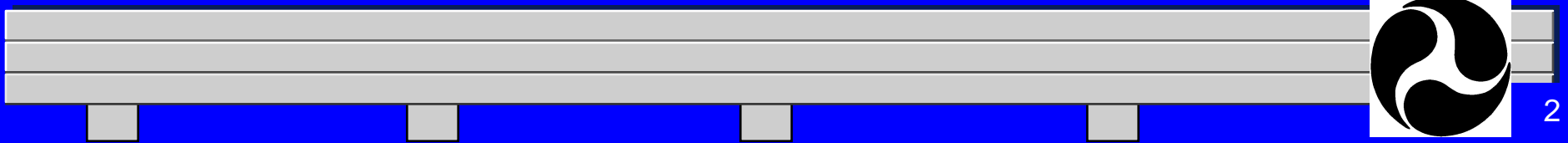


***NCHRP 350***  
***IMPLEMENTATION***  
***ARTBA***  
***May 11, 2001***



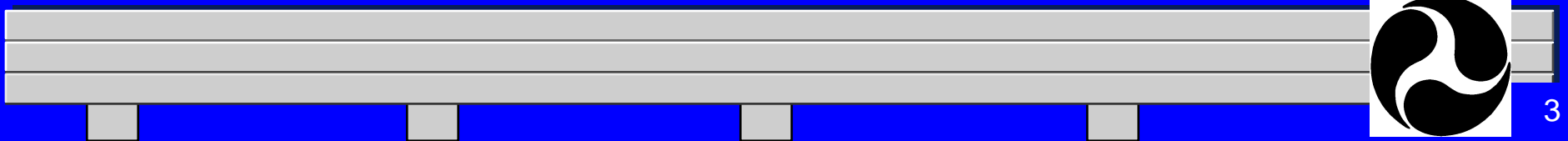
# The Road to New Crashworthy Requirements

NCHRP Report 350



# NCHRP REPORT 350

- Pick Up Truck
- Six Test Levels
- Includes Work Zone Devices



# NCHRP REPORT 350

- Adopted by FHWA July 1993
- Implementation in 1998
- AASHTO Requests delay
- AASHTO/FHWA Agreement sets range of dates



# NCHRP Report 350

- AASHTO / FHWA / ATSSA  
Agreement dated 1 July 1998
- Agreement Accepted 28 August  
1998
- FHWA Memo 28 August 1998  
“Crash Tested Work Zone Traffic  
Control Devices”



# AASHTO / FHWA / ATSSA Agreement

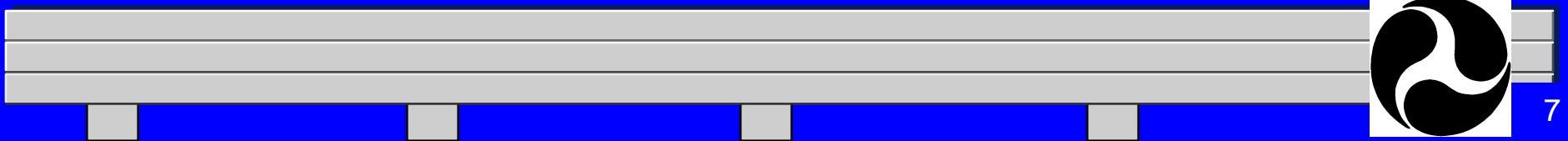
- New policy on crashworthiness applies only to the National Highway System



# Compliance Dates for Permanent Roadway Safety Features

July 1, 1990

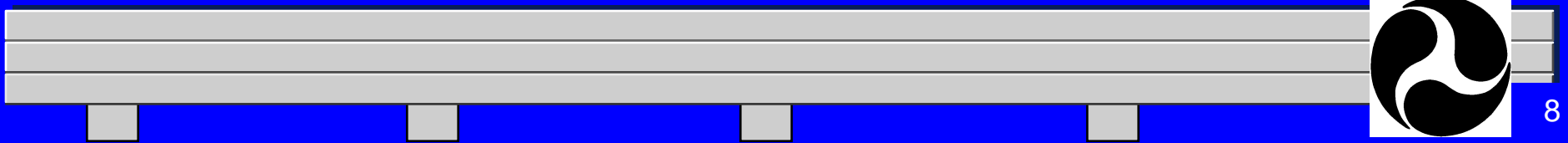
- All Breakaway Supports within clear zone
- 1985 AASHTO Specs
- All Breakaway Supports that comply with 1985 AASHTO are OK under Report 350



# Compliance Dates for Permanent Roadway Safety Features

October 1, 1998

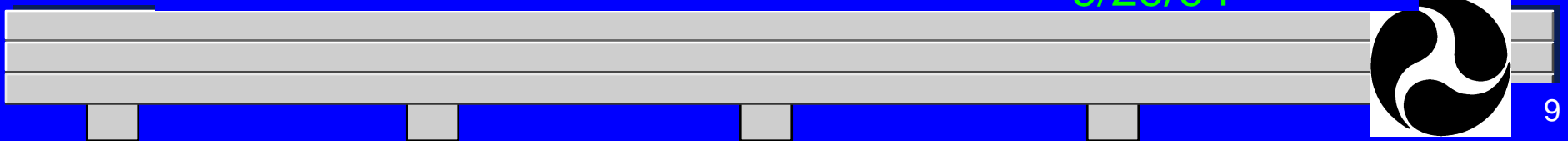
- Most longitudinal barriers
- Barrier Terminals
- Crash Cushions





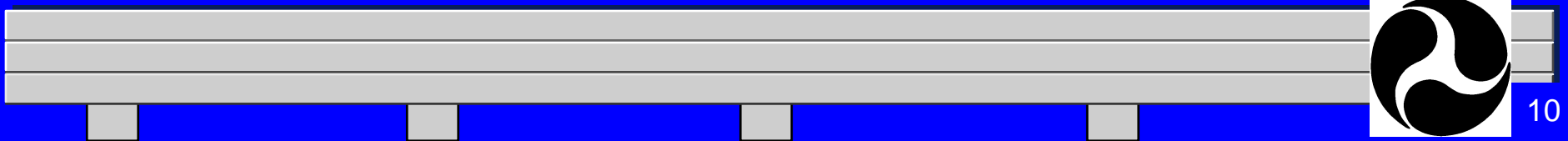
# Implementation Dates Permanent Safety Features

<b>Safety Hardware</b>	<b>New Installations</b>	<b>3R Projects</b>	<b>System-wide Replacement</b>
Longitudinal Barriers	October 1, 1998	October 1, 1998	Not Required
Guardrail to Bridge Rail Transitions	October 1, 2002	October 1, 2002	Not Required
Guardrail Terminals	October 1, 1998	October 1, 1998	Not Required beyond FHWA Memo 9/29/94



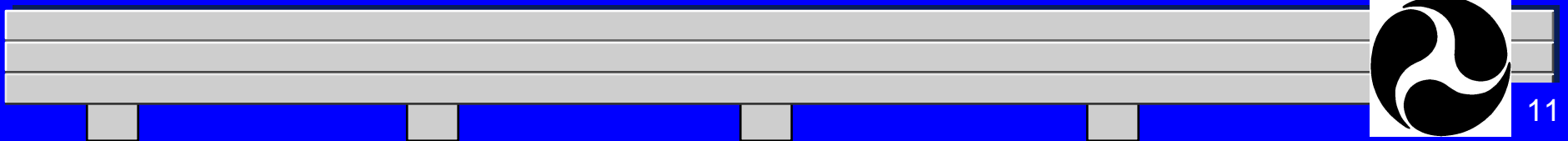
# NCHRP REPORT 350 TEST GUIDELINES

- WZ TRAFFIC CONTROL DEVICES
- TRUCK MOUNTED ATTENUATORS



# Crash Testing of Temporary Roadway Safety Features

- Hazardous Timber Barricades
- Precast Concrete Barriers



# Crash Testing of Temporary Roadway Safety Features

- Little testing of work zone devices prior to 350
- FHWA Guidance:
  - Four (4) Categories
  - Four Dates



# Work Zone Device Categories

- **Category 1 - Small, lightweight devices**
- **Category 2 - Potentially haz. devices**
  - *Minimum vehicle velocity change*
- **Category 3 - Potentially haz. devices**
  - *Significant vehicle velocity change*
- **Category 4 - Trailer-mounted devices**



# WZ Category 1 Devices Examples

(SMALL AND LIGHTWEIGHT DEVICES)

- PLASTIC OR RUBBER CONES
- PLASTIC OR RUBBER TUBULAR MARKERS
- PLASTIC DRUMS *With* LIGHTS



# **WZ Category 1 Devices Self - Certified**

**A. SIMILAR TO CRASH TESTED  
DEVICES OR SAFE**

**OPERATIONAL PERFORMANCE**

**B. MEETS SPECIFICATION BASED  
ON CRASHWORTHINESS**

**C. SIMPLIFIED CRASH TESTING**



# WZ Category 1 Devices

## AASHTO - FHWA 350 Implementation Schedule

- Implementation date
  - 10/1/98 for new purchases.
- Existing devices may be used by agencies until service life is exhausted.



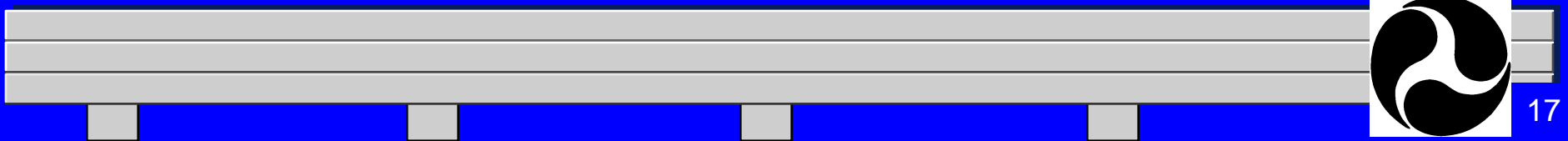


# WZ Category 2 Devices

## Examples

Potentially hazardous devices  
*Minimum vehicle velocity change*

- BARRICADES
- PORTABLE SIGNS SUPPORTS
- INTRUSION DETECTORS
- VERTICAL PANELS



# **WZ Category 2 Devices**

## **Degree of Testing**

### **REDUCED TESTING REQUIREMENTS**

- **LESSER INSTRUMENTATION**
- **SINGLE TEST AT 100 KM / H**
- **MAY BE VIDEOTAPED**



# WZ Category 2 Devices

## AASHTO / FHWA / ATSSA Implementation Schedule

- Implementation date was delayed until 10/1/2000 for new purchases.
- Existing devices may be used by agencies until service life is exhausted.

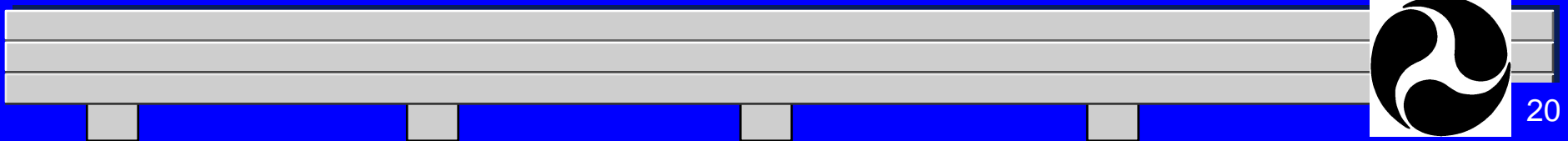


# WZ Category 3 Devices

## Examples

Potentially hazardous devices  
*Significant vehicle velocity change*

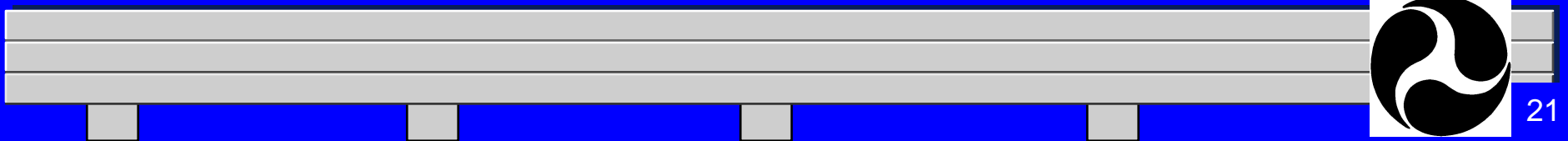
- BARRIERS INCLUDING PORTABLE CONCRETE BARRIERS
- CRASH CUSHIONS
- BREAKAWAY SIGN SUPPORTS



# WZ Category 3 Devices

## AASHTO - FHWA 350 Implementation Schedule

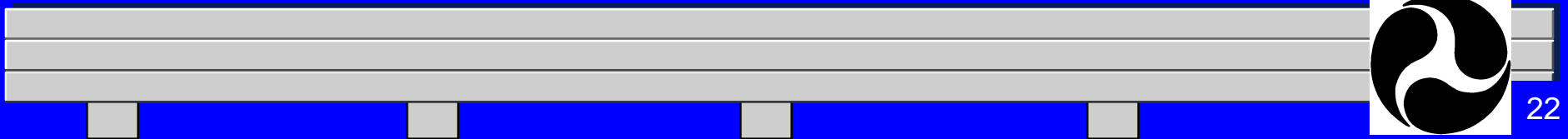
- WZ Category 3 devices, and devices which are similar to Category 2 devices except they exceed 45kg and/or "expected to cause significant occupant velocity change." Implementation date will be October 1, 2002.
- Portable Concrete Barriers (PCB) with joints that do not transfer tension and moment must be updated by 10/1/2000.



# WZ Category 3 Devices

## AASHTO - FHWA 350 Implementation Schedule

- New Portable Concrete Barrier units purchased after 10/1/2002 must comply with Report 350. (PCB meeting Report 230 can remain in use until the end of their service life.)

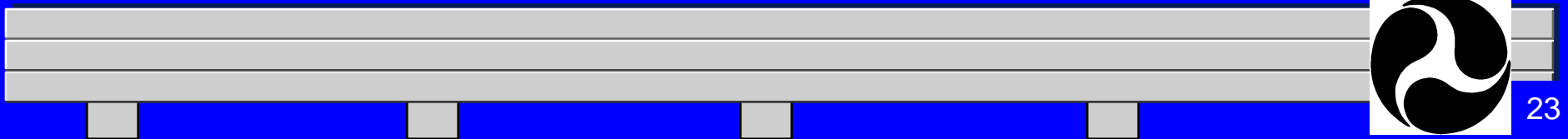


# WZ Category 3 Devices

## AASHTO - FHWA 350 Implementation Schedule

### Truck Mounted Attenuators and WZ Crash Cushions:

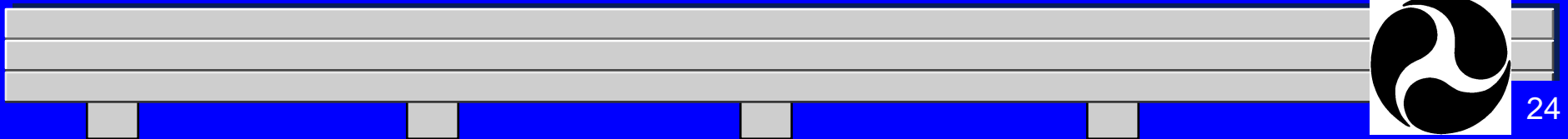
- New units purchased after 10/1/98 must comply with Report 350.
- Agencies may phase out existing Report 230 units as they complete their service life



# WZ Category 4 Devices

## Examples

- **FLASHING ARROW PANELS**
- **CHANGEABLE MSG. SIGNS**
- **TEMPORARY TRAFFIC SIGNALS**
- **OTHER TRAILER MOUNTED DEVICES**





# WZ Category 4 Devices

## AASHTO - FHWA 350 Implementation Schedule

- Delayed. Implementation date will be revisited by 10/1/2003.

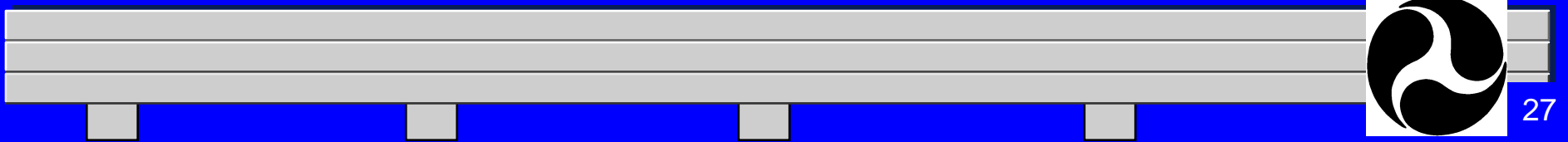


# FURTHER INFORMATION

- Q & A
- MEMO - WZ DEVICES  
PASSING NCHRP  
REPORT 350 dated 8-28-98
- <http://safety.fhwa.dot.gov/>

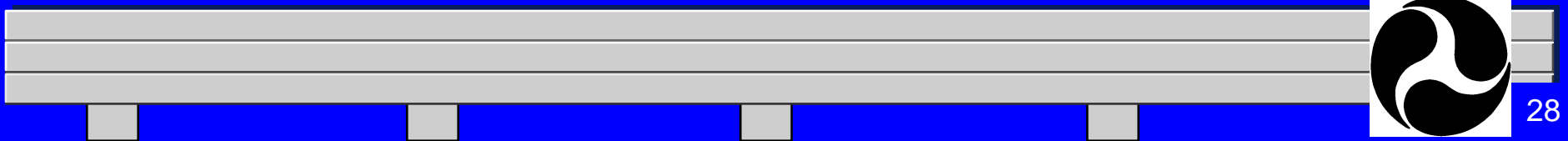


# Additional Topics in Roadside Safety



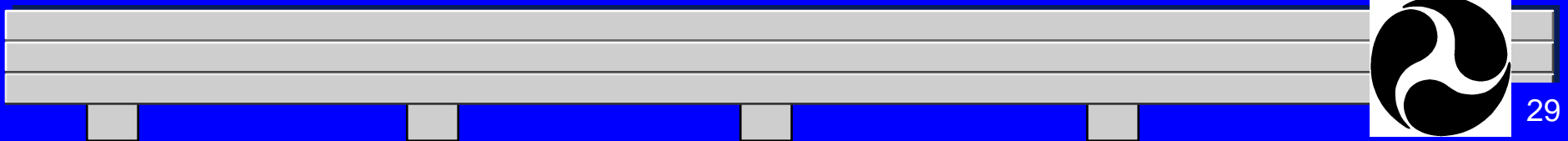
# WZ Warning Lights

- Type A and C – 8 inch Lens
  - Lightweight, or LED (max 1.5 kg )
  - Conventional (max 2.4 kg)
- Type B High Intensity
- Type D 360 degree visibility



# Temp Concrete Barriers

- 5 Designs listed on p. 9-3 of 1996 RDG transfer tension and moment.
  - Pin and loop
  - Channel splice
  - Vertical I-beam
  - Lapped Joint
  - J-Hook Joint



# 350 Temp Concrete Barriers

Pennsylvania, 12.5 ft, F Shape w/plate (marginal)

Idaho, 20 ft, NJ, Pin and Loop

Georgia, 10 ft, NJ, Pin and Loop, Thick stem

Barrier Systems, Inc. 1 meter Quickchange (3 types)

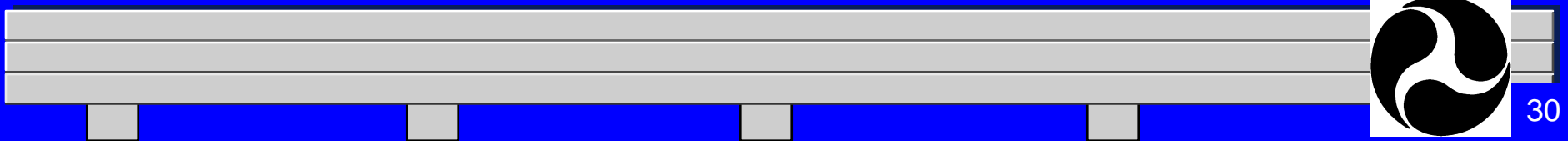
GPLINK, 20ft, Vertical, Pin and Loop

Caltrans K Rail, 20 ft, NH, Pin and Loop

Virginia, 20 ft, F Shape, Pin and Loop

Easi-Set, NJ and F, 20 ft, J-J Hook

Iowa, F Shape, 12.5 ft, Pin and Loop



# FHWA HQ Contacts

## 📞 General Coverage on Highway Safety

Rudy Umbs @ 202-366-2177

## 📞 Work Zone Devices, Breakaway Supports

Nicholas Artimovich @ 202-366-1331

## 📞 Barriers, Crash Cushions & Terminals

Richard D. Powers @ 202-366-1320

## 📞 Other Work Zone Matters

Harry Taylor @ 202-366-2175



# FHWA Web Sites

Roadside Hardware Homepage:

<http://safety.fhwa.dot.gov/programs/roadsideHardware.htm>

Overview and link to NCHRP Report 350

<http://safety.fhwa.dot.gov/fourthlevel/proResRoadOver.htm>

Index of Acceptance Letter Lists:

<http://safety.fhwa.dot.gov/fourthlevel/proResRoadNCHRP350.htm>

Policy Memos:

<http://safety.fhwa.dot.gov/fourthlevel/proResRoadPol.htm>

(Spaces contain “underscore” character)

