Florida Department of Transportation

Innovative Materials Structural Research

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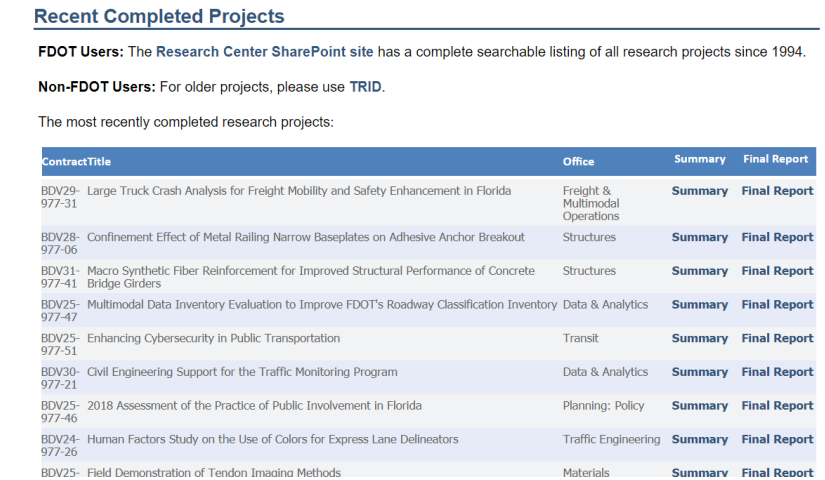
Overview

- 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



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

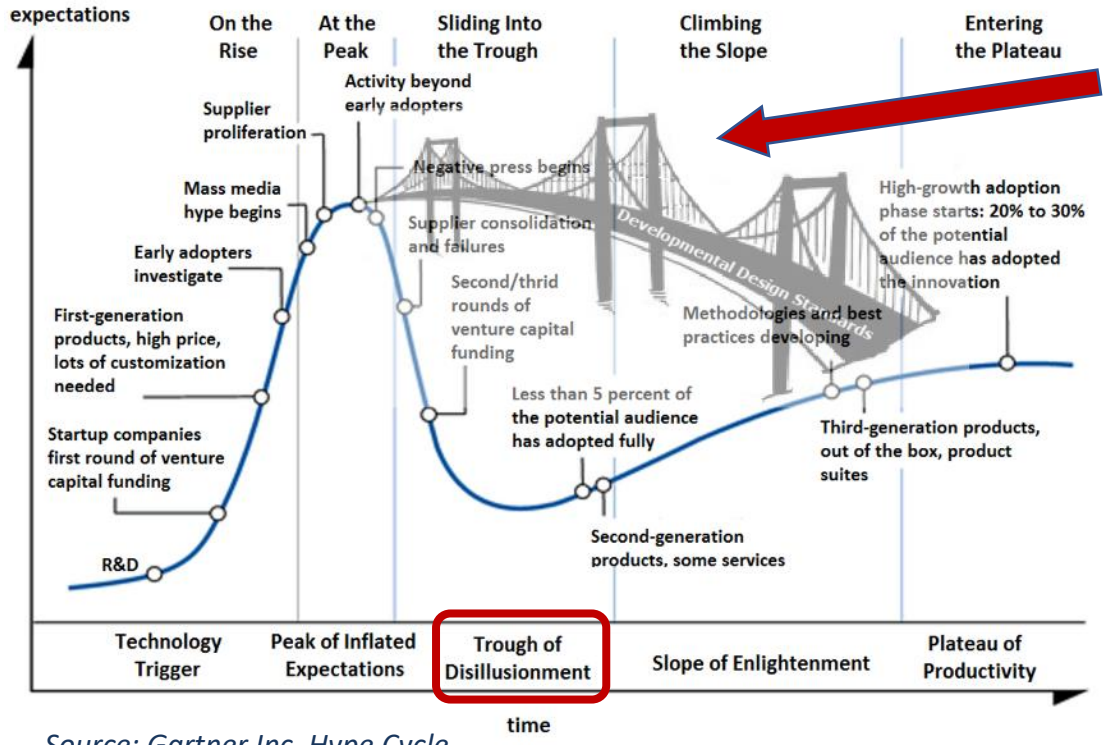
Evaluation of Glass Fiber Reinforced Polymers (GFRP) Spirals in Corrosion Resistant Concrete Piles

Development of GFRP Reinforced Single Slope Bridge Rail

	MASH TL-4 SUT impact test	*Pendulum impact test*
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/currentrelease/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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