5.8 Permanent Seeding

Description

Permanent seeding establishes dense, perennial vegetation on bare soil to reduce soil erosion and stormwater runoff discharge rates and volumes. Permanent seeding typically establishes a cover of urban turfgrasses but may also create meadow or prairie with tall grasses and herbaceous plants. In either case, establishing quality vegetation requires selecting the right plant materials for the site, preparing a suitable seedbed, and a seeding process that includes mulching, fertilization, and irrigation.

Use Criteria

Apply permanent seeding to

1. disturbed areas or portions of a construction site at final grade; and
2. areas subject to further grading activity that will remain unworked for a year or longer.

Permanent seeding must occur at a time that ensures the establishment and growth of the selected species. If it is the wrong time of year to plant desired species, use a temporary seeding (Chapter 5.6) or mulch temporary stabilization (Chapter 5.7) until conditions improve.

The soil to be seeded must have sufficient tilth with adequate nutrients and water-holding capacity to support vegetation. Soil restoration (Chapter 1.4) is necessary where grading and compaction have altered the soil profile.

Mulch cover is required to protect seeds from heat, moisture loss, and displacement.

Design Criteria

Permanent seeding is achieved when the entire seeded area reaches an even density of at least 70 percent ground cover of the seeded species (note this does not mean that 70 percent of the site is seeded). This density may take more than one growing season to achieve.

Specify a seed mix appropriate to the exposure, soil type, soil moisture, slope, and expected foot traffic. Where viable, consider planting species or mixes that support pollinators and other wildlife. In addition to those benefits, flowering shrubs and wildflowers often have resilient root systems and good soil-building capability that aid stabilization.

Additional controls such as slope drains, diversions, and rolled erosion control matting may be necessary to keep loose soil and seed from washing away on slopes and in shallow vegetated channels.

See the practice specification that follows.

Stormwater Pollution Prevention Plan

Include plans and specifications in a Stormwater Pollution Prevention Plan (SWP3) that describe the requirements for applying the practice to achieve its intended purpose. As a minimum, include the following in the SWP3:

- □ minimum topsoil conditions,
- □ seedbed preparation,
- □ timing of seeding,
- □ methods of seeding,
- □ seeding rates,
- □ seed species,
- □ mulching requirements,
- □ fertilizer requirements, and
- □ irrigation requirements.

Inspection and Maintenance

Check permanent seedlings within four to six weeks following planting. Look for vigorous green seedlings, uniform surface coverage with at least 30 percent growth density, and well intermixed seeded species. Continue inspecting until 70 percent coverage is attained.

If a stand fails to attain 70 percent coverage, identify the cause of failure and take corrective action. Reevaluate the appropriateness of the plant species selected and test the soil to determine if pH or nutrient deficiencies are the cause. Overseeding can improve insufficient stands, but will not rectify poor soil or seedbed preparation. If the seedbed is inadequate or the area becomes dominated by weeds or rill erosion, repeat the seedbed preparation and seeding process.

Weed, fertilize, and irrigate as conditions dictate to maintain 70 percent or greater cover.

Do not fertilize cool-season grasses during summer. Do not use nitrogen fertilizer if the stand contains more than 20 percent legumes.

References

USDA-NRCS Ohio. 2019. Electronic Field Office Technical Guide Appendix A

USDA-NRCS Ohio. 2017. Conservation Practice Standard Code 342 Critical Area Planting.

Ohio. 2023. Construction and Material Specifications, Item 659 Seeding and Mulching. Department of Transportation.

New York. 2016. New York State Standards and Specifications for Erosion and Sediment Control. Department of Environmental Conservation.

New Jersey. 2014, Revised 2017. The Standards for Sediment and Erosion Control in New Jersey, 7th edition. Department of Agriculture – State Soil Conservation Committee.

District of Columbia. 2017. Erosion and Sediment Control Manual. Department of Energy and Environment.

Washington. 2024. Stormwater Management Manual for Western Washington, Volume II - Construction Stormwater Pollution Prevention, II-4 Construction Stormwater BMPs, BMP C120: Temporary and Permanent Seeding. Department of Ecology.

Practice Specification
Permanent Seeding

Timing

1. Permanent seed areas within 50 feet of surface waters of the state within two days of reaching final grade and all other areas within seven days of reaching final grade. Do not delay permanent seeding of any portion of the site at final grade, including stormwater basins, while construction on another portion of the site is being completed. Complete permanent seeding in phases, if necessary.
2. Permanent seed any areas that will lie dormant for one year or more within seven days of the most recent disturbance.
3. Conduct permanent seeding according to the timeframes in Table 5.8.1.

Table 5.8.1 Ohio Seeding Dates (adapted from USDA-NRCS Ohio, 2019)

March 15 to May 31[1]	Spring permanent seeding window
June 1 to July 31	Permanent seeding with irrigation until 70% cover is established[2]
August 1 to September 15[1]	Fall permanent seeding window
September 16 to October 15	Permanent seeding with an additional 30 lb/ac of cereal rye[2]
October 15 to December 1	Permanent seeding is not recommended as seeds are likely to germinate but not be able to survive the winter. Use temporary stabilization until the spring window.
December 1 to March 14	Dormant permanent seeding coupled with mulch temporary stabilization[2,3]

Footnotes:
1. Spring and fall seeding dates may be extended two weeks beyond the date range listed based on a site-specific evaluation of the site and the local weather conditions at the time.
2. Seeding must be evaluated for adequate establishment after the following spring or fall seeding window.
3. Increase seeding rates by 50% for dormant seeding and follow mulch temporary stabilization specification.

Seedbed Preparation, Fertilizer, and Lime

1. Prior to the start of seeding operations, perform soil tests to determine site-specific application rates for both lime and fertilizer. Soil samples taken for engineering purposes or soil restoration may also be used for chemical analyses.
2. The soil being seeded must be of sufficient tilth with adequate nutrients and water-holding capacity to support vegetation. The seedbed should be firm and rough with small clods, moist at the surface, and free of weeds and competing vegetation.
    a. If the soil has become compacted or crusted, loosen it to a depth of three to five inches with a suitable agricultural or construction implement, such as a disc harrow, tine harrow, chisel plow, or ripper. Leave the seedbed in loose condition until after fertilization and seeding. If necessary, firm it with a cultipacker.
    b. Track walk sloped areas (greater than 3:1) leaving the surface in an irregular condition with ridges running parallel to the contour of the slope. (see Chapter 5.5 Soil Roughening)
3. Apply starter fertilizer and lime as recommended by a soil test and work into loose soil. If fertilizer is not incorporated, apply one-half the rate described above during seedbed preparation and repeat another one-half rate application of the same fertilizer within three to five weeks after seeding.

   When not specified by a soil test, apply standard commercial fertilizer 10-20-10 evenly over the surface at a standard dry application rate of 20 pounds per 1,000 square feet. Other commercial fertilizer mixture ratios may be applied at the application rate specific for that ratio to provide an equivalent quantity of nutrients. All dry or liquid fertilizers must be fully labeled, delivered, and stored per applicable laws and registered with the Ohio Department of Agriculture (ODA) in accordance with Ohio Revised Code (ORC) section 905.33.

When not specified by a soil test, apply two tons of pulverized agricultural-grade lime per acre to develop a slightly acidic growing environment. Equivalent liming materials described in Bulletin 472, *Ohio Agronomy Guide*, published by the Ohio State University Cooperative Extension Service (OSU Extension) may also be used. Liming material must be from a manufacturer licensed by ODA in accordance with ORC section 905.52.

Seed

1. Select a seed mix from Table 5.8.2 or an equivalent mixture recommended by the Natural Resource Conservation Service – Ohio, Ohio Department of Natural Resources, or OSU Extension.
2. Seed must be labeled according to ODA regulations and Ohio Revised Code section 907.03.
3. Legume seed must be properly inoculated with nitrogen-fixing bacteria specifically prepared for the species prior to seeding and should be applied at a rate of two pounds of inoculant per 100 pounds of seed. Use four times the recommended rate when hydroseeding.

Seeding Methods

1. Thoroughly mix all seed and evenly sow the seed over 100 percent of the prepared areas at the required rates. Seed may be applied by dry seeding, a mechanized seeder, or hydroseeding.
2. Dry seeding may be performed with a conventional drop or cyclone seeder. Seed shall be incorporated into the soil within 24 hours of seedbed preparation to a depth of one-quarter inch by raking or dragging or with a cultipacker or similar implement to assure good seed-to-soil contact. Seed may also be covered with compost or engineered soil media applied to a minimum depth of ¼ inch over the prepared areas. Where feasible, apply seed in two directions perpendicular to each other using half the seeding rate in each direction. After seeding, firm the soil with cultipacker or similar implement
3. Mechanized seeders may be used to bury the seed at least one-quarter inches. Where practical, apply seed in two directions perpendicular to each other, using one-half of the seeding rate in each direction. On sloping land, operate seeding equipment on the contour where feasible.
4. Hydroseeding should follow a two-step process to ensure the seed is in direct contact with the soil. First seed and fertilize with 25 to 30 percent mulch and tackifier onto soil in the first lift. Place the remaining 70 to 75 percent of the mulch and tackifier over the first lift in a second application. If seed, fertilizer, and mulch are applied in a single step, the seed rates in Table 5.7.2 should be increased by 50 percent to compensate for seeds not having direct contact with the soil. Hydroseeding alone does not provide adequate erosion control.

Mulching

1. Mulch material shall be applied immediately following permanent seeding. Apply the mulch material by hand or mechanically so 85 to 90 percent of the soil surface is uniformly covered.
2. Mulch shall be unrotten cereal grain straw applied at the rate of two tons per acre, woodchips with a minimum particle size of ¾ inches applied to a minimum depth of two inches, wood-fiber hydraulic mulch applied to the manufacturer's specifications at a rate of 1,500 to 2,000 pounds/acre with a tackifier, or rolled erosion control matting applied according to manufacturer's specifications.

   Wood fiber hydraulic mulches are generally short-lived (less than 3 months) and should only be used during the spring and fall seeding window. Do not apply hydraulic mulches to shallow vegetated channels unless used with an erosion control blanket or to saturated soils.

   Woodchips must be manufactured expressly from clean raw wood and be free of contaminants. Do not use woodchips where flowing water could wash them away.

   Organic mulch materials with carbon to nitrogen (C:N) ratios of less than 20:1 such as grass clippings will release nitrate-nitrogen that could cause water quality impairments and should be avoided.
3. Mulch shall be anchored immediately after placement to hold it in place. The following are acceptable methods for anchoring mulch.

a. Use a straw crimper or similar coulter-like implement to punch the straw mulch into the soil. Soil penetration should be about three to four inches. Crimped straw shall generally be longer than six inches (finely chopped straw cannot be crimped). On sloping land where equipment can operate safely, the operation should be on the contour.

b. Cotton, jute, or synthetic netting may be used according to the manufacturer's specifications. Pin or staple netting per the manufacturer's recommendations. Degradable netting is recommended for areas to be mowed.

c. High polymer synthetic emulsions or organic binders may be used at the manufacturer's recommended application rates if weather conditions are compatible with the manufacturer's recommendations. All applications of synthetic or organic binders must be conducted in such a manner that there is no direct contact with waters of the state. Weather forecasts must be considered to ensure the binders will not be washed into waters of the state. Binders must be physiologically harmless and not result in a phytotoxic effect or impede vegetation growth.

   All non-organic or non-biodegradable mulch and anchoring materials shall be removed and properly disposed of when the practice is terminated.

Irrigation

1. Thoroughly water permanent seeded areas after seed germination. Apply a total rate of 300 gallons per 1,000 square feet in at least two applications spread over seven days. Perform a secondary water application seven and ten days after the primary applications. If a one-half inch or greater of rainfall occurs within the irrigation period, watering may be omitted. Irrigation seedings performed between June 1 and July 31 at a rate of one-half inch per week until 70% cover is established.
2. Irrigate at a rate and method that will not erode soil or dislodge mulch cover.

Dormant Seeding

1. Dormant seeding may occur if soil moisture conditions allow access for seeding.
2. Increase all seeding rates by 50 percent when dormant seeding.
3. Dormant seeding shall be mulched so that 100 percent of the ground surface is uniformly covered with cereal grain straw applied at the rate of three to four tons per acre or bonded fiber matrix hydraulically applied at a rate of 3,500 to 4,000 pounds per acre. Hydroseed and standard hydraulic fiber mulch do not sufficiently protect dormant seeded ground from erosion.

Table 5.8.2 Recommended Permanent Seeding Mixes and Seeding Rates.[1] (adapted from USDA-NRCS Ohio and ODOT)

	Mix Use	Plant Species	Pure Live Seeding Rate (lb/ac)[2,3]	Percent of Mix
1	Multipurpose Lawn	Turf Type Fescue (*Festuca arundinadea*)	40	47
		Kentucky Bluegrass (*Poa pratensis*)	20	23
		Perennial Ryegrass (*Lolium perenne*)	25	30
			85 lb/ac total PLS rate	
2	Quick Cover	Kentucky Bluegrass (*Poa pratensis*)	15	41
		Creeping Red Fescue (*Festuca rubra*)	16.5	27
		Annual Ryegrass (*Lolium multiflorum*)	1.5	2
		Perennial Ryegrass (*Lolium perenne*)	19	30
			52 lb/ac total PLS rate	
3	Secondary Wildlife Benefits Cover	Kentucky Bluegrass (*Poa pratensis*)	11	18
		Orchardgrass (*Dactylis glomereta*)	22.5	37
		Annual Ryegrass (*lolium multiflorum*)	1.5	10
		Perennial Ryegrass (*Lolium perenne*)	19	31
		Red Clover (*Trifolium partum*)	2	4
			56 lb/ac total PLS rate	
4	Steep Slopes	Hard Fescue (*Festuca longifolia*)	55	55
		Creeping Red Fescue (*Festuca rubra*)	35	35
		Annual Ryegrass (*Lolium multiflorum*)	10	10
			100 lb/ac total PLS rate	
5	Meadow / Conservation Area[4]	New England Aster (*Symphyotrichum novae-angliae*), Partridge Pea (*Chamaecrista fasciculata*), Purple Coneflower (*Echinacea purpurea*), Rattlesnake Master (*Eryngium yuccifolium*), Ox-Eye Sunflower (*Heliopsis helianthoides*), Bergamot (*Monarda fistulosa*), Grey-Headed Coneflower (*Ratibida pinnata*), Orange Coneflower (*Rudbeckia fulgida*), Prairie Dock (*Silphium terebinthinaceum*), Whorled Rosinweed (*Silphium trifoliatum*), Stiff Goldenrod (*Solidago rigida*) (a mixture of 5 to 12 species with any one not to exceed 5% of the mix)	15	25
		Big Blue Stem (*Andropogan gerardii*)	2	3
		Little Blue Stem (*Schizachyrium scoparium*)	3	5
		Indian Grass (*Sorghastrumnutans*)	1	2
		Annual Ryegrass (*Lolium multiflorum*)	40	65
			61 lb/ac total PLS rate	

Footnotes:

1. Small variations within the seeding rates listed within the planned mix are acceptable so long as the mix includes all the listed species, and the total proportion of the seed mixture is 100% or more.
2. The seeding rates used in this document assume the seed used is all viable. All rates listed in this document are listed as Pure Live Seed (PLS). This PLS rate must be adjusted to account for the quality of the seed being used.
3. PLS seeding rates are to be increased by 20% if the method of seeding does not result in good soil seed contact included to account for the increased risk of poor emergence. For example, if the planned method involves broadcast seeding with no additional activities to improve seed-to-soil contact.
4. This is a general mix. Ecoregion-specific seed mixes are recommended where feasible.