7. Control of Road Drainage (PRACTICE: 2-7)

a. Objective: To minimize the erosive effects of water concentrated by road drainage features; to disperse runoff from disturbances within the road clearing limits; to lessen the sediment yield from roaded areas; to minimize erosion of the road prism by runoff from road surfaces and from uphill areas.

b. Explanation: The intended purpose of a road, and management thereof, includes consideration of the vehicles expected and allowed to utilize the road. The resultant design of the road is based on the expectations that: occupants of design vehicles can safely maneuver on the road to access the intended resource or destination, forest resources are not negatively impacted, the road can be constructed within budget, and maintained to protect its capital investment. The protection of capital investment is most effectively achieved through proper design and use of drainage methods to control runoff from both the road surface itself, and area upslope. All are balanced to achieve the best possible scenario; one objective is not met at the expense of another. Mitigation measures are incorporated when impacts are expected to occur.

Although this practice was originally intended to be utilized for new road construction, it can serve as a guide for subsequent road reconstruction and maintenance. The practice of forest road location and design requires a careful examination of all road site properties, including but not limited to: soil characteristics above, at, and below the road; grade of road; surface composition; side slope(s); quantity and quality of vegetation above and below the road; proximity of road to waterways, TES habitat, private property, and cultural resources. An interdisciplinary team (IDT) approach confirms the presence or absence of relevant resources. For roads scheduled to undergo reconstruction or maintenance, a smaller IDT can be effective in confirming site properties above, while identifying methods that have contributed negatively to water quality. The designer and hydrologist review location, design criteria, and jointly recommend mitigation measures for Forest Engineer and Line Officer review and approval. Line Officers are informed of all costs associated with drainage controls that protect water quality, in addition to protecting the road investment. Only approved drainage features are incorporated into the project plan.

c. Implementation: Use project level science-based travel analysis to identify necessary road construction, or to inform priorities for roads to be reconstructed, maintained or decommissioned. For projects or plans that have identified roads requiring improved drainage controls for protection of water quality, consider methods that differ from in-place methods: ie. outslope prism with graded dips in lieu of berms, and insloped prism with ditches and culverts. As in road location and design, all site properties are considered, as there is no one method that meets all needs.

A number of treatments can be used, alone or in combination, to prevent or control unacceptable effects of road drainage. Methods used to reduce erosion include but are not limited to such controls as construction of properly spaced cross drains, waterbars, or rolling dips; installing energy dissipaters, apron, downspouts, gabions, flumes, overside drains and debris racks; armoring of ditches, drain inlets, and outlets and removing or adding berms to control runoff. Accomplish dispersal of runoff on the road surface by such means as rolling the grade, outsloping or crowning. Installing water

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Comment [WW1]: The meaning if this is unclear. Why don't they say the road, or the road prism, or the road right-of-way? This term makes it sound like it refers to new road construction, but this should apply to all roads, not just new ones.

Comment [WW2]: The objective should be to minimize, not to lessen sediment delivery.

Comment [WW3]: They should specifically add stream crossings to this list. Stream crossings are one type of road drainage structure. They should add something like: "minimize erosion and the threat of erosion at stream crossings." This would include culvert upgrading, protection from plugging, minimizing outlet erosion, eliminating the potential for stream diversion, etc. Unless they have another BMP for stream crossings, this is where that item belongs.

Comment [WW4]: This entire section is a copy (with slight rewording) of the same sections in Practice #2-1, General Guidelines. All my comments there apply here. This is not a BMP and doesnt even uniquely address the topic of road drainage. This section should be revised to specifically address road drainage.

Comment [WW5]: So, where is the BMP for this activity? This is **the** activity that needs to occur, and without which not much else matters. It is generally addressed in Practice 2-1, but only generally. See my comments for that section to get a flavor of what is needed. Unfortunately, in this sentence it states that they will identify road priorities and treatments as a result of "project level" travel analysis. This is piece-meal ... [1]

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Comment [WW6]: The meaning of the term "in-place methods" is unclear and undefined.

Comment [WW7]: This statement is too vague to have practical usefulness. There is no guidance or standard here.

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Comment [WW8]: Ideally, you don't want to "control the unacceptable effects of road drainage;" you really want to control road drainage so you don't ... [2]

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Comment [WW9]: I have never heard of an "overside debris rack."

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spreading ditches or contour trenching can disperse road water after the water leaves the road surface. Wherever possible, locate dispersed drainage to take advantage of the absorptive benefit of down slope vegetative ground cover.

In some circumstances, hardening the road surface can reduce surface erosion, but results in more concentrated runoff flows. Reduce sediment loads from road surfaces by adding aggregate or paving surfaces or by installing such controls as: sediment filters, settling ponds, and contour trenches. Soil stabilization can reduce sedimentation by lessening erosion on borrow and waste areas, on cut and fill slopes, and on road shoulders.

The hydrologist and geologist works with the engineer to seek more effective yet feasible method(s) when they determine that road reconstruction, reconstruction, maintenance or decommissioning requires a modification from existing drainage methods, Design of road drainage features supports land management plans and overlaying amendments for proximity to waterways or locations in specific soil zones and terrain. The road drainage features provide the greatest benefit within available funding limits.

During activity, and after completion, the work is monitored and evaluated for effectiveness. Project crew leaders and supervisors are responsible for ensuring that force account projects meet construction specifications, and project criteria. Contracted projects are implemented by the contractor, or operator. Compliance with plans, specifications, and operating plans is ensured by the COR, ER, or FSR.

Proper construction and installation of drainage features is crucial to success in reducing impacts to water quality. Training may be required to educate construction and maintenance personnel who will be involved in the modified drainage controls implementation.

Installation of permanent drainage controls is addressed in several sections of the current edition of FHWA Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects.

Comment [WW10]: This list of generic practices is incomplete and lacks detail. What is needed are specific details about which practices should be implemented for specific types of situations

Comment [WW11]: This is not necessarily true. If the road is outsloped it can be hardened without concentrating runoff.

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Comment [WW12]: This was already covered in Practice #2-4. We are supposed to be talking about runoff control here.

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Comment [WW13]: This implies that cost is the controlling variable, not performance. If the correct and best solution (BMP) is too expensive, it won't be used. The Water Board has NEVER (to my knowledge) taken this tack when deciding if and how water quality is to be protected.

Comment [WW14]: Okay, so is this where stream crossings are addressed…? If so it should be explicitly stated at the very beginning of this Practice, with precise reference the intent language and BMP construction standards for elements not covered by this particular Practice.

Page 1: [1] Comment [WW5] **Bill Weaver** **7/2/2010 11:28:00 AM**

So, where is the BMP for this activity? This is **the** activity that needs to occur, and without which not much else matters. It is generally addressed in Practice 2-1, but only generally. See my comments for that section to get a flavor of what is needed. Unfortunately, in this sentence it states that they will identify road priorities and treatments as a result of "project level" travel analysis. This is piece-meal project-by-project planning and wholly inadequate to inform the process of watershed-wide and Forest-wide water quality threats. They need to step back and take a broader look at their transportation system.

Page 1: [2] Comment [WW8] **Bill Weaver** **7/2/2010 11:28:00 AM**

Ideally, you don't want to "control the unacceptable effects of road drainage;" you really want to control road drainage so you don't have unacceptible adverse effects. There is a real difference in how you approach these problems. Importantly, you should also focus on preventing the effects from occurring, rather than controlling the effects once they have already manifested themselves (i.e., it is easier and less costly to prevent a gully from forming than it is to control it once it hads developed). This gets at the best approach: prevention.