

## SP-Hybrid™ Submittal Data

SP-Hybrid™ is a stabilized base material with an AASHTO strength coefficient of .15 to .19 depending on mix design (see below geotechnical data). This material is best used within non-pervious pavements as a substitute for conventional sub-base and base structures within the pavement structure and in undercuts.

### Stabilization Process

The term “Hybrid” is used due to the presence of two stabilizing chemical agents; cement and lime. The materials exact percentage is calculated based on the soil and aggregate characteristics during the processing procedure.

Cement provides the permanent stabilization characteristics, while the lime stabilization adjusts the material to its best natural moisture percentage for processing. The advantages of this “Hybrid” process ensure complete encapsulation and stabilization in addition to one time placement. Lime stabilizing agents generally must be aerated and re-compacted, this period is called the “proofing” process. The SP-Hybrid™ does not require this process due to the testing process at the facility. This “Proofing” chemical reaction slows down the initial pozzolonic reaction of the cement, but not the subsequent addition of more chemicals; thus there is no delay in strength gain. This material cannot be re-handled without concern for re-compacted strength loss as a pavement structure.

### Geotechnical Information

Geo-Technology Associates, Inc.<sup>1</sup> (GTA) has performed an evaluation of the SP-Hybrid™ for use as a base layer material for roadway applications.

Many samples have been tested for grain-size analysis, Atterberg Limits, moisture-density relationships, CBR-value, and unconfined compressive strength. The grain-size analysis and Atterberg Limits testing were performed to determine the Unified Soil Classification System (USCS) designation for the soil. USCS classifications provide information regarding soil behavior beneath pavement and foundation systems. The typical results of the testing are as follows:

#### SUMMARY OF LABORATORY TESTING

BORING NO.	USCS CLASSIFICATION	AASHTO	Passing No. 200 Sieve, %	LL %	PI %
Typical Sample	Silty SAND with gravel (SM)	A-2-4	32.8	NP	NP

Note: LL=Liquid Limit PI=Plastic Index NP=Non-plastic

SP-Hybrid™ moisture-density relationship (Modified Proctor; ASTM D-1557, AASHTO T-180) had a maximum dry density of 121.0 (pcf) at an optimum moisture content of 14.5 percent. A typical sample yields an average CBR of 51.6% (ASTM D-1883 & ASTM D 2166; see test data for more details) prior to any additional chemicals being added.

Utilizing AASHTO guidelines for conversion of CBR to  $M_r$  in Sections 1.5 and 1.6, GTA believes the SB-Hybrid™ can be represented with a  $M_r$  value of 12,500 psi.

According to AASHTO Figure 2.7 ( $A_{3f} = 0.227 (\log M_r) - 0.839$ ), a resilient modulus can be equated to a sub-base layer strength of .09. The SP-Hybrid™ is recognized as a stable pavement supporting sub-base equal or greater than Bank Run Gravels. Projects where the SP-Hybrid™ are used as a base material should consider 0.15 (200 psi) coefficient for +3% (4.5% TL) up to .19 (350 psi) +6% (7.5% TL).

For questions regarding the Geotechnical data and design herein, please contact Scot Gordon, P.E. of GTA at 301-638-3094<sup>2</sup>.

<sup>1</sup> GTA is not affiliated with SmartSite, LLC and provides independent third party testing and consulting.

<sup>2</sup> Costs resulting from inquiries shall be paid by the customer that result in time and testing costs incurred by GTA.

## **FAQS:** Frequently Asked Questions

### **Q1: What is the compaction standard?**

A1: Because stabilized soils require moistures that are often more than 2% above optimum (3%-4% are good and normal), a modified proctor and sheep's foot roller are often necessary for compaction. Running a sand-cone test paralleling the nuclear gauge will help calibrate the gauge to the actual in place dry density of the materials and thereby provide a reliable compaction test. **IMPORTANT NOTE:** Proof rolling prior to pavement is still the best way to ensure both material compaction and sub-grade quality and performance.

### **Q2: Where does the Hybrid material come from?**

A2: **SP-Hybrid™** is processed by Soil Safe, Inc. at their Brandywine, Maryland facility. Soil Safe recycles construction materials from petroleum contaminated soil and aggregate materials. This recycling process prevents the burning or land-filling of valuable construction materials that are diverted from the waste stream while preventing natural resource extraction. This process is regulated by MDE and is performed in accordance with Permit #2003-OPS-14480C.

### **Q3: How can you tell that the material has been processed correctly?**

A3: Because the **SP-Hybrid™** is stabilized with both cement and lime the material will not be plastic (NP). This means that the material will not roll in your hand (like a standard plasticity examination).

### **Q4: How do I get it approved to substitute with another type of sub-base**

A4: The **SP-Hybrid™** has an AASHTO coefficient of .15 -.19 which is greater than either CR6 or GAB. For a fee, GTA can issue a letter to the appropriate agency recommending the reduction of asphalt base contingent upon the use of a stronger base layer **SP-Hybrid™**.

### **Q5 How do I get it approved to substitute Asphalt Base**

A5: See A4

### **Q6 Is this material LEED Certified?**

A6: The **SP-Hybrid™** is an environmentally friendly material, but LEED certifies green projects, not materials. As members of The United States Green Building Council (USGBC), we can help you apply for your project's LEED recognition.

#### **LEEDS**

The U.S. Green Building Council is a nonprofit membership organization whose vision is a sustainable built environment within a generation. Its membership includes corporations, builders, universities, government agencies, and other nonprofit organizations.

