How does understanding building components protect the client?

- The Real Estate agent can better understand property inspection reports and respond appropriately on behalf of the client.
- The Real Estate agent will more likely avoid pitfalls for the client and themselves by understanding physical property issues and addressing them before the close of escrow.

How can this knowledge be misused?

- This information is to help the agent understand issues. The Real Estate Agent should never become the Inspector or Tradesperson.
- A little knowledge is dangerous. If an agent tries to explain a physical property issue to a client and the information is wrong, it can hurt later.

Example on how to use the knowledge

- The agent notices damaged foundation concrete. Your knowledge just helped you to notice something. That’s great!!! Now consult a foundation expert.

Another Example

- You learned about water heaters (which you will). You can see the TPR discharge pipe is missing and the vent has a gaping hole in it. Instead of explaining the details, say something like “There are several aspects about this water heater that concern me; let’s get a plumber.”

What are we going to learn about?

- Water Heaters
- Heating
- Roofs
- Plumbing
- Foundations
- Building Terms
- Electrical
- Earthquake Retrofitting
- Siding
Where to Start?

How about Foundations?

The Foundation: Side View

Habitable Space

Foundation

Crawlspace

Foundation: Closer Look

Wall sits on top of the …

Floor, which sits on top of the …

Cripple wall, which sits on top of the …

Mudsill, which sits on top of the …

Foundation

The Cripple Wall View

Cripple Wall

Mudsill

Foundation

Anchor Bolts

Rebar

Lets Build a Raised Foundation

Concrete Foundation

Pier Footers

Bolts in the concrete

Lets add a mudsill

Piers to support the middle of the floor

Mudsill and Anchor bolts
Now for the cripplewall

Over all of this is the first floor of the house.

Now we can explain retrofitting

Foundation

Missing Foundation

Where to Next?

Roof Pitch
Why is pitch important?

Pitch helps us decide which kind of roof we should have.

If the roof has a steep pitch, then we can install shingles.

If the roof pitch is low (a 3/12 or less) we need a more waterproof roofing material.

Aren’t all roofs waterproof?

Yes, but in different ways. Here’s how a shingled roof takes care of water.

Shingled roofs rely more on gravity to remove the water. It is not impermeable.

Flat roofs are impermeable

Flat or low slope roofs are more likely to have water pond on them. They need to be impermeable.

A Shingle Roof

Shingles

Roof Deck

Drip Edge Flashing

Overlapping Building Paper

Built-Up Gravel Surface Roof

Roof Deck

Paper

Asphalt

Gravel

Modified Bitumen
Worn Edges

Often, edges are not protected by U.V. resistant paint. These edges prematurely wear.

Roof Flashing

Roof flashing is used to protect vulnerable portions of the roof from leaks. In most cases, flashing consists of sheet metal cut and installed in a prescribed manner.

Vulnerable portions of the roof are...

Roof Vents

Valleys

Roof-to-Wall Joints

Chimneys

Roof Edges

Vent Flashing

Note how the metal flashing is partially tucked under the shingles. Now the sheet metal becomes one of the umbrellas.

Poor Flashing

Flashing not properly placed under shingles.

Skylight Flashing

As long as water flows down, the umbrella effect will work here as well.

Roof to wall step flashing
Where to Next?

How about Plumbing and Water Heaters?

Plumbing

1. First, cold water comes into the building.
2. Some of the cold water goes to the water heater and the rest goes to the "Cold" side of fixtures.
3. Water is heated. Hot water goes to the "Hot" side of fixtures.
4. Waste water goes down the drain and to the sewer.
5. Sewer gases vent out past the roof line through the plumbing vents.

Sewer Gases ???!!!

What kind of gas is this?

Sewer gases contain a mixture of toxic and non-toxic gases. Sewer gases, such as Hydrogen Sulfide, can be poisonous. Methane gases can cause asphyxiation in the same way as Carbon Monoxide by blocking oxygen to the blood. Both Methane and Hydrogen Sulfide are flammable and highly explosive.

What keeps sewer gases from coming back up my drain?

Every drain has some type of water trap. Water trapped in the wastepipe blocks sewer gases from coming up the drain.

Often, these are improperly installed and ineffective.

Improper Traps

Non-standard kinked trap

“S” Trap

Trap too low

“S” Trap
Other Plumbing Issues

Pipe leaks

Black Pipe for water supply

Missing water mainstem

Missing drain mainstem

Other Plumbing Issues

Water Heater: How it Works

1. Cold water enters the tank.
2. Natural gas enters the combustion chamber where it is burned and heats the water.
3. Hot water leaves the tank and is delivered to the "Hot" side of fixtures.

Water Heater: Safety

1. If the water heater is located in the garage, it must be raised at least 18 inches from the ground to prevent fuel vapors from making contact with the combustion chamber. Newer water heaters are less susceptible to fuel vapor contact in the combustion chamber.
2. Straps and flexible water and gas connectors are installed to reduce or prevent earthquake damage.
3. Exhaust from the combustion chamber is vented to the exterior of the building.
4. A Temperature Pressure Release Valve (TPRV) is installed to release the water if the tank is in need of too much pressure in order to prevent tank explosion.
5. A discharge pipe is installed to carry discharged water from the TPRV valve to a safe location.

Obvious Tank Failure

Less Obvious Issues

Reduced Discharge Pipe

Threaded Discharge termination

Discharge Dilemmas

Tankless Water Heaters

Tankless water heaters, or on-demand water heaters, heat water as needed. Instead of the water heater maintaining water temperature in a storage tank, this type of water heater heats the water as it passes through.

This is an energy-efficient appliance.
Where to Next?

Let’s go to Electrical

Basic Electrical

Power enters the home on two service lines. A plug outlet uses one of those lines. The ground wire is generally inactive. It stands ready to safely ground the system if something goes wrong.

After the power is used, the electrons return to the power plant so they can sell them to you.

Basic Electrical

Basically, the power goes in and spins the blender blades. Then the power returns to the transformer.

Overcurrent protection

How do we reduce all the power in the big service wire?

Answer

Based on Ohm’s law, we only need to reduce the actual size of the wire to reduce the power.

Okay, lets simplify our system

We tried it this way starting around the turn of the 20th century when Thomas Edison invented a practical light bulb. Many dropped by all over the country. That is why the National Fire Protection Association has been publishing the National Electric Code since 1897. The NEC has been around since 1897.

Lets just get rid of all that fancy box work and install the right size line from the service drop, right to the appliance.
Overcurrent Protection

Overcurrent protection originally came in the form of fuses that would pop when wires became too hot. Breakers are commonly used today. Breakers have a bimetallic element that shuts off the breaker if the wire is too hot. It is easier to reset breakers than to replace fuses. They are safer because incorrect fuses can be accidentally installed.

Here is a main breaker

GFCI Outlets

GFCI stands for Ground Fault Circuit Interrupters. GFCI outlets are generally installed in bathrooms, kitchens, garages, basements (except for single appliance outlets), exterior outlets, and sometimes on sump pumps depending on the authority having jurisdiction of the building. Newer GFCI outlets have a symbol of a padlock with a lightning bolt passing through it on the face. These are safer than older styles.

AFCI

AFCI stands for Arc Fault Circuit Interrupter. Arc Fault Circuit Interrupters are breakers designed to shut off in special electrical problems. These problems usually occur when a wire is slightly damaged and a short problem is not detected by a regular breaker or a GFCI. Damaged wiring can arc and eventually cause a fire.

Wire Types

Knob and Tube Wiring
Non-metallic Sheathed Wire
Metal Clad Wiring

Electrical Issues

Poor wire connections
Ground and Neutral wires connected together in the sub panel

Where to next?

Let’s go to the furnace.
Furnace

1. Air enters the furnace through the cold air return vent.
2. Gas enters the combustion chamber, burns, and heats the walls of the chamber, which are collectively known as "the heat exchanger." Air from the house is heated by flowing past the heat exchanger.
3. A fan forces warm air back into the building.
4. Exhaust from the combustion chamber is vented out.
5. Based on the temperature of the house, the thermostat tells the furnace to turn on or off.

Air Conditioning

- Brass gas connectors
- Flexible gas connector through furnace wall
- Asbestos tape inside the registers
- Crushed heating duct

Heating Issues

- Insufficient clearance between hot vent and combustibles
- Heating vent terminating in the attic

Where to next?

Let’s visit siding
Stucco Siding

1. Sheathing is installed on the building. This is often plywood.
2. Building paper is installed.
3. Wire lath is then installed. It looks like chicken wire.
4. Stucco is applied, often in two to three coats.

Other types of siding, like wood, still have the plywood and building paper applied underneath.

Stucco Issues

Water Ingress Points

Efflorescence and staining suggest water behind stucco

That’s it for now!