

Road Improvement

Introduction	5-1
Goals of Road Improvement	5-2
Objectives of Road Improvement	5-2
Road Improvement Strategies	5-2
Road Improvement Planning	5-3
Road Improvement Design	5-4
Construction of Road Improvement Projects	5-7

Introduction

As used in this section, road improvement means the repair and/or upgrade of existing roads. Road improvement is distinguished from road maintenance by the nature and extent of the work. Road improvement includes changes to road alignment, subgrade widening, significant repair/upgrade of road surfacing, repair/replacement of stream crossings, repair/replacement of drainage structures, and repair/removal of unstable material. Road maintenance includes routine shaping of the road surface, cleaning and maintenance of drainage structures, spot treatment/repair of road surfaces, and vegetation control alongside roads.

Conditions commonly leading to a road improvement project:

- Road subgrades, alignments and/or surfacing need to be upgraded to meet current or future transportation needs.
- Fill slopes with old sidecast material are at risk of failure.
- Cut slopes show signs of failure
- Road fills are showing signs of failure
- Drainage structures are in need of repair, upgrading, or replacing.
- Stream crossings are in need of repair, upgrading, or replacing.
- Unsafe conditions in the transportation system must be repaired.
- Other unsatisfactory conditions are in need of repair.

Road improvement provides an opportunity to upgrade, improve, or repair a road that is substandard in one or more of its design elements. Improvements may include, but not be limited to, the following:

- Re-aligning the horizontal and/or vertical alignment of the road.
- Upgrading the size and/or number of culverts to current standards.
- Upgrading stream crossings to current fish passage standards.
- Installing additional cross drainage structures.
- Reshaping the roadbed and/or ditchline for improved surface drainage.
- Upgrading the road surface by adding new rock.

- Removing and/or stabilizing fill slopes that exhibit instability.
- Relocating sections of roads away from sensitive areas such as streams.
- Repair of washouts, fill or cut slope failures, and severe damage to road surfacing.

In general, stream crossings and unstable fill and cut slopes present the greatest challenge to road improvement, and the greatest opportunities for future erosion prevention and rehabilitation.

Goals of Road Improvement

The goals of road improvement are:

1. Upgrade existing roads to meet current and future needs, rather than construct new roads, where it is economically and environmentally feasible to do so.
2. Correct an existing unsatisfactory situation.
3. Update roads to current standards where necessary.
4. Prevent environmental damage.

Objectives of Road Improvement

1. Plan road improvement projects that will efficiently and effectively move the road system from the current condition toward the vision or desired condition.
2. Design road improvement projects that efficiently and effectively correct unsatisfactory conditions, upgrade the road system as needed, and prevent environmental damage.
3. Construct improvements according to design specifications.
4. Minimize soil disturbance during road improvement construction.
5. Minimize impacts to water quality, aquatic and wildlife habitats, and other natural resources during construction of road improvement projects.
6. Utilize professional level expertise and input in the formation of on-the-ground decisions and/or changes during the construction of road improvement projects.
7. Make on-the-ground decisions and/or changes to the road design specifications that react to unforeseen conditions during the construction of road improvement projects in a manner that will achieve the goals of the project. Professional level expertise and input will be utilized in the formation of the decisions and/or changes.

Road Improvement Strategies

Road improvement strategies are the specific actions and standards that will lead to achieving the goals and objectives of this section of the manual.

All of the strategies listed in the sections on Transportation Planning, Road Design and Road Construction apply to Road Improvement as well. To avoid redundancy those strategies will not be listed in this section. However, there are some additional strategies that apply to Road Improvement, which will be listed in this section.

Road Improvement Planning

Road improvement planning will use all of the strategies listed in the section on Transportation Planning. A key strategy from that section is the inventory of the current condition of the road system. The inventory will include information on: road surface drainage; road surfacing condition; stream crossing structures; landslide risks; and areas of the road system that need upgrading to meet current and future needs. The **Forest Road Hazard Inventory Protocol** developed as part of the Oregon Coastal Salmon Recovery Initiative provides a system for gathering much of this information. As mentioned in the section on Transportation Planning, a more comprehensive road inventory system will be developed in the future. Until the new inventory system is in place, districts will need to gather supplemental information to efficiently and effectively plan for road improvement projects.

Information from the road inventory can be used to help identify priorities for road improvement projects. Conditions identified in the inventory that will be considered a priority for repair include:

Stream Crossings/Fish Passage

- Culvert outlet drops in fish bearing streams
- Non-embedded culvert with gradients above 0.5% slope
- Structures such as old log fills
- High washout potential due to an undersized structure and/or long steady grades below a stream crossing
- Scour, oversteepening or other erosion around culvert inlets and outlets
- Structural deterioration of culverts

Sidecast Failures/ Slope Stability

- Steep slopes
- Nearby slope failures
- High cut slopes—over 15 feet high
- Sidecast over two feet deep on steep slopes
- Fills supported by trees and/or organic debris
- Arc shaped cracks in the fill or other evidence of fill movement

Water Quality/Sediment Delivery

- Direct delivery of sediment in runoff water from roads to streams
- Ditch downcutting
- Increase in heavy traffic
- Inadequate depth and/or poor quality road surfacing
- Damaged, collapsing, and/or inadequate drainage structures

- Eroding soil on cut and fill slopes
- Buried culverts
- Fill erosion at culvert outlet

Current/Planned Uses of the Road

- Unsafe conditions are present—width, alignment, visibility, etc.
- Volume of traffic exceeds road design
- Road surfacing will not accommodate current/planned uses

A number of factors will affect the final ranking of road improvement projects. Included are factors such as the need and timing of the planned uses of the road; the costs and benefits of the project; the amount and type of environmental damage that is occurring or could occur; the likelihood that damage will occur and the risk of impacts to human life/safety or private property. Factors such as the availability of funds, equipment, and manpower and the time of the year will affect the scheduling of road improvement projects.

Road Improvement Design

The design of road improvement projects will use all of the strategies listed in the section on Forest Road Design. However, because of the nature of some road improvement projects additional engineering and design work may be needed before construction begins. For example, an engineered solution such as a reinforced fill or a crib wall may be needed to repair a road fill that has failed.

Some design criteria that will be considered for road improvement projects are:

- Roads will be surfaced to handle the wettest road conditions that are expected
- Use geotextiles under the surfacing where the subgrade is wet, soft, and cannot be effectively drained.
- Crossings on fish-bearing streams will meet the design criteria listed in the **Oregon Road/Stream Crossing Restoration Guide**. (See list of useful references)
- Install cross drainage above stream crossings to divert ditch water on to vegetated ground for filtering.
- Revegetate all disturbed cut and fill slopes.
- Install measures such as flumes, downspouts, or armoring on the outlets of cross drains where erosion of steep slopes is occurring.
- Install measures such as armored relief dips, trash racks, or oversized culverts to prevent the road from being washed out.
- Install additional cross drains where downcutting of the ditch is occurring.
- Pull back and endhaul unstable fill material. Pull back should remove all “perched” fill material, flatten upper slopes on “sliver fills,” and create a uniform slope that will drain well.

Figure 1.

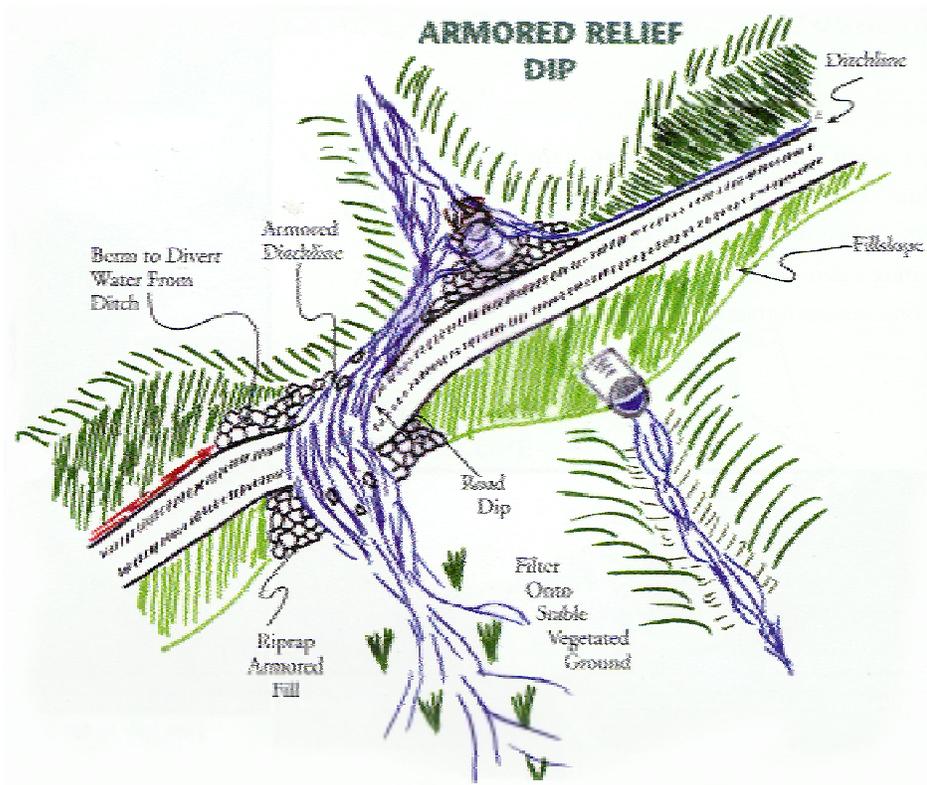


Figure 2.

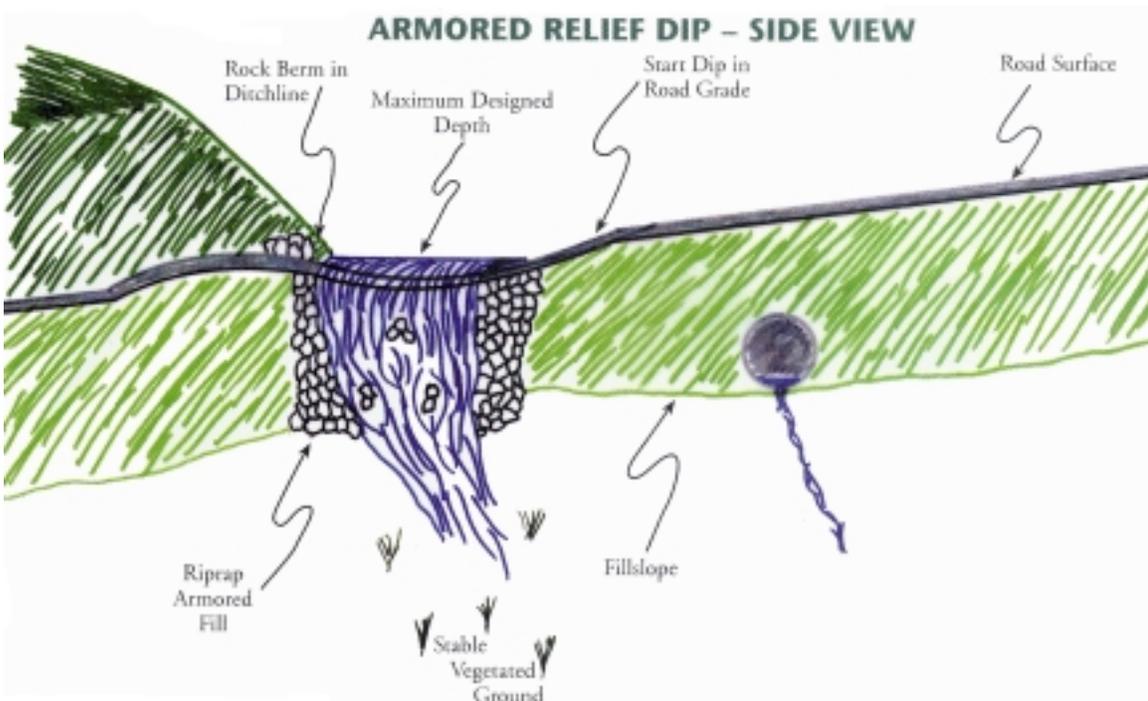
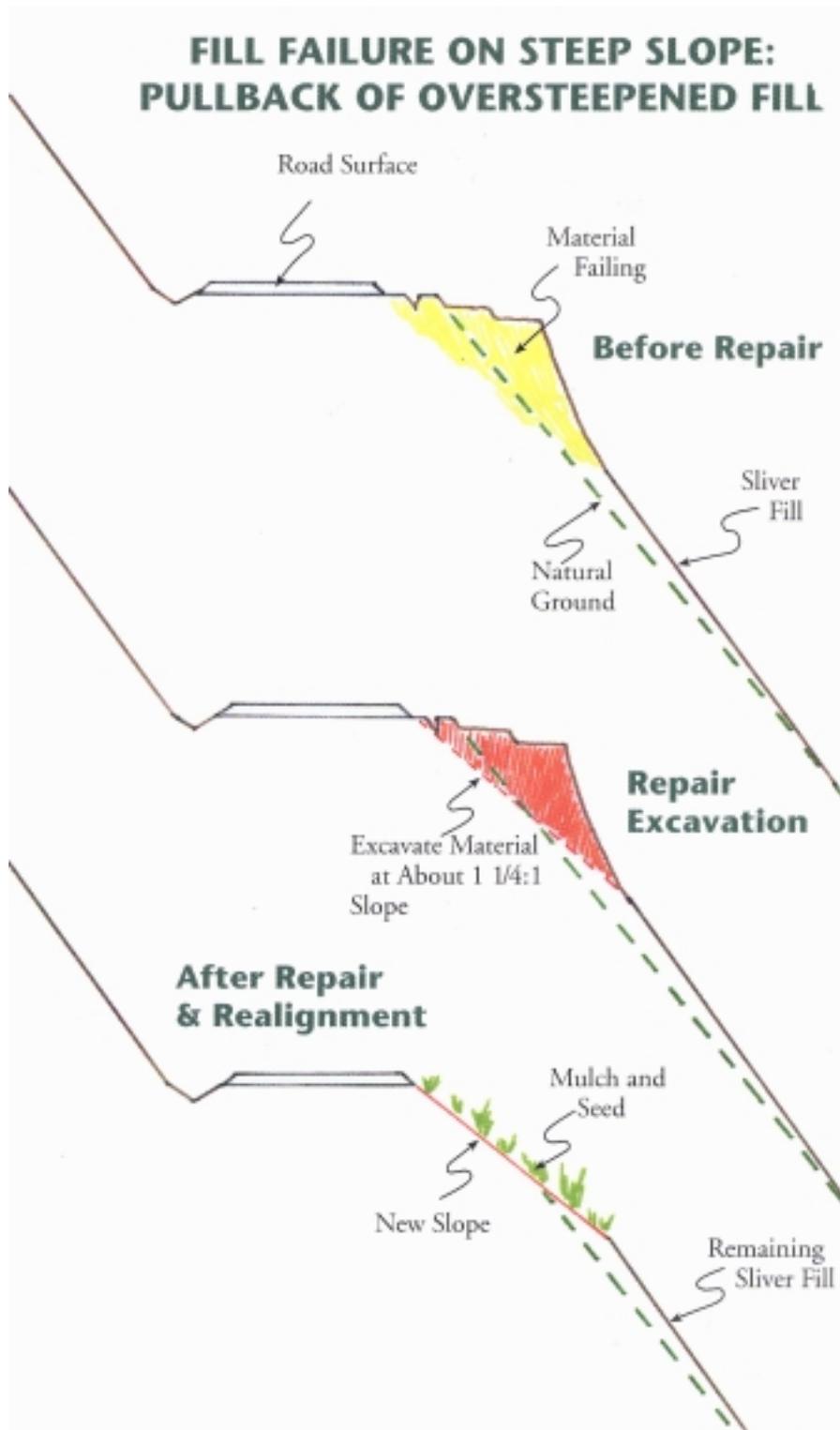


Figure 3.



It is not possible to identify and list all of the additional design criteria and standards for road improvement projects. Each project will be designed to meet the specific goals and objectives for that project. Where needed, additional expertise such as geotechnical specialists, hydrologists, biologists, and civil engineers will be used in the design of road improvement projects.

Construction of Road Improvement Projects

The construction of road improvement projects will use all of the strategies listed in the section on Road Construction. However, because of the unique designs used for some road improvement projects, additional strategies may be required. Some items to consider when constructing road improvement projects are:

- Additional compaction or special compaction techniques may be needed when repairing road fills that have failed.
- Buried organic material must be removed from the road subgrade before replacing or repairing old log fills or log culverts.
- Before replacing some culverts, removing the fill (and the associated old culvert) and allowing the stream to “self excavate” over a winter in order to find its natural channel is often the best solution where stream sediment has built up behind the fill.
- The use of specialized equipment may be required. The equipment will be used within its limitations and capabilities.

It is not possible to identify and list all of the additional construction criteria and standards for road improvement projects. Each project will be constructed to meet the specific design for that project. When it appears to be necessary to modify the project design and or the construction strategy, appropriate expertise such as geotechnical specialists, hydrologists, biologists, and civil engineers will be consulted regarding the proposed modifications.