

EROSION & SEDIMENT CONTROL PLAN

SWMU 13-MINE FILL B

Naval Support Activity
300 Highway 361
Crane, Indiana 47522

Submitted to:



Naval Facilities Engineering Command Midwest
Officer in Charge of Construction
Naval Support Activity
300 Highway 361
Crane, Indiana 47522

LES/TOLTEST JV Project No. 22367.01
Contract No. N40083-05-D-4015, Task Order FC40

Submitted by:

Joint Venture in EMAC



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September 2008

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LES/TolTest JV hereby certifies that, to the best of its knowledge and belief, the technical data delivered herewith under this contract is complete, accurate, and complies with all requirements of the contract.

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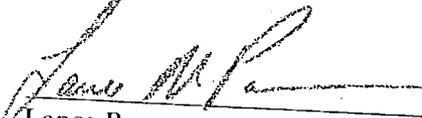


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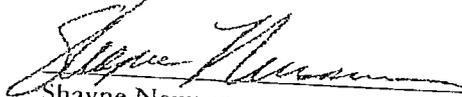
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EROSION AND SEDIMENT CONTROL PLAN

1.0 PURPOSE

The purpose of this Erosion and Sediment Control Plan is to provide the steps that will be taken to minimize and/or eliminate erosion and sedimentation during the implementation of the Interim Measures Work Plan (IMWP) at SWMU 13 Mine Fill B (MFB). This plan has been developed in accordance with the guidelines defined in the Indiana Handbook for Erosion Control in Developing Areas (Handbook) (IDEM, 1992). Relevant standards and specifications from the Handbook are included in this section and Appendix A.

2.0 REQUIREMENTS

Erosion and sediment control measures are implemented to reduce or eliminate erosion and sedimentation of soils that would be detrimental to surface water quality. Some of the SWMU 13 drainage channels to be excavated only carry flow from stormwater runoff during rain events; the remaining drainage channels and streams have a base flow and support aquatic life. Surface drainage at MFB is routed through storm sewers and ditches located throughout the relatively flat portion of the ridgetop. The ditches lead to larger drainage ways and gullies that flow down both sides of the ridge in northwest and southeast directions. Drainage from the northwestern side of the rail line flows to the northwest, down the side of the ridge, and into the unnamed tributary of Boggs Creek. Drainage gullies leading away from the southeastern side of the rail line flow southeast, down the side of the ridge, and eventually coalesce to form two unnamed tributaries of Turkey Creek, which lies approximately 5,000 feet (1 mile) southeast of MFB. IMWP implementation activities for SWMU 13 consist of excavation and off-site disposal of PCB-contaminated surface soils and sediments, backfilling excavations, and restoration of disturbed areas. Surface soil will be excavated from one area located northeast of Building 169 and another area south and east of Building 171. Sediment will be excavated from drainage channels and associated culverts that feed the unnamed tributary of Boggs Creek. Additionally, sediment will be removed from the sump located northwest of Building 171 and from the tunnel connecting Buildings 171 and 169. Because of site conditions, temporary access trails will need to be constructed to allow access to the excavation areas.

Considering the type of IMWP activities and access issues, the proposed erosion and sediment control measures include the following:

- Silt Fence - Placed along the downslope sides of the surface soil excavation area and the gravel construction entrance to provide a temporary sediment barrier. Silt fencing consists of synthetic filter fabric and wooden posts.
- In-stream Sediment Traps - Placed within the drainage channels from which PCB-contaminated sediments will be removed to provide a temporary sediment barrier while allowing flow within the disturbed channel. Multiple in-stream sediment traps will be required based on the proposed segments of channel to be disturbed within a given time period. In-stream sediment traps are constructed of gravel, riprap, and filter fabric and will not be placed greater than 300 feet apart.
- Gravel Construction Entrances - Placed as a controlled site entrance to reduce the amount of sediment transported by construction vehicles onto facility and public roads.
- Dust Control - Utilized to prevent surface and air movement of dust from exposed soil surfaces and to reduce the amount of airborne substances that may present health hazards, traffic safety problems, or harm plant/animal life.
- Permanent Seeding - Utilized to establish perennial vegetation on disturbed areas by planting seeds of native grasses. The construction, implementation, and maintenance of these erosion and sediment control devices will be in accordance with the Handbook. Figure 1 presents the proposed excavation areas along with the limits of disturbance and the locations of the proposed erosion and sediment control devices. Figure 2 presents typical details of the erosion and sediment control devices proposed for the IMWP implementation (i.e., silt fence, gravel construction entrance, and in-stream

sediment trap). Permanent seeding is discussed in the Section 04. All erosion and sediment controls will remain in place until all upstream areas have been stabilized. Completion of stabilization will be determined by the Contracting Officer's Technical Representative.

3.0 INSPECTION AND MAINTENANCE OF EROSION AND SEDIMENT CONTROLS

In general, all erosion and sediment control measures will be checked daily and after each runoff producing rainfall event. Any required repairs will be made immediately. The following items will be checked:

- The stone construction entrance - maintained in a condition that will minimize tracking sediment onto facility or public roads.
- Silt fence will be checked for undermining or deterioration of the fabric. Sediment will be removed when the level of sediment causes bulging or reaches one-half of the fabric height.
- In-stream sediment traps will be checked for undermining or erosion around the edges of the trap(s). Sediment will be removed when the level of sediment reaches one-half the height of the in-stream sediment trap or when the quantity of flow through the in-stream sediment trap is significantly reduced.
- Seeded areas will be checked regularly to ensure that a good growth of vegetation is maintained and these areas will be fertilized and reseeded, as needed.
- The fuel and lubricant materials storage area will be checked to ensure that stored containers are not leaking and that the lining system is functioning properly. All erosion and sediment control devices will be inspected and maintained until the Contracting Officer's Technical Representative has formally accepted the permanent stabilization of the disturbed areas. A log book of all erosion and sediment control device inspections and maintenance will be maintained on the Site. This log book will be available at all times for inspection by duly authorized officials including NSA Crane personnel and the IDEM.

4.0 SITE RESTORATION

All areas disturbed by the IMWP implementation activities (excavation and support facility areas) will be restored/stabilized using appropriate soils, and permanent seeding. Activities to establish permanent stabilization will be implemented as soon as possible following the establishing of final grades. The establishment of permanent vegetation includes site/seed bed preparation, seeding, and mulching of the following locations:

- Restored surface soil excavation areas
- Banks of the drainage channels
- Drainage channel beds where applicable
- Surface soils below support facilities

The procedures and requirements for permanent seeding activities are presented in Section 3.12 of the Appendix A. The seed mixture recommended for use at SWMU 13 is a standard Indiana seed mixture for open and disturbed areas. The seed mixture includes perennial Ryegrass and Tall fescue. Planting rates and optimum soil pH for this mixture are presented in Section 3.12-C of the Appendix A. Following seeding, the seeded areas will be covered with temporary erosion control matting (e.g., coconut fiber matting) to provide additional stabilization until vegetation is established. In the event that disturbed areas are brought to final grade outside of the optimal growing season for the permanent seed mixture, the disturbed areas will be temporarily stabilized using a temporary seed mixture. The procedures and requirements for establishing temporary stabilization are presented in Section 3.11 of Appendix A. Erosion and sediment control devices will remain in place until permanent stabilization is established over the disturbed areas. Therefore, erosion and sediment control devices will not be removed until directed by the Contracting Officer's Technical Representative.

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5.0 RESPONSE PROCEDURES FOR SPILL MITIGATION

Potential non-stormwater discharges anticipated during IMWP implementation activities include wash water resulting from decontamination efforts associated with field equipment and vehicles, fuel and lubricant spills from vehicle fueling, lubrication, and maintenance, and spills of fertilizers and small quantities of laboratory chemicals used in sample collection, and other flammable substances.

The primary objective in responding to a spill is to quickly contain the material(s) and prevent or minimize their migration into storm water runoff and conveyance systems. If the release has impacted on-site storm water, it is critical to contain the released materials on site and prevent their release into receiving waters.

If a spill of pollutants threatens storm water at the site, the spill response procedures outlined below must be implemented in a timely manner to prevent the release of pollutants.

- The Site Superintendent will be notified immediately when a spill, or the threat of a spill, is observed. The Superintendent will assess the situation and determine the appropriate response.
- If spills represent an imminent threat of escaping the Site and entering the receiving waters, Site personnel will respond immediately to contain the release and notify the Superintendent after the situation has been stabilized.
- Spill kits containing materials and equipment for spill response and cleanup will be maintained at the site. Each spill kit may contain:
 - Oil absorbent pads (one bale)
 - Oil absorbent booms (40 feet)
 - 55-gallon drums (2)
 - 9-mil plastic bags (10).
 - Personal protective equipment including gloves and goggles
- If an oil sheen is observed on surface water (e.g., settling ponds, detention pond, and swales), absorbent pads and/or booms will be applied to contain and remove the oil. The source of the oil sheen will also be identified and removed or repaired as necessary to prevent further releases.
- Site personnel with primary responsibility for spill response and cleanup will receive training from the Site Superintendent. This training will include identifying the location of spill kits and other spill response equipment and the use of spill response materials.
- Spill response equipment will be inspected and maintained as necessary to replace any materials used in spill response activities.

In the event of a spill, make the appropriate notification(s) consistent with the following procedures:

- Any spill of oil which 1) violates water quality standards, 2) produces a "sheen" on a surface water, or 3) causes a sludge or emulsion must be reported immediately by telephone to the National Response Center Hotline at (800) 424-8802.
- Any oil, hazardous substance, or hazardous waste release which exceeds the reportable quantity must be reported immediately by telephone to the National Response Center Hotline at (800) 424-8802.
- Any spill of oil or hazardous substance to waters of the state must be reported immediately by telephone to the Indiana Department of Environmental Management ("IDEM") within 24 hours and in writing within 14 days.
- Any release of a hazardous substance that may be a threat to human health or the environment must be reported to the Indiana Department of Environmental Management ("IDEM") within 24 hours and in writing within 14 days.

Complete emergency response and clean up procedures are detailed in the Health & Safety Plan.

Appendix A
IDEM Stabilization Specifications

Practice 3.11 Temporary Seeding

Purpose

(Exhibit 3.11-A)

- * To reduce erosion and sedimentation damage by stabilizing disturbed areas where additional work (e.g., grading) is not scheduled for a period of 2 mo. to 1 yr.
- * To reduce problems associated with mud or dust from bare soil surfaces during construction.
- * To reduce sediment runoff to downstream areas.
- * To improve visual aesthetics of the construction areas.

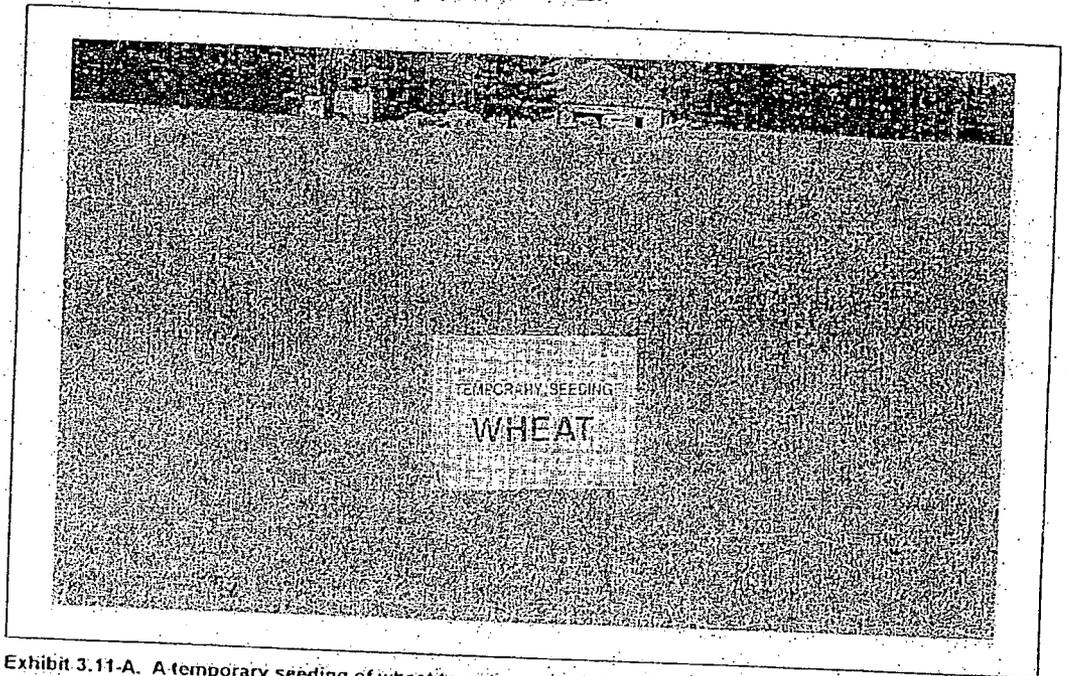


Exhibit 3.11-A. A temporary seeding of wheat to reduce erosion on a future home lot.

Requirements

Site and seedbed preparation: Graded and fertilizer applied.

Plant species: Selected on the basis of quick germination, growth, and time of year to be seeded (see Exhibit 3.11-B).

Mulch: Clean grain straw, hay, wood fibre, etc., to protect seedbed and encourage plant growth.

Seeding frequency: As often as possible following construction activity. Daily seeding of rough graded areas when the soil is loose and moist is usually most effective.

Application

(Exhibit 3.11-B)

SITE PREPARATION:

1. Install practices needed to control erosion, sedimentation, and water runoff, such as temporary and permanent diversions, sediment traps or basins, silt fences, and straw bale dams (Practices 3.21, 3.22, 3.72, 3.73, 3.74, and 3.75).
2. Grade the site as specified in the construction plan.

SEEDBED PREPARATION:

1. Test soil to determine its nutrient levels. (Contact your county SWCD or Cooperative Extension office for assistance and soils information, including available soil testing services.)
2. Fertilize as recommended by the soil test. If testing is not done, consider applying 400-600 lbs./acre of 12-12-12 analysis, or equivalent, fertilizer.
3. Work the fertilizer into the soil 2-4 in. deep with a disk or rake operated across the slope.

SEEDING:

1. Select a seeding mixture and rate from Exhibit 3.11-B, and plant at depth and on dates shown.
2. Apply seed uniformly with a drill or culipacker-seeder or by broadcasting, and cover to the depth shown in Exhibit 3.11-B.

3. If drilling or broadcasting, firm the seedbed with a roller or cultipacker.
4. Mulch seeded areas to increase seeding success. Anchor all mulch by crimping or tackifying. Use of netting or erosion control blankets is possible, but may not be cost-effective for temporary seedings.

Exhibit 3.11-B. Temporary Seeding Recommendations.

Seed species*	Rate/acre	Planting depth	Optimum dates**
Wheat or rye	150 lbs.	1 to 1½ in.	9/15 to 10/30
Spring oats	100 lbs.	1 in.	3/1 to 4/15
Annual ryegrass	40 lbs.	1/4 in.	3/1 to 5/1
German millet	40 lbs.	1 to 2 in.	8/1 to 9/1
Sudangrass	35 lbs.	1 to 2 in.	5/1 to 6/1
			5/1 to 7/30

* Perennial species may be used as a temporary cover, especially if the area to be seeded will remain idle for more than a year (Practice 3.12).

** Seeding done outside the optimum dates increases the chances of seeding failure.

Maintenance

- * Inspect periodically after planting to see that vegetative stands are adequately established; re-seed if necessary.
- * Check for erosion damage after storm events and repair, reseed and mulch if necessary.
- * Topdress fall seeded wheat or rye seedings with 50 lbs./acre of nitrogen in February or March if nitrogen deficiency is apparent. (*Exhibit 3.11-B* shows only wheat/rye fall seeded.)

Common concern

- Fertilizer not incorporated at least 2 in. deep—may be lost in runoff or remain concentrated near the surface to inhibit germination.
- Mulch rate inadequate—results in poor germination and failure.
- Seeding uneven or rate too low—results in patchy growth and erosion.

Practice 3.12 Permanent Seeding

Purposes

(Exhibit 3.12-A)

- * To reduce erosion and sedimentation damage by stabilizing exposed areas where additional work (e.g., grading) is not scheduled for a period of more than a year or areas where final grading has been completed.
- * To reduce problems associated with mud or dust from bare soil surfaces during construction.
- * To reduce sediment runoff to downstream areas.
- * To improve the visual aesthetics of the construction area.

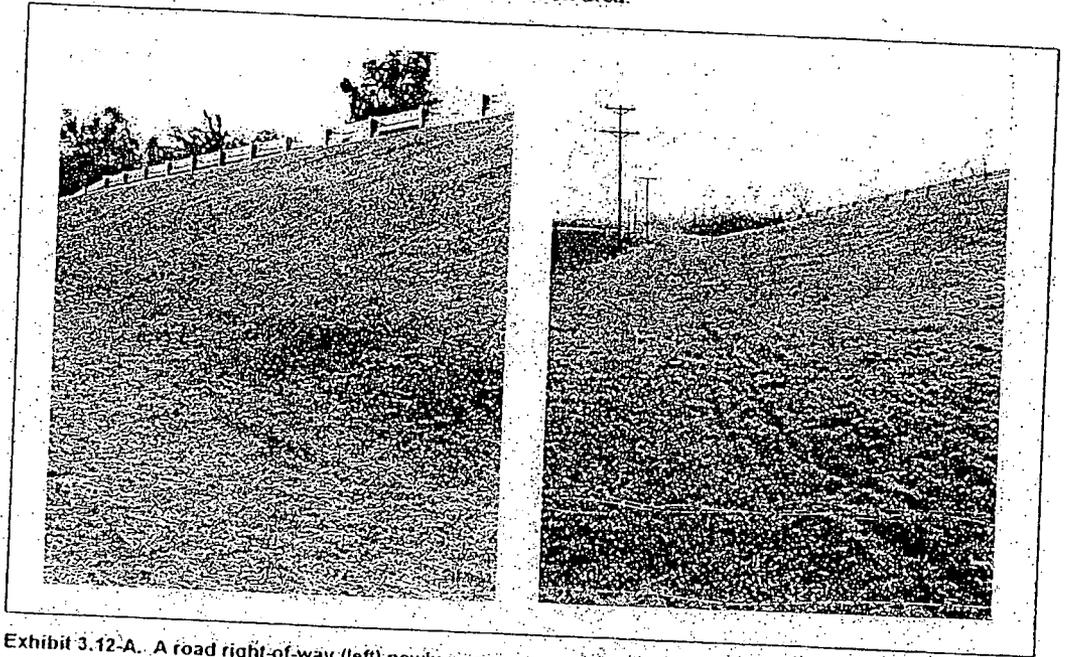


Exhibit 3.12-A. A road right-of-way (left) newly permanent seeded and mulched and (right) 6 mo. later.

Requirements

Site and seedbed preparation: Graded, and lime and fertilizer applied.

Plant species: Selected on the basis of soil type, soil pH, region of the state, time of year, and planned use of the area to be seeded (see Exhibit 3.12-C).

Mulch: Clean grain straw, hay, wood fibre, etc., to protect seedbed and encourage plant growth. The mulch may need to be anchored to reduce removal by wind or water, or erosion control blankets may be considered.

Application

(Exhibits 3.12-B, C, and D)

Permanently seed all final grade areas (e.g., landscape berms, drainage swales, erosion control structures, etc.) as each is completed and all areas where additional work is not scheduled for a period of more than a year.

SITE PREPARATION:

1. Install practices needed to control erosion, sedimentation, and runoff prior to seeding. These include temporary and permanent diversions, sediment traps and basins, silt fences, and straw bale dams (Practices 3.21, 3.22, 3.72, 3.73, 3.74, and 3.75).
2. Grade the site and fill in depressions that can collect water.
3. Add topsoil to achieve needed depth for establishment of vegetation (Practice 3.02).

SEEDBED PREPARATION:

1. Test soil to determine pH and nutrient levels. (Contact your county SWCD or Cooperative Extension office for assistance and soils information, including available testing services.)
2. If soil pH is unsuitable for the species to be seeded, apply lime according to test recommendations.

3. Fertilize as recommended by the soil test. If testing was not done, consider applying 400-600 lbs./acre of 12-12-12 analysis, or equivalent, fertilizer.
4. Till the soil to obtain a uniform seedbed, working the fertilizer and lime into the soil 2-4 in. deep with a disk or rake operated across the slope (*Exhibit 3.12-B*).

SEEDING:

Optimum seeding dates are Mar. 1-May 10 and Aug. 10-Sept. 30. Permanent seeding done between May 10 and Aug. 10 may need to be irrigated. As an alternative, use temporary seeding (Practice 3.11) until the preferred date for permanent seeding.

1. Select a seeding mixture and rate from *Exhibit 3.12-C*, based on site conditions, soil pH, intended land use, and expected level of maintenance.
2. Apply seed uniformly with a drill or cultipacker-seeder (*Exhibit 3.12-D*) or by broadcasting, and cover to a depth of 1/4-1/2 in.
3. If drilling or broadcasting, firm the seedbed with a roller or cultipacker.
4. Mulch all seeded areas (Practice 3.15). Consider using erosion control blankets on sloping areas (Practice 3.17). (NOTE: If seeding is done with a hydroseeder, fertilizer and mulch can be applied with the seed in a slurry mixture.)



Exhibit 3.12-B. Preparing the seedbed with a combination roto-tiller and cultipacker.

Exhibit 3.12-C. Permanent Seeding Recommendations.

This table provides several seeding options. Additional seed species and mixtures are available commercially. When selecting a mixture, consider site conditions, including soil properties (e.g., soil pH and drainage), slope aspect and the tolerance of each species to shade and droughtiness.

Seed species and mixtures	Rate per acre	Optimum soil pH
OPEN AND DISTURBED AREAS (REMAINING IDLE MORE THAN 1 YR.)		
1. Perennial ryegrass	35 to 50 lbs.	5.6 to 7.0
+ white or ladino clover*	1 to 2 lbs.	
2. Kentucky bluegrass	20 lbs.	5.5 to 7.5
+ smooth bromegrass	10 lbs.	
+ switchgrass	3 lbs.	
+ timothy	4 lbs.	
+ perennial ryegrass	10 lbs.	
+ white or ladino clover*	1 to 2 lbs.	

Exhibit 3.12-C. Continued.

Seed species and mixtures	Rate per acre	Optimum soil pH
3. Perennial ryegrass + tall fescue**	15 to 30 lbs.	5.6 to 7.0
4. Tall fescue** + ladino or white clover*	15 to 30 lbs. 35 to 50 lbs. 1 to 2 lbs.	5.5 to 7.5
STEEP BANKS AND CUTS, LOW MAINTENANCE AREAS (NOT MOWED)		
1. Smooth brome grass + red clover*	25 to 35 lbs.	5.5 to 7.5
2. Tall fescue** + white or ladino clover*	10 to 20 lbs. 35 to 50 lbs.	5.5 to 7.5
3. Tall fescue** + red clover*	1 to 2 lbs. 35 to 50 lbs. 10 to 20 lbs.	5.5 to 7.5
(Recommended north of US 40)		
4. Orchardgrass + red clover*	20 to 30 lbs.	5.6 to 7.0
+ ladino clover*	10 to 20 lbs.	
5. Crownvetch* + tall fescue**	1 to 2 lbs. 10 to 12 lbs. 20 to 30 lbs.	5.6 to 7.0
(Recommended south of US 40)		
LAWNS AND HIGH MAINTENANCE AREAS		
1. Bluegrass	105 to 140 lbs.	5.5 to 7.0
2. Perennial ryegrass (turf-type) + bluegrass	45 to 60 lbs.	5.6 to 7.0
3. Tall fescue (turf-type)** + bluegrass	70 to 90 lbs. 130 to 170 lbs. 20 to 30 lbs.	5.6 to 7.5
CHANNELS AND AREAS OF CONCENTRATED FLOW		
1. Perennial ryegrass + white or ladino clover*	100 to 150 lbs. 1 to 2 lbs.	5.6 to 7.0
2. Kentucky bluegrass + smooth brome grass + switchgrass + timothy + perennial ryegrass + white or ladino clover*	20 lbs. 10 lbs. 3 lbs. 4 lbs. 10 lbs.	5.5 to 7.5
3. Tall fescue** + ladino or white clover*	1 to 2 lbs. 100 to 150 lbs.	5.5 to 7.5
4. Tall fescue** + Perennial ryegrass + Kentucky bluegrass	1 to 2 lbs. 100 to 150 lbs. 15 to 20 lbs. 15 to 20 lbs.	5.5 to 7.5

* For best results: (a) legume seed should be inoculated; (b) seeding mixtures containing legumes should preferably be spring-seeded, although the grass may be fall-seeded and the legume frost-seeded (Practice 3.13); and (c) if legumes are fall-seeded, do so in early fall.

** Tall fescue provides little cover for, and may be toxic to, some species of wildlife. The IDNR recognizes the need for additional research on alternatives to tall fescue, such as buffalograss, orchard grass, smooth brome grass, and switch grass. This research, in conjunction with demonstration areas, should focus on erosion control characteristics, wildlife toxicity, turf durability, and drought resistance.

NOTE: An oat or wheat companion or nurse crop may be used with any of the above permanent seeding mixtures. If so, it is best to seed during the fall seeding period, especially after Sept. 15, and at the following rates: spring oats-1/4 to 3/4 bu./acre; wheat-no more than 1/2 bu./acre.

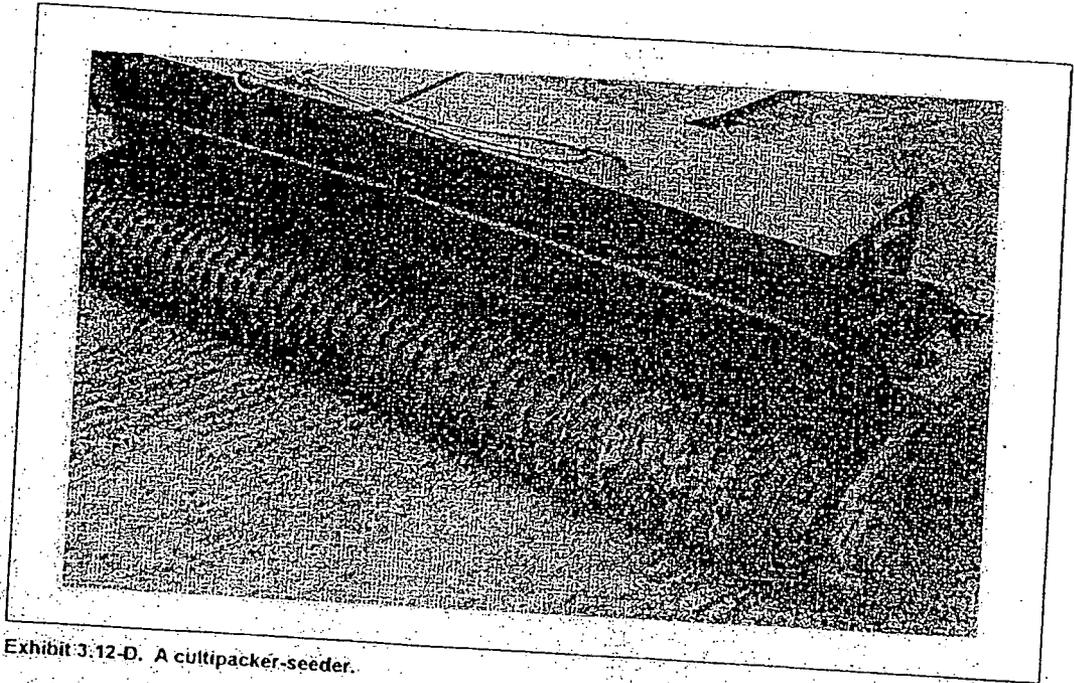


Exhibit 3.12-D. A cultipacker-seeder.

Maintenance

- * Inspect periodically, especially after storm events, until the stand is successfully established. (Characteristics of a successful stand include: vigorous dark green or bluish-green seedlings; uniform density with nurse plants, legumes, and grasses well inter-mixed; green leaves; and the perennials remaining green throughout the summer, at least at the plant base.)
- * Plan to add fertilizer the following growing season according to soil test recommendations.
- * Repair damaged, bare, or sparse areas by filling any gullies, re-fertilizing, over- or re-seeding, and mulching.
- * If plant cover is sparse or patchy, review the plant materials chosen, soil fertility, moisture condition, and mulching, then repair the affected area either by over-seeding or by re-seeding and mulching after re-preparing the seedbed.
- * If vegetation fails to grow, consider soil testing to determine acidity or nutrient deficiency problems. (Contact your SWCD or Cooperative Extension office for assistance.)
- * If additional fertilization is needed to get a satisfactory stand, do so according to soil test recommendations.

Common concerns

- Insufficient topsoil or inadequately tilled, limed, and/or fertilized seedbed**—results in poor establishment of vegetation.
- Unsuitable species or seeding mixture**—results in poor establishment of vegetation.
- Nurse crop rate too high in the mixture**—results in competition with the perennials.
- Seeding done at the wrong time of year**—results in poor establishment of vegetation, also plant hardiness is significantly decreased.
- Mulch rate inadequate**—results in poor germination and failure.

Practice 3.13 Dormant and Frost Seeding

Dormant seeding is a temporary or permanent seeding application at a time when soil temperatures are too low for germination to occur (less than 50°F). *Frost seeding* is a temporary or permanent seeding application in early spring when soils are in the freeze-thaw stage. (This practice can be used to repair or enhance areas having thin or declining cover or to re-vegetate an area.)

Purposes (Exhibit 3.13-A)

- * To provide early germination and soil stabilization in the spring.
- * To reduce sediment runoff to downstream areas.
- * To improve the visual aesthetics of the construction area.
- * To repair previous seedings.

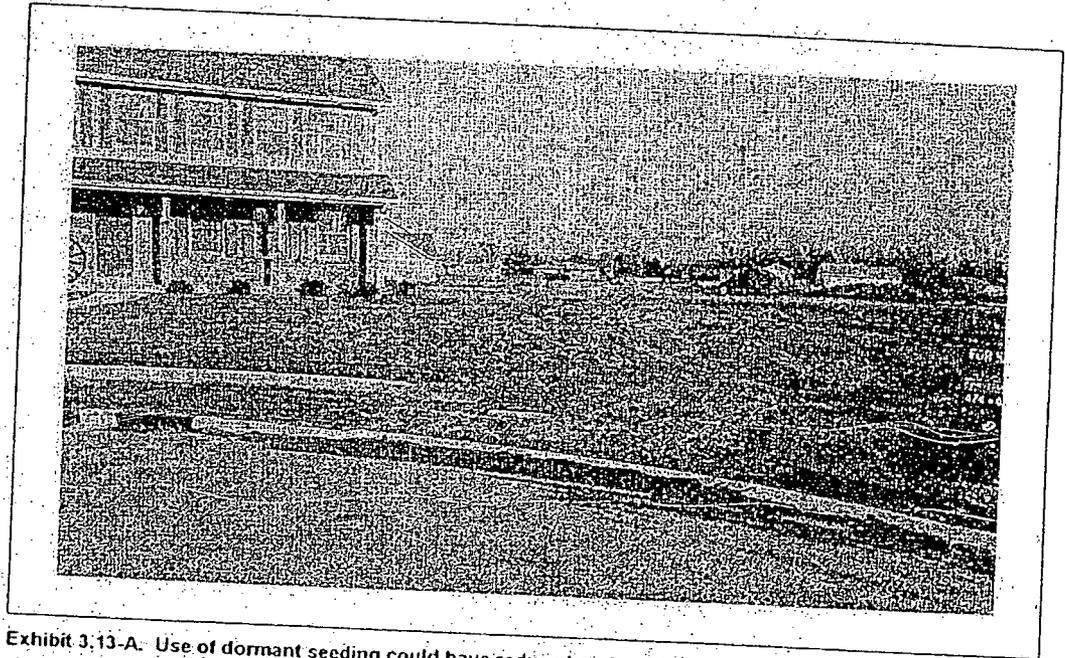


Exhibit 3.13-A. Use of dormant seeding could have reduced excessive early spring erosion on this site.

Requirements

Site and seedbed preparation: Graded as needed, and lime and fertilizer applied.
Plant species: Selected on the basis of soil type, adaptability to the region, and planned use of the area (see Exhibits 3.13-B and 3.13-C).

Application (Exhibits 3.13-B and C)

SITE PREPARATION:

1. Grade the area to be seeded.
2. Install needed erosion/water runoff control practices, such as temporary or permanent diversions, sediment basins, silt fences, or straw bale dams (Practices 3.21, 3.22, 3.72, 3.74, or 3.75).

FOR DORMANT SEEDING:

- Site and seedbed preparation and mulching can be done months ahead of actual seeding; or if the existing ground cover is adequate, seeding can be done directly into it.
- Seeding dates: Dec. 1-Feb. 28 (north of U.S. 40), Dec. 10-Jan. 15 (south of U.S. 40).
1. Broadcast fertilizer as recommended by a soil test, or if testing was not done, consider applying 400-600 lbs./acre of 12-12-12 analysis, or equivalent, fertilizer.
 2. Apply mulch upon completion of grading (Practice 3.15).
 3. Select an appropriate seed species or mixture from Exhibit 3.13-B for temporary seeding or Exhibit 3.13-C for permanent seeding, and broadcast on top of the mulch and/or into existing ground cover at the rate shown. (If site preparation occurs within the recommended dates, fertilize and lime, seed, and mulch at that time.)

FOR FROST SEEDING:

Seed is broadcast over the prepared seedbed and incorporated into the soil by natural freeze-thaw action.

Seeding dates: Feb. 28-Mar. 28 (north of U.S. 40), Feb. 15-Mar. 15 (south of U.S. 40).

1. Broadcast fertilizer as recommended by a soil test; or if testing was not done, consider applying 400-600 lbs./acre of 12-12-12 analysis, or equivalent, fertilizer.
2. Select an appropriate seed species or mixture from *Exhibit 3.13-B* for temporary seeding or *Exhibit 3.13-C* for permanent seeding, and broadcast on to the seedbed or into the existing ground cover at the rate shown. (Do not work the seed into the soil.)

Exhibit 3.13-B. Temporary Dormant or Frost Seeding Recommendations.

Seed species*	Rate per acre
Wheat or rye	150 lbs.
Spring oats	150 lbs.
Annual ryegrass	60 lbs.

* Perennial species may be used as a temporary cover, especially if the area to be seeded will remain idle for more than a year (Practice 3.12).

Exhibit 3.13-C. Permanent Dormant or Frost Seeding Recommendations.

This table provides several seeding options. Additional seed species and mixtures are available commercially. When selecting a mixture, consider site conditions, including soil properties (e.g., soil pH and drainage), slope aspect and the tolerance of each species to shade and droughtiness.

Seed species and mixtures	Rate per acre	Optimum soil pH
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OPEN AND DISTURBED AREAS (REMAINING IDLE MORE THAN 1 YR.)

1. Perennial ryegrass	50 to 75 lbs.	5.6 to 7.0
+ white or ladino clover*	1½ to 3 lbs.	
2. Kentucky bluegrass	30 lbs.	5.5 to 7.5
+ smooth bromegrass	15 lbs.	
+ switchgrass	5 lbs.	
+ timothy	6 lbs.	
+ perennial ryegrass	15 lbs.	
+ white or ladino clover*	1½ to 3 lbs.	5.6 to 7.0
3. Perennial ryegrass	22 to 45 lbs.	
+ tall fescue**	22 to 45 lbs.	5.5 to 7.5
4. Tall fescue**	50 to 75 lbs.	
+ ladino or white clover*	1½ to 3 lbs.	

STEEP BANKS AND CUTS, LOW MAINTENANCE AREAS (NOT MOWED)

1. Smooth bromegrass	35 to 50 lbs.	5.5 to 7.5
+ red clover*	15 to 30 lbs.	
2. Tall fescue**	50 to 75 lbs.	5.5 to 7.5
+ white or ladino clover*	1½ to 3 lbs.	
3. Tall fescue**	50 to 75 lbs.	5.5 to 7.5
+ red clover*	15 to 30 lbs.	
(Recommended north of US 40)		
4. Orchardgrass	30 to 45 lbs.	5.6 to 7.0
+ red clover*	15 to 30 lbs.	
+ ladino clover*	1½ to 3 lbs.	
5. Crownvetch*	15 to 18 lbs.	5.6 to 7.0
+ tall fescue**	30 to 45 lbs.	
(Recommended south of US 40)		

Exhibit 3.13-C. Continued.

Seed species and mixtures	Rate per acre	Optimum soil pH
LAWNS AND HIGH MAINTENANCE AREAS		
1. Bluegrass	160 to 210 lbs.	5.5 to 7.0
2. Perennial ryegrass (turf-type) + bluegrass	70 to 90 lbs.	5.6 to 7.0
3. Tall fescue (turf-type)** + bluegrass	105 to 135 lbs. 195 to 250 lbs. 30 to 45 lbs.	5.6 to 7.5
CHANNELS AND AREAS OF CONCENTRATED FLOW		
1. Perennial ryegrass + white or ladino clover*	150 to 225 lbs. 1½ to 3 lbs.	5.6 to 7.0
2. Kentucky bluegrass + smooth bromegrass + switchgrass + timothy + perennial ryegrass + white or ladino clover*	30 lbs. 15 lbs. 5 lbs. 6 lbs. 15 lbs. 1½ to 3 lbs.	5.5 to 7.5
3. Tall fescue** + ladino or white clover*	150 to 225 lbs. 1½ to 3 lbs.	5.5 to 7.5
4. Tall fescue** + Perennial bluegrass + Kentucky bluegrass	150 to 225 lbs. 22 to 30 lbs. 22 to 30 lbs.	5.5 to 7.5

* For best results: (a) legume seed should be inoculated; (b) seeding mixtures containing legumes should preferably be spring-seeded, although the grass may be fall-seeded and the legume frost-seeded; and (c) if legumes are fall-seeded, do so in early fall.

** Tall fescue provides little cover for, and may be toxic to, some species of wildlife. The IDNR recognizes the need for additional research on alternatives to tall fescue, such as buffalograss, orchardgrass, smooth bromegrass, and switchgrass. This research, in conjunction with demonstration areas, should focus on erosion control characteristics, wildlife toxicity, turf durability, and drought resistance.

NOTE: If using mixtures other than those listed here, increase the seeding rate by 50% over the conventional rate.

Maintenance

- * Apply 200-300 lbs./acre of 12-12-12 or equivalent fertilizer between Apr. 15 and May 10 or during periods of vigorous growth.
- * Re-seed and mulch any areas that have inadequate cover by mid- to late-April. For best results, re-seed within the recommended dates shown in Practices 3.11 for temporary seeding or 3.12 for permanent seeding.

Common concerns

- Seeding done at wrong time of year--results in poor seed germination and vegetative stands.
- Seeding on too steep a slope--results in seed loss and poor stands.
- Seeding failure due to late freeze, killing germinated seedlings.
- Mulch rate inadequate--results in poor germination and failure of dormant seeding.
- Unsuitable choice of seed species or seeding mixture--results in poor vegetative stands or vegetation that does not serve the intended purpose.
- Poor soil and seed contact--results in poor seed germination and vegetative stands.
- Dormant seeding over mulch or frost seeding in concentrated flow areas--can result in seed being washed away before seed-soil contact and germination can occur.

Exhibit 3.13-C. Continued.

Seed species and mixtures	Rate per acre	Optimum soil pH
LAWNS AND HIGH MAINTENANCE AREAS		
1. Bluegrass	160 to 210 lbs.	5.5 to 7.0
2. Perennial ryegrass (turf-type) + bluegrass	70 to 90 lbs. 105 to 135 lbs.	5.6 to 7.0
3. Tall fescue (turf-type)** + bluegrass	195 to 250 lbs. 30 to 45 lbs.	5.6 to 7.5
CHANNELS AND AREAS OF CONCENTRATED FLOW		
1. Perennial ryegrass + white or ladino clover*	150 to 225 lbs. 1½ to 3 lbs.	5.6 to 7.0
2. Kentucky bluegrass + smooth bromegrass + switchgrass + timothy + perennial ryegrass + white or ladino clover*	30 lbs. 15 lbs. 5 lbs. 6 lbs. 15 lbs. 1½ to 3 lbs.	5.5 to 7.5
3. Tall fescue** + ladino or white clover*	150 to 225 lbs. 1½ to 3 lbs.	5.5 to 7.5
4. Tall fescue** + Perennial bluegrass + Kentucky bluegrass	150 to 225 lbs. 22 to 30 lbs. 22 to 30 lbs.	5.5 to 7.5

* For best results: (a) legume seed should be inoculated; (b) seeding mixtures containing legumes should preferably be spring-seeded, although the grass may be fall-seeded and the legume frost-seeded; and (c) if legumes are fall-seeded, do so in early fall.

** Tall fescue provides little cover for, and may be toxic to, some species of wildlife. The IDNR recognizes the need for additional research on alternatives to tall fescue, such as buffalograss, orchardgrass, smooth bromegrass, and switchgrass. This research, in conjunction with demonstration areas, should focus on erosion control characteristics, wildlife toxicity, turf durability, and drought resistance.

NOTE: If using mixtures other than those listed here, increase the seeding rate by 50% over the conventional rate.

Maintenance

- * Apply 200-300 lbs./acre of 12-12-12 or equivalent fertilizer between Apr. 15 and May 10 or during periods of vigorous growth.
- * Re-seed and mulch any areas that have inadequate cover by mid- to late-April. For best results, re-seed within the recommended dates shown in Practices 3.11 for temporary seeding or 3.12 for permanent seeding.

Common concerns

- Seeding done at wrong time of year--results in poor seed germination and vegetative stands.
- Seeding on too steep a slope--results in seed loss and poor stands.
- Seeding failure due to late freeze; killing germinated seedlings.
- Mulch rate inadequate--results in poor germination and failure of dormant seeding.
- Unsuitable choice of seed species or seeding mixture--results in poor vegetative stands or vegetation that does not serve the intended purpose.
- Poor soil and seed contact--results in poor seed germination and vegetative stands.
- Dormant seeding over mulch or frost seeding in concentrated flow areas--can result in seed being washed away before seed-soil contact and germination can occur.

Practice 3.15 Mulching

Purposes

(Exhibit 3.15-A)

- * To prevent erosion by protecting the soil from wind and water impact.
- * To provide temporary surface stabilization.
- * To prevent soil from crusting.
- * To conserve moisture thereby promoting seed germination and seedling growth.



Exhibit 3.15-A. Applying straw mulch with a chopper-blower on freshly seeded soil adjacent to a road.

Requirements

(Exhibits 3.15-B and C)

Material: Straw, hay, wood fiber, cellulose, or excelsior (see Exhibit 3.15-B), or erosion control blankets or turf reinforcement mats (Practices 3.17 and 3.18), as specified in the erosion and sediment control plan.

Coverage: At least 75% of the soil surface.

Anchoring: Required for straw or hay mulch and sometimes excelsior to prevent displacement by wind and/or water (see Exhibit 3.15-C).

Exhibit 3.15-B. Mulch Materials, Rates, and Comments.

Material	Rate	Comments
Straw or hay	1½-2 tons/acre	Should be dry, unchopped, free of undesirable seeds. Spread by hand or machine. Must be crimped or anchored (see Exhibit 3.15-D).
Wood fiber or cellulose	1 ton /acre	Apply with a hydromulcher and use with tacking agent.
Long fiber wood (excelsior)	1/2-3/4 ton/acre	Anchor in areas subject to wind.

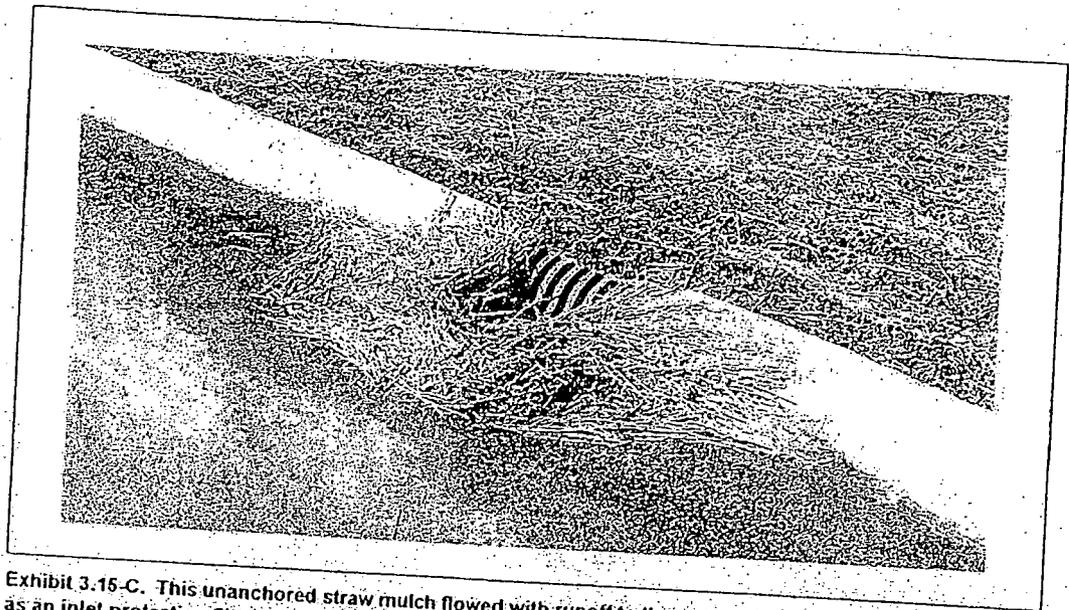


Exhibit 3.15-C. This unanchored straw mulch flowed with runoff to the storm drain. While acting somewhat as an inlet protection filter, it would have been more effective keeping soil from eroding off the site.

Application and anchoring
(Exhibits 3.15-D, E, and F)

1. Apply mulch at the recommended rate.
2. Spread uniformly by hand, hay fork, mulch blower, or hydromulcher. After spreading, no more than 25% of the ground surface should be visible.
3. If straw or hay is used, anchor it immediately one of the following ways (see Exhibit 3.15-D):
 - Crimp with a mulch anchoring tool, a weighted farm disk with dull serrated blades set straight (see Exhibit 3.15-E), or track cleats of a bulldozer; OR
 - Hydromulch with short cellulose fibers (see Exhibit 3.15-F); OR
 - Apply a liquid tackifier; OR
 - Cover with netting secured by metal staples.

Exhibit 3.15-D. Mulch Anchoring Methods.

Anchoring method	How to apply
Mulch anchoring tool <u>OR</u> Farm disk (dull, serrated, and set straight)	Crimp or punch the straw or hay into the soil 2-4 in. Operate machinery on the contour of the slope.
Cleating with dozer tracks	Operate dozer up and down slope, not across, or else the tracks will form rills.
Wood hydromulch fibers	Apply 1-2 tons/acre using a hydromulcher at a rate of 750 lbs./acre with a tacking agent (or according to contractor specifications). Do not use in areas of concentrated flow.
Asphalt emulsion	Emulsified asphalt should conform to the requirements of ASTM Spec. #977. Apply with suitable equipment at a rate of 0.05 gal./sq. yd. Do not use in areas of concentrated flow.
Synthetic tackifier, binder or soil stabilizer	Apply according to manufacturer's recommendation.
Biodegradable netting (polypropylene or similar material)*	Apply over mulch and staple with 6-8 in. wire staples. Follow manufacturer's recommendations for installation. Best suited to slope application.

* Install the netting immediately after applying the mulch. In areas of concentrated water flow, lay it parallel to the direction of flow; on other slopes, lay it either parallel or perpendicular to direction of flow. Edges of adjacent netting strips should overlap 4-6 in., with the strip on the upgrade side of any lateral water flow on top. Installation details are site specific, so follow manufacturer's directions.

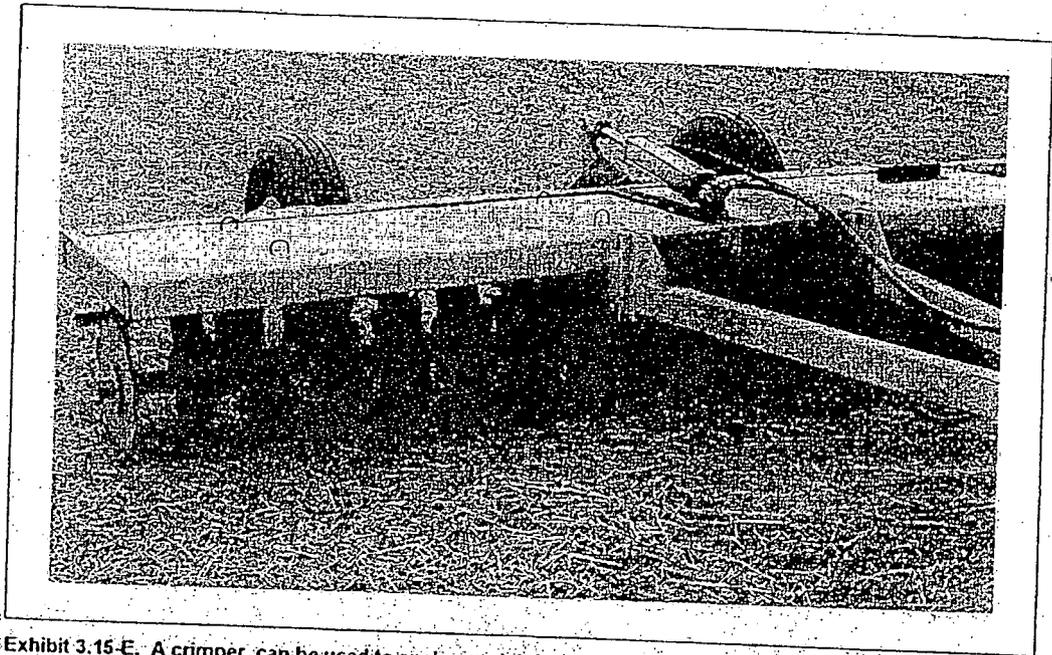


Exhibit 3.15-E. A crimper can be used to anchor mulch into the soil more securely.

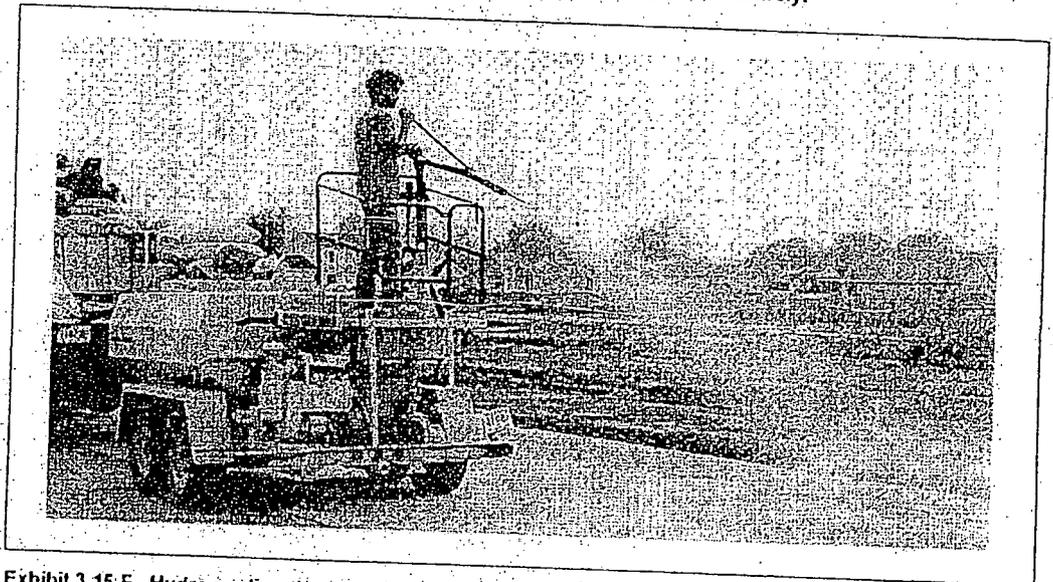


Exhibit 3.15-F. Hydroseeding the roadside in a new subdivision.

Maintenance

- * Inspect after storm events to check for movement of mulch or for erosion.
- * If washout, breakage, or erosion is present, repair the surface, then re-seed, re-mulch and, if applicable, install new netting.
- * Continue inspections until vegetation is firmly established.

Common concerns

- Inadequate coverage**—results in erosion, washout, and poor plant establishment.
- Appropriate tacking agent not applied or applied in insufficient amount**—results in mulch being lost to wind and runoff.
- Flow too concentrated to use straw mulch**—results in erosion in channel; consider use of erosion control blankets and/or a diversion until vegetation is established.
- Hydromulch applied in winter**—results in deterioration of mulch before plants can become established.
- Netting washed away**—because insufficient number of staples used.

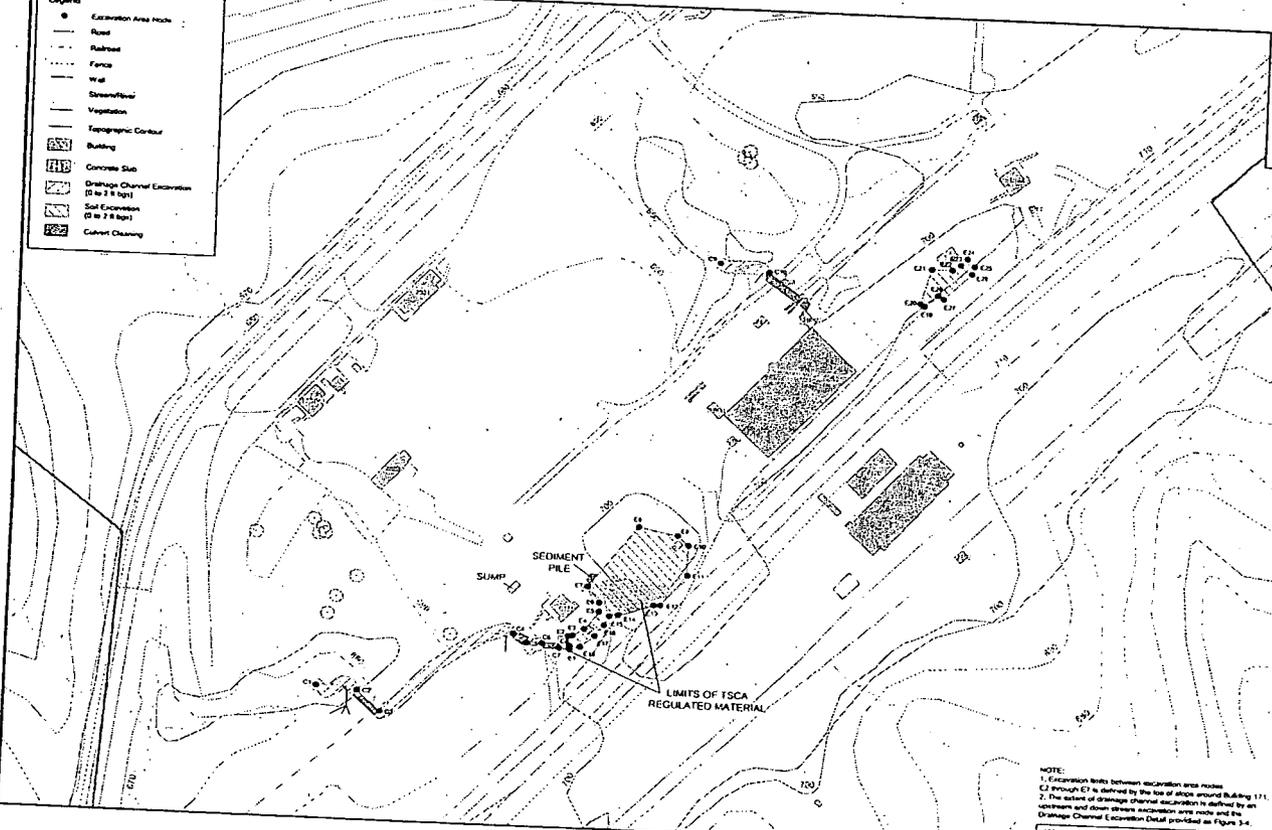
Appendix B Figures

Figure 1 – Proposed Excavation Areas

Figure 2 – Erosion Control Devices

FIGURE 3 - IMWP EXCAVATION AREA LAYOUT - SHEET 05

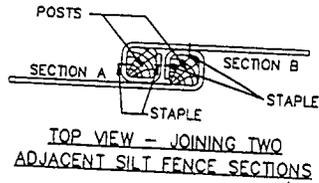
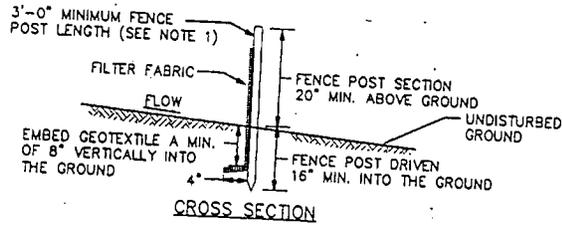
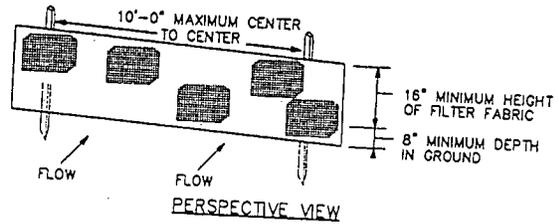
- Legend**
- Excavation Area Node
 - Road
 - Railroad
 - Fence
 - Wet
 - Stream/Flow
 - Vegetation
 - Topographic Contour
 - ▭ Building
 - ▭ Concrete Slab
 - ▨ Drainage Channel Excavation (2 to 3 ft deep)
 - ▨ Building
 - ▨ Soil Excavation (2 to 3 ft deep)
 - ▨ Culvert Channel



NOTE:
 1. Excavation limits between excavation area nodes E1 through E7 is defined by the top of slope around Building 111.
 2. The extent of drainage channel excavation is defined by an excavation area node and the upstream and downstream excavation area nodes and the Drainage Channel Excavation Detail provided as Figure 3-4.

		CONTRACT NO. 11500022	DATE
APPROVED BY		DATE	DATE
APPROVED BY		DATE	DATE
DRAWING NO.		FIGURE 3 - 1	
IMWP EXCAVATION AREA SWMU 13 - MINE FILL B INTERIM MEASURES WORK PLAN CRANE, INDIANA			
			
DATE	DRAWN BY	DATE	CHECKED BY
AS NOTED	CONTRACT NO.	SCALE	DATE

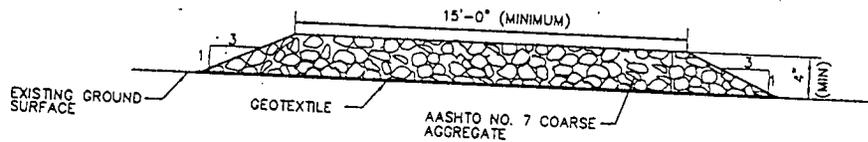
ACAD: 03/13/07 MF PT



NOTES:

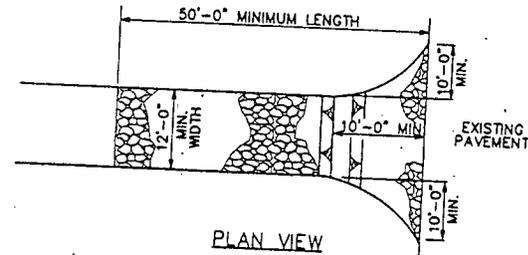
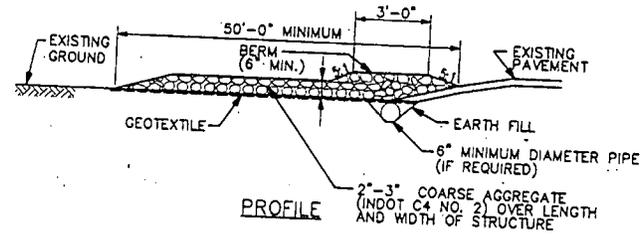
1. WOOD POSTS SHALL BE 1.5" BY 1.5" SQUARE (MIN) CUT OR 1.75" DIAMETER (MIN) ROUND AND SHALL BE OF SOUND QUALITY HARDWOOD. STEEL POSTS WILL BE STANDARD T OR U SECTION WEIGHING NOT LESS THAN 1.00 POUND PER LINEAR FOOT.
2. FILTER FABRIC SHALL BE FASTENED SECURELY TO EACH FENCE POST WITH WIRE TIES OR STAPLES AT TOP AND MID-SECTION.
3. INSTALL SILT FENCE PARALLEL TO THE CONTOUR OF THE LAND.

SILT FENCE



TEMPORARY SITE ACCESS ROAD

NOT TO SCALE

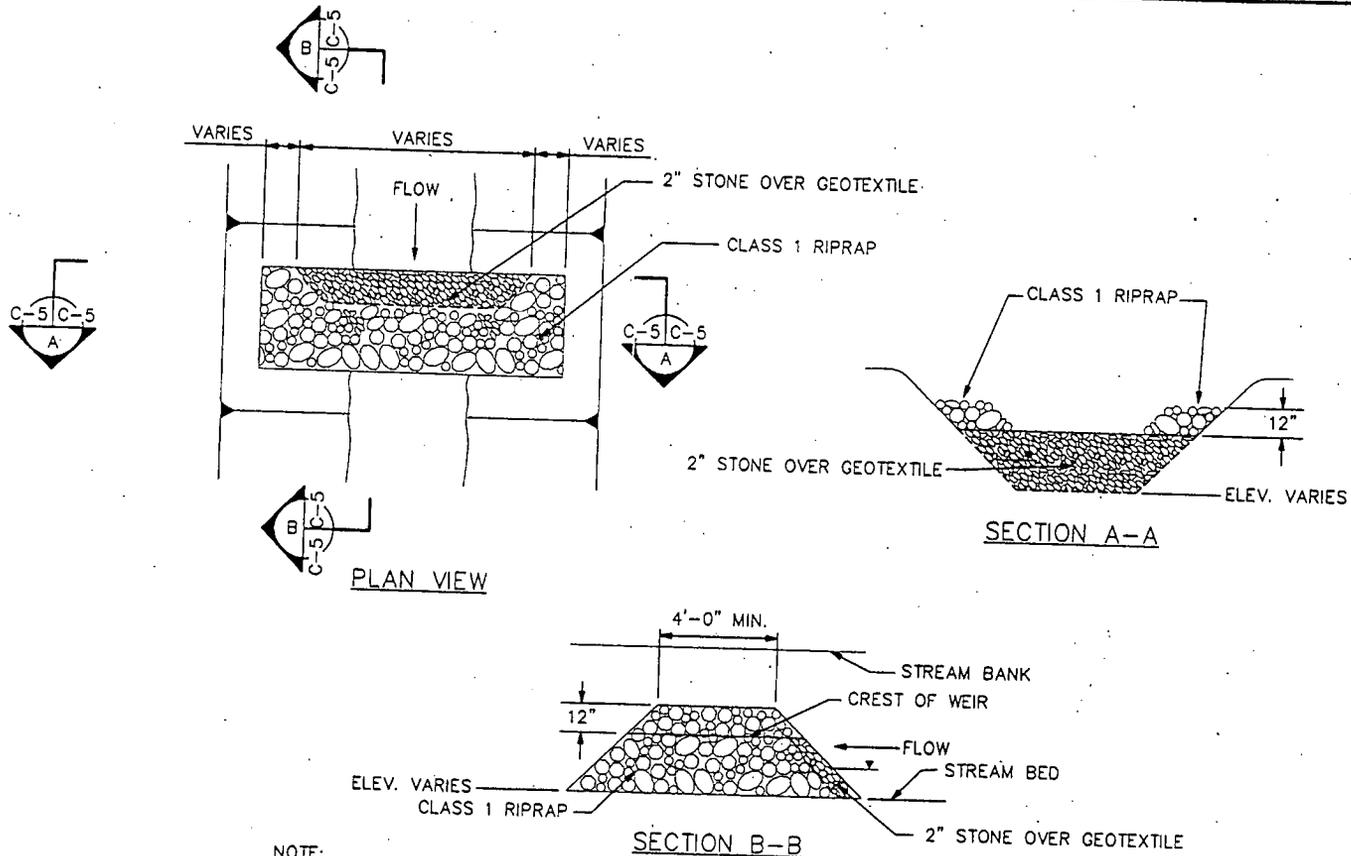


NOTES:

1. ALL SURFACE WATER FLOWING TO OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED THROUGH THE ENTRANCE, MAINTAINING POSITIVE DRAINAGE.
2. IF REQUIRED PIPE SHOULD BE SIZED ACCORDING TO THE AMOUNT OF RUNOFF TO BE CONVEYED. A 6" MINIMUM DIAMETER WILL BE REQUIRED.

GRAVEL CONSTRUCTION ENTRANCE

DRAWN BY MF	DATE 5/18/08		EROSION AND SEDIMENT CONTROL DEVICES SWMU 13 - MINE FILL B INTERM MEASURES WORK PLAN NSWC CRANE CRANE, INDIANA	CONTRACT NO. 0362
CHECKED BY	DATE			OWNER NO. 0020
REVISED BY	DATE	APPROVED BY	DATE	REV. 0
SCALE AS NOTED		DRAWING NO. FIGURE 4-2A		



NOTE:
 1. GABION BASKETS - GABION BASKETS WITH GEOTEXTILE CAN BE USED INSTEAD OF STONE.

IN-STREAM SEDIMENT TRAP

NOT TO SCALE

DRAWN BY MF	DATE 8/19/06		EROSION AND SEDIMENT CONTROL DEVICES (SHEET 2 OF 2)		CONTRACT NO. 0362
CHECKED BY	DATE		SWMU 17 - PCB CAPACITOR BURIAL/POLE YARD INTERIM MEASURES WORK PLAN		OWNER NO. 0020
REVIEWED BY	DATE		NSWC CRANE, INDIANA		APPROVED BY
SCALE AS NOTED					DATE
					DRAWING NO. FIGURE 4-2B
					REV. 0

Transportation and Staging Map

