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HOME INSPECTION REPORT - PART 2

NOTES

The following notes relate to the earlier sections of the report and are intended to explain or expand upon the information given there. They are included here for your reference and should be considered as an integral part of the home inspection report.

TERMITES

Termites usually live in the ground and enter a house by building mud tunnels or tubes from the ground to the wood of the house. Active mud tunnels are dark brown in color and are about 1/4 - 3/8" in diameter. They may be found on the inside or the outside of the house and are a sure indication that the house is, or was, infested with termites. If they are light brown, and very dry and crumbling, they are old and probably inactive. In any case, they should be removed so that any new activity can be easily spotted.

The long wings of the swarmers or reproductives are also evidence of an infestation in the house, under the house or nearby in the yard. When a termite colony is mature and thriving; one or more times per year, usually in spring, the winged reproductives emerge and a swarm of termites is produced. When they land, they shed their wings and look for mates and a place to nest. This is how they spread, and why certain precautions are necessary to avoid infestation.

The siding of the house should be a minimum of six inches above the ground and there should never be any wood of the house in direct contact with the ground. Wood scraps, waste lumber or firewood should never be left directly on the ground around the house, as they could get infested by termites and increase the likelihood of an infestation of the house itself. Firewood should be stored above the ground on racks or on concrete surfaces, etc. Old stumps, dead branches and dead parts of old trees, should be removed from the yard as much as possible near the house. Treated RR ties and pressure treated wood are susceptible to termites when they get old and deteriorated, and replacement with stone or masonry is recommended. In general, you should avoid termite hazards in the yard as much as possible. The outside of the house and the yard should be inspected for termites at least once each year.

The presence of termites on the inside of the house is indicated by their mud tunnels, or the damage they have caused to wood members, or possibly their wings. Treatment for termites usually consists of the injection of an insecticide into the soil around the house to create a **chemical barrier** which repels the termites. Very often, the chemical is placed into the hollow blocks of the foundation walls through small drill holes either on the inside or outside of the house. The patches on these holes and on concrete slabs around the house are the primary visible evidence that a house has been treated for termites. However, many treatments are done by injecting the chemicals directly underground into the soil around the foundation. Another treatment method is a system of baits placed in the ground around the house which the termites carry back to the nest, resulting in a slow but sure elimination of the colony. Treatments are effective in repelling termites anywhere from 5-20 years or more depending on the chemical used, dosage level and workmanship of the Pest Control Operator. When properly done, treatment poses no danger to humans or pets, according to industry authorities. Any information regarding Pest Control Treatments on the house should be obtained from the seller.

DRAINAGE & LANDSCAPING

The grading around the house is important for houses where there may be water problems in the basement or crawl space. The ground should slope away from the house 1/2" to 1" per foot, with a minimum of 6" in the first 10', to carry rainwater away from the house. Poor drainage around the house will increase the amount of water in the ground next to the foundation and contribute to water problems in the basement or crawl space. Also, serious structural problems can be caused by the expansion of wet soil and the shrinking of dry soil around the foundation. Very serious structural problems can be caused by frost heaves and the freezing of damp soil near the foundation.

Proper functioning of the gutters, downspouts, and drains is the most important factor regarding water problems in the house. In many cases, clogged and overflowing gutters or poor drainage under the downspouts is the main cause of water problems in the basement or crawl space.

Trees and shrubbery should be planted a minimum of 5-6 feet from the house or far enough away to provide 12-18 inches of clearance when they are fully grown.

ROOF

Asphalt shingles are the most common type of residential roofing material and generally last about 20 years. Asphalt-Fiberglass shingles are a little better and will last 20-25 years. A second layer of shingles can be installed over the first if the roof has a slope of at least three in twelve and a third layer can be added if the roof has a slope greater than seven in twelve. Heat, sunlight and rain cause the shingle material to deteriorate and the sunny side of a roof will always wear out first. Good ventilation of the attic spaces is important to prolong the life of the shingles. Torn shingles and popped nails are the most common type of deterioration. Most popped nails just push up the shingle tab but many will break through the shingle surface. Removal of the nail and resealing of the shingle is usually all that is needed. Shingle roofs should have a minimum slope of one in four, and will have a tendency to leak if the roof is too flat. In this case, flat roofing material should be used which could be asphalt roll roofing, built-up hot tar, sheet metal, fiberglass or rubber. In general, flat roofs are much more prone to leakage than sloped roofs, especially when covered with snow. Resealing of seams and flashing is necessary every few years to prolong the life of all types of roofs.

BASEMENT OR CRAWL SPACE

The access door to a crawl space should be a minimum of 18"x24". Adequate ventilation of crawl spaces is important to prevent the buildup of moisture. Excess moisture in a crawl space can result in the formation of mold which is a health hazard for some people and can cause serious rot and deterioration in the wood framing over long periods of time. Also, adequate ventilation will insure that there is no buildup of radon gas. There should be at least 2 vent openings on opposite sides of the foundation with at least 1 square foot of free vent area for each 1500 square feet of crawl space area. This figure applies where there is a concrete floor or plastic vapor barrier. Without a vapor barrier, much more ventilation will be needed. The vents can be closed and sealed only if moisture in the crawl space is not a problem. Otherwise, the vents should be left open 8-9 months of the year.

The water table in the ground rises and falls throughout the year and from year to year in response to local rainfall and runoff conditions. If there is a severe storm or a long period of above average rainfall, the water table in the ground may rise above the level of the basement or crawl space and begin seeping into the house. If this is a chronic condition which happens on a regular basis (1-2 times a year), it will usually leave visible stains and marks on the walls and floors. If it happens infrequently, say only once in five years, it may be impossible to detect, as the signs of the water are usually gone within a year or two. So, unless there is a chronic water problem with clear evidence, it is very difficult in most cases to predict whether or how often there will be water penetration in the future.

If a chronic water problem does exist, the first thing which should be checked is the grading and drainage around the outside of the house and the functioning of the gutters, downspouts and drains. Very often, clogged and overflowing gutters and poor drainage under the downspouts are the immediate cause of water problems in the basement or crawl space. Underground drains for the roof runoff are the first improvement which should be made along with the grading and drainage near the foundation. Good ventilation is also important. The ultimate solution to chronic water problems is a French drain and sump pump which will completely ensure a dry basement or crawl space.

ELECTRICAL

The National Electrical Code NFPA 70 is the basis for all electrical codes used in the United States. It specifies the minimum requirements for safe installations but modern standards or common practice often exceed the requirements of the Code. Since 2001, Indiana has adopted the International Residential Code which is enforced by each individual County.

The modern standard for entrance services is a minimum of 100 amps with one main panel of circuit breakers. However, if all the major appliances are electric (range, dryer, water heater and air conditioner), then a 125-ampere entrance service is usually needed. The minimum sized entrance service needed for a specific house is determined by the Service Load Calculation which is beyond the scope of this report. However, a sample Service Load Calculation follows which will illustrate the procedure and show the various electrical demands possible in a modern house. Although 125 and 150 ampere entrance services would be adequate for many houses, the common standard is now 200 amps for a house.

SERVICE LOAD CALCULATION for a 2000 Sq. Ft ALL - ELECTRIC HOUSE

watts				
6,000	General Lighting-3 watts per sq ft = 3 x 2,000 = 6,000 watts.			
3,000	Kitchen & Small Appliances-3000 watts.			
1,500	Laundry-1500 watts.			
8,000	Range & Oven-8000 watts, plus 2000 watts for each separate oven.			
5,000	Dryer-5000 watts.			
4,500	Water Heater-4500 watts or nameplate rating.			
____	Pool or Well Pump-allow 1000 watts each.			
____	Other: electric motors-allow 1000 watts per horsepower.			
______	Small Electric heaters - nameplate rating.			
28,000	Subtotal			
-10,000	@ 100%	=	10,000	100% of the first 10,000 watts.
18,000	@ 40%	=	+7,200	derating as per Code.
			+7,000	Air Conditioner-allow 7000 watts or
			______	if larger, Electric Heat-65% of total wattage.
	TOTAL LOAD		24,200	WATTS

amperes = watts/volts = $\frac{24,200}{240}$ = 101 amp entrance service needed.

The allowance for general lighting purposes of 3 watts per square foot of living space is computed by using the outside dimensions of the building and must include presently unused spaces such as basements and unfinished attics which may later be converted to living space. The Code specifies that a minimum of 3000 watts are to be allowed for the kitchen and small appliances and 1500 watts for the laundry. The Code also specifies the allowances for the major appliances. Since it is unlikely that all of the electrical uses will occur at the same time, the Code allows a demand factor to be applied. The first 10,000 watts must be added at 100%, but the remainder are added in at only 40% of their value with certain exceptions. Central air conditioning must be added at 100% and central electric heating at 65% of their nameplate ratings. The total computed load is then converted to amperes, which is the minimum size, entrance service wire and equipment needed for the house.

The general lighting circuits are 120 volts, so each 15-ampere circuit can theoretically carry 120 x 15 = 1800 watts. However, the Code allows the wire to be loaded to no more than 80% of its rating. This reduces capacity to no more than 1440 watts for a 15 amp circuit and 1920 watts for a 20 amp circuit. At 3 watts per square foot, this means there must be 1-15-ampere circuit for each 480 square feet of living space. In addition, the Code calls for 2-20-ampere small appliance circuits to serve only the kitchen and dining areas, 1-20 ampere circuit for the bathroom outlets and 1-20-ampere circuit for the laundry. Therefore the minimum requirements for a house are 4-20-ampere circuits and 1-15-ampere circuit for each 480 square feet of living space. However, in actual practice, most houses have many more circuits than this recommended minimum. For example, a typical house of 2,000 sq ft would need 5-15-ampere circuits for general lighting plus 4-20-ampere circuits for the kitchen, bathroom outlets and laundry. In addition, the range, dryer, water heater and air conditioner would each have individual 240 volt circuits. A list or directory of the circuits should be provided, unusually on the inside of the panel cover, showing which circuits serve which rooms and the circuits serving the large appliances, etc.

HEATING

The heating capacity needed to adequately heat a house depends on many factors, such as the type of heating system, the size and shape of the house, the type of construction, the kind of materials used, and the quality of weatherproofing in the house. In central Indiana, a heating input of 40-50 BTUH per square foot is needed for the average house with gas heat. For a very tight house with above average weatherproofing, as low as 35 BTUH per square foot will suffice. For example, an average house of 1500 sq ft would need a heating input of 1500 sq ft x 50 BTUH/sq ft = 75,000 BTUH.

Gas-fired units require maintenance every 2-3 years. Piping for natural gas should be black steel or flexible steel. Copper and galvanized piping should no longer be used for natural gas. Copper piping is acceptable for use with oil or propane gas.

An adequate supply of air is needed for proper combustion in all fuel burning equipment and appliances. Confined spaces which have less than 50 cubic feet of space per 1,000 BTUH of heating Input, should be ventilated. As much as 1.0 square inch of vent per 1,000 BTUH of heating Input may be needed with one vent high and one vent low, in the room or space.

On forced-hot-air systems, the air filter should be changed 3-4 times a year and more often with central air conditioning. The blower, motor, and belt should be checked on an annual basis; and, in some cases, the blower and/or motor needs to be oiled periodically. Any air leakage from the ducts or around the furnace should be sealed with duct tape. Duct tape should never be used on the flue pipes.

The chimney or flue pipe of a fireplace or wood stove needs to be cleaned for every 2-3 cords of wood burned depending on the type of wood, etc.

COOLING

The cooling capacity needed to adequately cool a house depends on many of the same factors as heating with some additional factors to be considered. A detailed cooling load calculation should be made if exact figures are desired. However, an average input of 20 BTUH per square foot of cooled space will be adequate in most cases. For example, a 1500 sq ft house would need 1500 sq ft x 20 BTUH/sq ft = 30,000 BTUH or 2 1/2 tons of cooling capacity.

Air conditioners should be properly sized or slightly undersized and run almost continuously for maximum comfort and efficiency. The temperature of the cooled air discharged from the supply registers should be 10°-15° below the temperature of the air in the house. If the temperature of the cooled air is less than 10° below the temperature of the house, the unit is not operating efficiently and recharging of the refrigerant is probably needed. Professional service and recharging of refrigerant is recommended every 3± years.

Air conditioners should not be operated when the outside temperature is below 60°F, in order to avoid possible damage to the compressor. Below 60°F, the refrigerant may be in a liquid rather than a gaseous state. As a liquid it could damage the valves of the compressor, which is designed to handle the refrigerant only as a gas. The compressor is the most important part of the air conditioning system and has an average life span of 10-15 years depending on the frequency of use.

ATTIC

Proper ventilation of attics is needed to remove heat in summer and moisture in winter. In the summer, good ventilation will keep the attic and the whole house cooler and help to prolong the life of the roof shingles. In the winter, particularly when there is snow on the roof, poor ventilation can cause moisture to build up and condense on the cold roofing nails or the underside of the roof boards. For this reason, the attic vents should not be covered in the winter. The minimum standard for attic ventilation is one square foot of open vent area for each 300 square feet of attic space. In addition, there must be adequate air circulation, which depends on the type and configuration of the vents. The most effective ventilation system is ridge vents in conjunction with soffit vents. However, air flow to the soffit vents is often blocked by insulation and ventilation chutes are needed at the eaves, to provide air circulation to the soffit vents. Exhaust fans from the bathroom or kitchen should be vented to the outside to avoid introducing extra moisture into the attic.

The modern standard for insulation in attics is now R-30 which is a measure of the resistance of the insulation to the passage of heat. This could be 9 1/2" of fiberglass batts, 8 1/2" of loose cellulose fill or 11" of loose fiberglass fill. The foil vapor barrier on batt insulation should be installed toward the living space. If the first layer of insulation is in good condition with the vapor barrier intact, then a second layer can be unbacked (without a foil vapor barrier). If the first layer is in poor condition, then a second layer can be installed over the first with the vapor barrier facing the living space as usual.

GLOSSARY

ARC FAULT CIRCUIT BREAKER - a safety device which can sense the arcing of a frayed wire or connection and disconnect the circuit; mandated by Code in 2002 but deleted a few years later.
AMPERE - the unit used to express the rate of flow of electric current through a wire. The size and material of a wire determines the amount of current it can carry.

BOILER - a central heating device that produces hot water or steam for circulation in heating pipes, radiators or baseboard convectors in steam or hot water heating systems.
BRANCH CIRCUITS - 120 volt circuits, usually of 15 or 20 amperes for general lighting purposes, 20 amperes for the kitchen and small appliances, and 20 amperes for the laundry.
BTUH - British Thermal Units per Hour abbreviated BTUH, is the unit by which the capacity of heating and cooling equipment is rated. One BTU is defined as the amount of heat required to raise the temperature of 1 pound of water 1 degree Fahrenheit.

CHIMNEY CRICKET - an additional part of the roof structure built up behind a chimney to facilitate drainage. Highly recommended for any chimney over 18" wide and required by Code for any chimney over 30" wide, parallel to the ridgeline.
COMBUSTION AIR - a supply of air for proper fuel combustion, draft hood dilution and ventilation of the space in which the fuel burning appliances are installed. An unconfined space of 50 cubic feet per 1,000 BTUH of heating Input of the appliances, is needed or ventilation of the space should be provided.

DOUBLE TAPS - two wires connected to a single circuit breaker or fuse. This is not good practice but is usually not a problem unless the circuits are heavily loaded in which case the circuit breaker or fuse may trip frequently.

EAVE - the overhanging lower edge of a roof.
EFFLORESCENCE - the powdery residue of soluble salts left behind when moisture evaporates on foundation walls or masonry.

FLASHING - sheet metal, usually aluminum or copper, used around roof and wall junctions to protect the joints from water penetration.
FLUE PIPES - the pipes for fuel burning appliances which vent the smoke and gasses of combustion, from the appliance to the outside, including the vent connectors.

FOUNDATION DRAIN or FRENCH DRAIN - an underground drainage system at the footings of the foundation, draining by gravity to open air on the outside. When it drains to a sump pit on the inside, it is sometimes called a French Drain. It can be built in a basement by breaking out the concrete floor slab and digging a trench all around the outer walls of the basement about 12" wide and 18" deep. The trench is filled with gravel and a perforated pipe installed to intercept ground water and carry it to a sump pit. This can also be done in a crawl space. The vapor barrier or concrete floor slab is then replaced to original grade.

FURNACE - produces hot air for circulation through heating ducts in a forced air system.

GFCI-GROUND FAULT CIRCUIT INTERRUPTER - a safety device which senses an abnormal flow of current to ground (i.e. a shock to a person) and disconnects the circuit. Now required on new construction for outlets in bathrooms, kitchens, garages, unfinished basements, crawl spaces, exterior outlets and any outlet within 6' of a sink. The GFCI can be in the circuit breaker or the first outlet downstream, where it will also protect the rest of the outlets on the circuit.

GOOD - above average, like new or almost new.
GPH - gallons per hour.

INSULATION BAFFLE - a cardboard or styrofoam trough about 3'-4' long which is inserted between the rafters to hold back the insulation and provide air flow to the soffits. Same as ventilation chutes.

JOIST - a floor beam usually a 2" x 8" or 2" x 10".

NATIONAL ELECTRIC CODE - the model code for electrical installations, which is the standard in most areas of the United States.

OLD TERMITE EVIDENCE - old mud tunnels or damage with no sign of active insects.

PARGING COAT - a thin coat of cement or other material over a masonry wall.
POOR - below average, old, worn, or run down.

R-VALUE - a measure of the resistance of an insulation to the passage of heat. For example, fiberglass batt insulation has an R-Value of about 3.1 per inch of thickness, while loose fiberglass fill has only 2.7 per inch of thickness. Loose cellulose fill gives an R-Value of about 3.5 per inch of thickness.

RECOVERY CAPACITY - the rate at which a hot water heater can heat cold water to the operating temperature of the unit measured in terms of gallons per hour. Usually 30-40+ GPH for gas units, 18 GPH for electric units @ 4500 watts, and 80+ GPH for oil fired units.

SATISFACTORY - average, serviceable, not in need of immediate attention or repair.
SILL PLATE - the lowest member of the house framing unually a 2x8, laying flat on top of the foundation.
SOFFIT - the underside of an architectural feature.

SPECIAL PURPOSE CIRCUITS - heavy duty, 240-volt, 3-wire circuits for the large appliances or other special uses, such as the range, oven, dryer, water heater, air conditioner, etc.
SPLASH BLOCK -a pad or short trough under a downspout to carry roof runoff away from the house.

TON OF REFRIGERATION - the unit by which the capacity of cooling equipment is sometimes measured. One ton is equal to 12,000 BTUH and is defined as the effect produced by melting one ton (2,000 lbs.) of 32°F ice to water at 32°F over a 24 hour period. This is equal to 288,000 BTU per day or 12,000 BTU per hour.

TUCK POINTING - to fill and finish or repair the joints of brickwork, stonework, etc., with mortar or cement.

VENTILATION CHUTES: cardboard or styrofoam chutes about 3'-4' long, placed between the rafters at the eaves to hold back the insulation and provide air flow to the soffits.
VOLTS - the electrical equivalent of pressure which causes current to flow, supplied for domestic use at 240 volts and used at 120 volts for general lighting purposes. 1 circuit breaker gives 120 volts, 2 circuit breakers tied together give 240 volts for the large appliances, etc.

WDI - wood destroying insect.
WATER TABLE - the upper level of water in the ground.

WATTS - the unit used to express electrical power or the amount of power consumed by an appliance. For simple calculations, the equation Watts = Volts X Amperes can be used. For example, a typical 15 ampere branch circuit at 120 volts can theoretically carry 1800 watts.