Pro-Seal*ECCO*® Rapid Install Canal Soil In Situ Placed Hydrophobic Alternate Concrete Water Conservation Liner

Keeping it Green

The Challenge: Receding waters of the Colorado River Basin and leaching of toxic contaminates into canal waterways

The Threat: Drinking water and irrigation water shortages and Toxic Leachate Contamination

The Solution: Stop canal channel water loss to ground, stop ingress of toxic leachates

Pro-Seal*ECCO* Stabilization, Environmentally Sound, Seamless, Hydrophobic, and Contains Toxic Leachates

- NSF Guidelines Compliant
- GO Green Certified Compliant
- Red Line Certified Compliant
- NSF Certified Compliant
- US EPA Compliant
- USFDA Compliant
- USACE ASTM Compliant
- LARR Compliant
- CSI Compliant
- Contains RCRA 8 Metals At Newest EPA ppb Requirements

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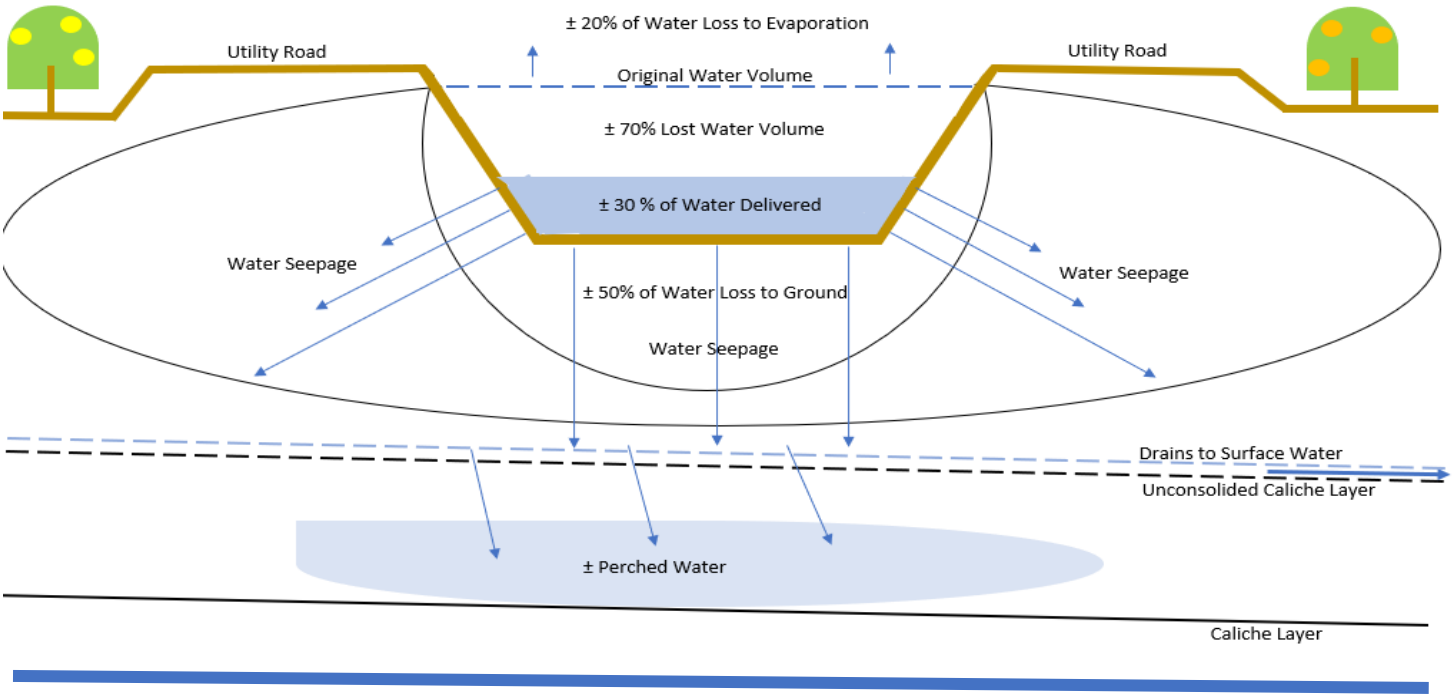
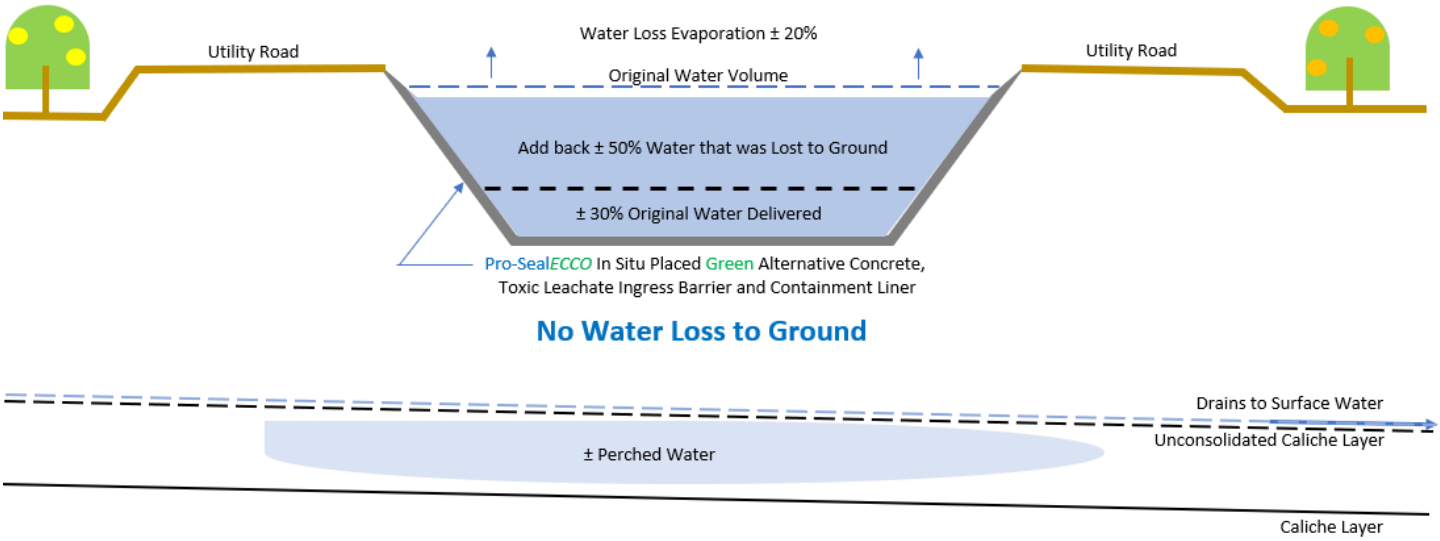
Challenge:

Losing Earthen Canal



Solution:

Pro-Seal*ECCO*® Semi-Structural Stabilization for Earthen Canal



- Deliver 60% more water!
- Efficiency increased 72.5% !

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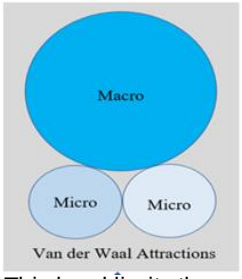
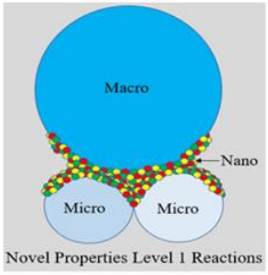
What is it?

Left, native soil with Pro-Seal*ECCO*® Nano Novel Matrix Material added to create alternate concrete, with up to 14,000 psi. Mixed in situ (in place), structurally stabilizing the soil creating a continuous hydrophobic (non-water absorbent) toxic leachate containment barrier.

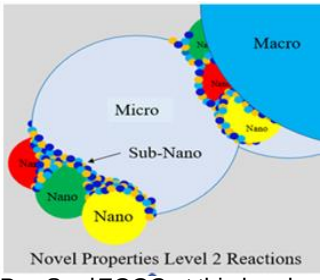
How does it work? The science:



This level limits the reaction points.



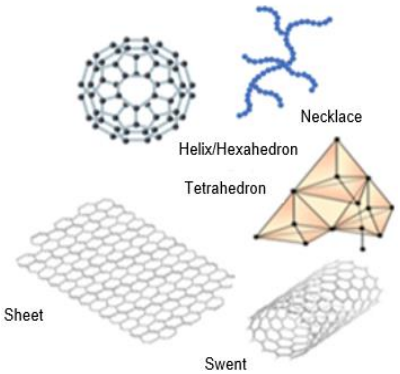
This level increases the reaction points by millions.



Pro-Seal*ECCO* at this level increases the reaction points by trillions.

With Pro-Seal*ECCO* Nano Novel Matrix materials we get trillions more reactions in the same footprint. Nanotechnology allows us to custom engineer the site soil creating structure, therefore generating far superior bond strengths.

Nano Novel Matrix properties. these are peculiar to the nano and sub-nano levels, a few examples:



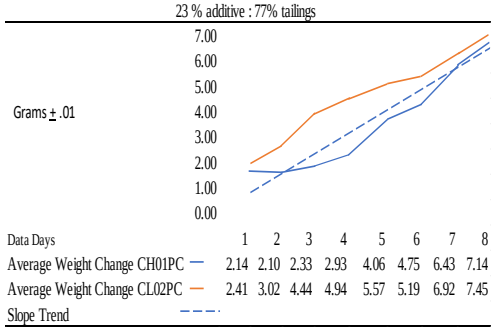
Above, Nano Novel matrix properties are strong physical, electrical, magnetic, and chemical bonding properties combining, creating a dynamic strength of bond. These properties are only available at the nano and sub-nano particle scales.

The proof: Independent testing from Dr. J. Lee, U of A and Colorado School of Mining.

Portland cement

Absorption Test Results Portland cement Dry Soils ≤ 16 % MC

23 % additive : 77% tailings



Data Days	1	2	3	4	5	6	7	8
Average Weight Change CH01PC	2.14	2.10	2.33	2.93	4.06	4.75	6.43	7.14
Average Weight Change CL02PC	2.41	3.02	4.44	4.94	5.57	5.19	6.92	7.45
Slope Trend								

ASTM 642 Absorption

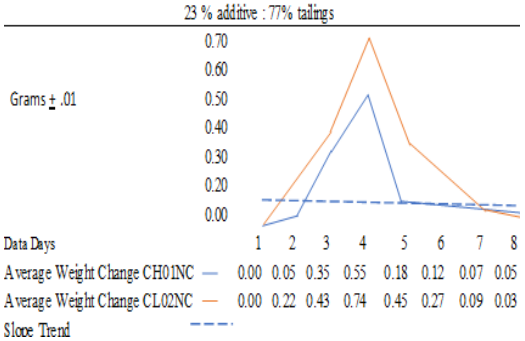
Left, Portland cement absorbed 18,333 – 28,420% more moisture than Pro-Seal *ECCO* Nano Novel Matrix material. **Results: Portland cement is hydro-philic (absorbent)**.

Right, Pro-Seal*ECCO* rejected all water. **Pro-Seal*ECCO* is hydrophobic (non-absorbent)**. Pro-Seal*ECCO* material will not allow water to wick through or pass through it to ground.

Pro-Seal*ECCO*

Absorption Test Results NanoCrete Treated Specimens Dry Soils ≤16% MC

23 % additive : 77% tailings



Data Days	1	2	3	4	5	6	7	8
Average Weight Change CH01NC	0.00	0.05	0.35	0.55	0.18	0.12	0.07	0.05
Average Weight Change CL02NC	0.00	0.22	0.43	0.74	0.45	0.27	0.09	0.03
Slope Trend								

Portland cement, below

Tailings ICP-EOS Analysis Leach Results From Portland cement polymerizd Mine Tailings Tumbled and Submerged Acidic Acid Solution, pH 3.4

Type	In ppm	Na	Mg	Al	K	Ca	V	Cr	Mn	Fe	Ni	Cu	Zn	As
FE A	LW1	1650.98	7.39	1.598	6.234	26.89	0.0415	0.02	0.02	0.711	1.27	0.035	6.42	0.265
CU B	LW 2	2791.21	2.21	1.792	7.186	22.07	0.902	0.043	0.025	0.093	1.09	0.073	5.47	0.499

Top left, EPA TCLP: 50% **Portland cement** mix specimens placed in pH 3.4 acidic acid, 72 hours, and tumbled. **Result:** RCRA 8 leaching accelerated, **failed** in **ppm.**

Pro-Seal*ECCO*, below

Tailings ICP-EOS Analysis Leach Results From NanoCrete Treated FE Tailings

		In ppb Ag	As	Ba	Cd	Cr	Hg	Pb	Se
Fe	Raw Tailings	1.00	1.32	100.10	0.11	2.10	0.00	2.30	1.20
Fe	NanoCrete Treated Tailings	0.0140	0.0500	0.0330	0.0100	0.0068	0.0000	0.0150	0.0020
% Change		99%	96%	100%	91%	100%	N/A	99%	100%
Change +/-		+	+	+	+	+	N/A	+	+

Bottom left, EPA TCLP modified: 23% **Pro-Seal*ECCO*** mix specimens placed in pH 3.0 sulfuric acid, 30 days, and tumbled. **Result:** RCRA 8 leaching contained**, passed** in **ppb.**

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How Is Pro-SealECCO applied/installed?


Begin with water losing canal.


Clean out and reshape.


Spread specified rock screen line.


Spread Pro-Seal*ECCO*® NanoCrete.


In situ mix Pro-Seal*ECCO*®: NanoCrete, BedROC, and rock.


Back drag for light compression.


Drum roll for tight compression.


End with water retention and efficiency.

- Its Green!
- Deliver 60% more water!
- Efficiency increased 72.5% !
- It makes *ECCO*nomic sense!

Make a significant "Environment Positive Impact" decision now.

- Custom designed stabilization matrix designed to specific site soil and use.
- The install is rapid and ready for use just hours after instillation.
- The material is hydrophobic, stopping water lost to ground.
- The material is a Green Nano Novel matrix material.
- Minimal pieces of equipment required per crew.
- Go Green, reduce the carbon footprint.
- Deliver up to 60% more water.

PRO-SEAL® ECCO Division of Pro-SealCorp
Keeping it Green

The Technical Team:

- Tal Brammer, S.A.M.E., MBA, CEO
- M. Jane Stone, BS, Geophysicist, Hydrologist, Geologist, Executive Vice President
- Ken Nowak, MS, Head of Civil Engineering
- Tim Lindor, TE, Head of Technical

Advisors:

- Dr J. Lee, formerly of U of A, currently Colorado School of Mining
- Dr. P Nelson, Colorado School of Mining
- C. Bannon, MS, U of A

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