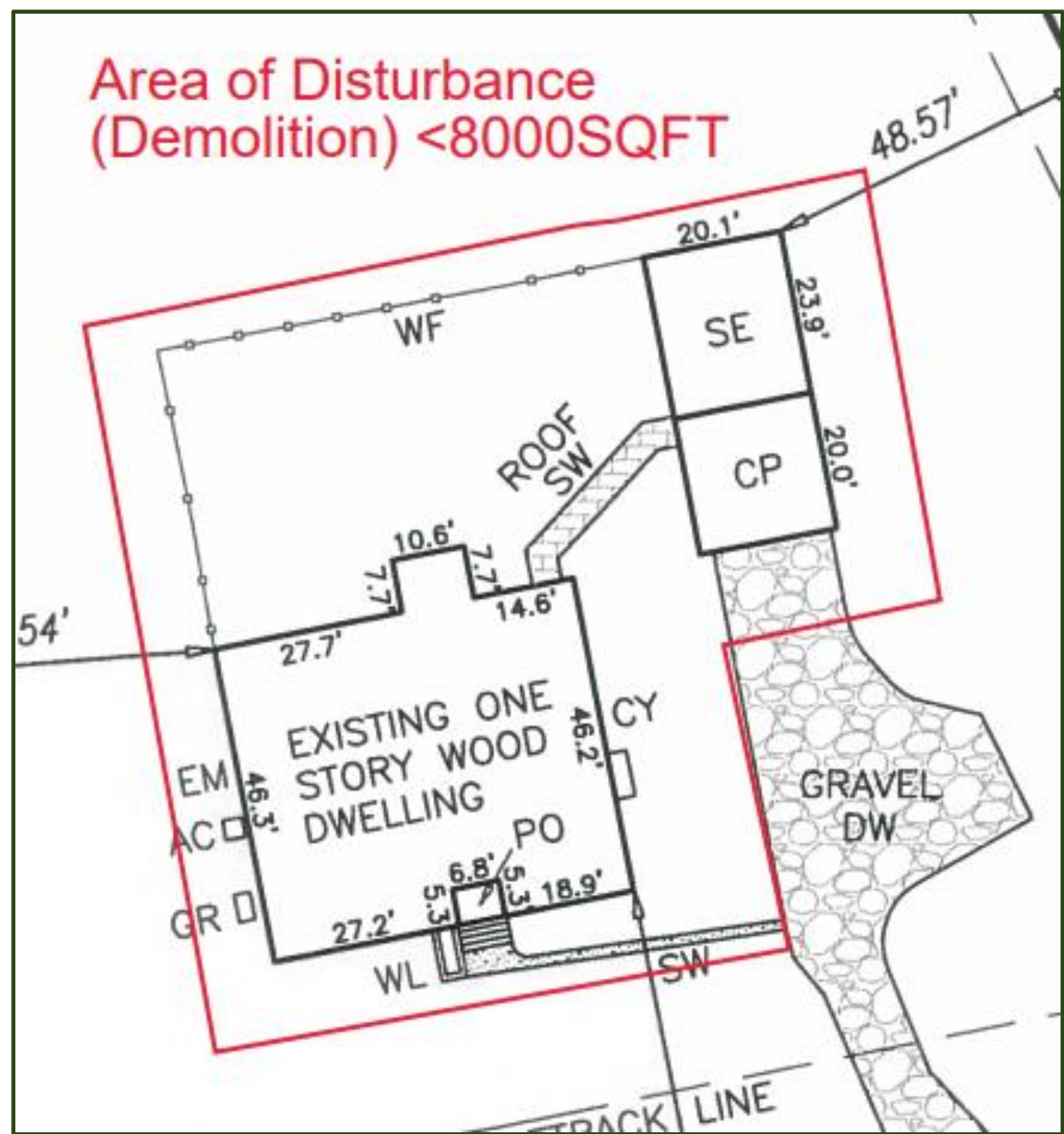
Stabilization

- Permanent stabilization is achieved when there is 100% growth and 80% density of permanent groundcover with no evidence of erosion.



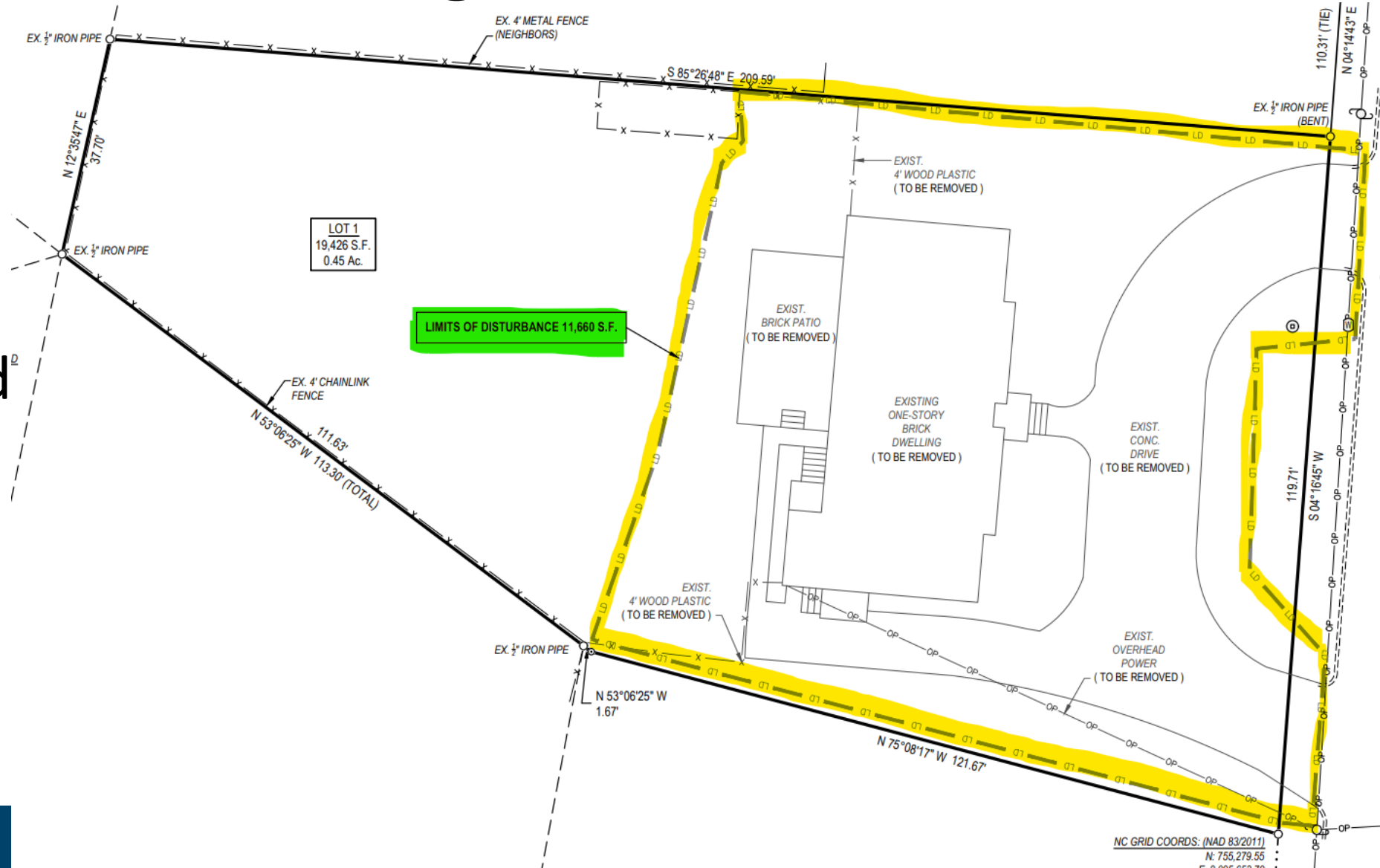
Limits of Disturbance

- Further defines what areas may be included with LOD
- Construction Access- Minimum 10 ft around structures or extended to property line if property line is less than 10 ft from structure
- LOD must be contiguous



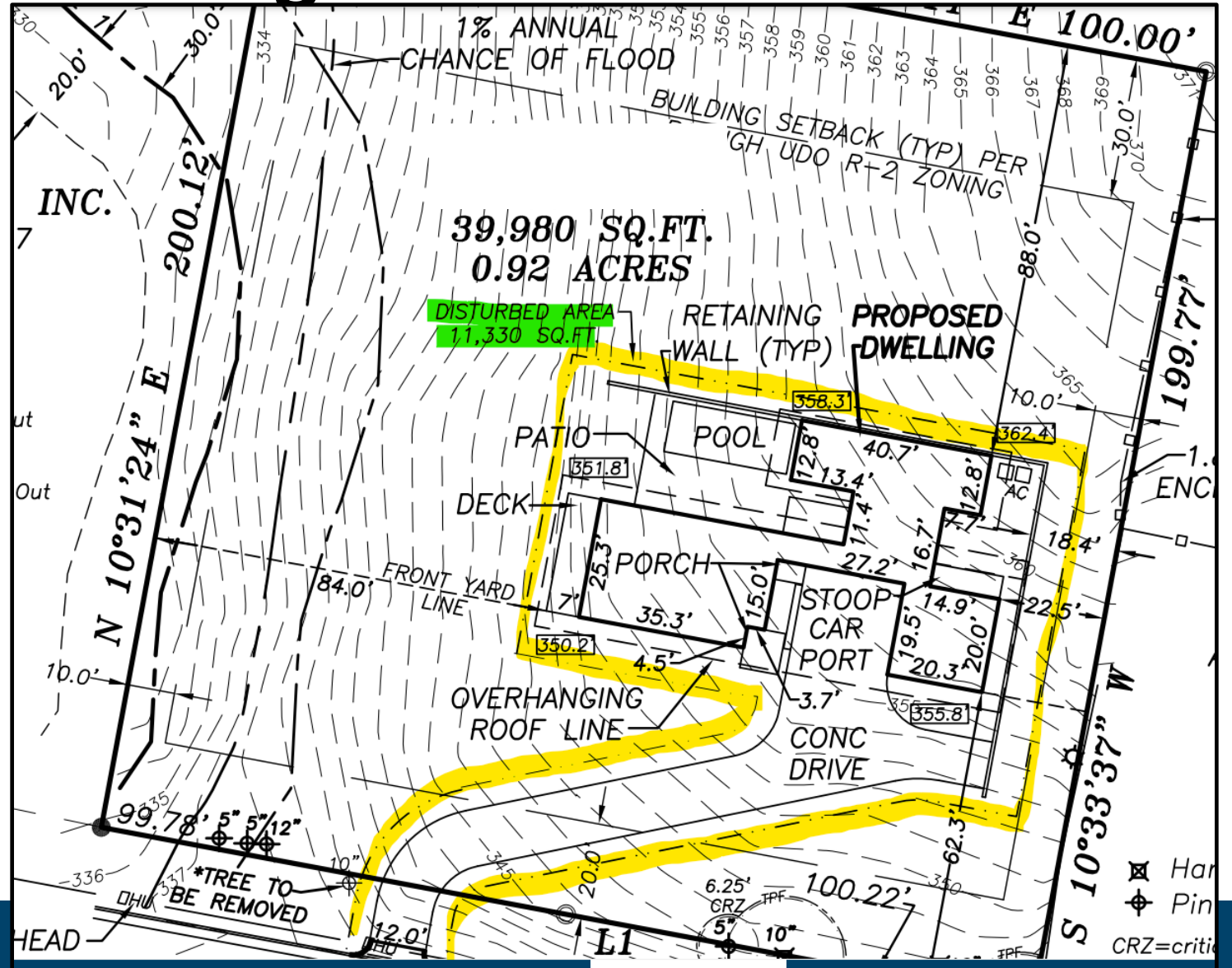
Land Disturbance Grading Permit

- Hold Permit Issuance until fence is installed
- Silt Fence required low side
- Fencing Required high side



Land Disturbance Grading Permit

- Call SW Inspector to schedule inspection
- Inspector will release hold after silt fence has been installed at or within LOD



Land Disturbance Surety

- Was \$1,000/acre
- Now \$2,000/acre



Land Disturbance Grading Permit Expiration

- Will expire three years following the date of approval if no land disturbing activity has been undertaken



Engineering Services
Stormwater Division

Stormwater Conveyance Permit

September 30, 2024



Raleigh



SCON Permit Required

A SCON permit is required if you meet at least one of the following:

Located in the
ROW

Located on public
or private
property & greater
than or equal to
12" in diameter

Located on
public or private
property &
conveys public
runoff

SCON Permit Not Required

Private Pipe less than 12" in diameter outside ROW and does not connect to ROW

Repairing or Replacing pipes that do not convey public runoff

What is required?

Depends, but may include:

- Calculations
- CAD File
- As-built
- 3rd Party Inspection (CCTV, Mandrel Testing)

Calculations/CAD File

Calculations (Provided During Plan Review) - unchanged

- Required for new stormwater conveyance pipes (including replacements) and repairs and
- When installation will require hydraulic performance

Electronic File (Provided During Plan Review)

- CAD file is required prior to permit issuance and submitted to StormwaterPermit.Submittals@raleighnc.gov (copy plan reviewer)

Pipes <12” Connecting to ROW

- No Calculations
- No as-built
- No CCTV
- Apply with building or zoning permit
- Use City Details
- Still photo of connection
- No encroachment agreement

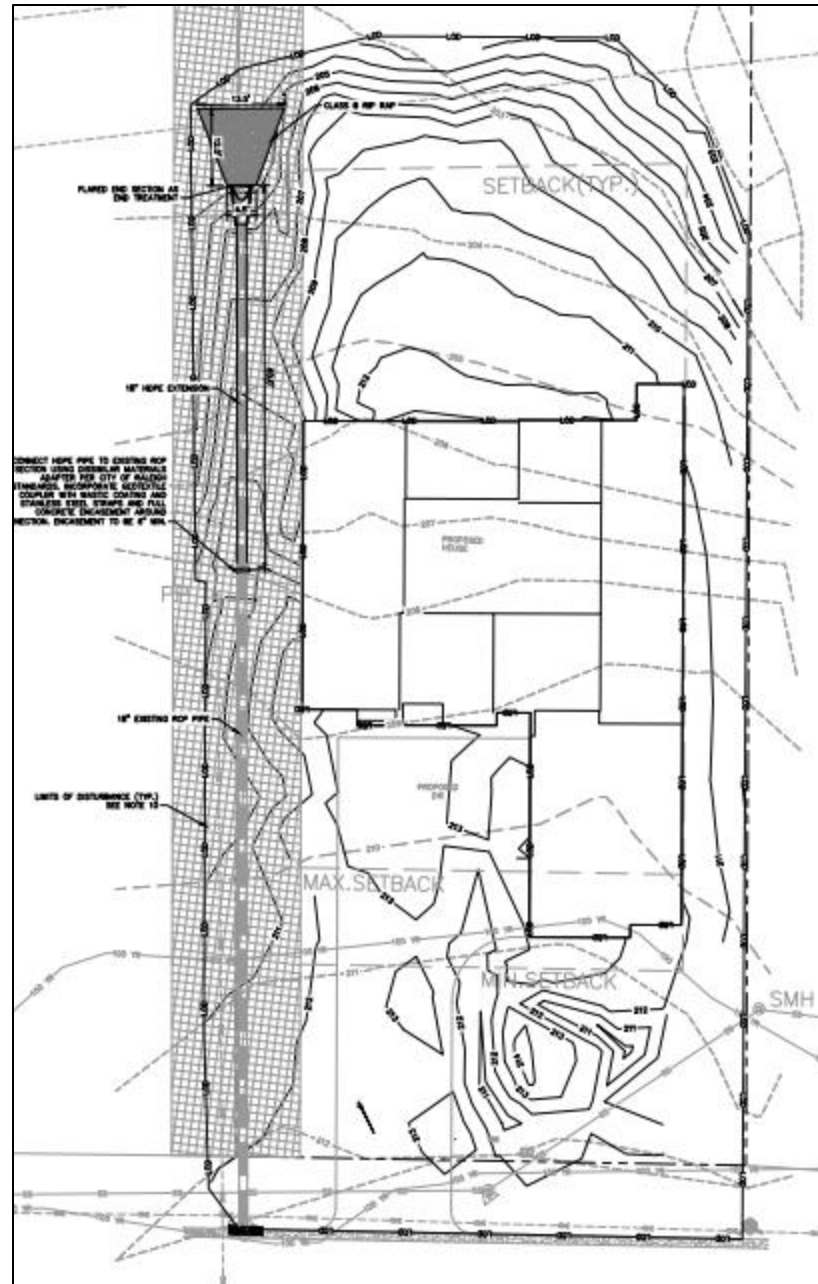


Site Permit Review

- Larger Pipes Proposed
- Connecting to ROW

Zoning Permit

- Pipes less than 12” connecting to ROW



As-builts

As-builts Required

- Required for New, Repaired, Abandoned, Replaced Pipes $\geq 12''$ diameter

How/When to Submit

- After Stormwater Conveyance System has been installed
- As-built Checklist/Surveyed by PLS/Certified by PE/RLS
- Submit as-built package/CAD file to asbuiltsubmittal@raleighnc.gov
- This will hold up CO

Items to be included in As-Built Submittal	
<input type="checkbox"/>	A certified set of as-built drawings with each sheet signed and sealed by a North Carolina PE or RLA, in (.PDF format).
<input type="checkbox"/>	A coversheet for the as-built drawings (.PDF format) including, at a minimum, the following information: <ul style="list-style-type: none"> • Project name • Name of firm which prepared the data • Drawings labeled as Final As-built including the date • Permit number(s) • COR plan identification number (if applicable)
<input type="checkbox"/>	Stormwater conveyance labeled with their respective North Carolina State Plane grid X and Y coordinates (and also in US Survey feet)
<input type="checkbox"/>	All units are in US survey feet.
<input type="checkbox"/>	Horizontal datum of as-builts provided is in NAD 83, and the appropriate realization of NAD 83 has been specified Note: The NC CORS Base Station Network is referenced to the NAD 83[2011] datum; vertical datum must be NAVD88, geoid 03 or later and indicated in survey text file
<input type="checkbox"/>	As-Built drawings provided include: <ul style="list-style-type: none"> • As-built date • Revision dates • Project name • Page numbering • North arrow • Scale of drawing • Scale bar • Vicinity map • Permit number • Engineer-in-charge • All recorded public and private drainage easements properly identified and dimensioned • Pipe size (dimensions in height and width in inches)

3rd Party Pipe Inspections

CCTV Inspections Required

- New pipes in City ROW or pipe conveying public runoff is ≥ 12 " diameter (NBIS if ≥ 72 " diameter)
- Repair of pipe ≥ 12 " diameter in City ROW or conveying public runoff (NBIS if ≥ 72 " diameter)

Still Photo Required but no CCTV

- Pipes < 12 " diameter connecting to City stormwater conveyance system in the ROW

YES	NOT APPLICABLE	CCTV INSPECTION REQUIREMENTS		
<input type="checkbox"/>	<input type="checkbox"/>	Stormwater infrastructure less than 72" in diameter, rise, or span has completed CCTV Inspection.		
<input type="checkbox"/>	<input type="checkbox"/>	Stormwater infrastructure must be cleaned prior to inspection. Sufficient time must be allotted between inspection and cleaning to allow for clear inspection of the pipe joints and barrel.		
<input type="checkbox"/>	<input type="checkbox"/>	Inspection is completed using NASSCO PACP 7 certified software and inspection protocol.		
<input type="checkbox"/>	<input type="checkbox"/>	PACP exportable database including all media files.		
<input type="checkbox"/>	<input type="checkbox"/>	CCTV Operator must have a current NASSCO PACP Certificate.		
<input type="checkbox"/>	<input type="checkbox"/>	The inspection is completed with <u>stormwater asset identification numbers</u> provided on the City's Stormwater Development Map (TBA).		
<input type="checkbox"/>	<input type="checkbox"/>	All inspection header information must be fully and accurately entered on all CCTV reports. These fields include: <table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; vertical-align: top;"> a. Date and Time b. City c. Street Name d. Pipe Asset Identification Number (Pipe Segment Reference) e. Upstream Node Number f. Downstream Node Number g. Direction of CCTV Inspection (in relation to Flow) h. Pipe Shape i. Pipe Height/Diameter j. Invert Elevation k. Pipe Material l. Pipe Condition </td> <td style="width: 50%; vertical-align: top;"> o. CCTV Operator Name p. CCTV Operator PACP Certificate Number q. Customer r. Weather s. Pre-Cleaning t. Date Cleaned u. Inspection Status v. Location Code w. Year Constructed x. If applicable, Year Renewed y. If applicable, Lining Method z. If applicable, Coating Method aa. If applicable, the CCTV Reviewer Name and PACP Certificate Number </td> </tr> </table>	a. Date and Time b. City c. Street Name d. Pipe Asset Identification Number (Pipe Segment Reference) e. Upstream Node Number f. Downstream Node Number g. Direction of CCTV Inspection (in relation to Flow) h. Pipe Shape i. Pipe Height/Diameter j. Invert Elevation k. Pipe Material l. Pipe Condition	o. CCTV Operator Name p. CCTV Operator PACP Certificate Number q. Customer r. Weather s. Pre-Cleaning t. Date Cleaned u. Inspection Status v. Location Code w. Year Constructed x. If applicable, Year Renewed y. If applicable, Lining Method z. If applicable, Coating Method aa. If applicable, the CCTV Reviewer Name and PACP Certificate Number
a. Date and Time b. City c. Street Name d. Pipe Asset Identification Number (Pipe Segment Reference) e. Upstream Node Number f. Downstream Node Number g. Direction of CCTV Inspection (in relation to Flow) h. Pipe Shape i. Pipe Height/Diameter j. Invert Elevation k. Pipe Material l. Pipe Condition	o. CCTV Operator Name p. CCTV Operator PACP Certificate Number q. Customer r. Weather s. Pre-Cleaning t. Date Cleaned u. Inspection Status v. Location Code w. Year Constructed x. If applicable, Year Renewed y. If applicable, Lining Method z. If applicable, Coating Method aa. If applicable, the CCTV Reviewer Name and PACP Certificate Number			
<input type="checkbox"/>	<input type="checkbox"/>	Inspection speed must be <u>per minute</u> .		

If PP or HDPE Mandrel or Laser Profiling Required

3rd Party Pipe Inspections

How/When to Submit Pipe Inspections

- NASSCO PACP certified
- Repair Plan for pipes that have NASSCO PACP structural or O&M defects with a score of 3 or greater
- Still photo if applicable (<12” connecting to SW conveyance system in City ROW)
- Mandrel Test for flexible pipes
- Bridge Inspection Report (If applicable) NBIS pipes >72” diameter
- Pipe Inspection Checklist/Certified by PE
- Submit as-built to asbuiltsubmittal@raleighnc.gov
- This will hold CO

Flood Study Update

Good News

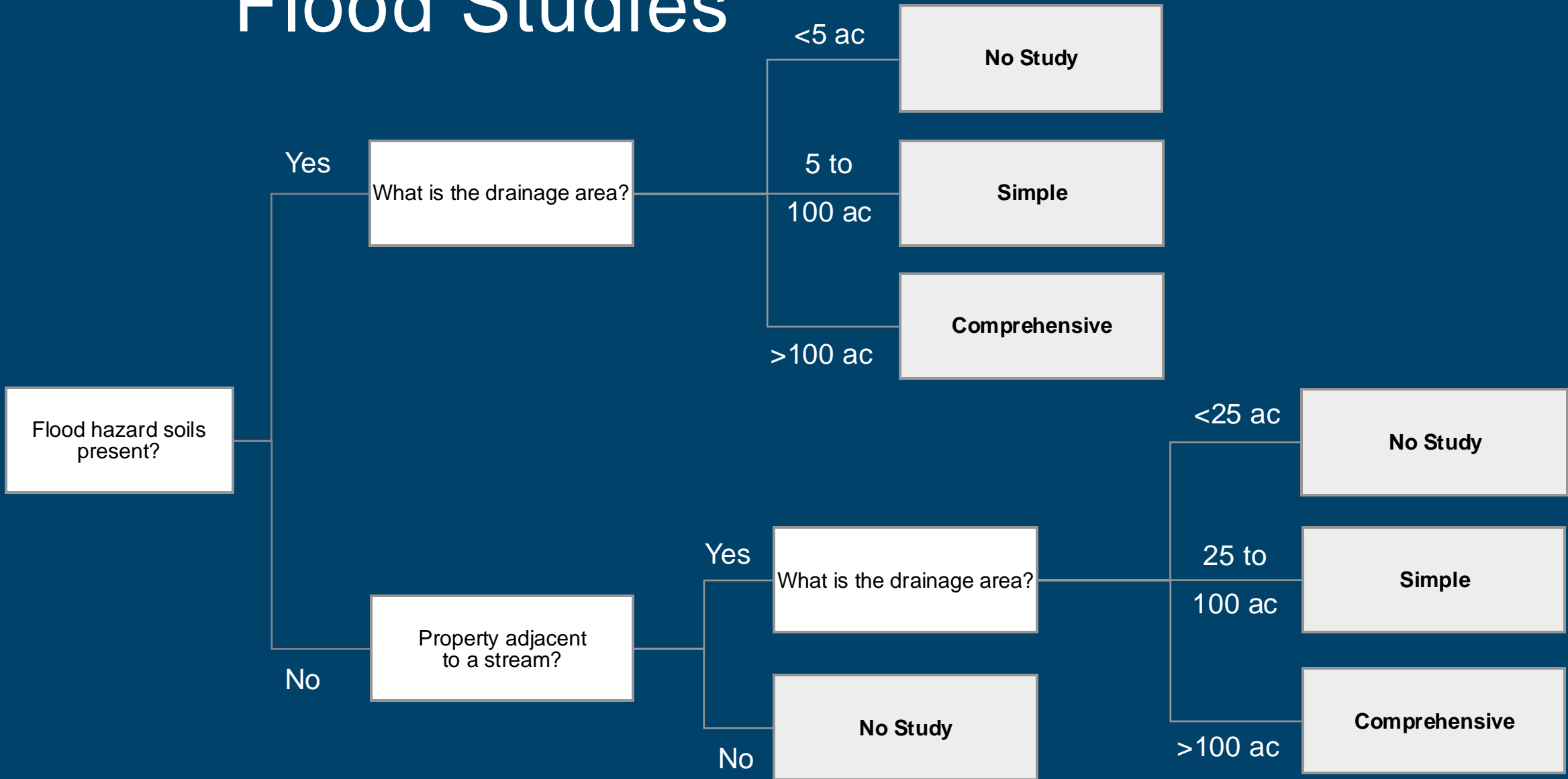
- If flood soils present, but less than 5 acres drain there, no flood study.

Bad News

- If stream present and drains more than 25 acres, flood study needed.



Flood Studies



Contact us:

Plan Review Questions:

stormwater.impervious@raleighnc.gov

sally.hoyt@raleighnc.gov

sean.eggleston@raleighnc.gov

Inspections Questions:

Lauren.Witherspoon@raleighnc.gov