

*Sustainable Solutions
for the Earth's Most
Challenging Problems*



Lithification – Nature Turning Soil into Stone Over Thousands of Years



A process involving naturally occurring minerals, in which sediments compact under pressure, expel connate fluids, creating porosity destruction through compaction and cementation, which gradually become solid rock over thousands of years.

LithTec's - Accelerated Lithification Turns Soil into Stone in 24 to 48 hours



A process involving LithTec™, moisture, and pressure that combine to form complex aluminosilicates, thereby turning road materials into a stone-like structure in 24 hours.

“LithTec™ Is one of the Most Significant GeoTechnical Advancements in Soil Sciences.” Dr. Gilles Bussod LANL Scientist

About LithTec™

The Product

- The Lithtec™ customized formulations are a unique combination of High Strength and High Ductility.
- LithTec™ is blended regionally across the US and available for shipment in 1 or 2-ton supersacks or shipped in pneumatic trucks.
- LithTec™ is laboratory tested and customized for every project, to optimize the performance in each material being treated.
- LithTec™ is safe and easy to install and is applied with a cement or lime spreader truck.

Environmentally Friendly

- **Zero (0) Hazard Category on SDS Sheet**
- **Passes U.S. EPA Synthetic Precipitation Leaching Procedure Test 1311 & 1312**
- **Demonstrates LithTec™ does not have any harmful chemicals that leach into the environment**



Sustainable Solutions

Best Available Technology / Best Available Practices



- **Transportation Industry**
Unprecedented Load Bearing Capacity
Resistance to water infiltration in base
Affordable all weather rural roads
- **Abandoned Uranium Mines (AUMs)**
LithTec™ U-Capping System
- **Superfund Site Remediation**
15 Scientists from 8 National Labs
- **Earth Pond Liners – Algae Biofuel**
- **Earth Block Construction**
- **Responsible Mining Solutions**
Mine Tailing Containment (GISTM)
Safer, cost-effective Haul Roads
Moving toward Carbon Neutral

LithTec™ Solution for America's Crumbling Infrastructure



DOT Studies Report...

“Every 40-Ton Truck has as much wear and tear on asphalt highways as 10,000 Automobiles.”

Road Section

500,000 PSI Modulus



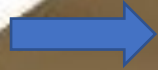
Surface Course

25,000 PSI Modulus



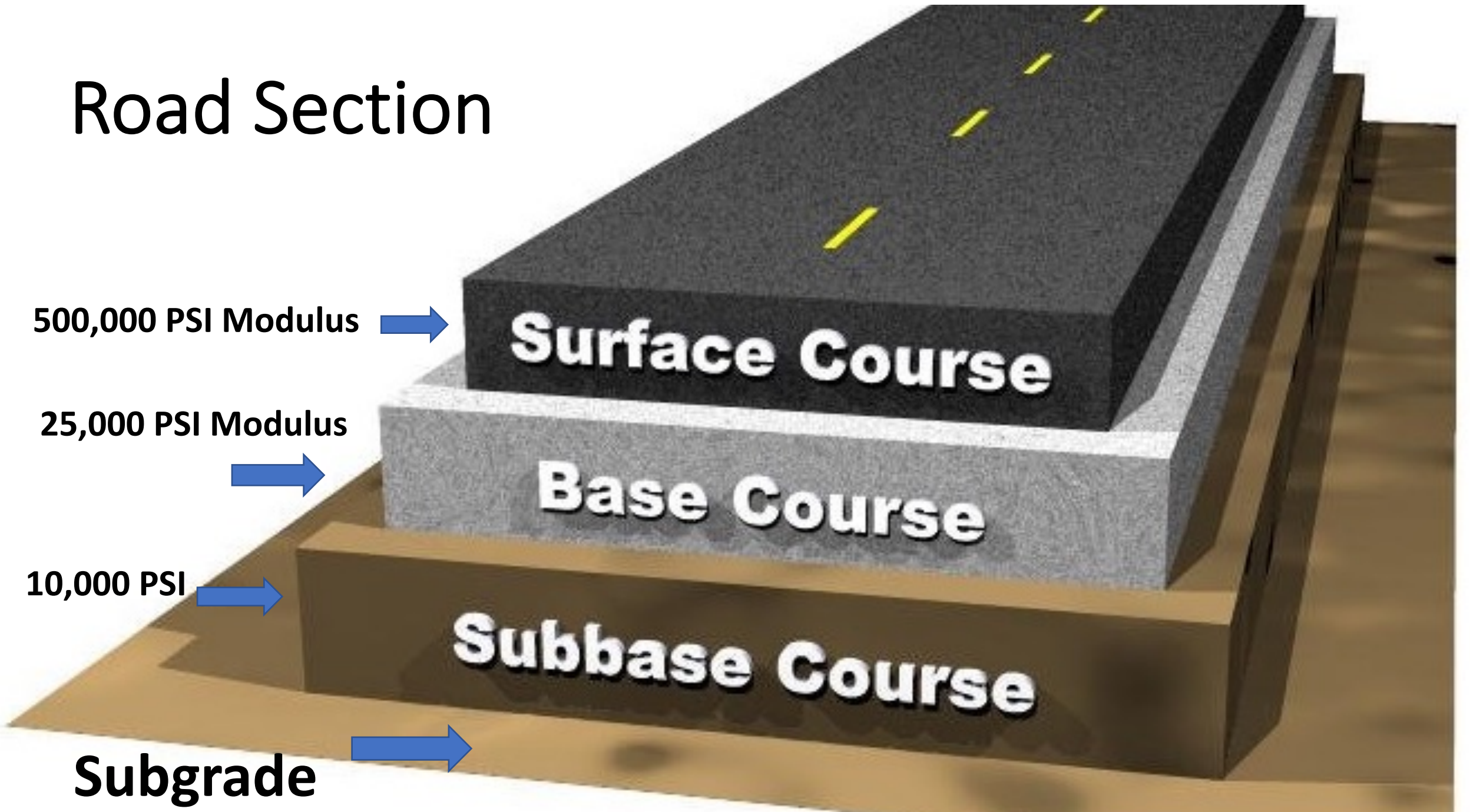
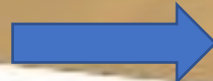
Base Course

10,000 PSI



Subbase Course

Subgrade





Value Engineering

Transfer the Structural Credits from Asphalt into LT Base

Asphalt cost \$10 sy, per inch thick

LithTec™ cost \$2 sy, per inch thick

Strength of Asphalt
80% Savings

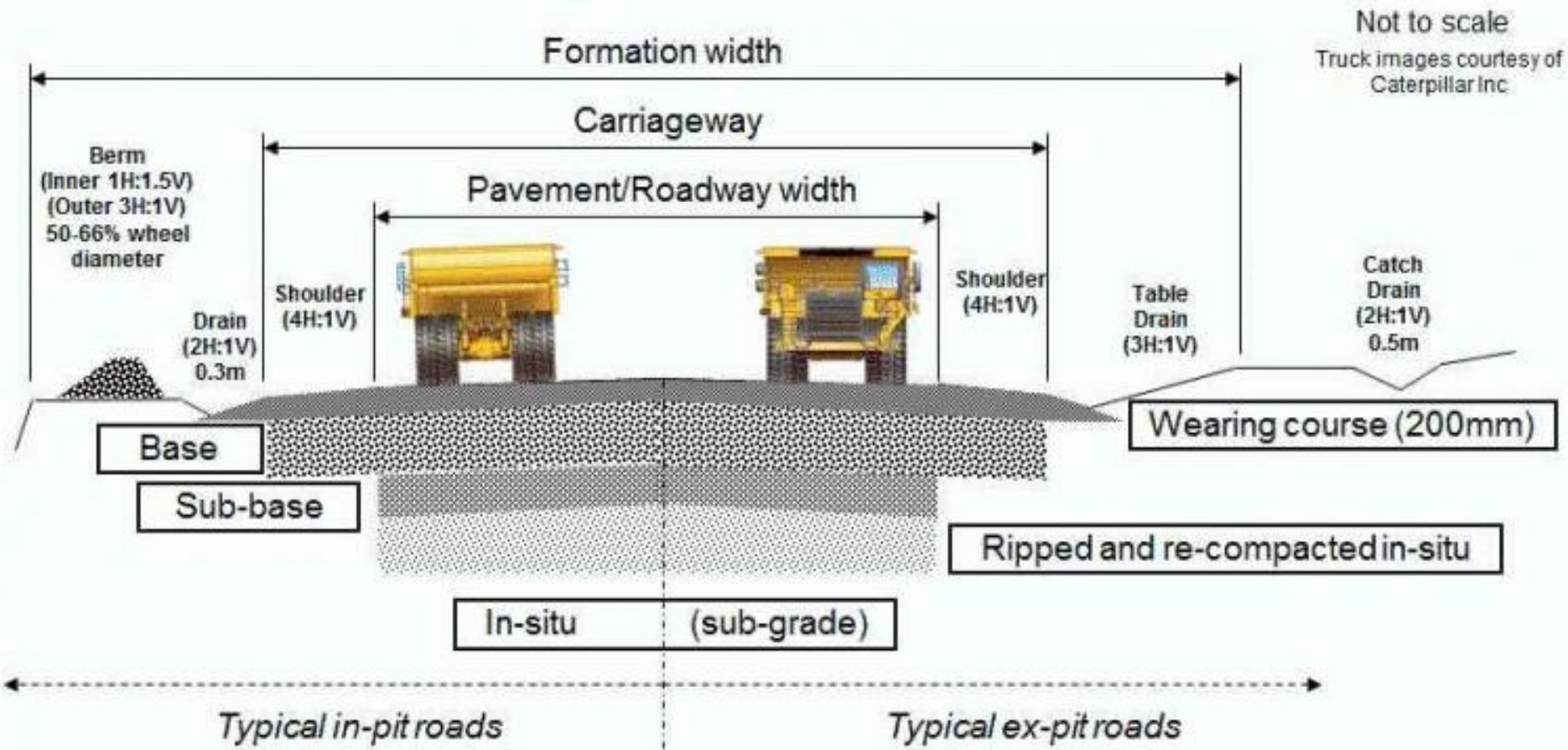


1000 x 40-Ton Trucks per day On LithTec™ treated base with Chip Seal surface

- **Over 4 1/2 years old**
- **Headquarters - Ruan Trucking**
- **Chip Seal Surface**
- **8" LithTec™ Treated Base**
- **Full Depth Lithification (FDL)**

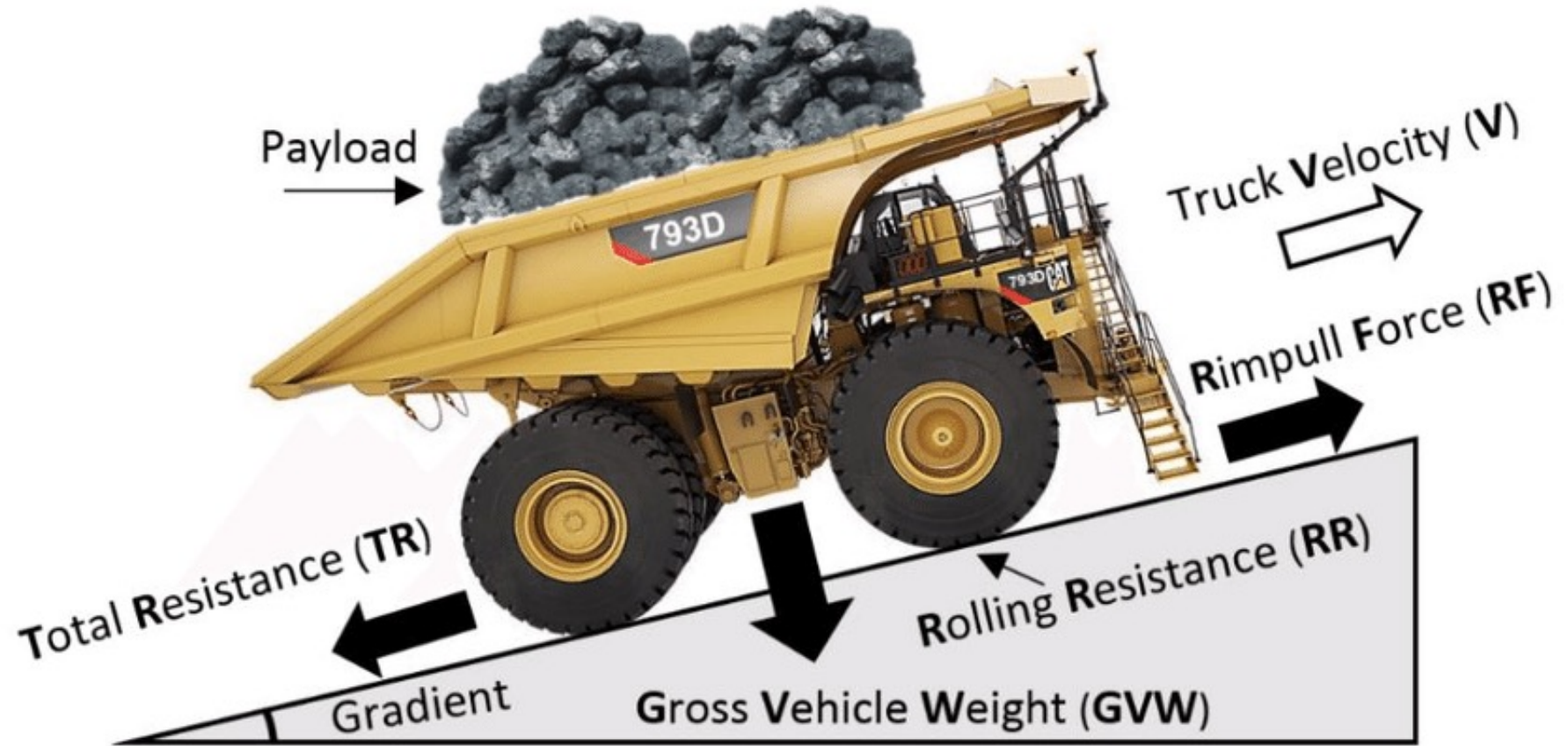


LithTec™ Haul Roads achieve Unprecedented Load Bearing Capacity



Number of pavement layers may vary according to specific design adopted

Safer Roads that Require Less Maintenance



LithTec™ Road = Extreme Load Bearing Capacity & Resistance to Water



Top two reasons Roads Fail

- Insufficient Load Bearing Capacity
- Water infiltration



**LithTec™ Treated Base with Chip Seal Surface
After 4 years – Dude Ranch Road
Monticello, UT – 8000' Elevation**

Lithified Technologies US
supplies the Product and all
GeoTechnical Testing

Stage #1

Materials Sampling





Stage #2

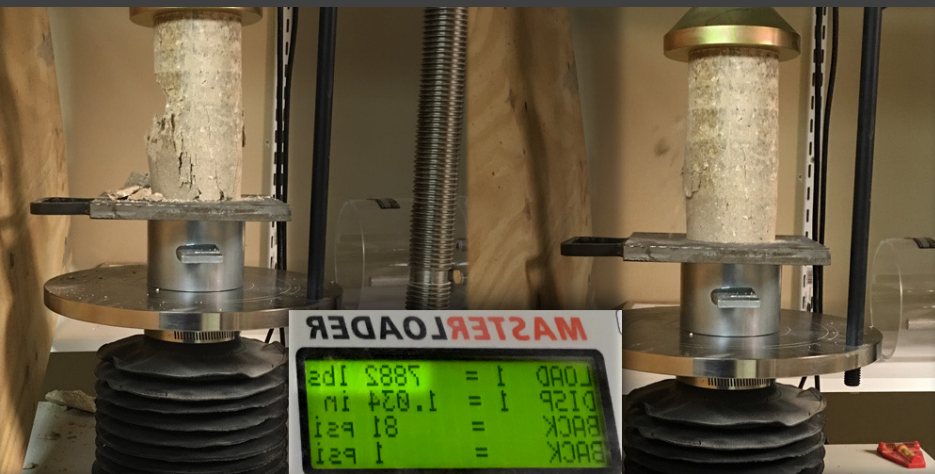
Custom Formulations



Stage #3

Geotechnical Testing

- California Bearing Ratio - CBR
- Unconfined Compressive Strength - UCS
- Post Submersion Strength Testing
- Modulus Derivative – Resilient Modulus
- Plasticity Index - PI
- Gradation – Soil Classification
- Dispersion – Bound and Non Dispersive
- Shrink/Swell – For Clay Soils



LithTec™ Remains Bound & Non-Dispersive Under Water

Treated with
LithTec™



Same material
Untreated

Los Alamos National Laboratory Testing

Third Party testing



"The LithTec™ samples suggest that they are potentially ideal materials for the construction of flexible surface and base layer pavements that can be optimized for local conditions." by, Gilles Y. Bussod (PI), Los Alamos National Laboratory LANL, 14 December 2019



Custom Formulation for Rio Tinto Tailings

Rio Tinto Tailings		
TEST TYPE	MINIMUMS	ACTUAL
Dispersion Test	ND	ND
Shrink/Swell	<.2	0
UCS Stress@Failure	>300	705.4
UCS Strain@Failure	>.8	.957
Resilient Modulus	>100,000	920,235



LithTec™ Treated Tailings Passes EPA SPLP 1312 Test

Rio Tinto

Rio Tinto Kennecott Environmental Laboratory CERTIFICATE OF ANALYSIS

Sample Type: EPA Method 1312 SPLP

Date: 16-Aug-19

2500 S 9180 W
Magna, UT 84044
Phone (801) 569-7952

To: RICK HANSEN

Submission Date: 07/22/2019

Sample Preparation: SW 846 Method 1312
Metals Analysis: SW 846 Methods 6010C and 7471

QC Reference Sample:

Lab No.	Sample Description	Collection Date	Analysis Date	Analyte	Result	Reporting Limits	Units
CA12082	UT-019-00102-A	07/22/2019	07/26/2019	Arsenic	Below PQL	0.1	mg/L
			07/26/2019	Barium	0.2	0.1	mg/L
			07/26/2019	Cadmium	Below PQL	0.01	mg/L
			07/26/2019	Chromium	Below PQL	0.1	mg/L
			07/26/2019	Lead	Below PQL	0.05	mg/L
			07/30/2019	Mercury	Below PQL	0.0010	mg/L
			07/25/2019	pH	8.47		
			07/26/2019	Selenium	Below PQL	0.1	mg/L
			07/26/2019	Silver	Below PQL	0.1	mg/L



Approved by: Melissa R. Olsen
KEL Laboratory Director



**LithTec™ is applied with a
Cement Spreader Truck**



The LithTec™ dosage and custom formulation is determined through GeoTechnical lab testing prior to installation



The LithTec™ is blended into the material at OMC with Reclaimer



Rio Tinto LithTec™ Installation, Magna, UT 2020
Haul road constructed on top of 10,000 acres of tailings



3rd Party
Densometer
testing



Stage #4 Quality Control Onsite Performance Testing

- Moisture Content Testing
- Nuclear Densometer
- Lightweight Deflectometer Testing
- Treated depth control



Sheeps Foot Compaction



Grading & Blading



Final
Compaction
with Steel
Roller



Chip Seal
Over LithTec™
Base



Rio Tinto - Kennecott
Needs Water Resistant Road for
5-Mile Underground Tunnel (2023)

LithTec™ Risk Management Solution for Tailings Containment (GISTM) Global Industry Standard on Tailings Management



Red Mud - BAUXITE RESIDUE
Kaiser Aluminum



- 30 Million Tons of Bauxite Residue – Goal- zero waste
- MOU for all Aluminum Mining in US and Louisiana
- 399,000 psi Modulus
- Passed EPA SPLP 1312 – No leaching of toxic chemicals





Chip Seal haul road on top
of LithTec™ treated base
Blue Diamond Almonds

ASPHALT CONTRACTOR

LATEST INNOVATIONS FOR ASPHALT PROFESSIONALS

PRESERVATION UPDATE | SPECIAL ADVERTISING SECTION



PRESERVATION TECHNIQUES

Improve the Strength of Roadways

New resources are available to help the base we're building our roads on last longer.

While we "love" plenty of new and innovative paving technologies and equipment to help prevent road failure, we have's found one such as creating a stronger foundation for our roadways.

If left untreated, cracks in asphalt lead to deterioration of the base structure beneath our roadways.

Lithified Technologies developed a technology known as Lithified™ that creates a foundation, a natural process

that stabilizes and increases your strength of base. The technology developed over the years naturally occurring minerals and chemicals, along with a foundation, to make Lithified™ more to 24-48 hours. This "self-healing" process provides optimal strength for road performance, enabling changeplans and highways to last much longer.

Lithified™ is all about building from the bottom up," Bob Stewart, CEO at Lithified Technologies says. "It allows the road base to adapt into a rich hard and more resistant and foundation that occurs below and new dispersion with water vapor. The road will where the will, the new soil samples base treated with Lithified™ and one cemented subgrade under water at the same time. The natural process naturally will cure during paving, leaving the water ready and the cycle will last approximately half of

to original size in a way that does. The Lithified™ treated sample will create rich hard and more dispersive as no treated will fall off and the water will remain clear."

Keeping water out of the road base is a big objective and this technology aims to help with that.

FULL DEPTH LITHIFICATION
We have all heard of full depth recycle (FDR), which is the process of

removing all layers of existing asphalt pavement in place to a depth of up to 20 inches. FDR has proven to be superior in no-sprays has crushed and recycled often have high strength. While the process is effective in creating a stronger, more uniform surface, it is a fraction of the cost of removal and requires a deep seal strength the existing road bed.

Lithified™ offers you a natural and full depth samples from the project," Stewart says. "They will do GPS mapping

of when the samples come from and bring them back to the lab where our technicians will perform a battery of 10 different tests on these samples. This is all a part of the communication process to determine which formula we need to get the optimal performance out of the material."

When it's time for installation of the product, each custom formula is blended on demand for each specific project. The blend the materials at one of their 10 locations across the country and ship it out the day before or the day of the project. The Contractor will again be on-site to perform quality control as well.

"The field testing will make sure the material is being the same number in the field as we achieved in the lab," Stewart says. "They make sure you're having your optimum moisture content, ensuring the proper depth is being met, the proper design is going down and compaction is being met. This is all included with the purchase of the Lithified™ product."

The Lithified™ product is applied on-site after a subgrade stabilization comes in to go up the following morning. The Lithified™ product is laid down per the custom formula. The machine then goes back through the

material ensuring the material is at the pre-determined optimum moisture content. Compaction then occurs with a sheepsfoot roller, a grade then shapes the road and a final roller finishes out the compaction before the surface course is put down.

PERPETUAL ROADWAYS & INFRASTRUCTURE PRESERVATION

When you look at the challenges of the road building industry today, we are facing much higher amounts of traffic in much heavier loads in the shipping of goods has never been higher. These increased loads are taking their toll on our roads and highways and the industry must figure out how to build roadways that sustain these volumes.

"We have 13 million 40-ton trucks on our highways and that number is growing by the day," Stewart says. "DOT studies have said that each 40-ton truck has as much wear and tear on an asphalt highway as 10,000 automobiles."

Building stronger foundations can be a key to longer lasting roadways. AC

For more information on pavement preservation, visit ForConstructionPros.com/lithified or call 877-229-9999

56 ASPHALT CONTRACTOR OCTOBER 2021 www.ForConstructionPros.com/lithified OCTOBER 2021 ASPHALT CONTRACTOR 57 www.ForConstructionPros.com/lithified www.ForConstructionPros.com/lithified




CUSTOM FORMULA PROVIDES LASTING RESULTS

Due to the high volume of materials in road construction, Lithified Technologies knows that optimization is the key to the success of each project.

To maximize the high performance potential of your roads, Lithified Technologies provides a "Value Engineer" package that includes communication of the Lithified product to meet the specific project needs. A custom "Lithified" field report is sent to each project to complete the project and determine variations on the product can be customized based on the specific variables present in the road base. Testing in the lab, and done again in the field, is performed to ensure optimal results will be achieved.

"From the very beginning of the process, our engineers will go over and pull soil samples from the project," Stewart says. "They will do GPS mapping

of when the samples come from and bring them back to the lab where our technicians will perform a battery of 10 different tests on these samples. This is all a part of the communication process to determine which formula we need to get the optimal performance out of the material."

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Lithified Technologies

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In The News...



Honorable Speaker
Ben Lujan
AWARD
for Small Business
Excellence

BOB SHERWIN
CEO

**BERNALILLO,
SANTA FE, AND
SAN JUAN COUNTIES**

There are only two labs that can measure uranium containment, and Los Alamos is number one by far. Thanks to our collaborative work with Los Alamos through NMSBA, we now have a white paper as analytical proof that the LithTec™ U-capping system is an effective uranium containment solution.

BOB SHERWIN
CEO
Lithified Technologies US, LLC



Meet the
PRINCIPAL INVESTIGATOR
GILLES YVES A. BUSSOD
Los Alamos National Laboratory

REBUILDING INFRASTRUCTURE LEVERAGED PROJECT

Lithified Technologies US developed a soil technology known as LithTec™ that mimics lithification, a natural process that transforms soil into stone. This process provides optimal strength for road infrastructure enabling thoroughfares and highways to last much longer. A common saying in road construction is: "Roads may wear from the top, but they fail from the bottom." LithTec is specifically designed to counter such road failures.

Bob Sherwin became aware of a very serious problem involving 523 abandoned uranium mines (AUMs) on the Navajo Nation. None of over 200 water wells could be used due to the high uranium content, so water has to be trucked in from over 100 miles away, and the people living near these sites have high rates of cancer and birth defects. Sherwin wanted to know if LithTec could provide a better solution for capping the AUMs.

In conjunction with Haven's Transport, LLC; Blanca Peak Indigenous Investments; and Blanca Holdings, LLC, Lithified Technologies approached NMSBA and was put in touch with Gilles Bussod at Los Alamos National Laboratory.

Bussod and his team evaluated LithTec's suitability for capping AUMs. Evaluations included assessing the strength and hydrochemical characteristics of the capping system, uranium sorption capacity, and overall suitability and sustainability. The evaluations concluded that the LithTec U-Capping system is an effective method for capping the AUMs and mitigating local contamination.

With these results in hand, Lithified Technologies US hired four additional full-time employees and plans to hire additional staff within the next five years to address the capping of AUMs and other LithTec applications. The company anticipates \$10-\$20 million in new revenues in 2021.

SUCCESS STORIES

Lithified Technology featured in LANL Annual Report



E-Edition

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Mt. Pleasant planning road rebuilds

by Steve Clark 05/04/2022 Reading Time: 2 mins read

MT. PLEASANT, UTAH—City Councilman **Rondy Black** announced on April 25 that two city road segments will be completely rebuilt and five segments resurfaced, which was more than originally anticipated, because of a new, less-costly process the city is utilizing.



Rondy Black

The road segments that will be rebuilt are 300 South from State Street to 400 West, and 500 East from 200 South to 700 South.

These two road segments, plus roads in the Aspen Village subdivision, will be rebuilt using a process developed by a company called Lithified Technologies out of Santa Fe, New Mexico. According to information released by the company, they have developed a means of turning a regular road base into stone, creating a surface that is far harder, stronger, and less permeable to moisture than standard road bases.

The process is marketed under the name LithTec™. It is a combination of creating a blend of materials and utilizing a very exacting means of laying and processing the material.

During the process, the road surface and subsurface are milled and pulverized and the proprietary LithTec™ materials blended in. The product is then graded and compacted and kept wet for 48 hours.

The company says that monitoring the moisture content of the blend during this 48-hour period is a critical part of the process. The result is what the company characterizes as a super-hard surface that typically receives a double-chip-seal asphalt top treatment rather than the 8 to 10 inches of asphalt of a regular roadway.

The company says their process approximates a million-year geological process that turns loose materials into stone.

Black said the city has confidence in the LithTec™ process because they used it previously on 400 East and in the industrial park with good success. He says that those roads have shown far less side deterioration and no potholing since laid. He said the cost of the LithTec™ roadway is only about 25% of the cost of standard asphalt construction.

In addition to the LithTec™ roads, the city will chip seal roads in the Pleasant View subdivision, on 700 South from State Street to 650 East, on 200 South from State Street to 900 East, and on 500 West from Main Street to Highway 89.

Black said that were it not for the savings achieved with the LithTec™ process, doing this much roadway in a single year would have been impossible.

<https://sanpetemessenger.com/mt-pleasant-planning-road-rebuilds>

Lithified Technologies in the Utah News

“...two city road segments will be completely rebuilt and five segments resurfaced...

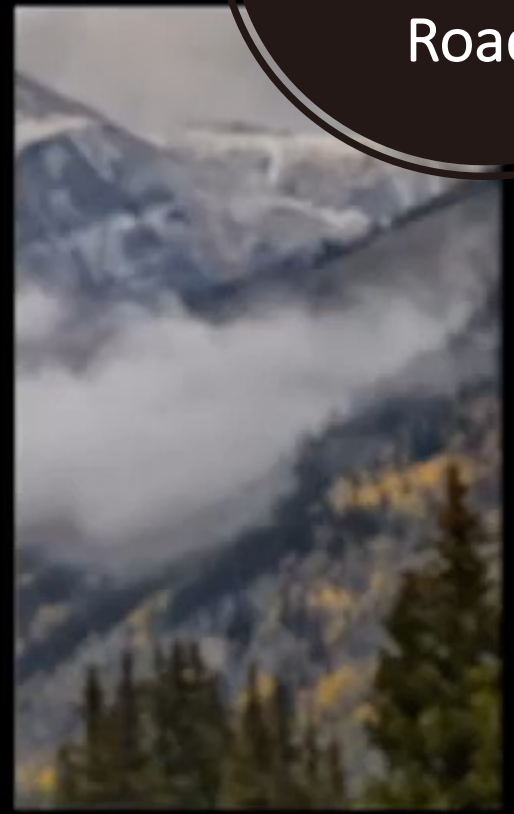
...because of a new, less-costly process the city is utilizing...

...under the name LithTec™”

5-4-2022



Pagosa Springs
completes
3 LithTec™
Roads



LOCAL
NEWS
NETWORK
Durango



San Juan
News
Video Link

KSL 6:03
89°

#KSLlive



TED DANSON
HOST

Sustainable Earth Solutions

LithTec.com to Learn More
or Call 1-(877) 437-9468
Email Bob@LithTec.com



THANK YOU