SECTION 5.1

COMMON PRACTICES FOR SITE ASSESSMENT AND PREPARATION

SECTION 5.1
COMMON PRACTICES FOR SITE ASSESSMENT AND PREPARATION

This section of the Handbook contains practices that are commonly used for site assessment and preparatory work associated with activities within drainageways. Not all site preparation techniques are provided in this Handbook. Many of these and other site preparation and stabilization techniques are discussed in detail within the Indiana Handbook for Erosion Control in Developing Areas. The latter document, also published by the IDNR, is considered as a companion to the Indiana Drainage Handbook.

A site assessment is the first critical step prior to implementing any drainage improvement project. Data collecting individuals, such as survey crew, can help with this process by taking detailed photos on existing site conditions as the survey is being performed. Designers should then float or walk the site equipped with a copy of these survey notes and should expand and/or add to these notes before or during the design phase.

Selecting an appropriate management practice should be based on the results of the noted site assessment. Special consideration should be given to environmental concerns (i.e. water quality and wildlife habitat issues), and social concerns such as the aesthetics of a given project. Site assessments should also identify sensitive areas and resources to be protected. Bank stabilizing trees should be identified and protected to the extent practical. Wetland crossings, if necessary, should be located in areas where impacts would be minimal, if not negligible.

Clearing and grubbing, are often necessary for large-scale construction projects. It is important that these activities only take place within clearly identified areas that are protected against siltation and erosion. The potential for siltation is often greatest during clearing and grubbing activities, and around stockpiles of topsoil.

Many measures may be taken to minimize erosion and contain siltation on site. At the very least, silt fencing or a straw bale filter should be properly installed around areas of impact, particularly along streams and ditches. Generally, silt fencing is more effective and requires less maintenance than a straw bale filter. Temporary diversion dikes may be recommended for construction sites along slopes. Diversion dikes channel sediment-laden runoff away from areas of concern.

Several of the practices contained in this section are utilized to avoid or minimize unreasonably detrimental impacts on the environment. These practices are often called for as part of construction plans.

Last Print/Revision Date: October 13, 1996

PRACTICE 101
SITE ASSESSMENT

DESCRIPTION

- On-site assessment of existing conditions.

Exhibit 101a: Site Assessment (Source: NRCS files)

PURPOSE

- To determine existing conditions prior to implementing a project.

WHERE APPLICABLE

- Applicable for all projects.

ADVANTAGES

- Saves time in the long run.
- Identifies sensitive areas to protect.
- Identifies best access areas.

CONSTRAINTS

- Gathering necessary information can be expensive and time consuming.

DESIGN AND CONSTRUCTION GUIDELINES

Materials

- Flagging.

Installation

Resource Protection

- Use a suitable map with adequate scale to highlight the project area and its surroundings.
- Identify and make arrangements with other site visit participants and landowners.
- Assemble existing information on soil, water, plant, animal, and human resources on and around the area.
- Clearly define the objectives of the site visit and the determinations to be made.
- Identify, delineate, and flag wetlands if necessary.
- Identify and mark/flag trees and/or important habitat to protect

(Practice 102).

- Determine whether threatened or endangered species, or potential habitat for them exist on site. Identify important areas with flagging.

Site Access

- Identify which side of the channel would be best to work from. When conditions allow, limiting work to north and east sides would be environmentally more beneficial as leaving trees on south and west sides provides shading to the stream.
- Identify appropriate access to the channel, and in the channel (fords, bridges, etc.), if necessary (Practice 103, 903).
- Determine whether clearing and grubbing, debrushing, or other preparatory activities will be necessary (Practice 107, Activity 5.3).
- Identify disposal areas for organic debris, if necessary (Practice 1301).
- Identify any other potential factors that could limit or complicate proposed activities.

Special Considerations

- Data collecting individuals, such as survey crew, can help with this process by taking detailed notes on existing site conditions as the survey is being performed. Designers should then float or walk the site equipped with a copy of the survey notes and expand and/or add to these notes before or during the design phase.
- Site assessment may be conducted at several stages along the planning phase. Initial site assessments may involve only observation of the site and its conditions. As the planning phase progresses, more detailed site assessment activities may be undertaken, as necessary.

MAINTENANCE

- Not applicable.

REFERENCES

Related Practices

- Practice 102 Tree Preservation and Protection.
- Practice 103 Temporary Wetland Crossing.
- Practice 107 Clearing and Grubbing.
- Practice 903 Fords/Low Water Crossing.
- Practice 1301 Debris Disposal.
- Activity 5.3 Debrushing.

Other Sources of Information

- COE Streambank Protection Guidelines.
- Indiana Erosion Control Handbook.
- Illinois Urban Manual.
- Illinois Stormwater BMPs.

Last Print/Revision Date: October 13, 1996

PRACTICE 102
TREE PRESERVATION AND PROTECTION

DESCRIPTION

- Methods to preserve and protect desirable existing trees from damage during construction. (Note: This practice is also included in the Indiana Erosion Control Handbook.)

Exhibit 102a: Tree preservation and protection (Source: IDNR Files)

PURPOSE

- To preserve and protect trees that have present or future value for their use in erosion protection, landscape and/or aesthetic value, or for other environmental benefits.

WHERE APPLICABLE

- Applicable to nearly every project.

ADVANTAGES

- Stabilize the soil and prevent erosion.
- Reduce stormwater runoff by intercepting rainfall, promoting infiltration, and lowering the water table through transpiration.
- Provide wildlife habitat.
- Increase property values and improve site aesthetics.
- Provides stream shading and cooling.

CONSTRAINTS

- Preserving and protecting trees may impede the maneuverability of large equipment.

DESIGN AND CONSTRUCTION GUIDELINES

Materials

- Standard steel posts or wood posts with a minimum cross sectional area of 3.0 sq.in.
- 40" high snow fence or 40" high plastic web fencing.

Installation

- Place barriers around protected and preserved trees to prevent the approach of equipment at the drip line of trees to be retained.
- Do not cut tree roots inside the tree drip line.
- Do not place equipment, construction materials, topsoil, or fill dirt within the limit of the drip line of the trees to be saved.
- Remove barriers during final site cleanup.

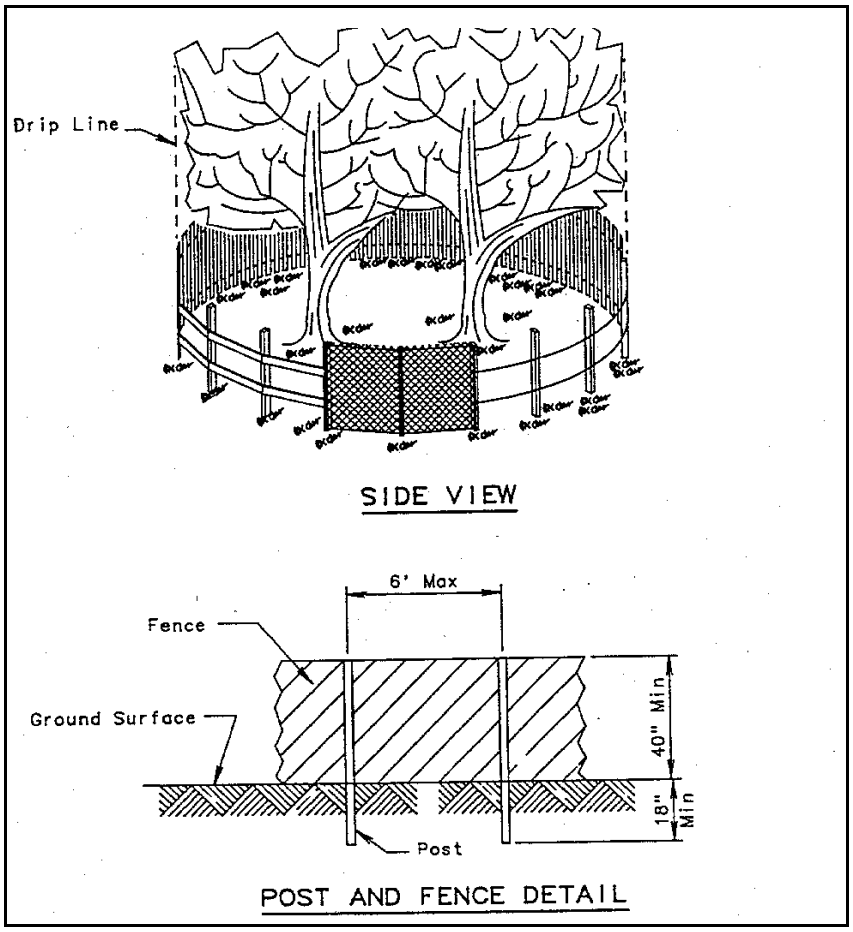

Exhibit 102b: Tree Preservation - Installation Detail (Source: NRCS Files)

Special Considerations

- Select trees to be saved prior to implementing construction activities. In general, leaving larger trees (8" or larger) will provide more shading, habitat, and food sources.
- Thinning undesirable trees ahead of time gives existing trees a chance to adjust to a more open environment.
- Prune low-hanging limbs of preserved trees that could otherwise be broken off by equipment.
- Try to leave trees in groups to avoid sun scald, frost cracks, excessive branching, and windthrow.
- In many cases, dead trees and cavities are important components of wildlife habitat. Unless the elimination of these features are essential for the project, these features may be left undisturbed.

MAINTENANCE

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

REFERENCES

Related Practices

- Practice 1102 Vegetative Stabilization.
- Practice 1202 Stream Environment Enhancement.

Other Sources of Information

- North Carolina Erosion Control Manual.
- Indiana Erosion Control Handbook.
- NRCS Standard Specifications.

Last Print/Revision Date: October 13, 1996

PRACTICE 103
TEMPORARY WETLAND CROSSING (Drag Line Mat)

DESCRIPTION

- A series of wooden "rafts" placed beneath the tread of heavy machinery to more evenly distribute the weight.

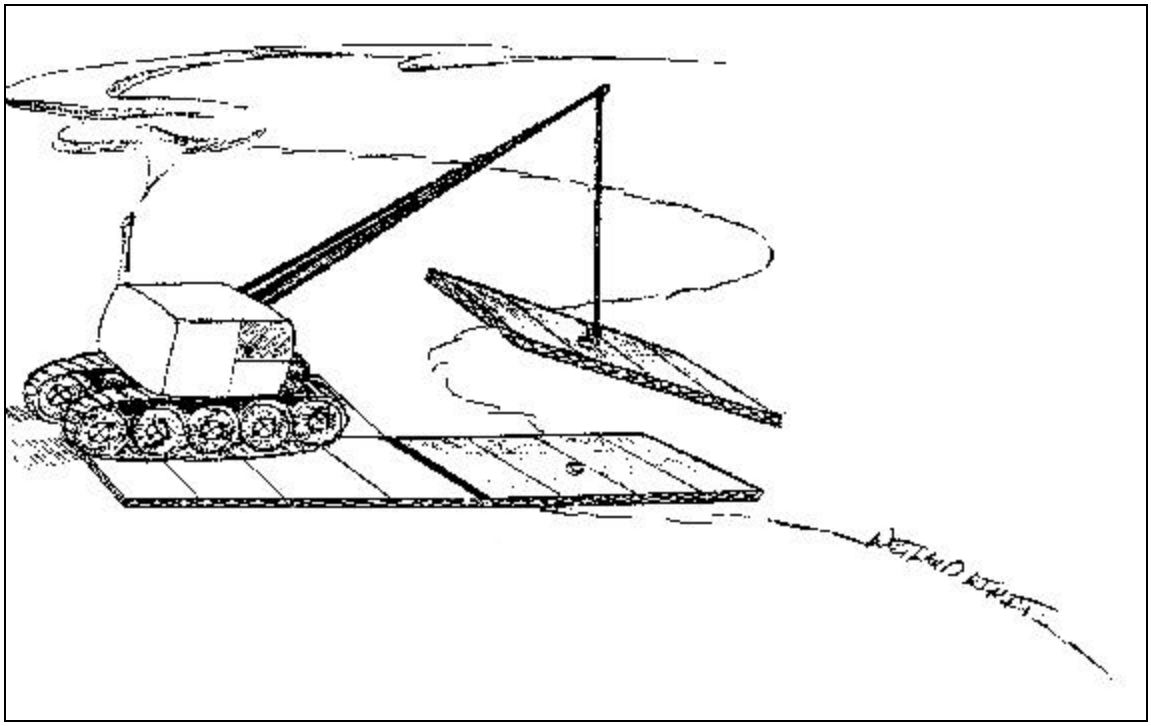

Exhibit 103a: Temporary Wetland Crossing (Source: CBBEL Files)

PURPOSE

- To reduce the impact of heavy machinery in wetlands or other sensitive or soft areas.

WHERE APPLICABLE

- Shallow wetlands.
- Soft soils or other sensitive areas.

ADVANTAGES

- Allows access through shallow wetlands or other sensitive areas.
- Minimizes adverse impacts to wetlands or other sensitive areas by more evenly distributing the weight.

CONSTRAINTS

- Only useful with machinery equipped with a boom such as a back hoe or drag line.
- Minor soil displacement is inevitable.

DESIGN AND CONSTRUCTION GUIDELINES

Materials

- 4 drag line mats, each constructed from 5 pieces of 20' long, 12" x 12" treated wooden beams cabled together.

Installation

- 2 drag line mats are placed in front of the machinery so that each mat is centered by each tractor tread, and two mats are placed behind the machinery.
- Machinery operator drives onto mats in front of the machine.
- Machinery operator uses boom to lift the two mats behind the

machine, and lines them up in front of the mats the machine is on.

- Operator drives onto the two mats just placed in front of the mats the machine is on.
- Operator uses boom to retrieve the 2 mats now behind the machine, and places them in front of the machine as described above.
- Piggy back process continues until operator reaches the final destination.

Special Considerations

- Only useful if water is ≤ 6" deep.

MAINTENANCE

- Periodically inspect the mats to make sure they maintain their structural integrity.

REFERENCES

Related Practices

- Practice 901 Culverts.
- Practice 902 Bridges.
- Practice 903 Fords/Low Water Crossings.

Other Sources of Information

- CBBEL Files.

Last Print/Revision Date: October 13, 1996

PRACTICE 104
TEMPORARY DIVERSION

DESCRIPTION

- A temporary ridge or excavated channel or combination ridge and channel constructed across sloping land on a predetermined grade to protect work areas and divert runoff. (Note: this practice is also included in the Indiana Erosion Control Handbook.)

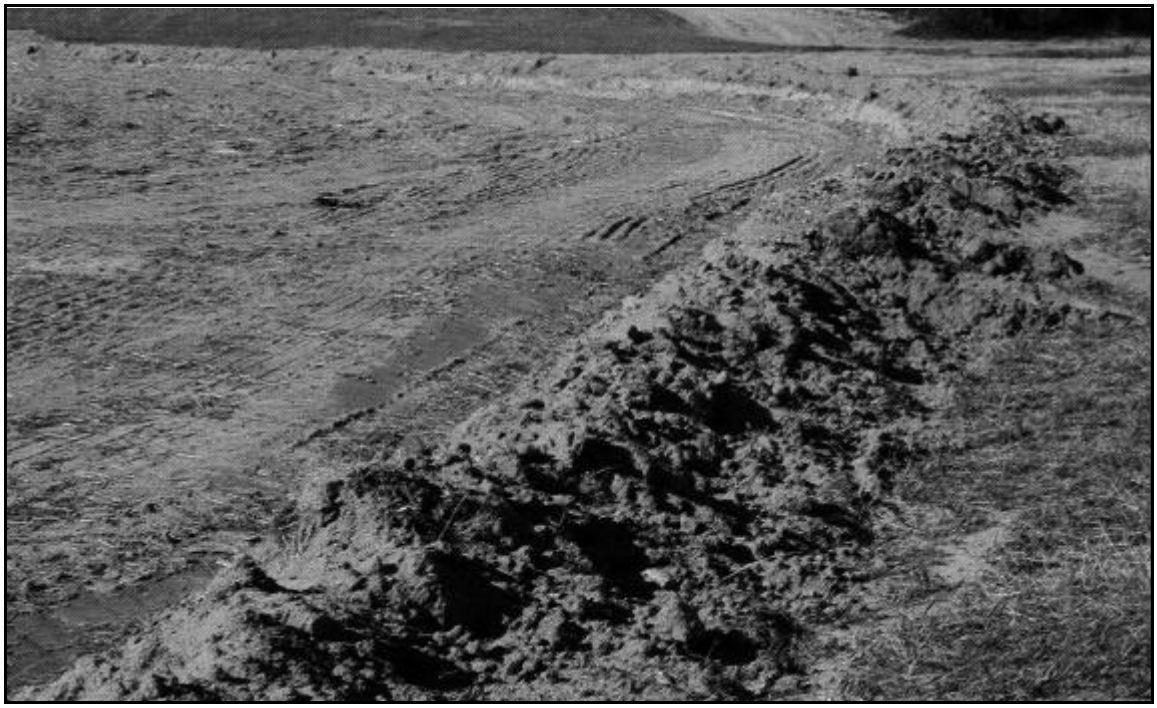

Exhibit 104a: Temporary Diversion (Source: North Carolina Erosion Control Manual)

PURPOSE

- To protect work areas from runoff and divert water to a stable outlet. Temporary diversions may be planned to function one year or more or may be rebuilt at the end of each day's operation to protect freshly graded cuts and fills.

WHERE APPLICABLE

- Up-slope side of a construction site where runoff can be diverted and disposed of properly to control erosion.
- Above disturbed existing slopes, and above cut or fill slopes before stabilization to prevent erosion and runoff over the slope, and to maintain acceptable working conditions.
- Down-slope side of the work area to divert excess runoff to stabilized outlets.

ADVANTAGES

- Prevent surface runoff from entering the disturbed area when placed up-slope of a construction area.
- Divert sediment-laden runoff to on-site sediment traps or basins when placed down-slope from the construction area.

CONSTRAINTS

- May only serve a drainage area $\leq$ 3 acres.
- Peak runoff capacity $\leq$ 2-year frequency, 24-hour storm event.
- Grade should be stable and positive towards outlet, but not exceeding 1%.

- Side slopes of the ridge must not exceed 2:1 (1V:2H). 3:1 (1V:3H) or flatter side slopes are desirable if the ridge and channel are to be vegetated and mowed.

DESIGN AND CONSTRUCTION GUIDELINES

Materials

- Soils available on site and grading equipment.

Installation

- Temporary diversions are usually constructed by excavating a channel and using the spoil to form a ridge or dike on the downhill side.

- Site Preparation:
  1. Mark diversion location.
  2. Remove all trees, brush, stumps, or other debris from the site and dispose of properly (See Activity 5.3 Debrushing, Practice 107 Clearing and Grubbing, and Practice 1301 Debris Disposal).
  3. Set grade and alignment to fit site needs and topography, maintaining a stable, positive grade towards outlet, and realigning or elevating the ridge as needed to avoid reverse grade.

- Construction:
  1. Construct the diversion to dimensions and grades shown in Exhibit 104b.

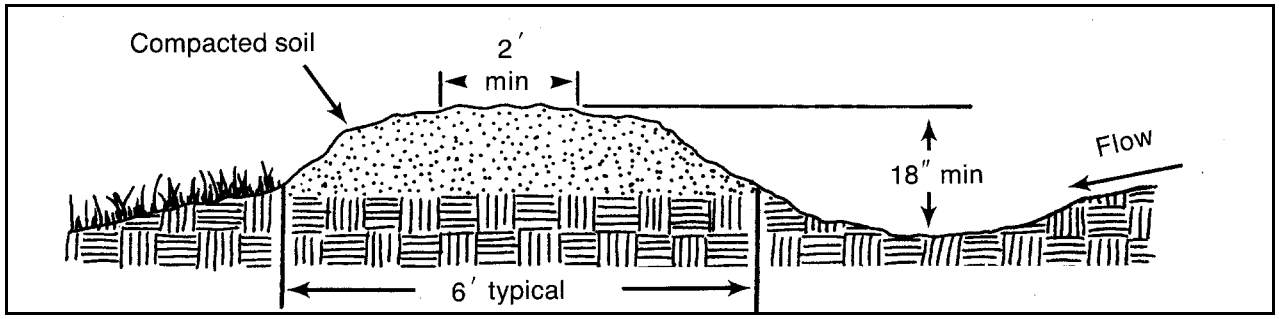

Exhibit 104b: Proper construction of a Temporary Earthen Diversion Dike (Source: North Carolina Erosion Control Manual)

  2. Build the ridge higher than the design elevation, and compact with wheels of construction equipment to design height, plus 10%.
  3. Leave sufficient area along the dike to permit access by machines for maintenance.
  4. Install outlet protection and sediment traps, if necessary, as part of the diversion.

- Stabilization:
  1. Establish vegetation on the ridge immediately following construction, unless the diversion will be in place less than 30 days.

Special Considerations

- Water diverted from construction site must not damage adjacent properties.
- Diversions should have a stable outlet with adequate capacity.
- Diversion dikes should be protected from ongoing construction activities (See Practice 103 Temporary Wetland Crossing and Practice 903 Fords/Low Water Crossings).
- Channel velocity should not exceed that considered erosive for soil and planned vegetation lining.

MAINTENANCE

- Inspect the dike weekly and after every storm event.
- Remove debris and sediment from the channel immediately.
- Repair dike to original height as necessary.
- Maintain outlets, and repair as necessary to prevent gullying.
- Once the work area has stabilized, remove the diversion ridge, fill and compact the channel to blend with the surrounding area, and stabilize all disturbed areas.

REFERENCES

Related Practices

- Activity 5.3 Debrushing.
- Practice 107 Clearing and Grubbing.
- Practice 1102 Vegetative Stabilization.
- Practice 1301 Debris Disposal.

Other Sources of Information

- Illinois Urban Manual.
- NRCS Standard Specifications.
- Indiana Erosion Control Handbook.
- North Carolina Erosion Control Manual.

Last Print/Revision Date: October 13, 1996

PRACTICE 105
SILT FENCING

DESCRIPTION

- 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. (Note: this practice is also included in the Indiana Erosion Control Handbook.)

Exhibit 105a: Silt Fencing (Source: North Carolina Erosion Control Manual)

PURPOSE

- Cause the deposition of transported sediment load from sheet flows leaving disturbed areas.

WHERE APPLICABLE

- Situations when sediment laden runoff from small drainage areas are a concern.

ADVANTAGES

- Silt fences capture and retain sediment on the construction site thus protecting waterways, streets and other areas outside of the construction limits from sedimentation.
- Silt fences often serve to define construction limits to equipment operators as well as bystanders.
- Silt fences are usually more effective and less expensive than a Straw Bale Filter (Practice 106).

CONSTRAINTS

- Not appropriate where the maximum drainage area exceeds 1/4 acre per 100 feet of fence. Silt fencing is further restricted by slope steepness.

Land Slope	Max. Distance Above Fence
< 2%	100'
2-5%	75'
5-10%	50'
10-20%	25'
> 20%	15'

Exhibit 105b: Maximum distance above silt fence based on land slope. (Source: Indiana Erosion Control Handbook)

- Silt fence should not be used in the flow path of defined drainageways.
- Silt fence may be a high maintenance item during earth moving activities in adjacent areas, and during the rainy season.

DESIGN AND CONSTRUCTION GUIDELINES

Materials

- 2" x 2" hardwood posts or steel posts.
- 14 gauge, 6" mesh wire fence (optional).
- Woven or non-woven geotextile fabric with specified filtering efficiency and tensile strength.

Physical Property	Woven Fabric	Non-woven Fabric
Filtering efficiency	85%	85%
Tensile strength at 20% elongation:		
Standard strength	30 lbs/l.in.	50 lbs/l.in.
Extra strength	50 lbs/l.in.	70 lbs/l.in.
Slurry flow rate	0.3 gal./min./sq.ft.	4.5 gal./min./sq.ft
Water flow rate gal./min./sq.ft.	15 gal./min./sq.ft.	220
UV resistance	70%	85%

Exhibit 105c: Properties of woven versus non-woven silt fence fabric. (Source: Indiana Erosion Control Handbook)

Installation

- Dig an 8" deep, flat-bottomed or V-shaped trench along the entire intended fence line.
- Drive wood or steel support posts at least 1' into the ground, $\leq$ 8' apart ($\leq$ 6' apart if not using support wire). Adjust spacing if necessary to ensure that posts are set at the low points along the fence.
- Fasten support wire to the up slope side of the posts, extending it 8" into the trench, or as recommended by the manufacturer.
- Run a continuous length of geotextile fabric on the up slope sides of the posts.

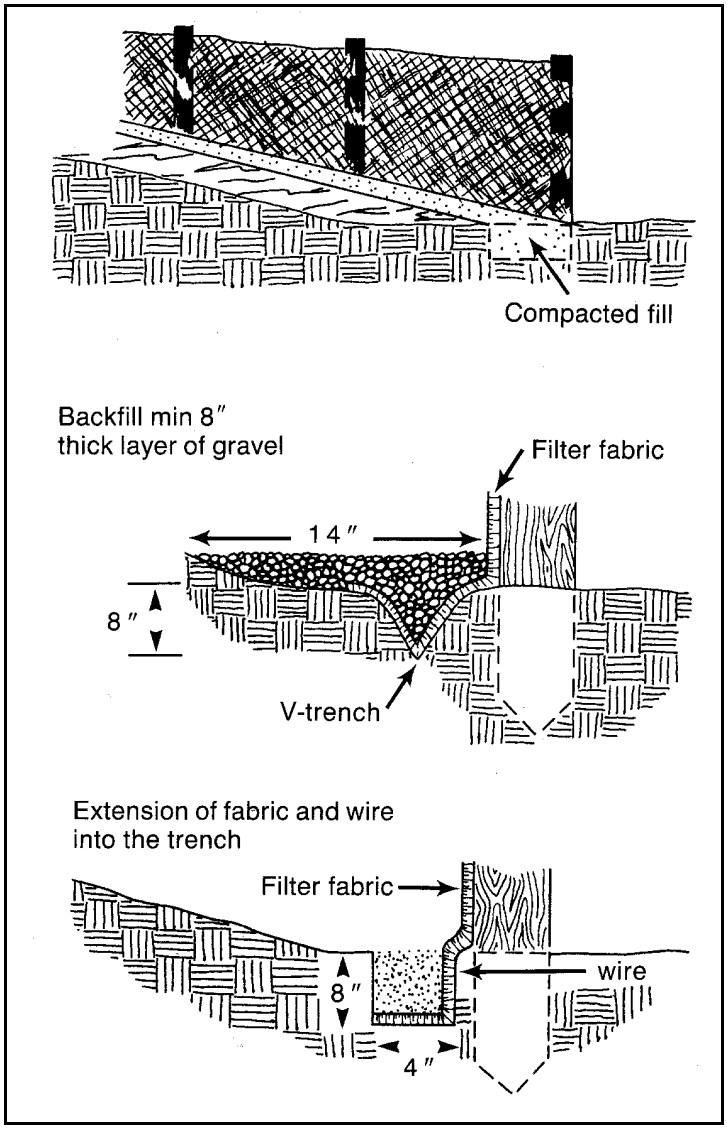

Exhibit 105d: Silt fence installation Details (Source: North Carolina Erosion Control Manual)

- If a joint is necessary, nail the overlap to the nearest post with lath.
- Place the bottom 1' of fabric in the 8" deep trench, extending the remaining 4" toward the up slope side.
- Backfill the trench with compacted earth or gravel.

Special Considerations

- Fence should be at least 10' from the toe of the slope to provide for sediment storage.
- The height of the fence should be 24"-36" above the ground surface.
- Silt fences should not be placed in areas of concentrated flows.
- Improper placement and/or installation can exacerbate and even create erosion problems.

MAINTENANCE

- Inspect fence periodically and after each storm event.
- Replace fencing as necessary.
- Remove deposited sediment when it reaches half the height of the fence at its lowest point, or if the fence begins to bulge.

REFERENCES

Related Practices

- Practice 106 Straw Bale Filter.
- Practice 1102 Vegetative Stabilization.

Other Sources of Information

- Indiana Erosion Control Handbook.
- NRCS Standard Specifications.
- North Carolina Erosion Control Manual

Last Print/Revision Date: October 13, 1996

PRACTICE 106
STRAW BALE FILTER

DESCRIPTION

- Temporary barrier consisting of a row of entrenched and anchored straw bales used to intercept sediment-laden runoff from small drainage areas of disturbed soil. (Note: This practice is also included in the Indiana Erosion Control Handbook.)

Exhibit 106a: Straw Bale Filter (Source: CBBEL Files)

PURPOSE

- Cause the deposition of transported sediment load from sheet flows leaving disturbed areas.

WHERE APPLICABLE

- Erosion would occur in the form of sheet and rill erosion.
- The maximum drainage area for overland flow does not exceed 1/4 acre per 100' of barrier.
- There is no concentration of water flowing to the barrier.
- Effectiveness is required for < 3 months.

ADVANTAGES

- Straw bale filters capture and retain sediment on the construction site thus protecting waterways, streets and other areas outside of the construction limits from sedimentation.
- Straw bale filters can serve to define construction limits to equipment operators as well as bystanders.

CONSTRAINTS

- Less resilient and usually more expensive than Silt Fencing (Practice 105).

Land Slope	Max. Distance Above Fence
< 2%	100'
2-5%	75'
5-10%	50'
10-20%	25'
> 20%	15'

Exhibit 106b: Maximum distance above straw bale filter based on land slope. (Source: Indiana Erosion Control Handbook)

- Lower filter efficiency than silt fencing.
- May be a high maintenance item during earth moving activities in adjacent areas, and during the rainy season.
- Higher flow-through rate than silt fencing.

DESIGN AND CONSTRUCTION GUIDELINES

Materials

- Straw bales 14" x 18" x 36" minimum.
- Two 36" long (minimum) steel rebars or 2" x 2" hardwood stakes per bale.

Installation

- Dig a $\geq$ 4" deep flat-bottomed trench along the entire intended fence line. The trench should be wide enough to accommodate a bale width, and long enough so that the end bales extend up-slope in such a way that trapped water cannot flow around the ends of the barrier.
- Place bales in the trench on edge (bindings oriented around the sides rather than top and bottom), and abut bales tightly against each other.
- Anchor the Straw Bale Filter by driving 2 rebars or hardwood stakes through each bale until nearly flush with the top. The first stake should be driven toward the previously laid bale to force the bales together.
- Tightly wedge straw into any gaps between the bales to prevent sediment-laden water from running through the cracks.
- Backfill and compact the excavated soil against the bales to ground level on the down-slope side and to 4" above ground level on the up-slope side.

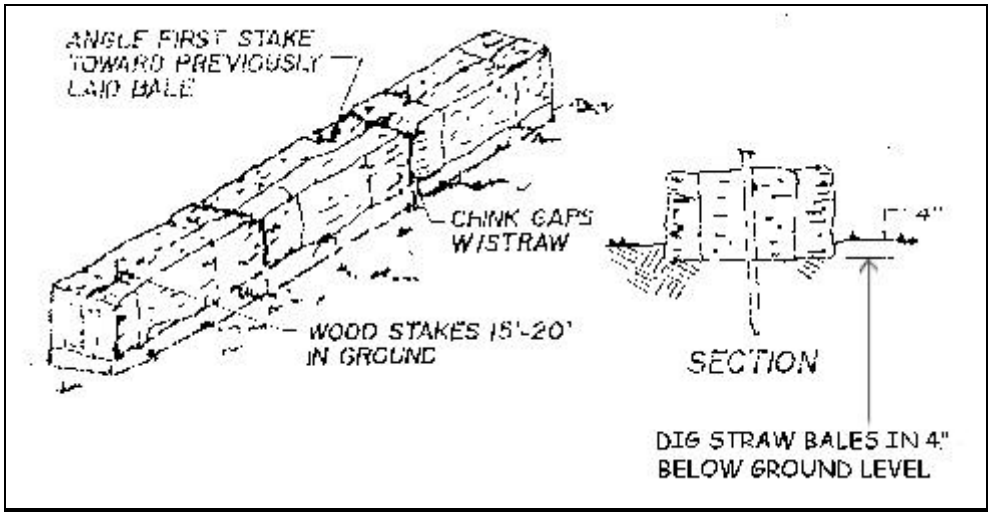

Exhibit 106c: Detail of straw bale filter installation (Source: CBBEL files)

Special Considerations

- Straw bales should not be placed in areas of concentrated flow.
- Field observations have shown that the efficacy of Straw Bale Filters is often compromised for the followings reasons:
  1. Improper use in which bales are used in waterways with high water velocities.
  2. Improper installation including no entrenchment.
  3. Inadequate maintenance.
  4. Straw bales decompose in the presence of moisture and have a very limited life span.

MAINTENANCE

- Inspect bales periodically and after each storm event.
- Replace bales as necessary.
- Remove deposited sediment when it reaches half the height of the bale filter.
- Sediment deposits remaining (after the straw bale filter is no longer required) should be dressed to the existing grade, and seeded.

REFERENCES

Related Practices

- Practice 104 Temporary Diversion.
- Practice 105 Silt Fencing.
- Practice 1102 Vegetative Stabilization.

Other Sources of Information

- Indiana Erosion Control Handbook.
- NRCS Standard Specifications.
- Illinois Urban Manual.

Last Print/Revision Date: October 13, 1996

PRACTICE 107
CLEARING AND GRUBBING

DESCRIPTION

- Removal and disposal of trees, snags, logs, stumps, shrubs, and rubbish.

Exhibit 107a: Clearing and Grubbing (Source: NRCS Files)

PURPOSE

- To prepare a site for construction activities.

WHERE APPLICABLE

- All situations in which vegetation, rubbish or debris must be removed prior to implementing construction activities.

ADVANTAGES

- Allows unimpeded access to construction site.
- Provides suitable substrate on which to work.
- Provides a safe environment in which to work.

CONSTRAINTS

- All areas cleared and/or grubbed must be stabilized with vegetation.
- All material cleared and/or grubbed must be properly disposed of.
- May require the use of heavy equipment.

DESIGN AND CONSTRUCTION GUIDELINES

Materials

- Brushhog, chainsaw, stump grinder, bulldozer, etc.

Installation

- The limits of areas to be cleared and/or grubbed should be marked with stakes, flags, or other suitable methods.
- Trees to be left standing and uninjured should be designated by special marks placed about 6' high on the trunks. Preserved trees should be protected as described in Tree Preservation and Protection (Practice 102).
- Clearing: Removal and disposal of woody vegetation and other debris. Trees and woody vegetation should be cut off as near the ground surface as field conditions permit.

- Grubbing: Removal of all stumps, roots, and root clusters having a diameter of ≥ 1" to a depth of ≥ 2' below subgrade elevations for concrete structures, and ≥ 1' below the ground surface at embankment sites and other designated areas.

Special Considerations

- All materials cleared and/or grubbed should be disposed of as described in Debris Disposal (Practice 1301).
- Measures should be taken to prevent erosion and siltation during clearing and/or grubbing activities.
- All areas cleared and/or grubbed should be stabilized as soon as possible.

MAINTENANCE

- Areas cleared and/or grubbed should be monitored periodically until the site is stabilized.

REFERENCES

Related Practices

- Practice 102 Tree Preservation and Protection.
- Practice 105 Silt Fencing.
- Practice 106 Straw Bale Filter.
- Practice 1102 Vegetative Stabilization.
- Practice 1301 Debris Disposal.

Other Sources of Information

- NRCS Standard Specifications.
- Illinois DOT Specifications.

Last Print/Revision Date: October 13, 1996