

*Flowing River*

SOLUTIONS

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A Better World For All

*Navajo Owned*

BASALT-BASED BUSINESSES

*Flowing River Solutions finds & provides a broad range of Proven & Potential Authentic Solutions, which may be used by communities, groups, organizations & individuals all around the world, in order to improve their own lives, and the lives of others, to help create:*

***A Better World For All***

# Proposed Navajo Owned Basalt Businesses

When steel rusts it swells. The internal pressure then bursts open the very concrete the rebar was supposed to be reinforcing. This type of failure is known as **spalling**. Spalling devastates all steel-reinforced infrastructure, sooner or later, because steel always rusts.



A vitally important question to ask is, *"How Do We Eliminate Spalling?"* and our answer to that question is:

***"Through the use of basalt-fiber reinforced, epoxy coated RockRebar®"***

*"Basalt is abundant, renewable volcanic rock. Basalt rock is melted into a continuous "glass state" fiber.*

*These continuous basalt fibers are coated with a proprietary epoxy based resin then aligned and arranged in our state-of-the-art process to produce the only true "Green", "Naturally Renewable" and totally "Rust-Free" alternative meant specifically for the building and repair of our nation's infrastructure in an environmentally responsible manner.*



RockRebar®

*RockRebar® is a modern tech, non-corrosive, superior alternative to traditional black steel rebar.*

## Proposed Business #001 | Basalt-Melting & Processing Furnace

It is important to note that currently there are no operational and large-scale **Basalt-Melting Furnaces & Processing Plants** located anywhere in the USA. As a result, all basalt-fiber-based and related products made in the USA are being manufactured from materials that have been processed abroad and then imported.

Setting up and operating at least one Basalt-Melting Furnace & Processing Plant in The Navajo Nation is a very large project, requiring significant financial investment. However, this would place The Navajo Nation in a most enviable position, enabling it to process locally-sourced basalt (*as well as any basalt trucked in from outside of The Navajo Nation*) and thus establish the foundation for myriad new Navajo Owned and basalt-based businesses, services and industries.



**Image:** Basalt Smelting & Processing Facility in Armenia.

There are significant natural reserves of basalt throughout the USA, including in various parts of The Navajo Nation.

The country is poised to engage in major Infrastructure Projects from 2021 onward – all of which may be built with steel-reinforcement that will eventually rust – this is the perfect time to establish a Navajo owned Basalt-Based Industry.

## Proposed Business #002 | Factories Producing Basalt-Based Products:

Proposed Navajo Nation owned Factories Producing “Basalt Fiber Reinforced Polymers” (BFRP) ~ such as RockRebar® ~ and many other products.

Below we illustrate a few examples of such products:

**Product #001:** *Basalt Rock Wool Fiber - The image below shows basalt rock-wool fiber, rolling out along a conveyor belt at a Ukrainian factory.*



*It is worth noting that producing and selling just this one product in the USA and abroad could, within two to five years, easily cover the costs of setting up and running a major Basalt-Melting Furnace (Smelting Plant) & Production Facility in The Navajo Nation*

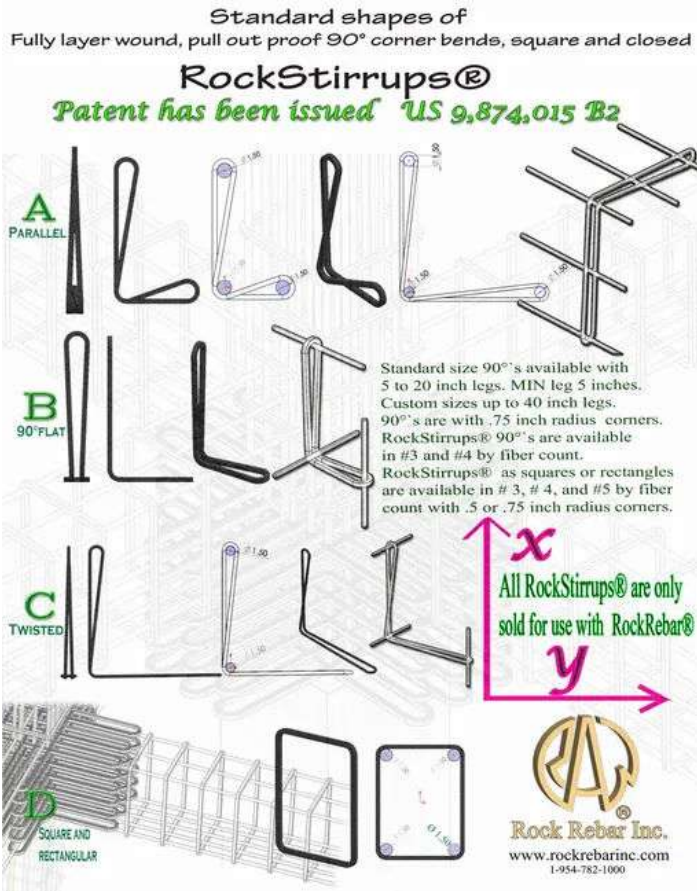
**Product #002:** *RockRebar® - Is a basalt-based and eco-friendly alternative to steel-rebar, which, as a structural component, is even better than steel-rebar in every significant respect.*





# Proposed Business #002 | Factories Producing Basalt-Based Products: (Continued)

**Product #003:** RockStirrups® - patents issued and pending – to be used with RockRebar®



RockStirrups® are designed to be the lateral support to RockRebar®.

Together, the RockStirrups® and the RockRebar® produce 90-degree corners, as well as the containment cages used to assemble beams and columns.

RockStirrups® are produced through the application of 360-degree layer wraps of continuous basalt fiber and epoxy tapes.

The result is fully closed Basalt Fiber Reinforced Polymers (BFRP) Stirrup where the corners are as strong as the sides.

This layer-wound continuity of basalt fibers gives a clear performance advantage in the efficiency of the composite reinforcement.

## Proposed Business #002 | Factories Producing Basalt-Based Products: (Continued)

**Product #004:** RockMesh® - RockMesh® has several uses in civil engineering.



The aggregate of the roadbed should be stabilized by 1-1/2"x1-1/2" RockMesh® rather than rusty steel.

RockMesh® is state of the art for the structural reinforcement of Pervious Concrete.

Pervious Concrete is 20-25% open to allow standing water to pass right through and a sustainable alternative to standard concrete in that it reduces stormwater runoff and improves water quality.

The application of Pervious Concrete helps municipalities meet requirements of the Clean Water Act as well as helping to achieve the United States Green Building Council's LEED [Leadership in Energy & Environmental Design] status for new construction.

The system allows for storm water to be managed onsite via retention and detention devices and only engaging the drainage system when those become full. After a rainfall event, the stored runoff will either evaporate from storage or infiltrate into the ground, saving millions of dollars in pumping and environmental impact fees.

## Proposed Business #002 | Factories Producing Basalt-Based Products: (Continued)

**Product #005:** *RockStaples® - are an improvement upon the white fiberglass "fiber-crete" concrete-reinforcement, used for some years in small and large-scale construction projects.*



Think of RockStaples® as a refined form of tiny basalt rebar with high tensile strength and excellent adhesion that ties the cement, sand, and aggregate together at a micro level to further reduce cracking.

RockStaples™® have a density balance on a par with concrete so they do not float and they do not sink. RockStaples® do not "clump" together like fiberglass. Like the aggregate itself, RockStaples® uniformly distribute within cement paste during mixing.

As a load is applied, concrete containing RockStaples® distributes the stress throughout the concrete in all directions.

As Portland based concrete inevitably shrinks and cracks during the curing phase RockStaples® significantly reduce the size of the cracks. RockStaples® "staple" the concrete components together thereby raising the flexural tensile strength.

The strength enhancement RockStaples® add is purely a function of the number of fibers crossing the various shrinkage stress points. In other words: more fibers = higher strength.

## Proposed Business #002 | Factories Producing Basalt-Based Products: *(Continued)*

A New Factory Producing: Innovative Solar Panels, seated on Basalt Frames.

Currently the vast majority of solar panel companies in the USA import various types of solar panels which have been made in China. Given the fact that the USA is now actively reducing its dependency on products of all kinds made in China, this is also the perfect time to establish a Navajo Made and Made In The USA solar panel company, with solar panels mounted on basalt frames, instead of being mounted on steel frames.

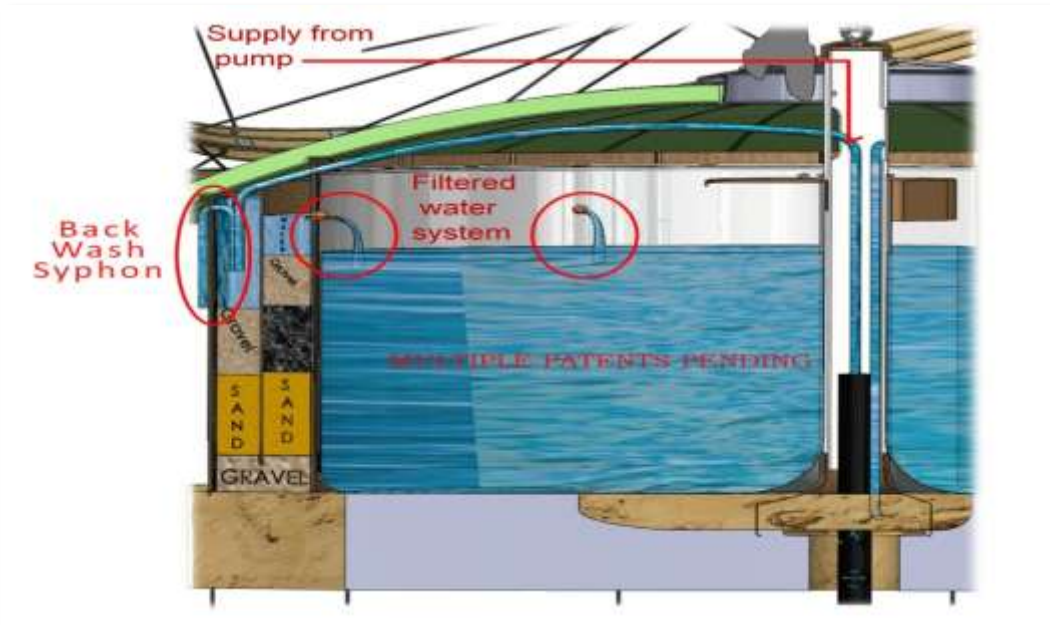


*Above: Proposed product from new Navajo Owned Business ~ solar panels seated on basalt-frames ~ panels follow the sun and are incorporated (for example) into roadside café tables, thereby providing both shade for customers and power for the café.*

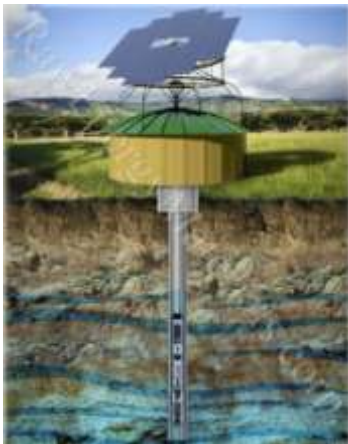


## Proposed Business #003 | Advanced Water Tanks Made From BFRP

A New Business Producing: **Advanced ~ Self-Contained, Solar-Powered, Deep-Well Water Pumping, Filtration & Storage Systems.** With tanks, pipes and more made from Basalt Fiber Reinforced Polymers (BFRP).



Above: Cross Section of Proposed - Advanced & Self-Contained, Solar-Powered, Deep-Well Water Pumping, Filtration & Storage System.



## Proposed Business #004 | Independent But Complementary Factories

A new Navajo Owned Industry that would consist of a number of independent but complementary & co-operative factories, including all of the proposed new businesses mentioned previously in this document and more, which together would produce **Community-Supporting** products & services for:

- Affordable Housing,
- Commercial Premises
- & Infrastructure Projects

**MULTIPLE PATENTS PENDING**



**Research Alternative Ways**

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*Thank You!*

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