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Rock Retaining Walls

Rock retaining walls as a means of retaining earth or retaining drainage is becoming a common occurrence in the Cache Valley. Most contractors will say that they have been building them for years, yet there is no clear record on their performance. Some walls that appeared stable have failed, while others, which appeared to be dangerous, have been standing for years.

When designing a rock wall, several factors should be considered. Among them are:

- Is the slope a cut slope or a fill slope?
- Is the backfill compacted or placed loose?
- Has a soils engineer been involved with the analysis or recommendations?
- Does the wall support a surcharge, such as a building, road, driveway, walkway or slope?
- How steep is the rock wall?
- Is angular rock used or is it round rock?
- Is the backfill reinforced with an earth reinforcing fabric?
- Has the bottom layer of rock been set below grade, confining the rock?
- Are the rocks placed so as to provide interlocking between adjacent rocks?
- Is the wall placed so that a failure might cause injury or damage to the public or to a structure?

To safeguard life and property, The City of Logan has formatted the following guidelines for rock retaining walls.

FILL SLOPES UNDER 4 FEET IN HEIGHT

1. Any fill slope at a slope no steeper than 1 ½ to 1 (horizontal to vertical) and not supporting a surcharge, may be protected by rock of any size or shape. This constitutes erosion protection, and is not intended to be structural.
2. A change in grade of 4 feet or less may be accomplished by the use of rock or boulders placed as a "wall" provided the average rock size is at least 18 inches, the slope is no steeper than ½ to 1 (63 degrees), and the natural grade is level both above and below the wall for a distance of 4 feet.

FILL SLOPES OVER 4 FEET IN HEIGHT

A fill slope steeper than 1 ½ to 1, but flatter than 1 to 1 may be constructed as follows:

Angular rock with the lowest layer of rock confined at least 1 foot into undisturbed or compacted soils. The average rock size must be at least 1/3 the height of the wall. The wall must maintain setbacks from buildings or structures (either above or below the wall) of at least 1/3 the wall height.

A fill slope steeper than 1 to 1 must be based upon recommendations from, and inspected by, a soils consultant. In addition, the following requirements must be met:

Rock must be angular and fitted together to interact with adjacent rocks. Confinement of the lowest level of rock must be at least 1/4 the height of the wall, but need not exceed 2 ½ feet. Back fill must be compacted in lifts of appropriate thickness (not to exceed 12"). The wall must maintain setbacks from buildings or structures of at least 1/3 the wall height.

A fill slope steeper than ¾ to 1 shall not be permitted.

CUT SLOPES UNDER 4 FEET IN HEIGHT

1. Any cut slope no steeper than 1 to 1 (horizontal to vertical) and not supporting a surcharge, may be protected by rock of any size or shape. This constitutes erosion protection, and is not intended to be structural.
2. A change in grade of 4 feet or less may be accomplished by the use of rock or boulders placed as a "wall" provided the average rock size is at least 18 inches, the slope is no steeper than $\frac{1}{2}$ to 1 (63 degrees), and the natural grade is level both above and below the wall for a distance of 4 feet.

CUT SLOPES OVER 4 FEET IN HEIGHT

A cut slope steeper than 1 to 1, but less than $\frac{3}{4}$ to 1 may be constructed as follows:

Angular rock with the lowest level of rock confined at least one foot into undisturbed or compacted soil. The average rock size must be at least $\frac{1}{3}$ the height of the wall. The wall must maintain setbacks from buildings or structures (either above or below the wall) of at least $\frac{1}{3}$ the height of the wall.

A cut slope steeper than $\frac{3}{4}$ to 1 but not steeper than $\frac{1}{2}$ to 1 must be based on recommendations from, and inspected by a soils consultant. In addition, the following minimum requirements must be met:

Rock must be angular and fitted together to interact with adjacent rocks. Confinement of the lowest level of rock must be at least $\frac{1}{4}$ the height of the wall, but need not exceed 2 $\frac{1}{2}$ feet. The wall must maintain setbacks from buildings or structures of at least $\frac{1}{4}$ the height of the wall.

A cut slope steeper than $\frac{1}{2}$ to 1 shall not be permitted.