



THE UNIVERSITY OF ARIZONA

HELICAL PIERS

What is needed for the successful introduction of helical piers in

Guilford County, NC.

By: Paul Beitz

4/29/2024

Spring 2024 Capstone

Sustainable Built Environments

College of Architecture, Planning & Landscape Architecture

The University of Arizona

Abstract

In the face of a housing shortage and climate crisis, helical piers, a widespread technology used since the mid-1800's, is a style of foundation that offers higher efficiency than traditional foundation types. This study focuses on why builders continually use traditional foundation building practices that take longer to install, require more skilled labor, and have larger embodied and operational carbon emissions associated with them, than building with helical piers. Currently the use of helical piers in new construction is non-existent in Guilford County, North Carolina. Interviews, a building performance survey, and observations allowed for the collection of data from homeowners, renters, building professionals, and building inspectors to better understand why this building technique has not been introduced. Outcomes are used to inform on the successful introduction of helical piers in Guilford County. The results revealed that most residents are unfamiliar with helical piers, contractors are nervous to try a new building system, and that Building Inspectors are open to more helical pier installations but see becoming a successful foundation system in Guilford County as a challenge. There are successful helical pier installers 100 miles south of Guilford County however, and the conclusion has recommendations on steps that can be taken to have a successful introduction of helical piers in Guilford County.

CONTENTS

Title Page	1
Abstract	2
Introduction	4
Literature Review	4
Methodology	10
Study Area	10
Research Design	11
Results	13
Discussion	20
Conclusion	22
References	26
Appendix	27

Introduction

Guilford County is in the Piedmont region of North Carolina. Within Guilford County is North Carolina's third largest metropolis, Greensboro, with a population of 301,115 (U.S. Census Bureau Quick Facts). The existing housing stock is built on traditional foundation systems of crawlspaces, slab-on-grade, and basements.

North Carolina, like many of the states along the East Coast of the United States, must address the strengthening and more frequent hurricanes, worsening air quality, and increased flooding that will be associated with climate change. In Guilford County over the next thirty years 9% of the buildings are at risk of severe flooding, air quality is expected to be worse than half of the state, and strengthening hurricanes will push further inland which will bring heavier rain and wind to the area (Sharai, et al. 2020). Helical piers are large screws drilled into the ground with special machinery that makes building elevated, airtight, high-performance homes easier to bring to the housing market than traditional foundation types. They can be used for new construction (Figure 1), or a retrofit to existing homes that are in flood prone areas (Figure 2).



Figure 1. Helical pier being installed.



Figure 2. Existing home near a river being lifted to install a higher helical pier foundation to adapt to increased flooding.

Traditional foundation types consist of vented and unvented crawlspaces, slab-on-grade, and homes built on basements. The three traditional types of basements can be built to high performance standards, but that is not common in Guilford County. The traditional foundations also suffer from challenges with water management and introducing poor air quality into the living spaces.

Literature Review

The construction sector faces unique challenges with weather daily, and weather-related issues are going to increase due to climate change. This is going to require construction companies to choose their building materials more carefully, be more flexible for the time of day they work, and how they work. To successfully introduce helical piers to Guilford County the vulnerabilities that this type of work faces needs to be researched and planned for. Literature review will cover

the vulnerabilities that come with hiring and maintaining skilled labor to install helical piers and the material readiness of helical piers during a major weather event.

Having qualified labor is critical to the success of a construction project. North Carolina, along with the rest of the United States, continues to struggle with labor shortages in the construction industry that have been worsened since the COVID-19 Pandemic (Mulligan et. al, 2021). A typical foundation crew requires excavators, formers, cement masons, and depending on the foundation type, cement finishers. The size of these crews varies on average from 2-6 people, or more, depending on the size and the number of concrete finishers needed. These crew members are trained in specialized skills and difficult to replace, 80% of general contractors who are members of the Association of General Contractors of America (AGC) reported issues with hiring skilled labor (Kim, et al, 2020). Replacing one of these positions with unskilled labor is an option, but this causes schedule delays due to training time, increased time for an untrained worker to complete tasks, and accidental damage to equipment and finished product (Kim, et al, 2020). A helical pier installation crew requires specialized labor and is not immune from these labor shortages. To attract quality employees who want to remain with the company for a substantial amount of time a new helical pier company introduced in Guilford County needs to offer skilled workers a safe place to work where there time invested in the company is meaningful. A worker cooperative may be a solution to retain skilled labor. By offering skilled workers the opportunity to become owners in a helical pier company that is a worker cooperative, employees will share in the successes and challenges of the company. Which has proven well for South Mountain Company, a successful residential building worker cooperative company since 1987, as said by the Founder and CEO, John Abrams-

“I am fully convinced that the conversion to worker ownership has been a critical factor in whatever modest successes we have been able to achieve. When the people who are making the decisions are the people who share the consequences of those decisions, and the rewards as well, better decisions will result.” (Abrams, 2005).

There are only 17 worker cooperatives in the state of North Carolina (Employee Ownership 101, 2024), and the smaller employee footprint that helical pier installation requires works well with a small worker cooperative that prioritizes their employees and workplace democracy (Bastida, et al. 2022).

From the Outer Banks of North Carolina to the Appalachian Mountains, every building is at risk of stronger storms due to climate change. This has caused the North Carolina Rate Bureau to request a statewide insurance increase of 42% for 2024, citing storm severity worsening in 2023 (King, 2024). With the increase in inclement weather buildings need to be built to more stringent codes, with building systems that are proven to hold up to inclement weather. Building projects also need to voluntarily reduce the carbon cost of a new build and reduce the operational carbon cost of that building to reduce the construction sector's role in climate change. Globally, construction is the largest producer of greenhouse gases, making up 37% of global emissions (Figure 3) (Sheikh, 2022). When comparing the CO₂ emissions associated with the raw materials needed to make the steel for a helical pier foundation system, and the cement and rebar for an equivalent concrete pier, a helical pier's CO₂ emissions are .62t/CO₂ and a concrete pier and a concrete pier's emission are 3.4t/CO₂ (Lisle, 2023). With less than a fifth of the overall carbon associated with the production of the raw material for a helical pier, homeowners and builders

who are concerned with their overall carbon output should strongly consider using helical piers. Helical piers offer a foundation system that will outlast the lifespan of the building materials used to frame a house and is the first permanent foundation system that can be removed and reused. Concrete foundations can be crushed and recycled, but helical piers offer the flexibility of being removed and reused for a remodel (Environmental benefits of using helical piers as a foundation solution for residential projects, 2023).

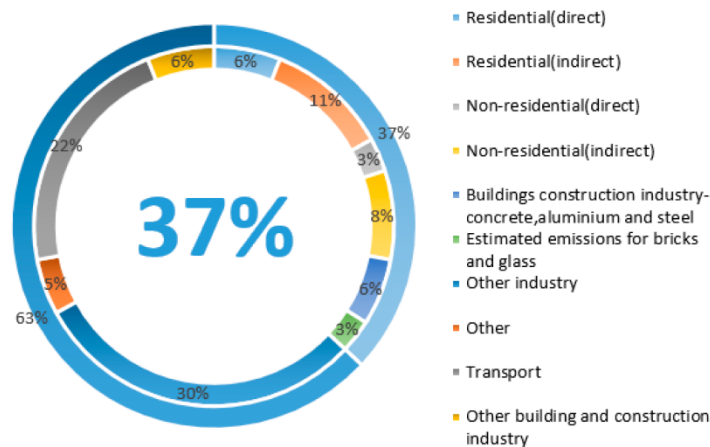


Figure .3 Global Greenhouse Gas Emissions by Trade.

This study determines what is needed for building professionals of Guilford County, North Carolina, to make helical pier technology a common foundation type, ensuring that the future housing stock in North Carolina will be built on foundation systems that will withstand the challenges of climate change. Prior research through interviews with building professionals focusing on the slow adoption of helical familiarity in Guilford County revealed there was no adoption of helical piers simply because it has not been widely introduced and both the public and the construction sector lack a familiarity with this foundation system. Research then focused on why helical piers have not been introduced, and to develop outcomes that would successfully introduce them into the area. To ensure an introduction of helical piers in Guilford County is

successful, homeowners need to want the building performance that is tied to helical piers, specialized labor needs to be attainable, and Contractors need to be willing and allowed to use helical piers.

Methodology

Study Area

The study focuses on Guilford County, North Carolina. The researcher is familiar with Guilford County and the outcomes of this research can be applied to other areas of the mid-Atlantic where helical pier construction has not been introduced or adopted yet. The research was inspired from making observations while conducting energy improvements on the housing stock in Guilford County, and recognizing how inefficient and unhealthy many residential foundation systems are in the area. The comprehension of building science principles and performance between alternative foundations and traditional foundations was obtained from the University of Arizona’s Sustainable Built Environments program.



Figure 4. Guilford County highlighted in Blue.

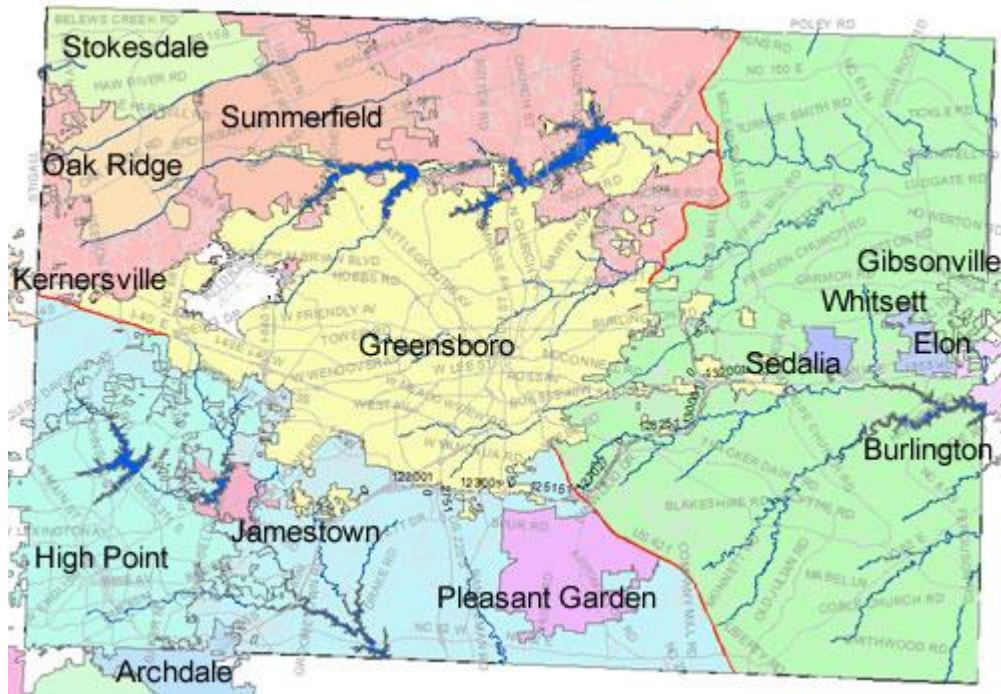


Figure 5. Detailed map of Guilford County.

Research Design

The focus of this research is to discover the reasons for the lack of introduction and slow adoption of helical piers in the construction industry of Guilford County, North Carolina. Literature review and interviews show that helical pier construction suffers from obtaining skilled labor, which is a typical symptom of specialized construction, but performs better in weather dependent installation, withstanding stronger storms due to climate change, and promoting a living space with higher indoor air quality. With these benefits known, the research is then guided based on the answers from survey respondents to generate specific questions for

building professionals. This process can be seen in Figure 6. The literature review, survey, and interviews will identify the steps that need to be taken to successfully introduce helical piers in Guilford County.

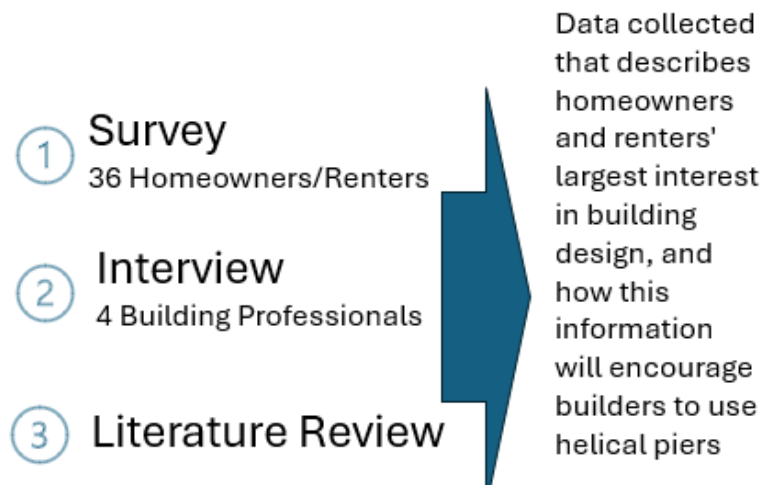


Figure 6. Methodology

Results by Method

Method 1 perceptions from residents

The study uses Google Forms to create a building performance survey, asking respondents to rate 9 building performance characteristics from lowest to highest priority, on a scale from 1-5. With 1 = lowest priority, 2 = low priority, 3 = neutral, 4 = high priority, and 5 = highest priority. When the survey was published, respondents could anonymously complete the survey. The survey included a free response answer to

the question “Do you see any advantages or conveniences with having helical piers as a foundation for your home/building?” The survey concluded with Figure 7, a helical pier system, asking if they were familiar with this foundation system, and if they wished to learn more about helical piers. The survey was aimed at homeowners, renters, and students, and shared



Figure 7. Illustration of Helical Pier System

through Discord channels, Facebook Messenger, and professional connections. There was a total of 36 survey respondents, and while a larger group or respondents would have provided more data, the data received was appreciated and formed a compelling case for the need to introduce helical piers.

Observational data collected while performing Energy Audits on existing crawlspaces, slab on grade, and basement type foundations were conducted on a weekly basis with a local Energy Assessment company. These observations expanded beyond Guilford County but were

still local to the surrounding area. Due to lack of helical pier installers in the area and conflicting schedules, there were no physical observations made to a structure with a helical pier system.

Analyzing Residential Survey

By giving each selection in the survey a numerical value, the answers were able to mathematically show which of the nine building performance characteristics were the most important. With 36 respondents to the survey, a total maximum score of 180 to each individual building performance characteristic was possible. Starting with the highest scoring building performance characteristic, Table 1 represents how each characteristic was ranked by the respondents. Complete survey results can be seen in Appendix A.

Rank	Building Characteristic	Score
1	Durability and Longevity	160
2	Indoor Air Quality	153
3	Moisture Control	151
4	Cost-Effectiveness	145
5	Thermal Comfort	141
6	Energy Efficiency	134
7	Aesthetics and Design	129
8	Sustainable and Eco-friendly features	119
9	Sound Insulation	112

Table 1 Survey Respondents Ranking Building Characteristics (n36) (maximum points expected=180)

Method 2 Interviews

Initial research through interviews with building professionals and building inspectors focused on the slow adoption of helical piers in Guilford County, NC. These interviews revealed that there was no adoption of helical piers in Guilford County because it has not been introduced, aside from one single helical pier being installed on a private job for a foundation repair. Interview questions then focused on the why helical piers have not been introduced, to better understand what outcomes in the construction industry could aid in the successful introduction of helical piers to the area.

Interview with Building Inspector

An interview with one of the Chief Building Inspectors of Guilford County was conducted. This is likely the person most familiar with real-world helical pier use in the county. This interview offered helpful insight on why helical piers are not being used in new building construction. The Building Inspector recognized the important role that helical piers play as a foundation system, and that when they are used for the correct job, they perform well. According to the Building Inspector, helical piers have only been used once in Guilford County. The single job that helical piers have been used on was to repair an existing foundation that was on unstable soil. When asked if he believed if there were any benefits to using helical piers, the Inspectors response was “Only time”. This is because a helical pier system can be installed in 1-2 days, whereas the other three main foundation types in North Carolina, the crawl space, slab-on-grade, and basement, take at a minimum one week to install. The Building Inspector offered that this was not that much of a benefit though, because even if a foundation system is installed in one day, are you going to be able to have a framing crew ready to begin work on that same day? The

real answer is most likely not. Construction crews typically like to start a new job on a new day. Not at the end of one. Proper coordination between trades is possible and is the responsibility of a General Contractor. While starting to build the structure from helical piers may not happen in the same day, with an experienced General Contractor on the job site it is certainly a possibility. Or a construction company that performs multiple trades in house could easily coordinate a quick transition from helical pier installation to framing.

Interview with Helical Pier Installer:

An interview with a helical pier Installer was conducted with the owner of a helical pier franchise located just south of Charlotte, North Carolina. This Installer is about 100 miles south of Greensboro. An interview with an installer was important for this research project because they are doing precisely what this project is about. They successfully introduced helical pier technology to the greater Charlotte area. Originally from Massachusetts, the owner was familiar with working with helical piers because this is a common foundation system in the Northeast. There were 3 installers within 100 miles of their old working area. When they moved to North Carolina and looked for helical pier installers, they realized there were none here. This is what convinced the owner to open a franchise outside of Charlotte, and now operates the most southern location of that franchise, with the closest one being 450 miles away in New Jersey. Although the Installer did mention that new franchises are opening in Tennessee and Southern Virginia, as the practice becomes more common.

When asked if there were any challenges with introducing helical piers into the area the Installer responded with “Still to this day, trying to educate people about it and the benefit of it” are their biggest challenges. The struggle to have the residents connect with the building

practices used in the place they are living coincides with the data that was collected on the survey “Residents Ranking of Building Performance”. Making not just helical piers, but all the building materials used in a building, a topic that is important to renters, homeowners, and developers, is a task that needs to be addressed on the design side and enforced by the builders. The builders are the ones that can help enforce the adoption of new building technology because of the sheer number of workers in the states. In the United States, as of 2022, there are over 65,00 architecture firms and 121,600 licensed architects (NCARB by the Numbers, 2022). In the construction field there are over 919,000 construction companies and over 8,00,000 workers (Construction Data, 2024). These 8 million workers are renters and homeowners, and based from a survey asking if construction workers employ what they learn at the job at home, 80% of workers say that they do. If a technology like helical piers is introduced in Greensboro, North Carolina, more construction workers will see it, and it will become more common as workers incorporate it within their own homes.

Method 3 Literature Review (based on new findings)

Helical piers are designed with building performance in mind, so many of their characteristics overlap with the building performance characteristics in the survey. What is significant is that the top three characteristics of Durability, Indoor Air Quality, and Moisture Control, are all benefits that come with building a residence on helical piers lifted off the ground.

Soil testing requirements vary from county to county, but often developers independently test soil conditions. While discussing soil tests with the helical pier Installer, they brought up that their company has gone to aid in new construction jobs, using

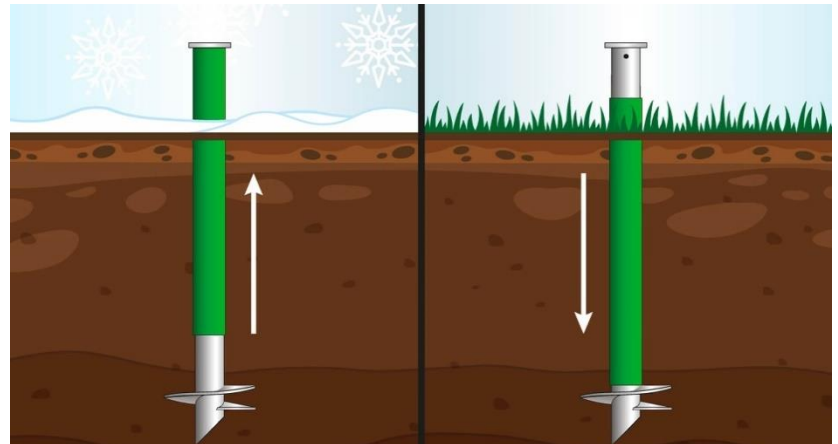


Figure 8- Sleeve that moves with soil heave

traditional foundation systems, where the initial soil test said the site was suitable, but once ground was broken in certain areas that was found to not be the case. When a helical pier is installed in unstable soil, additional lengths of pipe are installed until the pressure that is required to turn the helical pier, set by an engineer, is met. When homes using traditional foundation systems are built on suitable soil, there is still settling that happens overtime, the damage is often cosmetic but structural damage due to settling traditional foundation is not uncommon. Homes built on helical piers are less prone to damage associated with settling or ice heaving. Helical piers handle the freezing and thawing of the ground in colder areas by slipping a three-foot sleeve below the grade (Our Unique Polyethylene Green Sleeve, 2024). This sliding sleeve moves up and down the helical pier with the ground, avoiding any shifting and settling that could translate to the structure over time (Figure 8). When comparing the life span and durability of foundation systems, helical piers can outlast crawlspaces and slab on grade foundations because of their unique design and installation.



Figure 9-Encapsulated Crawlspace



Figure 10- Vented Crawlspace

When building on helical piers you have the ability to easily air seal all six sides of the building, improving the indoor air quality by controlling the points where outdoor air is introduced into the building. When utilizing a crawlspace as foundation system additional steps need to be taken to encapsulate the crawlspace to obtain similar energy performance (Figure 9). In Greensboro it is common practice to build vented crawlspaces that are not encapsulated but have a 6-millimeter vapor barrier line the crawlspace floor (Figure 10). The air in a crawlspace that is not encapsulated is moist, unconditioned air, which can be drawn into the living space from leaking air ducts and poor air sealing details. With traditional foundations, you also introduce the risk of radon exposure, a situation that is avoided when building on helical piers raised above the ground. The moisture that comes with vented crawlspaces is unhealthy for the residents and the building structure. Moisture is the enemy of buildings, and when building a home on helical piers, removing the structure from the moisture in the ground will keep the building dryer and increase the building's life. The raised structure will also protect the house from more frequent severe floods.

Discussion

The discussions with the helical pier Installer and Building Inspector both proved that helical piers have not been introduced on a residential or commercial scale in Greensboro, only a single repair job in the entirety of Guilford county. A reason suggested by both professionals is that residents are not interested in or may not even know what kind of foundation system they are living on. With 59.4% of the survey participants saying they were not familiar with the helical pier photo followed by 54.3% not being interested in learning more about helical piers there is proof that their thoughts on residents not knowing or caring to learn more about helical piers are true.

With data successfully collected from the interviews, survey responses, literature review, and personal observation the reasons why helical piers have not been introduced into this area were able to be determined. When focusing on the construction industry, the interviews with the Building Inspector and helical pier Installer were the most revealing. The Building Inspector was more critical about the introduction of this technology in the area because they did not believe that builders would adopt a new foundation strategy, simply because the ones they know work. Those being crawlspaces, slab-on-grade, and basements. Traditional foundations do work, all of North Carolina's housing stock is built on these three foundation types, but they do not perform well. This observation of resistance to change made by the Building Inspector is a real one that a helical pier installer would have to face in Guilford County. The strategy determined to be the best way to have a builder learn a new strategy, is for customers to want it. If customers become more aware of helical piers, and begin to ask builders for it, then builders will do what they do best, and build what the customer wants.

The issue discovered in this study is that homeowners and renters do not know that helical piers exist. With 59.4% of the survey respondents not knowing what they are, that means that most people would not know to ask for helical piers in a new construction build, when picking their style of foundation. If a builder is never asked to use this technique, then they likely will never utilize it. Steps need to be determined on ways to introduce the public to not only helical piers, but all aspects of building performance.

The challenges of introducing helical piers into Guilford County are cyclical. If homeowners and renters don't know of helical pier technology, they will never consider it, and builders will never risk building something that homeowners may not want. If builders are not using helical piers to build homes, then the housing stock will remain lacking in helical piers and people won't have the option to purchase them or learn about them. To break this cycle a helical pier Installer must take a calculated risk on Guilford County and determine what a successful marketing strategy may look like to successfully introduce helical piers. Based off the survey responses, people want a home that offers the same building characteristics that come with homes built on helical piers. Cost will play a factor, and although helical piers are slightly more expensive, they offer more durability and reusability than any other existing foundation type.

Conclusion

After initially recognizing that helical piers had not been introduced in Guilford County, the purpose of this study was to collect information from building professionals, Building Inspectors, homeowners, renters, and conduct literature review on the subject to create a plan that would successfully introduce helical piers into Guilford County, North Carolina. The introduction of helical piers in Guilford County will happen soon, if that introduction is a success or a failure depends on

1. Public Awareness of Building Science
2. Public Acceptance of Helical Piers
3. Retaining Skilled Labor
4. Positive Relationship with Building Inspectors

All four factors need to be met for a helical pier company to be successful, and currently none of the four factors exist. To do this interest needs to be created about Building Science, helical piers need to be used in a very public way, workers cooperatives need to be created, and Building Inspectors need to be involved at every step.

a. Recommendations

To create interest in Building Science in Guilford County a Building Science meeting group needs to be created. There is an international group, the “Building Science and Beer” (BS & Beer) group that has local chapters throughout much of the United States, Canada, and a chapter in Australia. BS & Beer meets up monthly at local breweries or active job sites that has building science incorporated into the building and discuss building science topics while having

representatives from companies come as well to speak on behalf of their product. If the monthly meeting was about Water Resistive Barriers (WRB), then a representative from Zip Sheathing may attend as a guest speaker about their product. This kind of group meeting in Guilford County would allow interested residents to come meet with like-minded builders, installers, and other residents. Within the last year two new chapters to BS & Beer have been created in North Carolina, one in Boone and the other in Charlotte, both about a one-and-a-half-hour drive away. This drive is not feasible for the average resident interested in building science, a designated chapter in the city of Greensboro would fill the building science knowledge gap that is central North Carolina.

A helical pier installer that moves into the area can also work with the local Parks and Recreations Department to donate the helical piers needed to install a small bridge in one of their parks. This should also incorporate other local groups by sponsoring a project from Boy Scouts of America or Girl Scouts of the USA. When installation is complete, attach an infographic to the structure with a brief description describing the helical piers that are holding up the bridge/structure, and how it has other uses, primarily being a foundation for homes. Included in the infographic could be a QR code that takes the user to their website highlighting that project, and then encouraging the user to explore their website. Including a local scouting troop or parks department in this scenario is key by getting more people to interact with this new-to-Guilford County building technology.

b. Limitations

While conducting interviews, surveys, and collecting data some limitations occurred that affected the output of the study. Being involved with a helical pier installation was going to be a key

moment in the data collection of the study. Involvement with an installation would have given real world experience, which is lacking in the data collection part of this study. All the information gathered about helical piers was from reliable building professionals, inspectors, and research, but the hands-on experience that comes with the involvement of an installation day would have given another point of view for the research, and bring up other challenges that may not have been reported on. Due to distance to the nearest helical pier job site and conflicting schedules a site visit has been unattainable so far. This site visit will happen, it just may happen after this research is concluded.

References

- Abrams, John., and William. Greider. (2005) *The Company We Keep: Reinventing Small Business for People, Community, and Place*. Chelsea Green Publishing Co.
- Bastida, Vaquero García, A., Pinto, L. H., & Oliveira Blanco, A. (2022). Motivational drivers to choose worker cooperatives as an entrepreneurial alternative: evidence from Spain. *Small Business Economics*, 58(3), 1609–1626. <https://doi.org/10.1007/s11187-021-00459-8>
- Construction Data*. (2024). Associated General Contractors of America. <https://www.agc.org/learn/construction-data>
- Environmental benefits of using helical piers as a foundation solution for residential projects*. (2023, August 1) Techno Metal Post. <https://www.technometalpost.com/en-US/environmental-benefits-of-using-helical-piles-as-a-foundation-solution-for-residential-projects/>
- King, J. (2024, January 15). *Premium surcharge: The cost of climate change*. Carolina Forward. <https://carolinaforward.org/blog/premium-surcharge-climate-insurance/>
- Lisle, J. (2023, January 18). *CO2 emissions helical piers vs concrete*. Helical Pier Foundation Experts. <https://sbhelical.com/blog/co2-emissions-helical-pier-vs-concrete>
- Mulligan, T., & Berner, M. (n.d.). *Student corner: Addressing construction labor shortages post-pandemic*. Community and Economic Development - Blog by UNC School of Government. <https://ced.sog.unc.edu/2021/09/addressing-construction-labor-shortages-post-pandemic/>
- NCARB By The Numbers*. (2022). <https://www.ncarb.org/sites/default/files/NBTN2022.pdf>
- Sharai Lewis-Gruss, Michael Kaminski, Marguerite Lally, Collyn Chan, Max Arnell, Elizabeth Bertan, & Ilan Bubb. (2020). First Street Foundation's National Flood Adaptation Database [Data set]. Zenodo. <https://doi.org/10.5281/zenodo.6560768>
- U.S. Census Bureau quickfacts: Greensboro City, North Carolina. (n.d.). <https://www.census.gov/quickfacts/fact/table/greensborocitynorthcarolina/PST045222>

List of figures

- Figure 1. Harris, & Cobb, K. (2016). Remediation of Differential Settlement in Residential Structures on Collapsible Soil in Western Colorado. In Geotechnical and Structural Engineering Congress 2016 (pp. 747–759). <https://doi.org/10.1061/9780784479742.062>
- Figure 2. (n.d.). Helical Piers for Home & Cottages Foundations. Techno Metal Post. <https://www.technometalpost.com/en-US/projects/house-cabins/>
- Figure 3. Xiong, Wang, M., Mao, J., & Huang, B. (2024). A Review of Building Carbon Emission Accounting Methods under Low-Carbon Building Background. Buildings (Basel), 14(3), 777. <https://doi.org/10.3390/buildings14030777>
- Figure 4. North Carolina Counties (to access links to NCPedia articles for all 100 counties); Charlotte Hawkins Brown Museum; Greensboro; Greensboro Sit-Ins; Guilford Courthouse. (n.d.). Guilford County. NCPedia. <https://www.ncpedia.org/geography/guilford>
- Figure 5. District Patrol Offices | Guilford County, NC. (n.d.-a). <https://www.guilfordcountync.gov/our-county/sheriff-s-office/divisions/district-patrol-offices>
- Figure 6. Person. (2024, January 8). Crawl spaces. Advanced Energy. <https://www.advancedenergy.org/crawl-spaces>
- Figure 7. *Our unique polyethylene green sleeve*. Techno Metal Post. (2024). <https://www.technometalpost.com/en-US/our-unique-green-sleeves/>

Appendix A – Survey Results

Q1 Energy Efficiency		
Answer	%	Count
Lowest Priority	0	0
Low Priority	5.6	2
Neutral	22.2	8
High Priority	66.7	24
Highest Priority	5.6	2

Q2 Indoor Air Quality		
Answer	%	Count
Lowest Priority	0	0
Low Priority	0	0
Neutral	8.3	3
High Priority	58.3	21
Highest Priority	33.3	12

Q3 Thermal Comfort		
Answer	%	Count
Lowest Priority	0	0
Low Priority	5.6	2
Neutral	16.7	6
High Priority	58.3	21
Highest Priority	19.4	7

Q4 Moisture Control		
Answer	%	Count
Lowest Priority	0	0
Low Priority	0	0
Neutral	13.9	5
High Priority	52.8	19
Highest Priority	33.3	12

Q5 Sound Insulation		
Answer	%	Count
Lowest Priority	2.9	1
Low Priority	11.4	4
Neutral	51.4	18
High Priority	31.4	11
Highest Priority	2.9	1

Q6 Durability and Longevity		
Answer	%	Count
Lowest Priority	0	0
Low Priority	0	0
Neutral	8.3	3
High Priority	38.9	14
Highest Priority	52.8	19

Q7 Sustainable and Eco-Friendly Features		
Answer	%	Count
Lowest Priority	5.6	2
Low Priority	11.1	4
Neutral	38.9	14
High Priority	36.1	13
Highest Priority	8.3	3

Q8 Cost-Effectiveness		
Answer	%	Count
Lowest Priority	2.8	1
Low Priority	0	0
Neutral	16.7	6
High Priority	52.8	19
Highest Priority	27.8	10

Q9 Aesthetics and Design		
Answer	%	Count
Lowest Priority	11.1	4
Low Priority	8.3	3
Neutral	25	9
High Priority	38.9	14
Highest Priority	16.7	6

Q10 Are you familiar with this foundation system? (Picture of Figure 1 Helical Pier)		
Answer	%	Count
Yes, that's a helical pier	40.6	13
No	59.4	No

Q11 Do you see any advantages or conveniences with having helical piers as a foundation for your home/building?

Yes, seems advantageous over more conventional methods.
No
I think it would depend on many factors such as the makeup of the ground beneath and I would rely on my builder to know that.
None
No
Unsure
No idea
I don't know enough about them to give that opinion
Probably reduces chances of settling? idk
Will it make it more stable?
No
I'm not sure what they do, so no
Probably, less damage to the surrounding eco system
I know OF helical piers but I dont know their conveniences
Less shifting and more long term stability.
improved air quality and moisture control
Don't know anything about it
Yes
I do not see any advantages for I understand none of it!!
Not without knowing more about it.
Helical piers look like it may be beneficial for structural support
Unsure
They could be quicker install but I do like a good concrete foundation.

Looks very sturdy
Geothermal possibilities
Yes, basically don't have to worry about foundation settling with time. I wish they were more standard.
Strength and stability

Q12 Are you interested in learning more about helical piers?		
Answer	%	Count
Yes	45.7	16
No	54.3	19