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**Tensar Roadways Local Performance Testing Program**

**Program Overview**

**Need**

Perceived risk of not achieving pavement life expectations is a primary barrier to the adoption of Tensar’s technology for Pavement Optimization. Owners (primarily public agencies), and to a lesser extent contractors, need to be thoroughly convinced that pavement sections designed with TriAx will perform as we say they will, before they will approve alternate designs or write specifications that provide a fair advantage to TriAx. Local testing of TriAx projects, properly executed, can be decisive in convincing key stakeholders that our technology and design methods are sound.

**Value**

Local testing adds value to Tensar’s business in several ways:

* Breaking down barriers to acceptance of TriAx designs for Pavement Optimization – we are willing to prove what we say is true, and this reduces the perceived risk to our customers.
* Adding to our ability to obtain specifications that provide a fair advantage to Tensar and TriAx for our superior products and application expertise – our competitors are not equipped to meet a specification that is based on performance validated by full scale Accelerated Pavement Testing (APT) and local testing.
* Expanding our project and performance database to allow us to further refine our design methods and validate our performance with key authorities and stakeholders.
* Adding to our proof of performance data for our entire worldwide roadway business, providing additional validation data that can be used across the organization to sell more TriAx.

**Approach**

The success of the local testing program depends on own internal understanding of its approach and objectives. While the program has elements that might be part of general application research on the use of geosynthetics in pavements, its purpose is not to serve as a research program for the industry. **The sole objective of the program is to validate the performance claims and design methods for TriAx, in order to drive greater acceptance and use.** It is not to be used for performance comparisons to other technologies, except conventional construction.

It should also be noted that the intent of the local testing program is not to provide testing on all, or even most, Pavement Optimization projects. Instead, it is to provide performance validation on key projects for important or influential owners, to gain acceptance for our Pavement Optimization designs and to assemble a portfolio of test data that can support more rigorous specifications that provide a fair advantage to TriAx.

There are two types of local testing that can be part of Tensar’s program:

* For projects to be newly constructed using a TriAx optimization design, we can provide testing that will validate that the stiffness of the Mechanically Stabilized Layer (MSL) is the same or better than that of the conventional unbound aggregate layer.
* For projects that were previously constructed using a TriAx design, we can collect pavement condition data that will demonstrate that the longer term performance of the pavement section has performed in a manner similar to the conventional section.

The specifics of implementing each type of testing program are detailed below.

It is critical that our customers understand why we are offering the local testing program, its scope, and its limitations. The purpose of the local testing program is to provide local verification of our APT research and design methods. Our customers must understand that this work is part of a comprehensive program, not a freestanding method for proving performance claims. Without the extensive data obtained from Tensar’s APT program, Plate Load Bearing Test data or even Automated Plate Load Testing (APLT) data cannot be properly integrated into AASHTO Pavement Design methodology. Therefore, Tensar’s local testing program will not include aspects such as comparative testing with other geosynthetic products or other means of subgrade stabilization (e.g., chemical stabilization).

**The local testing program should only be presented to our customers as an offer to validate our performance claims for TriAx and reduce the risk associated with using a Tensar design. It is simply our newest and strongest method of proving that what we say about TriAx is true.**

**New Construction Projects**

For projects where a TriAx design is to be constructed, the local testing program will consist of performing tests during or immediately after construction to verify and demonstrate that the TriAx design is valid. This can be accomplished either through the use of testing conducted by a local geotechnical engineer (Plate Load Bearing Tests or other investigations such as DCP testing), or by using the Geomatters APLT equipment.

**Project Criteria**

In order to be a candidate for the local testing program, a project must meet the following criteria at a minimum:

* Existing TriAx Pavement Optimization project with a design that follows Tensar’s methodology or has been reviewed and approved by Tensar Engineering
* Sufficient geotechnical information available to characterize the site conditions
* Friendly Contractor
* Easily recognized and/or influential Owner
* Tensar has received the purchase order for the project
* Contractor is willing to construct a conventional test section which will permit a minimum of three plate load tests.

**Test Section Approval**

In order to conduct a successful local testing project, it is necessary to get the approval and buy-in of the major stakeholders before proceeding, as follows:

1. Submit the proposed project to Mark Wayne for review and approval. In reviewing potential projects, Mark’s team will look at the design and proposed testing program to ensure that the expected results will be beneficial and that there are no conditions which could cause the test program to fail. If APLT is to be used for testing, Mark’s team will work with the RSM and Geomatters to determine the schedule and availability of the equipment.
2. Meet with the project Owner to explain the benefits of the testing program and get approval. The benefits include:
	1. Construction Quality Control – provide assurance to the owner that the stiffness of the MSL meets or exceeds the control section stiffness.
	2. Design Validation – demonstrate that the stiffness of the MSL over a conventional section aligns with the improvement demonstrated by Tensar’s APT program.
	3. Baseline Data – for a pavement that may be monitored over its life span, obtain baseline stiffness data so that stiffness retention can be monitored over time.
	4. Demonstration Project – For a friendly owner looking to gain wider acceptance for Pavement Optimization using TriAx, the local testing program can provide additional support.
3. Get Owner buy-in on the testing protocol. If APLT is to be used, explain the methodology. If testing by a local geotechnical engineer is to be used, explain how the results will be correlated to Tensar’s APT program and design method.
4. Meet with the Contractor to get approval. Explain that the Owner wants the testing performed and why. Note the competitive advantage that Pavement Optimization can provide on future projects.
5. For 3rd party testing, identify a friendly, local, independent geotechnical engineer or firm to conduct and report the testing. The test results will have greater credibility and value if reported by an independent 3rd party, and the consultant will likely become a stronger Tensar advocate moving forward. There is also the opportunity to co-author a conference paper or journal article with the consultant with approval from the project owner.

**Test Section Setup and Execution**

Since the objective of the testing program is to document the performance due to the use of TriAx in the pavement section, the project should include both conventional and mechanically stabilized sections. The sections do not need to have the same geometry or equivalent design capacity, but the design parameters must be known for both in order to allow for a meaningful comparison.

If the testing is to be performed using APLT, the setup and execution of the test will be directed by Tensar Engineering and Geomatters. For discussion purposes the testing will consist of a minimum of 3 plate load tests or seven APLT tests on both the conventional and mechanically stabilized sections. Once the approval process above has been completed, the RSM and Tensar Engineering will work with the Owner and the Contractor to execute the program.

For 3rd party studies, the project may be led by either the RSM or Tensar Engineering, depending on the project specifics and the technical comfort level of the RSM. In either case, close cooperation between the RSM, Tensar Engineering, the Owner, the Contractor, and the Consultant performing the testing is essential.

The RSM should identify the Consultant who will perform the testing, define the project scope, and obtain a cost proposal. Tensar Engineering is available as needed to assist with defining the project scope. The testing program should include at least three locations each for the control and TriAx sections. Both sections should be prepared a minimum of one week prior to the arrival of third party consultants. This is important as the construction process involves use of water in construction and may be close to the water table. Under both conditions it is important that drainage of the base course occur prior to APT. DCP testing should be performed immediately prior to plate load testing and located in an area close to the planned APT location.

The attached Test Report Template includes information on project scope and testing methodology.

The schedule for testing should be communicated to Tensar Engineering as early as possible, to allow either Mark Wayne or Jay Kwon to attend the testing if they are available. This provides additional assurance that the program will be successful even if unexpected conditions are encountered.

Once the testing is complete, the Consultant should provide a draft report of the findings to Tensar for review and approval. This review should be communicated up front and included in the project scope. The Consultant should also be made aware that Tensar intends to use copies of the final report as supporting information for future projects. The report may be addressed to the Owner, the Contractor, or Tensar.

**Test Report Template**

The attached word document serves as a guide for testing programs where a local geotechnical engineering firm is to be used to perform Plate Load Bearing Tests. It can be used to help define the scope of the testing for the consultant, and can also be provided to the consultant for use on his own letterhead to help ensure that the testing is reported clearly and consistently. It can be modified as necessary based on the project conditions, the needs of the project stakeholders, and the preferences of the consultant.

**Existing Projects**

Where no suitable Pavement Optimization project is scheduled for construction, the local research program may take the form of a pavement condition survey for a previously constructed TriAx pavement. The project would then consist of assembling design and construction information for the pavement and collecting visual survey data to allow a standard pavement distress survey report to be completed. In order to ensure consistent methodology that complies with FHWA guidance, the survey report will be generated by ARA, using the project data and visual survey information collected by Tensar.

**Project Criteria**

In order to be a candidate for the local testing program, a project must meet the following criteria at a minimum:

* Existing TriAx flexible pavement project with a design that followed Tensar’s methodology or has been reviewed and approved by Tensar Engineering
* Known pavement section materials and geometry, date of construction, and limits of TriAx installation
* Sufficient geotechnical information available to characterize the site conditions prior to or at the time of construction.

**Test Section Approval**

In order to ensure that the pavement condition survey generates useful data, the proposed testing plan should be reviewed and approved as follows:

1. Submit the proposed project to Mark Wayne for review and approval. In reviewing potential projects, Mark’s team will look at the design and proposed testing program to ensure that the expected results will be beneficial and that there are no conditions which could cause the test program to be of limited use to the client and Tensar. They will also arrange for ARA to receive and process the survey data.
2. If possible, work with the Owner of the road to collect any additional data available regarding the design, maintenance, traffic loading, or previous condition surveys previously conducted on the pavement. The survey can still be conducted without the participation of the Owner, but the value of the testing program to the Owner and to Tensar is greatly enhanced by collaboration.

**Test Section Setup and Execution**

The location of the test section must be identified by starting and ending GPS coordinates. This can be accomplished using Google Maps by navigating to the location, clicking on the starting position, recording the displayed coordinates, and repeating for the ending location. Alternatively, you can use the built in iPhone compass utility (see figure below). In order to see the GPS coordinates at the bottom of the screen you need to allow location services to remain on (Adjust this within the Privacy link in your iPhone settings). NOTE: You can take a snapshot of this screen, as shown in the figure below) by depressing the front face button and the on/off switch at the same time. The image is stored within your camera roll.



The visual survey information can be collected using the Garmin VIRB and GoPro video camera. The GoPro camera will be furnished to the RSM for use on the survey. The Garmin VIRB will be supplied by Jay Kwon for those projects where data will be supplied to ARA for review. The GoPro camera should be mounted to the front or rear bumper of a vehicle with a clear view of the entire lane to be surveyed. Mounting location must insure that the pavement is fully exposed to light. The vehicle should then be driven at the slowest safe speed (5-10 mph below the speed limit) over the survey section. The starting and ending points of the test section must be clearly identified (allow the GoPro camera to see your iPhone reading- if you do not have the Garmin camera as well) so that they are identifiable to the camera. Prior to initiating the drive you will also need a rafter square (see image below) to be placed on the asphalt surface for scale. ARA needs this to compare distress dimensions. Two perpendicular rulers would work as well. Make sure the long axis is parallel to the direction of your vehicle.



The video file from the survey and all other project information should be forwarded to Jay Kwon to complete the process.