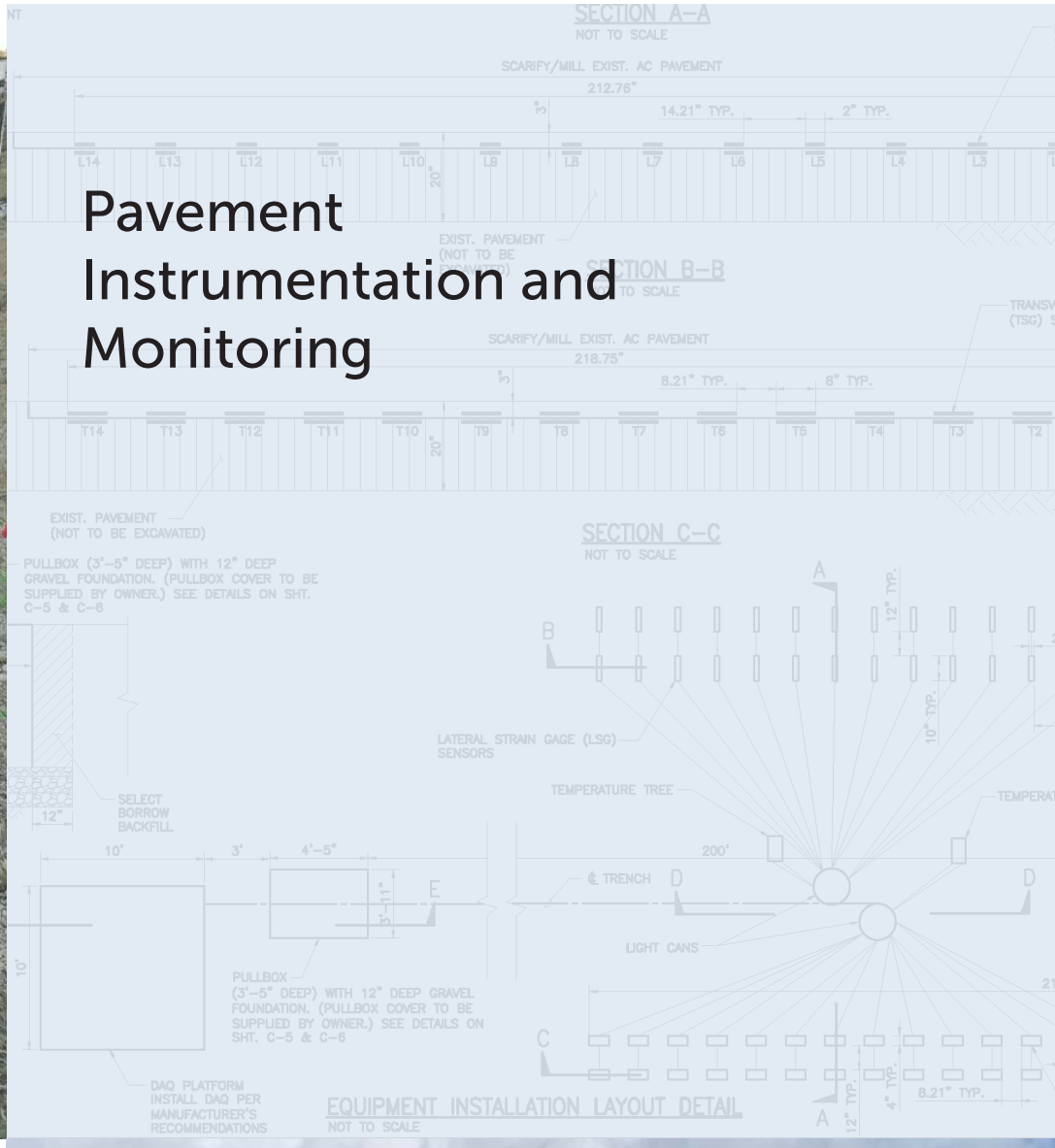
Geocomp

Technologies to manage risk for infrastructure

Pavement Instrumentation and Monitoring



Geocomp Pavement Instrumentation & Monitoring: Leading the Way for Pavement Research and Performance Evaluation

For nearly 20 years, Geocomp staff have worked with the Pavement Research Industry to advance pavement performance monitoring technology. Working with leading Accelerated Test Pavement facilities, Universities, and state DOTs, we have developed a full line of pavement sensors, verified installation procedures, and designed both remote and track-side dynamic data acquisition systems to autonomously trigger data collection and processing.

SPECIFICATION DEVELOPMENT

Geocomp has worked with the Hawaii DOT and Dallas Ft. Worth Airport Operations to develop a pavement instrumentation specification used to evaluate the performance of construction methods and compare pavement designs for the anticipated, project-wide reconstruction of airport taxiways and service roads. Through experience with sensor development and system design, Geocomp provided the performance specifications and engineering bid estimates used for contract document development.

SENSOR DEVELOPMENT

Geocomp staff have developed a proven line of pavement sensors originally initiated in 2000 with the building of the Federal Aviation Administration's National Airport Test Pavement Facility (NAPTF). More than 1000 sensors, including asphalt strain gages, concrete strain gages, temperature trees, and soil compression gages, were placed in the original NAPTF building and used in subsequent pavement re-builds. As a result of their success, these sensors became the sensor standard used by the Accelerated Test Pavement Industry.

Geocomp also developed a patented multi-depth deflectometer (MDD) used for measuring subsurface deformations under heavy vehicle loading and the use of fiber Bragg grating sensors embedded in flexible (asphalt) and rigid (concrete) pavement test sections.

Our Capabilities

INSTALLATION / TRAINING

As pavement instrumentation developer and original installer for these sensors, Geocomp staff are installation experts with high success rates in adverse environments. We have provided training to the FAA, FHWA, and NCAT, as well as self-performing installations under contract with DOT's, owners, and contractors. This continued hands-on experience and interaction with users has allowed Geocomp to continuously improve on sensor design and provide even higher success rates for sensor installation or alterations to standard sensors for custom installations.

SYSTEM DESIGN

With a strong background in geotechnical and structural instrumentation and product development for high-speed data acquisition, Geocomp staff have the experience to provide full system design and commissioning for road-side or remote applications. Geocomp staff have:

- Designed and installed the initial track-side data collection system for the FAA's NATPF providing autonomous data collection, initial processing, and storage based on vehicle passage.
- Provided direction and input for the trackside data collection system for the NCAT test track.
- Designed and installed the remote (solar) taxiway data collection system at HNL Airport. This system is triggered by aircraft passage over a test section that also captures aircraft wheel configuration to correlate with measured response.
- Designed and installed the remote (solar) road-side data collection system for the DFW Airport Operations comparison testing of multiple test pavement sections under ambient trafficking and load testing.

DATA MANAGEMENT

Geocomp's in-house database management software, *i*SiteCentral™ GIS, is used for real-time data collection, visualization, and data/document storage through a password protected website that requires no special user software. This software, or other software, can be custom developed for managing pavement response data.

Current and Past Clients

- National Center for Asphalt Technology
- FAA's National Airport Pavement Test Facility
- Dallas Fort Worth Airport
- Florida DOT
- Hawaii DOT
- Indiana DOT
- Minnesota DOT
- MnRoads
- Louisiana Technical Research Center
- SRA International
- Auburn University
- Florida University
- George Mason University
- FAPE University (Brazil)
- Earth Products China
- Korean Highway Department

STANDARD PAVEMENT SENSORS

Dynamic Asphalt Strain Gages (ASG/VASG) measure axial strain in flexible pavement under high frequency (dynamic) conditions. These low modulus, ruggedized sensors are built to withstand the high temperature and vibratory rolled compaction required for asphalt placement. Utilizing four active elements of a Wheatstone Bridge circuit, this gage is easily adaptable to most data acquisition systems. Each sensor is individually calibrated with high temperature resistant lead wire attached and is provided with QC documentation and Calibration plots.

Dynamic Concrete Strain Gages (CSG) measure axial strain in rigid pavement under long-term static (slab curling) or high-frequency dynamic (pavement response to trafficking) conditions. These ruggedized sensors are built to withstand the harsh conditions of concrete placement and vibration. Utilizing four active elements of a Wheatstone Bridge circuit, this gage is easily adaptable to most data acquisition systems. Each sensor is individually calibrated with overall lead wire length attached and is provided with QC documentation and Calibration plots.

Soil Compression Gages (SCG) measure horizontal or vertical displacements in soils or subgrade material. SCG's are ruggedized to withstand the harsh environment in soils and construction fill material during placement and compaction. They are moisture proof and can function to measure compaction or expansion of soils in various subsurface layers. Gages utilize displacement transducers over 1 to 6 inch travel ranges and can be used to measure dynamic response. Standard wiring configurations adapt to most data acquisition systems.

iSite™-HS System is designed for high-speed monitoring applications where the user needs access to data from remote instrumentation quickly and inexpensively. The system consists of standalone data loggers which take and store readings at programmed intervals up to 1,000 readings per second per channel. Units are networked with radio or Ethernet connections. By connecting the units through a switch to a G3 cell modem, data can be streamed to a remote location at up to maximum speed of the modem. Alternately units may be connected to an on-site computer with WiFi modules attached to each data logger.

Other sensors used in pavement instrumentation can include temperature trees used for measuring temperature gradients through pavement sections, pressure cells for measuring vehicle loads in base and sub-base layers and multiple level displacement measurement techniques to provide a comprehensive understanding of pavement/base/sub-base response to vehicle loading