



BEAR
ENGINEERING

Real Estate Agent
Education Series

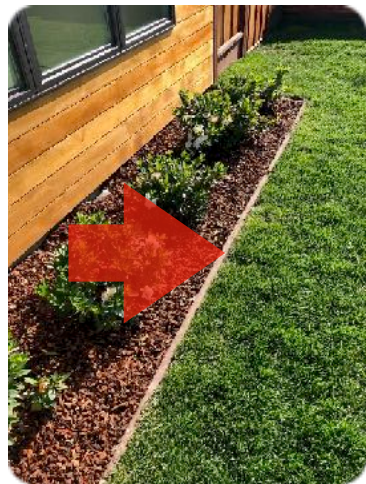
Drainage 101

MOST COMMON ISSUES



Downspouts Discharge Too Close

It is recommended to ensure all downspouts have extenders added to discharge water at least 5' from the house or discharge onto hardscape that then flows away from the foundation at least 5'



Flat or Negative Slope

It is recommended to ensure adequate slope away from the house in all areas & recommend hardscape as the best option. The slope for hardscape can be 1 inch in 48 inches of horizontal distance and for grass and other porous coverings it needs to be 1 inch in 12 inches of horizontal distance.



Planters Near Foundation

It is best to avoid planters near the structure as they tend to trap water next to the foundation and it is recommended that there be positive sloping of the grade away from the structure.



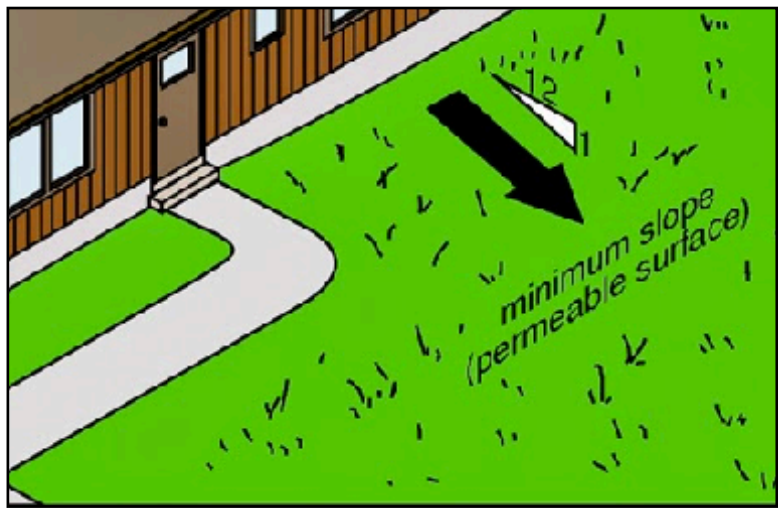
Lack of Drainage Below Decks

For the area below most decks, there is generally inadequate drainage away from the foundation. Options include improving surface drainage below the deck, the addition of subsurface drainage (french drain), adding a roof under the deck if space exists or adding a roof over the deck itself.



GOOD, BETTER, BEST APPROACH

Good
RE-GRADING



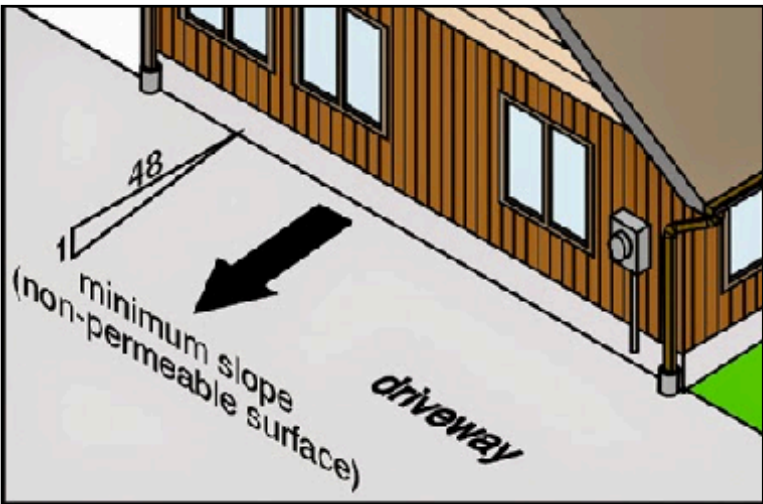
Permeable
Surface
1":12"



Soil Texture	Coefficient of Runoff	Soil Texture	Coefficient of Runoff
Concrete or Asphalt	1.00	Loam - Bare	.60
Gravel - Compact	.70	Loam - Light Vegetation	.45
Clay - Bare	.75	Loam - Dense Vegetation	.35
Clay - Light Vegetation	.60	Sand - Bare	.50
Clay - Dense Vegetation	.50	Sand - Light Vegetation	.40
Gravel - Bare	.65	Sand - Dense Vegetation	.30
Gravel - Light Vegetation	.50	Grass Areas	.35
Gravel - Dense Vegetation	.40		

Note: The above data is approximate. Coefficient of Runoff = Runoff/Rainfall

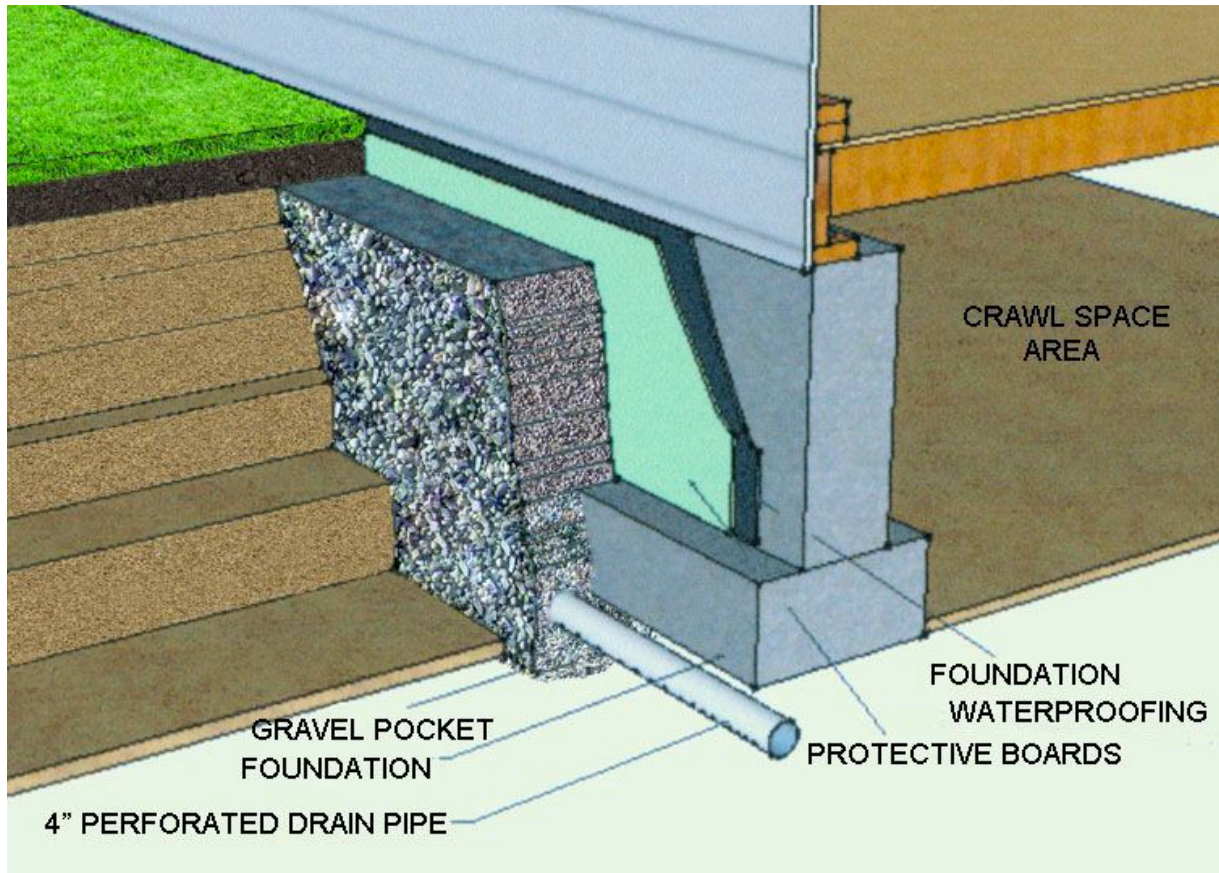
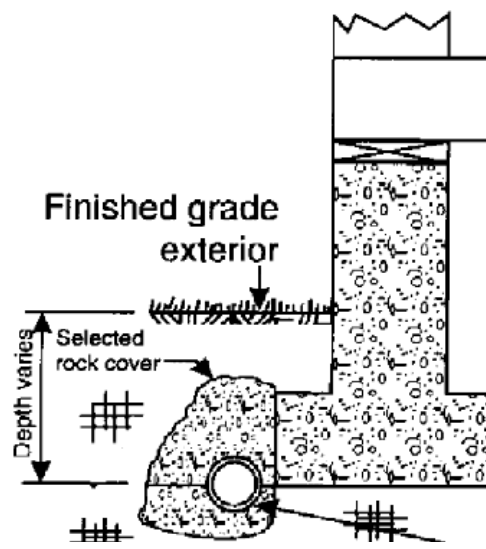
Better
HARDSCAPE



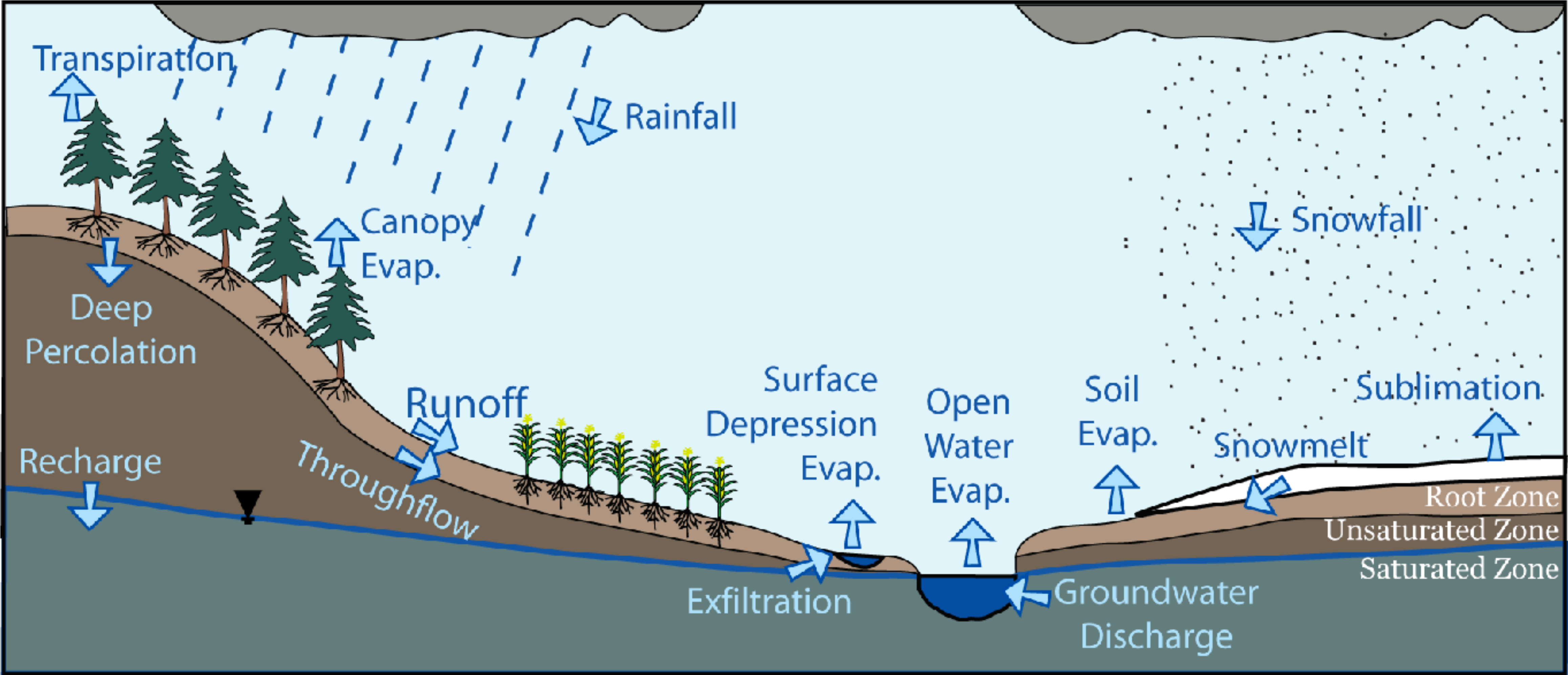
Hardscape
Surface
1":48"



Best
FRENCH DRAIN

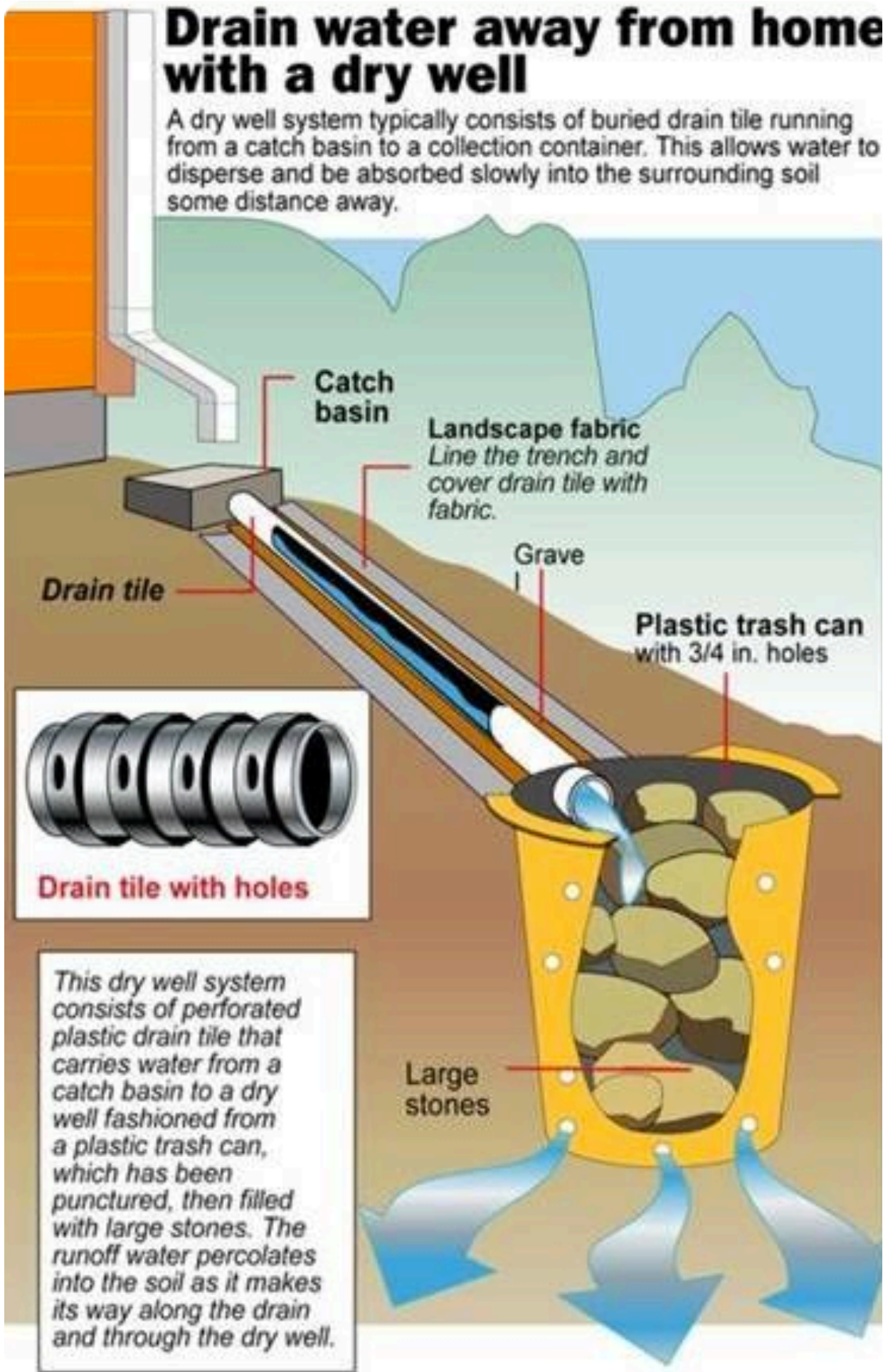
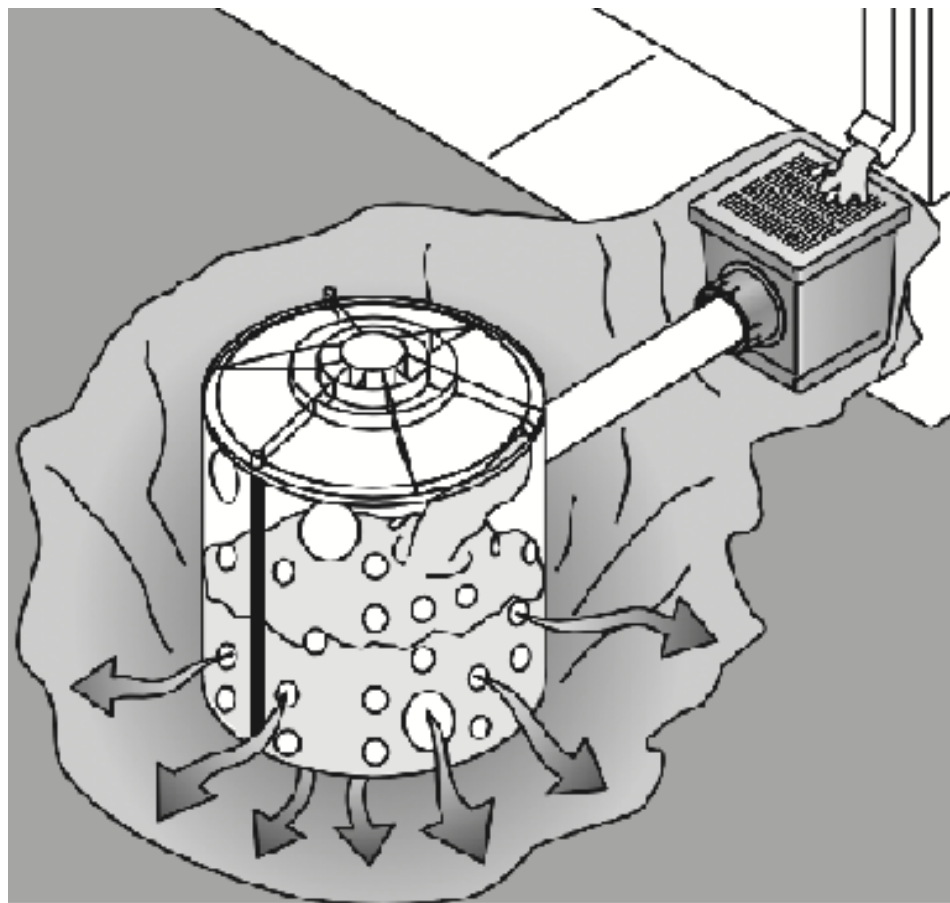


GROUNDWATER

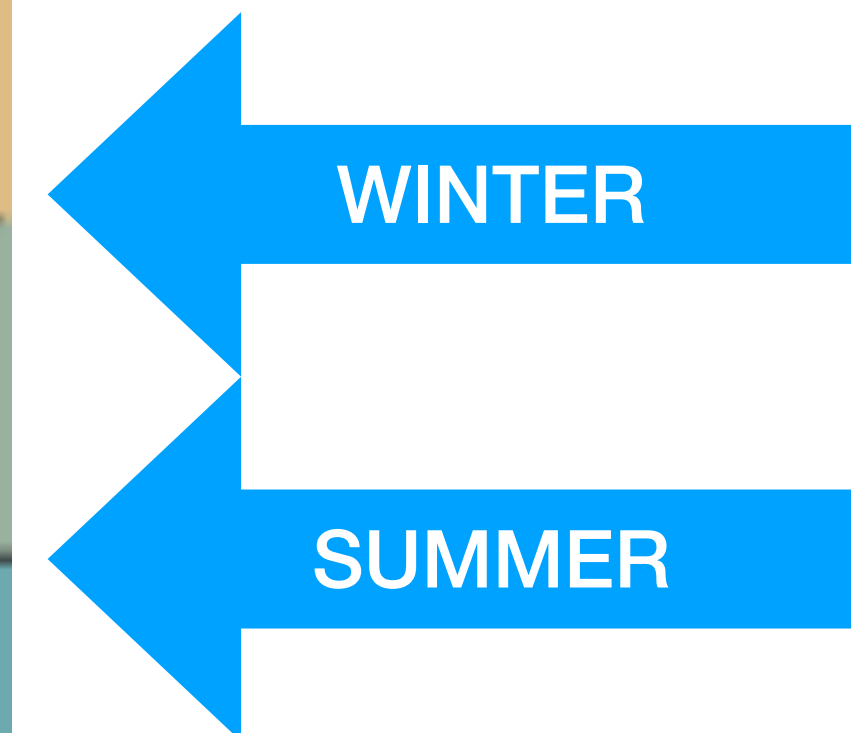
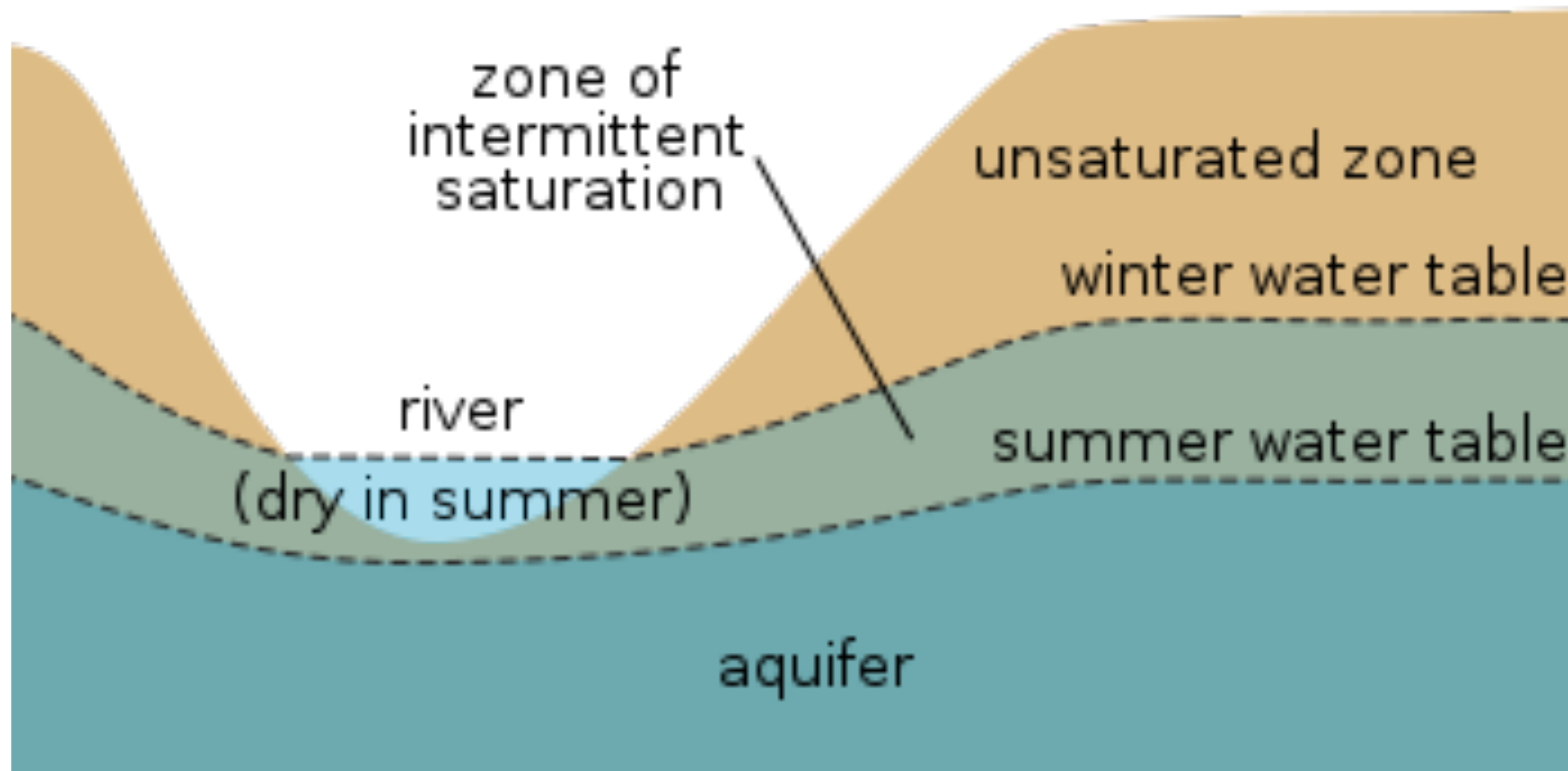


DRY WELLS

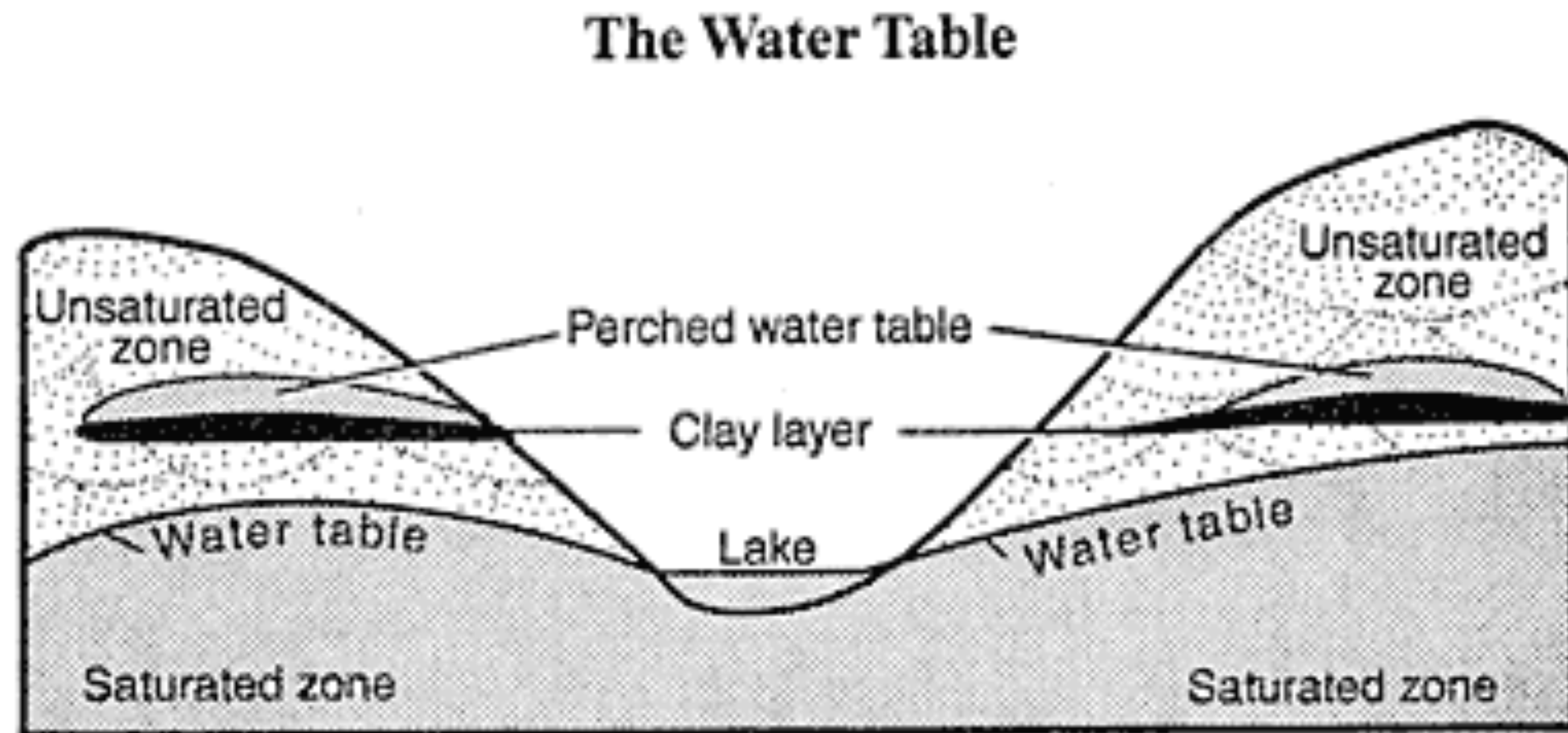
(WHEN YOU CAN'T GRAVITY DRAIN THE WATER AWAY FROM THE FOUNDATION - I.E. FLAT LOTS)



WINTER WATER TABLE VS. SUMMER

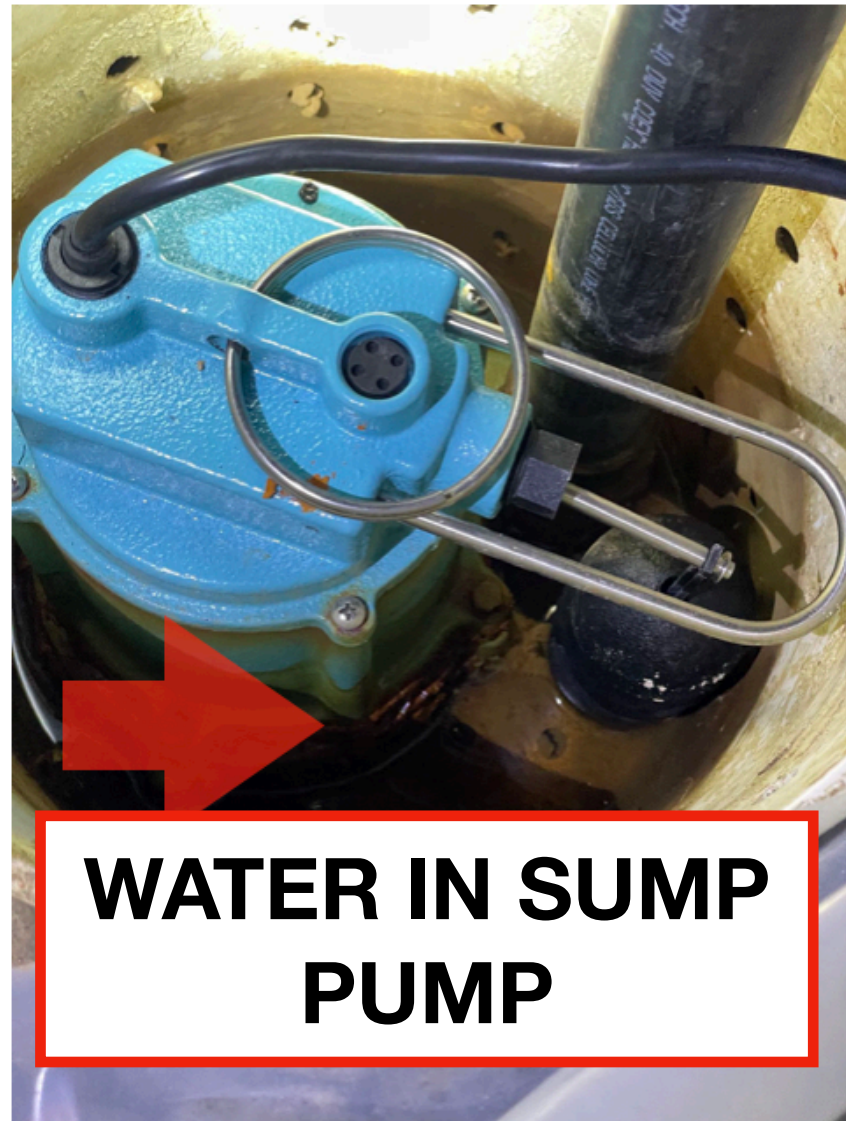


PERCHED WATER TABLE



CLAY LAYER

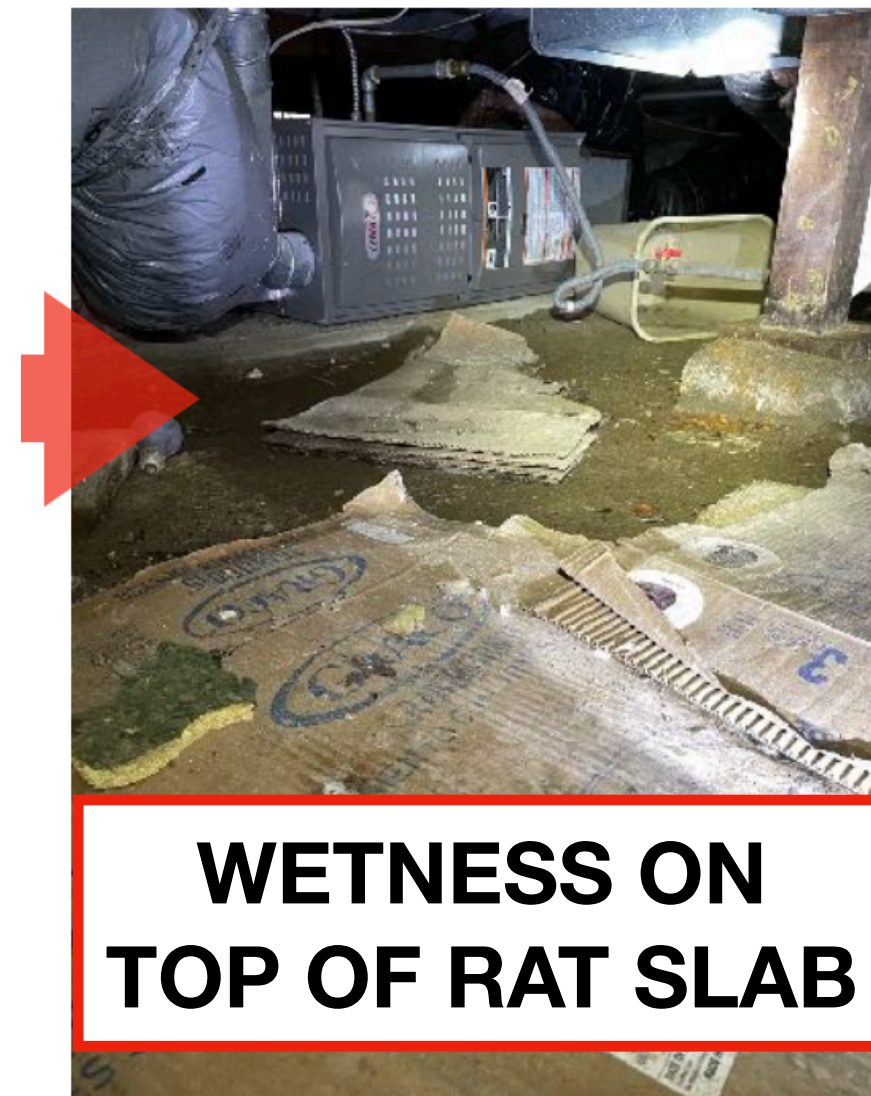




Item Image 2



Item Image 3



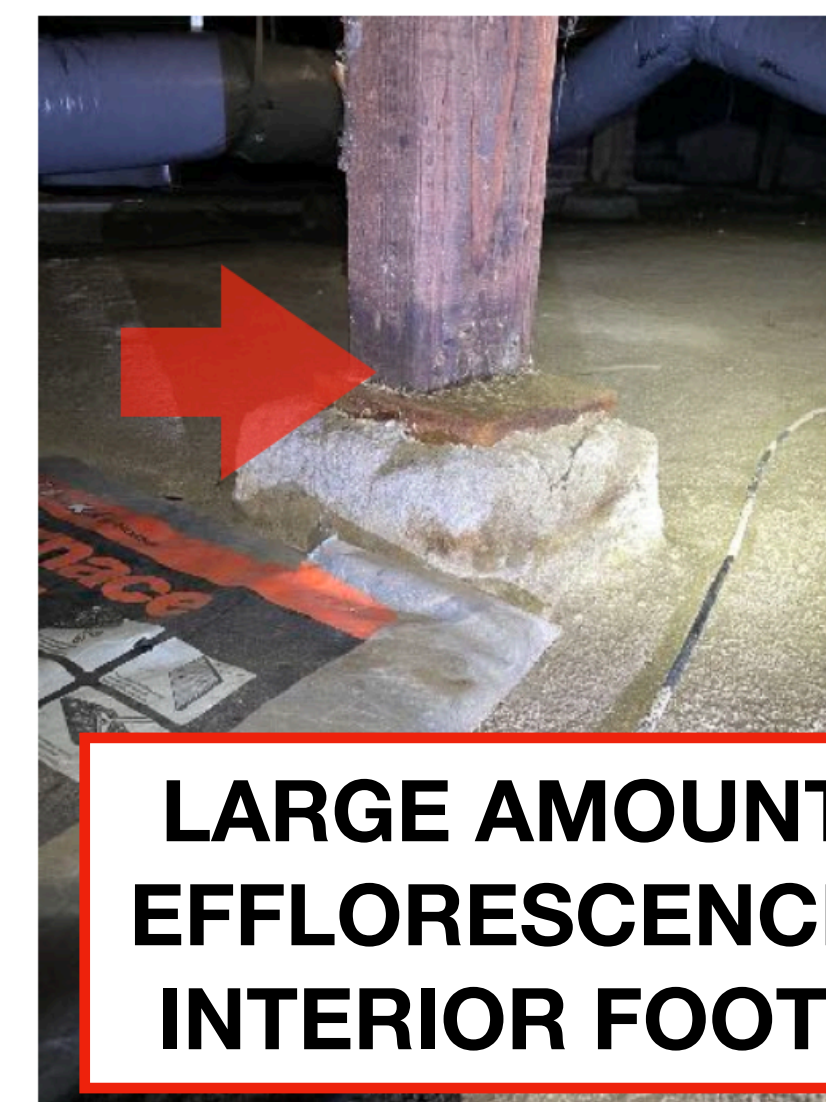
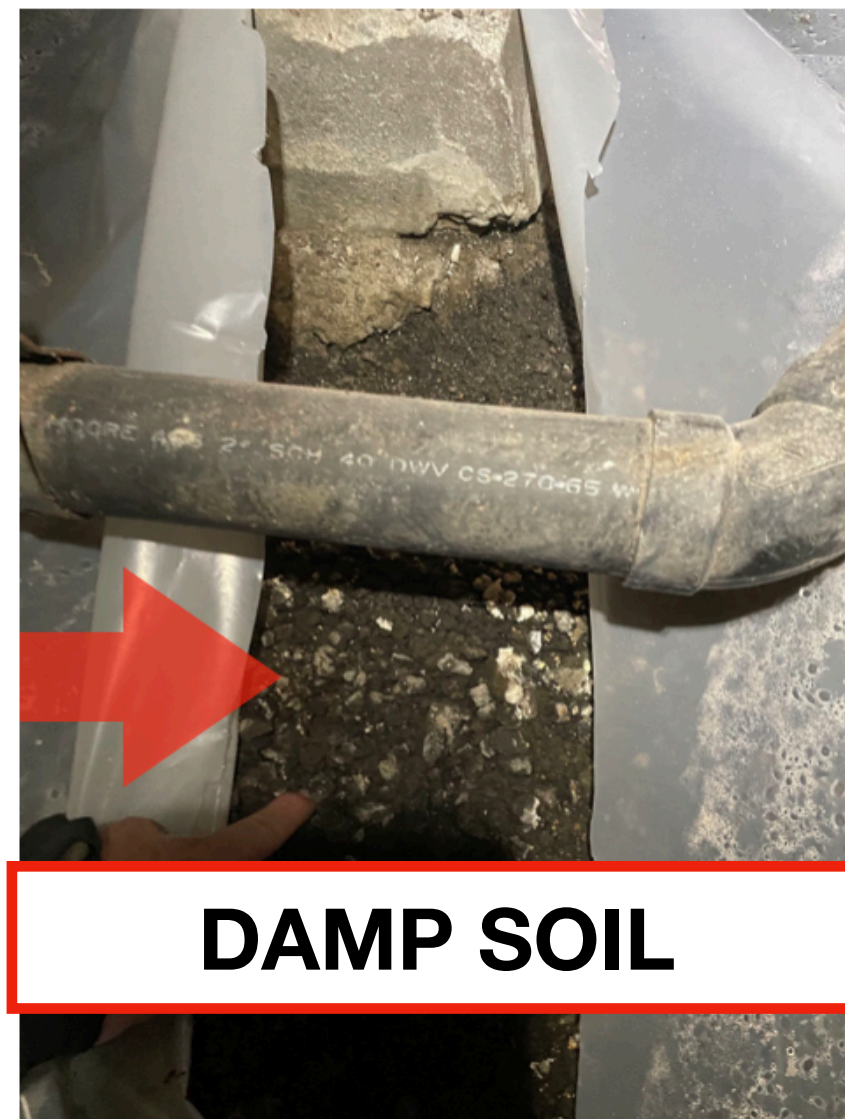
Item Image 1



Item Image 2



Item Image 3



VISUAL INDICATIONS WITH PARTIAL VAPOR BARRIER



**WATER IN SUMP
PUMP**

Item Image 2



**TRAPPED
MOISTURE BELOW
VAPOR BARRIER**

Item Image 3



**STAINED
POSTS**

Item Image 5



**DAMP SOIL
BETWEEN GAPS IN
VAPOR BARRIER**

Item Image 6

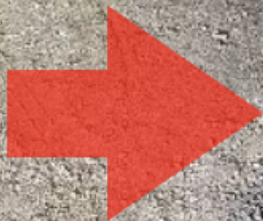
VISUAL INDICATIONS WITH 'RAT SLAB'



**WETNESS ON
TOP OF RAT
SLAB**



Item Image 1



**DEBRIS FROM PAST
STANDING WATER**



Item Image 2



WATER LINE



Item Image 3



STAINED POSTS



Item Image 4



**LARGE AMOUNT OF
EFFLORESCENCE ON
INTERIOR FOOTERS**



Item Image 5

INDICATIONS WITH ROBUST VAPOR BARRIER

YOU CAN'T SEE THE SOIL BUT YOU CAN FEEL SOFTNESS BELOW IF IT'S WET



Item Image 1



Item Image 2



Item Image 3

HUMIDITY READINGS

When the relative humidity of the air is 70% or higher, mold has enough water to grow.



Item Image 2

Inside
Crawlspace



Item Image 3

Ambient Outside
Crawlspace

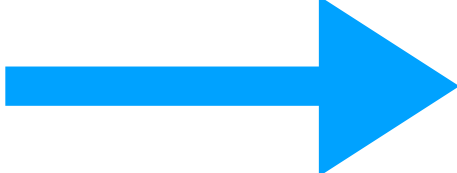


CONTINUALLY DAMP CRAWLSPACE

First Step

Make Drainage Improvements, probably help but looking for indications of subsurface water

THEN...



\$2.5K+/-30%



Sump Pumps



Vapor Barrier



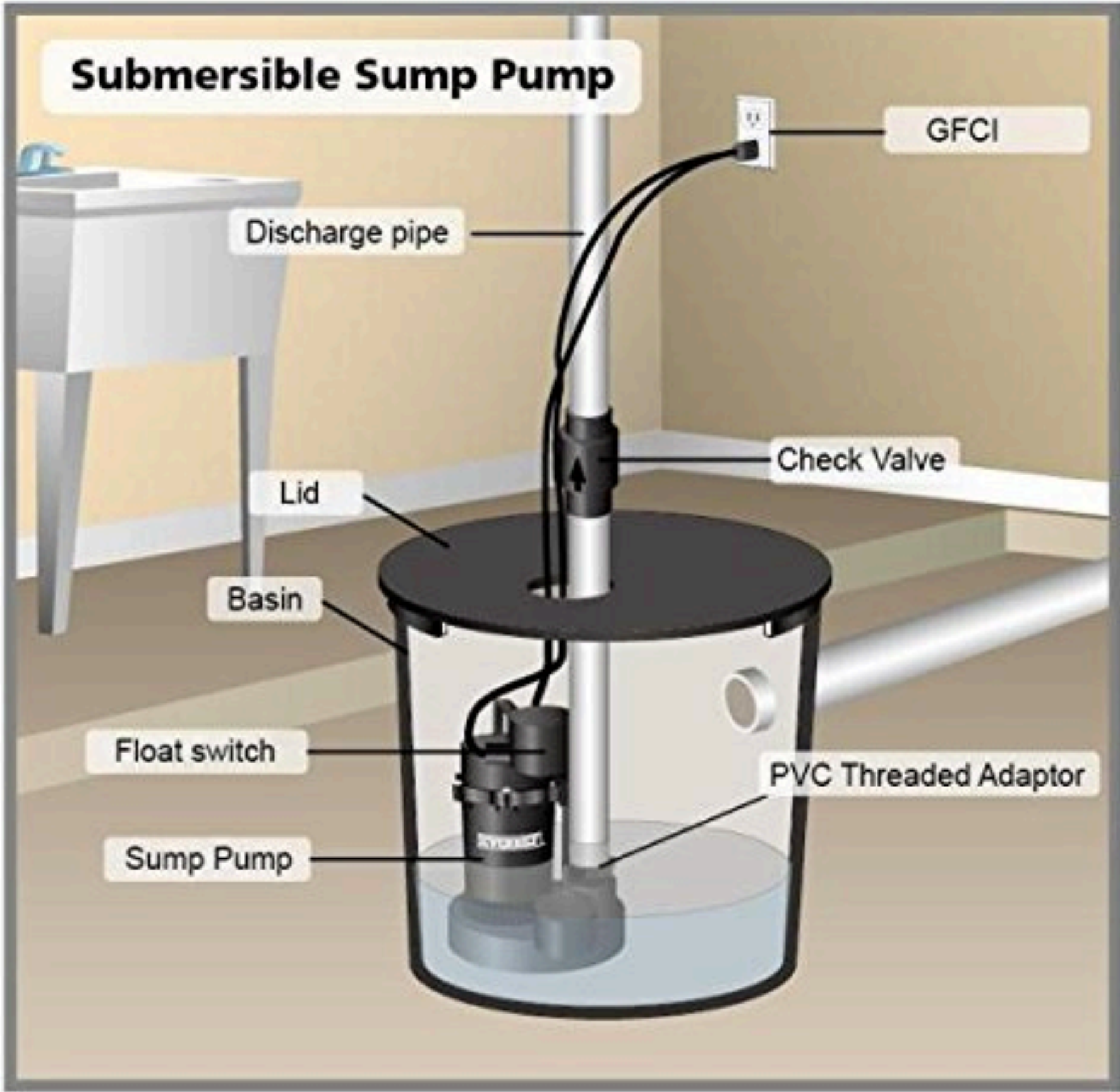
Vent Fans



Dehumidifier



SUMP PUMP IMAGES & NOTES



Basic Parts



Pit



Battery Backup



DIFFERENT VAPOR BARRIERS

THIN PLASTIC
SHEETS LAID
DOWN



Item Image 4



Item Image 5

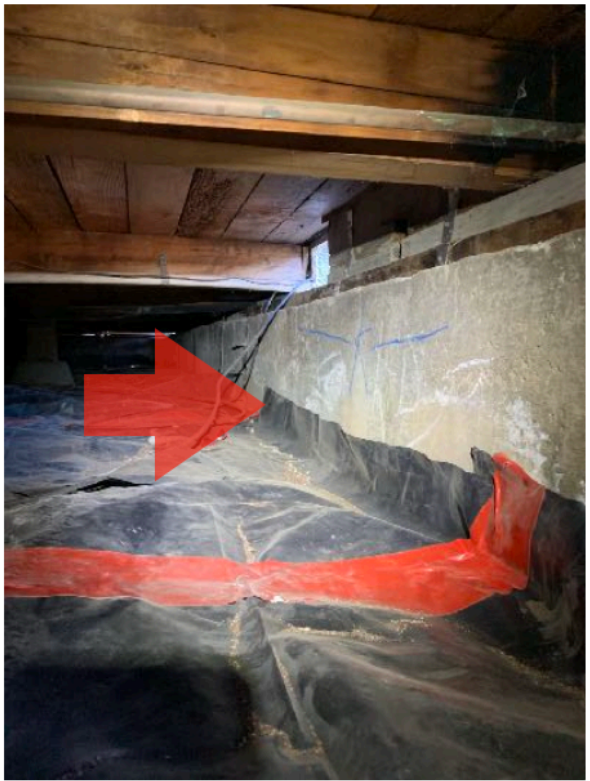


Item Image 6

Budgetary Cost
Ranges (+/- 30%)

\$1K - \$2K

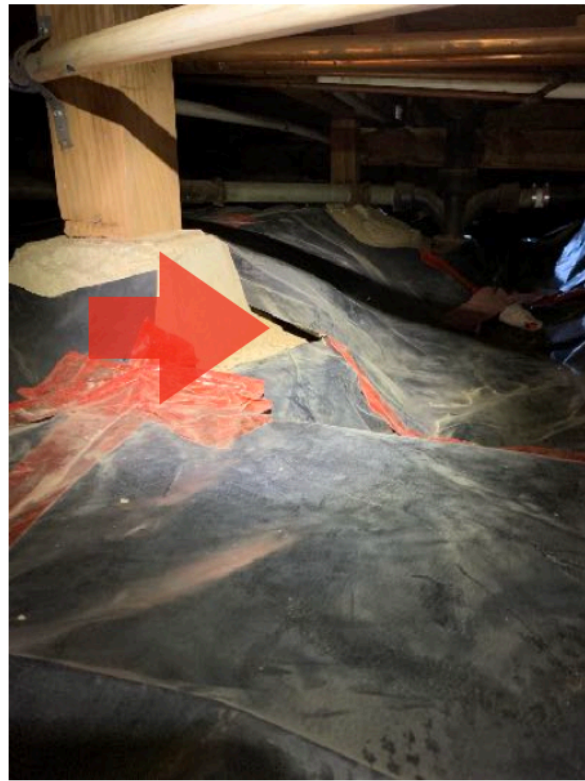
THICKER
PLASTIC WITH
TAPED SEAMS



Item Image 1



Item Image 2



Item Image 3

\$3K - \$5K

TARP-LIKE
MATERIAL WITH
WELDED SEAMS



Item Image 1



Item Image 2

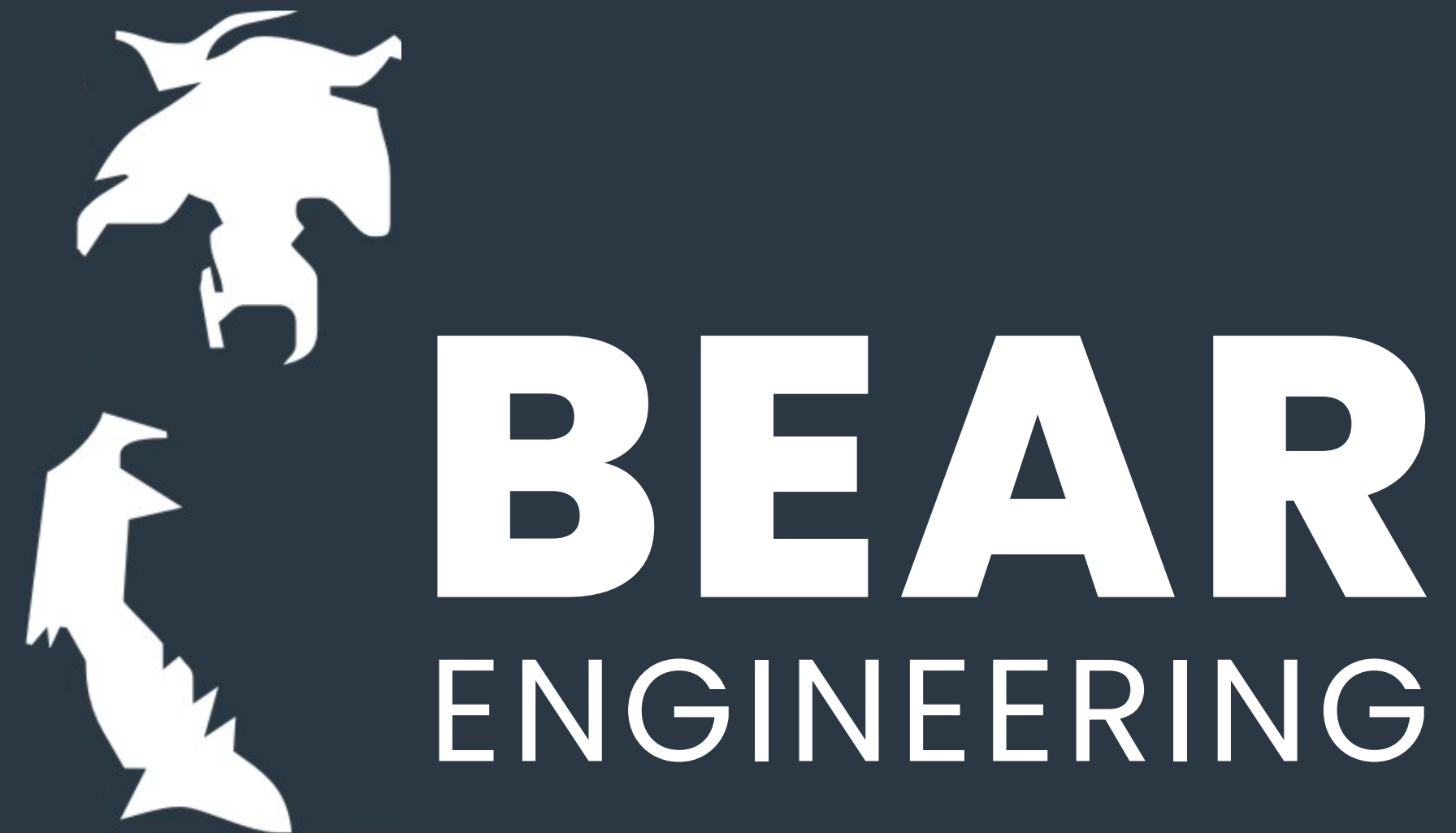


Item Image 3

\$10K-\$15K

FOR AN AVERAGE
SIZED HOUSE

THANK YOU & FEEL FREE TO REACH OUT WITH ANY QUESTIONS YOU HAVE
(nathan@beareng.com)



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