IGGA
International Grooving & Grinding Association
Your Pavement Preservation Resource® since 1972

surface-grooved bridges

Make Your Bridge a Safer Place to Drive

Surface-Grooved Bridge Decks Can Reduce Accident Rates and Hydroplaning Risks

DRIVING ON ROADWAYS IN INCLEMENT WEATHER CAN be perilous. In particular, bridge decks are often more dangerous than the roadways they connect. Standing water on relatively flat surfaces can cause hydroplaning and bridge decks often freeze faster than roadways, sometimes creating hazardous conditions.

Motorist safety is paramount and quick drainage of bridge deck surfaces can save lives. Considering the huge investment required to design and construct highway bridges, it is imperative to invest in time-tested methods that provide the safest possible surfaces for the motorist.

For decades, Department of Transportation (DOT) officials have recognized the importance of grooving on bridge deck surfaces to reduce hydroplaning risks, increase water drainage and aid in a vehicle's control. DOTs have found the low cost required to groove the deck offers the best return on investment for the for the entire project. Statistics show a clear relationship between grooved surfaces and a reduction in accident rates.

» THE BEST SOLUTION

Bridge deck grooving is a proven solution for bridge deck weather hazards. Patterned grooves increase traction and create efficient drainage. This is accomplished because the grooves allow for the displacement of water between vehicle tire tread and deck surface. Additionally, grooving allows the contractor to begin immediate curing methods after concrete placement which improves deck longevity. The main alternative, tining, can't do any of these as well as grooving.

» WHY TINING DOESN'T WORK

For many years, the most common technique used for improving traction and safety on new bridge decks was to tine the concrete transversely while it was still in a plastic state. Although inexpensive, the tining technique has a number of distinct shortcomings. The grooves lack uniformity in width and depth and the grooves are typically not deep enough to produce a long-lasting, high-friction surface. There is also a tendency for tines to distort the surface.

Low-slump concrete and latex-type concrete, which are frequently used in bridge deck rehabilitation projects, are very difficult to tine.

The superior and preferred technique is diamond saw cut grooving. Here, grooves of uniform width and depth are formed quickly, precisely and efficiently. Diamond-sawed grooves are exceptional in preventing hydroplaning and in helping to break up ice.

» HOW IS A SURFACE GROOVED?

To groove a concrete surface, bridge-grooving machines equipped with circular diamond-tipped saw blades saw either transverse or longitudinal grooves into the surface. The grooving machine's blades are mounted and spaced on a horizontal shaft and are cooled constantly by water pumped from a tanker. State DOTs specify grooves ranging from 1/8 inch to 3/16 inch deep and approximately 1/10 inch wide. Each state has adopted its own spacing configurations although the standard spacing is typically 3/4 inch center-to-center. The deck is grooved either perpendicular or parallel to the centerline to create the pattern that affords the most traction and drainage possible. It is also recommended that grooves extend across the spans to within 2 feet of the gutter lines.

In many states, the DOT requires that all new bridge decks be subject to smoothness tests using a profilograph or light-weight profiler. Decks and approach slabs that do not meet smoothness requirements must be corrected by diamond grinding before they are grooved. There is considerable merit in this requirement. A level pavement produces a smoother ride and will endure longer.

WHAT ELSE HAPPENS DURING THE TEXTURING OPERATIONS?

- The diamond blades are cooled by water, which then mixes with the sawed concrete to form slurry.
- This slurry is collected by a vacuum pickup system located near the cutting head.
- The deck is kept relatively clean and dry as the grooving progresses.
- The slurry is collected and disposed of per the DOT specification.

» SAFETY IS IMPROVED

Tests performed on ungrooved pavements during simulated rainstorms show that water depths on pavement are dependent upon:

- **Rainfall (or water flow) rate**
- **Surface winds**
- **Pavement cross slope**
- **Pavement macro texture**
- **Drainage path length**

While no one can control the rainfall rate or surface winds, their effects can be minimized. The other three factors can indeed be "controlled." Cross slope is normally determined when the bridge is built. Once constructed, diamond grinding may be used to modify the existing cross slope.

Pavement macro texture and drainage path length can be altered anytime after the bridge is built. It is at this point that pavement grooving enters the picture.

Safety grooving increases macro texture by two to five times that of the original pavement. Additionally, the grooves provide thousands of mini-drainage channels that can dissipate a lot of water very quickly, minimizing the potential of hydroplaning.

As for visibility, it is a simple fact that the water contained within grooves is less likely to create splash and spray visibility hazards. Under normal wet pavement conditions, the potential adverse effect of splash and spray is reduced because during most rainstorms the draining water in the groove channels lies below the pavement surface and is not dispersed due to tire/pavement interaction.

Motorist safety is paramount and quick drainage of bridge deck surfaces saves lives. Considering the huge investment required to design and construct most highway bridges, the low investment required to groove the deck offers the best return on investment for the entire project.

» THE RIGHT INVESTMENT

Surface-grooved bridge decks are a win-win situation for the owner, contractor and motorist. The grooving technique is a low cost investment, easy to implement and provides safer driving conditions in inclement weather. Everyone wins. Who can argue with a cost-effective, environmentally friendly technique that saves lives?

ADVANTAGES OF DIAMOND-SAWED SURFACE GROOVES:

- Help prevent hydroplaning
- Enhance braking action
- Often last as long as the deck does
- Are uniform and do not distort the surface
- Help facilitate ice breakup
- Can be sawed in any concrete including high performance and latex mix designs
- Can be sawed to different groove configurations
- Mechanical grooving lasts longer than conventional tines

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ABOUT IGGA
The International Grooving & Grinding Association (IGGA) is a non-profit trade association founded in 1972 by a group of dedicated industry professionals committed to the development of the diamond grinding and grooving process for surfaces constructed with Portland cement concrete and asphalt. In 1995, the IGGA joined in affiliation with the American Concrete Pavement Association (ACPA) to form what is now referred to as the Concrete Pavement Preservation Partnership (IGGA/ACPA CP3). The IGGA/ACPA CP3 now serves as the lead industry representative and technical resource in the development and marketing of optimized pavement surfaces, concrete pavement restoration and pavement preservation around the world.

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