Common Errors and Omissions in Plan and Permit Submittals

Leif Hauge, PE

Waukesha County Senior Civil Engineer

Land Resources Division

Omissions From Permit Paperwork

Waukesha County Dept. of Parks & Land Use – Land Resources Division
1320 Pewaukee Road, Room 260
Waukesha, WI 53188-3868

Phone: 262-896-8300 Fax: 262-896-8298

Storm Water Permit Application Form

Project Name:

Project Type (From Fee Schedule):

Project Location: 1/4, Section Township of

Who is Permit Applicant?

The following contacts are required at the time of application: (Enter on back page)

- **Applicant**: The person or entity holding fee title to the property or their representative, as delegated on page 2 of this form. The applicant shall sign the initial permit application form in accordance with the items 1-5 listed below, after which the applicant may provide written authorization for others to serve as the applicant's representative: 1) In the case of a corporation, by a principal executive officer of at least the level of vice–president or by the officer's authorized representative having overall responsibility for the operation of the site for which a permit is sought; 2) In the case of a limited liability company, by a member or manager; 3) In the case of a partnership, by the general partner; 4) In the case of a sole proprietorship, by the proprietor, or; 5) For a unit of government, by a principal executive officer, ranking elected official or other duly authorized representative.

- **Engineer** (or Planner): The primary contact for the preparation of erosion control and storm water management plans. All plan review comments will be addressed to this contact. For all storm water plans and other engineering, this person must: 1) be a licensed P.E. in Wisconsin; 2) stamp P.E. number and sign all plans submitted as part of permit; and 3) oversee and verify construction of all practices.

Additional contacts are required before a permit will be issued:(See permit check box below)

- Please use the Storm Water Permit Supplemental Information Form to identify these contacts.

Please indicate which one you wish to apply for: (Preliminary Review may be required by code.)

General Requirements Agreement

. by activities regulated by a permit under this ordinance. With the approval of the landowner, the LRD may also order repairs or clean-up on other affected property.

2. **Emergency Work.** The permit holder authorizes the LRD, in accordance with the enforcement procedures under sec. 14-339 of the ordinance, to perform any work or operations necessary to bring erosion control or storm water management practices into conformance with the approved plans and consents to charging such costs against the financial assurance retained or to a special assessment or charge against the property as authorized under subch. VII of ch. 66, Wisconsin Statutes.

3. **Permit Display**. The permit holder shall display the storm water permit in a manner that can be seen from the nearest public road and shall protect it from damage from weather and construction activities until permit termination by the LRD.

I have read and understand the above noted permit requirements. I also understand that a violation of any permit requirement is subject to enforcement action.

Applicant's Signature: _____ **Date**: _____

No Pre-Application Conference

- Saves time and money
- Development Review Team or individual
- “I hoped to establish the location for the basins first and collect soil boring information during our preliminary plat submittal…. I was trying to avoid collecting soil borings from the wrong locations. Please let me know if you will still require soil borings.”

Errors and Omissions - Plan Submittals

Soil Test Results Not Per COMM 85

- No tests submitted
- Reporting form, methodology
- Personnel qualifications
- Number, location, depth

Preliminary Storm Water Management Plans must include (for Preliminary Review Letter):

____ 1. A **site map** in accordance with Checklist #1. Digital submittal required.
____ 2. **Drafting date** and **contact information** for the project engineer with all other mapping elements and scale consistent with the site plan map.
____ 3. Delineation of existing and proposed **watersheds**, subwatersheds and major flow paths within the site and draining into the site from adjacent properties.
____ 4. Location, type and **preliminary design** of proposed storm water BMPs needed to comply with the ordinance.
____ 5. Location and type of major storm water **conveyance systems** proposed for the site.
____ 6. Existing and proposed storm water **discharge points**.
____ 7. Locations and preliminary dimensions of proposed **drainage easements**.
____ 8. Location of soil borings and **soil profile evaluations** with surface elevations and unique references to supplemental data sheets, as needed to determine feasibility of any proposed storm water BMP and to comply with applicable BMP technical standards.
____ 9. Preliminary location of **access lanes** for maintenance of storm water BMPs.
____ 10. Support documentation including:
    ____ a. Preliminary **plan narrative** describing site drainage, ultimate receiving water body for off-site discharges, major site restrictions, and how the preliminary storm water management plan will meet the requirements of the ordinance and other project objectives;
    ____ b. Summary of watershed, subwatershed and land use **data** in acres and the preliminary results of any hydrology calculations, following approved LRD format;
    ____ c. **Soil profile evaluation data** submitted on COMM form SBD-10793 in accordance with BMP technical standards and county basement/groundwater separation requirements.
    ____ d. Proposed ownership and **maintenance** responsibilities for all proposed storm water BMPs

Final Storm Water Management Plans must include (for Permit):

1. A **site map** in accordance with Checklist #1. Digital submittal required.

Wisconsin Department of Commerce
Division of Safety and Buildings

SOIL EVALUATION - STORM

In accordance with Comm 82.365 & 85, Wis. Adm. Code

Page _____ of _____

Attach complete site plan on paper not less than 8 1/2 x 11 inches in size. Plan must include, but not limited to: vertical and horizontal reference point (BM), direction and percent slope, scale or dimensions, north arrow, and BM referenced to nearest road.

Please print all information.

Personal information you provide may be used for secondary purposes (Privacy Law, s. 15.04 (1) (m)).

County

Parcel I.D.

Reviewed by Date

Property Owner

Property Location

Govt. Lot 1/4 1/4 S T N R E (or) W

Property Owner's Mailing Address

Lot # Block # Subd. Name or CSM#

City State Zip Code Phone Number ( )

☐ City ☐ Village ☐ Town Nearest Road

Drainage area _____ ☐ sq. ft. ☐ acres
Optional:

Test Site Suitable for (check all that apply)

☐ Irrigation ☐ Bioretention trench ☐ Trench(es)

☐ Rain garden ☐ Grassed swale ☐ Reuse

☐ Infiltration trench ☐ SDS (> 15' wide) ☐ Other _____

Hydraulic Application Test Method:

☐ Morphological Evaluation

☐ Double-Ring Infiltrometer

☐ Other (specify) _____

Obs. # ☐ Boring ☐ Pit

Ground surface elev. _____ ft. Depth to limiting factor _____ In.

Horizon	Depth In.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic Appl. Rate Inches/Hr

Obs. #

☐ Pit

Ground surface elev. _____ ft.

Depth to limiting factor _____ In.

Horizon	Depth In.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr

Obs. #

☐ Boring

☐ Pit

Ground surface elev. _____ ft.

Depth to limiting factor _____ In.

Horizon	Depth In.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr

CST/PSS Name (Please Print) | Signature | CST/PSS Number

Address | Date Evaluation Conducted | Telephone Number

Step B, Field Verification of the Initial Screening

A. Field verification is required for areas of the development site considered suitable for infiltration. This includes verification of Step A.1. 2, 3, 4, 9, 10 and 11.

B. Sites shall be tested for depth to groundwater, depth to bedrock and percent fines information to verify any exemption and exclusion found in Step A.10 and 11. The following is a description of the percent fines expected for each type of soil textural classification.

1. Several textural classes are assumed to meet the percent fines limitations of Ch. NR 151.12(5)(e)3.i. for both 5 and 5 foot soil layers. These classifications include the sandy loams, loams, silt loams and all the clay textural classifications. Coarse sand is the only soil texture that by definition will not meet NR 151.12(5)(e)3.i. limitations for a 5 foot soil layer consisting of 20% fines. Other sand textures and loamy sands may need the percent fines level verified with a laboratory analysis

2. Borings and pits shall be dug to verify soil infiltration capacity characteristics and to determine depth to groundwater and bedrock.

C. The following information shall be recorded for Step B:

1. The date or dates the data was collected,

within 100 feet of the development site, and public wells within 400 feet of the developed site.

3. Soil profile descriptions must be written in accordance with the descriptive procedures, terminology and interpretations found in the Field Book for Describing and Sampling Soils, USDA, NRCS, 1998. Frozen soil material must be thawed prior to conducting evaluations for soil color, texture, structure and consistency. In addition to the data determined in Step B, soil profiles must include the following information for each soil horizon or layer.

a. Thickness, in inches or decimal feet.
b. Munsell soil color notation.
c. Soil mottle or redoximorphic feature color, abundance, size and contrast.
d. USDA soil textural class with rock fragment modifiers.
e. Soil structure, grade size and shape
f. Soil consistence, root abundance and size.
g. Soil boundary.
h. Occurrence of saturated soil, groundwater, bedrock or disturbed soil.

1002 Site Evaluation Standard

[1] Use sandy loam design infiltration rates for fine sand, loamy fine sand, very fine sand, and loamy fine sand soil textures.

[2] Infiltration rates represent the lowest value for each textural class presented in Table 2 of Rawls, 1998.

[3] Infiltration rate is an average based on Rawls, 1982 and Clapp & Hornberger, 1978.

Qualifications

Table 3: Total Correction Factors Divided into Measured Infiltration Rates

Ratio of Design Infiltration Rates[1]	Correction Factor
1	2.5
1.1 to 4.0	3.5
4.1 to 8.0	4.5
8.1 to 16.0	6.5
16.1 or greater	8.5

[1] Ratio is determined by dividing the design infiltration rate (Table 2) for the textural classification at the bottom of the infiltration device by the design infiltration rate (Table 2) for the textural classification of the least permeable soil horizon. The least permeable soil horizon used for the ratio should be within five feet of the bottom of the device or to the depth of the limiting layer.

Required Qualifications

A. Site Evaluations - Individuals completing site evaluations shall be a licensed professional acceptable to the authority having jurisdiction and have experience in soil investigation, interpretation and classification.

B. Soil Evaluations - Individuals completing the soils evaluation shall be a Soil Scientist licensed by the Department of Regulation and Licensing or other licensed professional acceptable to the authority having jurisdiction.

CST

VI. Considerations

Additional recommendations relating to design that may enhance the use of, or avoid problems with this practice but are not required to insure its function are as follows:

A. Groundwater monitoring wells, constructed as per chapter NR 141, Wis. Adm. Code, can be used to determine the seasonal *high groundwater level*. Large sites considered for infiltration basins may need to be evaluated for the direction of groundwater flow.

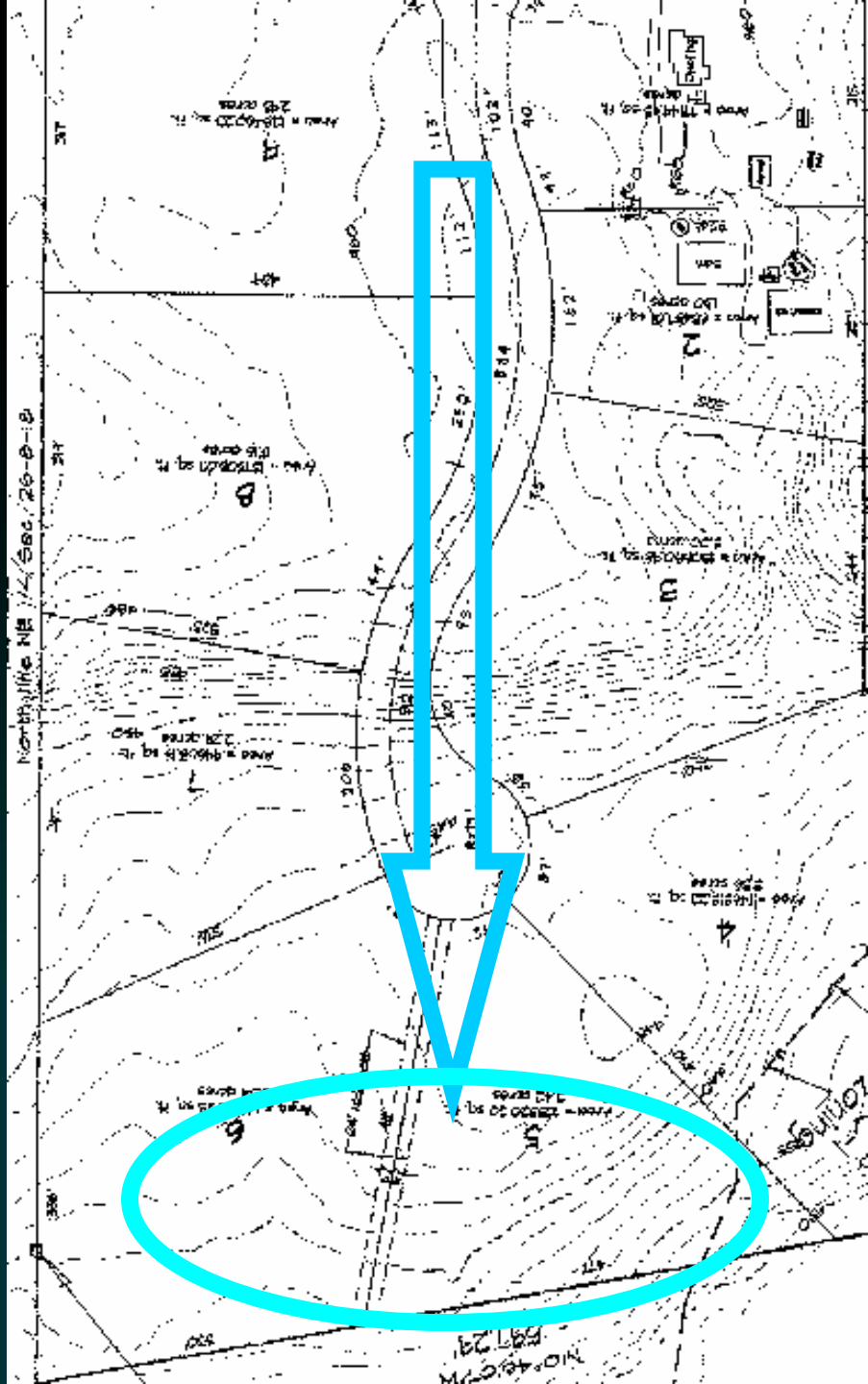
Number of Soil Tests

Table 1: Evaluation Requirements Specific to Proposed Infiltration Devices

Infiltration Device	Tests Required[1]	Minimum Number of Borings/Pits Required	Minimum Drill/Test Depth Required Below the Bottom of the Infiltration System
Irrigation Systems[2]	Pits or borings	NA[3]	5 feet or depth to *limiting layer*, whichever is less.
Rain Garden[3]	Pits or Borings	NA[3]	5 feet or depth to limiting layer, whichever is less.
Infiltration Trenches (≤ 2000 sq feet impervious drainage area)	Pits or borings	1 test/100 linear feet of trench with a minimum of 2, and sufficient to determine variability	5 feet or depth to limiting layer, whichever is less.
Infiltration Trenches (> 2000 sq ft of impervious drainage area)	• Pits or borings • Mounding potential	1 pit required and an additional 1 pit or boring/100 linear feet of trench, and sufficient to determine variability	Pits to 5 feet or depth to limiting layer Borings to 15 feet or depth to limiting layer
Bioretention Systems	• Pits or borings • Mounding potential	1 test/50 linear feet of device with a minimum of 2, and sufficient to determine variability	5 feet or depth to limiting layer
Infiltration Grassed Swales	Pits or borings	1 test/1000 linear feet of swale with a minimum of 2, and sufficient to determine variability	5 feet or depth to limiting layer
Surface *Infiltration Basins*	• Pits or borings • Mounding potential	2 pits required per infiltration area with an additional 1 pit or boring for every 10,000 square feet of infiltration area, and sufficient to determine variability	Pits to 10 feet or depth to limiting layer Borings to 20 feet or depth to limiting layer
Subsurface *Dispersal Systems*	• Pits or borings • Mounding potential	2 pits required per infiltration area with an additional 1 pit or	Pits to 10 feet or depth to limiting layer

BMPs Not In Outlots

- Outlot required for “BMPs that collect runoff from more than one lot”
- Especially a problem with CSMs

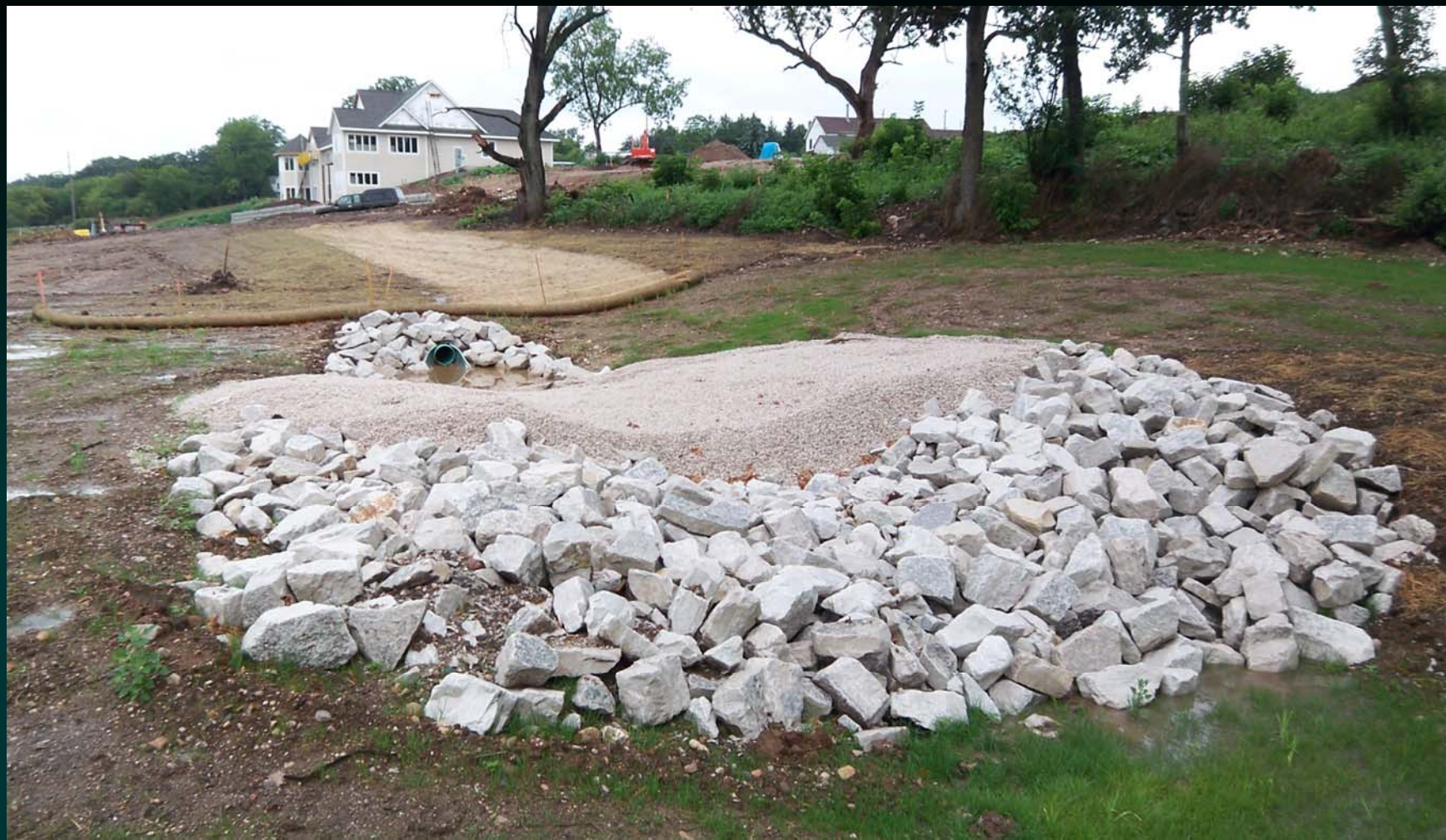


Narrative - Receiving Water Body

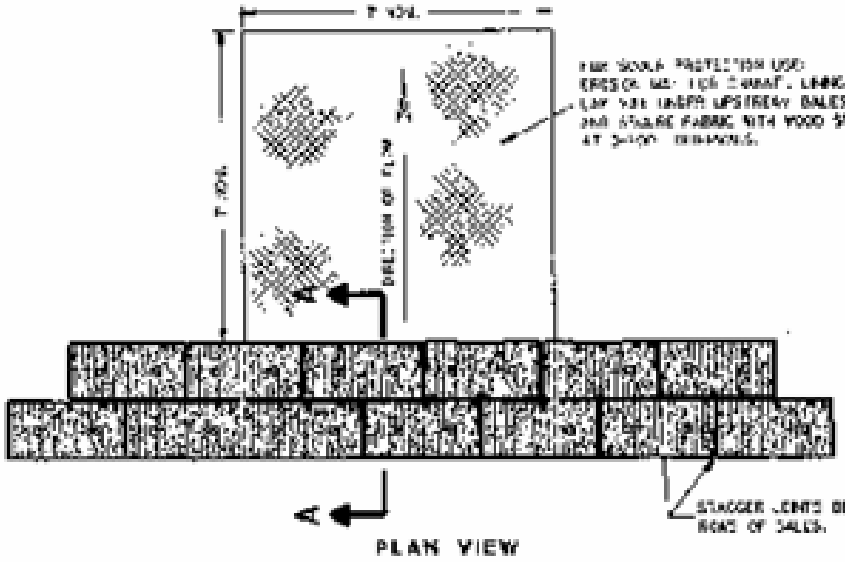
- Cold water communities overlooked
- Genesee, Mukwonago, Merton, Waukesha, Eagle, Ottawa, Delafield Townships
- Thermal mitigation

Ditch Checks

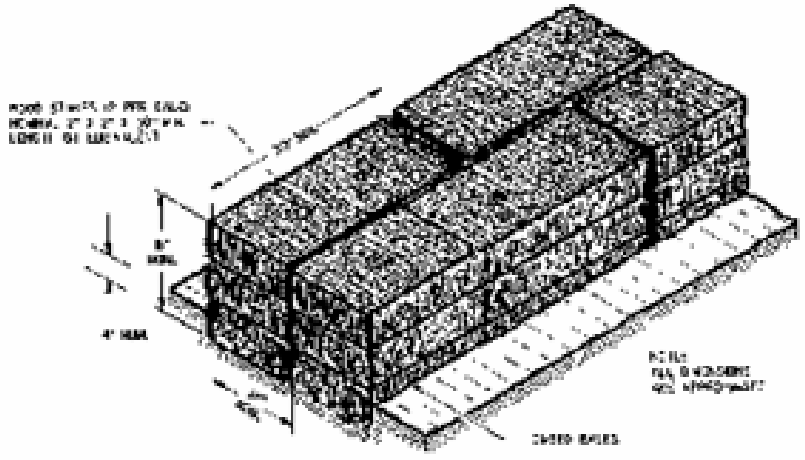
- No Fabric
- No Single-row bales
- Ends must be higher than middle



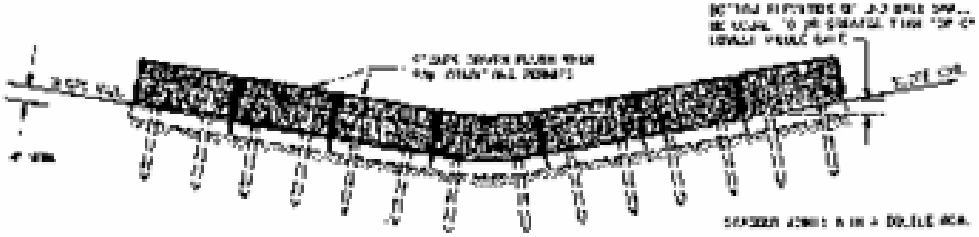
1062 Technical Standard



PLAN VIEW



SECTION A-A

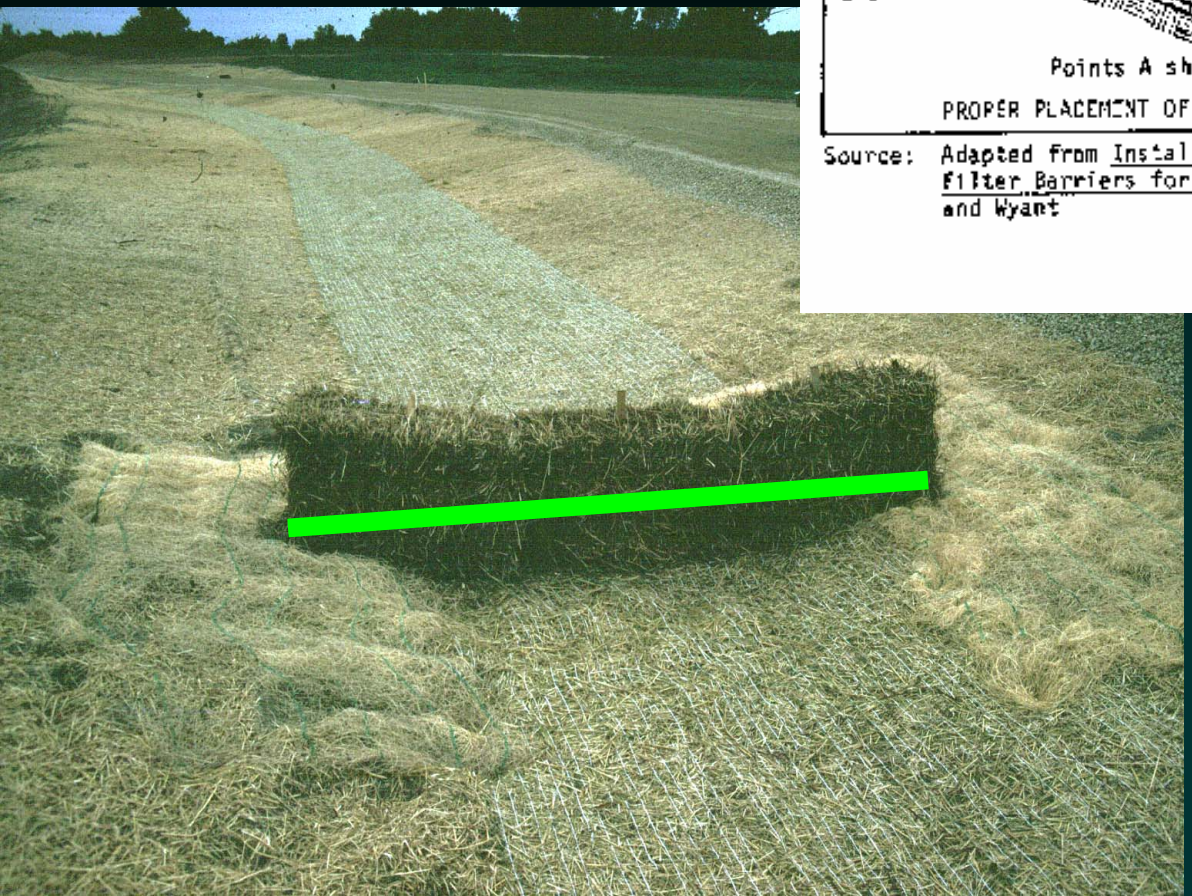


FRONT ELEVATION

TEMPORARY DITCH CHECK USING EROSION BALES ①

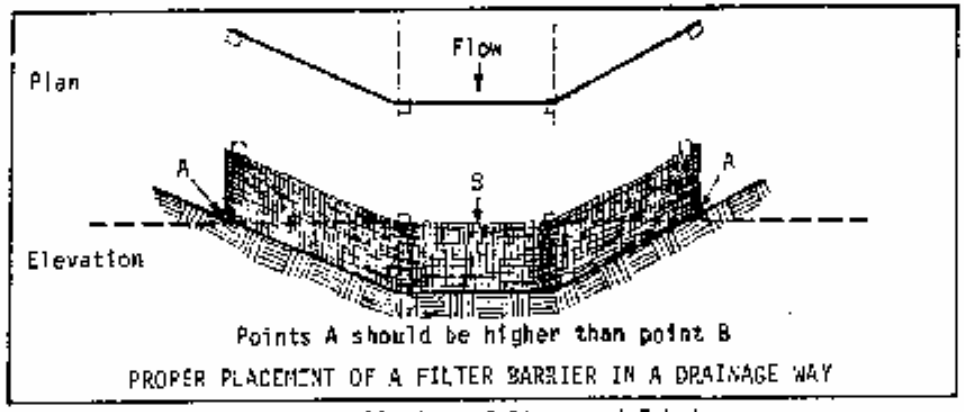
TYPICAL INSTALLATIONS OF EROSION BALES / TEMPORARY DITCH CHECKS

Bad Ditch Checks



April 1989

Figure 1.



PROPER PLACEMENT OF A FILTER BARRIER IN A DRAINAGE WAY

Source: Adapted from Installation of Straw and Fabric Filter Barriers for Sediment Control, Sherwood and Wyant

Better Ditch Checks

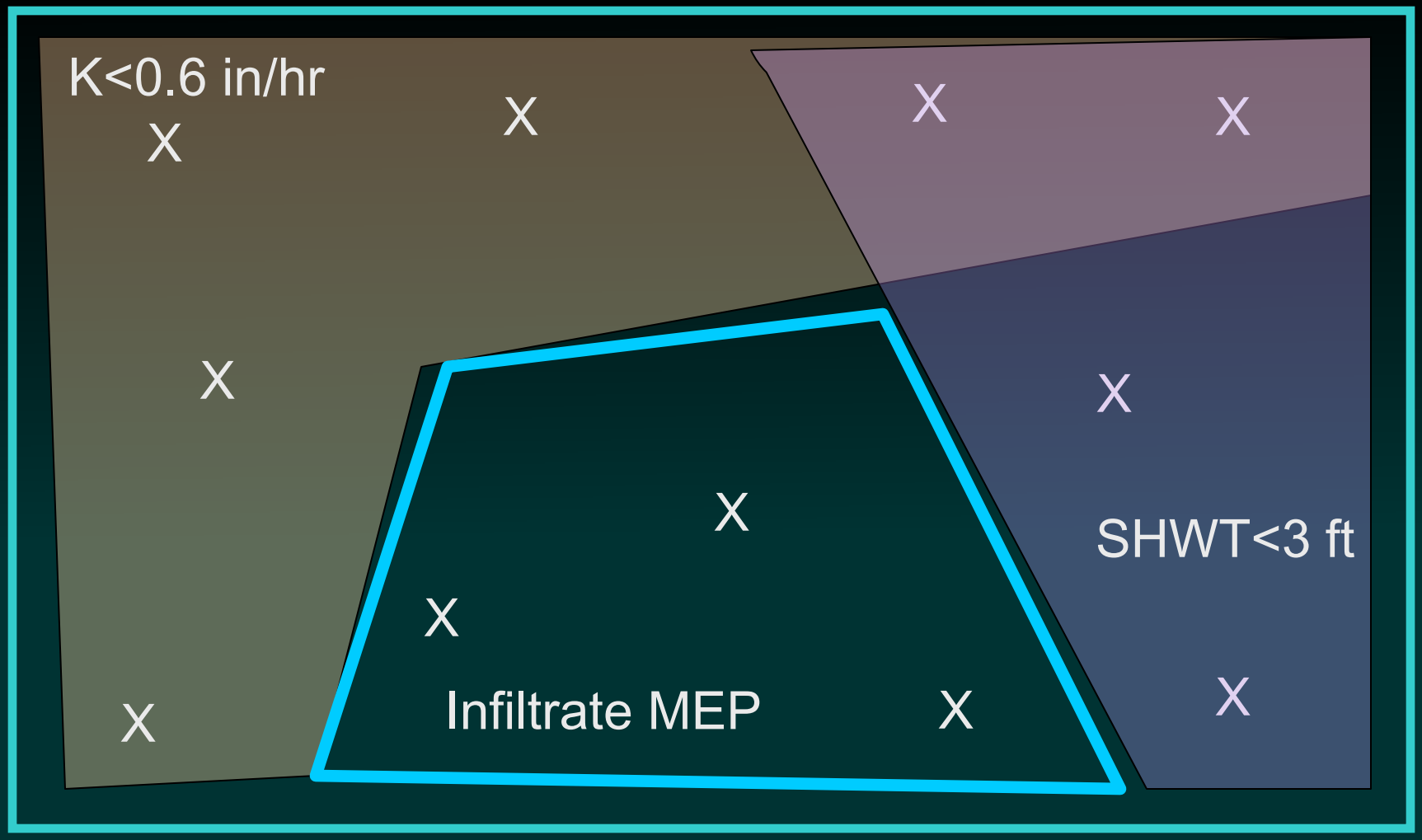
Inappropriate Infiltration Exemption Claims

- Table 1, 1002 Site Evaluation Standard – design only
- Loam soil not <0.6 in/hr
- Should use NRCS soil survey data (Loam 0.63-2.0)
- Only exempt soils clay, silty clay. Clay loam not exempt.
- Lack of supporting documentation (soil evaluations, infiltrometer tests, maps)
- Documentation only for end-of-pipe locations
- No exemption request fee

Confusion Between Exemption and Exclusion

- Exemption – soil is too impermeable *across entire site* to infiltrate
- Exclusion – seasonal high groundwater is shallow, inadequate filtering layer. Means infiltration from "dirty" sources in those areas ***will not be credited*** towards meeting the infiltration requirement
  - Could still infiltrate roof runoff in those areas
  - Must show that no other locations on site meet separation requirement

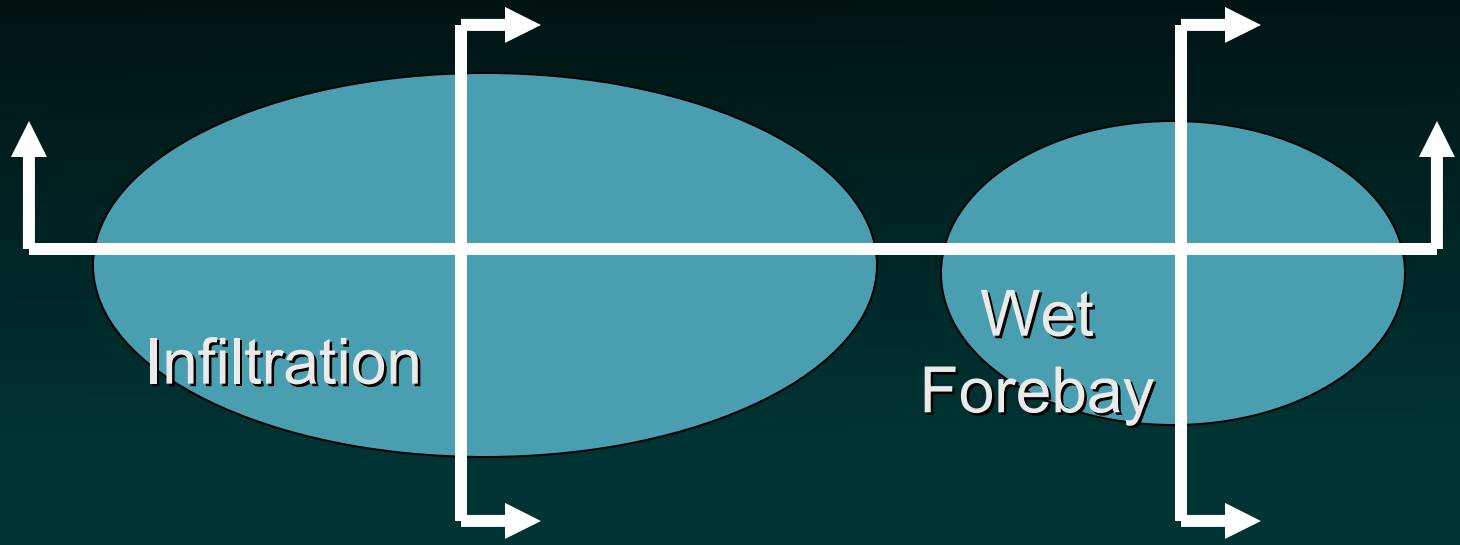
Example Infiltration Evaluation Map



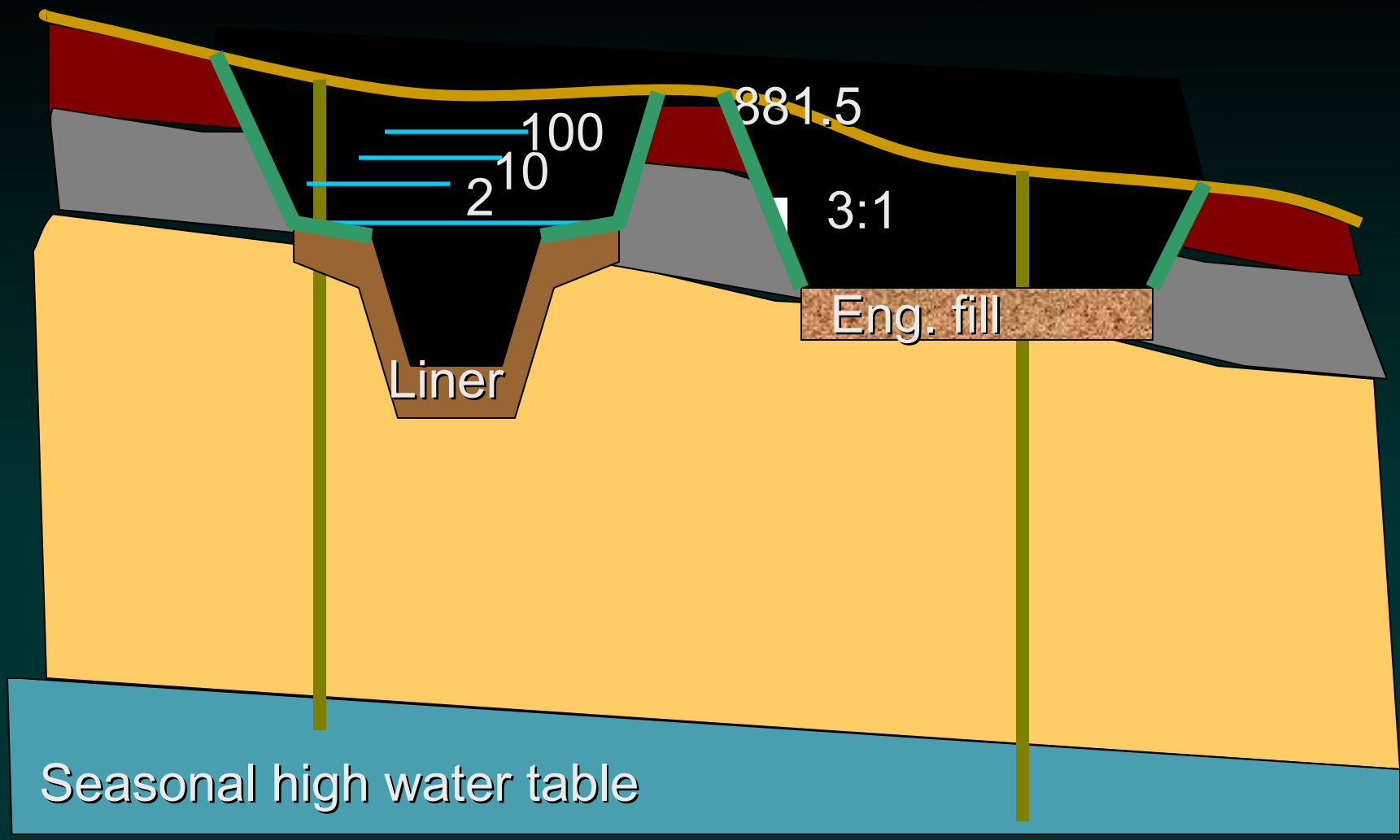
Basin Cross-Sections and Profiles

- Checklist 3 – two per BMP
- Soils
- Seasonal high water table
- Peak water surface elevations
- Topsoil re-application
- Liner, engineered soil, or bottom treatment

Cross Section and Profile



Example Profile / Section



Late-Season Stabilization Provisions

- September 15, October 15 seeding deadlines
- Dormant seeding is not stabilization
- Use of polymer or other soil stabilizers


Granular
Polymer

Utility Installation Delays

- Must provide for temporary stabilization during inactivity >7 days

Protection of Infiltration Basins During Construction

Same Basin, 7 Years Later

Effects of Construction Sediment


After Sediment Removal

Modeling Omissions, Mistakes

- SLAMM
  - Rainfall file dates
  - Starting water level in wet basin
  - Overlooking isolated areas
- TR55
  - Cropland CN
  - Composite CN calculation

Example Data Summary Sheet for Sto

Project Name: Rolling Acres **Project Size:** 110 Acres **Project type:**
Number of Runoff Discharge Points: 3 **Watershed (ultimate discharge):**
Watershed Area (including off-site runoff traveling through project area):
Public Land Survey Location: SE1/4, Section 32, T8N R19E (Pewaukee Towns

Summary Data Elements	Subwatershed A		S
	Pre-develop	Post-develop	Pre-dev
Watershed Areas *(in acres) (see attached map)*	100 acres	120 acres	20
[illegible]	[illegible]	2-8%	3-6%
Land Uses *(% of each) (see attached map)*	75 ac. cropland 15 ac. brush 10 ac. woodland	110 ac. ½ ac. lots 5ac. brush 5 ac. woodlands	100% cro
Runoff Curve Numbers	68 x 75ac.= 5100 30 x 25ac.= 750 Net 5850/100 ac. RCN = 59	70 x 110 ac.= 7700 10 x 10 ac.= 100 Net 7800/120ac RCN = 65	RCN = (state stan

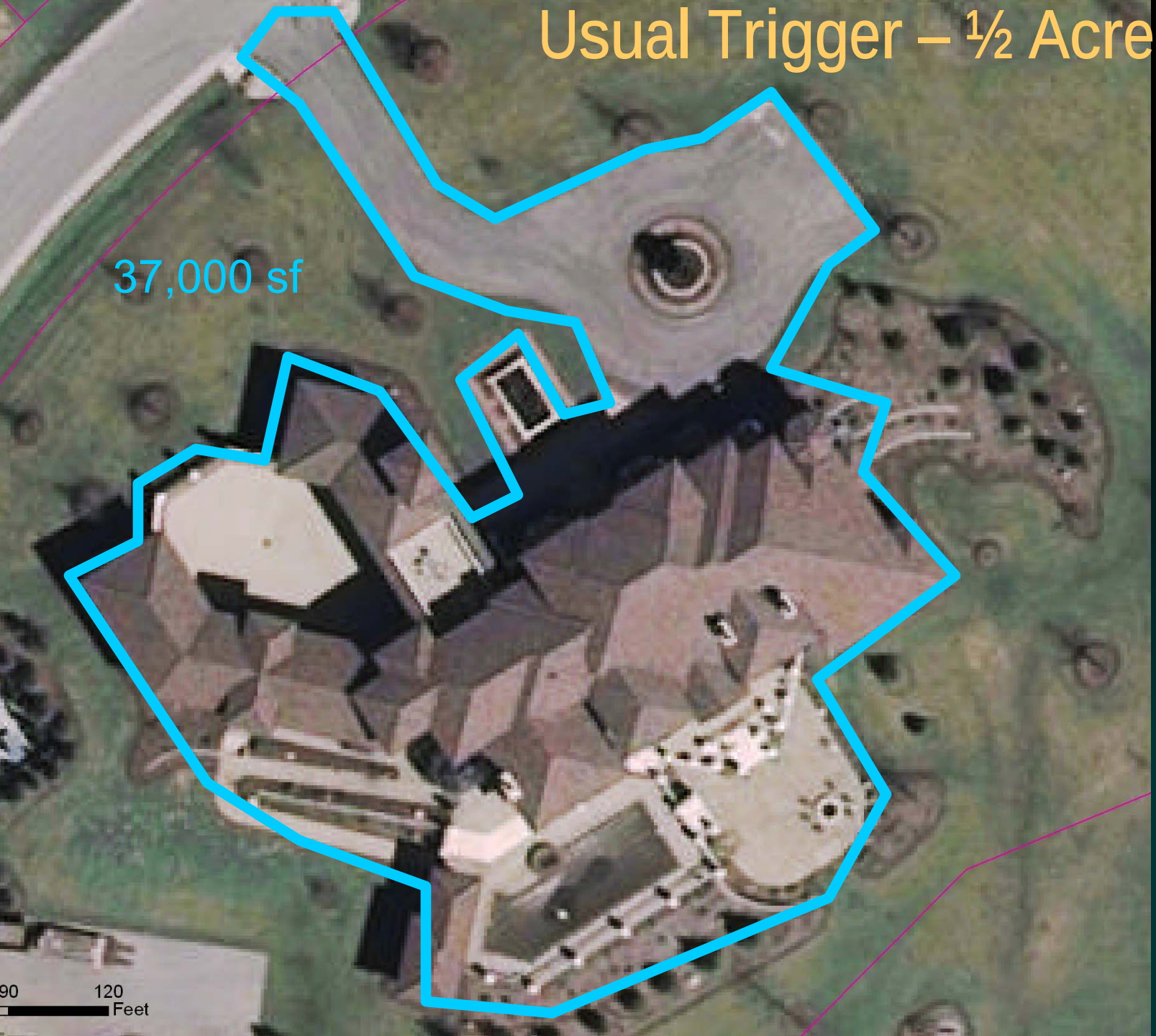
Direct Connection to Conveyances

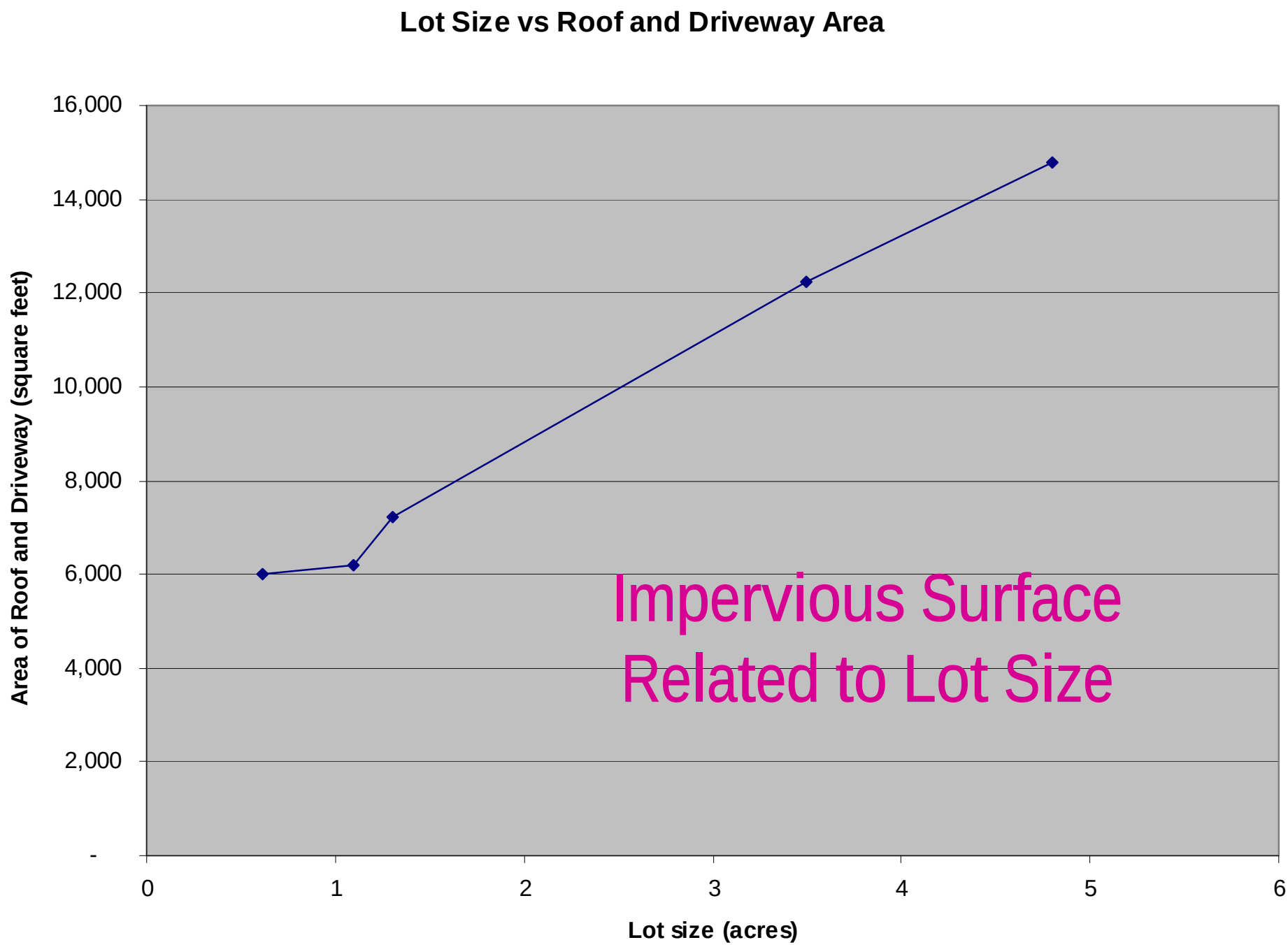
Overestimation of Swale Infiltration

- Infiltration rate <<3.6 in/hr
- Maximum slope
- Soil treatment
- See 1005 standard
- Soil tests required

Underestimation of Per-Lot Impervious Surface

Usual Trigger – ½ Acre




Lot Size vs Roof and Driveway Area
Area of Roof and Driveway (square feet)
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
-
0
1
2
3
4
5
6
Lot size (acres)
Impervious Surface
Related to Lot Size

Construction Inspections

- Different from erosion control inspections
- Spot checks of BMPs to allow for correction while contractor is still on site
- Schedule must be submitted
- Must list inspector / engineer

Example Combined Construction Sequence and Construction Inspection Schedule

Date	Duration	Milestone or Task	Date of Inspection	Inspector Initials	Inspector Role
		Prior to grading activities			
		Surveyor stakes road, drainageways, storm water BMPs. Mark wetlands.			
		Plan implementation meeting			
		Hold pre-construction meeting with Town, County, DNR, contractors, utilities			
		Install tracking pad			EC insp.
		Install silt fence or other perimeter BMPs, clearing and grubbing as minimally needed			EC insp.
		Contact County LRD and other authorities at least 2 days prior to beginning construction			
		Construct Basins			
		Strip topsoil in basin and subsoil stockpile areas			
		Excavate temporary or permanent basins to be used for sediment control			
		The following steps apply to construction of wet detention basins			
		Before berm material is placed, verify that			
		Topsoil, stumps, and vegetation are stripped in basin berm footprint			Engineer
		A 2'x8' keyway is excavated under berm (if permanent pool will pond >3 ft against embankment)			Engineer
		The basin berm is constructed with the specified material			Engineer
		Before a liner is placed, verify that:			
		Basin interior slopes do not exceed maximum pitches (3:1 above water, 10:1 safety shelf, 2:1 below)			Engineer
		Basin bottom and shelf elevations are correct			Engineer
		The safety shelf is at least 8 ft wide			Engineer
		Before the berm is re-compacted around outlet pipes following installation, verify that:			
		The correct pipe diameter, drain hole diameter, and materials are used			Engineer
		The outlet pipe and riser elevations are correct			Engineer
		Anti-seep devices are installed on specified outlet pipes			Engineer
		Before topsoil is re-applied, verify that:			
		A compacted 2-ft clay liner is installed up to the permanent pool elevation			Engineer
		The 90% standard Proctor compaction req't is met by sampling at five locations along embankmt			Engineer
		The berm elevation is 5% above design height (above existing grade) to allow for settling			Engineer
		Verify that topsoil is re-applied to all surfaces above and including the safety shelf			Engineer
		Basin is dewatered to verify bottom elevation and remove sediment			Engineer
		As-built elevations are correct (see as-built survey punch list)			Engineer
		The following steps apply to construction of infiltration basins			
		Before engineered soil is installed in the infiltration area, verify that:			
		Basin was over-excavated to expose permeable soil			Soil Scientist
		Compost used to amend soil meets WDNR specification S100			Engineer
		Correct mixture of engineered soil is used (40% sand, 30% topsoil, 30% compost)			
		Before berm material is placed, verify that			
		Topsoil, stumps, and vegetation are stripped in basin berm footprint			Engineer
		A 2'x8' keyway is excavated under berm (if permanent pool will pond >3 ft against embankment)			Engineer
		The basin berm is constructed with the specified material			Engineer
		Before a forebay liner is placed, verify that:			
		Basin interior slopes do not exceed maximum pitches (3:1 above water, 10:1 safety shelf, 2:1 below)			Engineer
		Basin bottom and shelf elevations are correct			Engineer
		The safety shelf is at least 8 ft wide			Engineer

Infiltration / Bioretention Plantings

- Warm season / native plants used to structure soil
- Can’t throw down seed and walk away
- No planting implementation plan provided
- No qualified person designated to oversee construction or verify plantings

Example Plan for Using Native Plantings for Storm Water Infiltration

The following information is provided to serve as a general guide for establishing native plantings especially for storm water infiltration. It has been compiled from information provided by staff at Retzer Nature Center – Waukesha County Department of Parks and Land Use. It is not intended to replace the guidance that would be provided by contracting with a qualified professional to prepare a site-specific plan and to direct or perform the plan implementation. It is assumed that the topsoil is stripped and stockpiled and the areas for infiltration areas rough graded before finally having topsoil reapplied and being planted.

Site preparation is key to a successful planting, including the removal of invasive or nonnative species. The following scenario assumes that the site is a typical subdivision, with site grading operations starting in early summer:

Phase I (B) - Site Preparation & Planting

- **1st year** June – Topsoil stripping and rough grading are completed. Infiltration basins are rough graded, but runoff is diverted around the basins. *(Note: To avoid soil compaction, minimize use of heavy equipment on basin bottom, especially with rubber tires.)*

At this point two options are available:

Planting Verification Letter
(minimum requirements)

DATE:

TO: Land Resources Division
Waukesha County Department of Parks and Land Use

FROM: (Landscape Architect or other qualified professional's name and qualification)

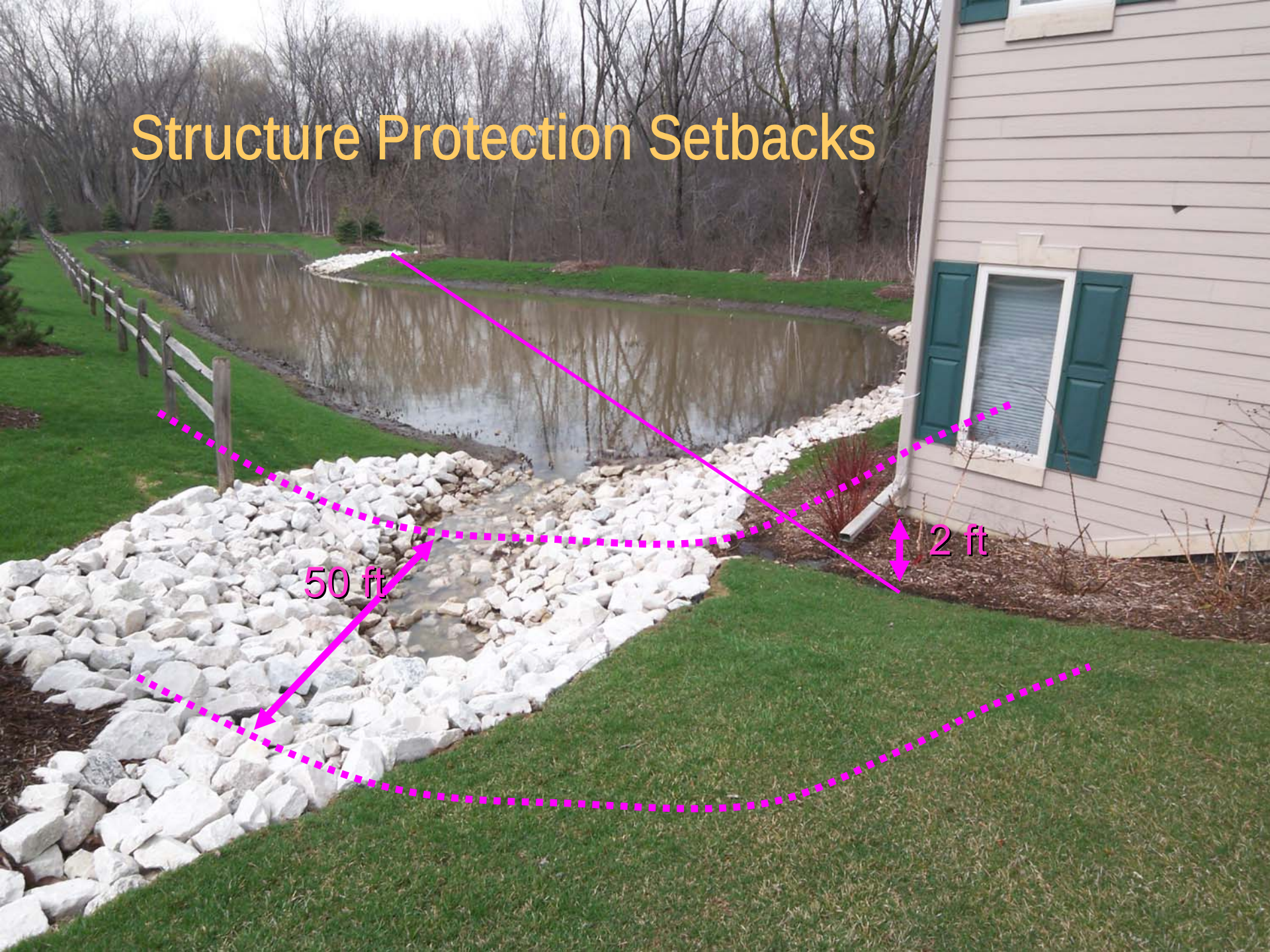
RE: Planting Verification for the following project:

Project Name: _____

Section _____, Town of _____

Permit # _____

This correspondence shall serve as verification that I have performed ___ transect surveys of the designated warm season or wetland planting areas described in the approved plans for the storm water facilities for the above-referenced project and that the plantings have a minimum coverage of 70% and match the species descriptions on the plans. Copies of the transect survey results are attached, along with a location map and any observations of potential future maintenance concerns.


Structure Protection Setbacks
50 ft
2 ft


Overflow
Elevation?

Wet Basin Post – Construction Tasks

- Dewatering following stabilization
- Sediment removal
- As built survey must include basin bottom elevation