CHAPTER 3
MAINTAINING THE ROADS

Roads can be a source of erosion, sedimentation, and pollution. Whether it's surface runoff or concentrated storm runoff, sediment and other pollutants are reaching streams and harming our natural resources. Sometimes sediment is also delivered to the county road drainage system from other sources, such as upslope property.

Each county has, or will soon have, a County Road Erosion Inventory to help it develop priorities for a Capital Improvement Program. Supplemental funding will likely be needed to upgrade the quality of the road systems in many areas.

The primary Goals for this chapter are:

- Maintain public safety and open roads for the traveling public.
- Prevent or minimize delivery of sediment and chemicals to streams.
- Prevent or minimize the interruption of normal runoff into streams.
- Protect aquatic and riparian habitat.

3-A Grading Practices

3-B Road Surfacing and Dust Abatement

3-C Vegetation Management

3-D Winterizing the Road System

3-A GRADING PRACTICES

During grading practices such as roadway and shoulder blading and rebuilding, slope grading, and sidecast construction, it is important to keep in mind the following general principles to reduce erosion and sedimentation that may enter fish- bearing streams:

- Fit grading to the surrounding terrain.
- Retain existing vegetation to the greatest extent feasible.
- Time grading operations to minimize soil exposure in the rainy seasons.
- Minimize the length and steepness of slopes.
- Emphasize erosion controls by vegetating and mulching.
- Direct runoff away from disturbed areas.
- Keep runoff velocities low, using energy dissipating control measures.
- Trap sediment on site using a combination of erosion and sediment control measures.
- Inspect and maintain control measures regularly (especially before and after major rainstorms).

Specific practices are detailed in the following sections.

3-A-1 Shoulder Blading and Rebuilding

3-A-2 Erosion Repair and Control

3-A-3 Ditch Shaping and Cleaning

3-A-4 Channel Maintenance

SHOULDER BLADING & REBUILDING 3-A-1

Description: This action includes shoulder blading and rebuilding to correct rutting and buildup of materials, to remove weeds, for safety, and to maintain proper drainage. This activity is similar to ditching and has similar best management practices. However, it should be considered a different activity than ditching.

Environmental Concerns:

- Sidecasting material and discharging sediment and organic material into streams or storm water drainage systems.
- Damaging vegetation beneficial to erosion control on cutslopes and fillslopes.
- Damaging rare plant populations.

Best Management Practices:

1. **Do not sidecast** when the bladed material can enter the stream directly or indirectly as sediment. Sidecast material can indirectly enter the stream when placed in a position where rain or road runoff can later deliver it to a channel that connects with the stream. [See: Figure 1-2.)

2. Ensure spoil disposal sites are not going to add any sediment to the stream system. [See: 5-A Spoil Disposal]

3. Treat berms as temporary spoil disposal sites unless made of non-erodible material (such as rock & cobbles). Remove the excess berm material immediately after re-grading is completed, including non-erodible material if it changes drainage patterns and concentrates flow to areas where erosion can result.

4. When berms are needed as a permanent measure, daylight berms (make "knockouts") at frequent intervals to break up the length of the berm and the accumulated runoff, making sure that a non-erodible material is used as a drain to carry runoff downslope past the base of the erodible fillslope . See Table 3-A-1.1 below for suggested spacing. The location and frequency of berm drains will also be determined by the presence of downslope land uses and ownerships compatible with the additional drainage as well as by the terrain and other site characteristics.

Table 3-A-1.1 Maximum suggested road surface drainage spacing based on road gradient and soil composition (in feet)

Soil composition	Road gradient (%)		
	2-4%	5-8%	9-12%
Granitic or sandy	400	300	200
Clay or loam	500	400	250
Shale or gravel	600	500	300

Source: Montana Dept. of State Lands (1991) in: Weaver & Hagans (1994).

5. On roads that are unsurfaced with low volume traffic (usually < 100 vehicles per day) and low speeds (usually < 25 MPH), determine if outsloping the surface during grading in order

to improve drainage pattern is feasible. Check with County Engineer for the design criteria for the degree of outsloping needed to drain road surfaces on differing grades and to protect public safety. Make sure that stormwater from outsloped road surface runs off onto a protected shoulder and slope. [See: Appendix B – Erosion Control Methods.]

6. Evaluate the width of the blading activity and, if appropriate, modify the width to minimize disturbance of vegetation.

7. Blade in dry weather when possible, but while moisture is still present in soil and aggregate to minimize dust and maximize compaction to prevent road fines from being discharged from the road surface.

8. Incorporate this activity into local vegetation management plans to consider and minimize impacts of this activity on streams.

9. Permanently stabilize disturbed or bare soils along cutslopes and fillslopes using erosion control BMPs (native seeding, plants, etc.), where geologically stable and where significant sediment is being delivered to the stream system. Correct priority sites identified from the County Road Erosion Inventory, as funding is available. [See: Appendix B- Erosion Control Methods.]

10. Pursue the surfacing of unsurfaced roads that yield significant amounts of sediment, dependent on available funding. Use the County Road Erosion Inventory to help select road sections for priority treatment.

Permits Possibly Needed:

- Maintenance activities are currently exempt from the CWA 402 Storm Water Permit (SWRCB/RWQCB).

Useful References:

EPA. 2000. Recommended Practices Manual: A Guideline for Maintenance and Service of Unpaved Roads. [www.epa.gov/owow/nps/unpavedroads.html]

Oregon State University. 2001. Primer: Environmental Impact of Construction and Repair Materials on Surface and Ground Waters. NR 443. Transportation Research Board, National Research Council. [www.nationalacademies.org/trb/bookstore]

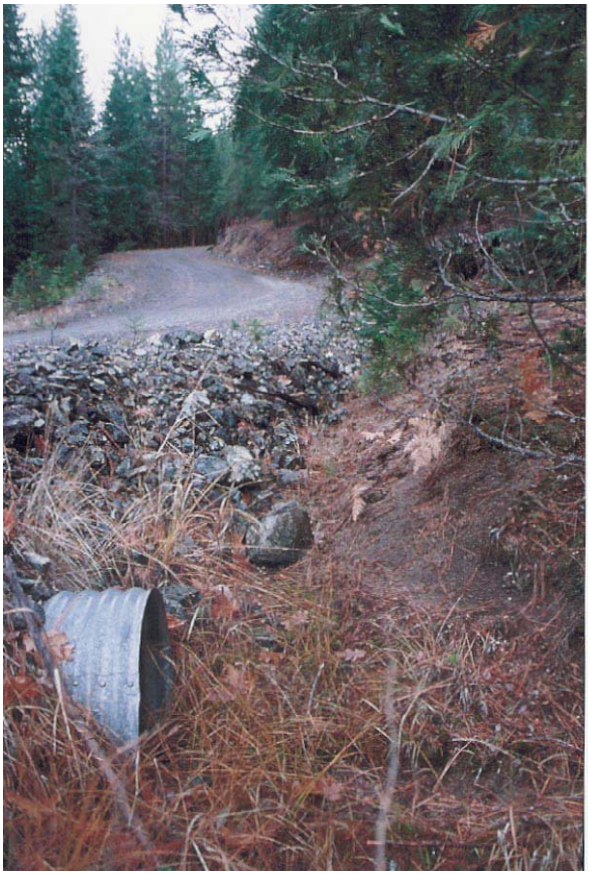
SHOULDER BLADING & REBUILDING 3-A-1

Beneficial Effects of Outsloping and Rocking a County Road

May 1990

A. Before – Insloped, unsurfaced road on decomposed granitic soils with heavy sediment runoff

November 1999



B. After – Outsloped, rocked road with no sediment runoff to culvert and into stream

Road treatment completed in Spring 1991 and sustained with minimal maintenance.

Location: French Creek County Road, Siskiyou County.

Photos taken by Sari Sommarstrom, Sommarstrom & Associates & John Hamilton, US Fish & Wildlife Service

EROSION REPAIR AND CONTROL 3-A-2

Description: This action involves repairing water damage to roadways, cutslopes, and fill-slopes, including the importing and shaping of material to restore slopes and grade lines. In-water work covered by this action could include, but is not limited to, replacement of riprap or rock, which has been removed due to bank erosion or to establish and maintain a vegetative cover to prevent erosion. See County Road Erosion Inventory for sites needing to be repaired, particularly for priority areas.

Environmental Concerns:

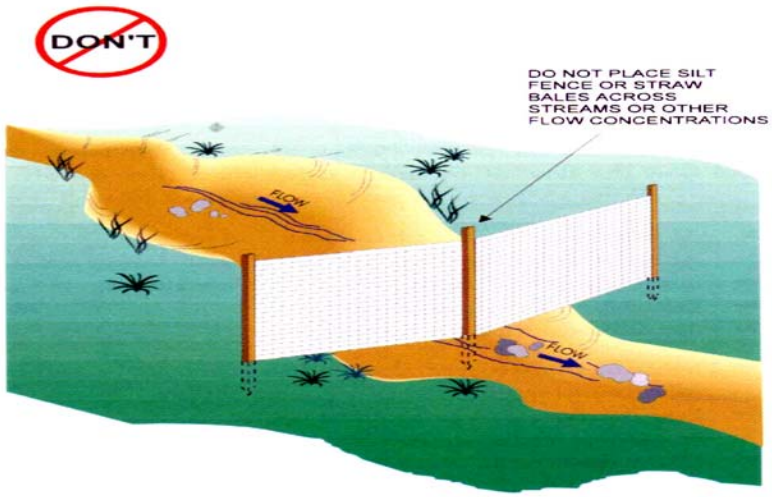
- Discharge of sediment and organic material into the stream or storm water drainage system.

Best Management Practices: See: Appendix B for specific Erosion Control standard designs and procedures

1. Avoid removing vegetation from erodible surface areas during road maintenance activities as a preventative measure.

2. Dispose of removed material at appropriate sites (stable locations outside the maintenance area, or if within the maintenance area, where the material won't be washed into wetlands or waterways). [See Chapter 5 – Disposing of Spoil]

3. Apply appropriate erosion control BMPs based on the standard designs and procedures described for each practice in Appendix B, sections B-4 and B-9, and the reference sources. Seek special training in the application of these techniques if possible, including certification as an erosion control specialist. Be aware of where not to apply certain measures, as noted in the example below.



Silt fencing placed across streams or other flow concentrations is ineffective in ponding water and leads to undercutting, gully formation, and fence failure.

4. Apply erosion control measures in a timely manner. Treating sources by anticipating erosion from existing or potential problem sites before the rainy season is best, focusing on priority erosion sites identified in the County Road Erosion Inventory. For maintenance projects causing temporary site disturbance, install erosion control measures nightly after October 15th.

5. Check temporary measures during and after storms, and remove sediment as needed (such as with silt fences, sandbags, and sediment traps). Materials used as temporary measures may need to be removed once the source of the erosion is stopped. Permanent measures, such as seeding, planting, and rocking, are preferred once the source of any runoff problem is corrected.

6. Coordinate any erosion repair activities (responses and cleanup of erosion problems, not the erosive action itself) which cause significant changes in the topography or vegetation within the riparian management area with the regulatory agencies.

7. Repair instream bank erosion sites by following these guidelines:
   a. Any installation of material that exceeds the material removed by bank erosion (below bankfull stage) will constitute significant action. Increases in the material profile will require additional coordination with regulating agencies, and are not covered in this document.
   b. Replacement of riprap will follow DFG and NMFS in-water work periods, in non-emergency situations. Situations which require expedited County Maintenance action, but which are not technically defined as 'emergencies' will be addressed with the DFG, and potentially the National Marine Fisheries Service/U.S. Fish and Wildlife Service individually. [See also: Chapter 8 – Emergency Work]
   c. Use bioengineering solutions where practicable. Practicable use areas include areas not shaded by bridge elements, and where success is probable and safety of the structural elements are assured. [See BMPs B-7.1 to 7.7 in Appendix B.]
   d. In large fluvial systems where in-water replacement of riprap is required, attempt to increase backwater areas, where appropriate, practical, and feasible.
   e. Follow one of the standard practices and procedures for streambank protection and channel improvement depicted in Appendix B-7.

8. Place a sediment filter or excavated impounding area around storm drain drop inlets and curb inlets in disturbed areas to prevent sediment from entering and clogging storm drain systems. Regularly inspect the storm drain inlet protection, especially during and after large storm events, for damage, clogging, and sediment build-up. Remove once the disturbed site is no longer contributing erosion. [Appendix B-9]

9. Straw bale barriers can be used below areas subject to sheet and rill erosion. Do not use straw bale barriers in active streams, for extended periods of time, or for sheet flow on slopes greater than 2%, as they will decompose and are very heavy and difficult to move when saturated . [Appendix B-9].

10. Use check dams to temporarily reduce the velocity of concentrated storm water flows in a channel or ditch, thereby reducing erosion and allowing sediment to settle out of the water. Remove trapped sediment to an appropriate disposal site. Line channel with rock or grass as a permanent measure and remove check dam. [Appendix B-9]

Permits Possibly Needed:

- 404 CWA permit from COE for any instream work. Bank stabilization work qualifies for a COE General Nationwide Permit No. 13. Regional General Permit 1 may also apply to sediment reduction measures at water crossings.

- DFG 1601 Agreement for instream work (includes bank and riparian areas).

- For Emergency erosion repair and control, see Chapter 8 – Fixing an Emergency.

DITCH SHAPING AND CLEANING 3-A-3

Definition: Ditch: a facility, typically parallel to the road, which carries stormwater runoff from a county facility and/or adjacent properties; it is not a channelized stream or a fish-bearing stream.

Description: This action includes the use of equipment for cleaning, reshaping, and stabilizing ditches. Ditches are needed along insloped roadways to intercept and carry non-stream flows to a location where the flow can be safely dispersed downslope, predominantly by way of ditch relief culverts (see section 4-E). Drainage options from county roads are often quite restricted due to potential conflicts with downslope property owners and land uses. The goal of routine ditch maintenance is to keep the ditchline free flowing. Subsequent actions include loading, hauling, and disposing of excess materials. This activity is performed in all weather. Material is removed to an appropriate location for disposal or storage (see Chapter 5).

Environmental Concerns:

- Discharge of sediment into a ditch, which may discharge into a stream or storm water drainage system that contains fish or contributes resources that support fish.
- Discharge of sediment into a stream from erosion within the ditch.
- Road surface erosion or roadway failure due to a plugged ditch or ditch relief culvert.
- Rerouting water into a stream above its normal carrying capacity and causing channel adjustments.
- Removal of riparian vegetation or damage to aquatic habitat.

Best Management Practices:

1. Grade ditches only when and where necessary, since frequent routine mechanical grading can cause erosion of the ditch, undermine banks, and expose the toe of the cutslope to erosion. Do not remove more grass and weeds than necessary to keep water moving, as vegetation prevents scour and filters out sediment.

2. Ditch spoil can be windrowed at the inside road shoulder for later endhauling by loader, backhoe, and/or truck. Never sidecast material into a waterway or the adjacent riparian area. Dispose of removed material at safe spoil disposal sites and not within any waterway, wetland, or riparian area. [See: Chapter 5 – Disposing the Spoil].

3. Adjust BMPs for ditch cleaning according to the area in which the work is being performed, that is, more stringent for an area near or hydrologically connected to a stream or drainage system (including lower order watercourses), and less for areas not connected. [See: Figure 1-2.]

4. Use erosion control devices, such as check dams, sand/gravel bag barriers, and other acceptable techniques, when it is neither practical nor environmentally sound to disperse ditch water immediately before the ditch reaches a stream. These sediment catchment facilities require routine maintenance to be effective. [Appendix B-9]

5. Minimize impact to existing vegetation on the cutbank above the ditch. If erosion from the cutbank is causing the ditch to fill with sediment, perform appropriate erosion control measures. Ditches functioning as rock fall areas, as opposed to drainage facilities, do not need to be treated. [Appendix B-4.]

6. When possible, perform ditch work in dry weather to minimize environmental impacts, and consult with appropriate county staff members if silt devices are inadequate to filter water prior to draining to watercourses.

7. Recycle excavated material when feasible. [See: Chapter 5 – Spoil Disposal]

8. Add filtering devices along the ditches or at the ditch relief culvert inlets. [Appendix B]

9. Retain water in its drainage of origin, to the extent practical, to avoid creating unwanted downstream impacts, using downslope opportunities that may be available.

10. Maintain artificial drainage ditches to prevent development of new wetlands by keeping water moving and preventing establishment of wetland plants, which can impede the permitting of ditch maintenance practices.

Permits Possibly Needed:

- Jurisdiction under CWA 404 may depend upon the following:
  - When a natural drainage channel (even an ephemeral stream) flows into a drainage ditch, then the ditch becomes a "water of the U.S." and requires 404 permitting.
  - Tidal drainage ditches and ditches through wetlands are "waters of the US" also.
  - If the ditch only collects rainfall off of the road, then it is not a jurisdictional water.
- If not reshaping the ditch but cleaning only (including removal of sediment, debris and vegetation), then the practice may be considered maintenance only and is exempt from the 404 permit process. See Corps' definition of maintenance exemption (33 CFR 323.4) if needed.
  - Ditch must be returned to its original dimensions and configuration.
- If reshaping a ditch, County may need CWA 404 permit from COE – General Nationwide Permit No. 41 – "Reshaping Existing Drainage Ditches".
  - Design capacity or area drained cannot be expanded.
  - Centerline of reshaped drainage ditch must be essentially in the same location as the centerline of the existing ditch.
  - Does not authorize reconstruction of drainage ditches that have become ineffective through lack of regular maintenance.
  - Notify COE if greater than 500 feet in length.
  - No mitigation required.
- CWA 401 Water Quality Certification permit from RWQCB
- Coastal Zone: Exempt from coastal development permit unless subject to review under Section 1601 of the Fish and Game Code, or excavation or disposal of fill is outside of the roadway prism.

CHANNEL MAINTENANCE 3-A-4

Definition: A channel is different from a ditch in that a channel is a facility that collects drainage water parallel or perpendicular to the roadway. A channel may or may not be a natural stream but intercepts and conveys natural flow.

Description: This action includes cleaning and repairing existing channels, as well as placing riprap to restore the grade. Drainage options from county roads and channels are often quite restricted due to potential conflicts with downslope property owners and land uses.

Environmental Concerns:

- Impacts on listed aquatic species.
- Discharge of sediment or debris into a channel, which may discharge into a stream or storm water drainage system.
- Rerouting water into a stream above its normal carrying capacity and causing channel adjustments.
- Removal of riparian vegetation and aquatic habitat.

Best Management Practices:

1. Installation of new sections of riprap in existing drainage systems (i.e., in systems acting as streams) will be considered significant action, and is not addressed within this manual.

2. During replacement of significant sections of riprap within drainage channels acting as streams, employ bioengineering solutions where the structures are stable and not cost-prohibitive. [See Appendix B-7]

3. Remove any excess material from channels after maintenance actions are completed and place in locations that will not reenter the drainage system, away from channel banks, riparian areas, wetlands, and waterways. [See Chapter 5- Spoil Disposal]

4. Within stream systems supporting sensitive fish species, perform work during the window of time that will have the smallest impact. See Table 1-2 for salmonid life cycle timing.

5. During any in-water work, minimize sediment impacts and ensure that fish stranding does not occur. [See Appendix B-9 for sediment control measures and B-5 for fish rescue practices.]

6. Use clean rock sources for channel maintenance work.

7. Retain water in its drainage of origin to the extent practical during channel maintenance for existing roads, using downslope opportunities that may be available.

Permits Possibly Needed:

When replacing riprap within original footprint, these permits may be required:

- CWA 404 permit from COE – NWP #13
- CWA 401 from RWQCB, if 404 needed
- DFG 1601 agreement
- Consultation with NMFS
- Coastal Zone: Exempt from coastal development permit unless subject to review under Section 1601 of the Fish and Game Code, or excavation or disposal of fill is outside of the roadway prism.

3-B ROAD SURFACING & DUST ABATEMENT

One objective of working on a road surface, paved or unpaved, is to keep pollutants from discharging into watercourses. For paved roads, pollutants include asphalt and concrete products, as well as oil and fuel from surfacing equipment. On unpaved roads, the main pollutant is sediment. Dust control or abatement helps reduce erosion caused by wind or storm water runoff. In dry climates, several applications of water may be used each day. Water drafting is often required to supply the needed water for dust abatement. When drafting water from a stream system, it is important to use a screen at all times to prevent the taking of adult or juvenile fish and to ensure that adequate water is left in the stream for use by fish that may be present. Low water stream crossings also must address possible sediment and fish impacts.

Topics addressed in this section are:

3-B-1 Surface Work

3-B-2 Dust Abatement

3-B-3 Water Drafting

3-B-4 Low Water Crossing Maintenance

SURFACE WORK 3-B-1

Description: Surface and inlay repair includes all repairs of road bases, surface, and shoulder irregularities, including asphalt and concrete surfaces. Asphalt plant production includes production of asphalt for patching materials, staging, moving, stockpiling and setup of asphalt plants. During on-site road grading, paving, surfacing or resurfacing, and asphalt removal activities, the proper management of concrete, asphalt, and seal coat can minimize or eliminate discharges of pollutants into watercourses.

Environmental Concerns:

- Discharge of the following materials into the stream or storm water drainage system: sediment, asphalt concrete binder, asphalt cement, liquid asphalt, asphalt concrete (AC), asphaltic emulsion, sealant material, Portland cement concrete (PCC), concrete rinse water, concrete grindings and cuttings, concrete waste, diesel oil.

- Harm to riparian vegetation adjacent to stream.

Best Management Practices:

1. Eliminate diesel and use only environmentally sensitive cleaning and releasing agents.

2. Use heat sources to heat and clean tack nozzles during operations.

3. Avoid road surface maintenance during wet weather to minimize the discharge of potential pollutants into the storm water drainage system. However, during periods of rain, road surface maintenance may be necessary.

4. Cover storm drain inlets and manholes when paving or maintaining road surfaces if runoff is anticipated.

5. Identify drain inlets and watercourses both upstream and downstream of the work site. Identify where the flow of a leak, spill or other runoff would go.

6. Protect waterways with straw bales, sandbags, filter fabric, or other diversion or filtering controls. [Appendix B-9]

7. Set-up the work area to minimize the tracking of material by vehicles and equipment in or out of the work area.

8. Always park paving machines over drip pans or absorbent materials. Keep equipment out of the riparian area.

9. A spill contingency plan and resources to contain a small to moderate spill (1-10 gallons) shall be in place. Carry adequate erosion control supplies and oil absorbent materials (diapers, kitty litter, shovels, etc.) to keep materials out of water bodies.

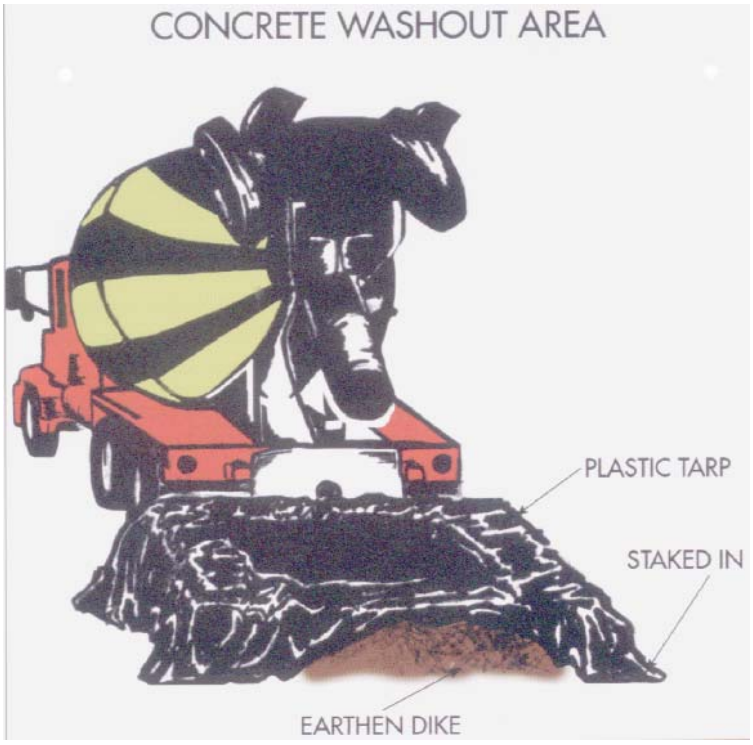
10. Dispose of excess material at appropriate sites, depending upon material being disposed. Keep material out of the riparian area. [See: Chapter 5 - Spoil Disposal and Stockpiling]

11. Asphalt concrete (AC) chunks and pieces may be used in embankments when these materials are placed where they will not enter the waters of the state. Keep material out of the riparian area.

12. AC pavement grindings may be used as road shoulder backing when these materials are placed where they will not enter the water of the state. Keep material out of the riparian area.

13. Follow these best management practices for concrete mixing on site:

    a. Ensure that contractors who fuel and operate asphalt plants or cement mixing operations on site have an adequate spill plan and materials for spill containment.
    b. Mixing excess amounts of fresh concrete or cement on site should be avoided.
    c. Establish mixing plants outside of riparian corridors.
    d. Dry and wet materials should be stored away from waterways and storm drains and should be covered and contained to prevent runoff from rainfall.
    e. Ensure that contractors provide areas for truck chute cleanout with proper containment of wet concrete.
    f. Protect inlets and catchments from fresh concrete.



14. Make inspection an ongoing practice:

a. After rainfall events, inspect drainage protection measures. In the case of an extended storm, inspect at least once per day. If the protection measures are subjected to non-stormwater flows, inspect daily.
b. Inspect inlet protection to prevent water from backing up. If back-up occurs, the protection needs to be replaced with an alternative device.
c. Monitor the concrete wash-out, waste storage and disposal sites and on-site procedures at least weekly.
d. Make sure employees and contractors are following pollution control measures.

Permits Possibly Needed:

- None required for surface work
- Temporary concrete batch plant may need a County Use Permit and air quality permit from Air Quality District.
- Note: Air quality rules by California Air Resources Board prohibit the use of serpentine rock and asbestos-containing aggregate for unpaved surfacing.
- To ensure that aggregate is asbestos-free, outside contractors paid to resize and/or crush rock must have MSHA (Mining Safety and Health Administration) 46 Identification number.

DUST ABATEMENT 3-B-2

Description: Dust abatement involves application of dust palliative to non-paved road surfaces to temporarily stabilize surface soils, leading to a reduction in erosion caused by traffic, wind, or storm water runoff. Palliatives are applied in liquid form and could include water, calcium magnesium acetate, magnesium chloride, emulsified asphalt, or lignin sulfonates.

Environmental Concerns:

- Discharge of sediment or dust abatement chemicals into a stream or storm water drainage system.

- Pumping water from streams for dust abatement can reduce flows to levels that harm fish and aquatic life.

Best Management Practices:

1. Do not apply chemical dust palliatives during rain or immediately before anticipated rain to lower the risk of running off into a watercourse.

2. Apply methods and materials in a matter that is not detrimental to either water or vegetation. See Table 3-B-2.1 below for selection criteria and recommended application rates.

3. Use environmentally friendly dust palliatives where warranted.

4. Carry adequate spill protection materials when applying chemicals.

5. Use environmentally sensitive cleaning agents.

6. Dispose of excess materials at appropriate sites. Never dispose of materials in the riparian area or the floodplain.

7. Avoid applying excessive amounts of water onto road surface to prevent sediment runoff into ditches and the stream system.

8. When applying chemical dust palliatives, follow these site preparation practices:
    A. Blade and compact a smooth surface. Never sidecast the surface material where it could be delivered directly or indirectly into a stream.
    b. Crown or slope the surface to avoid ponding. Compact soils if needed.
    c. Pre-wet the surface uniformly with water @ 0.03-0.3 gal/sq. yd.
    d. Apply the first treatment under pressure and overlap solution (6-12 in.). Apply the second treatment, before first treatment becomes ineffective at 50% application rate.
    e. Allow treated area to cure 0-4 hours. Compact area after curing.
    f. Reactivate chemicals in low humidity by re-wetting @ 0.1-0.2 gal/ sq. yd.

Table 3-B-2.1. Selecting and Applying Dust Abatement Chemicals

Method	Selection	Recommended Application rate
Chemicals-Inorganic		
Water	- most commonly used practice - evaporates quickly - lasts less than 1 day	0.125 gal/yd^2 every 20 to 30 minutes
Salts - Calcium Chloride (CaCl)	- restricts evaporation - lasts 6-12 months - can be corrosive - less effective in low humidity - can buildup in soils and leach by rain	Apply 38% solution at 0.27 gal/ sq.yd., or as loose, dry granules per manufacturer.
- Magnesium Chlorite (MgCl)	- better in higher temps and humidity - more costly than CaCl	Apply 26-32% solution at 0.5 gal/ sq.yd..
- Sodium Chloride (NaCl)	- not as effective - less expensive - corrosive - less effective in low humidity	Per manufacturer.
Silicates	- generally expensive - available in small quantities - requires at least two applications	
Surfactants	- short effectiveness period - high evaporation rates - must apply frequently	
Chemicals-Organic		
- Copolymers	- form semi-permeable, transparent crust - resist ultraviolet radiation and moisture induced breakdown - last 1 to 2 years	80-100 gal/ac.
- Lignin Sulfonate	- acts as dispersing agent - best in dry climates - can be slippery	Loosen 1-2 in of surface. Need 4-8% fines on first application.
- Spray-on Adhesives	- available as organic or synthetic - effective on dry hard soils - form a crust - can last 3 to 4 years	Per manufacturer.

(Taken and modified from San Francisco RWQCB (1999), Erosion and Sediment Control Field Manual, Table 1)

WATER DRAFTING 3-B-3

Description: Water drafting is a short-term, small portable pump operation that withdraws water from the streams or impoundments to fill tank trucks or trailers for the purposes of dust abatement or related water use needs for road maintenance practices. Typically, operators pump at or near maximum rates to limit down time and to maximize the amount of road surface that can be watered in a given period but the drafting rate can be adjusted. Official criteria for pumping and fish screening protections may change as biological knowledge improves and/or state or federal regulations change. Both NMFS and DFG have developed water drafting specifications that need to be followed - see Appendix D.

Environmental Concerns:

- Taking fish, particularly fry-size salmonids, from the stream system due an unscreened or inadequately screened diversion.
- Reducing flows or dewatering streams to levels that harm fish and other aquatic life.
- Increasing the water temperature due to over-drafting of the stream.
- Discharge of sediment into stream system caused by runoff from water spills at unsurfaced streamside drafting site for water truck

Best Management Practices: See: Appendix D

1. Seek drafting sites at streams and pools where water is deep and flowing, as opposed to streams with low flow and small, isolated pools. Do not draft water from the stream if any of the following conditions would result:
   a. bypass flows within the stream are less than 2 cubic feet per second
   b. pool volumes at the water drafting site would be reduced by 10% or more
   c. instantaneous diversion rate exceeds 350 gallons per minute
   d. pumping rate exceeds 10% of the stream flow
   e. fish may become stranded or adequate fish screens cannot be put in place.

2. Where seasonal drafting locations on Class I and Class II streams cannot meet the above conditions, develop appropriate off-stream reservoirs or adjacent watering hole or sump, or use existing fire hydrants. The county may propose to draw down Class I and II streams below the flow and pool volume conditions stated in #1 if DFG determines that such actions will not have an adverse impact on Class I beneficial uses downstream.

3. Draft water from Director-approved County sites. For each approved site:
   a. Describe and map the proposed water drafting location
   b. The watercourse or lake classification
   c. The general drafting location use parameters (i.e., yearly timing, estimated total volume needed, estimated total uptake rate and filling time)
   d. Recgonize the effects of the pumping operations proposed, particularly during dry and critically dry years.
   e. Proposed alternatives to prevent adverse effects (e.g. reduction on hose diameter, reduction in total intake at one location, described allowances for recharge time, and alternative water drafting locations).
   f. Plans for fish screening design, installation, and maintenance.

4. Provide adequate fish screening of each surface water diversion in Class I and II waters. Follow the latest, updated "Water Drafting Specifications" by NMFS and "Guidelines for Temporary Water Drafting from Watersheds Supporting Anadromous Salmonids" by DFG (see Appendix D). In general, these practices address the following:
   a. Design screens to prevent the entrainment or impingement of all life stages of fish or amphibians and to minimize adverse alterations to stream habitat. To be addressed are approach velocity (velocity of water through the screen openings), size of screen (proportional to diversion rate), and screen opening size (not usually larger than 3/32" in diameter). Work with County Engineer in this design or purchase NMFS / DFG approved pre-built fish screens for temporary sites.
   b. Use the screen on the pump intake whenever surface water is diverted in Class I and II waters.
   c. Orient the screen face parallel to flow for best screening performance. The approach velocity shall not exceed 0.33 cubic feet per second at any point on the screen surface. Submerge the screen below the water surface, with clearance above and below of at least one screen-height.
   d. Clean the screen to be free of accumulated algae, leaves or other debris which could block portions of the screen surface and increase approach velocities at any point on the screen.
   e. Keep the screen in good repair.

5. Surface the road approaches to drafting sites on streams with rock or other suitable material to avoid the generation of sediment-carrying runoff due to water spills or rainfall.

6. Require water drafting operators to keep a water diversion log on the water truck which records the operator's name, date, time, location, pump rate, filling time, screen cleaning and inspection, and bypass flow from the source stream.

7. Ensure that water drafting operators and county engineer have completed training by DFG, NMFS, or other appropriate entity in the above practices.

Permits Possibly Needed:

- DFG 1601 Agreement

LOW WATER CROSSING MAINTENANCE 3-B-4

Description: This practice involves maintaining fords of perennial, ephemeral or intermittent streams or channels which can be wet ("wet fords") or dry at different times of the year. Fords within the stream channel are typically made of permeable trench drains of coarse cobbles and boulders. Annual maintenance involves regrading the access ramps into the stream channel, while repair work involves replacing the entire washed-out ford after an extreme flood event. Streams with high stream banks require the maintenance of substantial "through-cut" ramps to get vehicles down to the streambed.

Environmental Concerns:

- Discharge of sediment into the stream or drainage system.
- Continuous clouding (persistent turbidity) of the stream due to high traffic disturbance of fine sediment within the stream channel or on the access road, and downstream deposition.
- Discharge of oil products from vehicles passing through deep water crossings
- Barrier to migrating fish at crossing and direct mortality of fish from vehicles instream

Best Management Practices:

1. Armor the road approach to the crossing with clean rock aggregate or paved surfacing to minimize erosion into the stream. When rocking, use coarse rock armor to protect the outer edge of the road bed.

2. Within the ford, use aggregate large enough to resist transport during winter flows. Protect the fill face on the downstream side of the fill with rock armor or a large overside drain (berm drain) to prevent erosion.

3. If traffic is more than infrequent, pave wet fords to maintain water quality if funding and permits are available. Paving consists of a concrete, slightly dish-shape slab across the watercourse, and a discharge apron or energy dissipator on the downstream side to prevent scour during high flows. Design the structure to pass both sediment and debris during high flows. Be aware that concrete fords tend to have scour around their edges, leaving the ford elevated and impassable. They also can be moved downstream during large flood flows.

4. Evaluate how to best eliminate low water crossings through a practical and economically feasible alternative, such as road relocation or permanent culverts or bridges, and implement the best option if supplemental funding is available. Base priorities on:
   a. where it fits within the infrastructure needs of the county;
   b. erosion and sediment potential of site as identified in County Road Erosion Inventory;
   c. degree the site serves as a barrier to anadromous fish passage; and/or
   d. degree the site cuts off access in winter and high flow periods for inspecting and maintaining the county road and drainage structures beyond the crossing.

5. Maintain riparian vegetation adjacent to the crossing site.

6. If possible, limit the use of the road crossing during the winter period and encourage an alternate route on public roads.

Permits Possibly Needed:

- DFG 1601 permit for repair or reinstallation of an instream low water crossing.
- CWA 404 permit from Corps of Engineers for any instream work.
- CWA 401 Water Quality Certification from RWQCB / SWRCB if 404 permit needed.
- NMFS consultation for instream work.

3-C VEGETATION MANAGEMENT

Vegetation management typically includes:

- Mechanical: using equipment such as mowers, chain saws, brushers, etc.
- Biological: using a natural predator to control the pest (flea beetle or Cinnabar Moth to control tansy ragwort, for example)
- Cultural: incorporating native, or more appropriate, plant material to out-compete the pest
- Chemical: use of herbicides and pesticides. However, none of the county road departments in the region presently apply such chemical treatments.

Note that noxious weed abatement may be required by the County Agricultural Commissioner. An Invasive Weed Management section will be added at a later date but is beyond the current scope of this manual.

In the future, the County should encourage the development of a Vegetation Management Plan. Each plan should typically include:

- Goals and objectives for Vegetation Management
- Maps of roads and management zones
- Methods (in some cases by mile point) to be used to control vegetation
- Reports
- Best Management Practices

The county should incorporate routine maintenance activities into the Vegetation Management program.

3-C-1 Mowing and Cutting

3-C-2 Tree Removal

3-C-3 Invasive Weed Management *(to be prepared in future)*

MOWING AND CUTTING 3-C-1

Description: These actions are designed to restore sight distance, reduce ice (due to shading) and to control/prevent slope failure. These actions involve mechanical mowing, trimming, removal of brush and cleanup.

Environmental Concerns:

- Excessive removal of vegetation can cause soil erosion or loss of riparian vegetation.
- Removal of rare plants, scenic trees, privacy & vegetative screens.

Best Management Practices:

1. Leave cut brush in riparian areas in place to minimize erosion, where doing so does not interfere with sight distance, create safety issues, cause fire hazards, involve noxious weeds or impair the proper functioning of road features, such as drainage.

2. Limit mowing to no more than 8 feet off edge of pavement in significant resource areas, unless needed to maintain proper functioning of road features, such as drainage.

3. Maintain shade trees along streams and rivers, unless those trees are hazard trees, could potentially impact bridge structures, or could impact line of sight. If trees provide shade or bank stabilization and are determined to be danger trees that must be removed, coordinate tree removal with DFG, CDF or other regulatory agency.

4. Remove only brush within 20 feet (on either side) of the road and under all bridge structures. All other brush not within County clear zones will be left in its current condition, unless the brush interferes with sight distance, shades the structure, or the brush is a noxious weed (e.g. scotch broom). Mapping of sensitive resource areas may lead to additional areas not being brushed.

5. On culverts 6 feet or greater, remove 10 feet of brush on both sides of the culvert, on the upstream end of the culvert and 10 feet on both ends on the downstream side, unless the brush around the culvert is noxious weed.

Permits Possibly Needed:

- Comply with County Tree Ordinance, County Herbicide/Pesticide Ordinance and regulations, and other relevant local ordinances.
- DFG 1601 agreement may be needed if working within riparian zone.
- Coastal Zone: Vegetation control is exempt from a coastal development permit for maintenance treatment of all vegetative material growing native within the highway rights-of-way. Included is cutting and trimming by hand and mechanical means.

TREE REMOVAL 3-C-2

Description: The appropriate county staff identifies and county maintenance crews remove hazard trees. County maintenance also removes trees from forested areas where the trees on unstable slide areas have the potential to reach the highway. They also may remove trees from designated fuelbreaks adjacent to county roads. County maintenance occasionally removes trees that threaten to fall, and in falling or uprooting, remove large portions of bank area. Large tree removal within a "clear recovery zone" adjacent to roads may sometimes be required under AASHTO's safety rules when road projects are federally-funded.

Definitions: Hazard Tree: Trees or snags on or near the highway that are found to be weakened, unsound, undermined, leaning, or exposed so they may fall across the highway, impair sight while driving, or damage structures within the near future (2-3 years). Mature tree: a tree with width greater than a 12-inch (30cm) diameter at breast height (dbh).

Environmental Concerns:

- Excessive or inappropriate removal of trees can lead to soil erosion and/or loss of riparian vegetation or habitat.
- Potential loss of trees as a source of large woody debris (LWD) in stream system
- Aesthetic concerns about loss of scenic trees.

Best Management Practices:

1. Maintain all riparian shade trees and other vegetation along streams or rivers unless those trees are "hazard trees" or within road-related, shaded fuelbreaks as described above. Where possible, attempt to maintain these suggested buffer strips:
   Stream Class I - 100 feet
   Stream Class II - 50 feet

2. When removing mature trees in riparian areas, replant two native, site-appropriate trees for every tree removed. Ensure that the replanted trees will not pose a future threat to county structures. Leave the downed tree in the riparian corridor for recruitment as large woody debris, as long as it does not pose an immediate threat to infrastructure or property downstream.

3. When permission to remove hazard trees cannot be obtained, it is necessary to trim and do whatever else is reasonable to alleviate the hazard.

Permits Possibly Needed:

- Comply with County Tree Ordinance.
- Federal Lands: Tree removal adjacent to County roads going through federal lands may need to be cut as part of a formal timber sale by the USFS or BLM. This action triggers NEPA review, ESA biological assessment, and possibly consultation with USFWS.
- Private Lands: Contact local CDF office to see if the proposed quantity, location and use of trees to be removed require a permit under the State Forest Practice Rules.

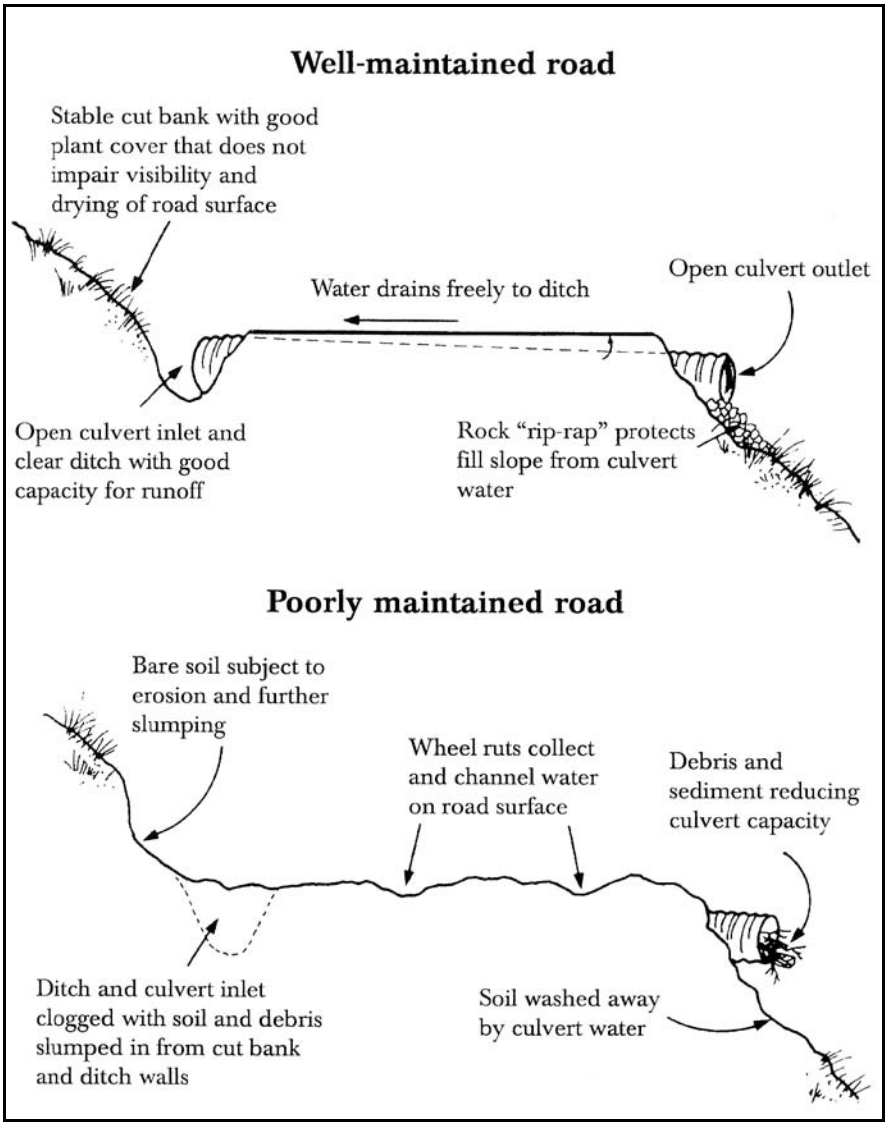
- Coastal Zone: Vegetation control is exempt from a coastal development permit for maintenance treatment of all vegetative material growing native within the highway rights-of-way. Included is cutting and trimming by hand and mechanical means.

3-D WINTERIZING ROADS

Introduction

Each year before the winter season the county monitors its paved and unpaved county roads within the priority system of the county and the resources available. It has always been in the county's interest of maintaining safe, open roads to prevent roads from washing out due to plugged culverts and other problems. An additional interest in not leaving roads with clogged culverts and ditches during the rainy season is that this lack of maintenance may lead to increased levels of sediment discharging into streams.

3-D-1 Winterizing Roads



Source: Oregon State Univ. (1998). Watershed Stewardship Guide.

WINTERIZING ROADS 3-D-1

Description: Winterizing includes preparing and inspecting the drainage conditions of all permanent, seasonal, and temporary roads– including the low traffic ones that may receive minimal year-round maintenance - for the coming rains. Activities included in the winterizing process consist of maintenance and erosion work necessary to drain the road surface, to open all culverts to their maximum capacity, and to ensure that ditches and drains are free flowing.

Environmental Concerns:

- Discharge of sediment into a stream or storm water drainage system.

- Plugging of culverts, inlets, and trash racks with debris & sediment could cause the road to wash out and deposit sediment into stream systems

Best Management Practices:

1. Clean floatable debris and sediment accumulations around culverts, drop inlets, and trash racks. [See: 4-A Culvert Cleaning; 4-B Culvert Improvement]

2. Remove soil and debris in ditches and trim vegetation that impedes ditch flow. [See: 3-A-3 Ditch Shaping & Cleaning; 3-A-4 Channel Maintenance; 3-C-1 Mowing & Cutting]

3. Excavate all unstable or potentially unstable fills and sidecast that could fail and enter watercourses during the winter period. [See: 3-A-1 Shoulder Blading & Rebuilding ; 5-A-2 Disposal Site Maintenance]

4. Culvert cleaning should be performed on a regular basis, usually just before the wet season begins. [See: 4-A Culvert Cleaning]

5. Apply erosion repair and control to bare ground where dirt may wash into ditch and stream system. [See: 3-A-2 Erosion Repair & Control]

Permits Possibly Needed:

- See relevant sections referenced above for possible permits needed