INVOICE

RAM JACK

2765 W Kingsley Rd
Garland, TX 75041
Main (800) 969-2255

INVOICE #	DATE
4057	September 14, 2023

Bid #: 16990

Description: 292 Langely, Kyle, TX 78640

BILL TO	PROPERTY
Lloyd Moskal 292 Langely Kyle, TX 78640 lmoskal1@austin.rr.com	292 Langely Kyle, TX 78640

DESCRIPTION	AMOUNT
One-Time Payment	$17,690.00
Thank you for your business!	**TOTAL: $17,690.00**

PAID

INVOICE

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4058	September 14, 2023

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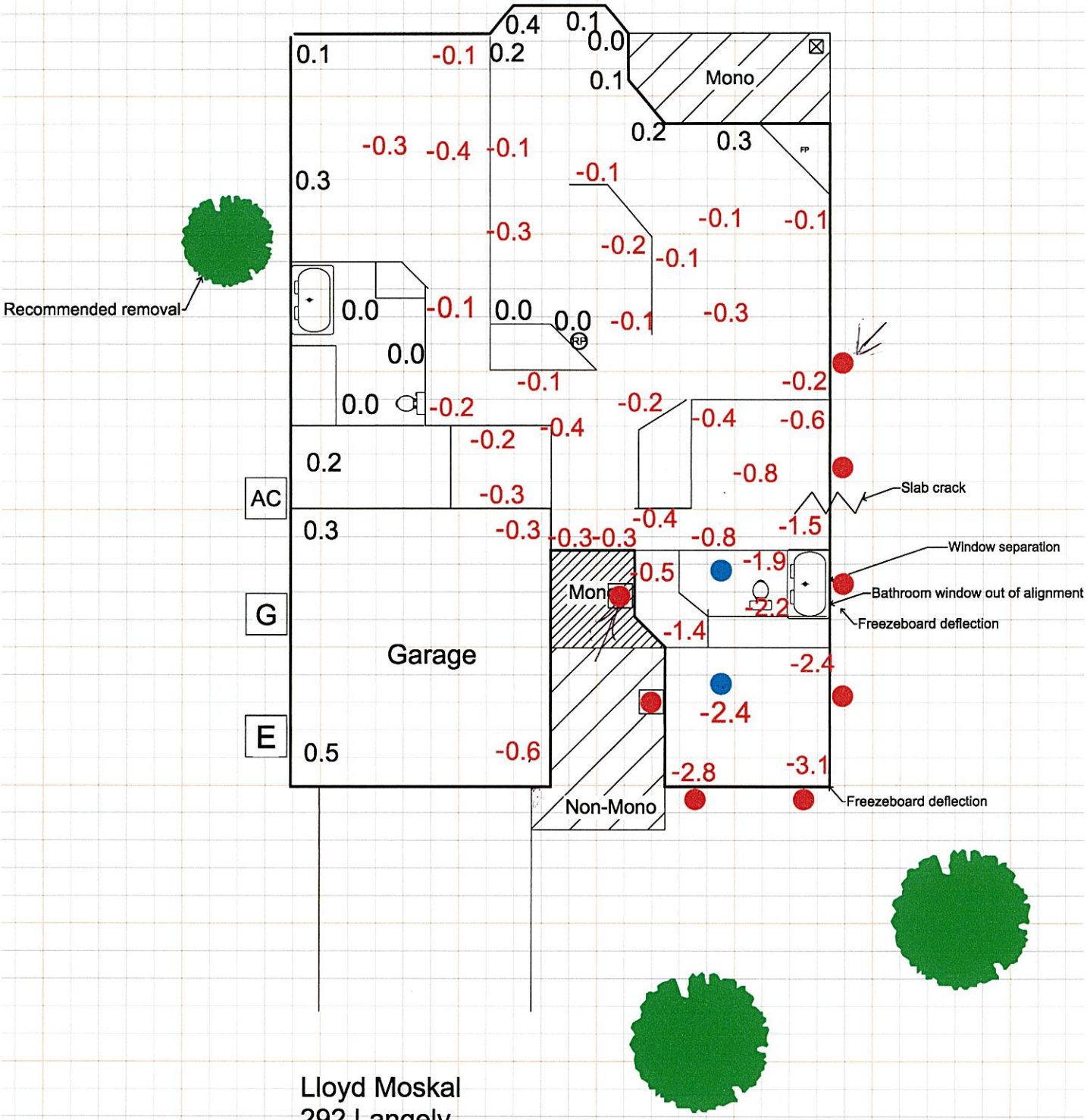
Description: 292 Langely, Kyle, TX 78640

BILL TO	PROPERTY
Lloyd Moskal 292 Langely Kyle, TX 78640 lmoskal1@austin.rr.com	292 Langely Kyle, TX 78640

DESCRIPTION	AMOUNT
One-Time Payment	$2,090.00
Thank you for your business!	**TOTAL: $2,090.00**

PAID



Lloyd Moskal
292 Langely
Kyle, TX 78640
PM Jody Woodruff
9/14/23

FORTIFIED ENGINEERING SOLUTIONS

Mr. Lloyd Moskal
292 Langely
Kyle, TX 78640

October 3, 2023

Re: Foundation Inspection:
292 Langely
Kyle, TX

Dear Mr. Moskal,

Per your request, a site inspection was performed at your residence on October 2, 2023. The purpose of the site inspection was to provide a general assessment of the structural condition of the foundation at the proposed underpinning section of the residence. The inspection was strictly visual and limited to the exposed areas of the structure. No material or geotechnical testing was performed and was beyond the scope of this investigation. The Texas Board of Professional Engineers describes this as a level "B" evaluation. Documents detailing the construction of the residence were not available for review. The residence is estimated to be approximately nineteen (19) years old and for orientation purposes is assumed to face south.

The residence is a one-story wood framed structure. The residence has a masonry brick facade with wood siding covering the exterior walls. The foundation of the residence appears to be composed of a post tension reinforced concrete slab on grade system. The roof consists of composite asphalt shingles and has rain gutters on the south side of the residence.

The interior walls of the residence are constructed of sheetrock. The interior floor coverings consist of carpet, tile, and vinyl. Removal of any floor or wall coverings to inspect for cracking was beyond the scope of this investigation.

As indicated, a geotechnical investigation was not included in the scope of this investigation. However, preliminary soil data can be obtained from the Web Soil Survey from Natural Resources Conservation Service produced by the United States Department of Agriculture. This soils survey indicates that the primary soil at the residence is classified as Houston Black Clay. This soil has a very slow infiltration rate and a very slow rate of water transmission. Houston Black Clay has a relatively high shrink-swell potential with Plasticity Index ranging from 37 to 50.

The Plasticity Index (PI) is a measurement of soil moisture content range through which the soil exhibits plastic behavior. Soil with PI greater than 30 is considered highly expansive to changes in moisture content and would be subject to relatively significant volume changes. Changes in moisture content due to plumbing leaks, ponding around the residence or trees located near the foundation could produce relatively significant soil volume changes and cause foundation movement.

OBSERVATIONS

Vegetation around the residence consists primarily of grassy areas with small to medium size shrubs. The residence does not appear to have a sprinkler system. The surface grades on all sides of the residence appear to be adequate to drain water away from the foundation.

Some evidence of foundation movement was observed during the inspection which is noted on the attached Foundation and Elevation Assessment Plan (SK-1). The evidence consisted primarily of sheetrock cracks, doors out of plumb, tile cracks, grade beam cracks, deflection of frieze boards, siding joint separation, brick separation from siding, and brick separation from windows.

Relative floor slab elevations were provided by Ram Jack of Texas. The floor slab elevations were reportedly taken September 14, 2023 with a Ziplevel. The Ziplevel is a pressurized hydrostatic altimeter

and works by measuring the difference in elevations between the base unit and the handheld unit. The basepoint for the residence was reportedly set to 0.0 inch and located near the center of the residence. Negative elevations referenced are below the basepoint, and positive elevations are higher than the basepoint. The lowest point was recorded near the southeast corner of the residence. The highest point was recorded near the southwest corner of the garage. The elevation differential between the low and high points of the residence was found to be about 3.6 inches. These elevations are shown on the attached Foundation and Elevation Assessment Plan (SK-1).

Multiple trees are located in close proximity to the perimeter of the foundation on the north and south sides of the residence. The approximate locations of the trees are marked on the Foundation and Elevation Assessment Plan (SK-1). The trees are located close enough to the residence that the tree roots will influence the performance of the foundation and floor slab. Depending on the species, trees are capable of removing moderate to significant amounts of water from the subsurface soils. This is probably more notable during the drier months or periods of low rainfall when the trees begin pulling moisture from the bearing soil beneath the foundation. This is called transpiration and will cause expansive clay soil to shrink. Since a slab on grade foundation system relies on the soil for support, the foundation of the residence will settle as the soil shrinks.

A common symptom of the effects of transpiration on a foundation system is the seasonal opening and closing of cracks in the sheetrock and masonry. The cracks will normally open in the summer and fall and close in the winter after the tree has gone dormant and the moisture returns to the bearing soil.

RECOMMENDATIONS

I recommend a minimum of ten (10) steel piles be installed at the residence. Pile locations are shown on the Foundation and Elevation Assessment Plan (SK-1). In addition, a Ground Penetrating Radar (GPR) scan was performed on the interior floor slab. The approximate location of the grade beams detected by the GPR scan is shown on the attached Grade Beam and Pile Layout Plan (SK-2). In addition, based on the GPR scan, the floor slab of the main residence appears to be approximately four (4) to five (5) inches thick with post tension cables approximately every thirty-four (34) inches on center each way. The steel piling system used should have an evaluation service report (ESR) recognized by ICC-ES showing compliance with the 2021 International Residential Code (IRC) and should meet or exceed the foundation repair amendments. The steel piling system should also have a minimum allowable working load of 20 kips and be capable of uniformly raising the foundation as applicable.

The residence has rain gutters on the south side. Rain gutters are recommended to be installed on all sides of the residence, where applicable. Rain gutters aid in controlling the moisture in the soil around the foundation of the residence as well as soil erosion adjacent to the foundation. It is recommended to clean out the rain gutters periodically for proper collection and discharge of water away from the foundation of the residence. Downspouts are typically suggested to be spread out no more than twenty feet (20'-0") apart in order to efficiently discharge rain water. All gutter downspouts discharging on soil should have splash blocks and be strategically placed to adequately drain water away from the foundation. Any downspout in flower beds should be extended so that water is discharged outside of the flowerbed barrier.

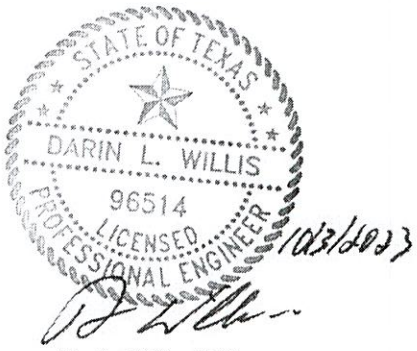
The effects of transpiration will most likely influence the foundation movement at the residence due to the proximity of the existing trees to the foundation. Since a large portion of the floor slab will continue to be supported by the soil, strong consideration should be given to installing root barriers. The root barriers will cut the roots extending beneath the foundation of the residence and cut the seasonal capillary suction of the soil. Approximate locations for the root barriers are shown on the attached Foundation and Elevation Assessment Plan (SK-1). A Typical Root Barrier Detail (SK-3) has been attached along with this report.

Underpinning one area of a foundation will not prevent foundation movement from occurring at other locations. Underpinning also will not prevent foundation heave. Therefore, due to the sensitivity of the soil to moisture, maintaining uniform moisture around the foundation is essential. The landscape grades around the residence should be corrected where noted and maintained to slope away from the residence where required. The landscape grades should slope away from the foundation at a minimum of ½" per foot for six (6'-0) feet. The top soil should extend a minimum of one (1'-0) foot above the bottom of the grade beam and should not extend above four (4") inches below the bottom of the masonry. All new fill soil should be clayey sand with a minimum Plasticity Index (PI) of twenty-five (25). Watering the soil around the foundation is also important during dry periods to help maintain uniform moisture in the soil.

It is recommended to have the sanitary sewer and domestic water lines tested for leaks beneath the floor slab after the underpinning work has been completed. A simple hydrostatic test can be performed by any reputable plumber. If any leaks are discovered beneath the floor slab, they should be repaired as soon as possible.

This concludes this report. Observations made in this report pertain to the condition of the residence on the date of the inspection which is subject to change. No foundation warranty is expressed or implied by this report. If I can be of further assistance or should you have any questions about this report, please do not hesitate to contact me.

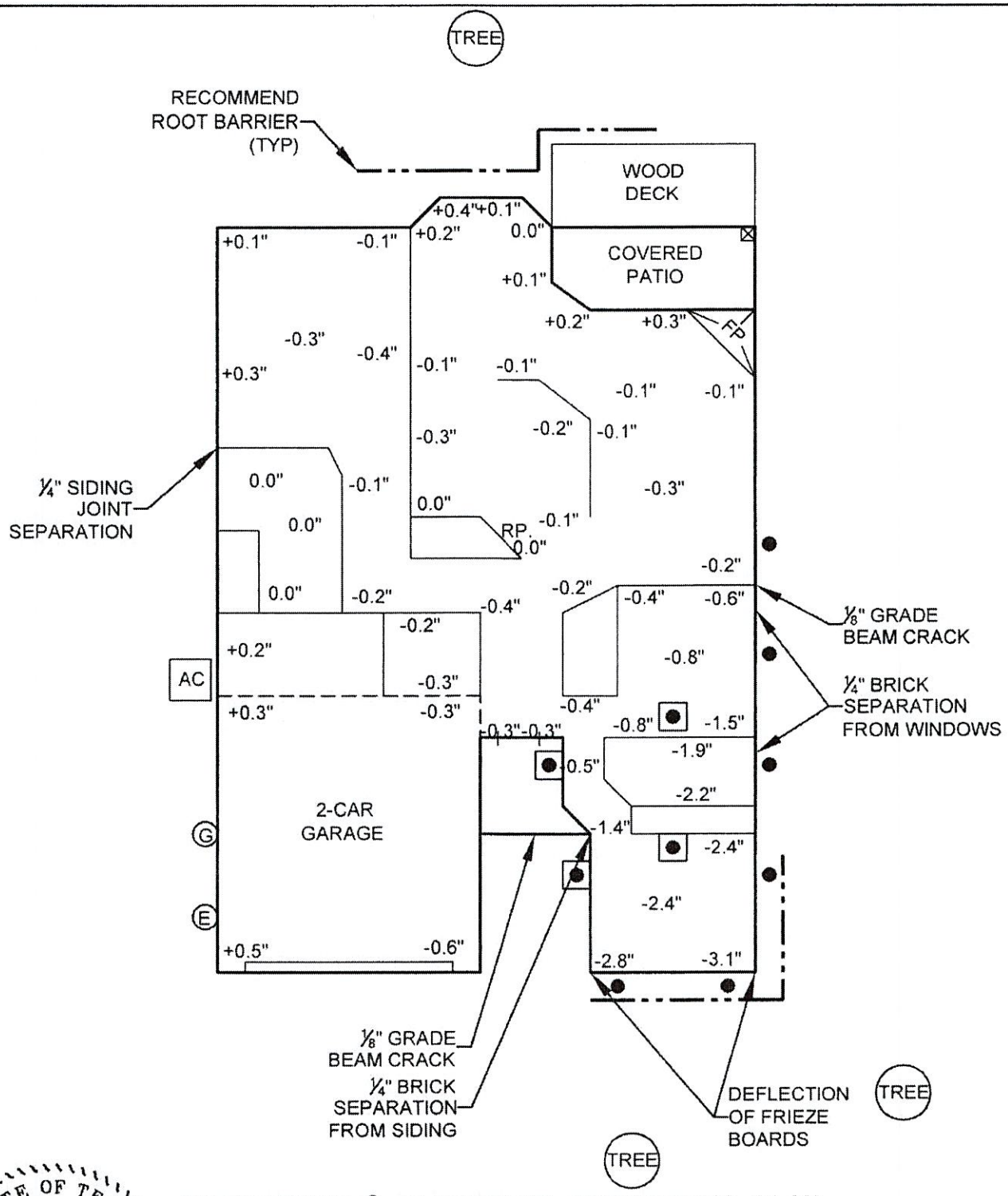
Sincerely,



David Garcia
Field Inspector

Darin Willis, P.E.
President
Texas Firm No. F-17828

Attachment:
Foundation and Elevation Assessment Plan (SK-1)
Grade Beam & Pile Layout Plan (SK-2)
Typical Root Barrier Detail (SK-3)
Ram Jack Driven Pile Detail



FOUNDATION & ELEVATION ASSESSMENT PLAN

NORTH

LEGEND

-0.50" - - - - SLAB ELEVATIONS TAKEN BY RAM JACK 09/14/2023

- - - - STEEL PILES

- - - - STEEL PILES THROUGH CONCRETE

STATE OF TEXAS
DARIN L. WILLIS
96514
REGISTERED PROFESSIONAL ENGINEER
10/3/2023

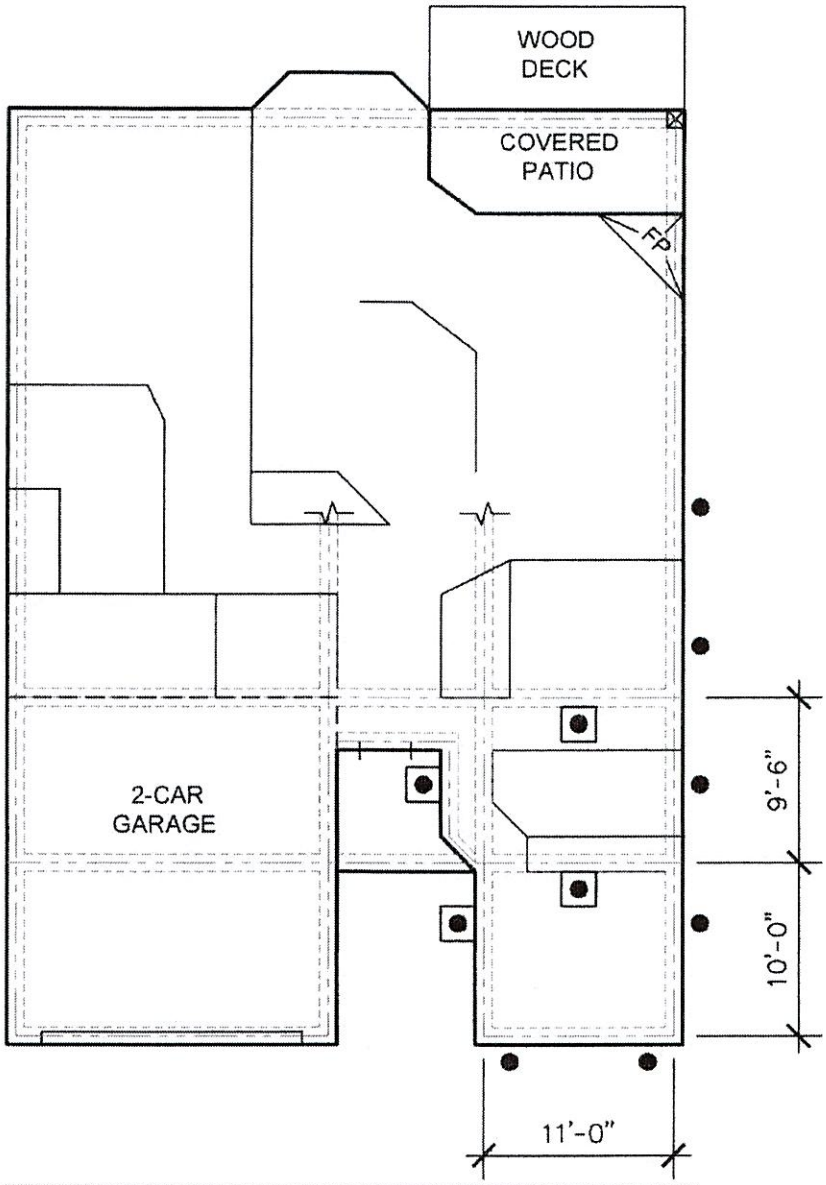
FORTIFIED ENGINEERING SOLUTIONS
2765 W. KINGSLEY GARLAND, TX 75041
FIRM NO. F-17828 (972) 535-4595

LLOYD MOSKAL
292 LANGELY
KYLE, TX

SHEET: SK-1

SCALE: 3/32" = 1'-0

DATE: 10/03/2023



PLAN NOTES

INTERIOR FLOOR SLAB APPEARS TO BE APPROX. 4 TO 5 INCHES THICK WITH POST TENSION CABLES APPROX 34" O.C. EACH WAY

GRADE BEAM & PILE LAYOUT PLAN

NORTH

LEGEND

- ---- STEEL PILES
- ---- STEEL PILES THROUGH CONCRETE

STATE OF TEXAS
DARIN L. WILLIS
96514
REGISTERED
PROFESSIONAL ENGINEER
10/3/2023

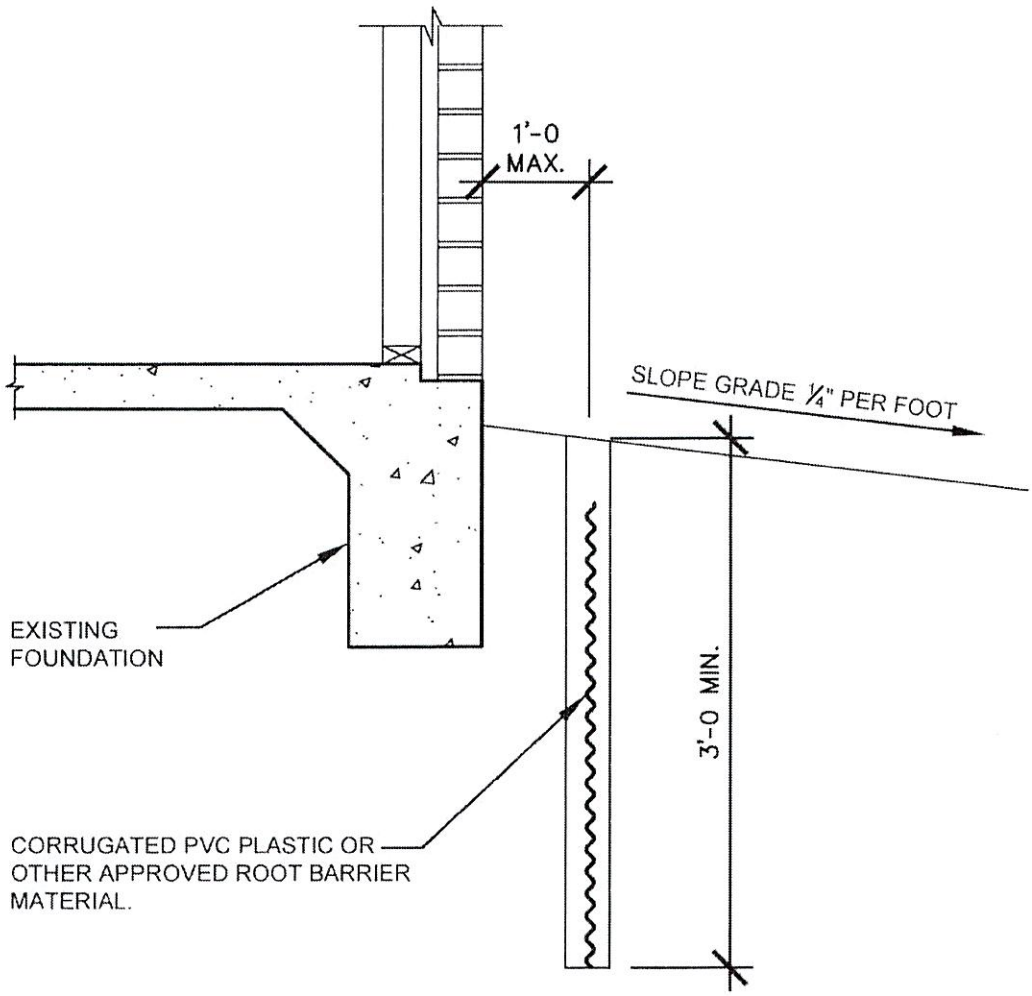
FORTIFIED ENGINEERING SOLUTIONS
2765 W. KINGSLEY FIRM NO. F-17828
GARLAND, TX 75041 (972) 535-4595

LLOYD MOSKAL
292 LANGELY
KYLE, TX

SHEET: SK-2

SCALE: 3/32" = 1'-0

DATE: 10/03/2023



NOTES:

1. PLACE PHYSICAL ROOT BARRIER (SK-2) AS CLOSE TO FOUNDATION AS POSSIBLE AND NO MORE THAN 1'-0 AWAY. THIS WILL SERVE AS A MOISTURE BARRIER AS WELL.
2. DO NOT WATER THE SOIL BETWEEN THE ROOT BARRIER AND THE FOUNDATION.
3. DO NOT ALLOW WATER TO STAND OR POND BETWEEN ROOT BARRIER AND FOUNDATION.
4. HAVE ALL UTILITIES MARKED IN AREA OF ROOT BARRIER BEFORE EXCAVATING.
5. AS AN ALTERNATIVE, A BIOBARRIER MAY BE INSTALLED FARTHER AWAY FROM THE FOUNDATION. FOR EXAMPLE THIS SYSTEM CAN BE USED TO GO AROUND FLOWER BEDS AND AVOID DISRUPTING MANICURED LANDSCAPING. HOWEVER, THIS WILL NOT SERVE AS A MOISTURE BARRIER.

STATE OF TEXAS
DARIN L. WILLIS
96514
LICENSED
PROFESSIONAL ENGINEER
10/3/2023

TYPICAL ROOT BARRIER DETAIL

SCALE: 1/2" = 1'-0

FORTIFIED ENGINEERING SOLUTIONS
2765 W. KINGSLEY FIRM NO. F-17828
GARLAND, TX 75041 (972) 535-4595

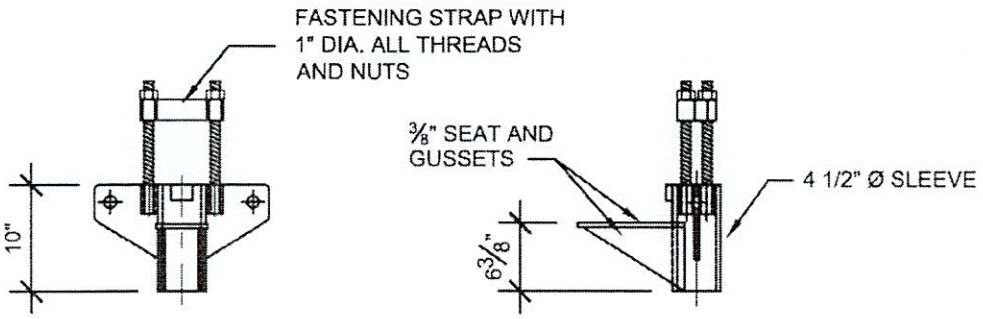
LLOYD MOSKAL
292 LANGELY
KYLE, TX

SHEET: SK-3

SCALE: 1/2" = 1'-0

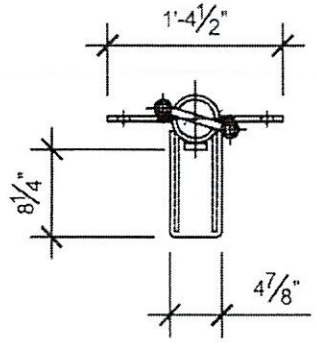
DATE: 10/03/2023

4001 BRACKET - 2 7/8"Ø DRIVEN PILE

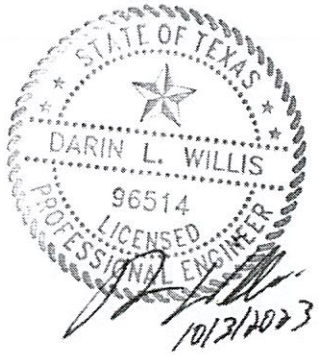


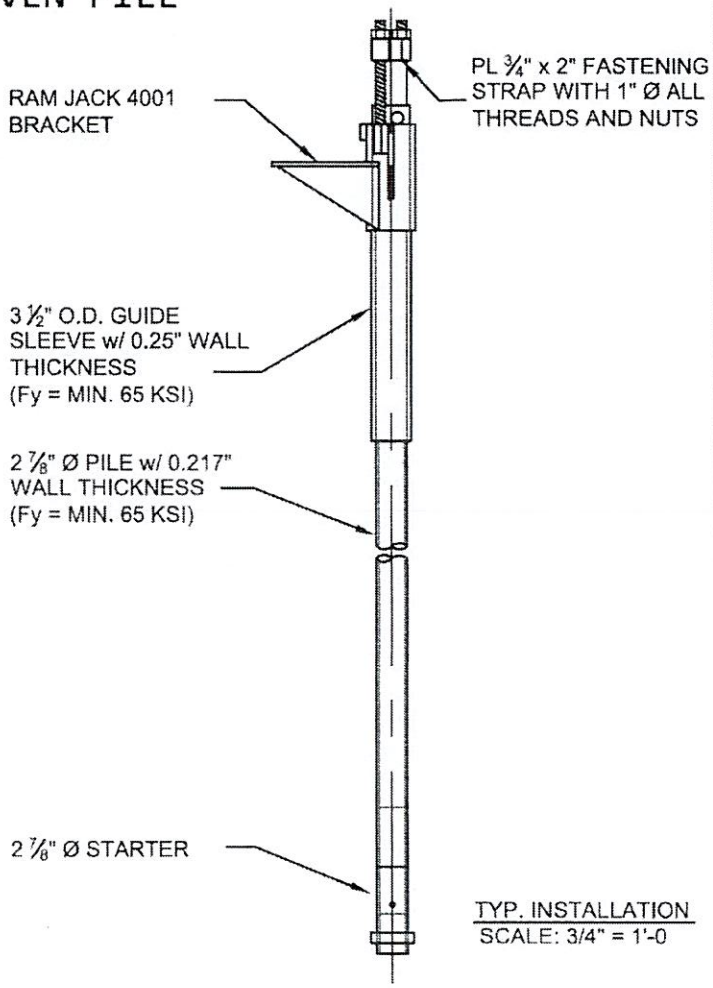
FRONT VIEW

SIDE VIEW



TOP VIEW





TYP. INSTALLATION
SCALE: 3/4" = 1'-0

NOTES:

1. POLYETHYLENE COPOLYMER THEMOPLASTIC COATING PER ICC-ES AC228.
2. MANUFACTURER TO HAVE IN EFFECT INDUSTRY RECOGNIZED WRITTEN QUALITY CONTROL FOR ALL MATERIALS AND MANUFACTURING PROCESSES.
3. ALL WELDING IS TO BE DONE BY WELDERS CERTIFIED UNDER SECTION 5 OF THE AWS CODE D1.1.
4. THE CAPACITY OF THE UNDERPINNING SYSTEM IS A FUNCTION OF MANY INDIVIDUAL ELEMENTS, INCLUDING THE CAPACITY OF THE FOUNDATION, BRACKET, PIER SHAFT, HELICAL PLATE, AND BEARING STRATA, AS WELL AS THE STRENGTH OF THE FOUNDATION BRACKET CONNECTION AND THE QUALITY OF THE INSTALLATION OF THE PILE. YOUR ACHIEVABLE CAPACITIES COULD BE HIGHER OR LOWER THAN THOSE LISTED DEPENDING ON THE ABOVE FACTORS.

RAMJACK

4001 BRACKET - DRIVEN		CATALOG NO. : SEE TABLES	REV. 1
SCALE 3/4"= 1'-0	DRAWN BY DLW	DATE: 08/11/09	SHEET 1 OF 1