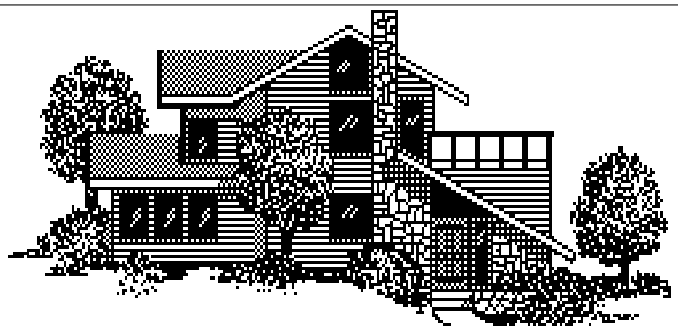
# *the* Inspection Reporter



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The purpose of this newsletter is to address some of the issues identified in inspections of Houston area homes built in the 1950's and 1960's, and constructed on reinforced "slab-on-grade" foundations. Some of the most desirable residential areas in Houston were built in this time period. For the purposes of this newsletter, these will be referred to as "older homes". Many of the issues identified in these homes are common, and can be anticipated by a potential buyer. With an understanding of these common issues, a buyer can be much better prepared to understand the findings and recommendations included in many inspections.

## Common Issues in the Evaluation of Houston Homes Built in the 1950's and 1960's

Prior to putting a home on the market, there is a lengthy list of components and conditions which are required to be addressed by the seller, as a part of the "Sellers Disclosure" information required for residential real estate transactions. The time spent by the agent and the homeowner in providing comprehensive disclosure information is extremely valuable, and any issues identified should be addressed and discussed at the time of the inspection.

The building "code" that is currently used as the standard for residential construction is the *IRC (International Residential Code) for One and Two Family Dwellings*. The purpose of the building code is to protect the health and safety of the occupants of a residential structure. Copies of the International Residential Code can be obtained online at: www.iccsafe.org or, by calling the International Code Council (ICC) at (205) 591-1853.

The Texas Real Estate Commission regulates inspectors through licensing and a comprehensive "Standards of Practice", which sets the minimum requirements for the evaluation and reporting for residential inspections. The rules and regulations for inspectors in the State of Texas, and the "Standards of Practice" for inspectors may be obtained from the Texas Real Estate Commission (Austin, Texas), at: (512) 465-5915; or, online at: www.trec.state.tx.us.

Unless an inspector is a licensed Structural Pest Control inspector, state laws do **not** allow an inspector to address wood destroying insects. Therefore, it is essential that homes of this age be inspected by a licensed Structural Pest Control inspector, for any conditions of wood destroying insects, or any associated wood rot or damage caused by these organisms. An official W.D.I. (Wood Destroying Insect) Report is normally required by most mortgage lenders, for the findings and recommendations regarding wood destroying insects, and any associated wood rot or damage caused by these organisms. In this inspector's opinion, it is best if the wood destroying insect inspection is performed at the same time as the structural/mechanical inspection.

# Foundations and Structural Movement in the Typical Older Home

Most homes of this age have experienced some degree of normal foundation movement (and associated structural movement), and the shrinking/swelling soils common in the Houston area can have an effect on foundation movement throughout the life of the home. Common forms of visible structural movement consist of: brick veneer cracks or separation at mortar joints, separation at window (or door) frame/veneer joints, separation at exterior trim (frieze) joints, contiguous "trend" cracks in tile floors, unlevel floor surfaces, drywall cracks at interior door and window openings (or ceiling surfaces), separation at interior trim or crown molding joints, and doors that do not fit in the frames properly (misaligned or tight doors). While it is normal in preparing a home for sale to repair typical "cosmetic defects", a seller should be certain that they are not concealing any abnormal movement conditions.

The visible portions of the foundation perimeter grade beams (and surface, where possible) are inspected for cracks or any construction deformities. Typical conditions observed are minor surface cracks (at attached garages or porch surfaces), and diagonal cracks at the foundation corners. In older homes, "hairline" cracks at the perimeter grade beams are often identified, and are typically a result of normal foundation movement conditions over the life of the home.

Some inspectors and engineers conduct a foundation (surface) elevation survey; the elevation difference measured across the surface area of the foundation should be less than 2" on a normal sized foundation of this age. The surface elevation survey information is valuable, in that it establishes a "benchmark", should any abnormal foundation movement conditions occur in the future.

Subsurface drain (sewer) piping leaks are a major cause of foundation movement in homes of this age. Water leaks can develop under the foundation as a result of the age and type of the drain piping (normally cast iron), prior foundation repairs, and/or foundation movement. The typical service life expectancy of cast iron drain piping is approximately 40 years. If the drain piping is cast iron, and has not been replaced, it is this inspector's opinion that a basic hydrostatic pressure test should be performed.

Trees are often located in close proximity to the foundation. While it is prudent to consider removal of trees to prevent foundation movement, there an indeterminate degree of risk (of causing foundation movement) inherent in removing large, mature trees located near a foundation. Should any abnormal foundation movement conditions develop in the immediate area of a tree, it is suggested that tree(s) be selectively removed, or a root barrier can be installed between the affecting tree(s) and the foundation.

In homes of this age, the air conditioning system condensate is often disposed of at the foundation perimeter, resulting in abnormal soil moisture conditions. It is recommended that air conditioning condensate be properly diverted away from the foundation (at least five feet), or disposed in the drain system vent piping in the attic area.

Active soil conditions (shrinking/swelling clays) are often the cause of soil movement, which produces typical cyclic (seasonal) foundation movement and associated drywall distress conditions (cracks above doors and windows). Consistent and uniform perimeter surface watering will assist in minimizing seasonal/cyclic foundation movement, and is recommended during extended dry periods (automatic lawn sprinkler systems are recommended). For information regarding Houston soil conditions and maintenance guidelines for foundation stability, see article "Recommended Homeowner Foundation Maintenance Program for Residential Projects in the Houston Area", at the following website: www.geotecheng.com (click "Guidelines" under "Publications" at sidebar).

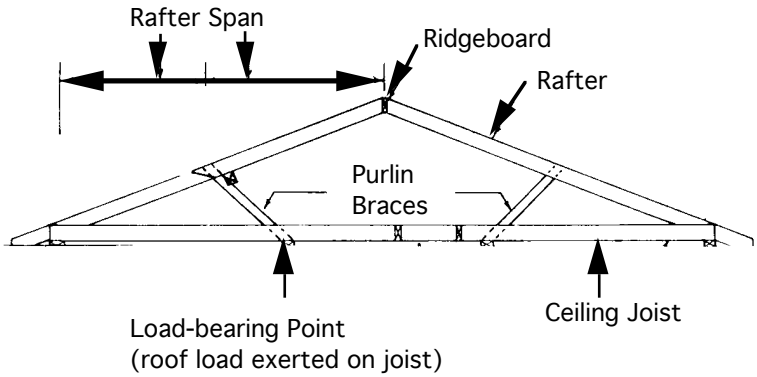
# Roof Framing in Older Homes

In the 50's and 60's, there were no formal building codes or municipal residential construction inspections in Houston. Due to our mild, temperate climate, roof substructures were often inadequately designed or constructed with inadequate support bracing, resulting in "sagging" (unlevel) roof surface conditions. In fact, many of the homes built in this period were constructed with lightly loaded wood shingle roofs, many of which were subsequently covered with additional layers of composition shingles (the dreaded "overlay" condition), adding significantly to the roof surface load. At this time, building codes specify the minimum framing requirements for roof substructures, which results in the capacity to support normal roof framing/covering load conditions, and a reasonable degree of infrequent/varying roof load conditions ("live" loads, such as snow or ice). One might question why an inspector would recommended modifications to a fifty year old roof substructure ------ if it has lasted that long and is not damaged, why modify it? The answer lies in the fact that the "sagging" surface condition is normally an indication that the framing is inadequate to support the roof framing and covering load conditions, much less any additional load ------- such as an inspector walking on the roof! No attempt should be made to straighten a 50 year old rafter, for the sole purpose of creating a level roof surface, as this action will typically result in a split, damaged rafter, and the need for additional repairs.

Some of the more common construction framing deficiencies observed in older homes by this inspector include:

- Excessive rafter spans, resulting in "sagging" roof surface conditions (deflection) visible from a ground-level view; this condition typically requires the addition of purlin support bracing.
- Inadequately designed purlins (horizontal framing supporting the rafters); purlins are required to be at least the dimension of the rafters (i.e., 2"x8" rafters require the use of 2"x8" purlins), and the purlins should be properly supported with "strut-type" braces.
- Inadequately designed ridgeboard or hip/valley rafters; i.e., cases where the adjoining rafters exceed the depth of the ridgeboard (or hip/valley rafters).
- An unsupported ridgeboard, resulting in a "sagging" condition (deflection) at the ridgeline of the roof.
- Roof framing supported by ceiling framing, which is not designed to support roof loads, often resulting in "sagging" ceiling surface conditions; structural modifications are often required to adequately support the roof framing (independent of the ceiling framing) in these cases.
- An inadequate number of nails at the rafter/ridgeboard joint connections (three nails required at face-nailed connections; four nails at "toe-nailed" connections), often resulting in excessive separation at the rafter/ridgeboard framing joints.

If framing deficiencies have resulted in abnormally unlevel roof surfaces, framing distress (joint separation), or framing defects, then framing modifications or reinforcement will be necessary. See the following schematic drawing for a description of the most common roof framing members.



# Appliances and Mechanical Components

Some of the common conditions, defects and deficiencies identified in the mechanical inspections, in 1950-60's era homes include:

• Furnaces and Heat Exchanger Coils: Heat exchanger defects are the most common issue identified in furnace inspections. Inspectors determine if there is *evidence* of a heat exchanger defect, by observing the burner flame pattern for conditions of flame discoloration or turbulence during the operation of the furnace. Excessive rust accumulations at the burners or heat scorching conditions at the furnace housing are also conditions indicative of possible exchanger coil defects. If any of the conditions of a possible exchanger defect are identified, a qualified HVAC (Heating/Ventilation/Air Conditioning) specialist should conduct a comprehensive evaluation of the coil, in which the furnace is disassembled for a thorough visual examination of the complete coil for any cracks or defects.

• Air Conditioning System and Ducts: System air leaks are very common, including air leaks at duct joints and plenums in the attic area, and at return air "chases"(wall partitions used as return air ducts). All wall partitions inside return air "chases" and duct/plenum air leaks should be properly sealed. The duct systems in many 1950's homes were designed for central heating only (central air conditioning was not common) and are inadequate in design for air conditioning system requirements.

• Kitchen Rangetop Vents (vented to exterior): The vent piping is required to be galvanized metal vent piping (flexible-type corrugated metal piping is not approved for this application), and should be vented to an exterior location (not into the attic space).

• Bathroom vent fans are required, when a bathroom does not have an operable window; *vent fans are required to vent to the exterior of the home*.

• Overhead Garage Door Operators: All door operator units are required to have a manual load-resistance function, which activates the safety retraction function if an obstruction is contacted by the door during the closing cycle. Newer units are required to have photo-electric sensor units, which activate the safety retraction function if an obstruction is anywhere in the area of the last six inches of door closure.

• Typical electrical deficiencies observed at original main service panels: 1) Breakers in use that exceed the wiring rating/specifications (this condition can result in overheating or a fire). 2) Panel coverplate screws which contact wiring inside the panel; a significant electrical hazard. 3) Air conditioner condenser breakers in use that exceed the manufacturer's specifications for protection of the unit.
4) Lack of proper bonding between the ground buss and the service panel. 5) A lack of breaker ties/clips (metal clasp between adjoining breakers), at 220-volt circuits. 6) Service panels located inside of clothes closets; a significant fire hazard condition. 7) Lack of a ground rod, and a secondary ground conductor. Many of the main service panels in homes of this age have been replaced with modern panels; if not, panel replacement is often recommended.

• Outlets in homes built before 1960: Ungrounded-type wall outlets are common in homes of this age (wiring did not include a ground conductor); these receptacles should not be replaced with grounded-type receptacles, unless the outlet will be properly grounded. Proper grounding is required for all GFCI-type outlet locations.

• Ground-Fault (GFCI-type) Outlets: This type of receptacle is characterized by the two small "test" and "reset" buttons between the outlet openings, and is designed to protect the user from a potentially fatal shock exposure. The areas that current building codes require GFCI protection include: kitchen outlets (*all* countertop-accessible outlets), all bathroom outlets, exterior outlets, garage outlets, and bathtub whirlpool-type motors. In older homes, it is recommended that the outlets in these areas be modified for GFCI protection; the Texas "Standards of Practice" requires licensed inspectors to report these conditions as "in need of repair or replacement". *A refrigerator or freezer should never be serviced from a GFCI protected outlet or circuit (circuit trip could result in food spoilage).*

• Water Piping: The most common water piping in use during the 1950-60's was galvanized steel. Unfortunately, this type of piping typically develops a layer of mineral scale over time, reducing the effective internal diameter of the piping. This condition results in a significant reduction in the pressure and effective volume at the plumbing fixtures (especially when multiple fixtures are in use simultaneously). When the normal functional use of the plumbing fixtures is not possible (due to low water pressure), piping replacement is necessary. The typical service life of galvanized steel water piping is approximately 40 years.

# Stairways and Handrails

Stairways, handrails and upstairs guardrails are controlled not only by building codes, but also by the American Disability Act provisions (1992), which defined various "safety hazard conditions". Examples of the common deficiency conditions found in 1950-60's homes include:

- The maximum spacing between stairway handrail or guardrail balusters is 4".
- Stairway handrails are required to be between 34-38" in height, and guardrails are required to be a minimum of 36" in height.
- Handrails are required for the full length of a stairway, and must conform with specific "graspability" and wall clearance requirements.
- Handrails and guardrails are required to meet minimum standards for human impact load conditions (able to withstand a significant horizontal force without damage).
- Stairway treads (step surfaces) are required to be a minimum of 6" in width at the narrowest point, at "winder" type stairways. The maximum riser (step) height is 7-3/4", and the minimum tread depth (width) is 10". The maximum height variation between steps is 3/8", within any flight of stairs.
- Headroom: The minimum required clearance for headroom in a stairwell is 6 feet, 8 inches.

# The Bottom Lines

Testing and/or assessment for environmental hazards, allergens and/or toxic/hazardous materials (including, but not limited to: air quality, radon, asbestos, lead, chemical, mold, mildew, and other biological contaminants) is beyond the scope of an inspection. These conditions are **not** addressed in inspection reports; however, any visible conditions conducive to mold and mildew are identified in this inspector's reports, and environmental inspections may be recommended. For information regarding mold and mildew issues, see the EPA website at: www.epa.gov/iaq/molds/index.html.

If soil (or mulch) obscures the foundation and/or is in contact with siding (or brick veneer), these conditions restrict the foundation evaluation, and can result in interior water penetration, or wood destroying insect (subterranean termite) infestations. Soil extraction and re-grading for positive drainage away from the foundation is recommended (preferably, prior to the inspection).

Attic space ventilation is often deficient in homes of this age, and adding the proper ventilation can significantly reduce the cooling (A/C) requirements. The most efficient ventilation consists of continuous soffit vents at the eaves, and ridge-type vents at the ridges of the roof.

Ceiling insulation is often deficient in homes of this age, and improvements can significantly reduce the heating and cooling requirements. The current ceiling insulation standard recommended for the Houston area climate is R-38 (approximately 12-15" depth of fiberglass insulation).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