

The background image shows a concrete stem wall with a repair system installed. The repair is a dark, textured material applied to the base of the wall. A white logo with red text is overlaid on the top right. The logo reads "NEVER RUST" in large, bold, red letters, with "STEM WALL REPAIR SYSTEM" in smaller, black letters below it. There are also decorative red concentric circles in the top left and bottom right corners of the image.

NEVER RUST

STEM WALL REPAIR SYSTEM

Stem Wall Repair

By Bob Brown

Arizona Foundation Repair™ Expert



About the Innovator

Robert 'Bob' Brown founded Arizona Repair Masons, Inc. in 1989. That business has evolved into the innovative Arizona Foundation Solutions.

Bob graduated in 1984 from Arizona State University with a Bachelor of Design Science from the School of Architecture and a Bachelor of Science from the School of Business in Finance. He brings 30+ years of construction experience, is LEED-accredited and is one of only two Certified Foundation Repair Specialists (CFRS) in Arizona.

Bob completed the grouting fundamentals course from the Colorado School of Mines in 2008. He has served as an expert witness in law cases on several occasions and has been behind some of the foundation industry's most innovative solutions!

stem wall repair

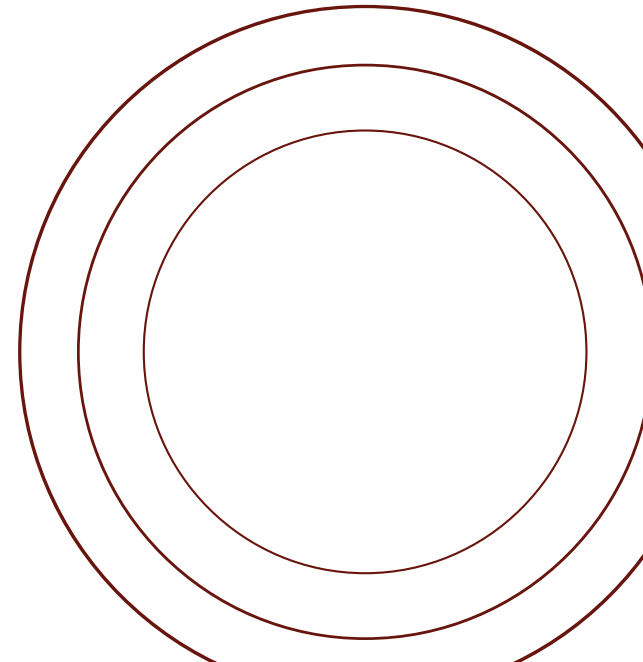
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What are these Cracks in My Foundation?



Cracking, Spalling & Flaking

If you see these cracks in your foundation, take action sooner rather than later...

This can turn to a serious problem very quickly!

What causes these Cracks in my Foundation?



When it is initially placed, concrete has a high PH level around 12 or 13. This is a high alkaline environment and initially protects the rebar from rusting. Over time it drops to around 8 to 8.5 because of carbonization.

The process that geologists refer to as mass wasting. Rain with CO₂ in it (acid rain) slowly over time reacts with the cement in concrete lowering its PH level toward a more acid level.

Concrete has millions of microscopic pores that hold water. Water usually is in these pores, from initial placement or exposure to water over time. It has a natural humidity and affinity for water.



"What happens if cracks are left unaddressed?"

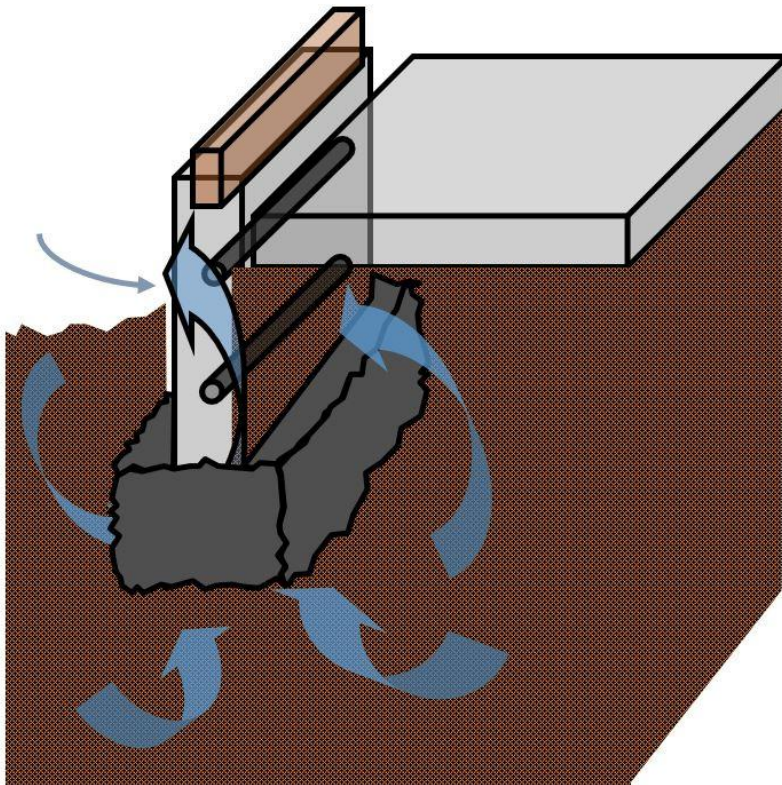
The cracking, spalling will get worse over time and result in structural failure.

Where Does this Water Come From?

SOURCES OF WATER

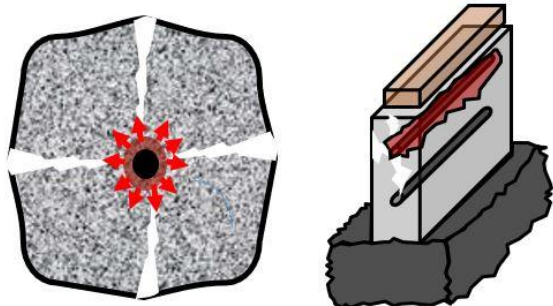
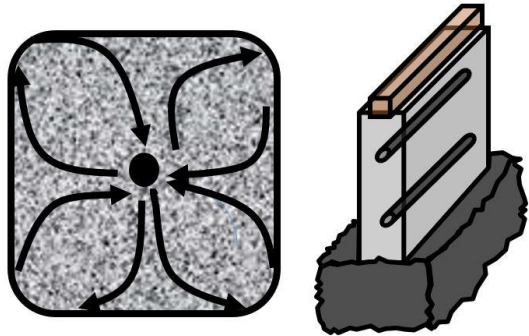
- Storm run off from the roof
- Storm water in the yard / plumbing leaks
- Underground moisture / vapor transmission
- Moisture from neighbor's property
- Irrigation

Some moisture exits from the face of the stem wall, some stays in the stem wall.



How does Water Cause Damage?

Circular micro electrochemical currents.

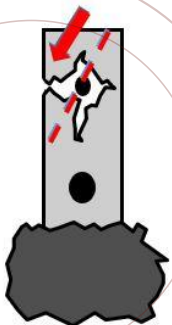


oxidization = rust.

As the concrete lowers from an alkaline PH level toward and acid one, tiny micro chemical electrical currents develop.

These tiny electrochemical currents deposit chloride ions on to the embedded rebar or any other iron products that help catalyze rapid oxidization of the iron...rusting.

As Iron rusts it loses strength and grows in volume. However as it is trapped and encased in concrete, when it grows, it puts pressure on the concrete, cracking it and continuing until the concrete is completely broken apart.



As the concrete deteriorates, it loses its ability to hold the walls above it and can shear off as shown to the left along the red dashed line.

Once started these electrochemical currents will continue to corrode the concrete. Sealing them, epoxy injecting them, replacing them with new rebar will all fail.

Traditional Foundation Repair Options

- **Method #1** - Replace the old rebar with new rebar. This is a fast way to failure. With fresh new steel embedded in the low alkali concrete, the electrochemical currents will attack the steel like fresh meat.

- **Method #2** - Epoxy inject the crack. Epoxy injection is a good method to repair concrete. However in this case it will still leave the steel exposed to the electrochemical currents and continued expansion resulting in the continued deterioration of the concrete. It is impossible to completely encase the rebar everywhere when injecting epoxy into a crack in front of it.

• **Method #3** - Coat the concrete with a sealer. This is extremely counterproductive, as it seals in the existing humidity accelerating the electrochemical attack.



Expanding rebar is the principle reason of concrete failure.

This may cause structural failure in short amount of time!



Foundation Repair Options *Continued...*

ICRI Recommended Repair Option

Method #4 - The International Concrete Repair Institute gives a good protocol for repairing concrete with rusted embedments.

It goes as follows:

- Remove concrete one inch behind all rebar and steel embedments
- Removal all rust on steel down to white metal condition. Usually with sand blasting.
This includes the steel on the back side of the rebar.
- Coat rebar and embedments with an ion blocking epoxy.
- Patch concrete with a rust inhibiting admix to the patch mortar.



This method is pretty good if done thoroughly. It slows down the electrochemical currents and delays the oxidization of the steel... for a while. It is very difficult to make sure that no steel has any rust on it and that all of it is completely encased & sealed off. How long will the repair last? Hard to say. It depends on many conditions. However the electrochemical currents and oxidization will return sooner or later.

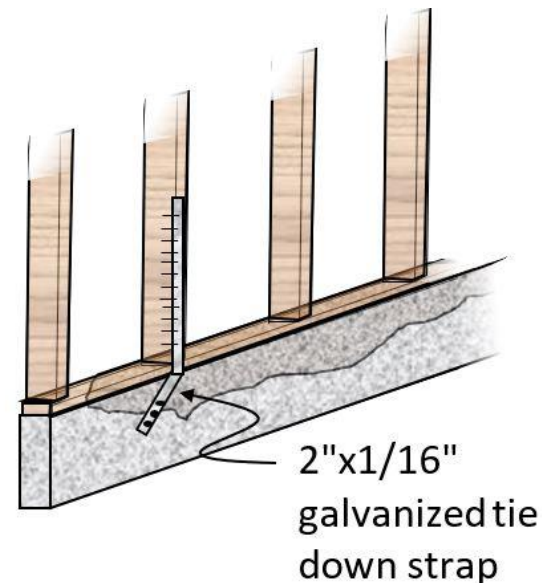
The Problems with Traditional Repairs

it's more than just a rebar issue...

There are more problems with embedments than just rebar. Homes with frame construction (not masonry) have hold down straps. These are designed to make sure that the house stays secured to the foundation in high winds.



These straps attach to the framing stud with 24 screws along the outside of the wall (under the stucco) and continue down into the concrete stem wall. Since they are fastened to the outer edge of the stud, they enter the stem wall on the outer edge and then continue on an angle to the middle of the concrete



Most people don't understand the more critical function of tie down straps and their propensity to fail!

Let's Get Technical for a minute...

Code requires all embedments to be at least 1.5" from the edge. By definition then none of these straps meet code. They are constructed of thin 1/16" thick materials and are zinc coated. However the zinc coating only protects for a short time because it is so thin. A very short time. Once they are deteriorated there is no hold down connection from the house to the foundation. By the time rebar is cracking the concrete, the tie down straps have almost always lost their ability to do any good whatsoever.

Replacing these straps is very difficult. It involves removing the existing strap all the way up the stucco (about 24") and replacing them. It requires restoration of the lath. ... (the waterproof membrane under the stucco) and sealing it properly... since the stucco itself is not waterproof. If it is not sealed properly, water penetrates and starts rusting the wire mesh between the membrane and the stucco. Not a fun thing. Once the strap is replaced, the stucco needs to be patched with a texture to match existing as well as the paint. A difficult thing to do unless you are a stucco craftsman. And to keep the paint the same color of the house as it fades, even if it is matched by computer, usually requires painting the entire wall.

**If you remove much of the stem to repair it...
how do you keep the house above it stabilized?**

Temporary Shoring

During repair, much of the concrete is removed, undermining the wall that it is designed to hold the walls & roof up. Unless you shore up the wall during construction you run the risk of having the wall shift off of its foundation. Unfortunately all the existing shoring mechanisms are metallic, putting us right back to where we started with oxidization.

WHY do So Many Stem Wall Repairs Fail

It's good to have accuracy on the target... It's more important to be aiming for the right target to start with.

- Most repairs do not address stopping the electrochemical currents.
 - Admixtures and fiberglass mix additives
 - Replacement of rebar with new steel
 - Epoxy injection
- Many repairs focus on sealing the stemwall... exacerbating the problem
- Some focus on piling up dirt in an attempt to divert water (unsuccessfully)
- Most repairs do not address the tie down straps
- Most repairs ignore the shoring during removals



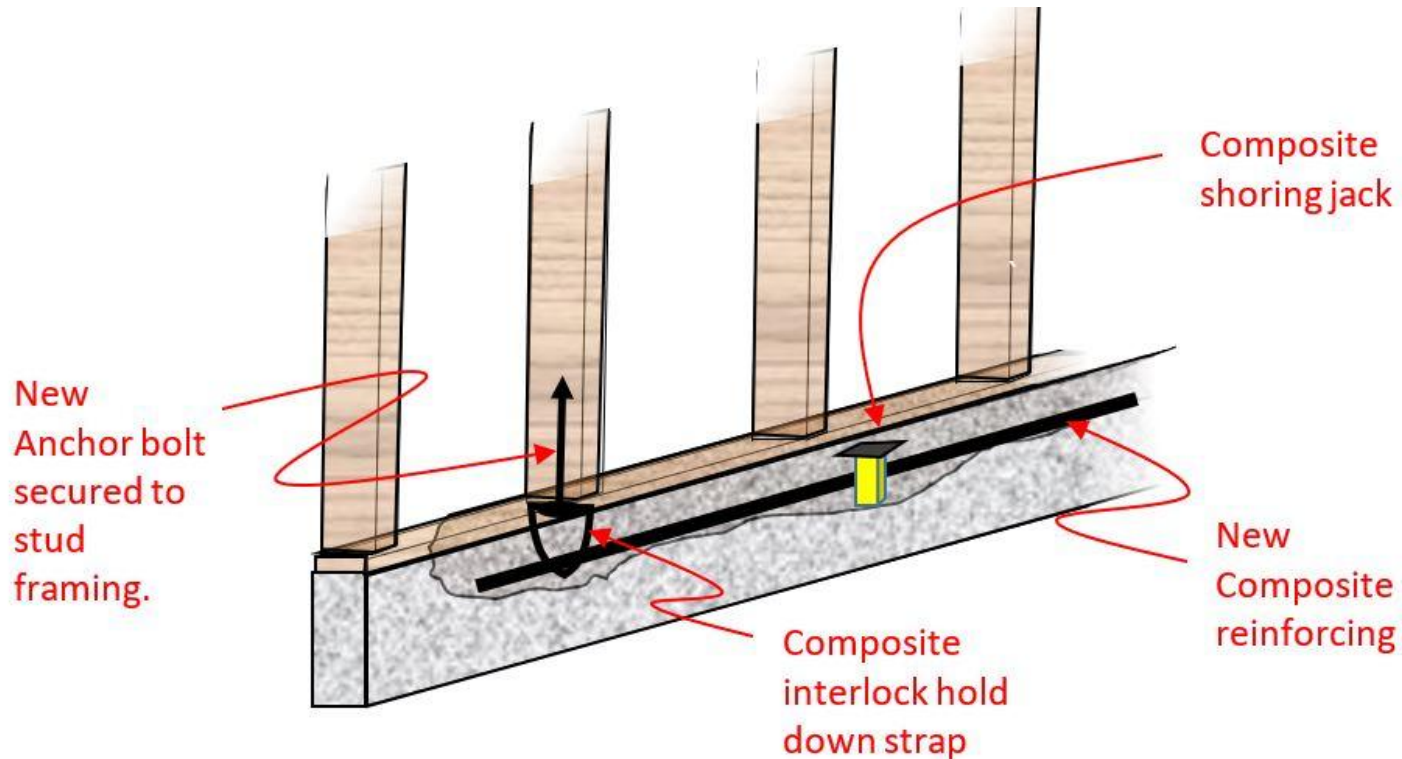
**Many repairs focus on the wrong things...
they aim for the wrong target!**

Introducing

NEVER RUST

STEM WALL REPAIR SYSTEM

Guaranteed to Never Rust!



**Never Rust
is different.**

Brought to you by Arizona Foundation Repair™ Experts

Installing NeveRust

Step by Step



Step One

Chip away deteriorated concrete to fractured rock strata, removing all ferrous oxide.



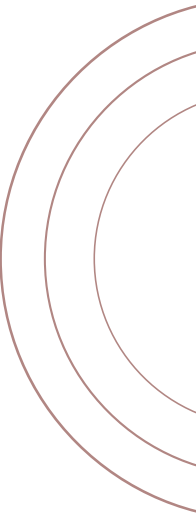
Step Two

Cut out all rusted rebar. Yes, ALL of it!



Step Three

Drill and dowel ends and middle sections every 5 feet.



Installing NeveRust

Continued...



Step Four

If tie down straps are encountered, remove them completely



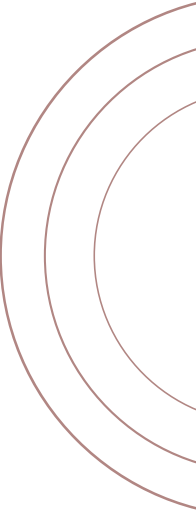
Step Five

Drill new 8" anchors into the base plate and up into the stud.



Step Six

Insert poly propylene loop in to anchor washer while drilling.



Installing NeveRust

Continued...



Step Seven

Insert horizontal composite bar into loops.

Step Eight

Clean surface and parge with a parge coat and acrylic admixture.(step not pictured)



Step Nine

Patch back with high strength low shrink grout mix.



Step Ten

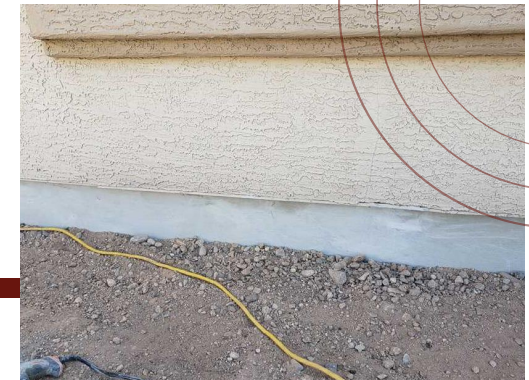
If the wall is completely deteriorated and loses all capacity to bear the load then insert composite shoring jacks as needed.



BEFORE



AFTER



You might save a little money having a cheaper system installed. This will be long forgotten when it fails in a short amount of time. This is one of the few investments that homeowners can make that fix a problem with severe consequences that if done properly will make a lasting difference!

After Photos

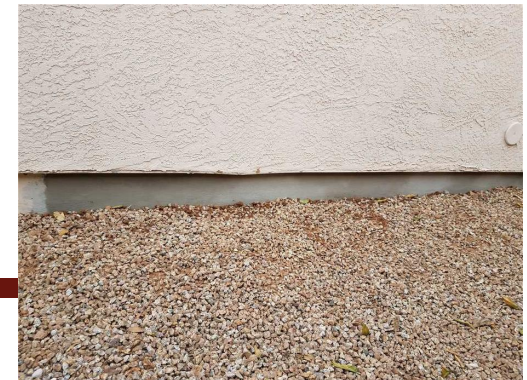
NEVER RUST
STEM WALL REPAIR SYSTEM



BEFORE



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v 2.06.2020

NeveRUST

STEM WALL REPAIR SYSTEM

ONLY available at*

Bob Brown's

**ARIZONA
FOUNDATION
SOLUTIONS**

*All rights reserved. The NeveRust Stem Wall Repair Solutions & The MoistureLevel Smart Foundation System are patented and proprietary foundation repair solutions **only available through Bob Brown's Arizona Foundation Solutions.**

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