

11. Construction and Maintenance Tips



Good construction and maintenance planning are essential to the successful completion of any project. Although it may not seem necessary to think about construction or maintenance until the actual work begins on a project site, detailed forethought will prevent problems, save time, and ensure a successful project. Construction and maintenance planning are especially crucial with larger projects due to the larger area of impacted land. The applicant must remember to stay in regular contact with the construction crews as they are implementing the approved permit design. If the plans are not followed as approved, the applicant is responsible for any wetland impacts that may occur. Many best management practices to help the applicant limit construction impacts and properly maintain the project site are discussed on the next few pages.

Prior to Construction the Applicant Should

- Make sure to read all the permit conditions and ask questions if they are unclear.
- Post a sign with the permit number in a visible location.
- Have a copy of the approved plans and permit at the site.
- Include all contractors in all pre-construction meetings. Make sure all contractors are aware of sensitive wetlands/habitat areas that must be avoided per DEM approved permit plans and conditions.

Protection During Construction

- Properly install all sediment and erosion controls.
- Consider the use of silt fencing and staked bales of hay if working on land, and consider cofferdams and silt curtains if working in a watercourse or pond or lake.
- Use other recommended sediment and erosion controls as described in this manual and the *Rhode Island Soil Erosion and Sediment Control Handbook*.
- Check all sediment and erosion controls and maintain them on a daily to weekly basis and after any storm event.
- Place baled hay at least a foot out from the proposed (planned) toe of the slope to prevent erosion once they are removed.
- Stabilize exposed soils by seeding and applying a thick mat of straw mulch.
- Use erosion control blankets, such as jute or other types of non-plastic matting to prevent

Common Construction & Maintenance Problems

- Soil erosion from clearing and grading a large area.
- Unauthorized work in areas outside the Limits of Clearing and Disturbance depicted on the approved plan.
- Sedimentation of a wetland from poorly installed sediment and erosion controls, lack of erosion control maintenance, and the failure to stabilize disturbed soils.

erosion on steep slopes.

- Divert runoff around excavations by using check dams, ditches, and filter structures made of stone, gravel, or sandbags. Install gravel trenches along driveways or patios to collect water and allow it to filter into the soil.
- Use wide-tire vehicles when working in or near wetlands to cause less rutting and soil disturbance.
- Use timber mats when working in or near wetlands, especially where heavy equipment access is required.
- If dewatering of trenches is necessary, pump all water to an acceptable, properly designed filter fabric basin - please see the *Rhode Island Soil Erosion and Sediment Control Handbook*.
- No excess cement washwater, excess cement, or other building materials (such as paint) should be flushed into or near a gutter or storm drain or near any wetlands.
- Utilize tree protection devices during construction.
- Please also see the *Rhode Island Soil Erosion and Sediment Control Handbook* for complete examples and descriptions of how to protect wetland areas during construction.

Clearing

- Especially on large projects, clear lots in phases so that the land is not stripped of vegetation all at once.
- Once an area has been cleared, try to schedule all work in close time proximity to avoid repeated disturbance to nearby wetlands and so the area can be stabilized quickly.
- Minimize the amount of exposed soils, especially on steep slopes, and limit the length of time that any soil is exposed.
- Avoid removing trees or other vegetation from, or in the vicinity of, the wetland.
- Preserve the existing tree canopy, and use selective clearing to minimize clearing of vegetation.
- Avoid impounding water.
- Limit grading to small areas.
- If cutting of vegetation in the wetland cannot be avoided, complete the work by hand (chain or hand saw) instead of using large equipment.
- When removing trees and brush, use cranes to lift them out of the area, or use chains or cables to drag them upslope to reduce the potential for erosion and sedimentation impacts from vehicle tires or treads.
- See the *Rhode Island Soil Erosion and Sediment Control Handbook* for examples and descriptions of how to protect cleared areas during construction.

Timing and Sequence

A good project design can be overshadowed by poor sequencing of construction if the construction activities fail to avoid or reduce wetland impacts. While sequence and timing of construction work is often dependent on the contractor's schedule, it is always important for them to employ best management practices.

- Limit construction activities within vegetated wetlands and flowing and standing water wetlands to the low flow period of July through October, unless there are overriding breeding or migratory issues.
- Schedule all construction adjacent to or within wetlands during dry periods - or at least not immediately prior to during rain events.
- Avoid work during the breeding and migratory seasons of sensitive wildlife species that utilize the area.
- Plan utility installations to occur during other project construction activities to limit the length of disturbance to nearby wetlands.

Construction Sequence Notes: All construction notes must be detailed enough so that they can demonstrate to DEM that the applicant has thought through the construction activities and their sequence with respect to the protection of wetlands. The notes should specify all construction steps that may affect wetlands and the order in which the steps will occur, including the following: 1. Installation of erosion and sediment controls; 2. Site preparation; 3. Removal and disposal of items; 4. Dewatering; 5. Grading; 6. Construction and building of structures and drainage systems; 7. Temporary and permanent site stabilization; 8. Restoration and plantings; and 9. Removal of temporary controls.

Materials

- Have all necessary materials on hand before beginning work.
- Establish a materials storage area and staging area prior to construction. Install and maintain proper soil erosion and sediment controls around areas for the life of the project.
- Place construction access roads and locate soil stockpiles as far from wetlands as possible.
- Keep the construction site clean of loose dirt, litter, toxic chemicals and other debris.
- Cover stockpiles and landscaping materials with tarps.

Recommended Construction Sequencing

- Acceptable soil erosion and sediment controls and buffer zone markers must be installed before the start of all construction activities, including clearing.
- Wetland restoration or mitigation areas should be completed prior to building of the actual project portion of the construction.
- Stormwater drainage systems and control facilities should be installed and properly functioning prior to paving activities.
- Floodplain compensation areas must be constructed and functional prior to, or in concurrence with, any floodplain filling/displacement as part of a project design.
- Mitigation plantings must be installed before on-site occupancy.

Site Stabilization, Restoration and Maintenance efforts must be considered during the initial planning and design phases and should be included in the application submittal. A project site must be effectively stabilized, revegetated, and maintained to prevent soil erosion and to prevent sediment from running into wetlands. Below are some good tips to follow:

Restoration

- Complete restoration efforts immediately after completing the construction of the project.
- Replant disturbed soils and restore the area as close as possible to its original topography and hydrology if required.
- Replant any and all disturbed vegetation with native, non-invasive vegetation.
- Restore stream channels to original, natural conditions if disturbance to the channel is unavoidable.
- Utilize a wildlife conservation seed mix on all disturbed surfaces within wetlands.
- Stabilize all disturbed areas outside of the cleared maintenance zone with trees, shrubs or other vegetation.
- Consider creating tree cover, nesting sites, or providing wildlife plantings adjacent to wetlands.
- See the *Rhode Island Soil Erosion and Sediment Control Handbook* for examples and descriptions of how to protect and restore disturbed areas during construction.
- Completely remove all sediment and erosion controls after a project is completed and the soil is stabilized.

Maintenance

- Maintain the area within the approved Limits of Clearing and Disturbance by hand-cutting or mowing, if permitted.
- Minimize or eliminate the use of any fertilizers, pesticides, or herbicides near wetlands.
- If the use of chemicals is unavoidable and if they are permitted, use natural pesticides and fertilizers, or use chemicals that tend to be less mobile in the environment and as a result will not move off site or degrade before movement can occur. Also ensure that any chemicals used are non-toxic to aquatic organisms.
- Replant any trees, shrubs or other groundcover that does not survive the required length of time (or at least one full growing season).

Temporary Seeding

If land is cleared and soil is exposed before construction will occur, it is a good practice to temporarily stabilize the soil by seeding.

- Seeding can begin in the spring, but should be completed by early fall for seeds to germinate before the weather becomes too cold.
- Seeding should be done as soon as an area is exposed if it will not be built on immediately.
- Areas to be seeded should be smooth and fairly level.
- Steep slopes should be covered with erosion control blankets or mulch in addition to seeding.
- Seeding must be kept within the Limits of Clearing and Disturbance.
- Seeded areas should be watered during the summer.

- Include methodology for completing regular maintenance and emergency repairs to any parts of the project that require access in or through wetland.
- Inspect and maintain all stormwater controls on a regular basis.
- Complete regular sweeping and litter clean up in parking lots and other impervious surfaces.

Maintenance Notes: Maintenance notes are a required part of a complete application. They often detail how engineering structures or grass or otherwise vegetated areas will be maintained. The notes will help program staff determine whether a project will impact wetlands, and they will ensure that the area will continue to be protected and that the structures will operate effectively after the project is constructed. Sometimes projects may only require a few specific notes on maintenance, such as a mowing note.

Below is a partial list of what to include in maintenance notes, as applicable to a specific project:

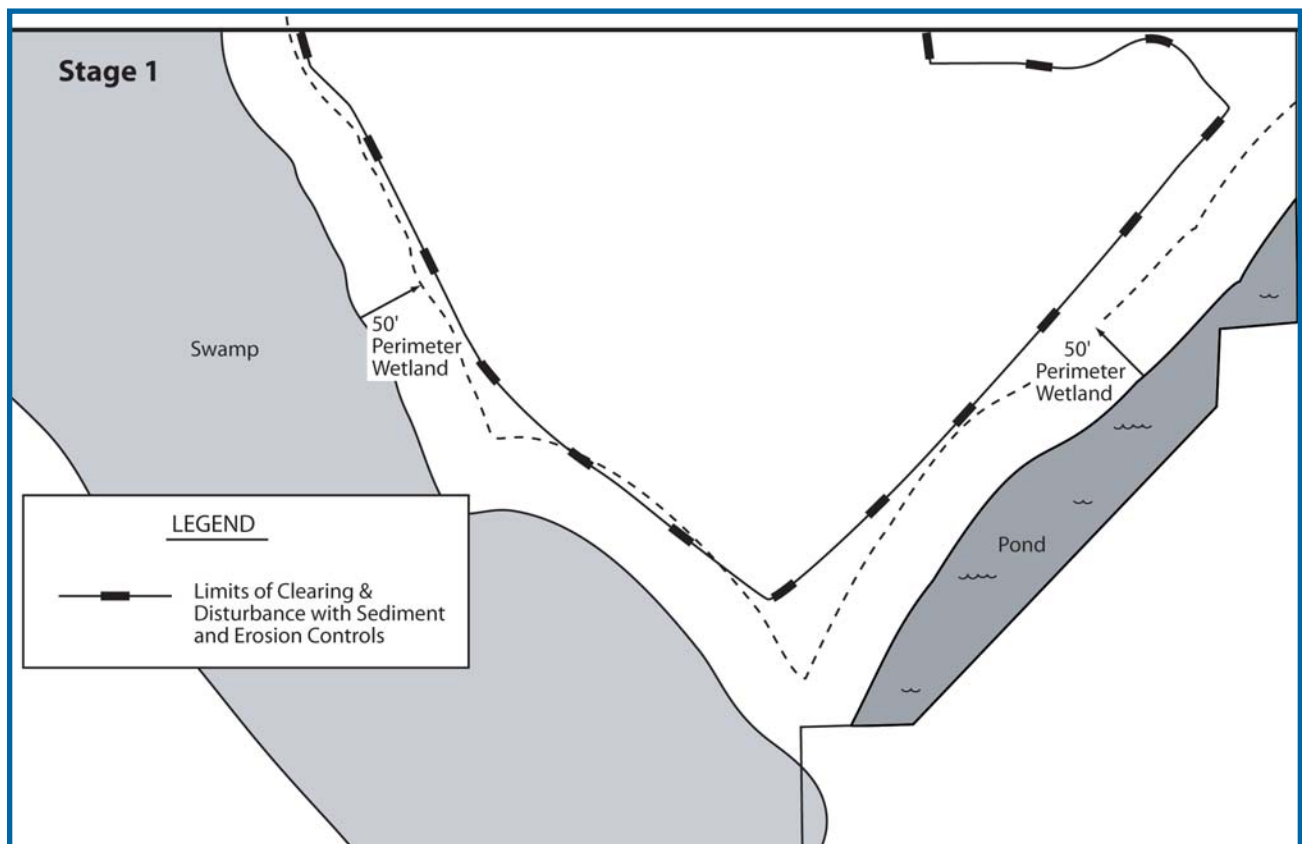
- Long term inspection and maintenance plan.
- Party responsible for long term maintenance.
- Sediment storage and disposal information.
- How hazardous materials will be handled.
- How engineering structures will be cleaned and maintained to prevent clogging.
- Frequency of mowing (i.e. mowing will be done at least once per growing season after August 15 to protect ground nesting birds and other animals), regrading, or revegetation.,
- Treatment for mosquito abatement.
- Provisions for removal of litter and debris.
- Use of herbicides, pesticides or fertilizers.

Example 41: Construction Sequencing

In addition to site layout and design, the proper sequencing of construction events during a project will further help to minimize impacts to wetlands. Information on construction sequencing is always helpful to the biologist and engineer who review the application. For some projects this information is an absolute requirement; for other projects it may not be as critical but is still very useful. Often large projects, or projects that include crossing a wetland, will require the construction sequencing information. The following example is an old farm, much of which was previously disturbed prior to the Freshwater Wetland Act. Not shown is an existing abandoned home and barn and some existing vegetation, which is maintaining ground stabilization and providing a woody habitat. The applicant is proposing to clear the site to build a condominium complex and has utilized a good construction sequence to protect the wetland areas. Although the vast majority of the construction and disturbance will occur outside of the 50 Foot Perimeter Wetland, this project will still need a wetland permit due to the change in stormwater runoff patterns that are created by the development of this lot.

Stages:

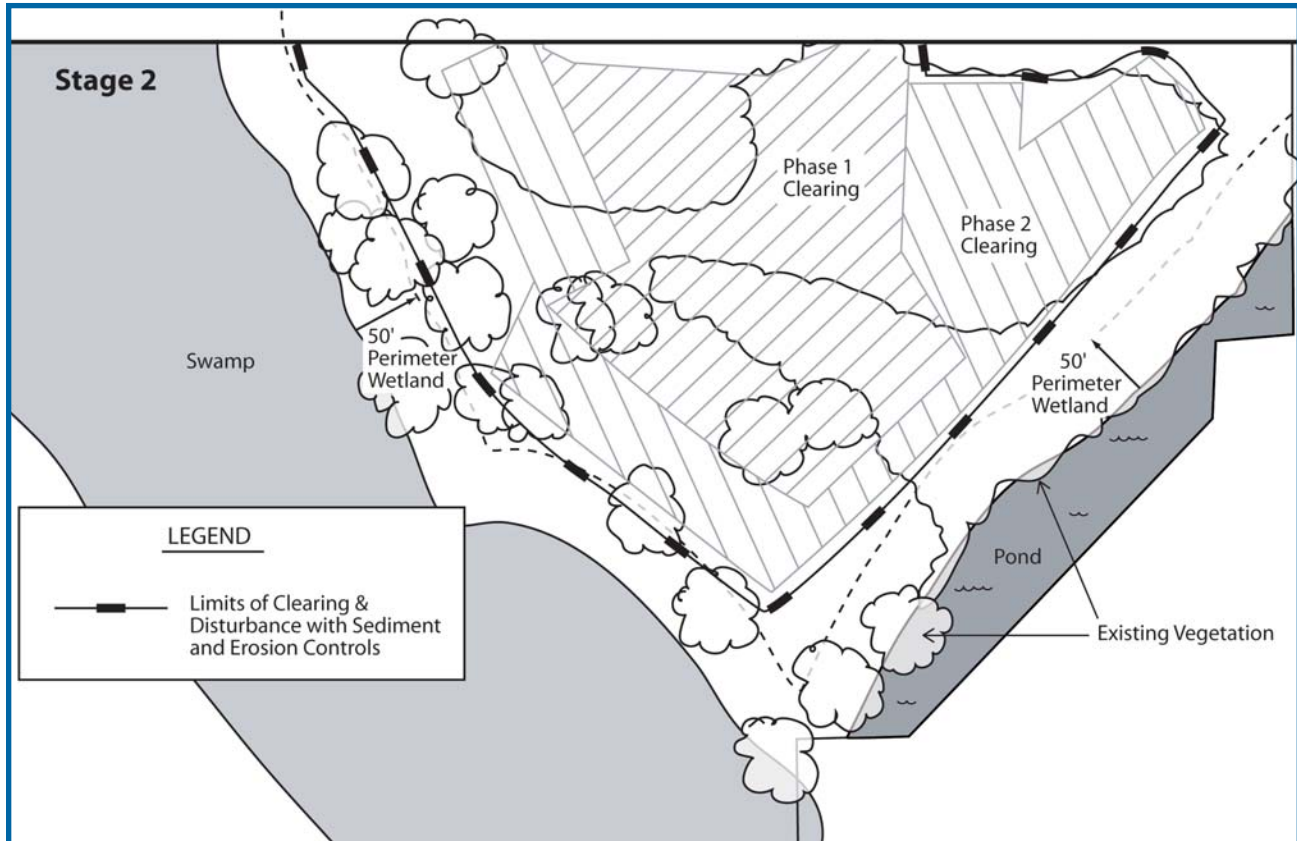
I. Sediment and Erosion Controls: These controls should be installed first, before beginning ANY type of construction, including clearing of a project site. The controls must encompass all work, and must be within the Limits of Clearing and Disturbance (most often they are at the limit of clearing and disturbance). Sediment and erosion controls will prevent sediment from passing into adjacent wetlands and will prevent erosion of exposed ground. This example shows a line of sediment and erosion controls that encompass the entire project for the construction work.



Example 41a

Example 41: Construction Sequencing Continued

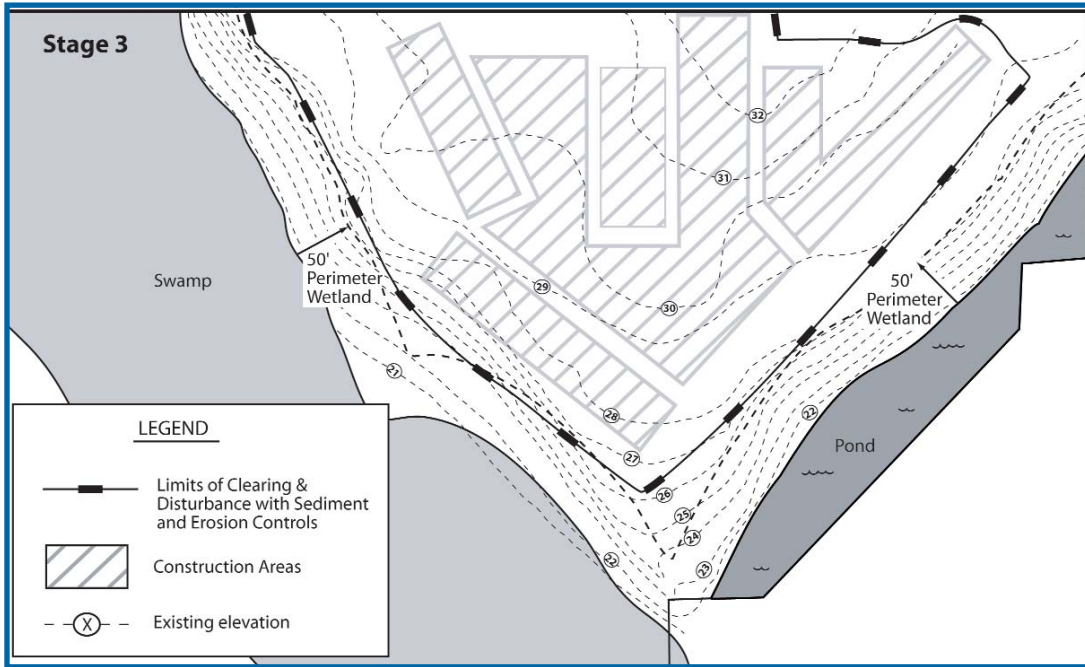
2. Phased clearing: It is important, especially on a large site to clear in such a way that the entire site is not exposed all at once. If more ground is cleared and exposed than will be built upon immediately, it will be necessary to temporarily cover, seed and stabilize the soil. This example shows clearing in two phases, as the building will be done in two phases.



Example 41b

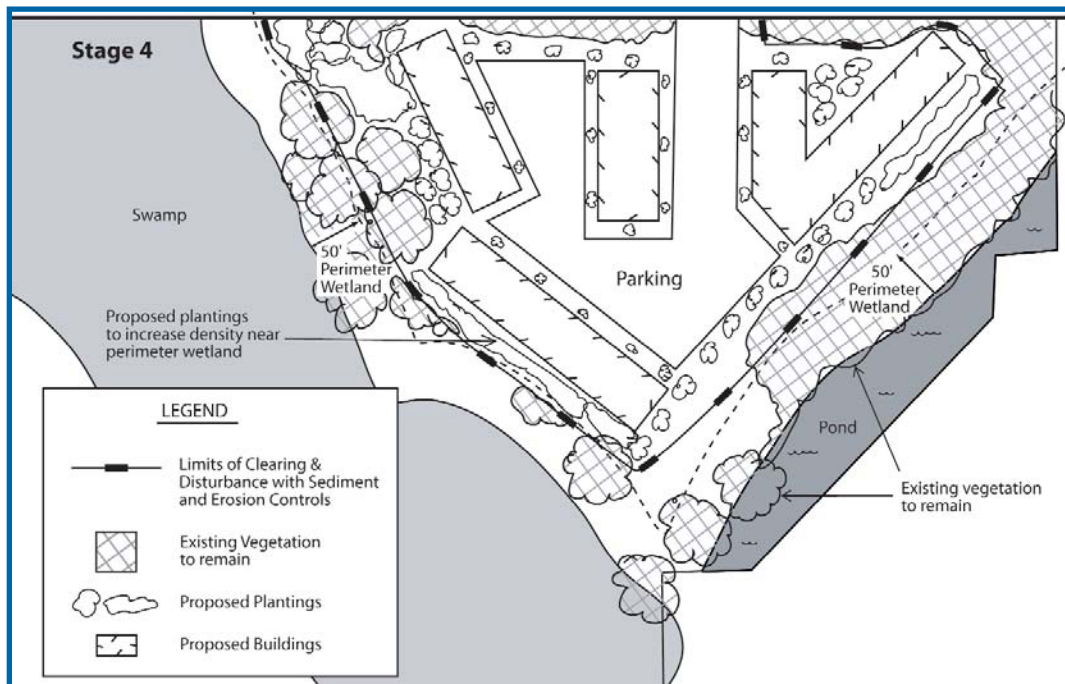
Example 41: Construction Sequencing Continued

3. Grading: When grading a project, gradual slopes are preferable to steep slopes because they are less susceptible to erosion. However, a site should not be graded so low as to intercept the groundwater table. In this example the project avoids the steeply sloped Perimeter Wetland and will maintain the original upland topography as much as possible, with gradual grading in the necessary areas. The final project contours are not shown.



Example 41c

4. Stabilization and Restoration: Generally all project sites will need some sort of restoration work after construction to keep soil from eroding, to provide a noise and light buffer to the wetland areas, and to reestablish lost habitat for wetland wildlife species. This example site has extensive plantings to minimize negative effects that the development will have on the wetland water quality and wildlife habitat, as well as to minimize flooding and maintain healthy wetlands.



Example 41d

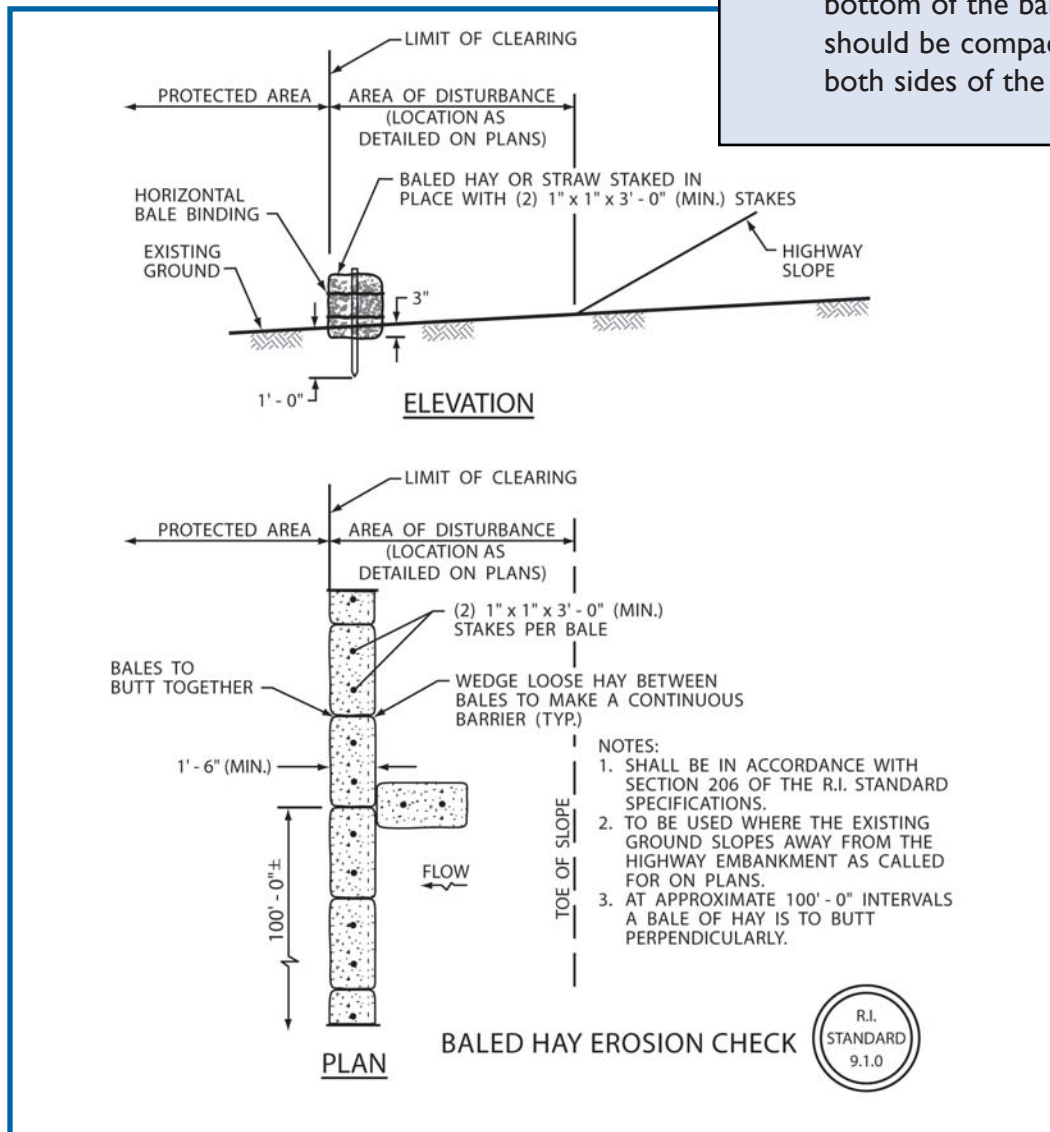
Example 42: Erosion Checks

The following illustrations are from the *Rhode Island Standard Details* (RI DOT 2008). They clearly illustrate how to install baled hay, silt fence, and combination erosion checks. Bales of hay and silt fences are commonly used in many projects to help protect wetlands. Certain projects may only require one type of erosion check, and some may require both.

All sediment and erosion controls must be checked and maintained on a daily to weekly basis and after any storm event. They should be cleaned when accumulated debris and sediment reach approximately one-half the height of the controls.

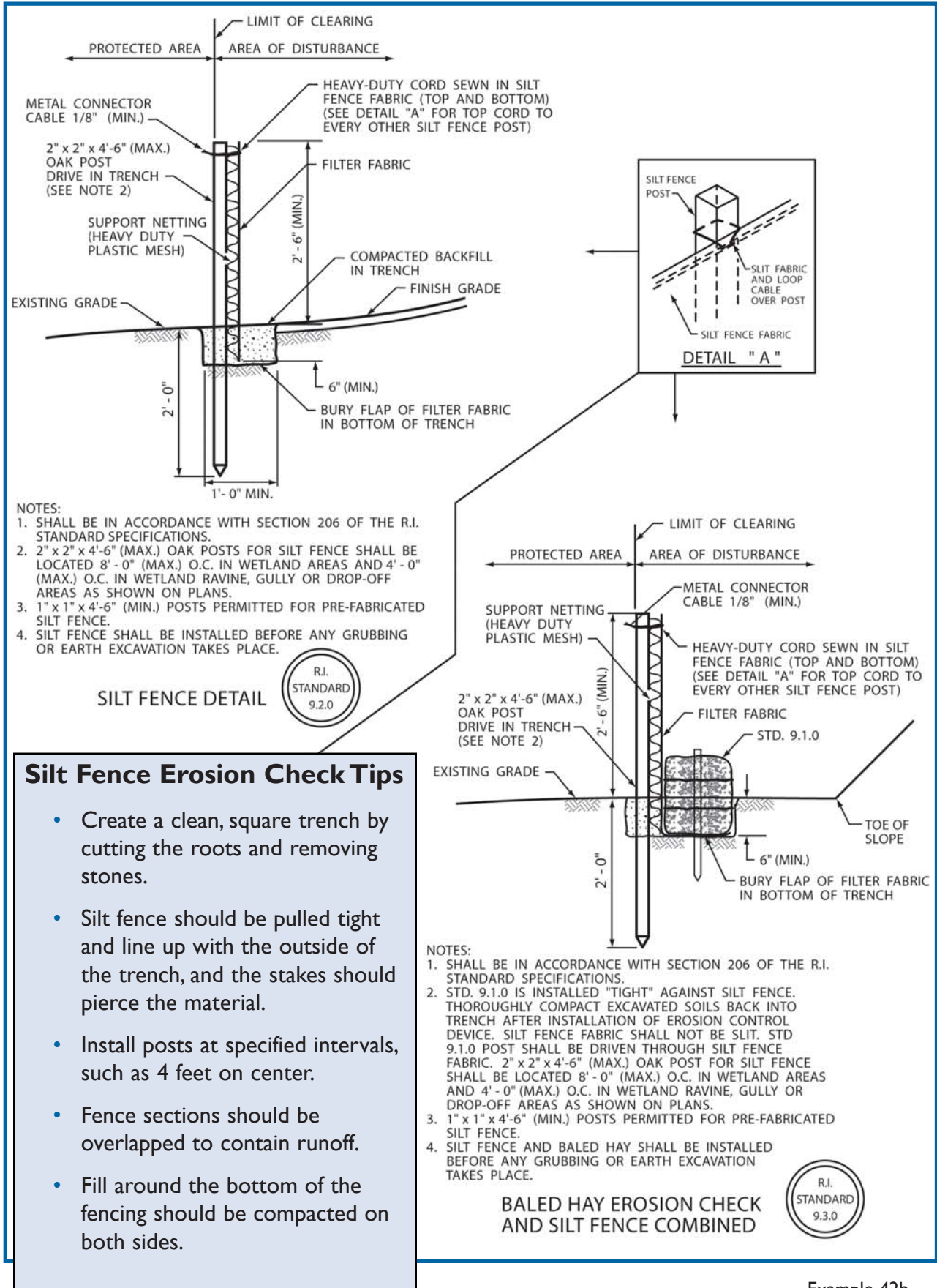
Baled Hay Erosion Check Tips

- Create a clean, square trench by cutting the roots and removing stones.
- Baled hay should sit flat and solid in the trench and firmly touch the next bale.
- Bales should be solidly staked and not be easily removed by hand.
- The substrate around the bottom of the baled hay should be compacted on both sides of the bale.



Example 42a

Example 42: Erosion Checks Continued



Silt Fence Erosion Check Tips

- Create a clean, square trench by cutting the roots and removing stones.
- Silt fence should be pulled tight and line up with the outside of the trench, and the stakes should pierce the material.
- Install posts at specified intervals, such as 4 feet on center.
- Fence sections should be overlapped to contain runoff.
- Fill around the bottom of the fencing should be compacted on both sides.

Example 42b