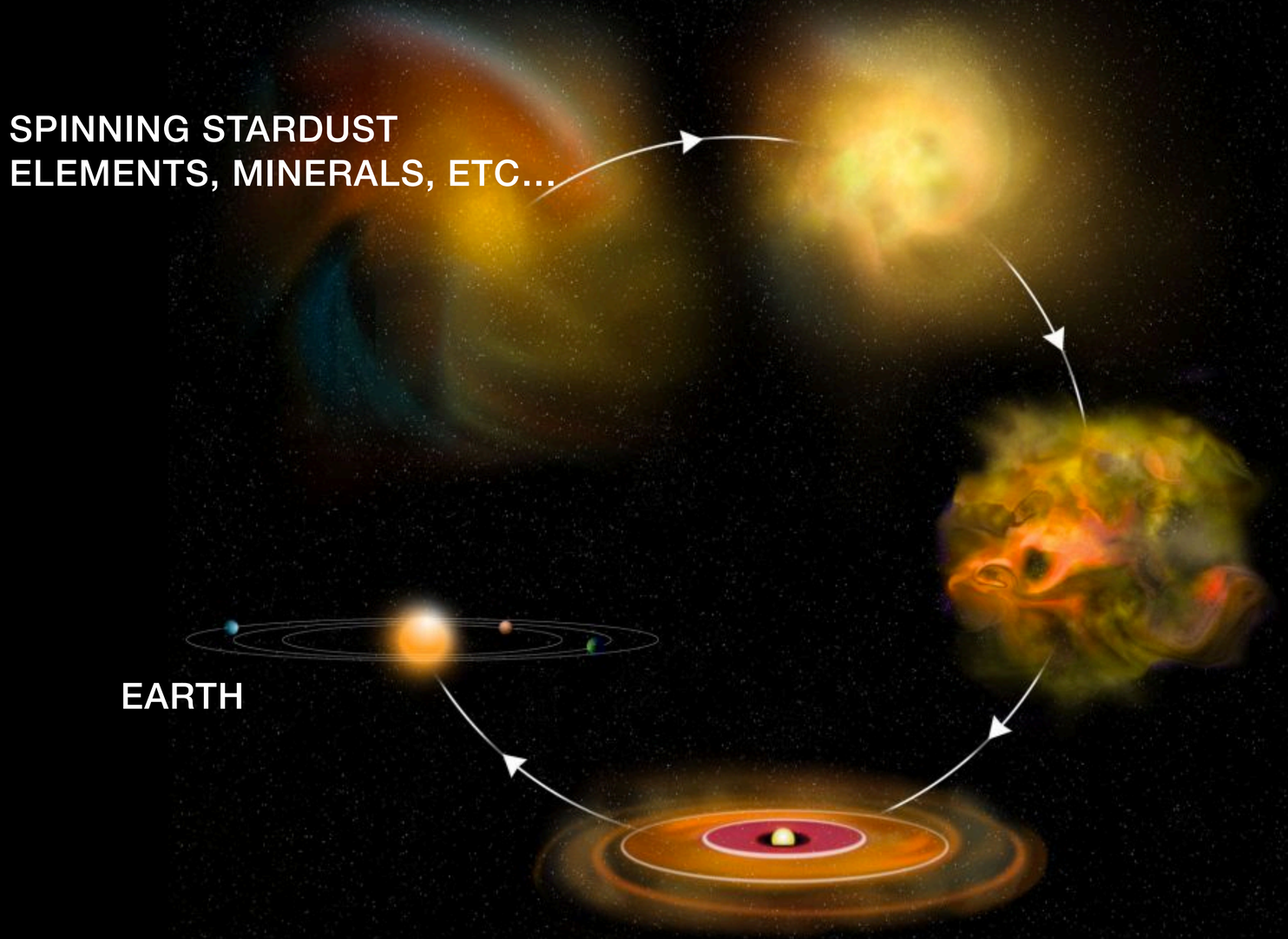
SOILS 101

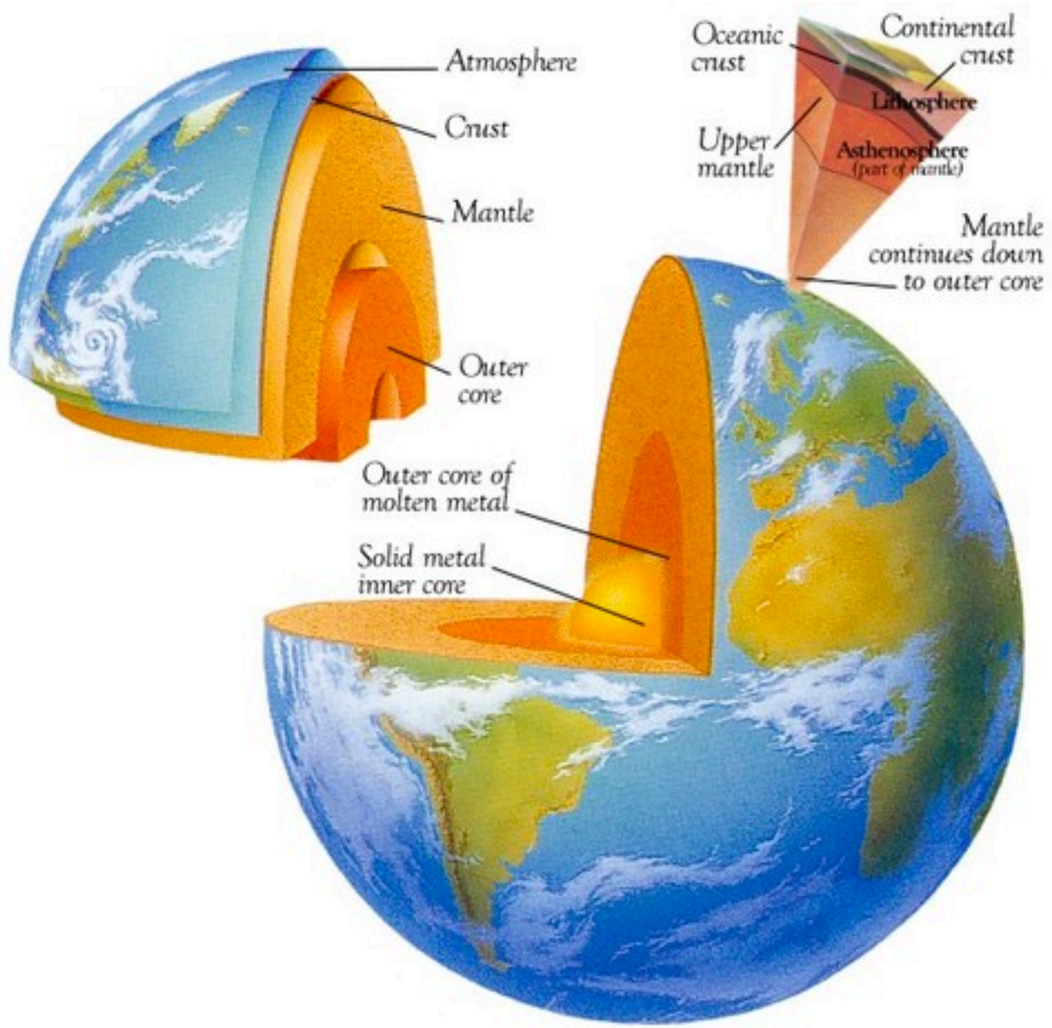
Educational Training For Real Estate Agents

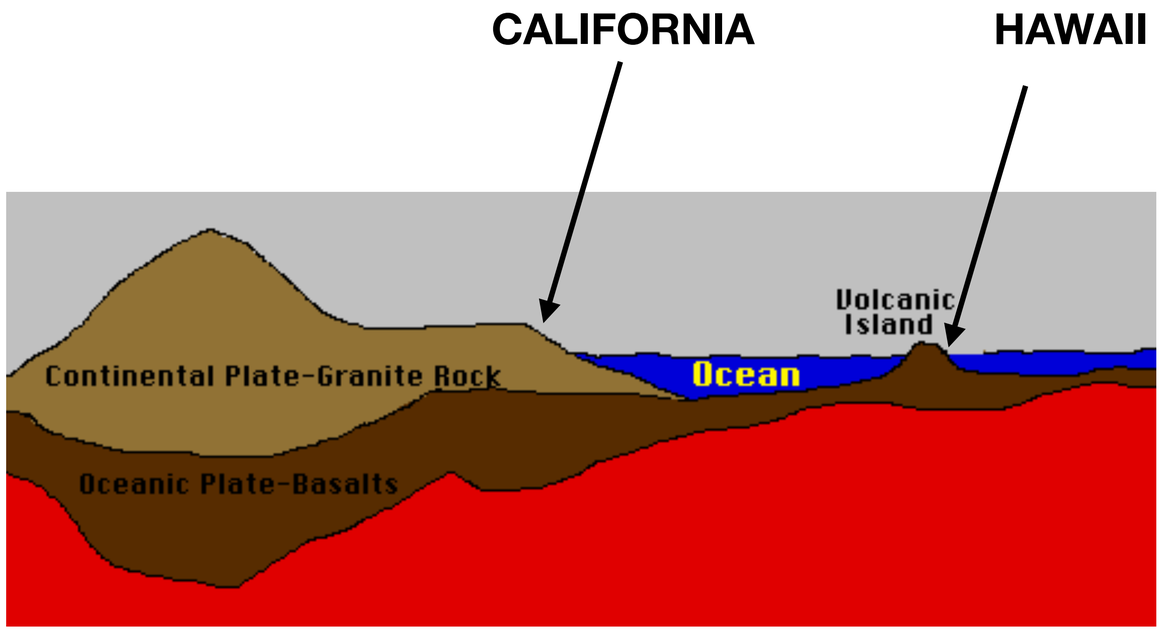
BEAR
ENGINEERING

WHERE ‘EARTH’ COMES FROM….

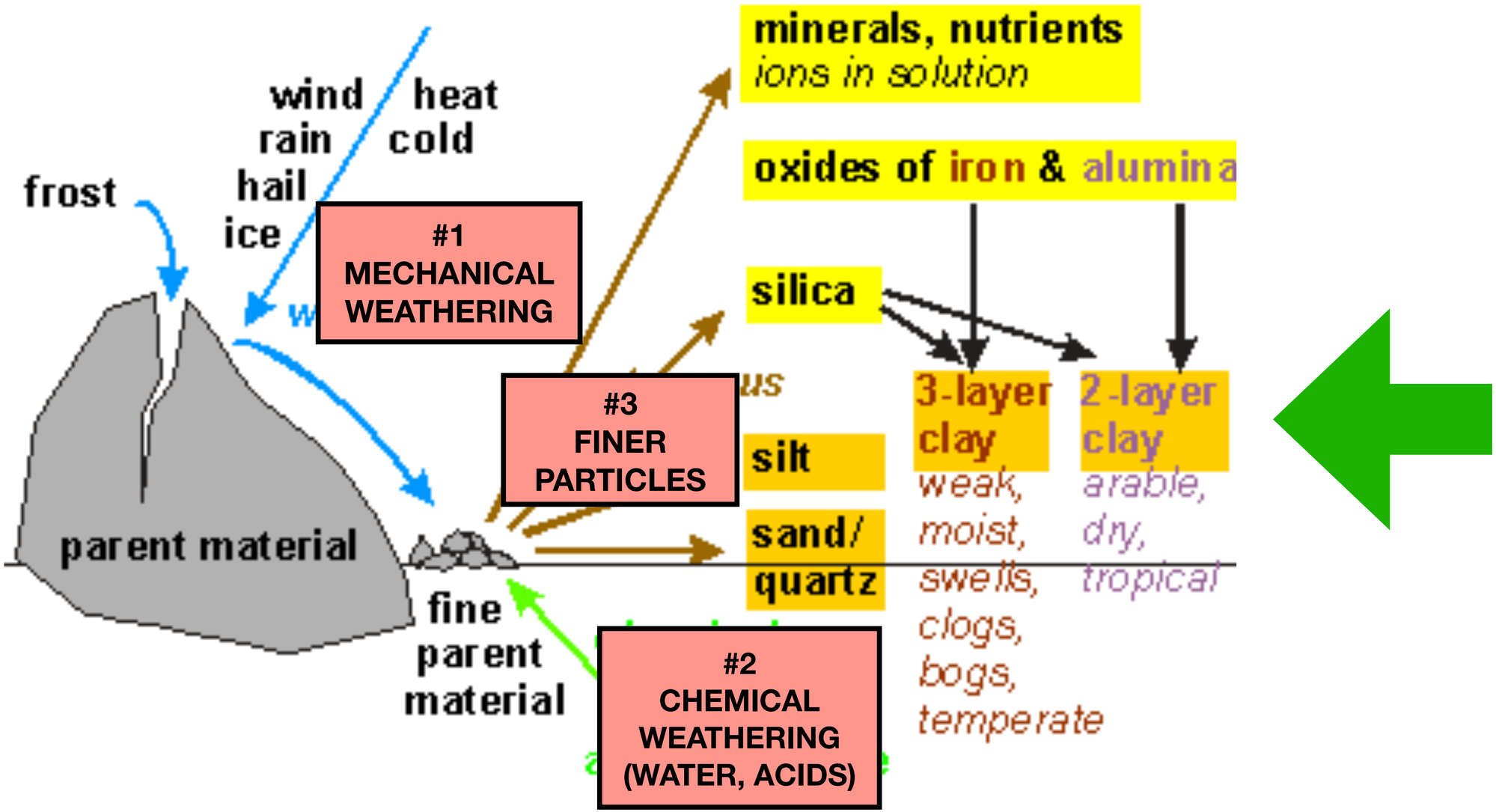


WHERE ‘ROCK’ COMES FROM….

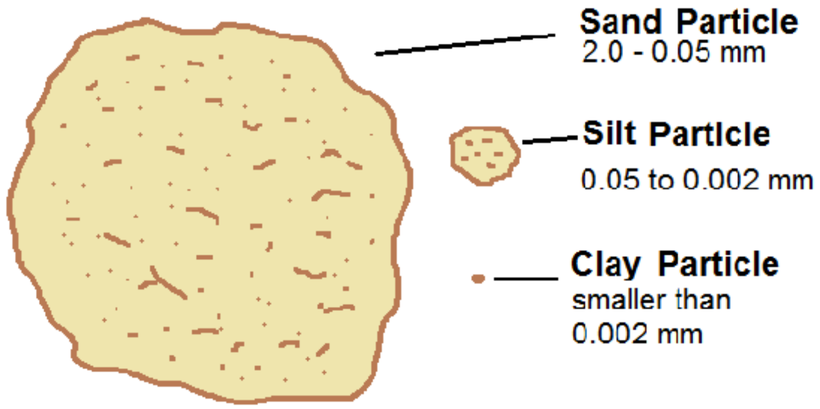




WHERE ‘SOIL’ COMES FROM….



EXPANSIVE SOIL DETAILS



Clay particles are **extremely small**

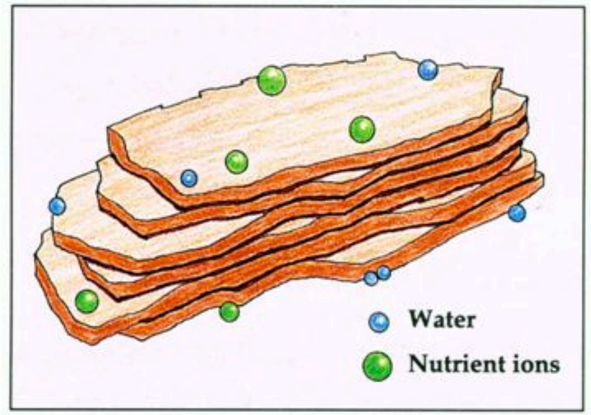
Composed of aluminum and silicon **sheets**

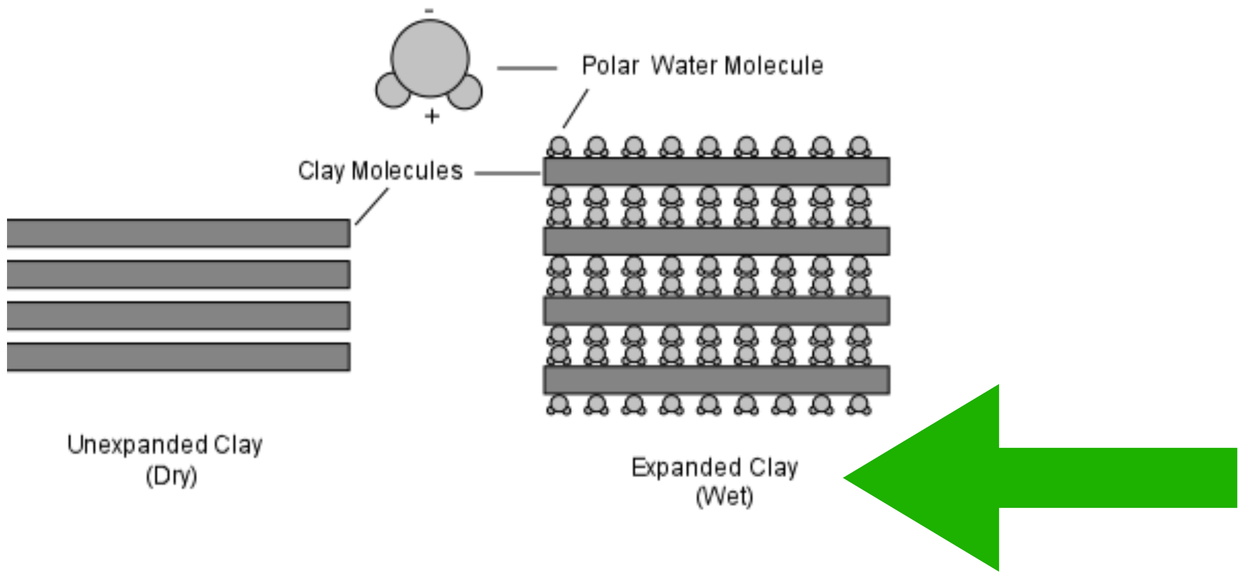
Which are **held together by intra-molecular forces**

Will **attract and hold water molecules** in a **molecular sandwich**

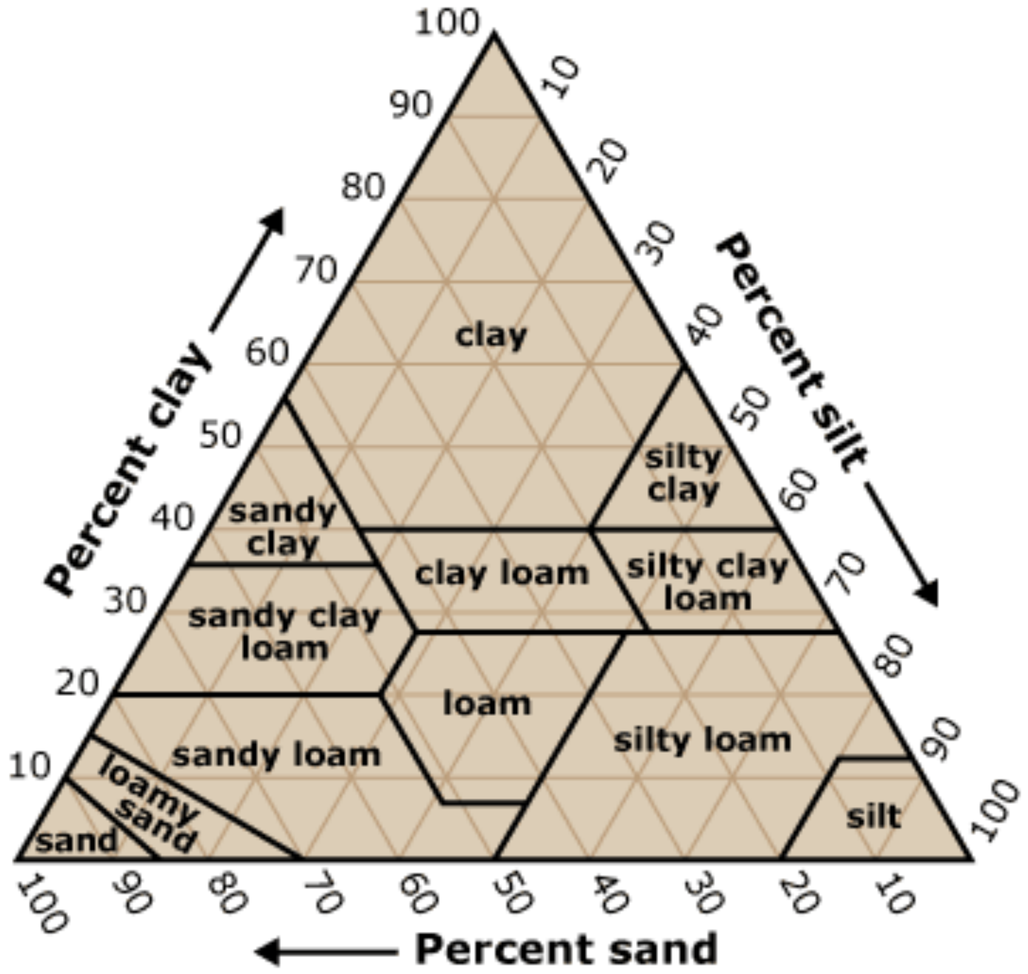
Sheets have a **electro-chemical attraction** for the water dipoles

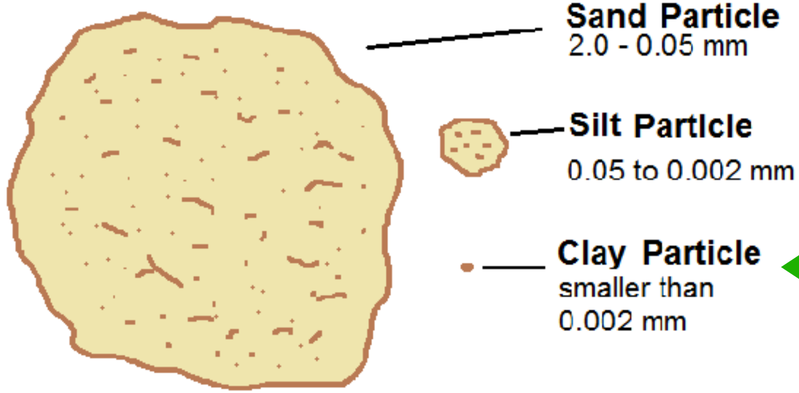
FORCE IS LARGE ENOUGH TO MOVE FOUNDATIONS

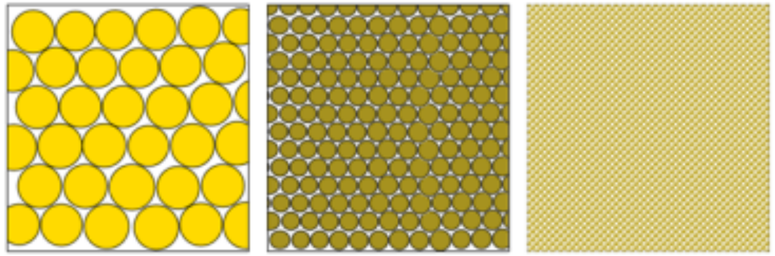




BASIC SOIL TYPES







Large particles and pore size (air spaces)

Medium particles and pore size (air spaces)

Small particles tightly packed with very little space between them

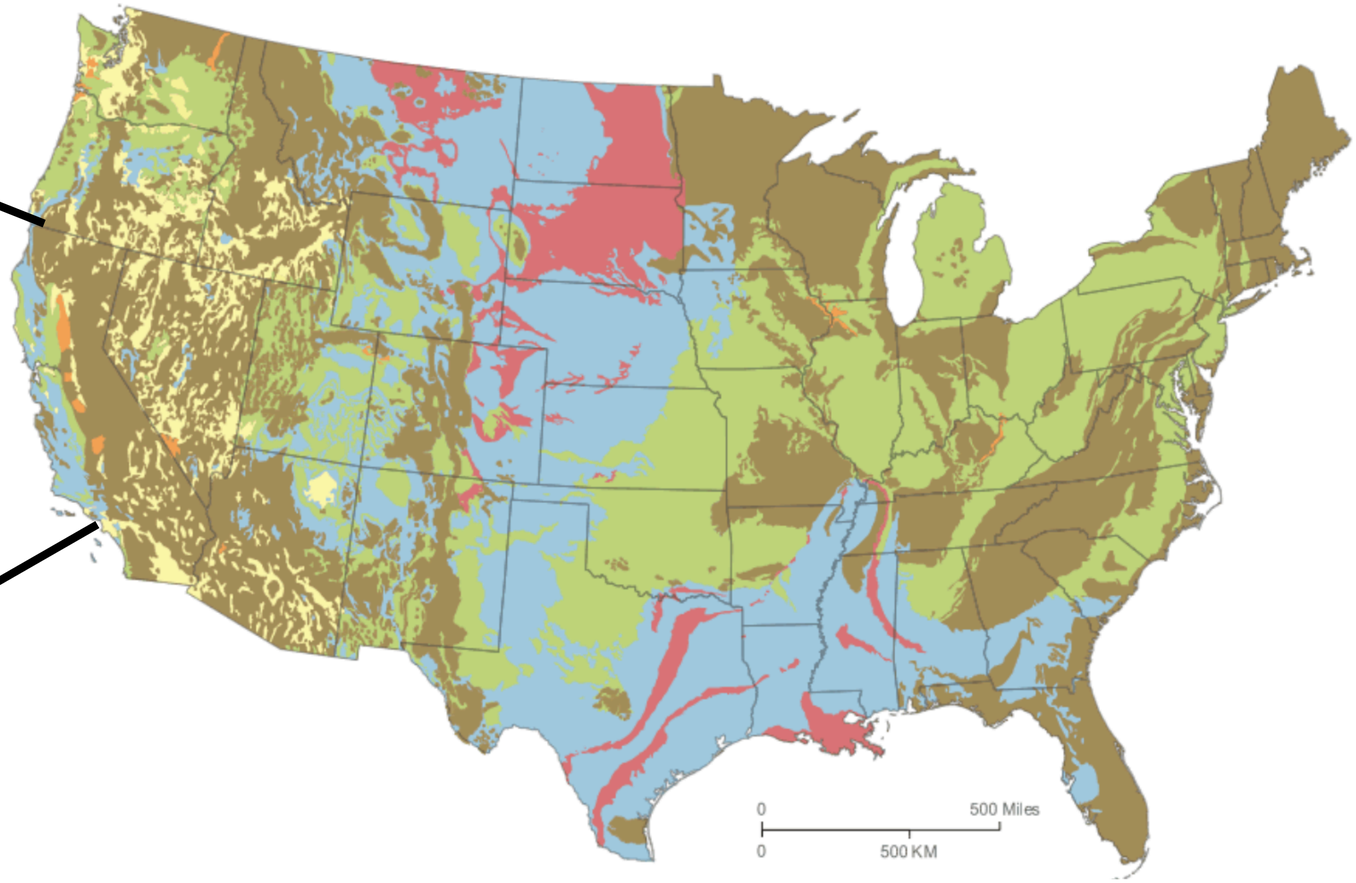
Sand **Silt** **Clay**

EXPANSIVE SOILS IN THE U.S. & C.A.

WORST

NEXT WORST

Partially due to the fact that these regions experience **severe moist climates and extreme dry climates within just a few months.**



HOW TO SPOT EXPANSIVE SOILS

VISUAL CLUES

- CRACKING

FIELD TEST

- ROLL MOIST SOIL & SEE IF IT STICKS TOGETHER

SOILS TEST / REPORT

DRILL RIG

HAND DRILL

LAB ANALYSIS

- $5K TO $10K
- 1 DAY ONSITE FOR DRILLING
- ANALYSIS TAKES FEW WEEKS
- REPORT COMPLETION TAKES FEW MONTHS

BORING LOG DATA

MOISTURE CONTENT (%)	UNCONFINED STRENGTH (ksf)	PLASTICITY INDEX (%)	BLOW COUNT (Blows per foot)	SAMPLE TYPE AND NUMBER	DEPTH IN FEET	GRAPHIC SYMBOL	UNIFIED SOIL CLASSIFICATION	GEOTECHNICAL DESCRIPTION
								4.5” concrete slab
							MH	**CLAYEY SILT**, brown, very moist, stiff, with scattered, fine to medium gravel -Fill-
24.5			24	SB-1				
							MH	**CLAYEY SILT**, brown, very moist, very stiff, with scattered, fine to medium gravel
42.4			37	SB-2	5			
								SAPROLITE, mottled-brown, humid, hard
			62	CP-1				
					10			
			72	CP-2				
								very hard
			179	CP-3	15			
								Bottom of Boring No. B-1 @ 15.0 ft. No free ground water observed.
					20			

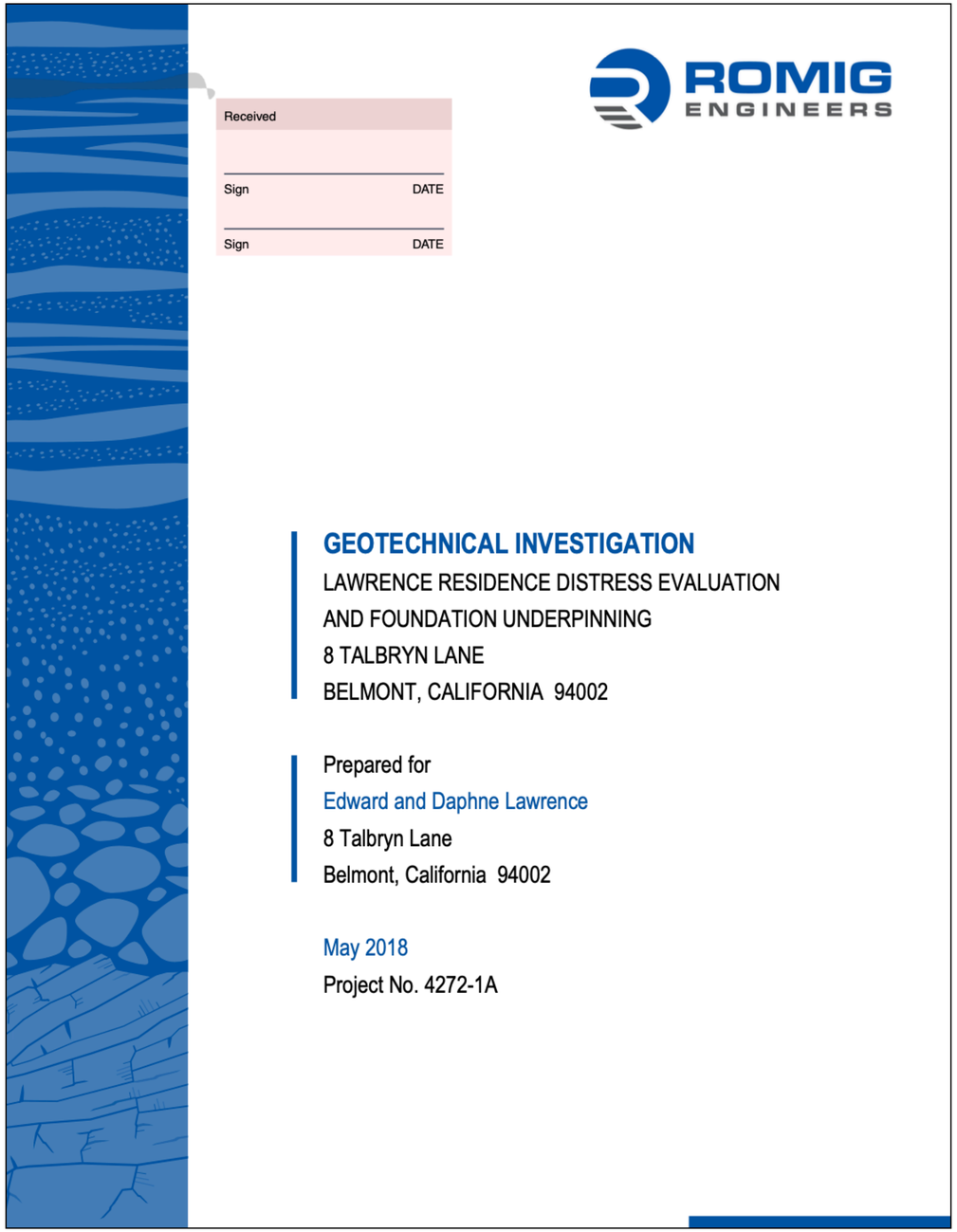
SAMPLE TYPE

SB - Split Barrel
trometer SP - Standard Penetration
ampler ST - Shelby Tube

OTHER LABORATORY TESTS

AL - Atterberg Limits
CN - Consolidation
DS - Direct Shear Strength
SA - Sieve Analysis
SS - Shrink/Swell
UC - Unconfined Compression

CASE STUDY



Received

Sign DATE

Sign DATE

ROMIG ENGINEERS

GEOTECHNICAL INVESTIGATION

LAWRENCE RESIDENCE DISTRESS EVALUATION
AND FOUNDATION UNDERPINNING
8 TALBRYN LANE
BELMONT, CALIFORNIA 94002

Prepared for
Edward and Daphne Lawrence
8 Talbryn Lane
Belmont, California 94002

May 2018
Project No. 4272-1A

WHAT THIS MEANS FOR THE HOME…

“SKIP THE BAD SOIL, HIT THE GOOD STUFF”

DRILL TYPE: Minuteman with 3-1/4" Continuous Flight Auger **LOGGED BY:** RL

DEPTH TO GROUND WATER: Not Encountered **SURFACE ELEVATION:** NA **DATE DRILLED:** 3/20/18

CLASSIFICATION AND DESCRIPTION	SOIL CONSISTENCY/ DENSITY or ROCK HARDNESS* (Figure A-2)	SOIL TYPE	SOIL SYMBOL	DEPTH (FEET)	SAMPLE INTERVAL	PEN. RESISTANCE (Blows/ft)	WATER CONTENT (%)	SHEAR STRENGTH (TSF)*	UNCONFIN. COMP. (TSF)*
Fill: Brown, Sandy Lean Clay, moist, fine to coarse grained sand, moderate plasticity.	Very Stiff	CL		0		16	13		2.0
Brown, Sandy Lean Clay, moist, fine to coarse grained sand, moderate plasticity.	Very Stiff	CL		5		23	17		2.8
						23	19		>4.5
Franciscan Complex: Light brown, Chert, moist, fine to medium grained sand, severely weathered, friable.	Soft to Medium	BR				50/6"	12		
Bottom of Boring at 7.5 feet.									

BAD (FILL AND/OR EXPANSIVE)

GOOD (HIGH BLOW COUNT AND ROCK OR NEAR ROCK)

THANKS!

BEAR
ENGINEERING

www.BearEng.com

nathan@beareng.com
650-722-0830