



Emergence of Modular Roundabouts as a Temporary AND Permanent Solutions

Vortex Modular Roundabouts

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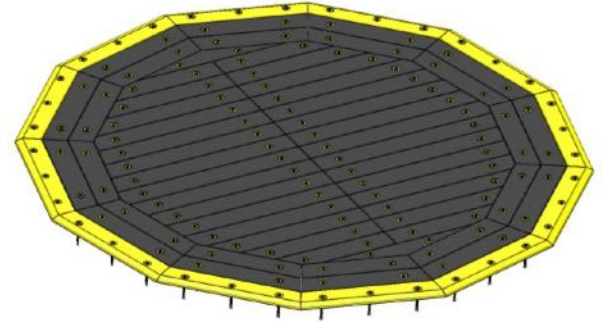
What is a Modular Roundabout?

System Approach

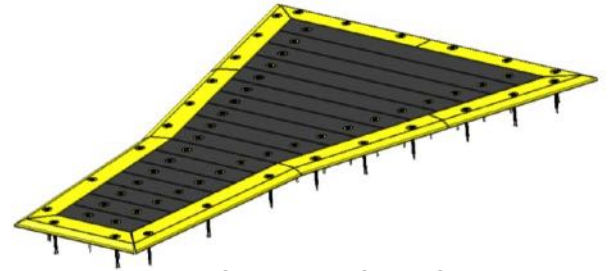
1. Modules made from recycled plastic
2. Aggregated to form large islands
3. Attached directly to existing roadway surface

Primary Goals

1. Minimize impact to existing roadway
2. Minimize impact to traffic – no closures
3. Install quickly (1-12 days)
4. Reduce cost



Center Island

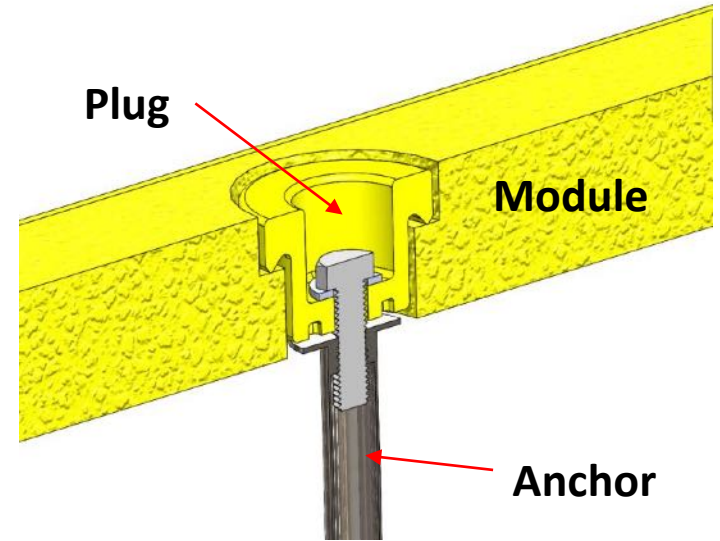


Splitter Island

Modular System

Basic Elements

1. Recycled Plastic Module
2. Asphalt Anchor
3. Energy-Absorbing Interface Plug



USDOT/FHWA Sponsored



- 2014-2016 Preliminary System Development
- 2017 First 3 Commercial Installations (Sundre, Alberta)
- 2017-2018 FHWA Funded Prototype Installations (VA, GA)
- 2019 Monitor Performance/Lessons Learned
- 2020 More Commercial Sales (Richmond, VA)
- 2021 Additional FHWA Funding
- 2022 FHWA Funded Gen 2 San Diego Installation
- 2023+ Multiple Commercial Installations (15+)

FHWA Sponsor
Dr. Wei Zhang
wei.zhang@dot.gov

FHWA Funded Prototype Installations

Southeast Georgia

- Ø28' Center island
- 5 days to install



Washington DC Area

- Ø48' Center island
- 9 days to install



→ *First Phase*

San Diego, CA


- Ø52' Center island
- 7 days to install



→ *Second Phase*

Lessons Learned Applied

YouTube Famous (kind of...)



YouTube

Search

Made of plastic

This is the key to safer streets

Streetcraft
47.9K subscribers

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Modular Roundabouts 101

See if it's Right for Your Project

1. Design the roundabout as normal
 - Vortex assists with design (not PE)
2. To get a quote, only need 3 things
 - Total area of center and splitter islands
 - Total perimeter of center and splitter islands
 - Desired colors
3. We also provide
 - Installation time estimate
 - Spare parts if requested
 - On-site installation assistance



Modularization Process – Step 1

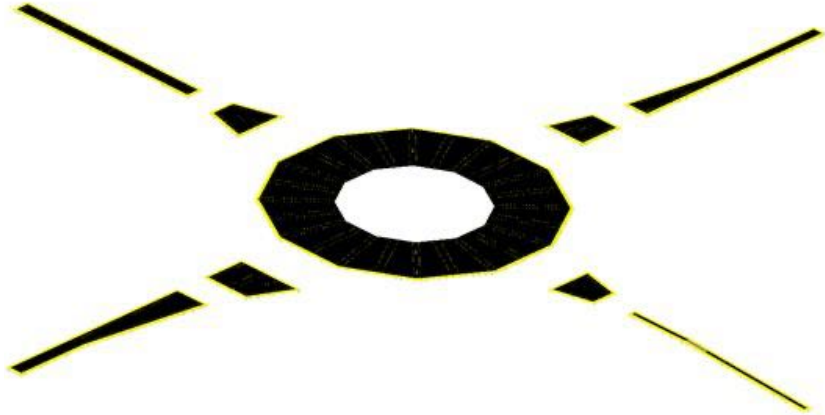


Customer drawing supplied to Vortex detailing general shapes



2-D rendering of the modular system developed by Vortex

Modularization Process – Step 2



**3-D rendering of modular shapes
for production by Vortex**



**Actual installation of the Vortex
modular system by maintenance
crew or sub-constructor**

Installation – 4 Step Process

1



Stage Materials

2



Lay-Out and Secure

3



Drill and Anchor

4



Bolt Down

Use Cases

Presidio San Fran, CA – NCE Engineering

Site Stats

- Installed Feb 2021
- Dutch Roundabout design with bike lanes
- Ø23', 2000 Sqft
- 5 days to install



August 2021

Chesterfield, VA - JMT Engineering/VDOT

Ø85', 7,000 sqft



Install Cost per Roundabout

\$400K vs \$2M per roundabout*

Ø64', 5,000 sqft



Modular Install Time

4 weeks vs 1-2 year per roundabout*

Ø64', 5,000 sqft



Green Impact

1 million milk jugs recycled

JMT Engineering Won Grand Virginia ACEC and National ACEC Award for this project.

Interesting Use Cases

Not just small, round, or even roundabouts!

Ashland, NE – Near Omaha

Site Stats

- Installed June 2023
- Ø110' center island
- 13,000 total sqft

Project Cost and Time*

- Cost: \$1.4M vs \$4-5M
- Install Time: 3 weeks
- Compared to conventional

Largest Modular Recycled Plastic Roundabout in the World



Photo courtesy of NDOT

*Source NDOT - <https://x.com/NebraskaDOT/status/1788955977309356211>

Henrico, VA – SE of Richmond

Site Stats

- Installed August 2023
- 3,700 total sqft

Project Cost and Time

- Cost: Unknown
- Installation: 1 week



Project Video: <https://www.youtube.com/watch?v=3-AotYkeJqk>

Silver Spring, MD – Washington DC

Site Stats

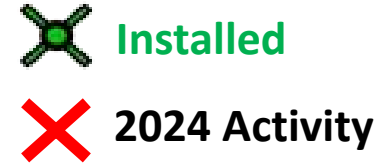
- Installed June 2021
- Protected Intersection
- Mountable for larger vehicles

Project Cost and Time

- Cost: ??
- Installation: 1 day



Where and What's Coming



Installation Locations

- USA and Canada
- In CA, FL, GA, MD, NC, NE, VA

New/Potential Projects

- USA
 - 12 new states
 - 5 repeat states
 - Awarded contract for up to 30 in San Diego – May 2024
- Non-USA
 - Ireland
 - Qatar



Summary

Vortex Modular Benefits

- No modifications to roadway
- Install directly on top of road
- Minimize traffic disruption
- Install in 1-12 days
- Temporary or permanent
- Drive over during construction
- Lay-out in hours
- Removable/relocatable/re-recyclable

Questions?



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Appendix

VDOT Presentation

VDOT



Modular vs. Traditional Roundabouts

JMT

- **Same functionality** (slower speeds & improved safety)
- **Quicker to implement** (~1 mo. vs. ~1-2+ yr.)
- **Cost effective** (~\$400K vs. \$2M+)
- **No ROW** (\$\$\$ & time)
- **No utility relocation** (\$\$\$ & time)
- **Easy to maintain** (few hours)
- **Easily modified** (flexibility)
- **No/minimal survey**



VDOT Presentation



Implemented Roundabouts Safety Performance

- **Roundabout #1 (Otterdale/Hampton Park)**
 - Before = 18 crashes/3 years
 - 15 angle, 7 injury
 - After = 8 crashes (All PDO)/2.5 years
- **Roundabout #2 (Otterdale/Harpers Mill)**
 - Intersection fully opened in late 2017
 - Before = 1 crashes/1 year (angle)
 - After = 0 crashes/2.5 years
- **Roundabout #3 (Spring Run/Bailey Bridge)**
 - Before = 14 crashes/3 years
 - 9 angle, 1 injury
 - After = 7 crashes (5 PDO, 2 Injury)/2.5 years



Modular Roadway Systems
Reimagine Traffic Control Hardware Design

Vortex Modular Roadway Systems greatly reduce long-established cost and installation time baselines for traffic calming and guidance hardware like roundabouts and bike lane dividers. Our product anchors on top of existing road surfaces and installations are completed in days, not months. Our recycled composite polymer modules are fully mountable by trucks and buses *during installation*, often eliminating the need to reroute traffic. Our system resists most issues found with conventional materials including rot, UV, freeze/thaw, rain, bugs and heavy loads. The fully customizable solution provides endless possibilities for designers – any size, shape or color – and can be recycled after installation.

Applications

- Roundabouts
- Bike Lane Dividers
- Lane Dividers
- Traffic Calming
- Pedestrian Refuge



Key Features

- Lays out / drive over in hours
- Anchor Over Existing Asphalt
- Fully Install in Days
- Fully Mountable
- Rated for Heavy Loads
- 50 yr. Board Life
- All Weather Conditions
- Modify Shape after Install
- All Colors
- Customizable
- Recycled / Recyclable
- Temporary / Permanent



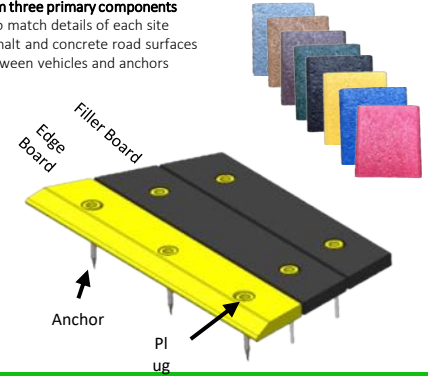
Modular Roadway Systems
Specifications

Vortex Modular Roadway Systems are constructed from three primary components

- Modular boards – CNC-milled to custom shapes to match details of each site
- Anchors – Attach modules directly to existing asphalt and concrete road surfaces
- Plugs – Provide an impact-absorbing interface between vehicles and anchors

Individual Module Specifications

Dimensions	Value	Unit
Length (Max)	16	ft
Length (Typical)	3 - 8	ft
Thickness	2.5 - 3.0	in
Width	12	in
Weight	11 - 12	lb/ft
Color	Any	
Expected Life	50	yrs
Material		
Type	Polymer Composite	
Recycled	Yes	
Recyclable	Yes	
Textured Surface	Yes	



Anchors and Plugs

Vortex Modular Roadway Systems are made from long-lasting materials engineered to withstand repeated transit by the largest vehicles. The material used to form individual modules has an expected 50-year life. Our patented engineering grade urethane elastomeric plugs mitigate load transfer to anchors, while resisting extreme environments, extending system life, and reducing maintenance. The system anchors directly over existing roadway substrates such as asphalt or concrete. Multiple corrosion-reducing options are offered, depending on site-specific conditions.

Compatible Roadway Type	Value	Unit
	Asphalt	
	Concrete	
Bolt Size (diameter)	3/8 5/8	in in
Anchor Material	Galvanized 304 SS 316 SS	
Standard Anchor Adhesive	Epoxy or Cement	
Specialty Anchor Adhesives for:		
	Wet Conditions	
	Cold Conditions	

Plug	Value	Unit
Material	Urethane Elastomer	
Color	Any	
Bolt Compatibility	3/8 5/8	in in
UV Resistant	Yes	

