

# partial depth repair (PDR)

*Partial Depth Repair Restores Rideability, Alleviates Further Deterioration*

Partial Depth Repair is a Vital Tool in the Concrete Pavement Preservation (CPP) Toolbox



**PARTIAL DEPTH REPAIR (PDR)** is a shallow depth repair procedure used to address pavement deterioration that does not fully extend through a concrete slab. This method is used to repair spalling and fraying of concrete slab edges at joints and cracks as well as localized scaling. Spalling, which can occur on both jointed and continuously reinforced pavements, reduces pavement serviceability and can become hazardous to highway users. This type of deterioration can be caused by a number of factors including late sawing, poor joint design, inadequate joint/crack maintenance and material durability issues such as Alkali-Silica Reactivity (ASR). Once initiated, spalls tend to grow under repeated thermal stresses and traffic loadings.

The purpose of PDR is to repair surface defects, reestablish joint reservoirs and restore localized areas of deterioration. PDR replaces unsound concrete to restore rideability and discourages further deterioration. Further, PDR is an excellent preventative maintenance technique as it is proven to last more than 20 years when properly constructed using quality materials and workmanship.

## » HOW IT WORKS

The first step is to properly evaluate the extent of the spalling and determine the limits of the repair. When spalling occurs, the deterioration often extends beyond the visibly spalled area. PDR is not always appropriate for use on severe spalls that extend more than 6 to 10 inches beyond a joint or crack, as this may be an indication that more widespread deterioration is taking place beneath the slab surface and will warrant further investigation. Cores can be very beneficial to determine the depth of the deterioration and help determine if PDR is the correct repair method. If it is determined that the deterioration extends through the entire slab, full depth repair should be considered as the preferred repair option as PDR cannot repair a crack that extends through the full thickness of a slab. Depending on the crack's condition, sawing and sealing, dowel bar retrofit, cross stitching or full depth repair may be the most appropriate repair method.

Sounding is an often used procedure to determine the limits of a PDR. To conduct a sounding test, drag a chain and/or drop a hammer near the spalled area. If the sound is solid and resonates with a high pitched sound, no repairs are required. However, if a dull or hollow sound

## » BENEFITS INCLUDE:

FAST	Rapid setting proprietary patching products can allow for opening times in less than one hour if needed.
LONG-LASTING	PDRs have proven to last more than 20 years when properly constructed using quality materials and workmanship.
DURABLE	PDRs constructed using high-quality repair materials won't rut, shove or deform as do asphaltic repair materials.
SMOOTH	The smooth, level surface reduces road noise and improves ride quality.
COST-EFFECTIVE	The use of milling equipment for concrete removal increases production rates and reduces costs significantly.
FLEXIBLE	Although PDR can be used for isolated spalls, the procedure can also be used along the entire joint. If needed, PDR can extend along the centerline of a joint or crack for miles with success.
MAINTAINS EXISTING ELEMENTS	PDR preserves the same elevation and slope as the surrounding pavement.



is heard, it indicates that the concrete is delaminated and needs to be replaced. To ensure removal of all delaminated concrete, it is good practice to extend the limits of the repair boundaries several inches beyond the limits determined by the sounding tests. In many instances, it helps to drop a small amount of sand on the questionable concrete and hit the concrete with a hammer, watching the sand bounce in delaminated sections.

The next step is to remove the deteriorated concrete. A typical method for removing spalled concrete is chipping. A shallow vertical saw-cut, approximately 2 to 4 inches deep, is made around the perimeter of the spalled area. A light (15–30 pound) jackhammer is then used to remove the deteriorated concrete until sound concrete is exposed.

An alternative method involves the use of milling equipment to remove the deteriorated concrete. This method is allowed by specification in Minnesota, Wisconsin, Michigan, Missouri and Kansas and has been used in these states with much success. Milling is a very cost-effective and efficient method when used on projects with a large amount of surface spalling. As an example, removal of deteriorated concrete along a 15-foot crack takes less than 10 minutes with a mill. Removing this same deterioration with a saw and jackhammer typically takes between 45 to 60 minutes. The Minnesota specification calls for a minimum removal depth of 2 inches with a tapered milling head measuring 10 inches at the bottom and 12 inches at the top to leave a tapered edge for the completed patch dimensions. This procedure has had tremendous success as evidenced by decades old PDRs still in service in Minnesota.



After the deteriorated concrete has been removed, the exposed repair surfaces should be cleaned with sandblasting. When applying traditional cementitious repair materials, it is desirable to screed from the center of the patch out to the patch boundaries. This construction process will strengthen the bond of the repair materials to the concrete. Next, paint the outside edges of the patch with a grout when required by the manufacturer to seal any hairline fissures between the old concrete and the patch mix. Finally, apply a double application of curing compound to the surface as good curing is essential for project success. Curing should begin as soon as possible after the repair materials have been applied. When using cementitious repair material, steps should be taken to reestablish the joint or crack using wax impregnated cardboard or by sawing.

In the past several years, new elastomeric and hot-applied polymer modified resin-based flexible concrete repair materials have entered the marketplace. Due to their flexibility and high tensile strength as well as their ability to bridge joints and offer high compressive resistance, these materials have gained favor with many maintenance practitioners. Please be sure to follow the aforementioned repair area preparation procedures as well as manufacturer recommendations during placement.

## » PERFORMANCE

The performance of PDRs is highly dependent upon the quality of construction operations and repair materials utilized in the repair. When properly constructed using high quality repair procedures and materials, PDRs have proven to last more than 20 years and are an effective pavement preservation tool.

To learn more about this important repair procedure, please visit [www.igga.net](http://www.igga.net).



### 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.