

# Saw Cut Vertical Curb Webinar



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# Zoom Meeting Platform User Information



- Participants are currently muted
- Question and Answer Session will follow presentations
- Use Chat function to ask questions
- The meeting is being recorded and will be shared on the All website

# Agenda

1. Overview of All Program
2. Introduction and Overview of Saw Cut Vertical Curb - NJDOT
3. Contractor Experience with Saw Cut Vertical Curb - M.L. Ruberton Construction Company
4. Question and Answer Session with Panel



Henry Jablonski



Gary Liedtka-Bizuga



Rick Berenato



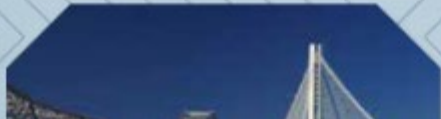
Peter Harry, Jr.

Innovation • Performance • Leadership  
Communication • Service • Quality

## Guide to AASHTO's Technical Service Programs and Products



July 2018



AASHTO Innovation Initiative (A.I.I.)

AASHTO Re:source

AASHTOWare

National Transportation Product  
Evaluation Program  
(NTPEP)

Development AASHTO Materials  
Specifications  
(DAMS)

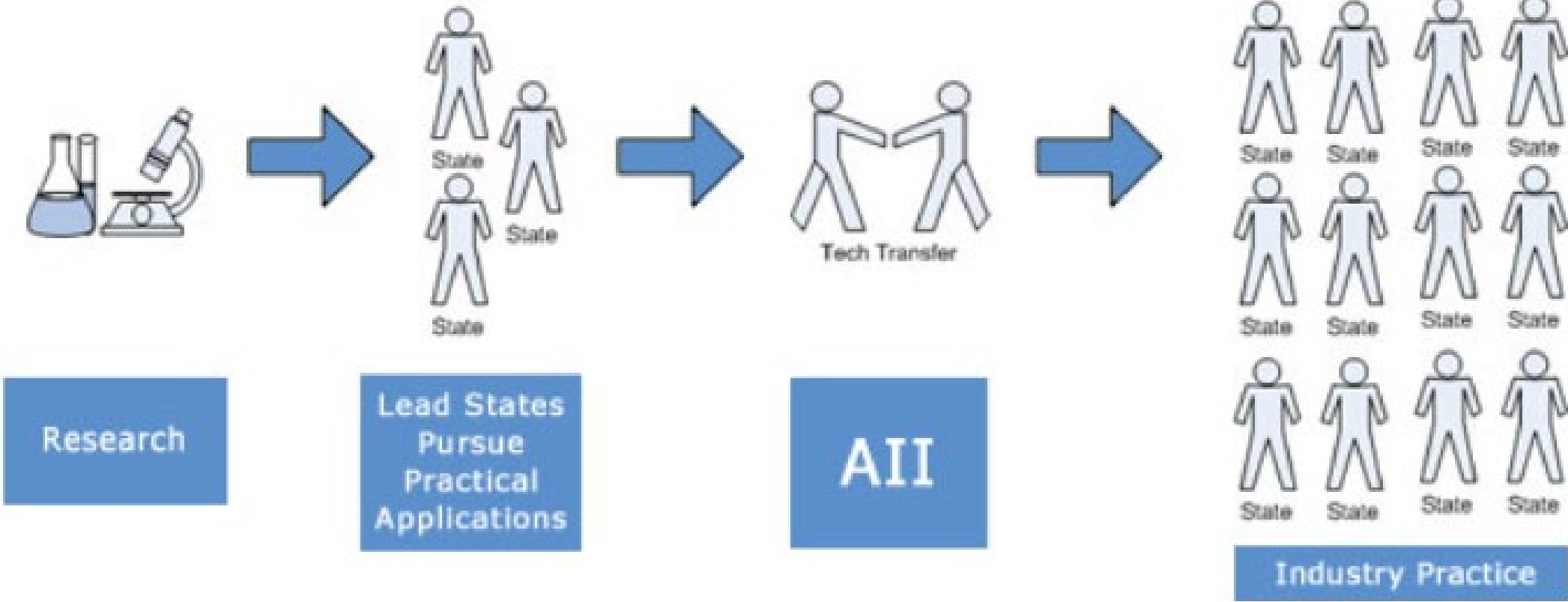
# All about All – *The AASHTO Innovation Initiative*

- Established in 1999 & Operating since 2000
- Previously called the *Technology Implementation Group (TIG)*
- Facilitate the implementation of **high-payoff, ready-to-use, innovative technologies**
  - Focus Technologies
  - Additionally Selected Technologies



*Support the implementation of  
100+ technologies since 2001*

# AII's Role in the Technology Lifecycle



# Current Active Focus Technologies

Saw Cut Vertical Curb

Freight Operations  
eXchange

Hydrogen Fuel Cell  
Technology

Electrically Conductive  
Concrete Heated  
Pavement System

Steel Press Brake  
Formed Tub Girder

Improved Project  
Delivery Using GIS

Wrong Way Driving  
Systemic Approach

Laser Ablation  
Coating Remove

Beam End Repair with  
Ultra High  
Performance Concrete



### What is AII?

Formerly the AASHTO Technology Implementation Group, AII advances innovation from the grassroots up: by agencies, for agencies, peer-to-peer. [More >>](#)

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**Submit Your Nomination Today!**

### Active Lead States Teams

- [Saw Cut Vertical Curb](#)
- [Steel Press-Brake-Formed Tub Girder](#)
- [On-Demand Microtransit](#)
- [Beam End Repair Using Ultra-High Performance Concrete](#)
- [Dynamic Friction Testing with Three Wheel Polishing Device](#)

# Focus Technologies

## Saw Cut Vertical Curb

The AASHTO Manual for Assessing Safety Hardware (MASH) establishes uniform standards for the safety features, including longitudinal barriers. In accordance with the recent MASH standards, the New Jersey Department of Transportation (NJDOT) has updated the installation requirements for guide rails. Per this new standard, the exposure of and along guide rail end terminal treatments should be limited to a maximum 2-inch exposure. Existing curbs that are four inches or more high should be replaced with 2-inch curbs. To make guide rail installation MASH compliant, the conventional practice typically requires seven days of field open road closure, replacement, and curing of concrete. Not only does this timeframe add to labor costs, but also it causes inconvenience to motorists to work zone traffic for longer periods of time.

NJDOT has developed an innovative method in which the existing curbs can be saw cut to two inches high. The existing guide rail can remain in place during saw-cutting, while the construction time to remove and upgrade the guide rail. The saw-cutting approach requires only two days of field open road closure. The power-driven vertical curb saw fitted with horizontally-oriented, diamond-edge blades or abrasive wheels is used to saw cut the curbs to the required dimensions without causing uncontrolled cracking. The saw is water-cooled to reduce dust and noise. The saw is also capable of immediately collecting the slurry produced from cutting the curbs. This method is based on the Manual on Uniform Traffic Control Devices (MUTCD) and DOT standard details, and includes crash cushion.

### Resources

- [NJDOT Specification for Saw Cut Vertical Curb](#)
- [NJDOT 2019 Standard Specifications for Road and Bridge Construction](#)

### Contact Information

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# Participant Poll #1

The background features abstract, overlapping geometric shapes in various shades of blue, ranging from light sky blue to deep navy blue, creating a modern and professional aesthetic.

New Jersey Department of  
Transportation  
Introduction and Overview  
Saw Cut Vertical Curb

An Introduction to

# Sawcut Vertical Curb

An Alternate Method to  
Pouring Concrete

By Gary Liedtka-Bizuga from NJDOT



# Overview

Sawcut Vertical Curb is using the application of sawcutting concrete applied to curb in front of and along guide rail runs to achieve the requirements curb heights of current National Standards.

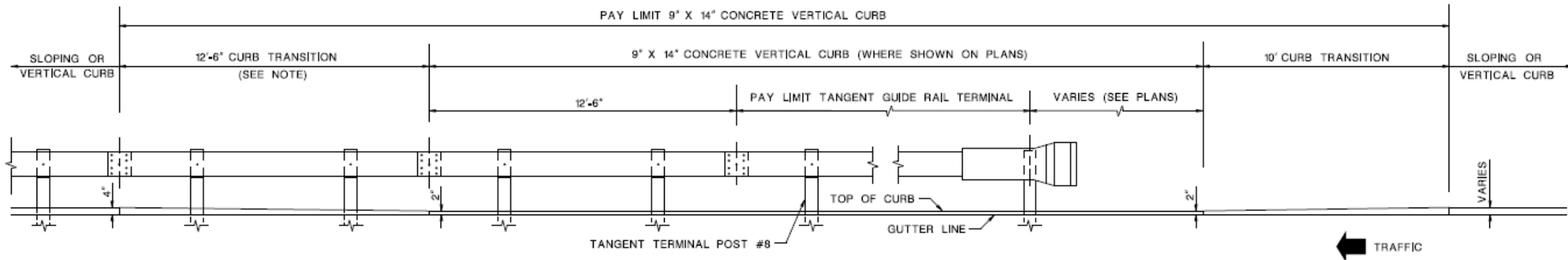
- What Need Brought this on
- Current Construction Methods and their Issues
  - Benefits of Sawcutting
  - History of the Concept
    - Implementation
    - The Specification
- Knowledge Gained from Field and Keynotes

# Need for Sawcut Vertical Curb (Part 1)

## Updated Standards:

- ▶ MASH (Manual for Assessing Safety Hardware) requirements.
- ▶ NJDOT following MASH developed construction details for designers, contractors, and residents to follow.

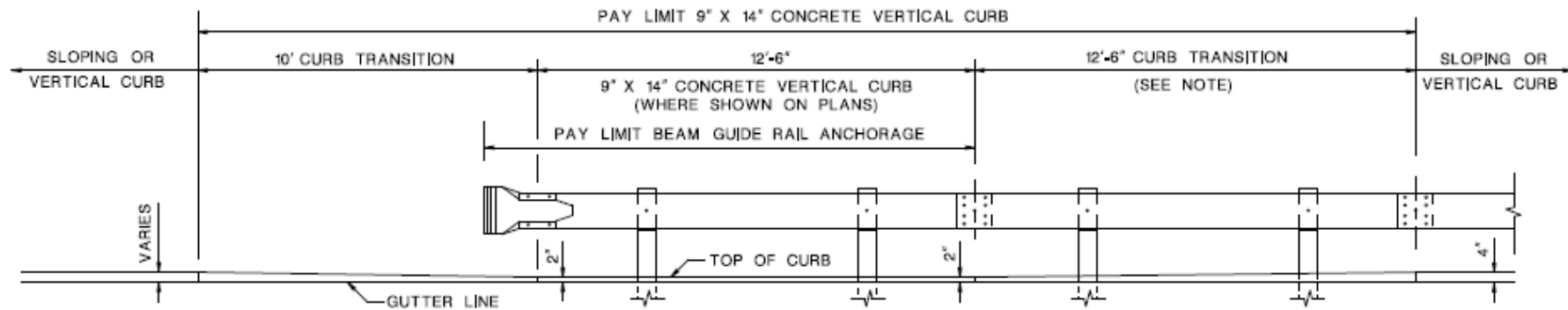
# Sections from NJDOT Construction Detail CD-607-2



NOTE: A RAIL HEIGHT TRANSITION MAY ALSO BE REQUIRED. SEE CD-609-5.

**METHOD OF TRANSITIONING TO 2" VERTICAL CURB AT A TANGENT GUIDE RAIL TERMINAL**

CD-607-2.1



NOTE: A RAIL HEIGHT TRANSITION MAY ALSO BE REQUIRED. SEE CD-609-4.

**METHOD OF TRANSITIONING TO 2" VERTICAL CURB AT A BEAM GUIDE RAIL ANCHORAGE**

CD-607-2.6

# Need for Sawcut Vertical Curb (Part 2)

- Typical construction method:
  - Extensive Traffic Control Set up
  - Removal of Guide/Guard Rail
  - Demo Curb
  - Pouring in Forms
- Problems with baseline practice:
  - Time and Safety due to exposure
- Industry timing is one (1) day for two-hundred (200) linear feet (LF) of curb.

# Benefits

## The Sawcut Vertical Curb Method

- ▶ Does not require the existing guide/guard rail run to be removed.
- ▶ Does not require potential asphalt patch to front to repair excavated curb within the shoulder\*.

Overall, this method allows for other sites to be worked on in quicker succession and for traffic control equipment to be utilized at more locations giving more flexibility in the construction schedule.

## Alternative Uses

- ▶ Curb Cutting on Old Sections of Freeways/highways

\* Multiple methodologies can be done for the removal of existing curb, each with time and cost.



# Cost Reduction

## NJDOT Rates

1. Save Approximately \$95,000 per location
2. Construction in 2 working days instead of 7 days

OPTION	WITH CONTRACTOR EST	WITH ALL DOT EST
VERTICAL CURB POURING (TRADITIONAL)	\$178,019.01	\$174,324.83
CUT VERTICAL CURB	\$72,242.34	\$80,468.90
Location estimates 250 LF of guide rail, an end terminal, an anchorage, and 150 LF of curb (115 LF for ET and 35 LF for anchorage based on CD-607-2). Based on pouring in a curb or cutting the curb, associated items were added.		
Traffic Control was based off TCD-14 for traditional curb with construction barrier.		
Traffic Control was TCD-14 with drums for curb cutting.		
Days for traffic control set up being on site for traditional curb is 7 days.		
Days for traffic control set up being on site for curb cutting is 2 days.		

# History and Concept

## Original Idea

During the pandemic, M.L. Ruberton Construction Company requested the use of sawcutting. I took initiative to produce and develop a full system of how this operation would go, and what requirements would be needed.

## Contractor Proposal

Through discussions and picking a location, Ruberton with the approval of the RE's on multiple projects tested out this method.



## Test Saw

- The approximate days were estimated for the sawcut curb was taken with a prototype saw seen above.

# Implementation Process at NJDOT

## Official Specification Process took approximately 4 months to Non-Standard Item

- ▶ Proposal from Contractor to use construction method
- ▶ Internal Design Unit discussion with Manager and Director approval
- ▶ Draft Specification to determine benefits of method and construction breakdown
- ▶ Coordination with Construction Services for eligibility of method as a “Pilot Project”
- ▶ Coordination with RE’s for Pilot Project options and potential test locations
- ▶ Selecting agreeable test location and trial date
- ▶ Independent Cost Estimate and timings from Contractor and Design Squad
- ▶ Revising and Finalizing Non-Standard Item Specification with Construction Services Review Unit
- ▶ Getting approval for item to be input into AASHTOWare

## Currently going through paperwork and process to make a standard item

# NJDOT Specification

## 607.01 DESCRIPTION

THE FOLLOWING IS CHANGED:

This Section describes the requirements for constructing concrete curb, granite curb, and HMA curb, for resetting granite curb, and for cutting concrete vertical curb.

## 607.02 MATERIALS

### 607.02.01 Materials

THE FOLLOWING IS ADDED:

Epoxy Waterproofing.....912.02.02

### 607.02.02 Equipment

THE FOLLOWING IS ADDED:

Vertical Curb Saw.....1008.07

THE FOLLOWING SUBSECTION IS ADDED:

### 607.03.08 Sawcut Vertical Curb

The RE will determine if the existing concrete vertical curb is suitable for saw cutting. Construct cast in place curb as specified in 607.03.02 if the existing curb exhibits visible cracking or deterioration or both.

Provide a concrete vertical curb saw as specified in 1008.07. Construct erosion control measures as specified in 158.03.02. Set the concrete vertical curb saw height to the desired vertical curb face height. Sawcut the vertical curb to  $\pm 1/2$  inch of the desired curb face dimension. Sawcut grooves as specified in 507.03.02.L to transition height differentials.

Finish the sawcut concrete vertical curb as specified in 607.03.01.E. Seal sawcut concrete with epoxy waterproofing as specified in 504.03.03. Prepare sawcut surface of concrete vertical curb according to manufacturer's directions before applying epoxy waterproofing.

Dispose of cut material as specified in 201.03.01.H.

# NJDOT Specification

## **607.04 MEASUREMENT AND PAYMENT**

THE FOLLOWING ITEM IS ADDED:

<i>Item</i> .....	<i>Pay Unit</i>
SAWCUT VERTICAL CURB	LINEAR FOOT

## **SECTION 1008 – MISCELLANEOUS EQUIPMENT**

THE FOLLOWING SECTION IS ADDED:

### **1008.07 CONCRETE VERTICAL CURB SAW**

Provide a power-driven vertical curb saw with horizontally-oriented blade capable of sawing to the required dimensions without causing uncontrolled cracking. Equip the vertical curb saw with water-cooled, circular, diamond-edge blades or abrasive wheels, and alignment guides. Ensure that the vertical curb saw is capable of immediately collecting the slurry produced from the operations. The Contractor may use a vertical curb saw that does not collect slurry if the RE approves an alternate slurry collection method.

When sawcutting grooves, use a multi-bladed saw with an adequate number of blades and alignment wheels.

Provide within the Project Limits spare saw blades and at least 1 standby saw that meets the above requirements.

# Projects and Awards

- ▶ Trial Projects:
  - ▶ Sign Structure Contract 2016-2
  - ▶ Sign Structure Contract 2016-5
  - ▶ Guide Rail Replacement Central, Contract 2019-1
  - ▶ Guide Rail Maintenance Contract Central
- ▶ Awards:
  - ▶ NJDOT Build a Better Mouse Trap (2022)
  - ▶ AASHTO Innovation Initiative (2022)

# Operational Consideration

Before sawcutting a curb, the RE shall determine if the existing curb is suitable for the operation.

This was left purposely vague within the specifications to allow the RE to make the final call.

Reasons for not using sawcut include but are not limited to:

- ▶ Old curb - either from the style and the complications that would go along with sawcutting of the age making the concrete brittle.
- ▶ Cracking along the section - a multitude of horizontal and vertical cracks forming along the section of curb creating an issue where the operation is taking place.
- ▶ Deterioration - exposure of the interior of the concrete either from erosion, vehicles driving over the curb, damage from winter, etc.

If the RE determines that sawcutting cannot be done, then follow cast in place curb as specified in 607.03.02 within the 2019 NJDOT Specifications.



# Construction Consideration

- ▶ Information Discovered
  - ▶ Comfortability of the Operator
  - ▶ Collection of Slurry
  - ▶ Waterproof Epoxy Options



# AASHTO Innovation Initiative (AII)

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NJDOT has developed an innovative method in which the existing curbs can be saw cut to two inches and replaced with 2-inch curbs. The existing guide rail can remain in place during saw-cutting, while the construction time to remove and upgrade the guide rail. The saw-cutting approach requires only two days of construction. The saw-cutting approach requires only two days of construction. The saw-cutting approach requires only two days of construction. The saw-cutting approach requires only two days of construction. The saw-cutting approach requires only two days of construction.

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# Participant Poll #2

M.L. Ruberton Construction  
Contractor Experience  
Saw Cut Vertical Curb

Operational Overview

# Mash Guide Rail - Changes to Curb Height

- ▶ MASH guiderail standards require that vertical curb be limited in height to 4” in any run of beam guide rail.
- ▶ Approach end terminals and trailing anchorages are also subject to curb height restrictions - 2” max height.
- ▶ Existing curb ranges significantly, from 2” to as much as 10”, with many areas falling into the 6”-8” range.
- ▶ Any guide rail which is updated due to maintenance damage or as a planned upgrade requires changes to the curb to ensure compliance with MASH standards.

# Traditional Curb Replacement

- ▶ Full curb replacement requires a multi-step process.
  - ▶ A work zone must be established, utilizing permanent construction barrier if the guiderail must be removed for curb installation, typically at night.
  - ▶ The previous curb must be excavated from the location.
  - ▶ A curb install crew must access the work zone, form and pour the curb, with production in the 400 LF/day range.
  - ▶ The next day, the forms will be stripped and the location backfilled behind the curb.
  - ▶ Depending on the roadway material, the roadway may have to be patched or milled/paved following the curb operation.

# Saw Cutting Method

- ▶ Beneficial reduction in volume of days, steps, and manpower.
  - ▶ Establish a temporary lane or shoulder closure.
  - ▶ Deploy the curb saw to cut the curb.
  - ▶ Clean the area of the slurry mixture.
  - ▶ Remove excess dirt depending on the location.
  - ▶ Finish the curb by grinding and sealing.
- ▶ This process can be done with a single crew in a single shift with no permanent impact to traffic or damage to the roadway.
- ▶ This process can be completed even with 0' offset guide rail with no damage to the guide rail.

# Determination of suitability

## Existing Condition Consideration

- ▶ Examine the existing curb and inspect for cracks and crumbling.
- ▶ Inspect roadway surface for smoothness.
- ▶ Roadway surface drainage direction.
- ▶ Presence and type of non-vegetative surface.

## Initial Curb Condition-6”

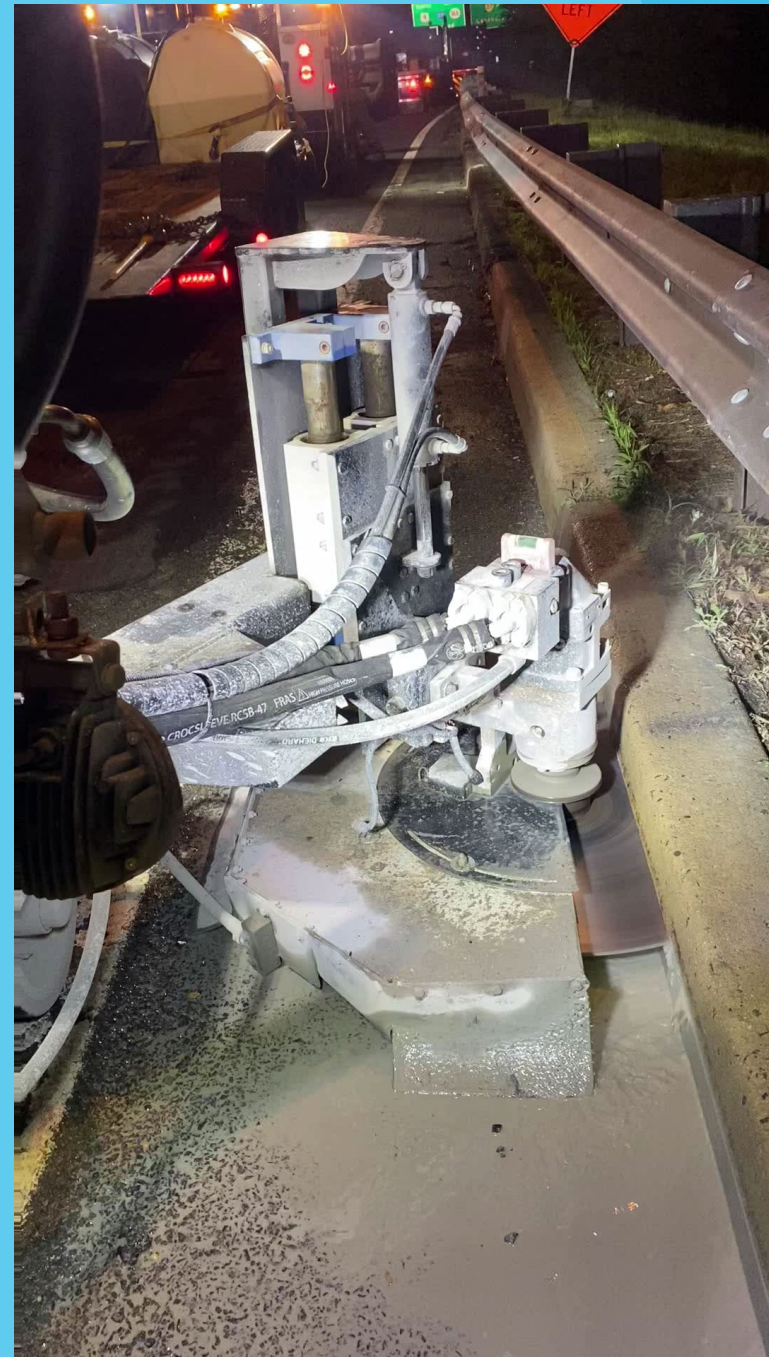




# Horizontal Cutting Of Vertical Curb (video)

Garden State Parkway

- ✓ temporary lane closure
- ✓ 0' offset guide rail run



# Post-cut Condition

- ▶ The lighter curb on the left is existing curb.
- ▶ The darker curb on the right was poured within the last 6 months.
- ▶ An unexpected change of plan resulted in modifications to the guiderail and therefore curb height.
- ▶ We did not have to remobilize a curb operation by utilizing the curb cutting method.



# Considerations After Cutting

- ▶ If the area has previously installed nonvegetative surface, it will likely need to be removed and replaced to eliminate an edge forming.
- ▶ Some areas have tremendous buildup of dirt which must be removed after curb cutting. In some instances this can be done via hand work as shown in the video, or may need an excavator if it is especially overburdened.
- ▶ Generally roadways drain toward the curb, which is beneficial for slurry collection and removal. If the road is pitched away from the curb, slurry collection can be challenging.



## Curb Transition At Guide Rail Anchorage

Transition installed with existing nonvegetative

# Curb height reduction from 8" to 2" excessive overburden material



# Finished Product

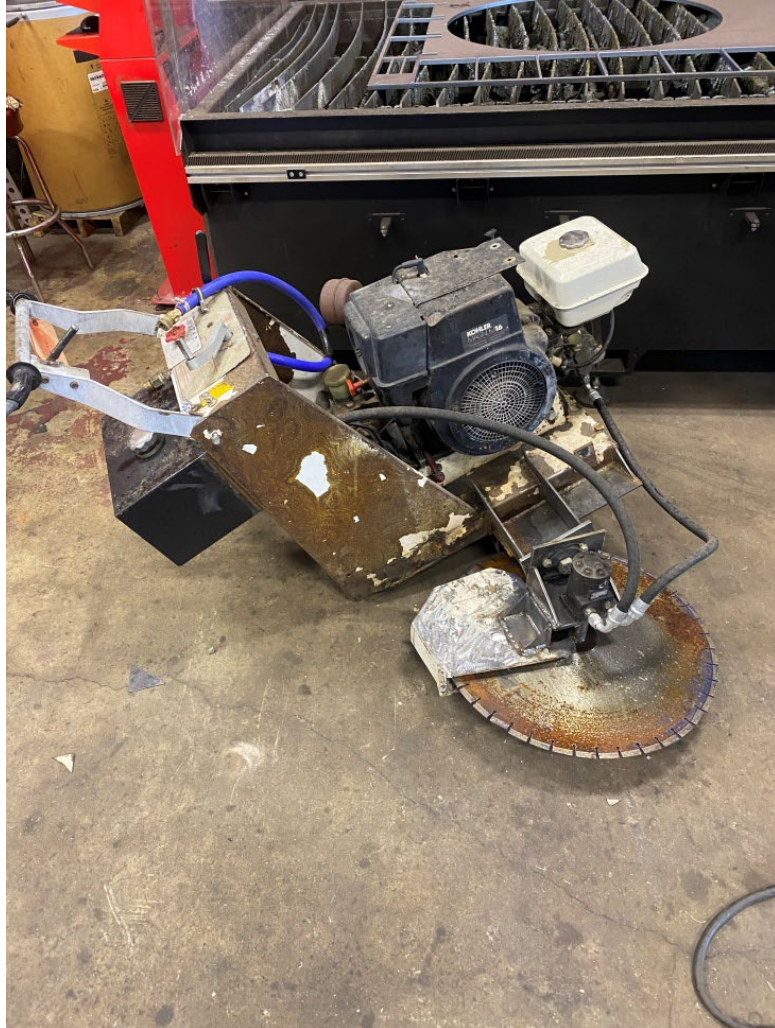


# Broken Concrete Removal

- ▶ The cut curb pieces are extremely brittle.
- ▶ They can be broken with a handheld hammer into small, manageable pieces.
- ▶ The pieces can be picked up by hand and thrown into a truck for removal.



# Evolution Of The Curb Saw



- ▶ Homemade Curb Saw 1.0
- ▶ Modified from a vertical concrete saw to show the process resulted in a satisfactory product.
- ▶ Took 13 hours to cut a single approach terminal transition.



# Evolution of the Curb Saw Part 2

Purchased Professional Saw  
from Core Cut



Modified in our in-house  
fabrication facility



# Fast Facts About The Process

- ▶ Production rates range from 100 LF per shift to as high as +400 LF per shift. Final production rates are influenced by many factors and may vary.
- ▶ Can be used in a guide rail maintenance capacity to bring old, complicated sites into modern MASH standard compliance.
- ▶ Can be used on roadway improvement projects to eliminate or reduce impact to traffic.
- ▶ Results in a product which is visually similar to existing or newly poured curb.
- ▶ Can modify existing curb to allow MASH standard end treatments to be installed.

# Participant Poll #3

# Question and Answer Session



Thank you!

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