



Florida Department of
Transportation

Innovative Materials
Structural Research

Christina Freeman



Overview

- Structural Research: 22 Managed Research Contracts, 3 In-House Projects
- Bridge Testing: approximately 3 per year
- 10 Full Time Staff, 2 Part Time Staff
 - 3 Engineers/EIT, 9 Technicians
- 110-ft x 50-ft Strong Floor with 1,000-kip Capacity
- Outdoor Pendulum Facility with capacity to swing 9 kips through a drop height of 35 ft



Welcome

- The Marcus H. Ansley Structures Research Center, located at Innovation Park in Tallahassee, Florida is a structural research and testing facility for the Florida Department of Transportation. The primary mission of the Structures Research Center is to provide research, testing, and evaluations of innovative structural components and bridge systems along with testing existing inventory to provide for safe, reliable, and cost efficient structures across the State's highway system.
- Our vision is to provide the Department the highest quality technical expertise in the field of structural research and structural testing.

News



TRB Annual Meeting
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Recent Completed Projects

FDOT Users: The Research Center SharePoint site has a complete searchable listing of all research projects since 1994.

Non-FDOT Users: For older projects, please use TRID.

The most recently completed research projects:

ContractTitle	Office	Summary	Final Report
BDV29-977-31 Large Truck Crash Analysis for Freight Mobility and Safety Enhancement in Florida	Freight & Multimodal Operations	Summary	Final Report
BDV28-977-06 Confinement Effect of Metal Railing Narrow Baseplates on Adhesive Anchor Breakout	Structures	Summary	Final Report
BDV31-977-41 Macro Synthetic Fiber Reinforcement for Improved Structural Performance of Concrete Bridge Girders	Structures	Summary	Final Report
BDV25-977-47 Multimodal Data Inventory Evaluation to Improve FDOT's Roadway Classification Inventory	Data & Analytics	Summary	Final Report
BDV25-977-51 Enhancing Cybersecurity in Public Transportation	Transit	Summary	Final Report
BDV30-977-21 Civil Engineering Support for the Traffic Monitoring Program	Data & Analytics	Summary	Final Report
BDV25-977-46 2018 Assessment of the Practice of Public Involvement in Florida	Planning; Policy	Summary	Final Report
BDV24-977-26 Human Factors Study on the Use of Colors for Express Lane Delineators	Traffic Engineering	Summary	Final Report
BDV25- Field Demonstration of Tendon Imaging Methods	Materials	Summary	Final Report

<https://www.fdot.gov/structures/structuresresearchcenter/default.shtm>

FDOT Research Library – Reports

Select Recently Completed Research



FRP Repairs for Concrete

Research and Testing from Early 90s

Stainless Steel Prestressing Strand



Stainless Steel Prestressing Strand

- Design Requirements and Guidance are provided in the FDOT Structures Manual
 - ASTM A1114, Grade 240, low-relaxation, stainless steel prestressing strands
 - Use materials that are compatible with stainless steel
 - Resistance factor ϕ of 0.75 for flexure
 - Maximum steel stress immediately prior to transfer, f_{pbt} , of $0.65f_{pu}$ (will investigate increasing to $0.70f_{pu}$)
 - Modulus of elasticity of prestressing strand, E_{ps} , of 24,000 ksi
 - Use equilibrium and strain compatibility for design

Standard Plans for:

12" Square CFRP and SS Prestressed Concrete Pile
14" Square CFRP and SS Prestressed Concrete Pile
18" Square CFRP and SS Prestressed Concrete Pile
24" Square CFRP and SS Prestressed Concrete Pile
30" Square CFRP and SS Prestressed Concrete Pile
54" Precast/Post-Tensioned CFRP and SS Concrete Cylinder Pile
60" Prestressed CFRP and SS Concrete Cylinder Pile

Over 11,000 linear foot of concrete piles constructed with CFRP or SS reinforcing from 2016-2021 for design-bid-build FDOT projects.



Epoxy Dowel Pile Splice Evaluation





Evaluation of Glass Fiber Reinforced Polymers (GFRP) Spirals in Corrosion Resistant Concrete Piles

Development of GFRP Reinforced Single Slope Bridge Rail



<u>MASH TL-4 SUT impact test</u>		<u>Pendulum impact test</u>
Mass	22,000 lb	10,000 lb
Drop height	N/A	15.5 ft
Transverse velocity	14.5 mph	21.5 mph
Impact energy	155 kip-ft	155 kip-ft
Peak impact load	~65 kip	~65 kip
Impact load rise time	0.1 sec	0.1 sec

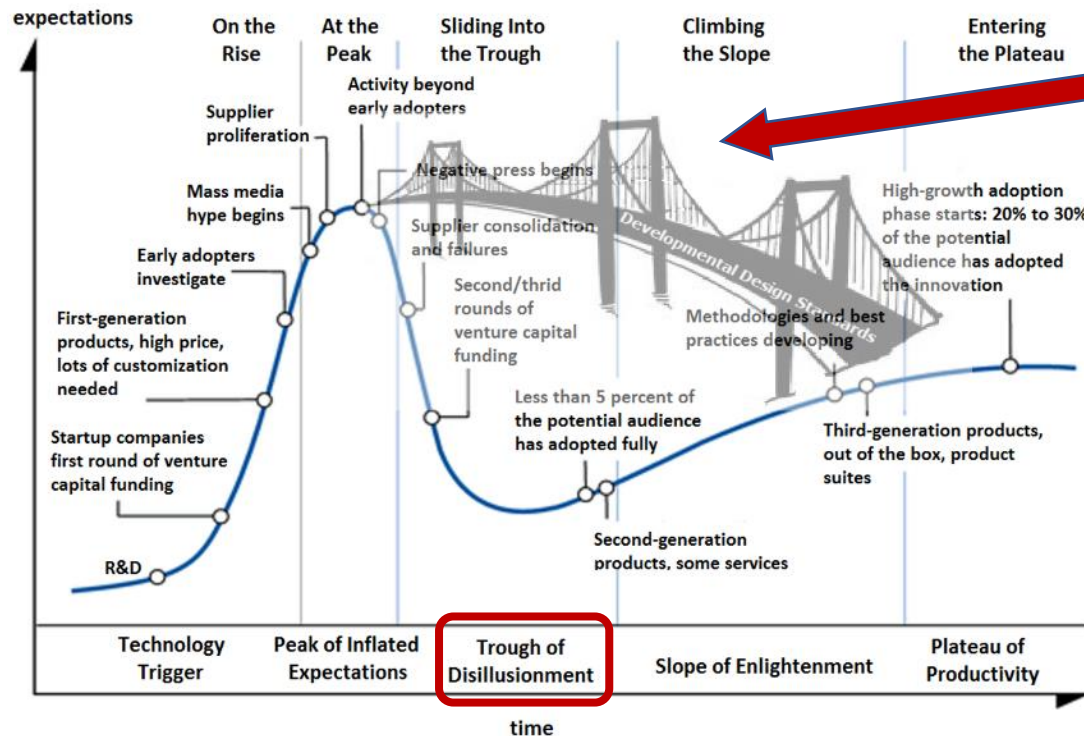
Implementation of Innovative Materials

Research

Demonstration Project

Developmental (DDS)
Index

Design Standard Index



Source: Gartner Inc. Hype Cycle

Developmental Design Standards (DDS) can bridge the *“Trough of Disillusionment”* for effective implementation!

- FDOT Structures Manual
 - <https://www.fdot.gov/structures/structuresmanual/currenrelease/structuresmanual.shtm>
- Design Innovation Webpage and Fast-Facts Sheets
 - <https://www.fdot.gov/design/innovation/default.shtm>
- FDOT Structures Research Center Website
 - <https://www.fdot.gov/structures/StructuresResearchCenter/default.shtm>

Questions?

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We are hiring!



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