Terra Technologies LLC was founded on the core principle that most utility conflicts and utility replacements encountered in roadway construction projects can be avoided through two processes:

• Early Identification, and
• Conflict Avoidance & Alternatives Analyses
Only when design alternatives are exhausted and the remaining conflicts are unavoidable, Terra Technologies can deliver the industry’s most cost-effective, environmentally conscious and time-saving solutions to utility relocation, support and protection jobs.
Terra Technologies LLC begins to work with using a proven **Conflict Mitigation & Alternatives Analysis Program** for whatever stage a project is in.
Because we identify conflicts in their earliest stages, TT can develop design alternatives to eliminate or reduce the impacts.

A later case study of a Terra Technologies project in Utah will demonstrate how the Terra Technologies approach, products and services deliver tangible and measureable solutions.
Terra Technologies LLC developed Terra Cap™ in response to the overwhelming need for alternative solutions to utilities relocations or replacements.

Terra Cap™ not only protects the utility from damages due to construction activities, but it is strong enough to carry the heaviest traffic loadings with less than two-inches of cover from the roadway base. Pavement failures from settling or damaged utilities are eliminated.
Terra Cap™
High Performance Protection for New or Existing Underground Utilities
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High Performance Protection for New or Existing Underground Utilities
Terra Cap™
High Performance Protection for New or Existing Underground Utilities
The Terra Cap™ Advantages...

- **Reduced Risk of Future Pavement Disturbance**: Terra Cap™ creates a nearly impenetrable barrier to the utility thereby reducing the chances for incidental damage that would require excavation in pavement in order to repair.

- **Time**: Because of its design, Terra Cap™ can be installed with conventional construction equipment and can be installed in conjunction with other roadway work. No longer are utility conflicts the controlling element on a project.

- **Dollars**: Terra Cap™ can be installed at a fraction of the cost of relocating the utility and even affords significant cost savings and greater performance over poured in-place concrete.

- **Expandable Infrastructure**: Terra Cap™ was designed to allow for the placement of additional conduits under its protective cover thereby expanding the utility infrastructure with no impact to the roadway or motoring public.
Terra Cap™ was designed in accordance with AASHTO standards and exceeds the HS20 design loading criteria of:

- 16,000 pound axle load;
- 10” x 20” tire footprint;
- 30% impact load;
- Distributed 1.75H

Terra Cap™ has a compressive strength of 6,000 psi at 28 days and Terra Cap™’s reinforcing steel mesh has a minimum of one-inch of clear cover and has a wall thickness greater than or equal to three-inches.
All Terra Cap™ licensed suppliers meet the manufacturing requirements of local and state agencies and can provide supporting documentation to ensure compliance with established standards and procedures.

In cases where local jurisdictional requirements vary from those standards outlined above, Terra Technologies’ engineers will develop project-specific design standards and work with its suppliers to ensure compliance.
From telecommunications ducts to gas to power distribution lines to jet fuel lines, Terra Technologies’ Terra Shield™ systems and equipment have not only reduced construction schedules, but have lowered the costs of support and protection projects.

The proprietary Terra Shield™ systems and equipment provide the industry’s newest advances in technology and the industry’s most cost effective means of supporting underground utilities in-place in ways never deemed possible.
The previous practice of supporting and protecting underground utilities and infrastructure involved numerous crews working in deep trenches and excavations for 3 to 4 days exposing worker to tremendous risks from trench collapses, exposure to hazardous materials that often encase the utility infrastructure, equipment failures and accidents.

Utility companies’ infrastructure was placed in jeopardy, the contractors’ progress and profit is threatened, and the general public is greatly impacted by the delays which ultimately impacts local businesses and increases traffic congestion.
Support projects that utilize the Terra Shield™ processes and products can be accomplished in off-peak periods typically in 4 to 8 hours with less equipment and fewer workers.

Consequently, the safety of the worker is greatly enhanced by virtually eliminating the need to have any workers in a trench. Because the utility infrastructure is not exposed in the Terra Shield™ process, the risks associated with hazardous materials and damage to the utility is eliminated. Local business losses and traffic flow impacts can be managed like never before.
Terra Shield™
The industry’s new standard for utility support and protect projects
Terra Shield™
The industry’s new standard for utility support and protect projects

Support & Protection Detail - Concrete Encased Conduit
(Also Applies to Transite Encased PVC Conduit)

- J-BARS (TYPICAL)
- TERRA SHIELD™
- LONGITUDINAL BEAMS
- CONCRETE ENCASED PVC CONDUITS
- TERRA SHIELD™
- J-BARS (TYPICAL)

Plan
Terra Shield™

The industry’s new standard for utility support and protect projects
Terra Shield™

The industry’s new standard for utility support and protect projects
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The industry’s new standard for utility support and protect projects
Terra Shield™
The industry’s new standard for utility support and protect projects
Terra Move™
Cost effective and time sensitive alternatives to utility relocation needs.

Terra Move™ is a patented process by which underground utilities can be moved up to 20-feet horizontally, 16-feet vertically or combination of the two with **NO SPLICING** and **NO INTERRUPTION** in service.

Terra Move™ can accomplish in days what replacement and splicing would require months. Through the use of its Terra Move™ systems and equipment, Terra Technologies has reduced its clients’ investment in utility relocations by 50% to 80% over conventional means and methods.
When conflicts are unavoidable and relocation is the only solution, Terra Technologies can leverage the innovative and cost-effective Terra Move™ Systems.

The Terra Move™ System is utilized when the identified solution requires that infrastructure to be raised, lowered, or horizontally moved from its existing position.

The Terra Move™ System may be customized for the environment in which you are working. A myriad of topography, soils, and overall intricate circumstances can be overcome.

Cost savings from the utilization of Terra Move™ are recognized not only in project schedule, but also by eliminating the downtime of customers, lessening environmental impact, and budget dollars.
Terra Move™
Cost effective and time sensitive alternatives to utility relocation needs.
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In 2012, Terra Technologies and the telecommunications owner partnered with the Utah Department of Transportation to seek solutions to conflicts that would inevitably arise between the planned roadway improvements to Highway U-89 and the critical telecommunications infrastructure in its path. This partnership was formed with two goals: keep the UDOT project on schedule and budget, and maintain the uninterrupted service so important to the entire state of Utah.

The utility owner engaged the professional services of Terra Technologies to work with UDOT and their professionals to develop plans and alternative construction methods that would allow for the relocation and protection of the telecommunications facilities, without sacrificing the goals of either partner.

The professionals at UDOT and Terra Technologies developed a set of criteria by which solutions would be judged as successful and then embarked on a 9-month coordination and collaboration process. Solutions were presented and contemplated at a number of levels and through the process, a constant communication was maintained and each stakeholder was able to provide valuable input, data and decisions.

The result of this collaboration and design process was a plan to employ the proprietary systems and materials developed by Terra Technologies for exactly these types of conditions where schedules are critical and the continued operation of the utility is essential for all.

Through a coordinated effort at the earliest stages, the Terra Move™ Systems and Terra Cap™ products were implemented by Terra Technologies on the utility owner's behalf in conjunction with the heavy highway work performed by UDOT.

Combined with the utility owner’s commitment to maintaining UDOT’s construction schedule, the time and resource preserving approach to Terra Technologies’ services, and UDOT’s vision to seek out new solutions, over 2,000 feet of telecommunications ducts and cables were lowered out of the roadway excavation path and nearly 2,000 additional feet of telecommunications infrastructure was protected in-place. All of this was done while the UDOT roadway contractor was implementing its plan.

This combined effort not only saved the owner and UDOT both time and resources, but the impact to the motoring public was minimized through shorter lane closure durations and the avoidance of duplicative work such as hardscape removal and restorations.

In all, the utility owner spent less than $900,000 preserving its infrastructure through this process. The use of conventional replacement and splicing methods would have doubled not only the costs, but would have failed to achieve UDOT’s project schedule needs.
Case Study
US-89, UDOT – Provo, Utah

## Cost Comparison

<table>
<thead>
<tr>
<th>Category</th>
<th>Removal &amp; Replacement Approach (dollars)</th>
<th>Preserve &amp; Protect Approach (dollars)</th>
<th>Resource Savings (dollars)</th>
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<tbody>
<tr>
<td>Engineering</td>
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<td>Splicing</td>
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<td>Construction and Installation</td>
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## Time and Resource Comparison

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<th>Category</th>
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<tr>
<td>Splicing</td>
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<td><strong>Total</strong></td>
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<td><strong>25</strong></td>
<td><strong>121</strong></td>
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</table>
Case Study
U-89, UDOT - Provo, Utah
Case Study
U-89, UDOT – Provo, Utah
Case Study
U-89, UDOT - Provo, Utah
Case Study
US-89, UDOT - Provo, Utah
As part of Terra Technologies’ commitment to the utility and public infrastructure professionals, we offer a no cost educational series.

The first part of this series is:

**Conflict Avoidance and Alternatives Analysis**

*A Professional’s Guide to Avoiding Utility Relocations and Conflicts*

To schedule a session for your team at your facility, contact us at info@terratechllc.net
Terra Technologies LLC
Solutions Provider to the Utility Industry

For more information, please visit us at www.terratechllc.net

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