1. General Guidelines for the Location and Design of Roads (PRACTICE: 2-1)

a. Objective: To locate and design roads with minimal resource damage; to minimize impacts on environmental and social resources through relocation or modifications to design.

b. Explanation: Implementation of forest land management objectives drives the planning for transportation facility development. The planning effort involves interdisciplinary team members with the professional knowledge and skills necessary to propose and evaluate alternatives with respect to road location and design. Opportunities and impacts of alternatives are analyzed in a science-based travel analysis, which includes public participation.

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.

The practice of forest road location and design requires a careful examination of all road site properties, including but not limited to: existing versus desirable road density in the watershed, geology and 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, cultural resources, and climate. 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 need for road construction, or to inform priorities for roads to be reconstructed or maintained. For projects or plans that have identified roads requiring improved drainageand mass wasting controls for protection of water quality, consider methods that differ from in-place methods: ie. outslope prism with graded dips in lieu of berms orinsloped prism with ditches and culverts; realign culverts to improve flow and reduce scour at intlet and/or outlet. As in road location and design, all site properties are considered, as there is no one designmethod that meets all needs.

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Comment [DB1]: The best road location is one that is hydrologically benign and geomorphically stable within the landscape.

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Comment [DB2]: Cite where these are defined.

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Comment [TU3]: Clarify meaning of design vehicle

Comment [DB4]: The protection of capital investment is most effectively achieved through proper design and use of drainage methods to control potential mass wasting and runoff from the road prism, the road surface itself and areas both upslope and downslope.

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Comment [TU5]: This pertains to BMP for Maintenance 2-22.

Comment [TU6]: Best management practice? It appears that BMP and mitigation are being used interchangeably.

Comment [TU7]: How does cost influence implementation of BMP? The BMP must be implemented according to standards regardless of cost. Cost would determine whether or not project is implemented.

Comment [DB8]: Identify, reference protocols.

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Comment [TU9]: This BMP is about road location and design – how is this being used here. Please clarify.

During activity, and after completion, the work is monitored for compliance and evaluated for effectiveness. Training may be required to educate construction and maintenance personnel who will be involved in the modified drainage controls implementation. 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.

Comment [TU10]: What is effectiveness monitoring schedule?

Incorporation of final design for road construction or reconstruction is through project drawings, and specifications if work is contracted. Various sections of the current edition of FHWA Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects are incorporated into the contract. For force account work, BMP's are listed and approved by Line Officer signature. Crew is knowledgeable of BMP's, and the crew leader and/or supervisor assures work is carried out in compliance. Erosion control plan is part of the project work.

Comment [TU11]: Reference source of specifications.

Reference: FSM 7700, Chapter 10 – Travel Planning Manual
FSM 7700, Chapter 20 – Transportation Development Manual
FSH 7709.56 – Road Preconstruction Handbook
FP-03 – Section 157 – Soil Erosion Control
Best Management Practices 2:2 – 2:28