

CASE STUDY: The Use of Concrete/Masonry Stain on the Las Vegas Monorail Project

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ABSTRACT

The Los Vegas Monorail project required integration of precast elements for a multiple phase construction project. Components from several casting yards came together with uniform color thanks to coatings from a single supplier. In some cases components coated as much as a year apart showed no visible signs or miss-match.

Keywords: Los Vegas Monorail, Concrete Stain, Color Consistency, Graffiti Prevention & Repair, Cost Effective.



Fig. 1 Los Vegas Monorail nears completion

INTRODUCTION

The Las Vegas Monorail is the newest attraction on the famous Las Vegas skyline, linking major hotels and attractions. Gliding above traffic at speeds reaching 50 miles per hour, visitors can cover the 4 mile route from Sahara Station to the MGM Grand in about 14 minutes. With 27 stops along the way, there's something for everyone.

It's fast, fun and convenient. Whether you're in Las Vegas for business or pleasure, cruising among the hotels and casinos has never been easier!

SOLUTIONS FOR COLOR CONSISTENCY

This prestigious project presented several unique problems to the construction team, as it would be the most highly visible and costly public works project undertaken in Las Vegas in over 50 years. Color and finish were major concerns of the Engineering Staff and Owners, since the project would have an indefinite time span, with new sections and platforms to be added over time.



Fig. 2 Completed section of the Las Vegas Monorail

As with any major construction project, cost was also a concern; not only the cost of installing a durable colored finish, but the cost of maintaining the uniformity of the finish over a long period of time. Various types of high performance precast and cast-in-place concrete were specified in order to meet the accelerated construction schedule. These components were cast at different times with up to a year between casting and installation. To further complicate matters, different precast facilities and different types of concrete construction were utilized, making integration and consistency more difficult. While the Monorail itself is the property of the Las Vegas Monorail Corporation; the individual hotels and other Private Owners linked into the system are responsible for maintaining their associated public loading platforms.

The Monorail is ultimately designed to extend to McCarran Airport and may eventually link to the Las Vegas-Los Angeles light rail connector. As more hotels and public loading

platforms are added to the Monorail System, the color and finish must be flexible enough to yield consistent results when installed by various contractors over an extended period of time. Color fade, graffiti resistance, dirt release and ease of maintenance were all evaluated during the specification process. The ongoing modifications that are expected throughout the lifespan of the structure make color consistency and finish uniformity key factors in the project's overall success.



Fig. 3 Stained pylon meets unstained rail sections

Standard architectural finished grade concrete was considered during the original design phase, but was later rejected. While it provided the lowest cost option, color inconsistency was all but guaranteed, with the design teams color choices being limited to “gray or gray”. Integral colored concrete was also a consideration. Although it offered a wider range of colors and the benefit of color throughout the concrete, it was eventually rejected due to cost as well as concerns over inconsistency between pours and between the various types of concrete construction that would be utilized. The primary General Contractor for the project, Granite Construction of Watsonville California, was also concerned that the integral colored concrete originally specified would not meet the engineering requirements for strength, nor the Owner's expectation of color consistency. The company had recently completed a large bridge construction project for the Washington State Department of Transportation in which a masonry stain was specified. They outlined their success in integrating a similar mix of design considerations on that project to the Engineering Staff and Owners of the Monorail project. After reviewing the available options, a masonry stain was specified as the best choice to ensure color consistency and finish uniformity over the life of the structure.



Fig. 4 LVMR, Rails in the casting yard

After 3 years of construction the first phase of the project is nearing completion, with operational tests currently underway. The concrete stain has met all design criteria – The color has remained consistent, allowing for easy touch up of repairs and modifications under the extreme UV exposure present in the desert environment. When a new platform or station is added, the individual hotel or property Owner is responsible for contracting the work. The stain has allowed these various additions to be integrated uniformly into the system. In areas that have been attacked by graffiti, maintenance personnel are able to either remove the graffiti or recoat the effected area. Where graffiti has been a repeat problem, a clear, water-based, non-sacrificial coating is applied over the concrete stain to help facilitate removal.

CONCLUSION

The overall success of the Las Vegas Monorail project is the result of the integration of performance requirements specified by the Engineering Staff, input from the Owners and creative thinking by the General Contractor. Working together, they identified the most important performance criteria for the concrete finish. While the concrete/masonry stain offered a cost savings of approximately 20% over integrally colored concrete, initial color consistency and the ability to reproduce the original color and finish were the keys to long-term success.