Planning, Sizing, and Design of an Infiltration Basin

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"Mitigation 101" Workshop
Detroit Lakes City Offices
Thursday, April 12, 2007

DETERMINING THE IMPERVIOUS SURFACE

On substandard size lots, surface coverage over 15% must be offset with mitigation. Impervious surface is not allowed to exceed 25% of any lot. Impervious surface includes structures or anything that reduces or prevents the infiltration of water, such as: driveways (asphalt / class 5); parking areas; concrete; impervious pavers; walks; decks; patios; houses; garages, etc.

Threshold Coverage: _____ %
Proposed Coverage: -- _____ %

Difference: = (_____) x (5) = _____ **Credit Units Required for Mitigation**

MITIGATING THE DIFFERENCE IN IMPERVIOUS SURFACE COVERAGE

Reduce Impervious Surface Coverage: 5 credit units is allowed for each percentage point reduction in coverage between 15 and 25 percent.

(_____% coverage reduced) x (5) = *Credit Units Gained* _____

Stormwater Management: If water runoff is diverted into an approved onsite stormwater management system, 10 credit units may be gained for each 350 sq ft of surface area from which the runoff is contained on the property.

Example 350 Sq Ft of Surface Area Diverted = 10 Credit Units Gained
700 Sq Ft of Surface Area Diverted = 20 Credit Units Gained

Credit Units Gained _____

Berm: If a berm is established that is not less than 12 inches above grade and parallel to the shoreline to contain / control stormwater runoff, 10 Credit Units is allowed for every 25 feet of protected shoreline. This option is only available to properties of less than 8% grade to the lake.

Example 25 Feet of protected Shoreline = 10 Credit Units Gained
50 Feet of protected Shoreline = 20 Credit Units Gained

Credit Units Gained _____

Shore Impact Zone Removal (see below): *Credit Units Gained* _____

Total Mitigation Credit Units Gained: _____

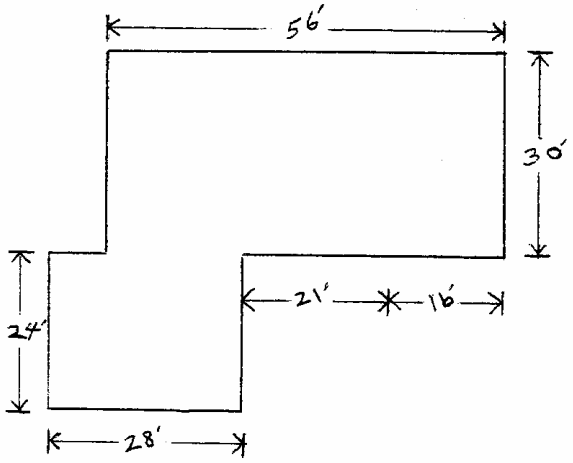
SHORE IMPACT ZONE OPTION

Structures and other impervious surfaces are not allowed in the Shore Impact Zone, with the

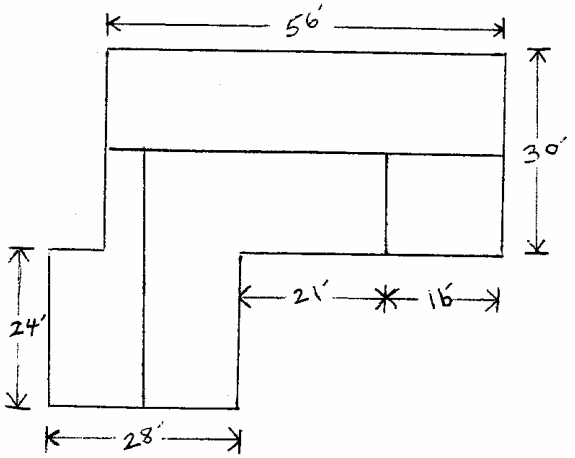
COMPUTATION SHEET
SCS–ENG–523 Rev. 8–69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

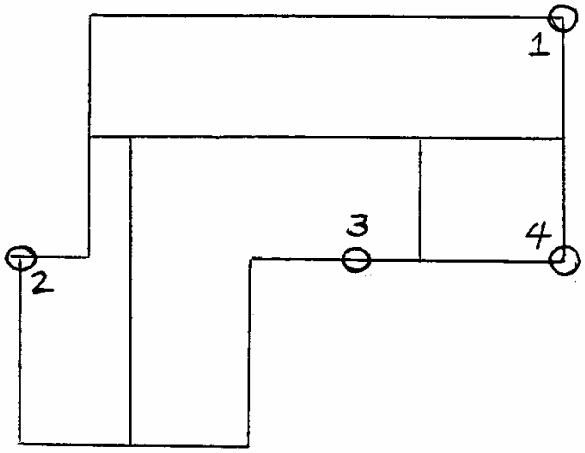
STATE		PROJECT		
BY	DATE	CHECKED BY	DATE	JOB NO.
SUBJECT				SHEET ____ OF ____



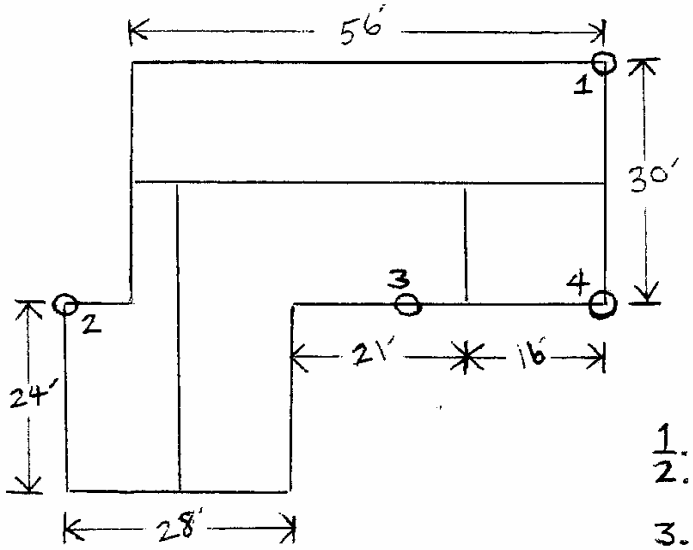
Draw footprint of structure with dimensions. (Include roof overhangs)



Draw in roofline peaks. (Not valleys)



Draw in and number roof gutter down spout locations.



Calculate square footage within foot print that flows to each down spout. (Drainage Area)

Length X width = Area

1. 15' X 56' = 840 sq. ft.
2. 24' x 14' = 336 } 411 sq.ft
   15' x 5' = 75 }
3. 39' x 14' = 546 } 861 sq.ft
   15' x 21' = 315 }
4. 15' x 16' = 240 sq. ft.

(Example)

Down spout #	Drainage Area
1.	840 square feet
2.	411 square feet
3.	861 square feet
4.	240 square feet

In the Mitigation Worksheet, you will see that 10 credit units may be gained for each 350 sq ft of surface area from which runoff is contained on the property. (1 credit unit = 35 sq ft) Therefore, to determine the credit units that may be gained in our example, we need to **divide the drainage area for each down spout by 35 to determine how many credit units that down spout can provide. (For all cases)**

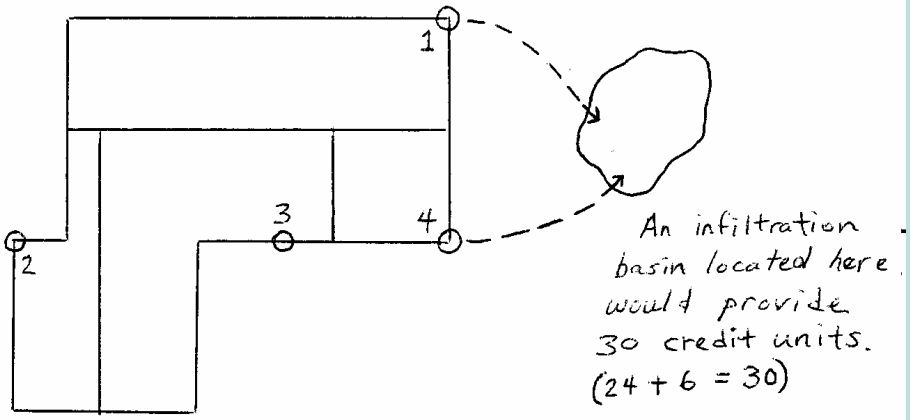
(Example)

Down spout #	Drainage Area	Credit Units Gained
1.	840 square feet	24
2.	411 square feet	11
3.	861 square feet	24
4.	240 square feet	6

Planning Infiltration Basins

Determine which down spouts to divert into infiltration basins based on:

- Credit units required for mitigation (from Mitigation Worksheet)
- Site feasibility for infiltration basins for each down spout
- Consider constructing individual or combination basins for multiple down spouts



Sizing Infiltration Basins

To calculate the size of an infiltration basin, **multiply the drainage area of all down spouts that contribute to that basin by 0.2 (or divide by 5).** This will convert the square footage of drainage area into the cubic feet of storage needed to contain the runoff for that downspout for a 2 year-24 hour rain event. (2.4 inch rain)

(Example)

Down spout #	Drainage Area				Cubic Feet of Storage in Infiltration Basin
1.	840 square feet	X	1/5	=	168 cubic feet
2.	411 square feet	X	1/5	=	82 cubic feet
3.	861 square feet	X	1/5	=	172 cubic feet
4.	240 square feet	X	1/5	=	48 cubic feet

DRAINAGE AREA TO DOWN SPOUT **DIVIDED BY 5** **=** **SQUARE FEET ON TOP FOR 1 FOOT DEEP BASIN**

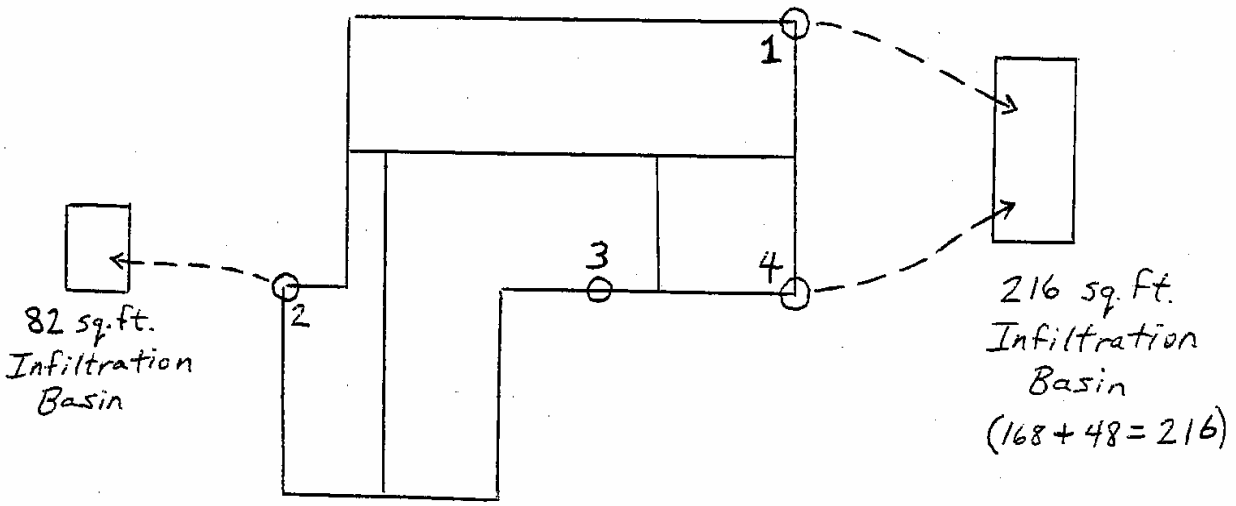


Table 12.INF.9 Design Infiltration Rates

Hydrologic Soil Group	Infiltration Rate [inches/hour]	Soil Textures	Corresponding Unified Soil Classification
A	1.6*	Gravel, sandy gravel and silty gravels	**GW** - Well-graded gravels, sandy gravels **GP** – Gap-graded or uniform gravels, sandy gravels **GM** - Silty gravels, silty sandy gravels **SW** - Well-graded, gravelly sands
	0.8	Sand, loamy sand or sandy loam	**SP** - Gap-graded or uniform sands, gravelly sands
B	0.6	Silt loam	**SM** - Silty sands, silty gravelly sands
	0.3	Loam	**MH** – Micaceous silts, diatomaceous silts, volcanic ash
C	0.2	Sandy clay loam	**ML** - Silts, very fine sands, silty or clayey fine sands
D	< 0.2	Clay loam, silty clay loam, sandy clay, silty clay or clay	**GC** – Clayey gravels, clayey sandy gravels **SC** – Clayey sands, clayey gravelly sands **CL** – Low plasticity clays, sandy or silty clays **OL** – Organic silts and clays of low plasticity **CH** – Highly plastic clays and sandy clays **OH** – Organic silts and clays of high plasticity

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist chiefly of very deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

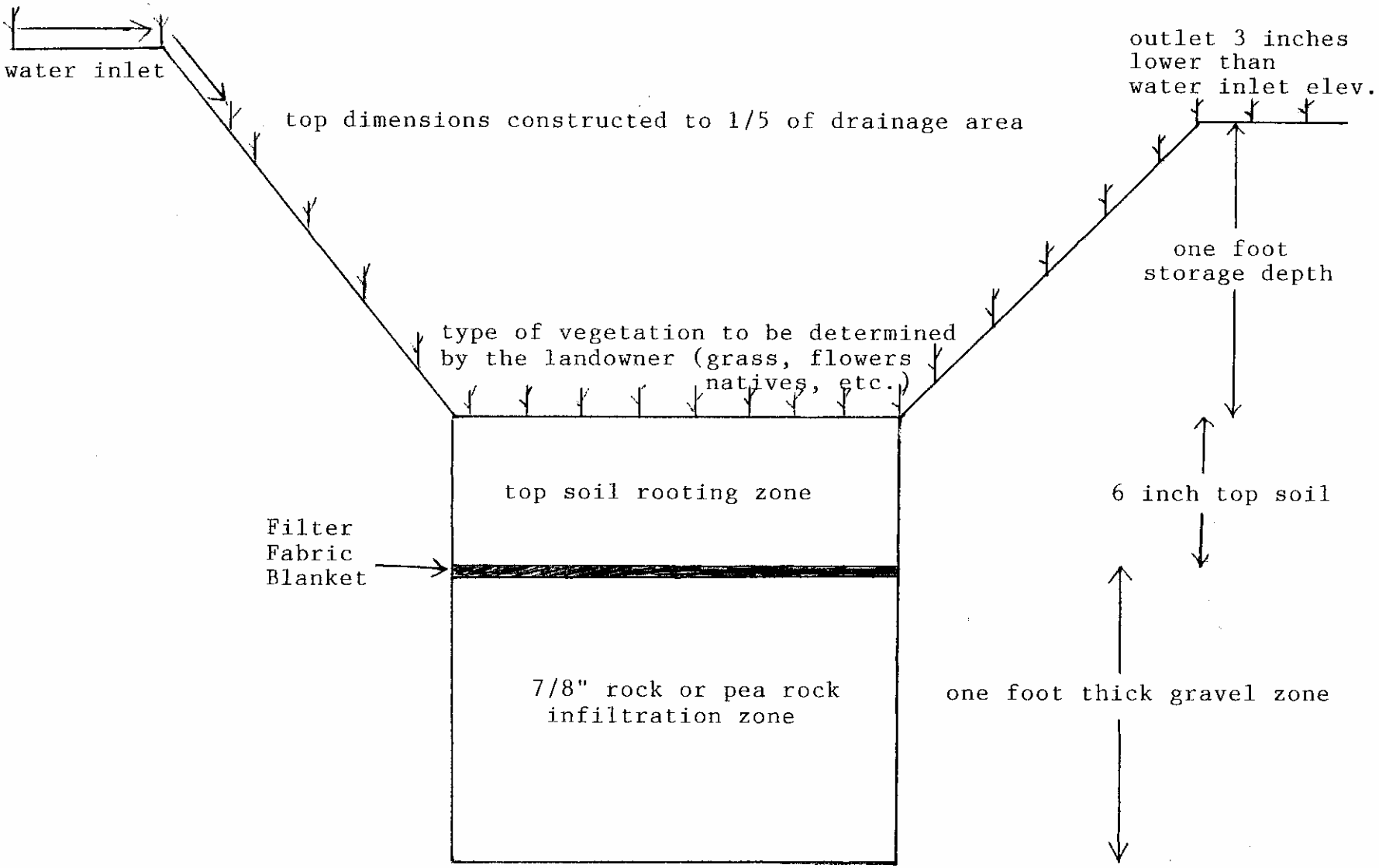
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have a moderately fine to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils that have a moderately fine or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clayey soils that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to two hydrologic groups in the table, the first letter is for drained areas and the second is for undrained areas.

SANDY SOILS = Soils with infiltration rates of more than one inch per hour



LOAM, SILTS, AND CLAY SOILS = Infiltration rates of less than one inch per hour