RESEARCH NOTES

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We would like to call your attention to the results of recently completed research. As many of you already know, our new Rockfall Hazard Rating System (RHRS) has gained wide national acceptance and international interest. Our most recent effort, a study of rockfall over ¼H:1V presplit slopes, represents the first installment in the development of a new rock fallout area design standard.

Even though many states, including Oregon, still use the Ritchie Criteria to size catchment areas, the critical Ritchie shape is usually ignored. The steep shoulder slope poses a threat to errant drivers and makes ditch maintenance difficult. The result is that catchment ditches are often built without any reasonable idea of their effectiveness. In the interest of providing safe and cost effective roadways which reduce our liability exposure, a modern rockfall catchment standard needs to be developed.

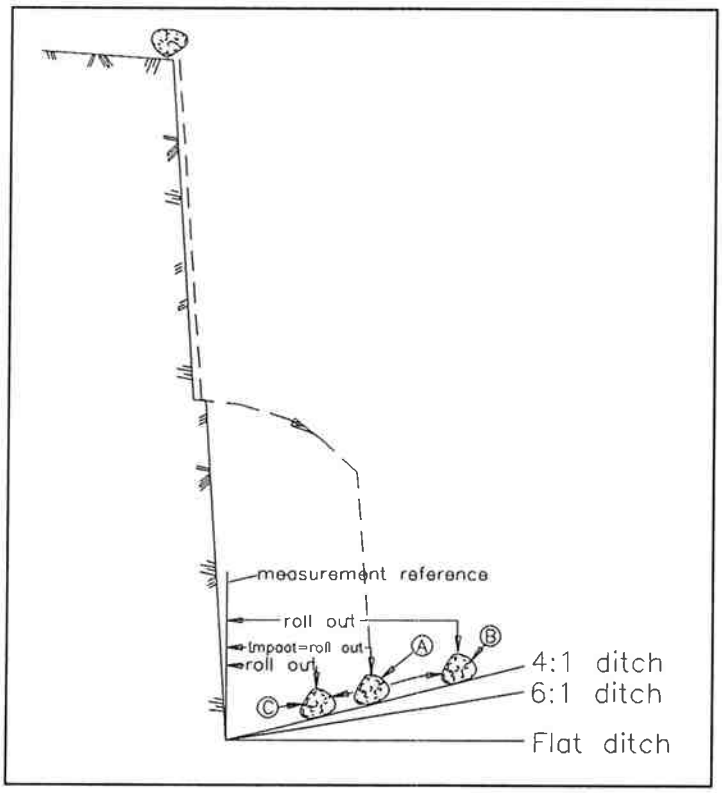

Figure 1

Our research on ¼:1 slopes was governed by some basic constraints. These were ditch shape, slope height and rock size. For a variety of reasons, modern rockfall ditches are usually constructed with uniform 4:1, 6:1 or flat bottomed bases. These begin at the paved shoulder and continue down to the base of the cutslope. We tested each of these shapes adjacent to 40, 60 and 80 ft. slopes (Figure 1). Rock types and sizes were chosen to represent those that are most commonly dealt with along highways. Rocks ranged in shape from tabular to spheroidal and measured 1, 2 or 3 ft. in at least one dimension. A suite of 275 rocks were rolled into each ditch shape for each slope height tested. In all, we rolled nearly 3000 rocks. Impact point, roll out distance and roll back were recorded.

Simple statistics were used to compare and analyze the data. A system of design charts were developed using this approach. Given the slope height and ditch shape, a designer can determine the appropriate width to provide the specified retention. In effect, a designer can select the percentage of rocks to be retained based on specific slope and ditch dimensions. We have developed these curves for 30% through 100% retention, at 10% intervals. Curves for 95% and 98% retention were also developed.

For the first time, the rock stopping ability of these typical catch ditches adjacent to presplit ¼:1 slopes is known. The benefits of this approach include:

1) The high cost of overly conservative designs can be avoided.
2) Danger due to inadequate design can be greatly reduced or eliminated.
3) Exposure to costly litigation can be greatly reduced.
4) Evaluations of existing fallout areas can be used to plan for future mitigations.
5) A site specific benefit/cost analysis can be calculated.

We are currently proposing an expansion of this effort to test 1¼:1, 1:1, ¾:1, ½:1 and vertical slopes, thereby providing a comprehensive fallout area design standard. Each slope angle will be tested with 6:1, 4:1 and flat ditches adjacent to 40, 60 and 80 ft. high slopes. Limited testing of slopes outside the more common 40-80 ft. range could be included.

If you would like a copy of the research report, entitled *The Nature of Rockfall as the Basis for a New Fallout Area Design Criteria for 0.25:1 Slopes*, please call one of the numbers listed below.

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