Office of Research and Implementation
FFY2025 Request for Proposals

UPDATED/ REVISED >>> *Reference SPR Item # 2319*

Research Problem Statement Title:

Comparative Performance of Geotextile Products for Subgrade Stabilization through Plate Load Tests

Problem Statement:

The use of geosynthetics varies widely between the various Departments of Transportation (DOTs); some DOTs avoid their use within their pavement design process, whereas others use them routinely. Regardless, it is agreed among nearly all pavement designers that it is difficult to quantify the benefit of the geosynthetic to the pavement structure. Some use methods derived from empirical testing (AASHTO R50), others empirically derived equations, or their past experience. This makes roadway design using geosynthetics inconsistent, and not necessarily the most reliable or economical. There is especially a pressing need for test results on in-soil performance of different subgrade stabilization geotextile products so that their performances could be quantified and compared consistently and reliably in terms of their corresponding Settlement Reduction Factors (SRF) and Traffic Benefit Ratios (TBR).

Proposed Research:

The project will include setting up, instrumentation and cyclic plate load testing of several aggregate base-substrate models in the laboratory. These models will include one unreinforced (control) aggregate base-substrate model, two reinforced models using two commonly-used products in ODOT projects, and four (4) other high-strength products from alternative manufacturers for the same functions of separation and subgrade stabilization in roadway construction. All products tested for this project must be approved by ODOT. Additional tests may also be necessary for verification purposes, as recommended by the Materials Division.

Suggested Tasks (to include but not limited to):

1. Perform literature review
2. Procure the materials and supplies
3. Calibration of sensors, setting up the test station and verification tests
4. Conduct testing of at least seven different samples
5. Analysis of test results
6. Write and submit the final report

Implementation:

Once this study is completed, the goal would be to provide guidelines on approved products for roadway design in the state of Oklahoma.

Benefits:

Pavement designers will be able to use the study data to either improve the modeling of their pavement design and show extended life, or reduced maintenance costs through increased resilient modulus values. This will help designers to perform more accurate value engineering with options such as reduced base thickness due to the added strength provided by the geosynthetic, leading to potentially more efficient and cost-effective pavement design. Another benefit of this research is to potentially create an ODOT-based evaluation program for other geosynthetic products.

Deliverables:

All projects require the submission of the following reports:

- Monthly Progress Reports
- Multi-Year Projects require a Year-end Annual Report
- Copies of the project Draft Final Report in Microsoft Word and ADA accessible Adobe Acrobat pdf electronic formats
- Copies of the project Final Report in Microsoft Word and ADA accessible Adobe Acrobat pdf electronic formats

The Year-end Annual Report, Draft Final Report, Final Report and Color Article should be submitted to satisfy all federal and state requirements pertaining to the accessibility of documents including but not limited to:

- Oklahoma State Statute 62 § 41.5e and the Americans with Disability Act (ADA) of 1990, 42 USC 12.01 et seq.

The PI must also participate in the following project meetings:

- New project initiation meeting
- Semi-annual project meeting
- Close-out project meeting
- Continuing project meeting

Estimated completion time eighteen months.

Existing Research found in light literature search:

Deformation Responses of a Geosynthetic Reinforced Soil-Integrated Bridge System Under Static Loading and Sensitivity Analysis of Influential Factors Based on the Improved Grey Relational Method, 2024

https://journals.sagepub.com/doi/10.1177/03611981241236471

A numerical parametric study is conducted to evaluate the effects of various parameters on the deformation responses of a geosynthetic reinforced soil-integrated bridge system (GRS-IBS) under static load. The investigated parameters include the abutment height, reinforcement spacing, reinforcement length, reinforcement stiffness, bridge load, and backfill internal friction angle. The improved grey relational method is used to investigate the sensitivity of influential factors on the deformation responses of the GRS-IBS. The simulation results indicate that the abutment height, reinforcement spacing, and bridge load have a significant impact on the performance of the GRS-IBS with respect to lateral displacement and settlement, while the effects of reinforcement length, reinforcement stiffness, and backfill internal friction angle on the deformation behavior of the abutment are negligible. Differential settlements between the girder and approach are minimal under all conditions. The potential failure envelope of the GRS-IBS exhibits a “L” shaped configuration where the potential failure surface starts beneath the inner edge of the strip footing, extending vertically downward to half of the wall height and further bifurcating toward the strip footing and the toe of the wall. The results of the improved grey relational analysis show that reinforcement spacing is the most sensitive to the lateral displacement of the GRS-IBS. The abutment height and bridge load are more sensitive to abutment deformation than other influential factors. These three parameters are crucial to the deformation behavior and should be given primary consideration when designing a GRS-IBS.

Cyclic performance of geosynthetic-encased granular pile with tire chips and aggregates mixture in soft soil – A model study, 2024

https://www.sciencedirect.com/science/article/abs/pii/S2214391224000436?via%3Dihub

The performance of encased granular piles subjected to heavy cyclic loading presents a significant concern in the current context. Meanwhile, global waste tire management poses a major challenge because it has a detrimental effect on the environment. To address both difficulties, this research utilizes recycled tire chips derived from end-of-life tires (ELTs) and substituting traditional aggregates in granular pile construction. This study summarizes laboratory model tests investigating the performance of geosynthetic encased granular piles designed for soft soil improvement under vertical cyclic loading. The composition of the granular pile comprised (25 % tire chips + 75 % aggregates). Various cyclic loading parameters were scrutinized, including the selection of encasement material and the best configuration for granular piles, cyclic loading frequency (f), cyclic loading amplitude (qca), length-to-diameter (L/D) ratios, granular pile end conditions, and strength of surrounding soft soil. The novel feature of this research is the evaluation of the cyclic induced settlement (Sc) – excess pore water pressure (Pexc) coupled performance for all considered factors and its effects on the encased granular piles improved soft ground under vertical cyclic loading. Key findings include ordinary granular piles (OGP) illustrated optimal performance when subjected to lower frequency and amplitude loading, smaller L/D ratios, and end bearing conditions. The provision of Combi-grid encasement notably improved the cyclic performance of granular piles by substantially reducing the cyclic induced settlement (Sc) on improved soft beds across all examined factors. This research also discusses the increased cyclic stress on the surrounding soft soil initiated excess pore water pressure (Pexc) development and is reduced to a greater extent with the help of Combi-grid encasement across all test cases.

Experimental investigation of mechanical behavior of geosynthetics in different soil plasticity indexes, 2023

https://www.sciencedirect.com/science/article/abs/pii/S2214391223000089?via%3Dihub

Nowadays, in-depth research is done to evaluate the behavior of geosynthetics in cohesive soil. However, it is still unclear how the plasticity index (PI) of soil affects the mechanical behavior of reinforced cohesive soil. The behavior of distinct geosynthetic types in soils having different PI is likewise uncertain. To bridge this gap, the mechanical behavior of three cohesive soils designated as S1, S2, and

S3 reinforced with four types of geosynthetics (woven/non-woven geotextile, geocomposite, and geogrid) were studied by executing multiple triaxial compression and interface direct shear tests with and without reinforcement. The results show that the soils reinforced with woven geotextile (GTW)

produce higher shear strength than other reinforcements because of their higher interface frictional resistance and tensile strength. It was found that three layers of GTW to S1 soil increased its stiffness, cohesion, and shear strength parameters by 150%, 307%, and 161%, respectively. On the other hand, the increase in shear strength caused by adding three layers of GTW to S2 and S3 soil was only about 59% and 37%, respectively. The interface properties indicate a strong interaction between GTW-S1 soil lasted, whereas a weak interaction between GTW-S2 or S3 soil existed. These findings demonstrate that an increase in the PI of soil significantly reduces the performance of reinforcements due to the reduction in interface friction, lateral constraint, and interlocking effect. The geosynthetic reinforcement performed better in lower plastic soil rather than in higher.

An intelligent approach for predicting the strength of geosynthetic-reinforced subgrade soil, 2022
https://www.tandfonline.com/doi/full/10.1080/10298436.2021.1904237
In the recent times, the use of geosynthetic-reinforced soil (GRS) technology has become popular for constructing safe and sustainable pavement structures. The strength of the subgrade soil is routinely assessed in terms of its California bearing ratio (CBR). However, in the past, no effort was made to develop a method for evaluating the CBR of the reinforced subgrade soil. The main aim of this paper is to explore and appraise the competency of the several intelligent models such as artificial neural network (ANN), least median of squares regression, Gaussian processes regression, elastic net regularisation regression, lazy K-star, M-5 model trees, alternating model trees and random forest in estimating the CBR of reinforced soil. For this, all the models were calibrated and validated using the reliable pertinent historical data. The prognostic veracity of all the tools mentioned supra were assessed using the well-established traditional statistical indices, external model evaluation technique, multi-criteria assessment approach and independent experimental dataset. Due to the overall excellent performance of ANN, the model was converted into a trackable functional relationship to estimate the CBR of reinforced soil. Finally, the sensitivity analysis was performed to find the strength and relationship of the used parameters on the CBR value.

Characterization of Soil-Geosynthetic Interaction to Evaluate Reinforcement Location in Pavement over Expansive Soils, 2022

https://ascelibrary.org/doi/10.1061/9780784484067.037

Longitudinal cracks develop on roads constructed on expansive subgrade soils. For several decades, state DOTs in the US have used geosynthetic reinforcement to mitigate the environmentally incited longitudinal cracks. However, only a small amount of field data has been collected to date to understand the reinforcing mechanism. Recently, the virtual load method (VLM) has been developed to identify expansive soil-induced stresses in the geosynthetic-reinforced pavement. This research integrates the VLM in the study on a low-volume rural hot mix asphalt road in Texas to evaluate the effectiveness of the geosynthetics and different reinforcement location options within the pavement layers. The soil-geosynthetic interaction is characterized by applying the subgrade heave/shrinkage-induced reaction pressure to the ground surface, with the heave/shrinkage deformations being computed from the field-measured moisture content variations data. The optimum location of geosynthetic reinforcement is determined based on the tensile force absorption value by observing the two extreme weather conditions. The results demonstrate that the tensile force absorption increases by shifting the geosynthetics towards the bottom of the pavement and achieves the most significance when it is placed between the base layer and subgrade layer in the model.

Quantifying the Benefits of Geosynthetics Reinforcement in Flexible Pavement Design Using Cyclic Plate Load Testing, 2022

https://journals.sagepub.com/doi/10.1177/03611981221084691

Development of pavement design over the past decades has focused on moving from empirical design equations to more powerful and adaptive design schemes. The AASHTO mechanistic–empirical pavement design guide (MEPDG) has been developed to model pavement structure and predict its service life more accurately. Although MEPDG has been widely implemented to design conventional pavement, it is not yet capable of predicting the service life of pavement reinforced with geosynthetics. Given the above concerns, seven full-scale test sections that were constructed at Louisiana Transportation Research Center-Pavement Research Facility (LTRC-PRF) were devoted to a structural experiment to investigate the performance of geosynthetic reinforced pavements. The benefits of using geosynthetics to enhance the performance of pavements constructed over soft subgrades was evaluated using cyclic plate load testing. Cyclic load at a frequency of 0.77?Hz was applied through a

305?mm diameter steel plate. The test results clearly show the benefits of geosynthetics in significantly reducing pavement rutting. The test section with double geosynthetic layers performed better than the other six sections studied. After eliminating the effect of variations in construction, the benefits of geosynthetic reinforcement are quantified within the context of the AASHTOWare Pavement ME Design Guide. The developed design procedure is capable of quantifying the contribution of geosynthetics in pavements to base reinforcement as well as subgrade stabilization. A design methodology is proposed that falls within the context of MEPDG.

Effect of Geogrid Stabilization on Performance of Granular Base Course over Weak Subgrade, 2021

https://ascelibrary.org/doi/10.1061/9780784482810.055

For years, geosynthetics have been placed at the interface between the granular base course and the weak subgrade of pavement sections to provide stabilization. Geosynthetics may provide physical stabilization (i.e., separation), mechanical stabilization (lateral restraint), and reinforcement (tensioned membrane effect). For pavement design, allowable deformation is typically limited to 13 mm or less, so only separation and lateral restraint are mobilized in the pavement section. Although geosynthetics provide marked improvements in soil stabilization and pavement performance, a single approach to account for these improvements by separation and lateral restraint has not been well established. Various geosynthetics allow for different design considerations in varying climatic and load-intensity situations. This study focuses on geogrids but uses non-stabilized sections as control sections. Products were selected from a state department of transportation pre-approved materials list in order to remove bias in selection and to mimic the potential selection process in practice. Geosynthetics were installed at the interface of 250 mm of vibratory-compacted granular base course and weak subgrade in large-scale box tests. Cyclic loading was applied at eleven load intensities or until 25 mm maximum deformation was achieved. Permanent displacement at the surface of the base course and interface pressure beneath the geosynthetic (at the top of the subgrade) were recorded. Stress distribution angle and stress patterns at the bottom of the base course were observed. This paper discusses the effects of geogrid as a means of stabilization in terms of interface stress reduction as well as the ratio of ermanent to resilient deformation. In this study, replacement of virgin aggregate with recycled concrete aggregate reduced the interface stress by 55%; addition of geogrid to both sections further reduced measured interface stresses. Addition of geogrid effected greater permanent deformation but a smaller incremental deformation in both VGB and RCA. The implications for pavement performance are also discussed.

Effectiveness of Geosynthetics in the Construction of Roadways: A Full-Scale Field Studies Review, 2021

https://ascelibrary.org/doi/10.1061/9780784483411.022

Many field experimental studies conducted for assessing geosynthetic reinforcement of flexible pavements show that pavement performance can be beneficial in terms of decreasing the required structural number of the roadway and extending their service life. However, the various researches conducted for evaluating the benefits of the reinforcements still lack comprehensive comparisons among different investigations. This review paper studies the general experimental field studies conducted by various investigators. The main appreciable improvement of pavement structures using geosynthetics reinforcement depends on multiple factors. Based on the results of falling weight deflectometer (FWD) tests, a method has been developed to calculate the granular equivalent (GE) factor, and then, according to the conducted comparison of the results, a unique formulation is presented in this study. Although more review and investigations are required to develop the presented method, the results of this study can be used by pavement engineers to assess the benefits of geosynthetic reinforcement in flexible pavements for their designs.

Effect of Geogrid Stabilization on Performance of Granular Base Course over Weak Subgrade, 2020

https://ascelibrary.org/doi/10.1061/9780784482810.055

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permanent to resilient deformation. In this study, replacement of virgin aggregate with recycled concrete aggregate reduced the interface stress by 55%; addition of geogrid to both sections further reduced measured interface stresses. Addition of geogrid effected greater permanent deformation but a smaller incremental deformation in both VGB and RCA. The implications for pavement performance are also discussed.

Long-Term Field Evaluation of a Geosynthetic-Stabilized Roadway Founded on Expansive Clays, 2020

https://ascelibrary.org/doi/10.1061/%28ASCE%29GT.1943-5606.0002206

This paper presents an evaluation of the long-term field performance of Farm-to-Market Road 2, the construction of which involved geosynthetic stabilization to address concerns related to the presence of expansive clays and associated environmental loads. A comprehensive study was conducted to quantify the benefits of geosynthetic stabilization in the performance of the roadway after having been subjected to 9 years of wet and dry season cycles. Control sections and seven design schemes (including various combinations of geosynthetic-stabilized base and lime-stabilized subbase courses) were incorporated in 32 test sections. Evaluation of the development of environmental longitudinal cracks over the 9-year period showed that the use of geosynthetics to stabilize the roadway base led to a significantly improved performance, as quantified based on the extent and length of environmental load–induced longitudinal cracks. The improvement, observed for all the geosynthetics considered in this study, was found to be more significant during dry seasons, which is when environmental longitudinal cracks develop. In addition, results from the field performance monitoring program revealed that lime stabilization of the subbase not only did not help but generally compromised the performance of road sections subjected to environmental loads.

Development of Geosynthetic Design and Construction Guidelines for Pavement Embankment Construction in North Georgia, 2019

https://g92018.eos-intl.net/eLibSQL14_G92018_Documents/16-11.pdf

Geosynthetics are becoming a popular alternative for soil improvement in highway construction to achieve enhanced performance in regions with soft problematic soils or to reduce aggregate base layer thickness to decrease construction costs. Subgrade soil improvement in a geosynthetic-reinforced pavement system is achieved by lateral distribution of vertical stresses at the reinforcing layer, through the tensile properties of the geosynthetic material, which is hard to measure with small-scale

triaxial tests. Therefore, it is desirable to conduct large-scale testing to more accurately monitor the behavior of
aggregate and soils under rolling wheel loadings when geosynthetic is present. The current study seeks to verify the behavior of geosynthetic-reinforced pavement systems through large-scale and bench-scale rolling wheel tests performed with problematic subgrade soils found in North Georgia. Large-scale and bench-scale specimens that mimic an aggregate base–geosynthetics–subgrade system were constructed at different subgrade soil conditions. Subgrades were constructed at a moisture content to produce a low California bearing ratio (CBR) or at optimum moisture content (OMC) during specimen preparation. Both an extruded biaxial geogrid and woven geotextile were placed at various locations in the aggregate base layer to investigate the optimal placement location for the different subgrade conditions. Pressure sensors were installed near the bottom of the aggregate base layer and near the top of the subgrade layer to monitor the vertical stress variations within the pavement system during trafficking. For large- scale testing, light weight deflectometer (LWD) and dynamic cone penetrometer (DCP) measurements were taken post-trafficking to determine the effects of the geosynthetics on the stiffness increase of pavement foundation layers. The results of this research indicate the effects of different subgrade conditions, geosynthetic reinforcement type, and geosynthetic placement location on the pressure experienced by pavement layers and the changes in stiffness of the aggregate base course.

Numerical Simulation of Stress Distribution beneath the Foundation of a Geosynthetic Reinforced Soil Bridge Abutment Using Parametric Studies, 2019

https://ascelibrary.org/doi/10.1061/9780784482087.010

Geosynthetic reinforced soil integrated bridge system (GRS-IBS) technology supports prefabricated bridge superstructure elements on geosynthetic reinforced soil bridge abutments. The close spacing of the geosynthetic reinforcement within the abutment increases the confinement and stiffness of the compacted granular backfill, which results in a very strong and internally-supported system. In a similar fashion as other types of reinforced walls, a given GRS-IBS structure should be internally and externally stable under various applied loads such as surcharge, self-weight, and earthquake loads. Both bearing capacity and global settlement analyses of a given GRS-IBS necessitate calculation of the applied bearing pressure beneath the GRS-IBS. However, the actual applied bearing pressure beneath a given GRS-IBS is fairly difficult to determine using traditional design approaches, given the significant eccentricity of the applied load induced by the bridge superstructure, lateral earth pressure, as well as the flexible nature of the reinforced soil foundation (RSF, the most commonly used GRS-IBS foundational support system). The flexible nature of the foundation is a particularly challenging issue,

because the deformed shape of the RSF is actually the result of a fairly complicated soil-structure interaction mechanism. Different
factors that were explored that can affect the applied stress distribution beneath the foundation include the geometry of the reinforced soil zone in the abutment itself, the reinforced soil zone and RSF foundation strength parameters, the unit weight of soil in the reinforced soil zone, and the rigidity of the connection between the retained and reinforced soil zones and between the reinforced soil and facing zones. The authors will present and discuss the effect of these parameters of interest, using results from a series of finite element numerical simulations.

Study on Composite Geosynthetic-Reinforced Method of Soft Soil Subgrade, 2019

https://ascelibrary.org/doi/10.1061/9780784482292.095

In order to meet the traffic requirements of road subgrade in soft soil area, the method of composite reinforcement of geosynthetic materials based on soft soil subgrade is proposed. Firstly, the morphological characteristics and working principle of the reinforcement method are introduced. The soil quality analysis is then carried out based on the engineering survey. Soil parameters such as moisture content limit, compressibility, and permeability are determined. In the end, the road settlement calculation is carried out based on the composite reinforcement method of geosynthetics. The results show that the method is effective according to the JKR ground settlement criteria.

Comparison of California Bearing Ratio and Pin Puncture Strength Testing Used in the Evaluation of Geotextiles, 2018

https://journals.sagepub.com/doi/10.3141/2656-01

Geotextiles are commonly used in pavements, earth retaining structures, and landfills, as well as in other geotechnical applications. The puncture strength test evaluates the ability of geotextiles to withstand stresses and loads during construction, which are among the severe conditions that geotextiles can experience. ASTM has recently replaced the standard pin puncture strength test, D4833, with the California bearing ratio (CBR) puncture strength test, D6241. However, many state departments of transportation and the FHWA still refer to ASTM D4833. Other state departments of transportation refer to ASTM D4833 and to D6241 or provide a list of alternative test methods to be considered in place of either of these tests. The objective of this research was to correlate the CBR and pin puncture strengths for various categories of geotextiles, regardless of weave type and mass per unit area. Five types of polypropylene geotextiles, three nonwoven and two woven, were subjected to testing in accordance with ASTM D4833 and D6241 standard procedures. Ten and 15 samples of each geotextile type were tested with CBR and pin puncture strength tests, respectively. All five types of geotextiles exhibited puncture strength values, whether pin or CBR, which were consistent within each group. Similarly, distinct load-displacement curves were exhibited within each material group. Statistical analyses were conducted to establish a correlation between the CBR and pin puncture strength values. The correlations were successfully used to estimate the CBR puncture strength values from the pin test with reasonable accuracy (R2 = .78).

Soil-Geosynthetic Interaction Test to Develop Specifications for Geosynthetic-Stabilized Roadways, 2018

https://library.ctr.utexas.edu/ctr-publications/5-4829-03-1.pdf

A comprehensive soil-geosynthetic interaction testing program was conducted to determine the stiffness of the soil-geosynthetic composite (KSGC) for a wide range of geosynthetics. The tests were conducted after establishment of test configurations that were found suitable for specification of geosynthetic-stabilized base roadways. Field performance of experimental test sections that were constructed using the same geosynthetics as those tested in the experimental program was also evaluated. By comparing the field performances to the KSGC values obtained using soil-geosynthetic interaction tests, a threshold value for selection of geosynthetics for base stabilization was identified. Recommendations were made to implement findings of this project into TxDOT DMS-6240.

Geosynthetics – Specifications and Applications for Arizona Vol 1-2, 2017

https://apps.azdot.gov/ADOTLibrary/publications/project_reports/pdf/SPR722(1).pdf

https://apps.azdot.gov/ADOTLibrary/publications/project_reports/pdf/SPR722(2).pdf

The purpose of this Arizona Department of Transportation (ADOT) research study was (1) to update the ADOT geosynthetic specifications for geogrids, geotextiles, geomembranes, and composites; and (2) to recommend design guidelines for using geosynthetics for base reinforcement and subgrade stabilization. The study included a survey of other states regarding their material specifications for geosynthetics and their design guidelines for using geosynthetics for base reinforcement and subgrade stabilization. The study also included a review of available research, studies, and design methods for using geosynthetics for base reinforcement and subgrade stabilization. Recommended design guidelines were developed for ADOT on the basis of the review. The costs of using geosynthetics for base reinforcement and subgrade stabilization were analyzed. The analysis compared the construction costs for design alternatives with and without geosynthetics using the recommended design guidelines. The cost comparisons focused exclusively on construction costs (i.e., installed materials). There were insufficient data in the literature to develop a life-cycle cost analysis for geosynthetic use in pavements. It was determined that geosynthetics can be cost-effective for base reinforcement and subgrade stabilization. The cost savings is dependent on the design conditions, the type of geosynthetic used, and the material costs. Finally, new ADOT material specifications for geosynthetics were recommended, and revisions to the installation specifications were suggested. The recommendations were based on the results of the surveys, research, evaluations, and design guidelines developed through this project.

Geosynthetic Subgrade Stabilization – Field Testing and Design Method Calibration, 2017

https://www.sciencedirect.com/science/article/abs/pii/S2214391216300988?via%3Dihub

Geogrids and geotextiles are used routinely to stabilize weak subgrade soils during road construction. Typical subgrade stabilization applications are temporary haul roads or unpaved low-volume roads, but can also include paved roads built on poorer foundation materials. Full-scale test sections were constructed, trafficked and monitored to compare the relative operational performance of geosynthetics used as subgrade stabilization, as well as determine which material properties were most related to performance. Unpaved test sections were constructed using twelve geosynthetics consisting of a variety of geogrids and geotextiles. Multiple control test sections were also built to evaluate the effect that subgrade strength, base course thickness, and/or presence of the geosynthetic had on performance. Even though the geotextile materials used during this study showed good performance as subgrade stabilization, material properties associated with their performance was difficult to establish due to the limited number of test sections and lack of relevant tests to properly characterize these types of materials for this application. Using longitudinal rut as the primary indicator of performance, it was determined through a linear regression analysis that the stiffness of the geogrid junctions in the cross- machine direction correlated best with performance in this application and under these conditions.

Using this knowledge, the design equation associated with the Giroud–Han method was calibrated to make geogrid junction stiffness in the cross-machine direction the primary property of the geosynthetic, thereby replacing geogrid aperture stability modulus. The calibration and verification of this method is described herein.

Development of ODOT Guidelines for the Use of Geogrids in Aggregate Bases, 2012

https://www.odot.org/hqdiv/p-r-div/spr-rip/library/reports/rad_spr2-i2220-fy2011-rpt-final-hatami.pdf A primary objective of the current study was to help the Oklahoma Department of Transportation (ODOT) expand its selection of approved geogrid products for base reinforcement applications by producing measured data on selected geogrids and a dense-graded base aggregate commonly used in ODOT roadway projects. The study involved in-isolation and in-aggregate laboratory testing of several base reinforcement geogrid products from major geosynthetic suppliers.

In-isolation test included rib strength and junction strength tests, and in-aggregate tests included pullout and plate load tests. Field- scale installation damage tests were also performed. Test results on different geogrids in this study were aimed to quantify the significance of the geogrids in-isolation properties on their in-aggregate response under control conditions.