SOIL EROSION CODE

SOIL CONSERVATION SERVICE
CONSERVATION PRACTICE
STANDARD

APPENDIX "A"

TREE PROTECTION
CODE 990

DEFINITION – Methods to preserve and protect desirable trees from damage during project development.

PURPOSE – The purpose of this practice is to preserve and protect desirable trees that have present or future value for erosion protection for landscape and aesthetic value, or for other environmental benefits.

CONDITIONS WHERE PRACTICE APPLIES – This practice applies on development sites containing tress or stands of trees.

CRITERIA – The following general criteria should be considered when developing sites in wooded areas:

1. Leave critical areas (such as floodplains, steep slopes, and wetlands) with desirable trees in their natural condition or only partially cleared.
2. Locate roadways, storage areas, and parking pads away from valuable tree stands. Follow natural contours, where usable, to minimize cutting and filling in the vicinity of the trees.
3. Select trees to be preserved before siting roads, buildings or other structures.
4. Minimize trenching in areas with trees. Place several utilities in the same trench.
5. Designate groups of trees to be saved on the erosion and sedimentation control plan.
6. Do not excavate, traverse, or fill closer than the drip line or perimeter of the canopy of trees to be saved.

CONSIDERATIONS – Preserving and protecting trees and other natural plant groups often results in a more stable and aesthetically pleasing development. During site evaluation, note where valuable trees and other natural landscape features should be preserved, then consider these trees and plants when determining the location of roads, buildings, or other structures.

Trees that are near construction zones should be either protected or removed, because damage during construction activities may cause the death of the tree at a later time.

Trees should be considered for preservation for the following benefits:

1. Trees stabilize the soil and prevent erosion.
2. Trees reduce stormwater runoff by intercepting rainfall, promoting infiltration, and lowering the water table through transpiration.
3. Trees moderate temperature changes, provide shade and reduce the force of wind.
4. Trees provide buffers and screens against noise and visual disturbance, providing a degree of privacy.
5. Trees filter pollutants from the air, remove carbon dioxide from the air, and produce oxygen.
6. Trees provide a habitat for animals and birds.
7. Trees increase property values and improve site aesthetics.

Construction activities can significantly injure or kill trees unless protective measures are taken. Although direct contact by equipment is an obvious means of damaging trees, most serious damage is caused by root zone stress from compacting, filling, or excavating too close to the tree. Clearly mark boundaries to maintain sufficient undisturbed areas around the tree.

PLANS AND SPECIFICATIONS – The plans will show the trees to be protected and the location and type of barrier to be installed.

OPERATION AND MAINTENANCE – In spite of precautions, some damage to protected trees may occur. In such cases, repair any damage to the crown, trunk, or root system immediately.

1. Repair roots by cutting off the damaged areas and painting them with tree paint. Spread peat moss or moist topsoil over exposed roots.
2. Repair damage to bark by trimming around the damaged area. Taper the cut to provide drainage, and paint with tree paint.
3. Cut off all damaged tree limbs above the tree collar at the trunk or main branch. Use three separate cuts to avoid peeling bark from healthy areas of the tree.

APPENDIX "B"

TOPSOILING
CODE 981

DEFINITION – Methods of preserving and using topsoil to enhance final site stabilization with vegetation.

PURPOSE – The purpose of this practice is to provide a suitable growth medium for final site stabilization with vegetation.

CONDITIONS WHERE PRACTICE APPLIES

1. Where the preservation or importation of topsoil is determined to be the most effective method of providing a suitable growth medium.
2. Where the subsoil or existing soil present any or all of the following problems:
   a. The texture, bulk density, pH, or nutrient balance of the available soil cannot be modified by a reasonable means to provide an adequate growth medium for the desired vegetation.
   b. The soil is too shallow to provide adequate rooting depth or will not supply necessary moisture and nutrients for growth of desired vegetation.
   c. The soil contains substances toxic or potentially toxic to the desired vegetation.
3. Where high-quality turf or ornamental plants are desired.

CRITERIA – Determine if sufficient quantities of suitable topsoil (described in material specification 804 Material for Topsoiling) is available at the site or nearby. Topsoil will be spread at a lightly compacted depth of 2 to 4 inches. Depths of 4 inches or greater are recommended where fine-textured (clayey) subsoils or other root limiting factors are present.

If topsoil is to be stockpiled at the site, select a location so that it will not erode, block drainage, or interfere with work on the site.

During construction of the project, soil stockpiles shall be stabilized or protected with sediment trapping measures such as practice standards SILT FENCE 920 or TEMPORARY SEEDING 965. Perimeter controls shall be placed around the stockpile immediately; seeding of stockpiles shall be completed within 7 days of formation of the stockpile if it is to remain dormant for longer than 30 days.

Bonding – If topsoil and existing soil surface are not properly bonded, water will not infiltrate evenly, and it will be difficult to establish vegetation.

Care must be taken not to apply topsoil to existing soil surface if the two have contrasting textures. Clayey topsoil over sandy subsoil is a particularly poor combination, as water creeps along the junction between the two soil layers and may cause the topsoil to slough.

Do not apply topsoil to slopes greater than 2:1 to avoid slippage. Topsoiling of steep slopes should be discouraged unless good bonding of the soils can be achieved.

Depending on subsoil conditions, additional measures may be required for ornamental shrub and tree plantings. See practice standard TREE AND SHRUB PLANTING 985.

CONSIDERATIONS – Topsoil is the surface layer of the soil profile, generally characterized as darker than the subsoil due to the enrichment with organic matter. It is the major zone of root development and biological activity. Microorganisms that enhance plant growth thrive in this layer. Topsoil can usually be differentiated from subsoil by texture as well as color. Clay content usually increases in the subsoil. Where subsoils are high in clay, the topsoil layer may be significantly coarser in texture. The depth of natural topsoil may be quite variable. On severely eroded sites it may be gone entirely.

Advantages of topsoil include its higher organic matter content, friable consistence (soil aggregates can be easily crushed within only moderate pressure), its available water holding capacity, and its nutrient content. Most often it is superior to subsoil in these characteristics. The texture and friability of topsoil are usually much more conducive to seedling germination, emergence, and root growth.

In addition to being a better growth medium, topsoil is often less erodible than subsoils, and the coarser texture of topsoil increases infiltration capacity and reduces runoff.

Although topsoil may provide an improved growth medium, there may be disadvantages, too. Stripping, stockpiling, hauling, and spreading topsoil, or importing topsoil, may not be cost-effective. Handling may be difficult if large amounts of branches or rocks are present, or if the terrain is too rough. Most topsoil contains weed seeds, which compete with desirable species.

In site planning, compare the options of topsoiling with preparing a seedbed in the available subsoil. The clay content of many subsoils retains moisture. When properly limed and fertilized, subsoils may provide a satisfactory growth medium, which is generally free of weed seeds.

Topsoiling is normally recommended where ornamental plants or high-maintenance turf will be grown. It may also be required to establish vegetation on shallow soils, soils containing potentially toxic materials, stony soils, and soils of critically how pH (highly acid).

PLANS AND SPECIFICATIONS – The plans and specifications for installing topsoiling shall be in keeping with this standard and shall describe the requirements for applying the practice. At a minimum include the following items:

1. Topsoil source.
2. Stockpile location and method of stabilization prior to its use.
3. Topsoil/subsoil bonding procedures.
4. Site preparation plans and method of application, distribution and compaction.
5. Installation, inspection, and maintenance schedules with the responsible party clearly identified.

The application of topsoil shall meet the requirements as listed in the construction specification 752 STRIPPING, STOCKPILING SITE PREPARATION AND SPREADING TOPSOIL.

OPERATION AND MAINTENANCE – After topsoil application, follow procedures for seedbed preparation. Take care to avoid excessive mixing of topsoil into the subsoil. Permanently stabilize the site following appropriate practice standards as quickly as practicable. Periodically inspect the site until permanent stabilization is achieved. Make necessary repairs to eroded areas or areas of light vegetative cover.

APPENDIX "C"

804 MATERIAL FOR TOPSOILING

1. **SCOPE** – This specification covers the quality of material for use in topsoiling.

The site shall be explored to determine if sufficient surface soil of good quality exists to justify stripping. Stripping of topsoil from areas where it will later be reapplied is not recommended if bedrock or other root limiting layer is within a depth of 20 inches.

2. **QUALITY** – Topsoil shall be friable and loamy (loam, sandy loam, silt loam, sandy clay loam, or clay loam). Sand content shall generally be less than 70% by weight, and clay content shall generally be less than 35% by weight.

Organic soils, such as beat or muck, shall not be used as topsoil material.

Organic matter content shall be not less than 1.5% by weight.

pH shall be within the range 6.0 to 7.5. If pH is less than 6.0, lime shall be added in accordance with soil test results or in accordance with the recommendations of the vegetative establishment practice being used.

Soluble salts shall not exceed 500 ppm. (Natural soils in Illinois rarely exceed this parameter.)

Sodium adsorption ration shall be less than 12. (Natural soils in the northern one-half of Illinois rarely exceed this parameter.)

It shall be free of debris, trash, stumps, rocks, and noxious weeds, and shall give evidence of being able to support healthy vegetation. It shall contain no substance that is potentially toxic to plant growth.

The material meeting the above qualifications should be at least 2 inches thick. Soil factors such as rock fragments, slope, depth to water table, and layer thickness affect the ease of excavation and spreading of topsoil.

Generally, the upper part of the soil profile, which is richest in organic matter, is most desirable; however, material excavated from deeper layers may be worth storing if it meets the other criteria listed above.

APPENDIX "D"

752 STRIPPING, STOCKPILING, SITE PREPARATION, AND SPREADING TOPSOIL

1. **SCOPE** – The work shall consist of stripping, stockpiling, site preparation, and spreading topsoil in accordance with the applicable specification.

2. **STRIPPING** – Strip topsoil only from those areas that will be disturbed by excavation, filling, road building, or compaction by equipment. A 4 to 6 inch stripping depth is common, but depth varies depending on site.

Determine depth of stripping by taking soil cores at several locations within each area to be stripped. Topsoil depth generally varies along a gradient from hilltop to toe of the slope.

All planned erosion and sediment control practices shall be in place and functioning properly proper to stripping.

3. **STOCKPILING** – Select a stockpile location to avoid slopes and natural drainagewyas, and to avoid traffic routes. On large sites, respreading is easier and more economical when topsoil is stockpiled in small piles located near areas where they will be used.

Perimeter controls shall be placed around the stockpile immediately. Examples of suitable control measures include DIVERSION DIKE 820, SILT FENCE 920, and STRAW BALE BARRIER 935.

Temporary stabilization of the stockpile shall be completed within seven (7) days of the formation of the stockpile, in accordance with practice standard TEMPORARY SEEDING 965, if it is to remain dormant (undisturbed) for longer than thirty (30) days.

Permanent stabilization of the stockpile shall be completed within seven (7) days of the formation of the stockpile, in accordance with practice standard PERMANENT SEEDING 880, if it is to remain dormant (undisturbed) for longer than 12 months.

4. **SITE PREPARATION** – Before spreading topsoil, assure that all necessary erosion and sediment control practices such as diversions, berms, dikes, waterways, and sediment basins are in place and functioning properly. These practices must be maintained until the site is permanently stabilized.

Grading – Maintain grades on the areas to be topsoiled according to the approved plan and do not alter them by adding topsoil.

Liming of subsoil – Where the pH of the existing subsoil is 6.0 or less, or the soil is composed of heavy clays, incorporate agricultural limestone in amounts recommended by soil tests or specified for the seeding mixture to be used (Practice 880 PERMANENT SEEDING). Incorporate lime to a depth of at least 2 inches by disking.

Roughening – Immediately prior to spreading the topsoil, loosen the subgrade by disking or scarifying to a depth of at least 4 inches, to ensure bonding of the topsoil and subsoil. If no amendments have been incorporated, loosen the soil to a depth of at least 6 inches before spreading the topsoil.

5. **SPREADING TOPSOIL** – Uniformly distribute topsoil to a minimum compacted depth of 2 inches 3:1 slopes and 4 inches on flatter slops. To determine the volume of topsoil required for application to various depths, use Table 1.

Topsoil shall not be spread while it is frozen or muddy or when the subsoil is frozen or muddy.

Irregularities in the surface that result from topsoiling or other operations shall be corrected to prevent the formation of depressions or water pockets.

Compact the topsoil enough to ensure good contact with the underlying soil, but avoid excessive compaction, as it increases runoff and inhibits seed germination and seedling growth. Light packing with a roller is recommended where high-maintenance turf is to be established.

In areas that are not going to be mowed, the surface shall be left rough.

Table 1

CUBIC YARDS OF TOPSOIL REQUIRED FOR APPLICATION TO VARIOUS DEPTHS

Depth (inches)	Per 1,000 Square Feet	Per Acre
2	6.2	269
3	9.3	403
4	12.3	537
5	15.4	672
6	18.5	807

APPENDIX "E"

TEMPORARY SEEDING
CODE 965

DEFINITION – Planting rapid-growing annual grasses, small grains, or to provide initial temporary cover for erosion control on disturbed areas.

PURPOSE – The purpose of this practice is to temporarily stabilize denuded areas that will not be brought to final grade or on which construction will be stopped for a period of more than 14 working days.

Temporary seeding helps reduce runoff and erosion until permanent vegetation or other erosion control measures can be established. In addition, it provides residue for soil protection during seedbed preparation and reduces problems of mud and dust production from bare soil surfaces during construction.

CONDITIONS WHERE PRACTICE APPLIES – This practice applies to all cleared, unvegetated, or sparsely vegetated soil surfaces where vegetative cover is needed for less than 1 year. Applications of this practice include diversion, dams, temporary sediment basins, temporary road banks, topsoil stockpiles and any other exposed areas of a construction site.

CRITERIA

Plant selection – Select plants appropriate to the season and site conditions from Table 1.

Site preparation – Prior to seeding, install necessary erosion control and sediment control practices if possible.

Remove large rocks or other debris that may interfere with seedbed preparation or seeding operations.

Seedbed preparation:

1. Liming: Where the pH of the soil is below 5.5, apply one and one-half to two tons per acre of finely ground agricultural limestone. If the seeding period is less than 30 days liming will not be required.
2. Fertilizer: Apply 500 pounds per acre of 10-10-10 fertilizer or equivalent. Incorporate lime and fertilizer into the top 2 – 4 inches of soil. If the seeding period is less than 30 days fertilizer will not be required.
3. Prepare a seedbed of loose soil to a depth of 3 to 4 inches. If recent tillage or grading operations have resulted in a loose surface, additional tillage or roughening may not be required except to break up large clods. If rainfall caused the surface to become sealed or crusted, loosen it just prior to seeding by disking, raking, harrowing, or other suitable methods. Groove or furrow slopes steeper than 3:1 on the contour before seeding.

Seeding – Seed shall be evenly applied with a cyclone seeder, drill, cultipacker seeder or hydroseeder. Small grains shall be planted no more than one inch deep. Grasses shall be planted no more than one-half inch deep.

Cover broadcast seedings by cultipacking, dragging a harrow, or raking.

Mulching – Seedings made during optimum spring and summer seeding dates, with favorable soil and site conditions, will not require mulch.

When temporary protection is needed see practice standard MULCHING 875.

CONSIDERATIONS – Temporary seedings should be used to protect earthen structures such as dikes, diversions, dams and other structures used for sediment control during construction. Temporary seedings can also reduce the amount of maintenance these structures may need. For example, the frequency of sediment basin clean-outs will be reduced if watershed areas, outside the active construction zone, are stabilized.

Proper seedbed preparation, selection of appropriate species, and use of quality seed are as important in this practice as in practice standard PERMANENT VEGETATION 880. Failure to follow established guidelines and recommendations carefully might result in an inadequate or short-lived stand of vegetation that will not control erosion.

Temporary seeding provides protection for no more than 1 year, during which time permanent stabilization should be initiated.

PLANS AND SPECIFICATIONS – Plans and specifications for temporary seeding shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose. At a minimum include the following items:

1. Plant species to be used.
2. Dates of seeding.
3. Seedbed preparation.
4. Fertilization and seeding rates and methods.

All plans shall include the installation, inspection, and maintenance schedules with the responsible party identified.

OPERATION AND MAINTENANCE – Reseed areas where seedling emergency is poor, or where erosion occurs, as soon as possible. Protect from vehicular and foot traffic. Control weeds by mowing.

Table 1

TEMPORARY SEEDING SPECIES, RATES AND DATES

Species	Lbs./Acre	Lbs per 1000 sq. ft.	Seeding Dates
Oats	90 lbs.	2 lbs.	Early spring – July 1
Cereal Rye	90 lbs.	2 lbs.	Early spring – Sept. 30
Wheat	90 lbs.	2 lbs.	Early spring – Sept. 30
Perennial Ryegrass	25 lbs.	0.6 lbs	Early spring – Sept. 30

APPENDIX "F"

PERMANENT SEEDING
CODE 880

DEFINITION – Establishing permanent vegetative cover to stabilize disturbed areas.

PURPOSE – The purpose of this practice is to reduce erosion and decrease sediment from disturbed areas, and to permanently stabilize such areas in a manner that adopts to site conditions and allows selection of the most appropriate plant materials.

CONDITIONS WHERE PRACTICE APPLIES

1. Disturbed areas where long-lived vegetative cover is needed to stabilize the soil.
2. On other areas where cover is desired.

CRITERIA

Selection of plant materials – Selection of plant materials will be based on climate, topography, soils, land use, available light, aesthetics and maintenance. See tables A, B and C for selection of grasses and legumes and ground covers. For trees and shrubs see practice standard 985, TREE AND SHRUB PLANTING.

Site preparation – The soil must meet minimum requirements as a good growth medium.

a. Must have enough fine-grained (silt & clay) material to maintain adequate moisture and nutrient supply and sufficient pore space to permit root penetration. The bulk density should be 1.2 to 1.5 grams per cubic centimeter. Clay content should not exceed 35 percent.

b. The depth of suitable rooting material to rock or impermeable layers shall be 12 inches or more, except on steep slopes where adding soil material is not feasible.

c. A pH range of 5.5 to 6.5.

d. Free of toxic amounts of materials harmful to plant growth.

If any of the above criteria cannot be met by the addition of modifying materials, ie: lime or organic material, then topsoil shall be applied in accordance with practice standard 981 TOPSOILING.

The following materials may be used where needed to improve the soil conditions for plant growth.

Peat-Appropriate types are sphagnum moss peat, hypnum moss peat, reedsedge peat, or peat humus from fresh water sources.

Sand-clean and free of toxic materials.

Vermiculite-horticultural grade and free of toxic substances.

Rotted manure-stable or cattle manure not containing undue amounts of straw or other bedding materials. Incorporate to reduce potential odor problems.

Thoroughly rotted sawdust-free of stones and debris.

Sludge-treated sewage and industrial sludges should be used only in accordance with local, State and Federal regulations.

Where extensive excavation is to be done and the subsoil materials will not be suitable for plant growth, remove and stockpile existing topsoil and re-apply when final grade is achieved.

Install necessary mechanical erosion and sedimentation control practices before seeding, and complete grading according to the approved plan.

Seedbed preparation:

1. Apply fertilizer and other required soil amendments prior to final seedbed preparation.
2. Prepare a seedbed to a minimum depth of 3 inches by disking or other suitable means. All tillage operations should be on the contour.

Fertilization – Lime and fertilizer needs should be determined by soil tests. When soil tests are not available, apply 1000 pounds per acre or 25 pounds per 1000 square feet of 12-12-12 fertilizer or equivalent.

Seed – Certified seed will be used for all permanent seedings whenever possible. All legumes will be inoculated with the proper inoculant prior to seeding.

Seeding – Seeding may be done by any of the following methods:

A. Conventional.
   1. Prepare seedbed and incorporate lime and fertilizer.
   2. Apply seed uniformly at a depth of ¼ to ½ inch with a drill (band seed) or cultipacker seeder or broadcast seed uniformly and cover to ¼ to ½ inch depth with a cultipacker, or similar tool.
   3. Mulch following seeding.

B. Hydroseeding.
   1. Final seedbed preparation should leave the soil surface in a roughened condition.
   2. Lime and fertilizer should be incorporated prior to seeding unless they are to be applied at the same time of the seed. (applying lime with a hydroseeder may be abrasive to the equipment).
   3. No less than 1000 gallons of water per acre will be used.
   4. When seeding legumes, increase the recommended rate for inoculant four times.
   5. If seed and fertilizer are mixed together they should be seeded within 2 hours of mixing. Beyond 2 hours, a full rate of new seed may be necessary.
   6. Cultipacking or harrowing following seeding will help insure a better stand.

C. Dormant seeding may be between November 15 and March 1 by either of the following methods:
   1. Conventional Method – If soil conditions are suitable during the dormant seeding period, apply lime and fertilizer, prepare the seedbed and seed as specified in this specification. Increase the seeding rate at least 50%. Mulch following seeding.
   2. Overseeding Method – Liming, fertilizing, seedbed preparation and mulching may be done after August 31. The seed shall be broadcast uniformly over the mulch between November 15 and March 1. When this is done, increase the seeding rates 50%.

Sprigging – Some plants cannot be grown from seed and must be planted vegetatively. Sprigs are fragments of horizontal stems or roots which include at least one node (joint). Sprigs may be planted by either of the following methods.

A. Broadcast sprigs and press into the top ½ to 2 inches of soil with a cultipacker or a disk set straight so that the sprigs are not brought back toward the surface.

B. Make furrows 4-6 inches deep and 2 feet apart. On sloping areas, make furrows perpendicular to the slope (on the contour). Place sprigs in the furrows with one end at or above ground level. Close the furrow when plants have been placed.

C. Plant sprigs in furrows with a tractor-drawn transplanter. Sprigging should be done during specified seeding periods.

Planting ground covers – Most shrub and vine type ground covers are available as bare root stock, balled and burlapped, or in containers or pots. On flat areas where erosion is not a problem, prepare the site by tilling to a depth of 10-12 inches. On sloping sites, till 2-3 inches deep to incorporate needed soil amendments.

When planting individual plants, prepare a hole slightly larger than the container or ball and deep enough that the roots can extend to the bottom. Most ground covers should be planted ½" to 1" deeper than they have grown in the pot or container.

Mulching – All permanent seedings and plantings will be mulched upon completion of seed application or planting. Refer to practice standard 875, MULCHING. When planting ground covers it may be advantageous to mulch prior to planting.

PLANNING CONSIDERATIONS - Protect the area from excess runoff as necessary with diversion, grass-lined channels, terraces, or sediment basins.

Evaluate the capabilities and limitations of the soil to be seeded or planted. Special attention needs to be given to soil pH, texture, internal water movement, steepness, and stability in order to plan the appropriate treatment.

Plant species should be selected on the basis of soil type, planned use of the area, and the amount or degree of maintenance that can be devoted to the area in the future. Land use and maintenance, whether residential, industrial, commercial, or recreational, can be divided into two general categories:

High-maintenance areas are mowed frequently, limed and fertilized regularly, and either (1) receive intensive use (e.g., athletic fields or golf courses) or (2) require maintenance to an aesthetic standard (e.g., home lawns). Grasses or ground covers used for these situations are long-lived perennials that form a tight sod and are fine-leaved and attractive in appearance. They must be well adapted to the geographic area where they are planted and able to endure the stress of frequent mowing. Sites where high-maintenance vegetative cover is desirable include homes, industrial parks, schools, churches, and recreational areas.

Low-maintenance areas are mowed infrequently or not at all, and do not receive lime and fertilizer on a regular basis. Plants must persist with little maintenance over long periods of time. Grass and legume mixtures are favored for these sites because legumes are a source of soil nitrogen. Mixed stands are also more resistant to adverse conditions. Prairie grass may be appropriate but are slow to establish. Sites suitable for low-maintenance vegetation include steep slopes, stream or channel banks, some commercial properties and roadbanks.

Fertilizer, lime, seedbed preparation, seed coverage, mulch, and irrigation should be used as necessary to promote quick plant growth.

Vegetation cannot be expected to provide erosion control cover and prevent soil slippage on a soil that is not stable due to its structure, water movement, or excessive slope.

The operation of equipment is restricted and may be unsafe on slopes steeper than 3:1. Where steepness prohibits the use of farm machinery, seedbed preparation, fertilization, and seeding or planting may need to be done by hand.

Mulching, in addition to preventing erosion during establishment, may make the difference in success or failure of the seeding. When selecting mulching materials, consider steepness and length of slopes, areas of concentrated runoff water flow, and materials that will provide protection to the site in case the seeding or planting fails.

Moisture is essential for seed germination and seedling establishment. Supplemental irrigation can be very helpful in assuring adequate stands in dry seasons or to speed development of full cover.

PLANS AND SPECIFICATIONS - The plans and specifications for seeding or planting and mulching shall include the following items:

1. Seeding mixtures and rates or plant species and density.
2. Site preparation.
3. Fertilization.
4. Seeding or planting methods.
5. Seeding or planting periods.
6. Mulching materials and application rates.
7. Schedule for installation, inspection and maintenance.

OPERATION AND MAINTENANCE - Generally, a stand of vegetation cannot be determined to be fully established until soil cover has been maintained for one full year from planting.

Protect the planted area from human, animal and vehicular traffic until the stand is adequately established.

Inspect all planted areas for failures and make necessary repairs, replacements, reseedings, and remulching within the planting season, if possible. If a stand has less than 40% cover, re-evaluate the choice of plant materials, quantities of lime and fertilizer, seeding or planting methods, time of seeding or planting and available light and moisture. Re-establish the stand following the original specifications, but with modifications based on the evaluation.

Where an adequate water supply is available, irrigate to keep the seedbed moist (not wet) for 7 to 10 days after seeding. This may require watering daily the first week, especially during hot weather, and less frequently thereafter. Water application rates must be carefully controlled to prevent runoff and erosion. Inadequate or excessive amounts of water can be more harmful than no supplemental water. Irrigation is seldom needed for low-maintenance seedings made at the appropriate time of the year.

Both low and high-maintenance seedings should be fertilized one year after planting to strengthen the plants and insure proper stand density. The following recommendations may be used:

1. For grass only stands, apply 500 lbs./acre (12 lbs/1000 sq. ft.) of 10-20-10, or equivalent.
2. For grass-legume or pure legume stands, apply 500 lbs/ac. (12 lbs./1000 sq. ft.) of 10-20-20, or equivalent.
3. The best time to apply fertilizer is between March 1 and May 30 or August 1 and September 30.

Do not mow high-maintenance turf seedings until the stand is at least 6 inches tall. Do not mow closer than 3 inches during the year of establishment.

Low-maintenance stands should be mowed only as needed to control weeds. Mowing should be done before weeds go to seed. Keep mowing height above the height of the seeded plants. Vine and shrub type ground covers may need hand weeding until the area is well covered.

Herbicides may also be used for weed control. Apply all herbicides according to rates specified on the label.

Table A
LOW MAINTENANCE GRASSES AND LEGUMES

Site Suitability			Sun Light Availability			Seed Mixture (PLS)	Seeding Rates	
D	WD	W	FS	PS	S		Lbs/Ac.	Lbs./1000 sq. ft.
X	X		X			Smooth bromegrass or Tall fescue	24	.55
						Plus Alfalfa or Birdsfoot trefoil	8	.20
X	X		X	X		Smooth bromegrass or Tall fescue	24	.55
						Plus Crownvetch	16	.20
X	X	X	X			Tall Fescue plus	12	.30
						Timothy or redtop	2.5	.06
						Birdsfoot trefoil	12	.30
X	X	X	X			Switchgrass 1/	8	.20
X	X		X			Switchgrass 1/ plus	2	.04
						Big Blue plus	6	.14
						Indianagrass	6	.14

1/ Warm season grasses

D = Droughty FS = Full Sun
WD = Well Drained PS = Partial Sun
W = Wet S = Shady

Table B
HIGH MAINTENANCE SEED MIXTURES

Site Suitability			Sun Light Availability			Seed Mixture	Seeding Rates	
							Lbs/Ac.	Lbs./1000 sq. ft.
D	WD	W	FS	PS	S			
X	X		X	X		Ky bluegrass Use at least 3 adapted varieties	88-130	2-3
X	X			X		Ky bluegrass plus Red fescue	110 44	2.5 1.0
X	X	X	X	X	X	Tall Fescue (turf type)	220-260	5-6
X	X			X	X	Red fescue plus Ky bluegrass	110 44	2.5 1
X	X		X	X		Ky bluegrass plus Perennial ryegrass	86 43	2.0 1.0

D	=	Droughty	FS	=	Full Sun	
WD	=	Well Drained		PS	=	Partial Sun
W	=	Wet		S	=	Shady

SEEDING DATES

SPRING		
	Northern Illinois	Early Spring to June 1
	Central Illinois	Early Spring to May 15
	Southern Illinois	Early Spring to May 15
FALL		
	Northern Illinois	August 1 to September 1
	Central Illinois	August 1 to September 10
	Southern Illinois	August 1 to September 20
DORMANT		
	Northern Illinois	November 1 to March 15
	Central Illinois	November 15 to March 1
	Southern Illinois	November 15 to March 1

Table C
GROUND COVERS (Shrubs & Vines)

This table contains a list of ground covers commonly used in Illinois. When selecting species to use, check with a local nursery for availability of plants, growth characteristics and recommended spacings.

Bugle
Wild Ginger
Barberry
Dwarf quince
Crownvetch
Creeping cotoneaster 4" – 2' prostrate
Mock strawberry
Euonymus – several species (Wintercreeper) Evergreen
English ivy
Daylilly
Evergreen candytuff
Juniper (Creeping)
Pachysandra (Japanese spurge)
Creeping phlox
Shrubby cinquefoil (Potentilla)
Dwarf alpine current
Stonedrop (Sedum)
Creeping thyme
Common periwinkle (Vinca)

APPENDIX "G"

STRAW BALE BARRIER
CODE 935

DEFINITION – A temporary barrier consisting of a row of entrenched and anchored straw bales or similar material used to intercept sediment-laden runoff from small drainage areas of disturbed soil.

PURPOSE – The purpose of this practice is to cause deposition of transported sediment load from sheet flow leaving disturbed areas.

CONDITIONS WHERE PRACTICE APPLIES – A straw bale barrier may be used subject to the following conditions:

1. The maximum allowable slope lengths contributing runoff to a straw bale barrier are listed in the table below:

Slope (%)	Maximum Spacing (ft.)
25	25
20	50
15	75
10	100
Flatter than 10	125

2. The maximum drainage area for overland flow to a straw bale barrier shall not exceed ¼ acre per 100 feet of barrier; and
3. Erosion would occur in the form of sheet and rill erosion; and
4. There is no concentration of water flowing to the barrier; and
5. Where effectiveness is required for less than 3 months.

CRITERIA - Straw bale barriers do not require any formal design but the following requirements must be met:

1. Bales shall be placed in a single row, lengthwise on the contour, with the ends of adjacent bales tightly abutting one another. The end bales should extend upslope so that the trapped sediment laden water cannot flow around the ends of the barrier.
2. All bales shall be either wire-bound or string tied. Straw bales shall be installed so that bindings are oriented around the sides rather than along the tops and bottoms of the bales in order to prevent deterioration of the bindings. Hay or other baled material may be used in lieu of straw.
3. The barrier shall be entrenched and backfilled. A trench shall be excavated the width of a bale and the length of the proposed barrier to a minimum depth of 4 inches. After bales are staked and chinked, the excavated soil shall be backfilled and compacted against the barrier. Backfill soil shall conform to the ground level on the downhill side and shall be built up to 4 inches against the uphill side of the barrier.
4. Each bale shall be securely anchored by at least two stakes (minimum cross sectional area of 3.0 square inches or standard "T" or "U" steel posts (minimum weight of 1.0 pound per linear foot) or rebars driven through the bale. The first stake in each bale shall be driven toward the previously laid bale to force the bales together. Stakes or steel pickets shall be driven a minimum 18 inch deep into the ground to securely anchor the bales.
5. The gaps between bales shall be chinked (filled by wedging) with straw to prevent water from escaping between the bales. Loose straw scattered over the area immediately uphill from a straw bale barrier tends to increase efficiency.
6. Straw bale barriers shall be installed prior to the clearing of existing vegetation or any site grading.

CONSIDERATIONS - Straw bale barriers should be considered for trapping sediment where sheet and rill erosion is occurring in small drainage areas. Straw bale barrier should not be placed in areas of concentrated flow. The practice standard SILT FENCE 290 does the same job and is usually faster and cheaper to install.

Based on field observations in Illinois and other states, straw barriers have not been as effective as a sediment control measure as they could be. There are four major reasons for this. First, improper use of straw bales has been a major problem. Straw bale barriers have been used in streams and drainageways where high water velocities and/or volumes have destroyed them or significantly impaired their effectiveness. Second, improper placement and installation of the barriers, such as staking the bales directly to the ground with no soil seal or entrenchment, has allowed undercutting and flow around the end. This has resulted in additions of, rather than removal of, sediment from runoff waters. Third,

inadequate inspection and maintenance lowers the effectiveness of these barriers. Fourth, because straw bales decompose in the presence of moisture, they have a very limited life span.

PLANS AND SPECIFICATIONS - Plans and specifications for installing straw bale barriers shall be in keeping with this standard and shall describe the requirements for applying the practice and contain the following minimum requirements:

1. The depth of trench used to bed the bales.
2. The method(s) required to anchor the bales.
3. The installation, inspection and maintenance schedules with the responsible party clearly identified.

Standard drawing STRAW BALE BARRIER PLAN IL-635 may be used as the plan sheet.

OPERATION AND MAINTENANCE

1. Straw bale barriers shall be inspected immediately after each rainfall and at least daily during prolonged rainfall.
2. Close attention shall be paid to the repair of damaged bales, end runs and undercutting beneath bales.
3. Necessary repairs to barrier or replacement of bales shall be accomplished promptly.
4. Sediment deposits should be removed after each rainfall. They must be removed when the level of deposition reaches approximately one-half the height of the barrier.
5. Any sediment deposits remaining in place after the straw bale barrier is no longer required shall be dressed to conform to the existing grade, prepared and seeded.
6. Straw bale barriers shall be removed when they have served their usefulness, but not before the upslope areas have been permanently stabilized.

APPENDIX "H"

SILT FENCE
CODE 920

DEFINITION – A temporary barrier of entrenched geotextile fabric (filter fabric) stretched across and attached to supporting posts used to intercept sediment-laden runoff from small drainage areas of disturbed soil.

PURPOSE – The purpose of this practice is to cause deposition of transported sediment load from sheet flows leaving disturbed areas.

CONDITIONS WHERE PRACTICE APPLIES – A silt fence may be used subject to the following conditions:

1. The maximum allowable slope lengths contributing runoff to a silt fence are listed in the table below:

Slope (%)	Maximum Spacing (ft.)
25	50
20	75
15	125
10	175
Flatter than 10	200

2. The maximum drainage area for overland flow to a silt fence shall not exceed ½ acre per 100 feet of fence; and
3. Erosion would occur in the form of sheet erosion; and
4. There is no concentration of water flowing to the barrier; and
5. Where effectiveness is required for more than one construction season or 6 months, whichever is less.
6. As protection for a storm drain inlet refer to practice standard INLET PROTECTION – FABRIC DROP 860.

CRITERIA - Design computations are not required. All silt fences shall be placed as close to the contour as possible, with the ends extending upslope. The area below the fence must be undisturbed or stabilized.

1. Silt fence fabric shall meet the requirements in material specification 592 GEOTEXTILE Table 1 or 2 class I with a minimum apparent opening size (AOS) of 30 for nonwoven and 50 for woven.
2. Fence posts shall be a minimum of 60 inches long. Wood posts will be of sound quality wood with a minimum cross sectional area of 3.0 square inches. Steel posts will be standard T and U sections weighing not less than 1.0 pound per linear foot. The maximum spacing will be 5 feet. When wire backing is used, the maximum spacing may be increased to 10 feet. The posts shall be driven a minimum of 24 inches into the ground. Spacing may need to be adjusted so that posts are located in low areas where water may pond.
3. Wire fence shall be a minimum 9 gauge top and bottom wires with a maximum 6 inch mesh opening, or as approved by the engineer inspector.
4. The filter fabric should be furnished in a continuous roll cut to the length of the silt fence needed to avoid splices. When splices are necessary, the fabric should be spliced at a support post with a minimum 6 inch overlap, folded over and securely fastened.
5. The height of a silt fence shall be a minimum of 24 inches above the original ground surface and shall not exceed a height of 36 inches above the ground surface. Wire supports shall be used on silt fences exceeding 24 inches in height.
6. The silt fence shall be entrenched to a minimum depth of 8 inches, with an additional 6 inches extending along the bottom of the trench in the upslope direction. The trench shall be backfilled and the soil compacted over the fabric.
7. The filter fabric and wire support, if used, must be securely fastened to the upslope side of the posts using heavy duty wire staples at least one inch long, tie wires or hog rings. The fabric shall not be stapled or wired to the wire support. The fabric shall not be stapled to existing trees.
8. Silt fences shall be used prior to the establishment of erosion controls and installed prior to the clearing of existing vegetation.

CONSIDERATIONS - Silt fences should be considered for trapping sediment where sheet and rill erosion may be expected to occur in small drainage areas. Silt fences should not be placed in areas of concentrated flows.

Research has shown that silt fences can trap a much higher percentage of suspended sediments than can straw bale barriers and in most cases are the preferred option. As with straw bale barriers, improper placement as well as improper installation and maintenance of silt fences have, in many instances, significantly decreased the effectiveness of this practice.

While both woven and non-woven fabrics are commercially available, the woven fabric generally displays higher strength than the non-woven fabrics. When tested under acid and alkaline water conditions, most of the woven fabrics increase in strength. There is a variety of reactions among non-woven fabrics. The same is true of testing under extensive ultra violet radiation. Permeability rates demonstrate very high filtering efficiencies for sandy sediments, there is considerable variation among both woven and non-woven fabrics when filtering the finer silt and clay particles.

PLANS AND SPECIFICATIONS - Plans and specifications for installing silt fences shall be in keeping with this standard and shall describe the requirements for applying the practice and contain the following minimum requirements:

1. Location where the silt fence is to be installed.
2. The type, size, and spacing of fence posts.
3. The size of woven wire support fences if used.
4. The type of filter fabric used.
5. The method of anchoring the filter cloth.
6. The method of fastening the filter cloth to the fencing support.
7. The installation, inspection and maintenance schedules with the responsible party clearly identified.

Standard drawing SILT FENCE PLAN IL-620 can be used as the plan sheet.

OPERATION AND MAINTENANCE - Silt fences shall be removed when they have served their usefulness, but not before the upslope areas have been permanently stabilized.

Silt fences shall be inspected immediately after each rainfall and at least daily during prolonged rainfall.

Should the fabric decompose or become ineffective prior to the end of the expected usable life and the fence still is necessary, the fabric or the entire system shall be replaced promptly.

Sediment deposits should be removed after each rainfall. They must be removed when the level of deposition reaches approximately one-half the height of the barrier.

Any sediment deposits remaining in place after the silt fence is no longer required shall be dressed to conform to the existing grade, a seedbed prepared and the site vegetated.

APPENDIX "I"

LAND GRADING
CODE 865

DEFINITION – Reshaping the ground surface to planned grades as determined by engineering survey evaluation and layout.

PURPOSE – The purpose of this practice is to provide suitable topography for buildings, facilities, and other land uses, to control surface runoff, and to minimize soil erosion and sedimentation both during and after construction.

CONDITIONS WHERE PRACTICE APPLIES – This practice is applicable where grading to a planned elevation is necessary and practical for the proposed development of a site and for proper operation of sedimentation control practices.

CRITERIA - The grading plan and installation shall be based upon adequate surveys and investigations. The plan is to show the location, slope, cut, fill, and finish elevations of surfaces to be graded. It will also show the auxiliary practices for safe conveyance of runoff water, slope stabilization, soil erosion and sediment control, and stormwater management. These practices may include but are not limited to retaining walls, grass-lined swales, grade stabilization structures, lined ditches, sediment basins, detention ponds, diversions and surface and subsurface drains. The practices may be temporary or permanent, depending upon the need after construction is completed.

The development and establishment of the plan shall incorporate the following, as appropriate:

1. The cut face of the excavation, which is to be vegetated, shall be two horizontal to one vertical 2:1 or flatter. Cut slopes of materials not to be vegetated shall be at or below the safe angle or repose for the materials encountered. For maintenance reasons 4:1 or flatter slopes are preferable. Slopes steeper than 2:1 shall require special design and stabilization considerations that shall be adequately shown on the plans.
2. The permanent exposed faces of fills shall be two horizontal to one vertical 2:1 or flatter. For slope maintenance, 4:1 or flatter are recommended. Slopes exceeding 2: shall require special design and stabilization considerations that shall be adequately shown on the plans.
3. Provisions shall be made to safely conduct surface water to storm drains or to suitable natural water courses and to prevent surface runoff from damaging the cut faces and fill slopes.
4. Subsurface drainage shall be provided in areas having a high water table to intercept seepage that would affect building foundations, slope stability, or create undesirable wetness.
5. Excavations shall not be made so close to property lines as to endanger the adjoining property without supporting and protecting such property from erosion, sliding, settling, or cracking.
6. No fill shall be placed where it will slide or wash upon the premises of another, or so placed adjacent to the bank of a channel as to create bank failure or decrease the natural carrying capacity of the stream.

   At a minimum a setback of 25 feet should be provided as a buffer to sensitive areas.
7. Fills shall consist of material from cut areas, borrow pits, or other approved sources. Fill material shall be free of brush, rubbish, rocks, logs, stumps, building debris, and other objectionable material. It should be free of stones over two inches in diameter where compacted by hand or mechanical tampers or over eight inches in diameter where compacted by rollers or other equipment. Frozen material shall not be placed in the fill nor shall the fill material be placed on a frozen foundation.
8. Diversions shall be provided whenever the vertical interval of any slope exceeds 20 feet. Diversions shall be located to divide the slope face as equally as possible and shall convey the water to a stable outlet. Soils, seeps, rock outcrops, etc., shall also be taken into consideration when designing diversions.
   a. Diversions shall be a minimum bottom width of six feet to provide for maintenance.
   b. Diversions shall be designed with cut slope of 6:1 or flatter to the toe of the upper slope and with a minimum of one foot in depth. The gradient to the outlet shall be between 2% and 3%, unless accompanied by appropriate design and computations.
   c. The flow length within a diversion shall not exceed 800 feet unless accompanied by an appropriate design and computations. See practice standards DIVERSION 815, DIVERSION DIKE 820 or TEMPORARY DIVERSION 955.
9. Surface water shall be diverted from the face of all cut and fill slopes by the use of diversions, ditches and waterways or conveyed downslope by the use of a designed structure, except where:
   a. The face of the slope is or shall be stabilized and the face of all graded slopes shall be protected from surface runoff until they are stabilized.

b. The face of the slope shall not be subject to any concentrated flows of surface water such as from natural drainageways, graded waterways, downspouts, etc.

c. The face of the slope will be protected by special erosion control materials, sod, gravel, riprap, or other stabilization method.

10. Cut slopes occurring in ripable rock shall be serrated. These serrations shall be made with conventional equipment as the excavation is made. Each step or serration shall be constructed on the contour and will have steps cut at nominal two-foot intervals with nominal three-foot horizontal shelves. These steps will vary depending on the slope ratio or the cut slope. These steps will weather and act to hold moisture, lime, fertilizer and seed thus producing a much quicker and longer lived vegetative cover and better slope stabilization. Overland flow shall be diverted from the top of all serrated cut slopes and carried to a suitable outlet.

11. Stockpiles, borrow areas, and spoil areas shall be shown on the plans and shall be subject to the provision of this standard.

12. All disturbed areas shall be stabilized in accordance with the practice standards MULCHING 875, PERMANENT SEEDING 880 or TEMPORARY SEEDING 915, as appropriate.

13. Use slope breaks, such as diversions or benches, as appropriate, to reduce the length of cut-and-fill slope to limit sheet and rill erosion and prevent gullying. A spacing guide is shown below.

		Horizontal Distance (ft.)
Steep Slopes	2:1	20
	3:1	35
	4:0	45
Long Slopes	15-25%	50
	10-15%	80
	6-10%	125
	3-6%	200
	<3%	300

CONSIDERATIONS - Fitting a proposed development to the natural configurations of an existing landscape reduces the need for some erosion and sediment control measures. It may also result in a more desirable and less costly development.

Before grading begins, decisions must be made on the steepness of cut-and-fill slopes, how they will be protected from runoff, how they will be stabilized, and how they will be maintained. The grading plan establishes drainage areas, directs drainage patterns, and affects runoff velocities.

The grading plan forms the basis of the erosion and sediment control plan. Key considerations that affect erosion and sedimentation include deciding which slopes are to be graded, when the work will start and stop, the percent and length of finished slopes, where and how excess material will be disposed of, and where fill is needed.

Leaving undisturbed temporary and permanent buffer zones in the grading operation may provide an effective and low-cost erosion control measure that will help reduce runoff velocity and volume and off-site sedimentation. In developing the grading plan, always consider how to take advantage of undisturbed water disposal outlets before storm drains or other constructed outlets are installed.

PLANS AND SPECIFICATIONS - Plans and specifications for land grading shall be in keeping with this standard and shall describe the requirements for applying the practice. At a minimum include the following items:

1. The finished land slope grade and direction of land slope.
2. Location of other related structures, e.g. drains, curbs, etc.
3. Topsoil stockpile location.
4. Borrow areas if needed.
5. Installation, inspection and maintenance schedules with responsible party identified.

MAINTENANCE - Periodically check all graded areas and the supporting erosion and sediment control practices, especially after heavy rainfalls. Promptly remove all sediment from diversions, sediment trapping practices and other water-disposal practices. If washouts or breaks occur, repair them immediately. Prompt maintenance of small eroded areas before they become significant gullies is an essential part of an effective erosion and sediment control plan.

APPENDIX "J"

DIVERSION
CODE 815

DEFINITION – A channel and supporting ridge constructed across the slope to collect and divert runoff.

PURPOSE – The purpose of this practice is to divert excess surface water from one area for use or safe disposal in other areas.

CONDITIONS WHERE PRACTICE APPLIES – This permanent site development practice applies to areas where runoff can be diverted and used or disposed of safely to prevent flood damage, erosion, or sedimentation damage.

Specific locations and conditions include:

1. Above steep slopes to limit surface runoff onto the slope;
2. Across long slopes to reduce slope length to prevent gully erosion;
3. Below steep grades where flooding, seepage problems, or sediment depositions may occur;
4. Around buildings or areas that are subject to damage from runoff.

CRITERIA

Capacity - Diversions designed to protect areas such as minor buildings and roads, shall have enough capacity to carry the peak runoff expected from a storm frequency consistent with the hazard involved but not less than a 25-year frequency, 24-hour duration storm. Durations designed to protect major structures, homes, school buildings and high capacity roads shall have enough capacity to carry the peak runoff from a 100-year frequency 24-hour duration storm.

Cross section – The channel may be parabolic, V-shaped, or trapezoidal, and shall accommodate the equipment to be used for maintaining the diversion. The diversion shall be designed to have stable side slopes. Channel cut slopes shall not be steeper than 3:1. The slope of a vegetated fill shall be 2:1 or flatter. The ridge height shall include an adequate settlement factor. Settlement allowance will be 10% of design fill height or 0.2 feet, whichever is greater. The ridge shall have a minimum top width of 4 feet at the design elevation. In the case of diversions with a ridge, the design height of the ridge should be 0.5 feet above the design water elevation. In the case of an excavated channel diversion, the lowest bank of the channel shall be 0.3 feet above the design water elevation. The minimum cross section shall meet the specified dimensions. The top of the constructed ridge shall not be lower than the design elevation plus the specified overfill for settlement.

Grade and velocity – Channel grades may be uniform or variable. Channel velocity shall not exceed that considered erosive for the soil and planned vegetation or lining. See table 1 for the maximum design velocities. Channel grades shall be sufficient to minimize standing water and wetness problems. If possible velocities 2 fps or higher should be used to avoid sedimentation. Compute velocity for bare earth channels using Mannings formula with or "n" value of 0.035.

Location – The location of a diversion and outlet must be in compliance with state drainage law, traditional case law precedent and local ordinances and regulations. Diversion location will be dictated by outlet condition, topography, land use, length of slope, and soil type. Diversions shall not outlet on the right-of-way of a public road, highway, or other public utility without the written approval of the appropriate authorities.

Sedimentation – Diversions should not be used below high sediment producing areas unless land treatment practices or structural measures, designed to prevent damaging accumulations of sediment in the channels, are installed with or before the diversions. If movement of sediment into the channel is a significant problem, a vegetated filter strip meeting the requirements of practice standard FILTER STRIP 835 shall be used where soil or climate does not preclude its use. Then, the design shall include extra capacity for sediment and be supported by supplemental structures, cultural or tillage practices, or special maintenance measures.

Outlets – Each diversion must have a safe and stable outlet with adequate capacity. Examples of acceptable outlets include are not limited to GRASS LINED CHANNELS 840, IMPOUNDMENT STRUCTURE – FULL FLOW 841, IMPOUNDMENT STRUCTURE – ROUTED 842, INFILTRATION TRENCH 847, LEVEL SPREADER 870, and ROCK OUTLET PROTECTION 910. The outlet must convey runoff to a point where outflow will not cause damage. Vegetative outlets shall be installed prior to and have vegetation adequately established in the outlet channel before diversion construction. Underground outlets consist of an inlet and underground conduit. Underground outlets shall meet the requirements of the practice standard

SUBSURFACE DRAIN 945. The release rate when combined with storage is to be such that the

design storm will not overtop the diversion ridge. On large watersheds, runoff flows are usually too large to outlet entirely through underground outlets.

The design elevation of the water surface in the diversion shall not be lower than the design elevation of the water surface in the outlet at their junction when both are operating at design flow.

Vegetation – Disturbed areas shall be established to vegetation as soon as practicable, generally within 15 days after construction is complete. If the soils or climatic conditions preclude the use of vegetation for erosion protection, non-vegetative linings such as gravel, rock riprap, or cellular block may be used. Seedbed preparation, seeding, fertilizing, and mulching shall comply with the practice standards PERMANENT VEGETATION 880 and MULCHING 875. The vegetation shall be maintained and trees and shrubs controlled by hand, machine, or chemicals.

Sediment-laden water should first be directed through an approved sediment-trapping device before entering receiving surface waters. Examples of acceptable sediment trapping facilities include but are not limited to practice standards IMPOUNDMENT STRUCTURE – ROUTED 842 and TEMPORARY SEDIMENT TRAP 960.

CONSIDERATIONS - Diversions should be planned as a part of initial site development. They are principally runoff control measures that subdivide the site into specific drainage areas. Permanent diversions can be installed as temporary diversions until the site is stabilized, then completed as a permanent measure, or they can be installed in final form during the initial construction operation. The amount of sediment anticipated and the maintenance required as a result of construction operations will determine which approach should be used. Stabilize permanent diversions with vegetation or materials such as riprap, paving stone, or concrete as soon as possible after installation. Base the location, type of stabilization, and diversion configuration on final site conditions. Evaluate function, need, velocity control, outlet stability, and site aesthetics. When properly located, landforms such as landscape islands, swales or ridges can be used effectively as permanent diversions. Base the capacity of a diversion on the runoff characteristics of the site and the potential damage after development. Consider designing an emergency overflow section or bypass area to limit damage from storms that exceed the design storm. The overflow section may be designed as a weir with riprap protection.

A typical diversion cross-section consists of a channel and a supporting ridge. In the case of an excavated type diversion, the natural ground serves as the diversion ridge. Diversion cross sections must be adapted to the equipment that will be used for their construction and maintenance. The channel may be natural, parabolic or trapezoidal in shape; use of "V" channels is generally discouraged due to erosion problems experienced.

At all points where diversion ridges or channels will be crossed by construction equipment, the diversion should be protected according to requirements of the practice standard STABILIZED CONSTRUCTION ENTRANCE 930. Bridges or culverts of adequate capacity may also be used.

Subsurface drainage should be used along permanent vegetated diversion channels when adequate grade cannot be achieved to prevent ponding water, when hillside seeps or soils with poor internal drainage keep the channel wet or when base flow is intercepted by the diversion.

PLANS AND SPECIFICATIONS - Plans and specifications for installing diversions shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended function. At a minimum include the following items:

1. Diversion location.
2. Channel grade.
3. Diversion cross-sections.
4. Seeding and fertility rates.

All plans shall include the installation, inspection, and maintenance schedules with the responsible party identified.

Construction of the diversion shall meet the requirements as listed in the construction specification 27 DIVERSIONS AND WATERWAYS. Standard drawing IL-515 DIVERSION PLAN may be used as the plan sheet.

OPERATION AND MAINTENANCE - A maintenance program shall be established to maintain diversion capacity, storage, ridge height, vegetation and outlet. Maintenance needs are to be discussed with the landowner or operator who is responsible for maintaining the practice. Diversion ridges can be hazardous for mowing. Any hazards must be brought to the attention of the responsible party. Diversions should be inspected after every major rainfall and any needed repairs made promptly.

TABLE 1
MAXIMUM PERMISSIBLE DESIGN VELOCITIES

Soil Texture	Channel Vegetation Retardance and Cover	Permissible Velocity (ft./sec.)[1/]
Sand, silt, sandy loam, silt loam, loamy sand (ML, SM, SP, SW)	B - Tall fescue, smooth bromegrass	3.5
	C – Kentucky bluegrass, redtop, red fescue	3.0
	D – Annuals[2/], small grain (rye, oats, wheat, ryegrass)	2.5
	E – Bare channel	1.5
Silty clay loam, sandy clay loam (ML-CL, SC)	B – Tall fescue, smooth bromegrass	4.5
	C – Kentucky bluegrass, redtop, red fescue	4.0
	D – Annuals[2/], small grain (rye, oats, wheat, ryegrass)	3.5
	E – Bare channel	2.0
Clay (CL)	B – Tall fescue, smooth Bromegrass	5.5
	C – Kentucky bluegrass, redtop, red fescue	5.0
	D – Annuals[2/], small grain (rye, oats, wheat, ryegrass)	4.0
	E – Bare channel	2.0

[1/] To be used only in stabilized protected areas.

[2/] Annuals – use only as temporary protection until permanent vegetation is established.

APPENDIX "K"

CONSTRUCTION SPECIFICATIONS
27. DIVERSIONS

1. **SCOPE** – The work shall consist of constructing the diversions at locations shown on the drawings or as, stated in the field.

2. **MATERIAL** – The earth material used in constructing the earthfill portions of the diversion shall be obtained from the diversion channel, or other approved sources.

3. **FOUNDATION PREPARATION** – The base area of the ridge sections shall be stripped of unsuitable material and scarified prior to placing fill.

4. **PLACEMENT** – Fill material shall contain no frozen particles, rock particles greater than 6" diameter, sod, brush, or other objectionable material.

The earthfill materials used to construct the diversion shall be compacted by routing the hauling and spreading equipment over the fills in such a manner that the entire surface of the fills will be traversed by not less than one track tread of the loaded equipment. The completed diversion shall conform to the cross section shown on the drawings.

When an excess of earth material results from cutting the diversion to the cross section and grade it shall be deposited adjacent to the diversion at locations approved by the Engineer.

5. **MEASUREMENT AND PAYMENT** – For items of work for which specific unit prices are established in the contract, the length of diversions will be determined to the nearest linear foot by measurement of the diversion along the centerline of the channel.

Payment for diversions will be made at the contract unit price. Such payment will constitute full compensation for all labor, materials, equipment, and all other items necessary and incidental to the performance of the work.

Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in Section 6 of this specification.

APPENDIX "L"

DIVERSION DIKE
CODE 820

DEFINITION – A dike or dike and channel constructed along the perimeter of a disturbed construction area.

PURPOSE – The purpose of this practice is to prevent storm runoff from entering the work area or to prevent sediment-laden runoff from entering the construction site without first passing through a sediment trapping facility.

CONDITIONS WHERE PRACTICE APPLIES – Diversion dikes may be located at the upslope of a construction site to prevent surface runoff from entering the disturbed area or at the downslope side of the work area to divert sediment-laden runoff to on-site sediment traps or basins. Diversion dikes do not usually encircle the entire area.

CRITERIA – Diversion dikes with 3 acres drainage area or less shall be designed using the practice standard TEMPORARY DIVERSION 955 Diversion dikes with drainage areas greater than 3 acres shall be designed using the practice standard DIVERSION 815.

CONSIDERATIONS - A diversion dike is a special application of a temporary or permanent diversion. It differs from other diversions in that the location and grade are usually fixed, and the cross section and stabilization requirements are based on the existing grade of the work boundary. Hence, the design cross section may vary significantly throughout the length. Give special care to avoid erosive velocities in steep areas. Identify areas where sedimentation will occur since they are often subject to overtopping.

Diversion dikes should be protected from damage from ongoing construction activities. At all points where diversion ridges or channels will be crossed by construction equipment, the diversion should be protected according to requirements of the practice standard STABILIZED CONSTRUCTION ENTRANCE 930. Bridges or culverts of adequate capacity may also be used.

Immediately vegetate diversion dikes after construction, but make sure channel flow area is stabilized during the initial phase of construction. Exercise caution in diverting flow to be certain that the diverted water is released through a stable outlet and that the flow will not cause flood damage. Sediment laden water should first be directed through an approved sediment trapping device before entering receiving surface waters. Examples of acceptable sediment trapping devices include but are not limited to practice standards IMPOUNDMENT STRUCTURE-ROUTED 842, or TEMPORARY SEDIMENT TRAP 960.

PLANS AND SPECIFICATIONS - The plans and specifications for installing diversion dikes shall be in keeping with this standard and shall describe the requirements for applying the practice. At a minimum include the following items:

1. Dike location.
2. Minimum cross sections.
3. Channel grade.
4. Seeding requirements.
5. The installation, inspection and maintenance schedules with the responsible party clearly identified.

The diversion shall be constructed according to the requirements shown in construction specification 27 DIVERSIONS.

OPERATION AND MAINTENANCE - Inspect diversion dikes once a week and after every rainfall. Immediately remove sediment from the flow area and repair the dike. Protect the dike from construction equipment crossing.