

Two Decades of Resilient Flood Mitigation

Recently FEMA increased its support for mitigation activities through the new Building Resilient Infrastructure and Communities (BRIC) program.

According to the National Institute of Building Sciences (NIBS), every \$1 invested in disaster mitigation saves society \$6.¹ For more than two decades, Propex has been offering flood mitigation solutions. The case study of Abbott Wash in Mesquite, Nev., is a proven example of the resiliency of PYRAMAT 75 for flood mitigation.

In the early 2000s, Mesquite was one of the fastest-growing towns in the United States. To accommodate the growing population, multiple housing developments were constructed. Mesquite Vistas was one of the new developments, including luxury homes and an Arnold Palmer golf course.

The Abbott Wash Channel bordered one side of the development. The channel slopes needed to be reinforced to protect from erosion and sedimentation caused

by urban development and flood events. Arid and semi-arid environments are especially vulnerable to damage from flash floods due to the lack of vegetation. When it does rain, water is not absorbed quickly enough by the soil and vegetation, instead running in any direction. Stabilizing channel slopes and mitigating erosion in these environments is essential.

When the project was constructed, most stormwater drainage channels in Mesquite were unlined. To increase the channel's performance life, the project engineer included a 6-inch reinforced-concrete lining in the original plan. However, the developer wanted a long-term solution that also would complement the natural beauty of the area.

PYRAMAT[®] 75 High-Performance Turf Reinforcement Mat (HPTRM) was selected because it is a vegetated solution that offers up to 75 years of erosion control and flood mitigation. PYRAMAT 75 has been proven to greatly improve hydraulic

1. National Institute of Building Sciences: "National Institute of Building Sciences Issues New Report on the Value of Mitigation" <https://enews.nibs.org/t/r-A40041C9475B66082540EF23F30FEDED>

Abbott Wash Channel was installed in 2002 (left). A photo shows the Abbott Wash Channel's performance in February 2021 (right).



resistance limits by reinforcing vegetative root structure and providing greater stability during and beyond vegetation establishment. Additionally, PYRAMAT® was installed at approximately 22 percent of the cost of concrete, saving nearly \$1.2 million on this project.

The channel design was based on a 100-year storm event predicted to generate flow discharges of nearly 3,156 ft³/sec with an average channel gradient of 0.6 percent. Average velocities and shear stresses of approximately 13 ft/sec and 1.9 lb/ft² were calculated based on the project conditions and compared to the permissible values for PYRAMAT 75 in the unvegetated state, representing the worst-case scenario. The comparison resulted in a factor of safety of more than 1.3 for both velocity and shear stress, demonstrating that the design was well within the capabilities of PYRAMAT 75 in an unvegetated condition.

Approximately 25,000 yd² of PYRAMAT 75 were installed along the slopes of the channel. Although the channel was designed to perform in an unvegetated condition, Bermuda grass was planted within the HPTRM to create an aesthetically pleasing outcome. The developer integrated the vegetated channel into a linear park, fulfilling a city ordinance that required minimal disturbance.

Performance criteria for channel stabilization materials traditionally focused on hydraulic parameters such as

shear stress and flow velocity, but field performance also is highly dependent on non-hydraulic factors, including UV resistance and tensile strength. This is especially true for arid and semi-arid environments where vegetation can be sparse. PYRAMAT 75 features a proprietary ultraviolet stabilizer package, high tensile strength and superior hydraulic performance, providing up to 75 years of slope protection and erosion mitigation in environments with limited vegetation and direct exposure to sunlight.

After installation, PYRAMAT 75 helps to decrease sedimentation and pollutants, and encourages infiltration of water back into the groundwater table. These are two reasons why the EPA identified systems that utilize HPTRMs such as PYRAMAT 75 as a Best Management Practice (BMP) for improving water quality. In addition to promoting vegetation and improving water quality, PYRAMAT 75 offers a low-carbon alternative to hard-armoring solutions. From cradle to grave, its carbon footprint is 2.7 kgCO₂e per 1m² of material. Comparatively, the carbon footprint of concrete-based alternatives are up to 10 times higher.

The Abbott Wash project was installed in 2002, and nearly two decades later is continuing to mitigate flooding to nearby homes and recreation areas. To learn more about PYRAMAT 75 and other flood-mitigation solutions, visit www.PropexGlobal.com. **II**

