

# *Resperion Solutions At-A-Glance*



---

**Asphalt Modification  
Dust Control  
Soil Stabilization  
Natural Paving Alternatives  
Natural Recycled Asphalt Pavement**

---

**June 1, 2010**

**Resperion**  
20801 N. 90<sup>th</sup> Place  
Suite 201  
Scottsdale, AZ 85255  
480.538.5054 (p)

[www.resperion.com](http://www.resperion.com)

## Resperion Overview

Leading the way since 1999, Resperion is a global pioneer in the creation and development of innovative technologies and solutions for the road construction industry. Resperion manufactures the only asphalt modifier which so dramatically increases the structural capacity of asphalt that it is possible to reduce the thickness of base and binder courses and lower initial construction costs. Resperion also manufactures natural, environmentally-friendly products for dust control, soil stabilization, and cost-effective paving alternatives.

We understand that ever increasing performance requirements, energy optimization factors, and safety concerns, along with sustainable life-cycle needs, are creating new challenges and increased complexity for the road construction industry.

Resperion, through our products, market knowledge, and extensive chemistry know-how, is a company that can help. We enable governmental agencies and private organizations to quickly and cost-effectively react to these market demands by bridging the gaps between traditional road construction methods and today's performance needs.

Through leveraging our innovative road construction products and expertise, these groups can save valuable time and money with their various construction projects. We also understand that regional and local factors such as raw materials, construction standards, climate, etc. are critical drivers in the construction marketplace, and have designed our products to meet the global needs of our customers.

Resperion, via our vast global sales presence, truly represents a company that can deliver locally the global expertise and quality that people expect this day in age.

Headquartered in Scottsdale, Arizona, Resperion is led by an experienced management and engineering team focused on delivering numerous solutions for road designers to build stronger, cost effective, longer lasting roads at a fraction of the cost of traditional materials.

## Solution

Resperion's IntegraBase modifier is the only technology solution that can increase the strength of HMA Base and Binder courses while also improving its fatigue life. The increased strength from our unique binding technology enables thickness reductions while reducing costs and time needed to build without sacrificing any performance or longevity of the pavement. IntegraBase also provides for improved high temperature performance, retaining strength in warm temperatures while withstanding typically deleterious thermal cycling. IntegraBase's binding technology also improves wet strength and improves water stripping properties (separation of the bitumen from the aggregate). There are no other technology solutions today that can achieve these results.

## How it Works

IntegraBase is a multi-metallic catalyst that when injected into bitumen and aggregate creates superior asphalt at a significant cost savings. The solution is injected at a rate of just 2% by weight of asphalt cement directly into the asphalt feed line at the mixing plant. Once added to the mix, all normal HMA procedures can be followed. IntegraBase delivers its benefits in both extreme heat and cold conditions and is used in the structural layer of construction.

## IntegraBase Economic, Construction & Environmental Benefits

- **Asphalt Savings** - IntegraBase allows for a reduction in pavement thickness in the structural layer (base/binder course) of up to 40% without compromising structural integrity. For example, if the base course required was 14 inches, we could reduce that base course to 8 inches by treated the asphalt with IntegraBase, and the 8 inch IntegraBase treated layer would last longer and be stronger than the 14 inch untreated base course.
- **Sub-Layer Savings** – The use of IntegraBase also enables the reduction or elimination of sub layers such as sand, or crushed aggregate due to the increased strength we deliver in the structural layer. This was one of the large cost-savings factors achieved in Afghanistan.
- **Use of Marginal Aggregates** - Save money using marginal aggregates without compromising any quality, durability or performance. In other words, it allows one to use readily available aggregates without having to import them, crush them, and transport them. This is especially important where good aggregate is not available. Our ability to use river run gravel or other marginal aggregates can be a significant cost savings to any road project.
- **Reduced Construction Time & Labor** - With reduced thicknesses, the time to build will be reduced significantly. For toll roads or public private partnerships, reducing time to build can significantly increase IRRs.
- **Lower Maintenance Costs** – Increased ESAL's lead to longer lasting roads and lower total ownership cost
- **Environmental** - There are several environmental benefits. Reactive Organic Gasses (ROGs) are released into the air when asphalt is manufactured. By reducing the amount of asphalt needed by up to 40%, the amount of ROGs is reduced by the same amount. The same reduction in the amount of bitumen (oil) and aggregate is also achieved. Additionally, by reducing pavement thickness, fewer diesels burning equipment is used in construction, further reducing the environmental damage.

## IntegraBase Technical Advantages

- **Supports More Weight Above it** - IntegraBase's load-spreading ability takes the stress and strain off of material placed above it and allows the road to support twice as many axle loads.
- **Reduced Cracking** - IntegraBase reduces the strain at the bottom of the pavement layer, reducing the formation of cracks.

- **Greater Aggregate Adhesion** - The binding ability of IntegraBase modified asphalt resists water stripping and improves wet strength.
- **Holds up to Thermal Cycling** - Changes of temperatures and extreme heat can cause rutting and cracking issues. The hotter the temperatures and the greater the temperature fluctuations, the greater the improvements delivered by IntegraBase. The use of the IntegraBase-modified HMA mix in the base/binder course will significantly improve the resistance of the HMA pavement to any rutting failures.

### Recent IntegraBase Testing and Usage

- INDIA: Central Road Research Institute (CRRRI), the governing body for all roads
- AFGHANISTAN: USAID funded 389 km award winning highway. Analysis performed at Univ. Nevada Testing Labs
- POLAND: General Directorate of National Roads and Highways-multi-year study
- ROMANIA: Govt. Permanent Technical Committee for Construction Works, Min. Transportation
- SERBIA: Highway Institute, Building Materials Dept, Belgrade, Serbia
- U.S.: California Dept. of Transportation, December 2006 highway constructed in Palmdale, California.
- U.S.: Port of Oakland
- U.S.: University of Texas resilient modulus thickness reduction testing performed
- TURKEY: Government, University labs testing for water stripping

We are beginning new testing and work in the State of Florida, Turkey, Brazil, Chile, West Virginia and other markets.

### Case Summary: Highway 1 in Afghanistan (Kabul – Kandahar)

- Louis Berger Group chooses IntegraBase solution to build award winning highway
- Highway was built to the highest standards of the U.S. government, which paid for the construction of the highway. Paving time was reduced by several months.
- Decreased thickness of the base course of the road from 14-inches to 8-inches
- Increased overall strength, durability and performance of the road
- Eliminated another planned 12-inch sub-base.
- Allowed Louis Berger to use local river-run gravel in place of expensive imported crushed rock.

**BOTTOM LINE:** Total Highway Cost: \$190 million; Cost Savings: \$90 million= 33% Cost Savings

Actual savings will likely be less than above because IntegraBase was sold at steep discount in order to prove it works and because nearly every possible component of potential savings was realized due to local conditions.

## Solution

IntegraSeal is a cost-effective and environmentally friendly dust & erosion control composition that can be applied onto a variety of soil or gravel surfaces to control dust as well as to compact and stabilize the top or base surface. Unlike most other chemical dust control and soil stabilization products, IntegraSeal is 100% organic, biodegradable, and causes neither toxic leaching nor adversely affects vegetation, aquatic life or other living organisms. IntegraSeal can be custom formulated depending on the customer application to provide for a precise and cost-effective solution.

## How it Works

IntegraSeal penetrates the surface and adheres to the dust and soil particles using an action similar to capillary action. The binding agents follow the water and as the water evaporates and flashes, the binder agents provide cohesion to the soil and the dust particles, preventing fugitive dust and erosion. IntegraSeal is sold in a concentrated form that is diluted with water prior to application. IntegraSeal is best applied with a spray arm attached to a tanker truck to ensure a consistent application of the product, however, IntegraSeal may also be applied by hand, plane or helicopter.

## IntegraSeal Benefits

- **Cost Effective** – IntegraSeal provides for longer lasting dust and erosion control compared to similar products.
- **100 % Natural & Non-Toxic** – IntegraSeal is comprised of 100% organic products – making it biodegradable, non-corrosive, and safe for all living organisms and the environment. We believe only 100% organic solutions, like IntegraSeal, should be used to solve our world's growing dust problem.
- **Non-Water Soluble** – Unlike many other dust control products which easily break down with the presence of water, IntegraSeal provides a non-water soluble layer of dust protection which holds up to water.
- **Easy Application & Immediate Results** – IntegraSeal can be applied with readily available equipment, such as a simple water truck – and once applied, will provide for immediate binding power.
- **Custom Formulated for Each Application** – Depending on each unique customer application, Resperion can customize the formulation of IntegraSeal to meet the specific needs depending on variables such as weather, traffic, soil, or length of service.

## IntegraSeal Applications

IntegraSeal reduces the need for frequent watering of haul roads and parking lots, making it an economical water management tool. IntegraSeal binds aggregate particles together, effectively reducing dust emissions resulting from wind or vehicle movements on areas such as:

- Shoulder construction and stabilization
- Haul roads
- Mine tailings operations
- New housing development areas
- Road construction activities
- Major infrastructure developments such as dams and power stations
- Parking Areas
- Road Compaction
- Quarries
- Open cut and longwall mining operations
- Smelting and refining operations
- Construction Sites

## Recent IntegraSeal Projects

- Haydon Building Group
- Pulte Homes
- First Industrial Realty Trust
- City of Tempe (Arizona)
- US Department of the Interior, Bureau of Land Mangement
- Pioneer Sand Company
- Nag's Head Farm

## IntegraSeal Case Study: Nag's Head Farm

Nag's Head Farm is a premier dressage and combined driving facility located in both Scottsdale and Flagstaff, Arizona. Nag's Head Farm Scottsdale location was challenged with higher levels of dust from the drive paths and within the arena while riding. Although the facilities were watered regularly, they were just not able to keep the dust under control.

- IntegraSeal was applied to arena and drive ways for a 4 month application
- Costs for water solution to provide average dust control per month \$1113.60. (x4months = \$4,454.40)
- Total treatment cost with IntegraSeal: \$2,252.29
- **Total Savings = \$2,202.11 (49%)**

## Solution

IntegraPave is a 100% GREEN surfacing solution that saves money and application time over asphalt and concrete. Scientifically engineered, IntegraPave is mixed with aggregate mixtures to provide a rigid surface with remarkable properties. IntegraPave replaces toxic petroleum-based emulsions, providing an organic surface and sealant that preserves strength and load-bearing qualities. IntegraPave can save up to 50% over the cost of concrete or asphalt while providing for a long-lasting solution with similar characteristics to asphalt and concrete. IntegraPave is an ideal paving solution where asphalt or concrete are cost prohibitive, or when a 100% natural solution is desired. IntegraPave can be added to aggregate fines, mineral fines, or soil, to provide for a long-lasting surface that requires very little maintenance. IntegraPave is non-water soluble and provides for load bearing capabilities similar to those of asphalt or concrete.

## How it Works

IntegraPave's binding agents penetrate and extend bonding into a surface, such as aggregate fines, by providing cohesion, and increasing the load bearing capacity of unpaved road surfaces. IntegraPave's 100% natural formulation provides all of the beneficial surfacing capabilities of asphalt and concrete without the high cost and toxic side effects. Resperion will help create a mix design and application rate that will meet the specifications and needs of each client. IntegraPave can be applied in different ways: a pugmill can be used for an optimal mix of the IntegraPave and material or IntegraPave can simply be sprayed onto a windrow of material, and then compacted.

## IntegraPave Benefits

- **Cost Effective** – IntegraPave can be up to 50% more economical when compared to traditional surfacing applications such as asphalt or concrete.
- **Environmentally Friendly** – IntegraPave is comprised of 100% organic products; no air pollution or fossil fuel burning is required to heat the product during its manufacturing, transportation or placement!
- **Non-Water-Soluble** – IntegraPave provides for a hard, dense surface which is completely non-water-soluble
- **High Strength** – Depending on the mix design, IntegraPave can achieve strengths in the 2,500 – 3,000 psi range
- **Easy Application & Maintenance** – IntegraPave can be mixed with the material in a pugmill, or sprayed directly onto the material before compaction. Maintaining IntegraPave surfaces is as easy as spraying a coat of IntegraPave directly onto the surface.
- **Wide Variety of Colors and Textures** – IntegraPave is a clear product. When blended with different colored materials, the materials determine the final color. Different materials can be used for different textures, depending on the application.
- **Wide Variety of Materials and Gradations** – IntegraPave can be used with a wide variety of materials such as aggregates, fines, soil, or a combination of each. A wide variety of gradations can be used with IntegraPave, however uniform, or dense gradations are optimal.
- **Holds Up to Extreme Temperatures** – IntegraPave dramatically reduces heat absorption and radiation, providing for a surface that can withstand freeze thaw cycling and provide a cool alternative to black asphalt and its deleterious contributions to the Urban Heat Island Effect.

## IntegraPave Applications

- Private Roads (mining, logging, power, etc.)
- Parking Lots

- Storage Lots
- Courtyards, Driveways & Pathways
- Trails

### Recent IntegraBase Testing and Usage

IntegraPave is a proven, 100% green and natural paving solution – here are some different projects where IntegraPave was utilized:

- Paradise Valley Mall (Arizona) – Bike/walk paths
- Tres Rios Wetlands (Arizona) – Maintenance roads
- Papago Buttes (Arizona) – Parking lot & paths
- City of Phoenix (Arizona) – Bike/walk paths
- City of Glendale (Arizona) – Bike/walk paths

## Solution

EcoRAP provides for an incredibly hard, dense and drivable surface that takes advantage of RAP (Reclaimed Asphalt Pavement.) EcoRAP is a 100% organic emulsion which enables the replacement of bitumen-based hot mix applications. EcoRAP makes one of the most widely used paving materials on the planet GREEN. The finished surface of an EcoRAP paved road has a higher compressive strength than a comparable asphalt emulsion mix, for a cost-effective solution that is GREEN. EcoRAP is a revolutionary product that binds aggregate fines of recycled asphalt to produce a strong, long-lasting, environmentally friendly driving surface. The combination of these materials makes it possible to produce 100% recycled asphalt with remarkable properties. When added to RAP, EcoRAP creates an incredibly hard, dense, water-resistant surface that avoids the introduction of any toxins or hazards in its manufacture. The finished surface offers enhanced durability and compares favorably with hot-mix asphalt for a cost effective solution that is as green as it is smart.

## How it Works

EcoRAP binds recycled aggregate and fines in an environmentally friendly, radically new cold process for a 100% environmentally friendly solution. EcoRAP can either be mixed in with the RAP at a pugmill, it can be added during cold in-place recycling, or directly sprayed onto a windrow of RAP before rolling and compacting. EcoRAP is typically added at a rate of 4% by weight of RAP material. Additional fines may be added for a stronger and longer lasting mix. All procedures stay the same with EcoRAP as they would with any other recycled mixture.

## EcoRAP Benefits

- **Cost Effective** – Compared to traditional asphalt, EcoRAP can cost up to 75% less.
- **100 % Natural & Non-Toxic** – EcoRAP is comprised of 100% organic products – making it biodegradable, non-corrosive, and safe for all living organisms and the environment.
- **Long Lasting** – EcoRAP provides for a water-resistant surface that can withstand heavy loads and freeze-thaw cycling. Very little maintenance is required – which is as simple as spraying a new coat of EcoRAP to the surface.
- **Easy Application & Immediate Results** – EcoRAP is used in place of the AC emulsion – no other special procedures or equipment are needed.
- **Better Performance than AC Emulsion** – EcoRAP mix provides for a higher Marshall Stability, as well as both dry and wet tensile strength than a recycled mix with an AC emulsion.

## EcoRAP Applications

- Private Roads (mining, logging, power, etc.)
- Parking Lots
- Storage Lots
- Courtyards, Driveways & Pathways
- Trails

## EcoRAP vs. Asphalt Emulsion RAP

Test	EcoRAP	AC Emulsion
Voids, %	11	7.6
Marshall Stability @ 60°C (N)	9219	5836
Marshall Flow	16.9	18.9
Dry Tensile Strength	1188	783

