TELLA FIRMA BASICS FOR DEVELOPERS, GCS and BUILDERS

Q: What is the Tella Firma Foundation System?

A: Tella Firma is an innovative and patented foundation design system, which combines the construction ease of a slab-on-ground foundation, with the performance of an elevated slab such as pier-and-beam. This is accomplished by constructing the foundation on ground, then raising it above the ground, resulting in a void between the foundation and soil thereby protecting the concrete slab from soil movement. Tella Firma utilizes profiled post-tensioned cables, eliminating the need for interior beams thereby reducing the amount of concrete required for the foundation. This profiled cable design has traditionally been utilized in commercial structures such as multistory office buildings, apartment building podiums and parking garages.

Q: What are the benefits of Tella Firma?

A: An important benefit of Tella Firma is reduced risk of foundation movement that can result in damage to the foundation and house. Since the slab portion of the foundation is not supported by or in contact with the soil, it is not affected by soil shrinkage or swelling resulting from seasonal moisture changes or when the homeowner forgets to water their foundation. Isolation from active soils can also be accomplished by installation of an elevated/structural foundation system. However, Tella Firma offers the risk reduction without the cost or hassle of a pier-and-beam or void cartons. A Tella Firma foundation is more economical than other types of elevated slab foundations; the cost is comparable to a post-tension/rebar slab-on-grade foundation with piers.

Q: How far do you raise the Tella Firma foundation?

A: Tella Firma recommends that the foundation be raised per specification of a licensed Geotechnical Engineer in the GeoTechnical Soils Report. The soils report will provide the Potential Vertical Rise (PVR) of the soil on the building site. Tella Firma recommends that the slab be elevated a minimum of 1" great than the PVR or preferably 1.5X the PVR. For example, if the PVR is determined to be 6 inches, Tella Firma recommends the foundation be raised no less than 7" but preferably 9 inches or more. The PVR is the amount of movement the soil is expected to expand when the soils goes from a dry to a wet condition as defined by the Geotechnical Engineer.

Q: Do I still have to have good drainage?

A: Tella Firma is designed to eliminate seasonal movement and to resist soil movement up to the amount that the foundation has been elevated. As in all cases with a foundation, the grading around the house should slope away from the house to allow for proper drainage away from the house.

Q: Will animals invade the void under the foundation?

A: Certain animals are known for burrowing under foundation and Tella Firma is no different. But there is no more likelihood of animals burrowing under a Tella Firma because of the void. This is because the air under the foundation is not vented and there is no free oxygen available. This condition is not habitable to most animals.

Tella Firma Foundation
1701 N. Collins Blvd., Suite 100
Richardson, TX 75080

www.tellafirma.com
Phone: 817.348.9100

Q: Does a Tella Firma foundation provide any value in energy savings?

A: Yes, a Tella Firma foundation is elevated above the ground. The air between the ground and the concrete foundation acts as an insulator. Therefore, in the cold winters, the ground will not transfer heat away from the slab into the ground.

Q: Will the Tella Firma lifting mechanism rust over time?

A: All components in the lifting mechanism are zinc plated and/or galvanized. Either process is one of the best methods for resisting corrosion over time. In addition, the bolts are coated with special grease that provides additional corrosion resistance. Tella Firma retained CTL Group to perform an analysis of its lifting mechanism with respect to corrosion over a structure's lifetime. CTLGroup is a well-respected 3rd party firm that offers material-testing lab services including physical and chemical analysis of concrete and other building materials. CTLGroup began operations in 1916 as the R&D labs of its parent organization, the Portland Cement Association (PCA). Based upon a third-party analysis conducted by CTL Group, Tella Firma estimates that the lifting mechanism operating under normal non-corrosive environment, should function per specification for at least 100 years.

Q: If the subdivision already has a Geo-Tech report, is that good enough for my home site?

A: Because the Tella Firma Foundation is an elevated foundation, the homes foundation is designed to elevate approximately 1.5 times the PVR (Potential Vertical Rise) relative to the nearest Geo-Tech testing location. This is done to anticipate any PVR's that may be higher than the selected tested areas.

Q: What is a Geo-Tech Report?

A: A Geotechnical or Geo-Tech Report is a developed by a licensed geotechnical engineer. To generate the report, the geotechnical engineer must take random bore samples from the ground, and then perform analysis and measurements to determine the soils characteristics. The boring is done at random locations throughout the community or subdivision. Depending on the size of the testing area there may be as many as 100 test borings taken. Once the geotechnical engineer completes the bore sampling, the samples are taken back to Geo-Tech laboratory and measurements are taken to determine a variety of soil characteristics included PVR (Potential Vertical Rise) and swell factors within each sample. The geotechnical engineer then generates a Geo-Tech report, which is delivered to the homebuilder and the foundation-engineering firm hired by the builder to design or "engineer" the foundation. The Geo-Tech report provides valuable information to the foundation engineer including recommendation on soil remediation and potentially pier size and depth, based on the type of foundation, the PVR, and if the builder elects to use piers.

Q: What are pier?

A: A pier is a foundation element typically penetrating the soils that provides support for the structure above. For homes and light commercial buildings the most common pier is a concrete pier that is formed by pouring liquid concrete into holes drilled into the ground. A concrete pier can either be a straight shaft that maintains the same shape to the bottom of the drilled shaft, or has a footer piece which serves to spread the load carried by the pier. Helical steel piers are also a modern alternative to concrete piers (see Helical Pier FAQ).

Q: How far down should my piers be drilled?

A: The piers drilling depth is calculated by the Geo-Tech engineer based on the properties PVR and the structure's loads. Typically, most piers are drilled at a minimum of 20' below grade.

Q: How long has the Tella Firma Foundation System been around?

A: The Tella Firma Foundation System has implemented in almost 1,000 structures and longevity of successful projects that are over 10 years old.

Q: Is the Tella Firma Foundation System based on new principles?

A: The Tella Firma Foundation System is based proven engineering principles that have been proven out over the past 50 years. A Tella Firma foundation is similar to foundation and floor systems that have been designed and built into commercial buildings since the 1960s and implemented in many of iconic buildings throughout the world including the new Freedom Tower in New York. Tella Firma's brought innovation to this tried-and-true system by applying widely used commercial foundation in a residential application.

Q: Have there ever been any foundation problems using a Tella Firma System

A: The Tella Firma Foundation System has been installed in over 1,000 foundations over the past 10 years and in slab sizes ranging from 2,800 to 48,000 square feet. To date we have documented about a dozen problems that have occurred over this 10-year during this period. The number of problems is surprising low given that most occurred during the early period of implementation when the process was still evolving. As is the case in any suspended foundation system, be it pier-and-beam, void box system, or Tella Firma, there is dependency on proper design and installation of the slab, piers that support the slab, and the plumbing under the slab. We have experienced a very small number of situations in which the one or more individual piers have either sunk or were pushed up by a several inches. This unusual situation has resulted in movement in the foundation. We have also experience some problems where the perimeter beam or plumbing was not implemented properly. (See *Question Regarding Plumbing Installation* below and also see separate document entitled, *Tella Firma Suggested Perimeter Beam Implementations)*

Q: Can repairs or adjustments be made to a Tella Firma foundation in the event there is unexpected movement in piers?

A: Yes. Tella Firma foundation system is unique vs. any other suspended foundation system in that the lifting bolts remain as a permanent part of the installation. Great care is taken by the foundation engineer during the design and layout process to not place the mechanism under the location of a yet-to-be-installed wall. This placement allows for future adjustment of the foundation should the need arise. For example, if a pier should unexpectedly move causing movement in the foundation, the carpeting can be rolled back allowing access to the mechanism for adjustment either up or down depending on the situation.

Q: Is the Tella Firma foundation system patented?

A: Yes. Tella Firma has 6 issued U.S. patents and 1 issued Canadian patent.

QUESTIONS REGARDING PLUMBING INSTALLATION

Q: Can movement in the under-slab plumbing be a problem with a Tella Firma System?

A: Generally the plumbing has not been a problem, however some problems have arisen when the following occur:

1. Excessive moisture is accumulating under the slab, such as from a plumbing leak or other water source, which accelerates the heaving of the plumbing.
2. The plumbing lines were laid directly on top of the hard/compacted clay or virgin soils instead of in an over-trenched bed of non-expansive / flexible materials such as cushion sand as recommended.
3. The void space between the vertical sleeves and plumbing stacks were not sealed with a recommended strong adhesive in addition to the toilet flange not being properly anchored to the foundation causing toilets to rock or heave.

Q: Does a suspended slab, such as a Tella Firma foundation require any special installation procedures for the plumbing?

A: The details of the plumbing installation are left to the discretion of the plumber and the builder. Typically, neither the engineer-of-record nor Tella Firma will be directly involved with specifying or inspecting the plumbing process. However, Tella Firma does make recommendations to the builder suggesting installation methods that have been implemented successfully by existing Tella Firma customers to help mitigate movement in the plumbing caused by movement in the soils under the slab. In addition, Tella Firma provides training for the plumber on the special installation consideration to help avoid problems in the future. Tella Firma strongly recommends that the builder require the plumber to complete the training and follow the recommendations provided by Tella Firma.

Q: What are the plumbing installation methods?

There are several plumbing installation options which range in effectiveness and cost, with the Basic Installation method being the most cost effective and fully Suspended Plumbing method being the most expensive.

1. **Basic Installation:** Setting the plumbing in sufficient non-expansive / flexible materials such as cushion sand as to minimize movement in the plumbing should movement occur in the soils and sealing the plumbing to the slab and bolting down the toilet flanges after the slab is raised.
2. **Basic plus Void Boxes:** Setting the plumbing with the Basic Installation method and placing void boxes selectively under key sections of the plumbing (such as under the elbow of the plumbing stacks leading to the toilets or showers on the first floor.
3. **Suspending the Plumbing:** Tying the plumbing to the slab and suspending the plumbing such that the plumbing is lifted in unison with the slab at the time of the slab raising. This eliminates all possibility of plumbing movement should movement occur in the underlying soils.

Q: Is there a suggested method and means of installing the plumbing with the cushion sand method?

A: Tella Firma provides suggested plumbing details for the cushion sand method. Paragraph P2604.1 from the International Residential Code states . . . *unstable soil shall be over-excavated by two or more pipe diameters and brought to the proper grade with suitable compacted granular material.* Tella Firma recommends that the plumber simply follows the code and place 6" – 8" of cushion sand under all plumbing such that the plumbing has a moveable barrier between it and the unstable clay soil.

Q: Is there a suggested method for placing the plumbing protruding through the slab before and after raising the slab?

A: Using the Basic Installation method, the plumbing cannot come in direct contact with the slab, as the plumbing must remain in place as the slab is raised. The plumber can either sleeve the pipes that protrude through the slab with PVC or 1/2" foam insulation. In either case the plumbing protruding through the slab must be sealed to the slab after the lift is complete with a sealant such as non-shrink grout or epoxy. As a substitute for the PVC sleeves, we suggest the installation of 1/2" Armaflex or equivalent and then removing 2 inches of the Armaflex before sealing the plumbing after the lift with non-shrink grout or epoxy to stabilize the plumbing.

QUESTIONS REGARDING FLATWORK

Q: Are there any special consideration for the flatwork (patios, sidewalks, driveways) in active soils?

A: Typically Tella Firma is only implemented under the actual foundation of the structure, be it a residence or commercial building. Therefore the surrounding flatwork is still subject to movement with active soils. There are several options to alleviate movement in the flatwork.

1. **Elevate the flatwork with Tella Firma.** This option is often used in the cases of front porches, stoops, and small patios. In these cases, the flatwork is tied monolithically to the structural foundation and elevated or lifted simultaneously. In homebuilding sites with active soils, swimming pools are often installed on top of piers to stabilize the pool. However, in cases with very large patios or driveways, the option to elevate may be prohibitively expensive and movement in the flatwork further away from the main foundation may not be as critical.
2. **Stabilize the soil under the flatwork.** Soil under a driveway or sidewalk is stabilized by mixing 12"-15" of the soil with a lime base, or replacing the topsoil with stable gravel or sand.

NOTE: In all cases, the builder should consult the foundation design engineer and the geotechnical engineer for specifications.

Q: Are there any special consideration for the juncture where the flatwork abuts the Tella Firma foundation, such as the driveway.

A: Since the flatwork such as the driveway is not suspended, it can have the possibility of moving independently from the stable suspended foundation. Tella Firma recommends the unsuspended flatwork such as driveways or sidewalk, NOT be tied to the foundation but rather simply abut up to the foundation. In the case of flatwork that needs to be level or close to level with the top of the foundation, Tella Firma recommends that the perimeter beam at the abutment contain a 4" apron, which the flatwork can sit. The flatwork should be poured with a 3'-4' void space under at a distance of 3' – 4' from the outside perimeter of the foundation thus allowing the flatwork to move up or down and still maintain level at the abutment point to the foundation. SEE TELLA FIRMA ALTERNATE GARAGE APRON DETAIL DRAWINGS

QUESTIONS REGARDING WARRANTY

Q: Does Tella Firma provide a warranty on its product?

A: Yes. Tella Firma provides a 10-year limited warranty on its "Products". The warranty is provided to Tella Firma's customer, who is typically the concrete installation contractor, but may be the builder in the case where the builder is purchasing the Product and installing foundations on a 'labor only' basis.

Q: Does the homeowner get the benefit of the warranty?

A: Yes, indirectly. The coverage of the warranty is given to the concrete contractor (or in some cases the builder). Should a problem arise with the foundation, the homeowner must contact the Builder, who will in turn determine if the homeowner problem is associated with the foundation. If it is, the Builder will contact the concrete contractor who will in turn contact Tella Firma if he determines that the source of the problem is due to a failure of the Tella Firma lifting Product.

Q: Do any other parties provide warranty coverage for the foundation?

A: Yes. The Concrete Contractor provides a warranty to the Builder. The Geotechnical Engineering firm and Engineering Design Firms typically carry Errors and Omissions (E&O) Insurance that covers the GeoTechnical survey and Engineering design for 10 years.

Q: What are the terms of the warranty from Tella Firma?

A: For a period of 10 year(s) from the date of installation Tella Firma warrants against failure of the foundation's structural integrity as a direct result of a failure of the Product causing excessive deflection or tilt in the foundation.

Q: What is the definition of a Tella Firma Product?

A: Tella Firma currently has two types of "Products: - Lifting Mechanism (Lifting Assemblies) and Steel Helical Piers.

Q: Does Tella Firma provide a warranty on the installation of the Lifting Mechanism?

A: No. Tella Firma does not install the Lifting Mechanism and therefore does not warranty the installation of the Lifting Mechanism. The Lifting Mechanism is typically installed by the concrete installation contractor.

Q: Does Tella Firma provide a warranty on the installation of the Helical Piers?

A: Yes, but ONLY in the situation where Tella Firma is contracted to install the helical piers. In the case where the customer purchases the helical piers from Tella Firma, but installs the helical pier himself, Tella Firma does not provide an installation warranty.

Q: What does the warranty pay in the event of Product failure?

A: In the event that Product failure causes loss of structural integrity of the foundation, Tella Firma will replace the Product and repair, or pay to repair, the foundation to return it to structural integrity.

Q: Does the warranty pay for any other cosmetic repairs?
A: No, the warranty is only for the foundation and therefore only pays for foundation repair. However, typically the majority of the costs are foundation repair costs.

Q: Are there any conditions or limitation on the coverage of the warranty?
A: Yes. Please read the Master Purchase, License and Warranty Agreement for more details.

MORE INFORMATION / CONTACT US

Q: How do I learn more about the Tella Firma Foundation System?
A: Go to www.tellafirma.com for any questions or any of our latest updates or contact us at info@tellafirma.com or call us at **817.348.9100**