

PROFESSIONAL ENGINEERING INSPECTIONS, INC.

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STRUCTURAL INSPECTION REPORT

Mr. Austin Conroe
9305 Cleveland
Houston, Texas
August 1, 2007

This report is divided into two sections: an opinions section and an observations section. The opinions section is intended to provide an opinion of the building foundation performance, the condition of the roof, the structural performance, and the general status of need for maintenance as compared to other buildings of similar age. The observations section is an attachment intended to provide a list of observations and/or considerations which provide a basis for the opinions stated in section one.

I. INTRODUCTION

A. Property Description

The property inspected is a house, having wood framing, brick veneer and wood siding, a composition shingle roof, and a concrete slab on grade foundation. It is understood that the age of the structure is 38 years.

B. Purpose

This inspection was to evaluate the condition of the foundation, roof, and structure of the building in order to provide information related to their condition and an opinion as to whether they are in need of repair. The data obtained and included in this report will provide insight into the overall condition of the property and information that will assist in maintaining it in the best possible condition during future years. Some of the comments contained in the observations attachment to this report are related to need for preventative maintenance and may not indicate need for immediate repair.

C. Scope

The scope of this inspection included visual observations of those portions of the foundation, roof, and structural components readily visible without moving or removing items causing visual obstruction. Observations were made at the exterior and interior of the structure, including the attic from the readily accessible interior and the roof from the surface at some locations and from the ground. The items listed in the observations attachment are not claimed to be a total list of problems or defects, but rather a representative list of items on which the stated opinions are based. Estimates of repairs should be obtained from a building contractor who can determine the extent of repairs necessary. There is no warranty implied nor stated as a part of Professional Engineering Inspections, Inc. performing this inspection work. This information is provided for the use of the person to whom this report is addressed and is in no way intended to be used by a third party, who may have different requirements.

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If a third person chooses to use this information, caution is advised because there may be addendums that affect the information contained herein or the stated opinion.

No special testing was performed to determine if leaks existed in the plumbing system below this building's foundation. Below the foundation plumbing leaks which were not detectable as part of a cursory inspection have been attributed to differential movement in the foundation of some buildings in the past. In some cases, the effects of plumbing leaks below a foundation can result in a need for repair of the foundation. If it is determined by the client that they wish to have the plumbing systems tested, then testing should be performed by a qualified plumber who can provide cost estimates for repair if it is found to be necessary.

Inspection for hazardous gases or materials, such as radon or asbestos, or for latent defects in the roof, foundation, or structure is considered beyond the scope of this inspection. This inspector has not been trained to detect such materials, and no tests were performed to discover any latent defects in the foundation, structure, roof, or maintenance of the building that may become evident after taking possession of the building.

II. FOUNDATION OPINION

There is evidence that the foundation of this building has experienced differential settlement that is considered normal for this area and the age of the building. Due to the highly expansive nature of the soil, some amount of differential settlement is to be expected as the building ages. In accordance with the stated purpose of this inspection, no observations were made that would indicate that the foundation is not performing its intended function.

Differential settlement of building foundations is a common problem in this area because of the expansive clay soil and changing weather conditions. As a building resting on the expansive soil ages, it is probable the foundation will continue to experience differential movement, regardless of how well it was constructed or its present condition. Most buildings, with average owner foundation maintenance, may require foundation repair in a period of 35 to 40 years. If the building is to be left unoccupied for an extended period of time, provision should be made to have the yard watered frequently during dry periods. Constant care and/or maintenance is necessary to maintain movement to a minimum. See the attached foundation care information for recommendations.

III. ROOF OPINION

The roof was inspected to provide information as to its general condition and an opinion as to whether or not it is serviceable. A serviceable roof may leak but it is repairable.

The composition shingle roof appeared to be in fair to good/serviceable condition and should have normal years of useful life remaining for a roof of its type. There was a need for some maintenance as indicated in the observations attachment.

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IV. STRUCTURE OPINION

No irregularities were observed that would indicate that the basic structure of the building, including load-bearing walls and other framing members, was in need of repair or not performing adequately with the exception: there was evidence of significant wood rot along the base of the wall at the south side of the den, which may extend into the area of the utility room. There is a need to further investigate the extent of rot of the structure at the base of the wall, which will require removal of wall coverings. The source for water entry causing the deterioration should also be investigated and repaired and may be related to roof leaks, which could allow water to run through the walls and cause deterioration.

There was an abnormal sag in the floor structure over the span at the north side of the den, which appeared to correspond to floor slopes at the upstairs gameroom and center bedroom areas. There is concern that this may be related to a failed floor joist or beam supporting the wall along the south side of the gameroom, which should be further investigated by removing ceiling coverings at the den area in order to evaluate the configuration and condition of the structure. Repair may require installation of a beam at this location to prevent further deflection and/or to eliminate the deflection which exists as much as possible.

Broken rafters could be observed at the attic space. Repair of the broken rafters where they exist is recommended.

The back wall at the garage appeared to be poorly repaired relying on lap splices at the studs that support the roof structure. Replacement of the improperly repaired or damaged studs in this area is recommended, which will require removal of the plywood covering at the back wall of the garage to fully evaluate.

If there is a desire to make repairs to components of the structure, they should be made by a qualified construction contractor who can determine the extent and cost of repair necessary.

V. DEFERRED MAINTENANCE

The number and/or degree of deferred maintenance observations were generally more than normally observed in a building of this age. Deferred maintenance is defined as the need for immediate maintenance related to drainage, water penetration, rotted wood, need for paint, etc.

VI. SPECIAL NOTICE

Opinions and comments contained in this report are based on observations made at the time of inspection. The observations contained in the attachment are to be considered a part of this inspection in order that the reader be aware of the items observed or considered that provided a basis for the opinions expressed above. Opinions related to compliance with specifications, legal, and/or code requirements are specifically excluded as being a part of our agreement to perform this inspection.

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There is no guarantee or warranty as to future performance, life, and/or need for repair of any item inspected, nor should same be assumed.

PREPARED BY:

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ER/sl
Attachment



The seal appearing on this document was authorized by Edward Robinson, P.E.87035 on 1/8/2008. Alteration of a sealed document without proper notification to the responsible engineer is an offense under the Texas Engineering Practice Act. The signature on this document can be validated electronically by obtaining a validation certificate from Professional Engineering Inspections, Inc. This signature and subsequently this document is no longer valid if unauthorized modifications are made to it.

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OBSERVATIONS/RECOMMENDATIONS ATTACHMENT

Mr. Austin Conroe
9305 Cleveland
Houston, Texas
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This attachment, which provides a basis for the opinions stated in the body of the report, is to be considered a part of the inspection report. The following observations are indicative of the conditions considered or existing at the time of the inspection and should not be considered a total list of irregularities but a representative list of items considered.

FOUNDATION

1. Drainage at the perimeter of the building foundation, which can have an effect on the rate of differential settlement of the foundation, was poor at a portion of the perimeter, where it appears that water stands or runs alongside the foundation during or immediately after rains. The more significant locations included: along the south side of the building outside the master bedroom and den; along the east side of the master bedroom near its southeast corner adjacent to the tree; along the northeast corner of the downstairs north bedroom; and at the flowerbeds along the front of the dining room. The recommendations contained in the attached foundation care information should be implemented to maintain the rate of differential settlement to a minimum.
2. The sheetrock floating material had popped off the heads of the nails at the kitchen. This sometimes happens when there is foundation movement causing the sheetrock to shear against the wood framing of the building.
3. Sheetrock cracks above doors, windows, and in the ceiling, usually associated with differential settlement, were observed in the following locations: in the living room at the entry to the dining room; in the downstairs north bedroom at the closet door; in the ceiling of the closet at the upstairs east bedroom and at the entry to the west bedroom from the gameroom.
4. Out-of-levelness of door tops, window sills, built-in furniture and other horizontal surfaces was more than the norm or average, with the more noticeable areas being in the following locations: at the windowsill at the dining room toward the corner of the building.
5. The floors inside the building were determined to slope at the dining room toward the outer walls, at the entry to the living room from the foyer toward the east and at the master bedroom along the east wall toward the east. Because of the lack of other indications of differential settlement, it is believed that a portion of the slope was built in at the time the building was originally constructed.

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6. Some cracks were observed in the exterior brick veneer. The degree was acceptable for structures in this age group. Locations included: at the west side of the building at the dinette window; at the north side of the building at the windows of the living room at the entry porch; and at the east side of the building at the master bedroom.
7. Dislocations and separations in the brick could be observed at the living room window and over the entry door at the front porch. This may be related to differential settlement at the front portion of the building.
8. There were no significant separations in finish work or separations, cracks or dislocations in the brick siding which could be determined to correspond to evidences of differential settlement related to floor slopes at the interior of the dining room area.
9. No significant cracks were observed in the floor concrete, but small cracks probably exist since cracks exist in almost all concrete due to its nature. Small or moderate cracks that may exist in the concrete floors below carpeting or other floor coverings would have no bearing on the inspector's opinion of the foundation performance.
10. Cracks were observed in the foundation concrete. These cracks were hairline in size with little, if any, serious detrimental effect on the function of the foundation at this time. Locations included: at the storage space below the stairs.
11. The corner was chipped off the concrete grade beam of the foundation at the northeast corner of the foundation adjacent to the north bedroom, which is usually caused by differential settlement that has caused shearing between the brick veneer and the concrete grade beam. Chipped corners indicate foundation differential settlement, but there is no need for foundation repair because of the chipped corner.
12. Separations or differential movement of materials were observed. The degree of separation observed was slightly more than normal. The locations included between: the concrete drive and the foundation, the fireplace face and the interior ceiling and/or walls and the tile joints at the master bath.
13. Doors with tapered gaps between the door and door casing at the top, indicating differential settlement in the foundation of the building, were observed, including: at the utility room exit door and at the gameroom bath entry door.
14. There was a large tree growing very close to the building foundation. If the house is resting on expansive soil, the roots of the tree would usually have an adverse effect on the foundation performance by supporting or lifting the foundation adjacent to the tree and causing differential settlement at a distance away from the tree. The effect may become more apparent during extended dry periods as the tree becomes larger and consumes more water.

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15. Large trees were observed relatively near the building being inspected. Construction research has indicated that large trees, which grow closer than their mature height to a building that is resting on expansive soil, can cause rapid and severe differential settlement. The effect on the rate of differential settlement, which can result in need for foundation repair, will become more pronounced as the tree grows.
16. Differential settlement caused by expansion and contraction of the expansive soil on which the concrete driveway rests has caused it to crack and break. This is pointed out even though the drive is not a part of the building foundation because it is indicative of the type of movement caused by the expansive soil on which the building rests.
17. Even though there was evidence of differential movement of the building foundation, there were no significant separations between construction materials or failure of structural components observed during the course of this inspection that could be related to differential settlement of the building foundation.
18. Because the building is believed to be resting on expansive soil which exists in this area, it is recommended that an automatic watering system be installed to maintain a uniform moisture content in the soil. Maintaining a uniform moisture content in the soil will prevent it from shrinking and causing cracks to develop in the walls, floors, and siding.
19. Consideration should be given to installing a root barrier between the trees and the building; if installing a barrier is not practical, the trees should be removed if they grow closer to the building than their mature height. If a root barrier is to be installed, a qualified tree expert should be employed to determine where the root barrier should be installed, since cutting off too much of the tree roots may be hazardous to the health of the tree.

ROOF

1. Most composition shingle roofs have a normal life expectancy of 9 to 18 years in this area, with an average life of 15 years. The life of the roof depends on pitch, color, exposure to chemical fallout, and exposure to the sun. The more reflective colors last longer, and dark roofs usually last from 4 to 6 years less. We understand the age of the composition shingle roof was not determined; however, the reflective age is 3 to 5 years.
2. The composition shingle roof was showing premature signs of wear and deterioration in the form of: worn shingles.
3. Catch basins were noted in the attic at possible points of roof leakage. The catch basins may or may not be necessary at the current time. They may have been necessary before repairs were made, so further inquiry of the current owner is recommended. Reference Photograph 1
4. Water stains were observed on some of the wood framing at the attic, which may be related to roof leakage, current or past.

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5. You should make further inquiry as to the status of the following observed evidences of roof leaks, current or previous: stains and deteriorated roof decking at the southeast and southwest attic space; ceiling stains at the gameroom bath, the living room and the utility room; mildew on the walls and ceilings at the gameroom bathroom; seam bulges in the ceiling at the den; sheetrock damage at the gameroom bathroom, the center bedroom, the utility room, the water heater closet, the living room and the master bedroom closet; sheetrock patches at the den closet; deterioration and discoloration in the decking at the garage; deterioration of the paneling over the top of the window casing at the south side of the den; and stains at the decorative beam across the ceiling of the den. You are cautioned that other evidences of roof leaks may exist which were not detected at the time of this inspection.
6. There was no cricket between the back side of the fireplace flue chase and the surface of the roof. A cricket is normally installed to divert debris and water that run down the roof around the fireplace flue chase.
7. Tree limbs were observed to be near or touching the roof and should be trimmed to prevent wear, which can lead to premature failure. The limbs should be cut back at least four feet from the roof surface each year.
8. The lead roof jacks around the upper edge and/or at the exposed portions of the skirts have been chewed away by squirrels or other animals. The roof jacks must be repaired to prevent water penetration during rains.
9. The ridge vent was continuous at the change in pitch of roof along the main ridge. This left openings where animals may be able to gain access to the attic space through the ridge vent or water penetration may be able to occur. Reference Photograph 2
10. The flashing installation at the front dormer was improper where the top edge of the head flashing was visible. This will allow water to bypass the flashing at this location and run into the structure of the building. Many of the evidences of water entry at the interior of the building appeared to occur under areas where roof-to-wall flashings exist, and it appeared possible that some of these locations may still be active leaks. There is a need for evaluation and repair of the roof-to-wall flashings as necessary to prevent further water penetration into the building. Due to the deteriorated condition of the siding, it may be possible to evaluate or replace all flashings to ensure that water entry is not occurring or is corrected in these areas with replacement of the siding. Reference Photograph 3
11. Roof decking was deteriorated over the area of the garage at a hip ridge. This may be an indication that water entry has been occurring at this location.
12. The roof decking was deteriorated below the southwest corner of the upstairs dormer adjacent to the center bedroom. There is evidence that the flashings at this location may not be well fitted and may be the cause for evidences of water penetration at this location. A catch basin full of water located below this area indicates that leaks through the roof may be active in some areas,

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including this location, and should be further investigated by a roofer, which will require some disassembly of the siding to determine if there is a defect in the installation of the flashing. Reference Photograph 4

13. Stains could be observed around the fireplace, including damage to the paneling. This appeared to be related to water penetration around the south dormer roof-to-wall interfaces or fireplace flue. It could not be determined if these are indicative of current water entry and warrant further investigation. Reference Photograph 5
14. Screws were observed protruding from the surface of the composition shingle roof over the hip ridges of the garage. The reason for installation of the screws was not determined; however, they should be removed and the shingles replaced to prevent leaks in the roof
15. There was an antenna dish mounted over the surface of the garage roof at its west side, which can allow water penetration into the building. It is normally recommended that antenna dishes be mounted off the surface of the roof to reduce the potential for leaks into the building.
16. Sealant had been applied around the neoprene seal of the roof jack for the electric service. This may indicate problems with leaks at the seals as a result of deterioration and may require that the roof jack be replaced.
17. The mineral coat on the shingles was worn at many locations at the roof. It was not determined if this was due to heavy traffic up the steep pitch roof during installation or due to a defect in the shingles. The mineral coat provides protection for the shingles from sunlight and continued loss of mineral coat may significantly reduce the life expectancy of the roof. Areas where mineral coat loss has occurred may wear more rapidly.
18. It appeared that old flashings had been used at some locations at the roof, including around the fireplace flue chase penetration. Normally, in a good quality roof replacement all flashings and roof jacks are replaced to ensure that they are well installed and do not continue to corrode or deteriorate, creating problems with performance of the roof as it ages. The condition of the flashings could not be determined without some further investigation since they were covered with roofing and siding.
19. The fascia boards at the south side of the roof were observed to be slightly higher than the lower edge of the roof decking, resulting in the drip edge being slightly flat and flaring the shingles along the lower edge of the roof slightly. If the shingles continue to flare to the meet the curvature created by this irregularity, this may create a potential for water penetration along the lower edge of the roof as the roof continues to age. This condition may exist at other locations where it is less apparent.

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BUILDING STRUCTURE

1. Vulnerability to termite infestation was observed where siding was in contact with the soil. Subterranean termites can enter the structure below or through the siding without being observed.
2. Vulnerability to termite infestation was observed where siding was in contact with a concrete surface that is not monolithic with the foundation. Subterranean termites can enter the structure below or through the siding without being observed. Reference Photograph 6
3. It appears that the irregularities of doors fitting at the upstairs portion of the building, such as doors that stick, drag, have tapered gaps, or have been trimmed, are indications of deflection in the building structure rather than differential settlement of the building foundation.
4. The floors at the upstairs portion of the building were noted to pop and squeak when walked on. This may be due to an insufficient number of fasteners being used to secure the decking to the framing. This condition is frequently observed and is not considered a problem.
5. The floors at the upstairs portion of the building are not even and have some slope that is related to deflection in the floor joists. Although not strictly adhered to by builders, a maximum allowed deflection is usually considered to be 1 inch in 30 feet. This condition is found in many wood framed buildings and probably exists due to floor joists of insufficient strength to provide the stiffness necessary to prevent the deflection.
6. Collar ties, which should be installed between rafters on opposite sides of the roof below the ridge, were minimal in number. The collar ties, normally installed between each second rafter or at four foot intervals, prevent the rafters from separating along the ridge under high wind loading.
7. Vertical bracing normally used to support the mid span of the roof rafters did not exist where the warm air furnace had been installed. Reference Photograph 7
8. It was observed that one or more of the roof rafters were split and/or cracked and should be repaired to provide adequate strength for the roof surface. Reference Photograph 8
9. The ridge beams were not wide enough to support the entire width of the miter cut on the end of the roof rafters. Even though this is a common observation, the greatest strength requires that the ridge beam be wide enough to uniformly distribute the roof load across all the width of the rafter miter cuts. Reference Photograph 9
10. There was a deflection in the roof surface at the south roof over the upstairs center bedroom and bathroom which has apparently occurred due to the lack of adequate vertical bracing at the mid-span of the roof rafters. Properly

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installed vertical bracing could be installed to prevent further deflection of the roof surface.

11. Investigation of the building for termite infestation or damage was not the intent of this inspection. It is recommended that an inspection be performed by a licensed pest control inspector, who can determine the possibility of termite infestation and/or damage. It is possible that termite infestation and/or damage exist in the building that are not apparent and cannot be detected without removal of wall covering and/or siding.
12. The quality of a rafter over the area of the furnace appeared to be poor. The rafter was performing satisfactorily; however, the deterioration at the rafter may reduce its strength. Reference Photograph 10
13. The base of the wall at the south side of the den showed evidence of severe rot that may include the lower ends of the studs at this location. This appeared to be related to water entry around the door opening or from the roof at the southwest corner of the den as observed at the attic. Further investigation will be necessary to determine the extent of wood rot and the need for repair and will require removal of wall coverings.
14. There appeared to be some sag in the breezeway between the house and the garage due to a lack of support at its mid span. Typically breezeways in this configuration and length have mid span support.
15. The west wall at the northwest corner of the dining room was uneven. The reason for this irregularity was not determined and would require removal of wall coverings to further investigate.
16. Caution is advised that areas where significant water penetration has occurred or is occurring are prone to developing wood rot and wood-destroying insect infestation damage, and such damage may become apparent based on further evaluation, including removal of wall coverings for repair.
17. There was evidence of a sag in the floor structure of the building over the span of the den at the north side of the den below the south wall of the upstairs gameroom. This has resulted in abnormal floor slopes at the south side of the gameroom and may indicate a floor joist of insufficient stiffness to support the upper wall of the structure over the span of the den or a floor joist or beam that has failed. It is recommended this be further evaluated by removing ceiling coverings to determine the method of construction and condition of the support structure. Repair of this irregularity may require installation of a beam across the span of the den to support the upstairs wall.
18. It appeared that some of the wall studs at the rear wall of the garage have been damaged, possibly by wood-destroying insect infestation. These studs have been improperly repaired by lap splicing new pieces at the bottoms of the studs. Since the studs are compression loaded they should be continuous from the top to bottom plate and should be replaced where they are improperly repaired or damaged.

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MAINTENANCE

1. There was no evidence of sheet metal flashings installed above aluminum framed windows mounted in exposed flat siding. Windows installed without the flashings are prone to leak during rains.
2. Locks were missing from the windows at the gameroom bathroom and at the upstairs bedrooms. The windows cannot be easily locked to ensure security.
3. Window panes were observed to be cracked or broken out, including: at the master bedroom.
4. Window screens were missing at some locations, including: at the living room and at the upstairs gameroom. It is not desirable to open windows in this area without screens because of insects.
5. Some of the exterior siding was observed to be in need of repair or replacement due to loose and rotted siding at many locations around the perimeter of the house and garage. Reference Photograph 11
6. Some of the expansion joints in the brick veneer had not been caulked to limit air infiltration and water penetration. The joints should be caulked with a mastic caulk material that will allow relative movement between the edges of the expansion joints.
7. The exterior paint was observed to be cracked and peeling. Repainting is suggested to prevent undesirable deterioration in the wood trim and siding.
8. The exterior trim paint (window facings, door facings, roof fascia, etc.) was observed to be cracked and peeling; repainting is suggested.
9. Because the eaves that overhang the walls of the house are very small, or do not exist, it is recommended that gutters and down spouts be maintained or installed at all draining surfaces of the roof. This can prevent an undesirable rate of differential settlement of the building foundation.
10. There was no fire stop in the fireplace flue chase at the point where the flue passes through the attic. A stop is normally installed here to prevent the spread of a fire that could begin at the fireplace.
11. The fireplace draw was not checked during this inspection because it is outside the scope of the inspection. A qualified chimney sweep should be asked to check the fireplace for draw and proper performance.
12. The fireplace flue at the den could not be viewed along its length without special tools. It is recommended that a qualified chimney sweep be employed to check the fireplace system before using it.
13. The attic insulation was observed to be missing or out of place at the den, at the vertical walls at the south attic and at the attic over the stairs, which can

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result in loss of energy. The insulation should be replaced. Reference Photograph 12

14. The attic insulation was thin by today's standards, with an average insulating value of approximately R=4-6. Most new houses have attic insulation rated at between R=30 and R=38. The cost of heating and cooling the building could be reduced by adding additional insulation.
15. There appeared to be insufficient ventilation provided at the attic space. A recognized standard for proper attic ventilation is 1 square foot of ventilation for every 150 square feet of attic space.
16. The gable vent screens were corroded away, allowing attic access to birds and other small animals. The screens should be replaced with a suitable material.
17. The space between the upstairs floors and the downstairs ceilings was open to the attic and uninsulated. This can be a significant source of energy loss that can be eliminated by insulating or sealing the opening. Reference Photograph 13
18. Some of the uninsulated interior walls of the house were open to the attic at furr downs, which will result in loss of energy during the seasonal extremes. The openings should be sealed and covered with insulation.
19. Some of the uninsulated interior walls of the house were open to the attic at duct chases to the lower floors, which will result in loss of energy during the seasonal extremes. The openings around the ducts should be sealed and covered with insulation. Reference Photograph 14
20. Evidence of water entry, past or current, was observed at the entry foyer, as indicated by stains in the terrazzo floor along the wall; at the north side of the living room, as indicated by stains in the tack strip and carpeting along the north wall; at the dining room, as indicated by stains in the tack strip along the north wall; at the kitchen, as indicated by stains and damage to the lower cabinetry at the floor; at the dinette, as indicated by stains at the lower base trim and stains in the cabinetry; at the utility room and utility room 1/2 bathroom, as indicated by stains along the base of the walls and at the floors; at the utility room exit door; at the den over the top of the window; and at the north bedroom at the northwest corner of the room, as indicated by stains in the tack strip. There is a need for further inquiry or investigation. Reference Photograph 15
21. There was no rain stop lip at the main garage door(s), so there is the possibility that water blowing against the door during heavy blowing rains will leak into the garage for a short distance.
22. The brick veneer was overhanging the edge of the concrete foundation at the east side of the master bedroom. Even though this increases the probability of the bricks falling off, the siding appears to be performing satisfactorily.

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23. The carpet was observed to be stained and/or dirty at locations in the house where carpet existed, and it may be that the stains cannot be removed.
24. The door latch mechanism was missing or not functional at the gameroom bathroom.
25. Flat ledges that extend beyond doors at the same elevation as the floor inside the building create a high potential for water penetration when it rains. Flat ledges were observed in the following locations: at the utility room exit door.
26. The laminated plastic counter top was chipped or cracked at the kitchen range, creating an unsightly appearance.
27. The silvering material was peeling away from the back of the mirror at the 1/2 bathroom and at the master bathroom. The silvering is probably peeling due to a poor quality mirror and water splash.
28. The site drainage is believed to be poor at the east yard, as indicated by evidence of standing water, dark areas in the soil and/or lack of vegetation where water appears to stand during or after rains. Further inquiry as to the type of drainage in this area is recommended.
29. The vinyl floor covering was cut or torn at the kitchen and at the utility room. It may be that the floor can be repaired, but it may require replacement of the vinyl.
30. The weather stripping was noted to be damaged or missing at the entry door, which is a source of energy loss because of air infiltration.
31. There were no weep holes observed in the brick veneer along the lower edge of the brick veneer siding. Weep holes are installed to provide for ventilation and drainage of the wall cavity. The absence of weep holes could allow moisture to build-up in the wall cavity.
32. Wood rot was observed at the soffit at the entry porch area, at the main entry door door jamb, at the door jamb and trim and at the lower wall structure at the den exit door, at the fascia at the northeast corner of the building, at the siding trim at the front dormers, at the northwest fascia at the siding trim at the garage, at the fascia at the rear of the garage, at the fascia at the dormers at the front of the building and at the siding around the perimeter of the building at the house and garage.. The rot should be further investigated to determine the necessity and extent of repair required.
33. Insulation in the attic space appeared to be 2 to 3 inches of blown fiberglass where it existed. Additional insulation could be installed to improve energy efficiency at many locations.
34. Panels at the overhead garage door were bent or damaged at some locations, which may require replacement of sections of the door in order to improve its appearance to a normal condition. Reference Photograph 16

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35. The vapor barrier was missing behind the siding at the garage area and may allow water penetration into the building since the siding was rotting away at the ends of the planks at some locations. Reference Photograph 17
36. Siding along the west side of the garage did not appear to lap the edge of the foundation. This creates a potential for water running down the siding to run onto the foundation and into the garage if not corrected. Reference Photograph 18
37. Mildew could be observed on many of the finished surfaces at the interior of the building, indicating a higher than normal humidity at the interior of the building. The source of water entry was not conclusively determined but may be related to water entry from the roof or other conditions. If mold is of concern, a qualified mold contractor should be consulted who can provide specific recommendations for cleaning and repair at the interior of the building to mitigate any mold problems. Reference Photograph 19
38. Cabinetry at the kitchen area was rotted along the base of the cabinetry. This may be related to water entry or failure of the mechanical equipment or plumbing inside the building. Damaged cabinetry will require replacement to repair. Reference Photograph 20
39. The threshold at the entry porch appeared to be at or above the floor height at the entry foyer. This may allow water blowing onto the front porch to run in around the entry door threshold and may be difficult to repair due to its configuration. Reference Photograph 21
40. Window glass or window sashes appeared to be loose at some of the windows in the building, as indicated by rattling of the windows when they were operated or when doors were opened and closed at some rooms. This is an indication that the windows may allow energy loss and warrant repair.
41. There was evidence of water entry into the building at some locations, and it could not be determined if this was related to flooding as a result of rising water around the perimeter of the building. Further inquiry of the owner or investigation is recommended to determine if this area has any problems with flooding since such an evaluation is beyond the scope of this inspection.
42. Some of the interior doors could not be opened and closed because they dragged the sides of the door jambs near the bottoms of the doors, which can be related to swelling caused by the jambs having been wet in the past. Locations where this was observed; included at the dining room and at the utility room 1/2 bathroom.
43. The laminated plastic at the kitchen countertop was delaminating at some locations, and repair may require replacement of the counter.
44. Windows would not operate smoothly at some locations where side opening windows existed; including: at the dinette and at the east bedroom.

STRUCTURAL OBSERVATIONS CONROE

45. The center bedroom door to the closet was off its hinges and was in need of repair.
46. It appeared an interior door had been used as an access door at the pedestrian exit from the garage. An interior door is usually not considered durable enough for use at this location.
47. The exit door from the utility room was rotted and was in need of replacement.
48. Balusters at the stair rail at the stairs were wider than currently considered acceptable, and the handrail and balusters did not extend all the way to the bottom of the stairs, creating a hazard.
49. Holes were observed at the sheetrock walls at the interior of the building at some locations that needed to be repaired; including: at the west bedroom closet, in the ceiling at the master bedroom closet and at the gameroom bathroom.
50. Decorative shutters installed around the windows at the front of the building were loose and falling off at some locations and should be removed or reinstalled.
51. There was a gap at the gable at the northwest attic visible from the attic space, which may allow animal access into the building and should be corrected.
52. The screen at the upstairs center bedroom was damaged and in need of replacement to prevent insects from gaining access to the building when the window is open.
53. Ridge vents and gable vents existed at the roof to provide ventilation. It is recommended that gable vents be discontinued when ridge vents exist and that the ridge vents be used in conjunction with soffit vents to provide cross ventilation. The current installation may prevent adequate ventilation for the central portion of the attic space.

FOUNDATION CARE INFORMATION

Maintenance Recommendations For Foundations On Expansive Clay Soil

INTRODUCTION

Differential movement of building foundations is a common problem in this area, because of the highly expansive clay soil and changing weather conditions, and costs owners thousands of dollars a year in repair bills. As the building ages, it is probable the foundation will continue to experience differential movement, regardless of how well it was constructed or its present condition. This differential movement does not stop as buildings become older; older structures with a history of minimal differential movement have been known to develop foundation problems in a very short time due to changing conditions at the perimeter of the building foundation.

REASON FOR FOUNDATION PROBLEMS

The primary reason for foundation problems is the highly expansive nature of the clay soil on which the building rests. The clay expands or contracts as its moisture content changes with the weather. Depending on the area, the amount of contraction or shrinkage ranges from minimal to upwards of 65% of the total wet volume. The average amount of shrinkage that can be expected in this region is approximately 35%, with wide variation depending on the location. For example, a sample of water-saturated clay will shrink up to an average of 35% when dried completely. This shrinkage accounts for the large cracks that form in the soil after an extended dry period. The more expansive the clay, the larger the cracks.

EFFECT OF PLANTS ON FOUNDATION PERFORMANCE

Because of the highly expansive nature of the soil, trees and other large plants can significantly contribute to differential settlement of a foundation. The roots of trees and large plants consume the moisture from the soil, causing the soil to shrink much faster than other soil areas exposed to the weather. The soil where the moisture is lost more rapidly will sink lower than the surrounding soil, causing evidences and consequences of differential settlement in building structures. Research studies indicate that a tree should be at least as far away from a building as the mature height of the tree to minimize the effect of drying caused by the tree.

EFFECT OF WET SPOTS AT THE SIDE OF A FOUNDATION

Wet spots caused by dripping faucets, leaking drains, air conditioning condensate drains, leaking water pipes, etc., can cause differential settlement at the location where the soil has been kept wet. The foundation may sink into the soil at a wet area while the soil dries and shrinks at other locations because the drying soil allows the foundation to move downward and overload the wet area.

EFFECT OF POOR DRAINAGE AT THE PERIMETER OF A FOUNDATION

Water standing or running alongside a foundation after rains may cause differential settlement of a foundation. If soil grading is such that water runs alongside a foundation during rains, the water will run under the edge of the foundation and carry away soil supporting the foundation. The effect is much more pronounced if the soil was very dry prior to the beginning of the rain. In addition, if water is allowed to stand alongside a foundation, it will flow below the foundation and dissolve the clay supporting the foundation, carrying it into the cracks that develop in the yard outside the foundation area during extended dry periods. This problem is more severe if the soil in the general area has been very dry, but it is less severe if the soil has been maintained moist.

FOUNDATION CARE PROFESSIONAL ENGINEERING INSPECTIONS

FOUNDATION MAINTENANCE RECOMMENDATIONS

An owner can significantly reduce the rate of differential settlement by observing the following recommendations:

1. Try to maintain a constant moisture content in the soil around the foundation. Water the soil evenly and around the entire foundation during extended dry periods. This should prevent a gap from opening between the soil and foundation edge. However, if a gap does appear, water frequently (at least daily) around the entire foundation during extended dry periods (6 to 7 days in the summer). Do not apply water directly into the gap. Instead, water 1 to 2 feet away from the foundation edge. Some homeowners choose to install a fully automated foundation watering system to eliminate the need to remember to water. It is best to add water about three times per day to insure that the applied water has time to soak into the soil.
2. Cut and cap the roots of any large trees growing closer to the foundation than the mature height of the trees. The roots from a large tree or several medium size trees can consume more water from the soil than can be added with a watering system. This will limit the consumption of water from the soil below the foundation and may prevent excessive differential settlement and cracks in the structure. It is recommended that a professional tree expert be used to prevent damage to the trees. When a tree grows too close to a building to allow cutting and capping of the roots, it is advisable to remove the tree or make special provision for watering the soil below the foundation.
3. Properly grade the soil by filling in low spots and leveling off high spots adjacent to the foundation so that the surface of the soil slopes gradually away from the building. A recommended slope is 1 inch per foot for a distance of 3 to 4 feet from the foundation.
4. Control roof water runoff and help prevent soil erosion by using a gutter and downspout system. This is especially important if a building has no eaves which overhang the walls or if the eaves are less than 1 foot wide.
5. Water trees and shrubs growing near a building during extended dry periods as they cause shrinking of the soil due to their high water consumption. Keep in mind that moderate to large trees consume 50 to 75 gallons of water from the soil every day.

SUMMARY

Remember: the intent of foundation maintenance is to maintain a constant moisture content in the soil around and below the entire foundation and to prevent soil erosion that can result from water flowing off the roof or other large flat surfaces near the building.

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1. Catch basins were noted in the attic at possible points of roof leakage. The catch basins may or may not be necessary at the current time. They may have been necessary before repairs were made.

2. The ridge vent was continuous at the change in pitch of roof along the main ridge. This left openings where animals may be able to gain access to the attic space through the ridge vent or water penetration may be able to occur.



3. The flashing installation at the front dormer was improper where the top edge of the head flashing was visible. This will allow water to bypass the flashing at this location and run into the structure of the building.



4. The roof decking was deteriorated below the southwest corner of the upstairs dormer adjacent to the center bedroom. There is evidence that the flashings at this location may not be well fitted and may be the cause for evidences of water penetration at this location. A catch basin full of water located below this area indicates that leaks through the roof may be active in some areas.

5. Stains could be observed around the fireplace, including damage to the paneling. This appeared to be related to water penetration around the south dormer roof-to-wall interfaces or fireplace flue.



6. Vulnerability to termite infestation was observed where siding was in contact with a concrete surface that is not monolithic with the foundation. Subterranean termites can enter the structure below or through the siding without being observed.



7. Vertical bracing normally used to support the mid span of the roof rafters did not exist where the warm air furnace had been installed.

8. It was observed that one or more of the roof rafters were split and/or cracked and should be repaired to provide adequate strength for the roof surface.



9. The ridge beams were not wide enough to support the entire width of the miter cut on the end of the roof rafters. Even though this is a common observation, the greatest strength requires that the ridge beam be wide enough to uniformly distribute the roof load across all the width of the rafter miter cuts.



10. The quality of a rafter over the area of the furnace appeared to be poor. The rafter was performing satisfactorily; however, the deterioration at the rafter may reduce its strength.

11. Some of the exterior siding was observed to be in need of repair or replacement due to loose and rotted siding at many locations around the perimeter of the house and garage.



12. The attic insulation was observed to be missing or out of place at the den, at the vertical walls at the south attic and at the attic over the stairs, which can result in loss of energy.



13. The space between the upstairs floors and the downstairs ceilings was open to the attic and uninsulated. This can be a significant source of energy loss that can be eliminated by insulating or sealing the opening.

14. Some of the uninsulated interior walls of the house were open to the attic at duct chases to the lower floors, which will result in loss of energy during the seasonal extremes. The openings around the ducts should be sealed and covered with insulation.



15. Evidence of water entry, past or current, was observed at several locations, including at the north side of the living room, as indicated by stains in the tack strip and carpeting along the north wall; at the dining room, as indicated by stains in the tack strip along the north wall; and at the north bedroom at the northwest corner of the room, as indicated by stains in the tack strip.



16. Panels at the overhead garage door were bent or damaged at some locations, which may require replacement of sections of the door in order to improve its appearance to a normal condition.

17. The vapor barrier was missing behind the siding at the garage area and may allow water penetration into the building since the siding was rotting away at the ends of the planks at some locations.



18. Siding along the west side of the garage did not appear to lap the edge of the foundation. This creates a potential for water running down the siding to run onto the foundation and into the garage if not corrected.



19. Mildew could be observed on many of the finished surfaces at the interior of the building, indicating a higher than normal humidity at the interior of the building.

20. Cabinetry at the kitchen area was rotted along the base of the cabinetry. This may be related to water entry or failure of the mechanical equipment or plumbing inside the building.



21. The threshold at the entry porch appeared to be at or above the floor height at the entry foyer. This may allow water blowing onto the front porch to run in around the entry door threshold and may be difficult to repair due to its configuration.