

CANYON BUILDING SITE PRESENTS UNIQUE REVEGETATION CHALLENGE

An unusual location for a building and a near disastrous landslide were just two of the many challenges of a revegetation project carried out for Johns-Manville Corp. in a canyon area 15 miles southwest of Denver.

The approach to the corporation's world headquarters follows Deer Creek Canyon, a very narrow but short canyon piercing the front range hogback. The hogback is a geologic formation of immense red sandstone monuments providing a spectacular transition from the eastern plains of Colorado into the foothills of the Colorado Rockies.

The vegetation on the project site further illustrates the transition from plains to mountains. Gambel's Oak, Mountain Mahogany, Rabbit Brush and Four-wing Saltbush are native to this area. The dominant grasses are Buffalograss, Blue gramma, Western Wheat, Crested wheatgrass and Smooth

brome. Rocky Mountain Juniper and Ponderosa Pine are the dominant trees on dry, well-drained soils while some aspens are present at higher elevations, along drainage collection points.

In this setting of magnificent geologic forms and earthen hues the architects, The Architects Collaborative Inc. (TAC), engineered a building utilizing materials made by Johns-Manville.

The natural setting and building design utilize the difficult concept of contrasting two immense visual features without subjugating either element. As a result, the beautifully strong sandstone forms and piercing clean lines of the building offset each other in spectacular fashion.

To achieve this concept in design the two primary elements must stand alone without visual interference from lesser features in the landscape. One such feature interfering with this concept was



Workmen roll out netting by hand so as not to disturb the relatively loose soil structure of the canyon wall.

GENERAL CONTRACTOR REWORK

the extensive slide area directly behind the headquarters.

After site preparation had been completed by the general contractor, a massive 200,000 cubic yard landslide occurred requiring this additional material to be incorporated into the building site and road construction. The landslide left behind a tremendous scar creating severe erosion and slide potential, as well as visual interference with the design concept.

Randall & Blake, Inc., at the direction of TAC, provided expertise to achieve the following goals as related to the slide area:

- Reduce the visual disturbance to a minimum.
- Prevent surface erosion.
- Reduce massive slide potential.
- Reduce maintenance to a minimum.
- Provide forage for resident wildlife.



A helicopter delivered all supplies to men on the project in four hours flight time.



Scar left by landslide prior to revegetation.



Workmen on hillside unload materials brought to the site by helicopter. Use of the helicopter preserved the slope from additional wear.

As a result of the massive landslide, sensing probes were placed in the slide area to monitor movement of the hillside to forewarn site managers of further slide potentials. A thorough study of the situation placed several constraints on the ensuing revegetation project.

The use of heavy equipment in this area was prohibited because it could further deteriorate slope stability. The erosion control medium could not allow moisture accumulation and subsoil percolation increasing slide potential. Access road construction was prohibited because of increased substrata disturbance as well as visual disturbance. Placement of topsoil was economically prohibitive and could increase slide potential.

Common Name	Application Rate pounds pure live seed per acre
Crested Wheatgrass	7
Intermediate Wheatgrass	3
Western Wheatgrass "Arriba"	6
Smooth Bromegrass	4
Blue Grama	6
Buffalo Grass	4
Annual Rye	2.5
Cicer Milkvetch	2
Mountain Mahogany	1.5
Sagebrush	.5
Rabbit Brush	1.5
Total PLS Pounds/Acre	38.0

Three alternative methods of revegetation were developed. Two of the methods revolved around hydroseeding the slopes and then applying a cover of wood fiber hydromulch. A helicopter would be utilized to provide access by hoisting the hydromulcher and hovering over the slide area.

After consideration of these two methods, their total cost, and potential success, a third alternative was recommended by Randall & Blake.

All seed was broadcast by hand during the spring, except the last three forbes (herbaceous plants other than grass) which were incorporated in the fall seeding period. Fertilizer with 50 pounds of available nitrogen per acre in the form of slow release was distributed by hand, as well as 1.5 tons of hay mulch per acre.

"Conwed Economy Netting" was installed as per manufacturer's recommendations but a longer and sturdier staple was substituted due to the rocky, unstable soil conditions. Finally, 1000 seedling Rocky Mountain Junipers and Gambels Oak were planted.

A second seeding in the fall utilized the same seed and fertilizer rates.

The cost of this method versus hydromulching was substantially less with the same potential success of meeting all prescribed goals.

Due to the constraints mentioned and the fact the slide area constituted a rise in elevation of 850 ft. with a run of 1350 ft., Randall & Blake incorporated the use of a helicopter to transport material to strategic locations to minimize material movement and thus excessive labor costs.

All materials were transported to the parking area at the base of the slide area. Two cargo nets with hook assemblies, eight men loading nets alternately and four men unloading at the pre-planned



Jot Carpenter (Left), Pres.-Elect of A.S.L.A., and **Dick Brickman** (Right), Pres. of ALCA, present the ALCA Environmental Improvement Grand Award to **Rick Randall**, of Randall & Blake, for his firm's reclamation project at the Johns-Manville World Headquarters Building in Colorado. This was one of thirteen Grand Awards presented at the Eighth Annual Environmental Awards Luncheon, held on Feb. 1st, at the ALCA Annual Meeting in Orlando, Florida.

points provided a smooth and continuous placement operation. With this system of operation 13 tons of hay, 11 rolls of netting, 370 lbs. of seed, 6.5 tons of fertilizer, and 80 boxes of staples were transported using only 6 hours helicopter time. Installation of seed, fertilizer, mulch and netting required 480 hours of labor time.

A fall seeding and fertilization program the first year completed the project with a stand of grass establishing itself fairly well on a site composed mostly of rocky subsoil.

The following spring, 1977 indicated a continuation toward a permanent stand of grass. The summer moisture was well below average, inhibiting optimum growth, but a survey of the slope this past fall showed a remarkable tenacious stand of grass. With a good winter and normal spring the slope will be very near to appearing much like the surrounding area.

In summary, the landslide revegetation project met all the goals set prior to construction. The slope no longer appears as a stark reminder of a nearly disastrous slide. The building lays against the foothills in grandeur overlooking the inspiring sandstone formations of the front range hogback.

A hike up the slope will illustrate the presence of a deer population through pellets and split hoof prints. Erosion is minimal and percolation will not become a problem due to the slope and vegetative association.

"The site conditions, soil, slope and aspect challenged our company (Randall & Blake) as no other site has and we feel the success in installation will be followed by an enduring natural vegetation enhancing the architectural design." **WTT**

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