



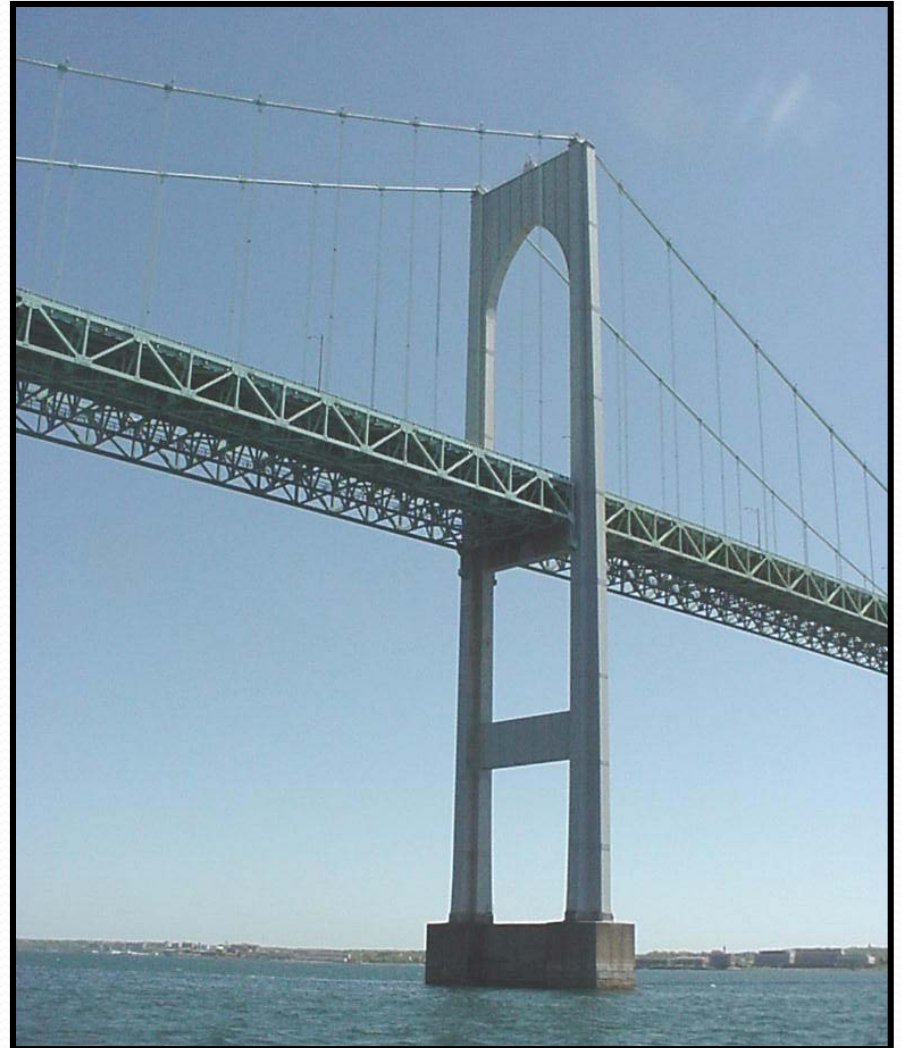
Newport/Pell Bridge

Improving Road Safety &
the Implementation of a
Moveable Median Barrier



General Description of the Newport/Pell Bridge

- Opened in 1969
- 2.14 miles long
- 4 lanes carry traffic over Narragansett Bay
- Aesthetics very important
- Posted Speed of 40 mph





Lane Configuration

- 12 foot lanes
- No median
- No shoulder
- Emergency walkways



Traffic Figures

- Almost 11,000,000 vehicle crossings annually
- 28,000 vehicles per day (mostly daily commuters)
- Summer months have the highest traffic, averaging 35,000 vehicles per day
- 85th Percentile speeds over 60 mph

Traffic Collision History



406 accidents during last 8 years



- 156 accidents on the “Bridge” span itself
- 134 at the toll plaza
- 126 at the Newport Interchange

Types of Collisions

- Rear-end
- Fixed Object
- Head-on
- Sideswipe
- Angle







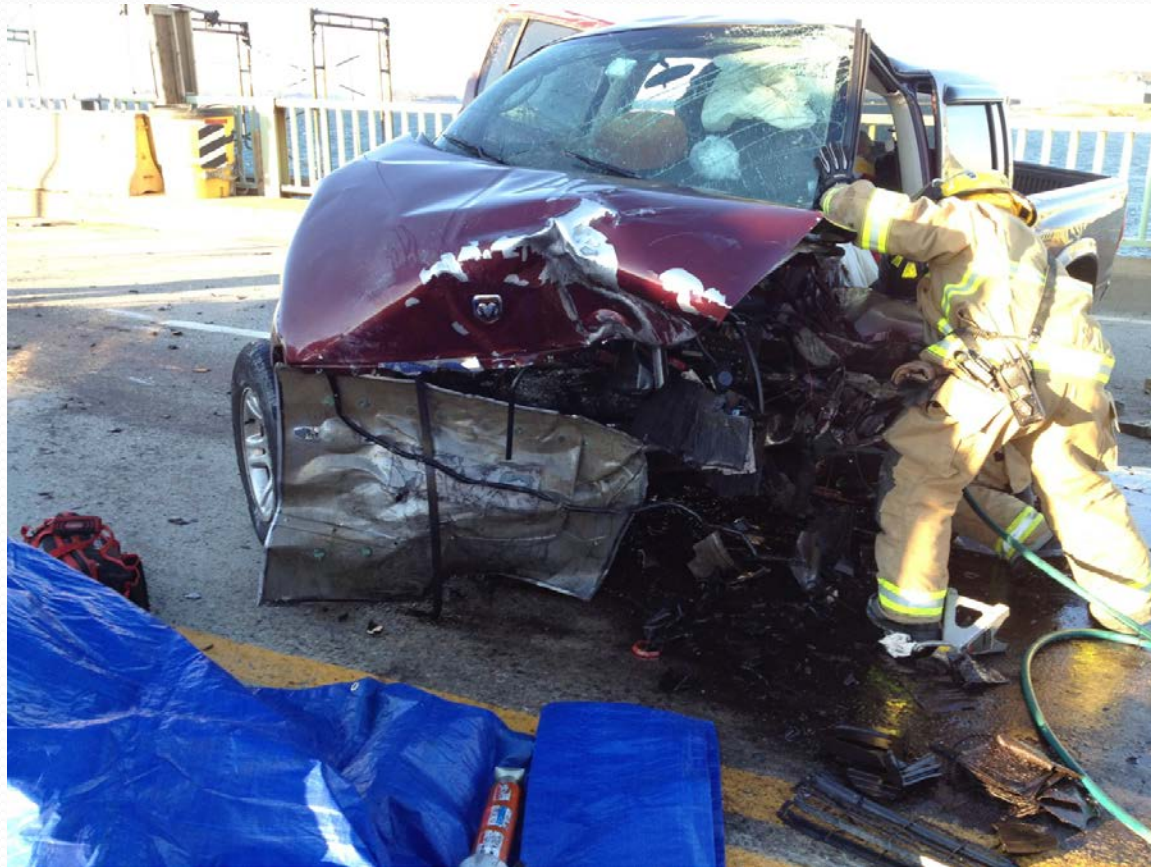


Most are Rear-end Collisions



Primarily at Toll Plaza & Newport Ramps

The Most Serious are Head-on Collisions



**On the Bridge Span itself
(where no median existed)**

Traffic and Safety Studies

- Route 138/Pell Bridge Road Safety Assessment – February, 2014
- Claiborne Pell Bridge Traffic and Safety Study, April 2014



Route 138/Pell Bridge Road Safety Assessment

Newport/Jamestown, Rhode Island
February 2014



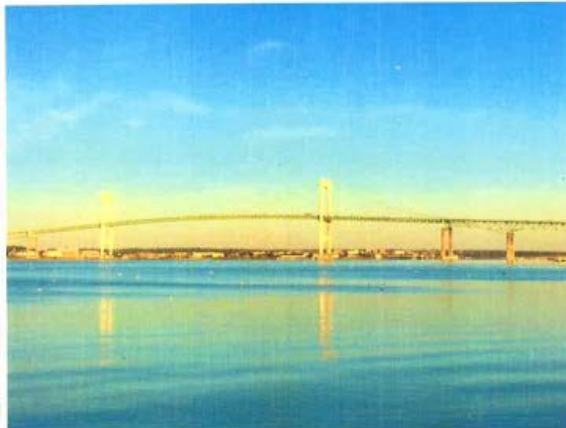
HIGHWAY SAFETY IMPROVEMENT PROGRAM
STATE OF RHODE ISLAND
Department of Transportation
Michael P. Lewis, Director
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RSA TEAM PARTICIPANTS
Rhode Island Turnpike and Bridge Authority
Rhode Island State Police
Rhode Island Department of Transportation
Federal Highway Administration
Vanasse Hangen Brustlin, Inc.
CDM Smith

Claiborne Pell Bridge Traffic and Safety Study

**Rhode Island Turnpike and Bridge
Authority**



DRAFT

March 12, 2014

**CDM
Smith**

Route 138/Pell Bridge Road Safety Assessment

- Participants - RITBA, RISP, RIDOT, FHA, CDM Smith and VHB
- Data review – Site characteristics, traffic volumes, speed data and crash data
- Road safety assessment findings and recommendations
- Conclusions

Route 138/Pell Bridge

Road Safety Assessment

- To improve safety the following areas needed to be addressed:
 - Vehicle crossovers
 - Speeding
 - Vehicle queuing on the bridge
 - Driver overload/sign clutter
 - U-turns (potential a result of driver confusion)

Pell Bridge

Traffic & Safety Study for a Potential Median Barrier

- Study looked at a number of factors to determine the feasibility of a median barrier
 - Political Concerns
 - Community Concern
 - RITBA Concern

Political Concerns

- Safety
- Aesthetics
 - Most recognized structure in RI
 - Tint barrier
- Construction Schedule
 - Needed barrier installed before summer
 - Limit lane closures
- Local Events Coordination
 - Boat race
 - Marathon



Community Concerns

- Safety

- EMS

- Used to crossing lanes at any point along the bridge
 - Need turn around area for quick response
 - Did not want to unpin segments and push apart
 - Did not want to jump and carry items over barrier

- Residents

- Safety

- Speeding
 - Advocated for median barrier to prevent accidents
 - Construction effects and traffic

RITBA CONCERNS



- Worker Safety
- Public Safety
- Repairs
 - Deck patching throughout the bridge
 - Joint deterioration
- Maintenance – sweeping, drain cleaning, sealing, pressure washing, inspections
- U-turns

Median Barrier Design Criteria

Median Barrier Options - Risk Assessment Matrix

	CRTS Moveable Barrier With Moveable Feature	BarrierGuard 800	Concrete Rigid Median Barrier	No Action (Includes existing pylons)
Number of Lanes:	4 Lanes	4 Lanes	4 Lanes	4 Lanes
Width of Lanes:	10.5 feet*^	10.5 feet*	10.5 feet*	11.5 feet
Offset of Travel Lane to Barrier:	Direction 1: 1.0 feet Direction 2: 1.0 feet	Direction 1: 1.0 feet Direction 2: 1.0 feet	Direction 1: 1.0 feet Direction 2: 1.0 feet	n/a
Outside Shoulder Width	1 foot	1 foot	1 foot	1 foot
Safety				
Reduction in potential crossover collisions	○	○	○	●
Other collision types	●	●	●	○
Operations				
Operational restrictions	○	○	○	○
Emergency response	●	●	●	○
Structural				
Compatibility with existing structure	○	●	●	n/a
Ease of installation	○	●	●	n/a
Other				
Aesthetics	◐	●	◐	○
Driver Comfort	◐	◐	◐	◐
Cost				
Installation	◐	●	●	n/a
Maintenance of barrier	○	◐	○	n/a

Most Beneficial	○
Beneficial	◐
Least Beneficial	●

* A design exception would be required to reduce lanes down to 10.5 feet.
^ Alternative lane configuration is a 10-foot inside land and 11-foot outside lane

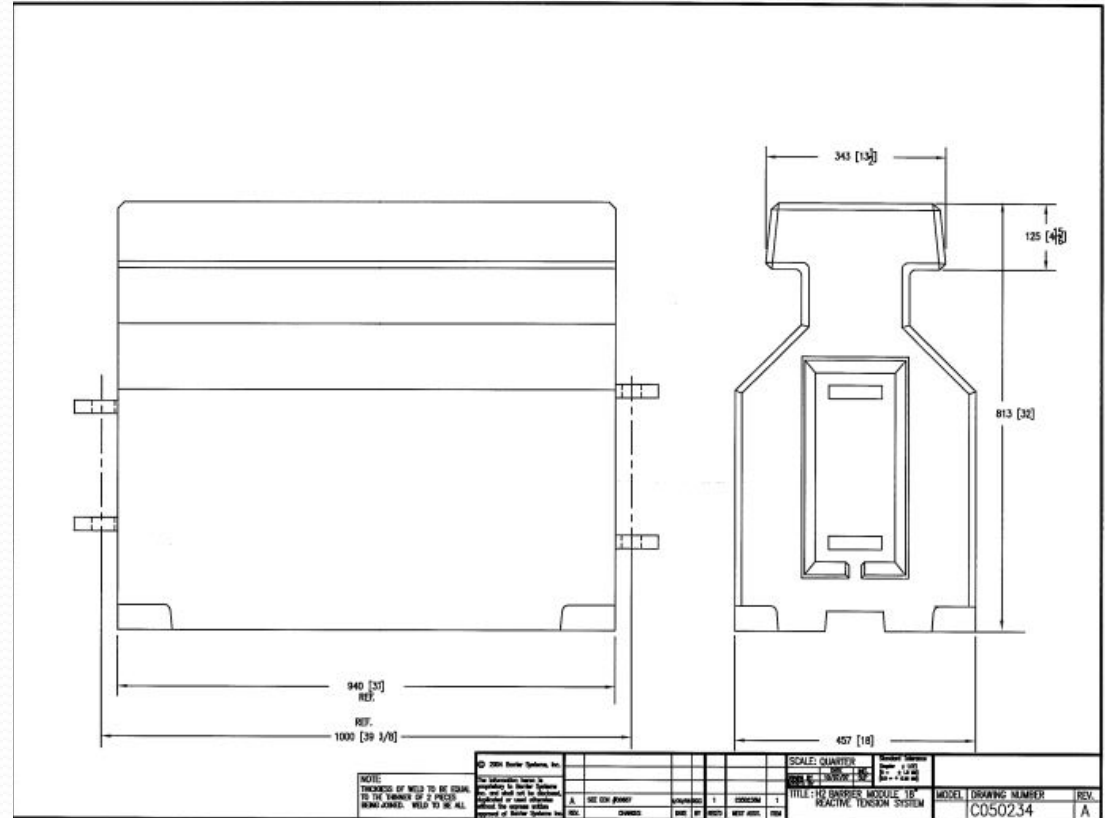
CRTS MOVEABLE BARRIER CHOSEN

- Accident mitigation
- No anchorage in deck
- Vehicle response
- Maintenance



Moveable Median Barrier Design

- Self-weight of 500 lbs/ft
 - Do not need to anchor along bridge deck
- Anchorage at either end
 - Capable of reacting to a 100,000 lb tensile force
- TL-4



Lane width changes

Existing lane widths



Proposed lane widths



Variable Length Barrier (VLB)

Expand and contract with bridge movements
Allows median barrier to move through
barrier transfer machine



Fabrication Challenges

- Varying levels of pigment in concrete mix to achieve color to match bridge superstructure steel paint
 - “Newport Blue”



Fabrication Challenges

Old tinted concrete mix compared to untinted



New tinted concrete mix



- Had to modify mix with various additives

Barrier Compressive Strength

	Set 1	Set 2	Set 3
Date	12/17/14	12/17/14	12/17/14
Air Entrainment	5.5	7.8	7.5
Tint	No Tint	Single Dose	Double Dose
1 day break	1584	1530	1507
2 day break	4720	3659	2307
5 day break	6385	4968	2901

- Single dose
 - 8 lbs per batch
- Double dose
 - 16 lbs per batch

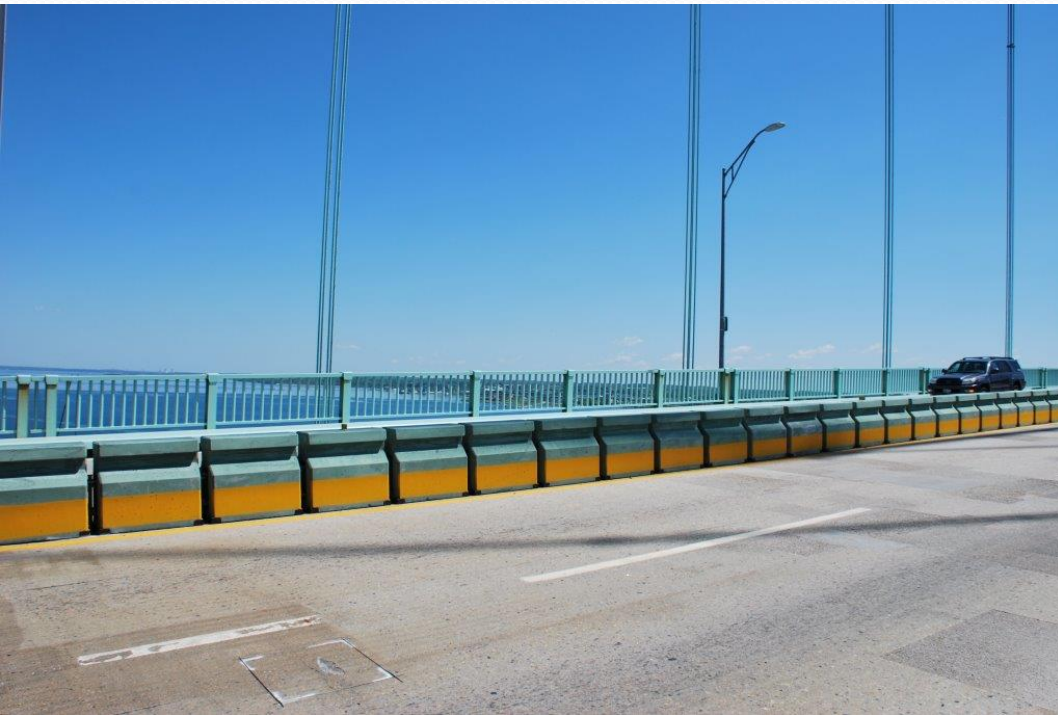
***Acceptable compressive strength is 5000 PSI**

Unveiling Segments

New green segments



Completed Median Barrier



Route 138/Pell Bridge

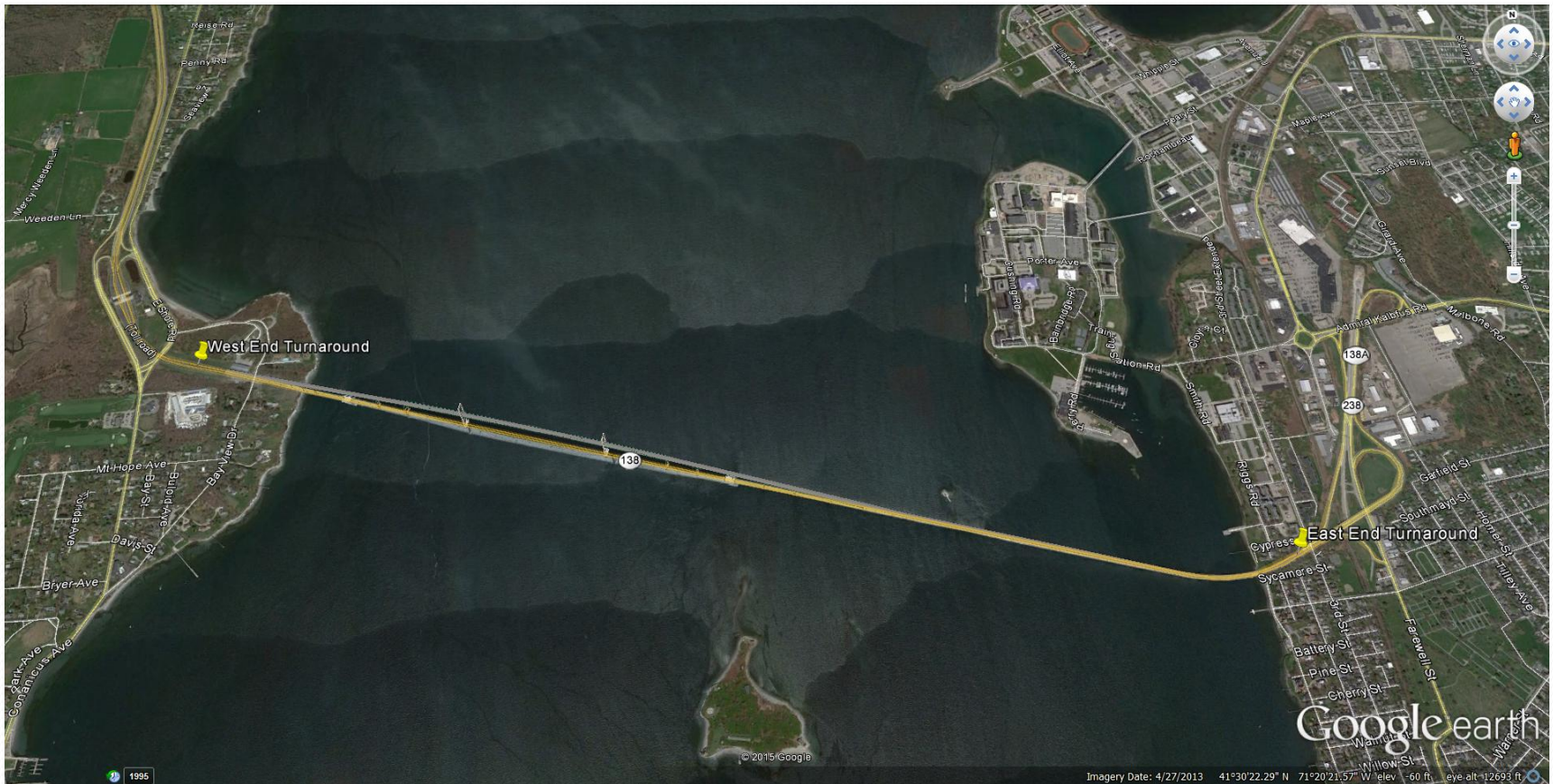
Median Barrier Assessment

- Input from first responder agencies was taken in the location of the two barrier openings to facilitate emergency vehicles



Location of Turnarounds

The turnarounds will be 40 feet wide with delineators across the opening to prevent the public from using them. Emergency vehicles can drive over the delineators which are designed to bend.



Goal in Improving Road Safety

Reducing:

- Illegal U-turns
- Crossovers
- Rear-end collisions

Types of Emergency Incidents - Other Than Traffic Accidents

- Disabled vehicles
- Debris in roadway
- Road walkers/Suicidal subjects
- Tourists taking photos
- Oversized vehicles

First Responder Agencies

- RI State Police
- Jamestown Police
- Newport Police
- Jamestown Fire/EMS
- Newport Fire/EMS
- Coast Guard



Team Effort in Emergency Response



Response Prior to Median Barrier

- Emergency vehicles could do U-turns
- Traffic could be easily redirected around incident scene
- Emergency vehicles could travel in oncoming lanes when responding

Prior Lane Closures

Travel lane closure

- Motorists tend to cross center line



Passing lane closure

- Need to close both center lanes



Response After Median Barrier

- Traffic tends to be delayed longer during incidents for both directions of travel
- Emergency vehicles have only two locations to do a U-turn or gain access into the oncoming lanes
- Emergency vehicles that travel in oncoming lanes generally have to back up to exit travel lanes
- RITBA maintenance staff is prepared to move/open the median barrier when required

Lane Closures Using New Barrier

Only need to close one lane for center closures



Cars won't be able to cross center line



Improvements to Road Safety

- The median barrier has prevented crossovers
- Upgraded static variable message signs boards and purchased additional portable VMS
- Improved the signage
- Improved access to the bridge from City of Newport – (redesigned ramps)
- New safety requirements for workers on the bridge - (including reduced work hours, increased traffic control procedures and monitoring)
- Additional cameras on bridge and 24/7 monitoring

Traffic Enforcement

- RI State Police has jurisdiction and has duty personnel patrol the bridge
- Since 2010 RITBA has hired RISP details to augment RISP duty personnel for traffic enforcement/incident response
- Bridge design limits traffic enforcement to moving radar or clocked vehicle speeds. Since the median barrier has been installed, can only do clocked speeds.
- Possible future law change to allow speed cameras. State law currently permits traffic light cameras only
- Promoted new distracted driver legislation



Thank You