

# CASE STUDY: How Comal County Saved Local Taxpayers Nearly \$1M

## COMAL COUNTY NEW JAIL FOUNDATION DESIGN AND COST CASE STUDY

In November 2015, Comal County residents approved the issuance of \$76 million in bonds to build a new county jail and renovate the existing Walter Fellers Law Enforcement Center. The new jail will be located in New Braunfels, Texas, and will hold 565 general-population inmates plus an additional 18 infirmary and mental health beds for 583 total beds, with room to expand to 900 inmates. Housing options include a wide variety of custody levels, including separation cells, single cells, double-occupancy cells, quad cells and open dormitories. Ground-breaking on the jail project occurred on Nov 29, 2017, with expectations of substantial completion in Fall 2019.



## FOUNDATION DESIGN CHALLENGES

The design of the new jail foundation was challenging. The goal was to design a cost-effective and quality foundation system. The site for the new jail contains problematic active clay soils that will expand and contract like a sponge in response to changes in moisture content. The soils are expected to have vertical movements up to 6¼ inches. The foundation design needed to incorporate a concrete slab that can accommodate the significant soil movement. Furthermore, the new jail superstructure and interior design needed to incorporate tilt-up wall panels, heavy concrete block (CMU) walls, interior structural steel support columns, pre-fabricated steel modular cell construction and extensive under-slab plumbing, electrical and security electronics conduits.

Two competing foundation designs were engineered and furnished to industry commercial concrete subcontractors for bidding purposes:

- Plan A** A traditional suspended slab on conventional drilled concrete piers using carton forms to create the under-slab void space.
- Plan B** A new innovative foundation design utilizing the Tella Firma Foundations System that incorporates steel helical piers and steel lifting mechanisms allowing the slab to be poured on the ground and elevated to form the same under-slab void space indicated in Plan A.

Both the *Plan A and Plan B* foundation designs were bid and submitted to the Construction Manager-at-Risk (CMAR) firm, Yates-Sundt JV. On February 8, 2018, Comal County Commissioners Court approved the new jail GMP. This GMP approval allowed the concrete foundation package to be awarded to Urban Concrete Contractors of San Antonio, TX. The Plan B Tella Firma foundation design described above was chosen as the foundation design of choice with an estimated **direct cost of work savings afforded to the Comal County taxpayers at nearly \$900K**. Furthermore, the project team is working on additional value engineering savings opportunities to hopefully increase the Tella Firma cost savings to \$1 million overall.

## WHY THE COST DIFFERENCE?

The Tella Firma design is based on the principle of a larger number of lower-cost steel piers, placed closer together with a thinner lower-cost slab, resulting in the following cost savings, which are summarized below:

- 5" thick slab vs. 10" thick slab reduced concrete cost almost in half.
- Elimination of more than 350 very expensive 18" diameter drilled concrete piers.
- Reduced cost for the post-tension cable and rebar package.
- Elimination of cost and schedule risk with carton forms under the main slabs.
- Elimination of the need for expensive stud-rails.



### **PLAN A HEAVY DESIGN – HEAVY PIERS, HEAVY SLAB SUSPENDED WITH CARTON FORMS**

*Plan A* design included drilled shaft piers with a 10” thick suspended slab temporary suspended with 12” thick carton forms reinforced with post tension cables and rebar. The *HEAVY DESIGN* incorporates 18” diameter drilled concrete piers to support the slab. The optimal spacing/slab thickness drove the requirement for more than 600 drilled concrete piers with 18” diameters, spaced 25’ – 30’ apart to support the slab. The slab thickness was required to be 10” thick to achieve the strength necessary to span the piers.

### **PLAN B LIGHT DESIGN – STEEL HELICAL PIERS, SLAB SUSPENDED WITH LIFTING MECHANISMS**

The *Plan B* design was based on utilizing the Tella Firma patented slab-lifting process. The Tella Firma process creates a structurally suspended slab using the Tella Firma lifting mechanism that is embedded into the slab at the time of the pour. The under-slab void space is similar to the traditional method but without the cost and weather risk associated with carton forms.

The *LIGHT DESIGN* also incorporates 1.5” and 1.75” square-shaft helical piers with 3 helix plates, 8”, 10” and 12” in diameter. The optimal spacing / slab thickness drove the requirement for 1,614 steel helical piers, spaced 10’ – 12’ apart to support the slab. The slab thickness was required to be only 5” thick (half the carton-form slab) to achieve the strength necessary to span between the piers.

**NOTE: It was imperative that no structural design concessions be made in an effort to save cost. The Tella Firma *Plan B* design provides the same level of structural design integrity and reliability as the *Plan A* traditional foundation design, but at a substantially reduced cost and reduced Schedule risk.**

	<b>SLAB ON CARTON FORMS</b>	<b>TELLA FIRMA FOUNDATION</b>
<b>Structurally Engineered:</b>	Yes - high quality	Yes - high quality
<b>Slab Type:</b>	P.T. Structurally Suspended	P.T. Structurally Suspended
<b>Slab Thickness:</b>	<b>10”</b>	<b>5”</b>
<b>Suspension / Void Method:</b>	<b>Void Boxes</b>	<b>Slab Lifting Bolts</b>
<b>Structural Support Piers:</b>	24” Ø straight shaft concrete	24” Ø straight shaft concrete
<b>Structural Pier Qty.:</b>	98	98
<b>Slab Support Pier Type:</b>	18” Ø straight shaft concrete	Steel Helical Piers
<b>Slab Concrete Pier Qty.:</b>	<b>327</b>	<b>0</b>
<b>Slab Helical Pier Qty.:</b>	<b>0</b>	<b>1,614</b>
<b>Number of Slab Pours:</b>	<b>14 separate pours</b>	<b>7 separate pours</b>

### **TIME SAVINGS IN ADDITION TO COST SAVINGS**

The Tella Firma system not only saves concrete slab thickness, heavy piers and labor, it also saves time in the schedule, especially when it comes to unpredictable weather, as outlined below.

- Pier installation is much faster utilizing Steel Helical Piers vs. Concrete Drilled Piers
- Slab make-up is faster because of the elimination of carton forms and building pad subgrade compaction requirements
- Slab pours are faster because half the amount of concrete is required in the slab

### **CONCLUSION**

The Tella Firma system is an excellent alternative to the traditional slab-on-carton-form designs. In the case of the Comal County new jail project, the Tella Firma system is a high-quality structural foundation design that will save nearly \$1 million in total costs to the county taxpayers.