

DESIGNING FOR CONSISTENCY

Matching Applications to Scenarios in the Design of Traffic Control Devices

PRESENTED TO

**5th International Symposium on Highway Geometric Design
Transportation Research Board
Tuesday, June 23rd, 2015**

Scott O. Kuznicki, P.E.

Bryan J. Katz, Ph.D., P.E., PTOE

DISCLAIMER

**THE VIEWS AND OPINIONS EXPRESSED
IN THIS PRESENTATION ARE THOSE
OF THE PRESENTER(S) AND ARE
NOT INTENDED TO REFLECT THE
VIEWS, PREFERENCES, OR POLICIES OF
TOXCEL, LLC,
ANY DEPARTMENT OF TRANSPORT,
THE FEDERAL HIGHWAY ADMINISTRATION,
THE NATIONAL COMMITTEE ON
UNIFORM TRAFFIC CONTROL DEVICES, OR
THE TRANSPORTATION RESEARCH BOARD AND
ANY OF ITS COMMITTEES OR
SPONSORING ORGANIZATIONS.**









CLARITY?



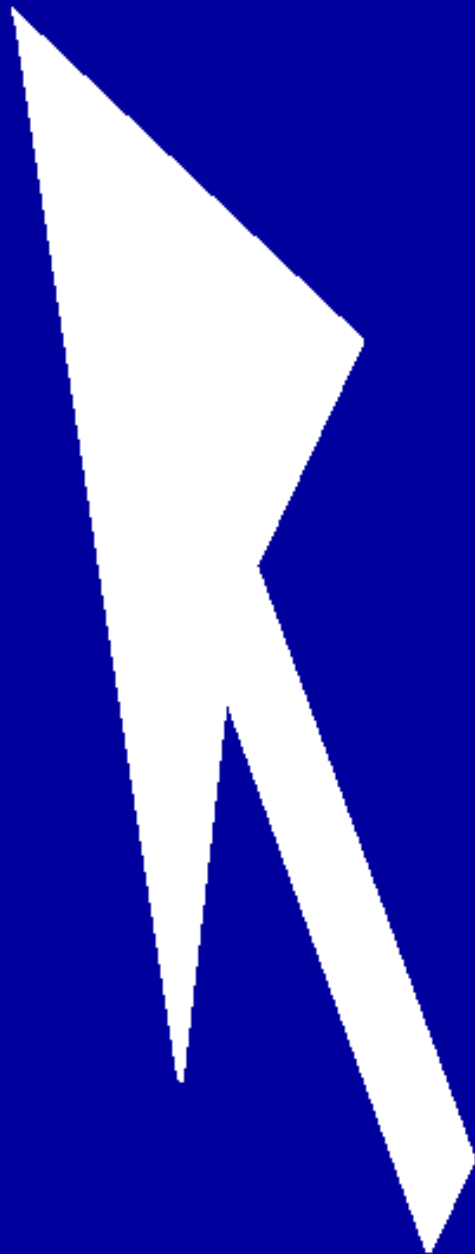




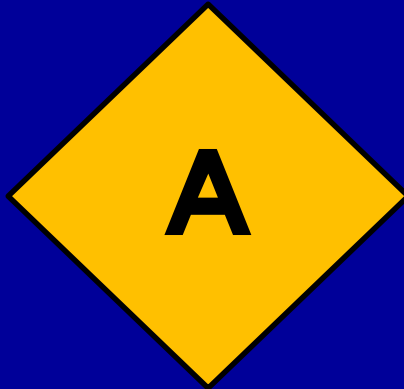




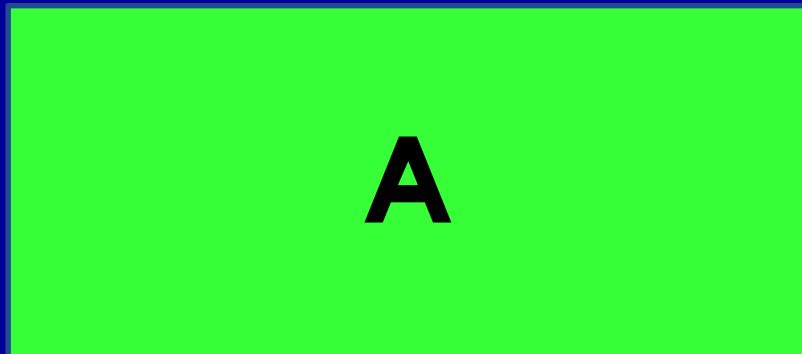
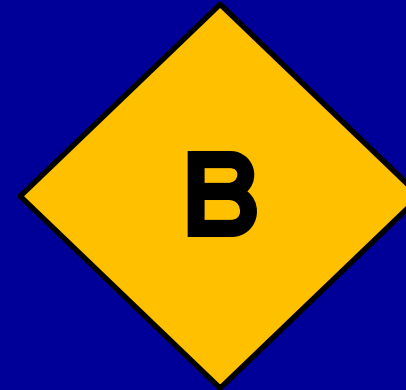




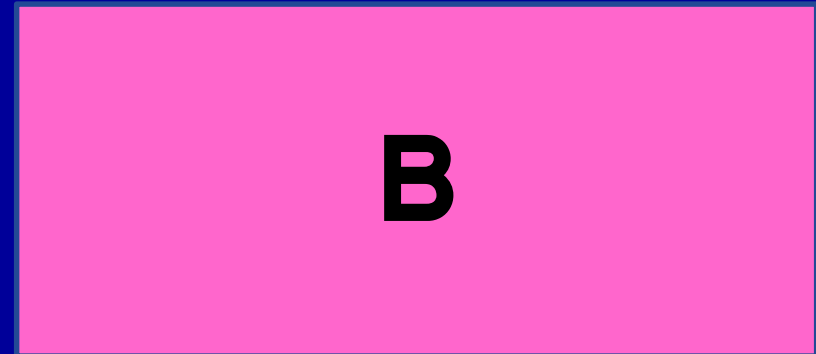
IF IT MEANS THIS, IT DOESN'T MEAN THAT



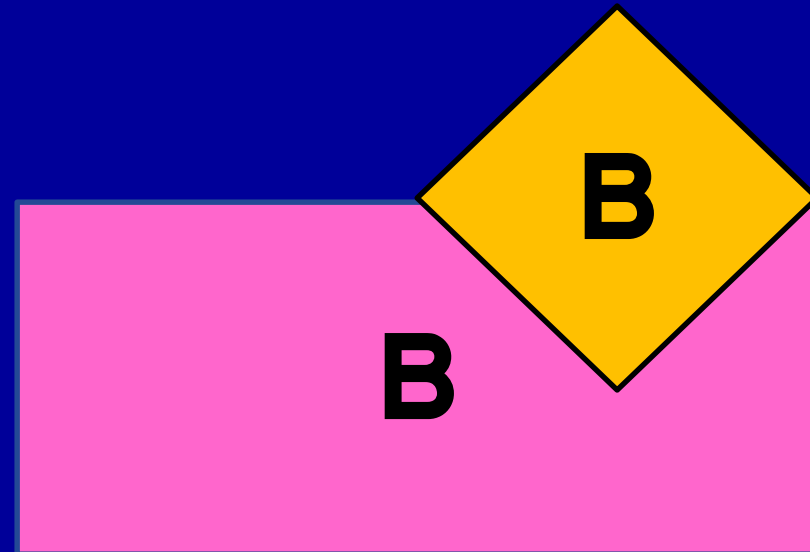
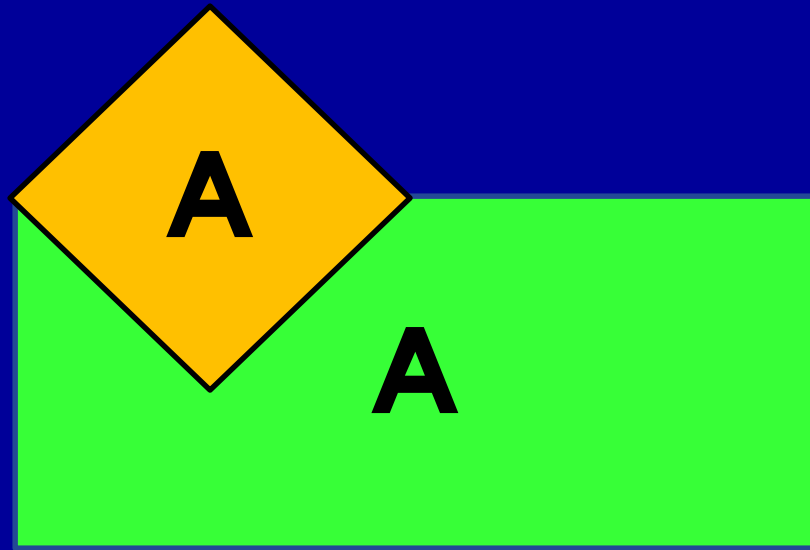
\neq



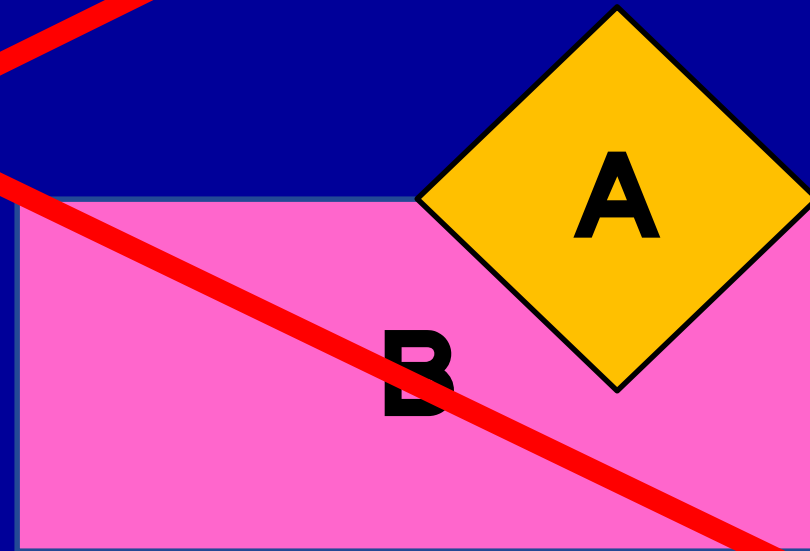
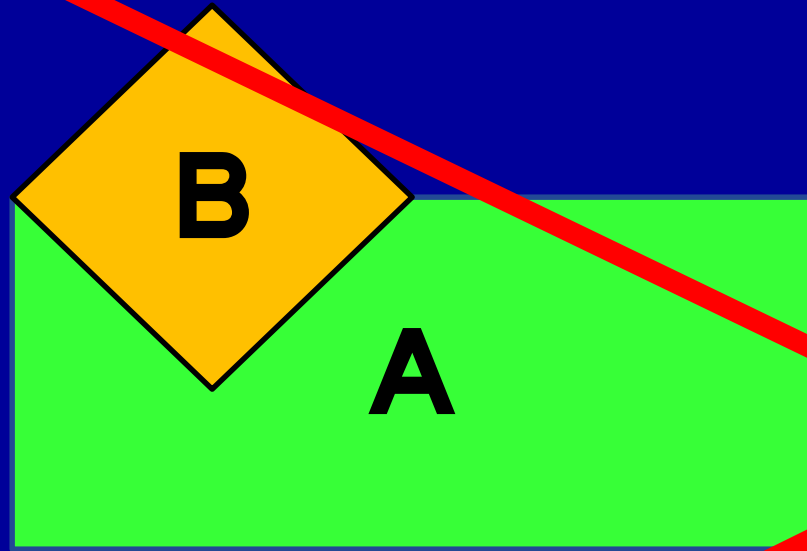
\neq



IF IT MEANS THIS, IT DOESN'T MEAN THAT



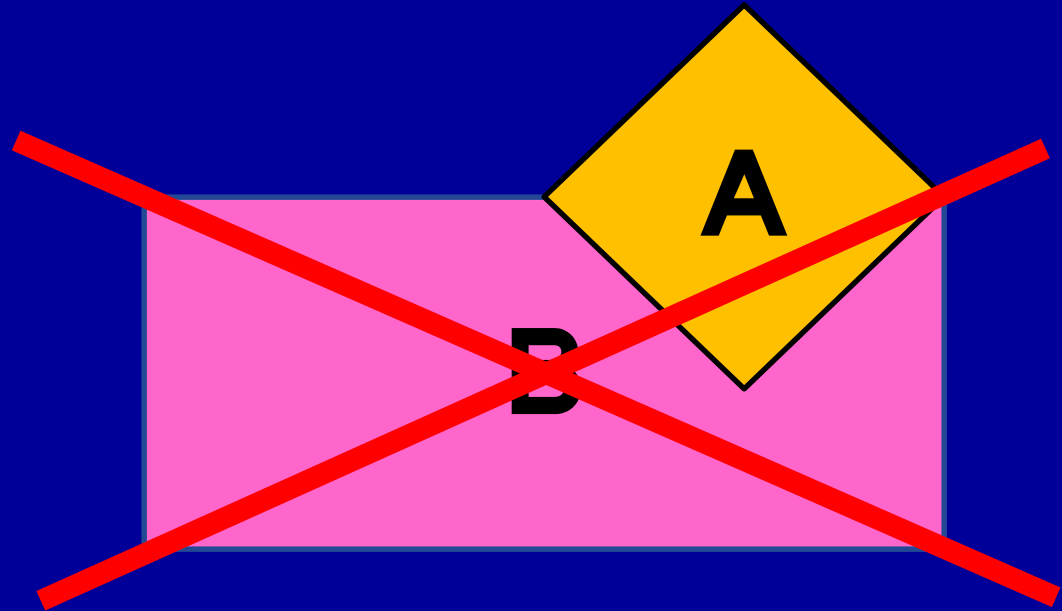
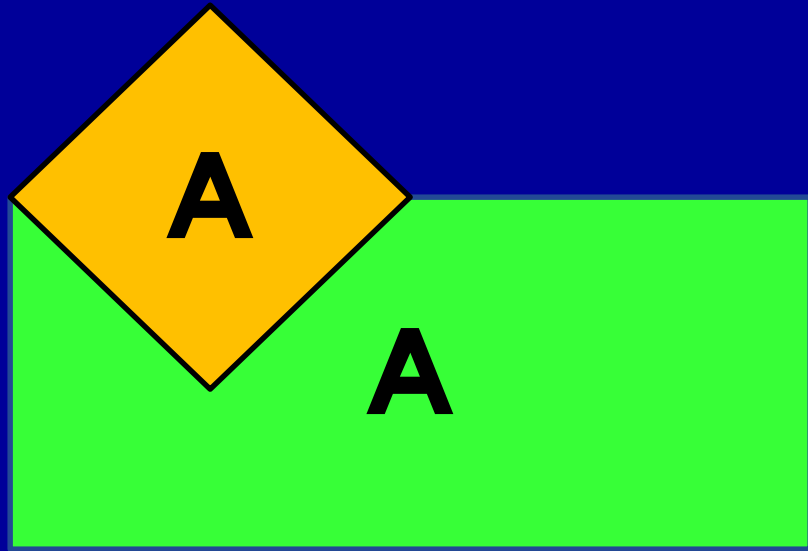
IF IT MEANS THIS, IT DOESN'T MEAN THAT



BROADENING USE

**“The application of a TCD
beyond the specific case
or specific set of related cases
for which it was intended.”**

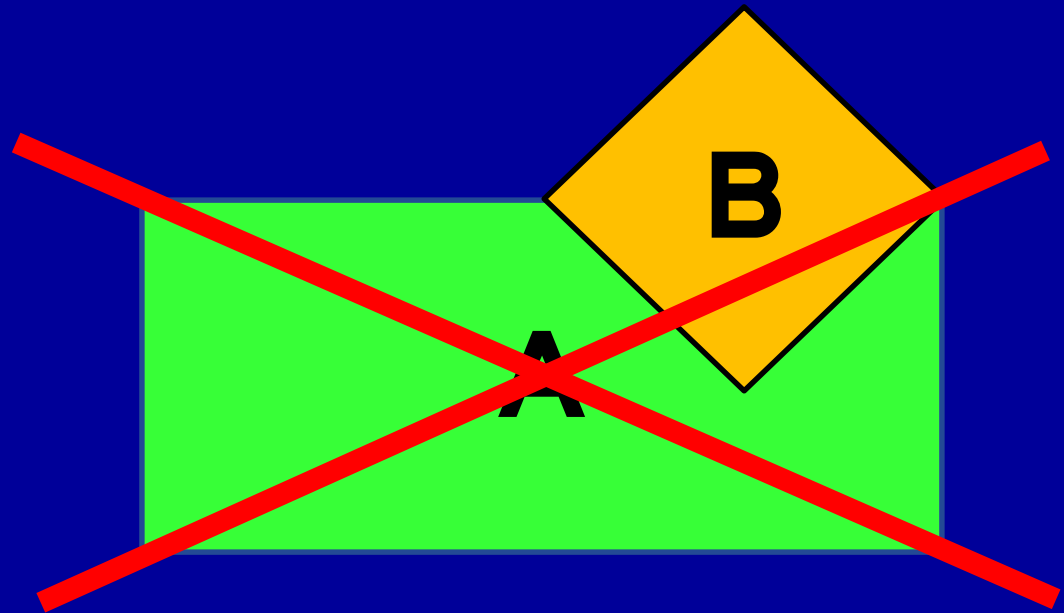
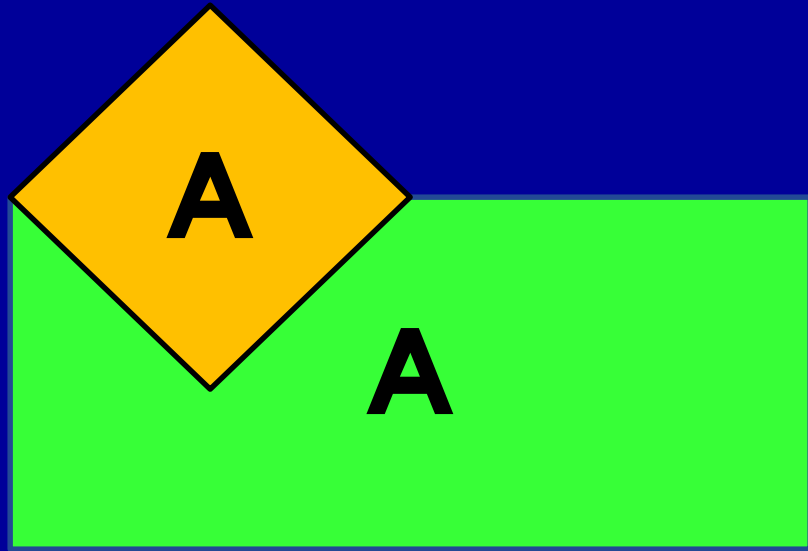
IF IT MEANS THIS, IT DOESN'T MEAN THAT



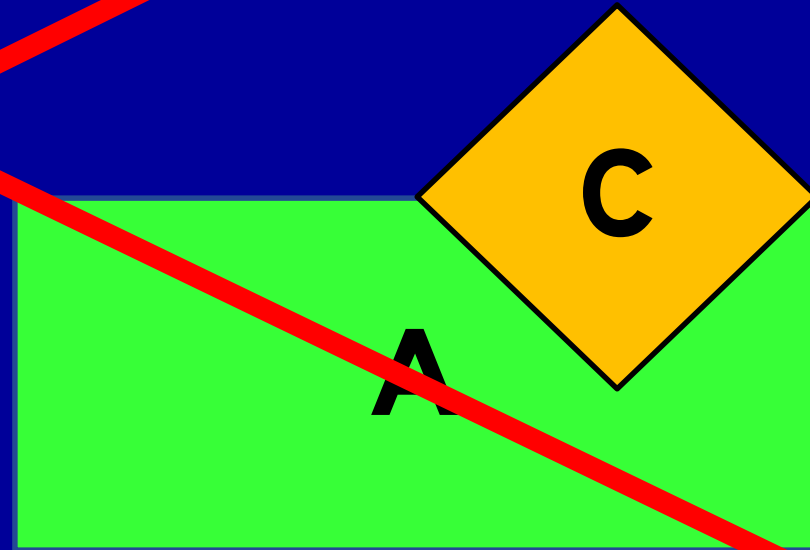
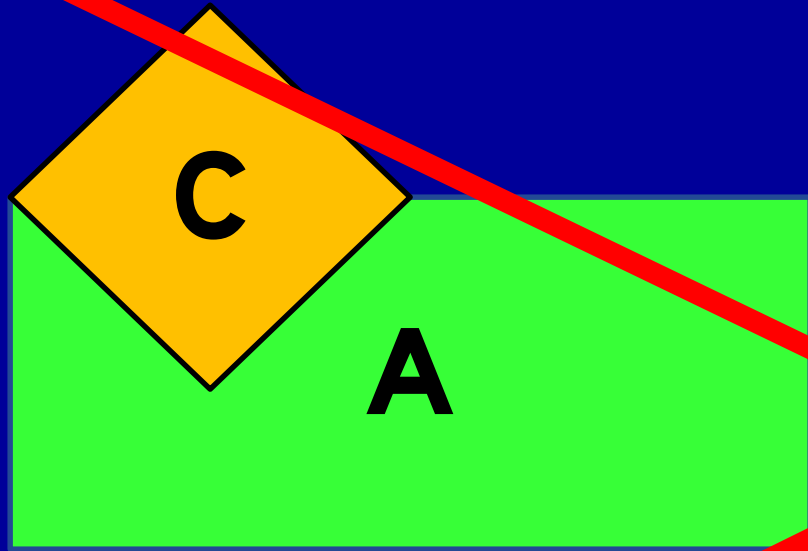
ERRATIC USE

**“The application of TCDs
with differing meanings
in locations where
one or a discrete set of TCDs
should be consistently employed”**

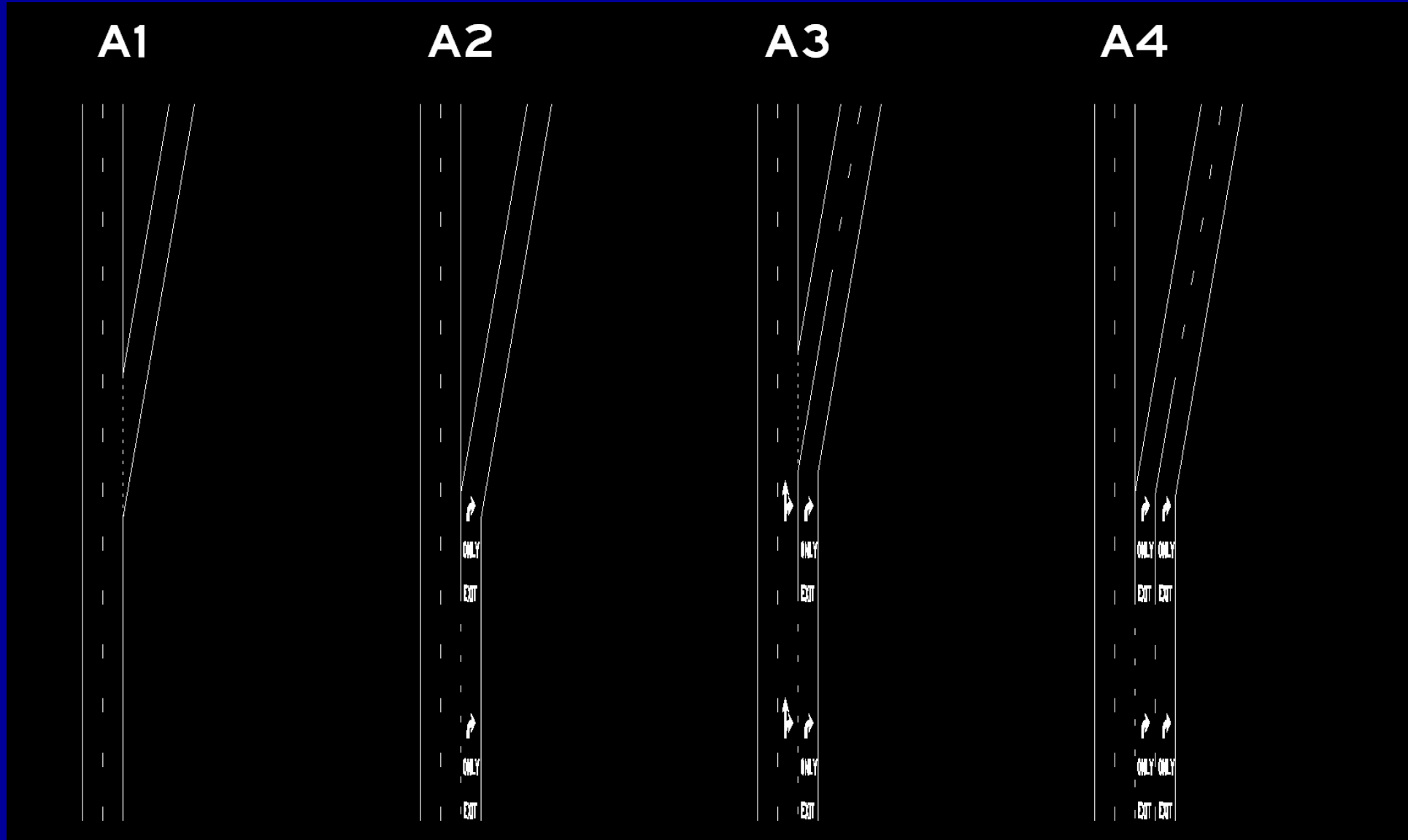
IF IT MEANS THIS, IT DOESN'T MEAN THAT



IF IT MEANS THIS, IT DOESN'T MEAN THAT



FOUR GEOMETRIC DESIGN OPTIONS ... FOUR *SCENARIOS*



EXITING LANES

LOCATION 1

LOCATION 1



LOCATION 1



EXITING LANES

LOCATION 2

LOCATION 2



LOCATION 2



LOCATION 2



LOCATION 2



LOCATION 2



EXITING LANES

LOCATION 3

LOCATION 3



LOCATION 3



LOCATION 3



LOCATION 3



LOCATION 3



EXITING LANES

LOCATION 4

LOCATION 4



LOCATION 4



LOCATION 4



LOCATION 4

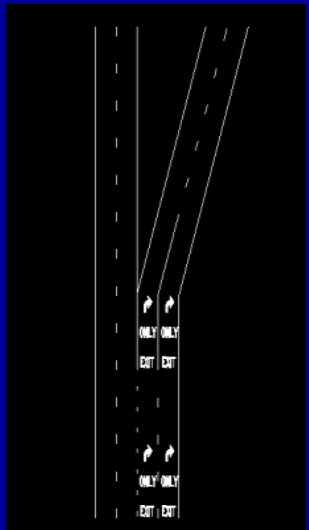
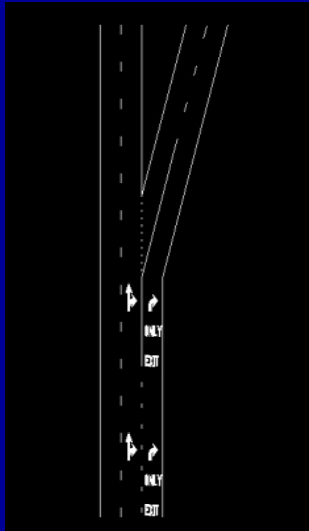


LOCATION 4

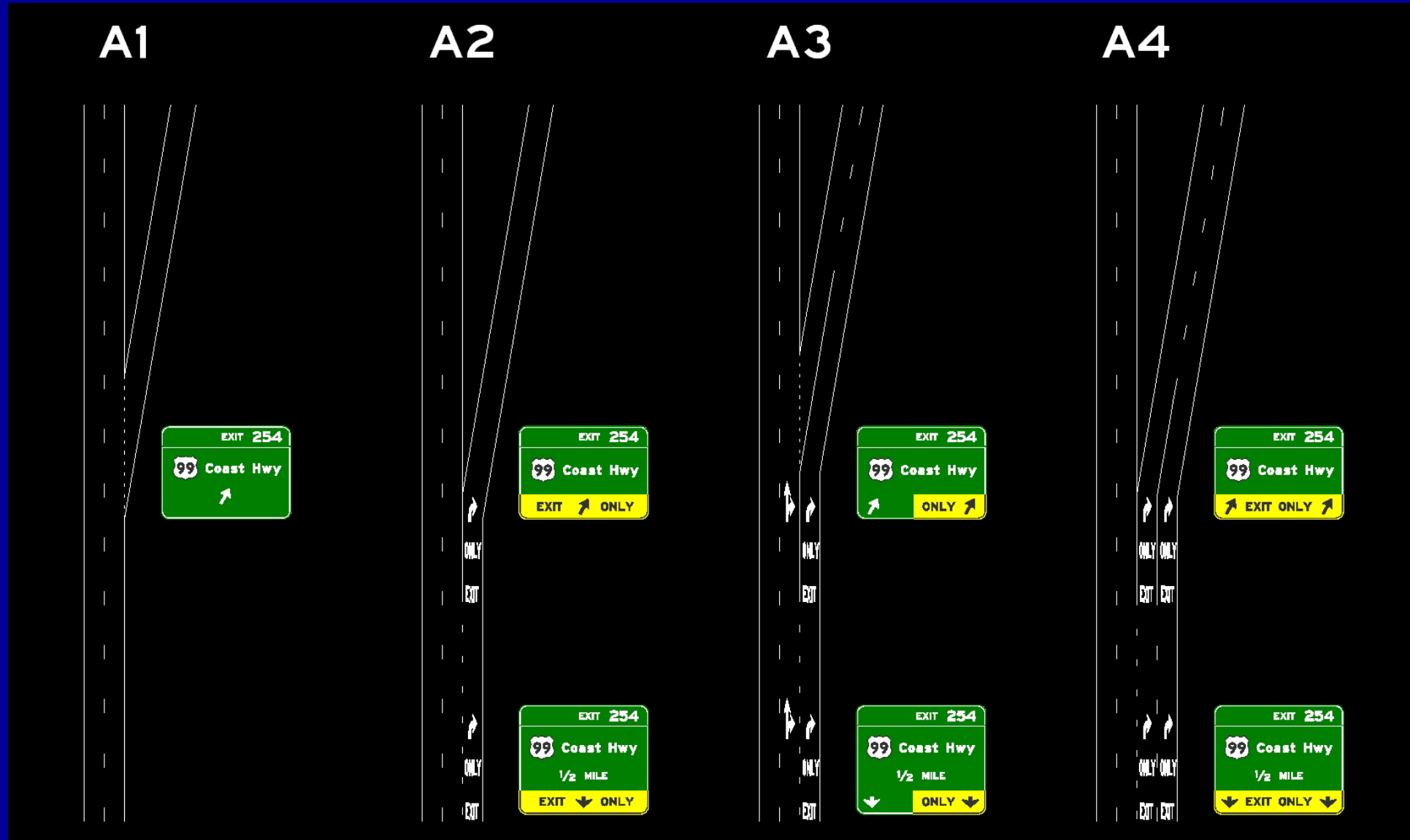


LOCATION 4 IN COMPARISON TO LOCATION 3





FOUR GEOMETRIC DESIGN OPTIONS . . . FOUR *EXCLUSIVE* APPLICATIONS



BROADENING USE

**TRAP LANES AND
LANE REDUCTION SIGNING**















BROADENING USE

GUIDE SIGNING IN ADVANCE OF SYSTEM INTERCHANGES



Kipling St 1/2
Wadsworth Blvd 2
Jct I-76 LEFT 2 1/2

KIA

CHEVROLET
Cadillac
MEDVED

WARP SPEED
Water World

2 SONS ME PLANNING LBS

FEDERAL





















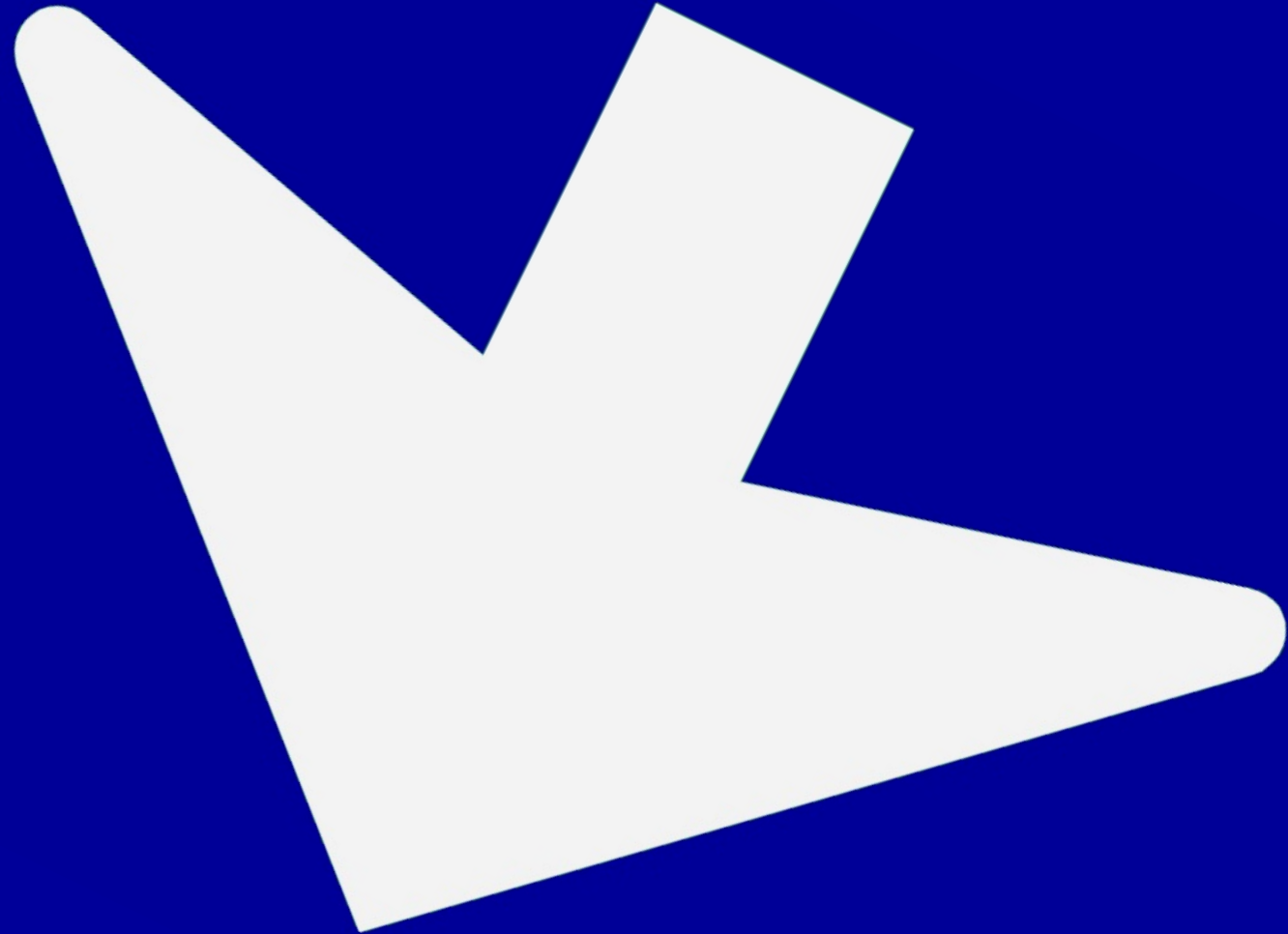




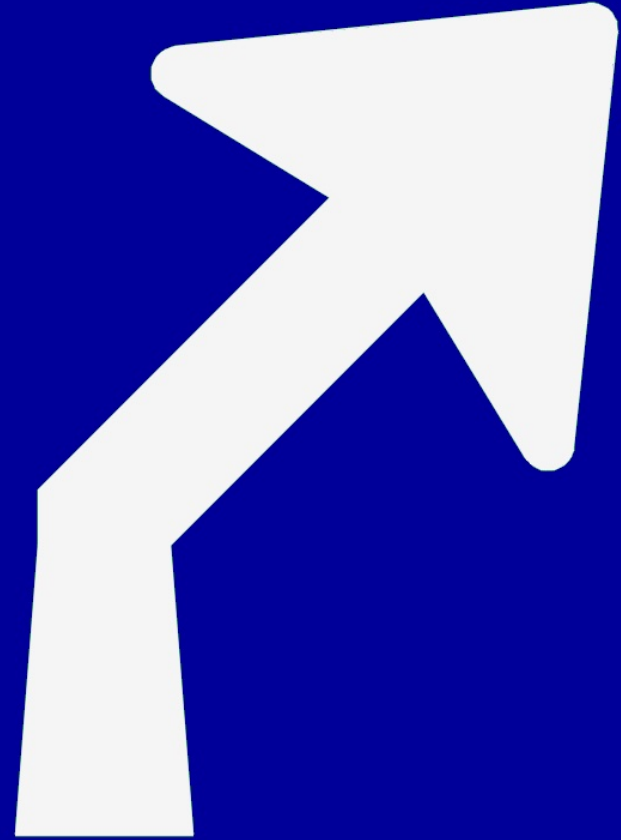


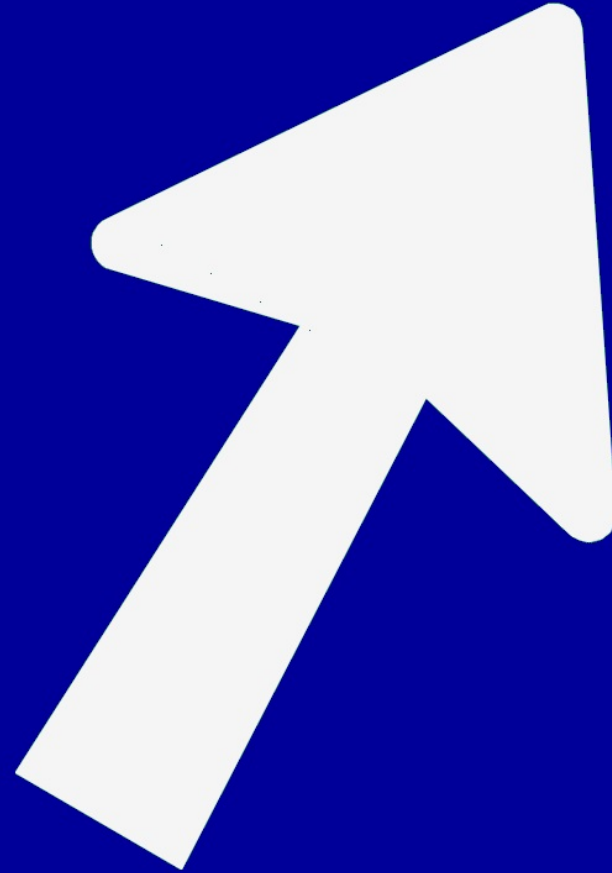












ERRATIC USE OF GUIDE SIGN ARROWS





◇ HOV - 2 6 - 9 AM MON - FRI

TO  SOUTH Washington N Virginia	TO  EAST Silver Spring College Park
	





HOV - 2

TO  SOUTH Washington N Virginia	TO  EAST Silver Spring College Park
	

 SOUTH
TO  EAST
Silver Spring
College Park

 ONLY 

 SPUR
TO  SOUTH
Washington
Northern Virginia

 ONLY 



COMPOUNDING THE PROBLEM OF BROADENING AND ERRATIC USE







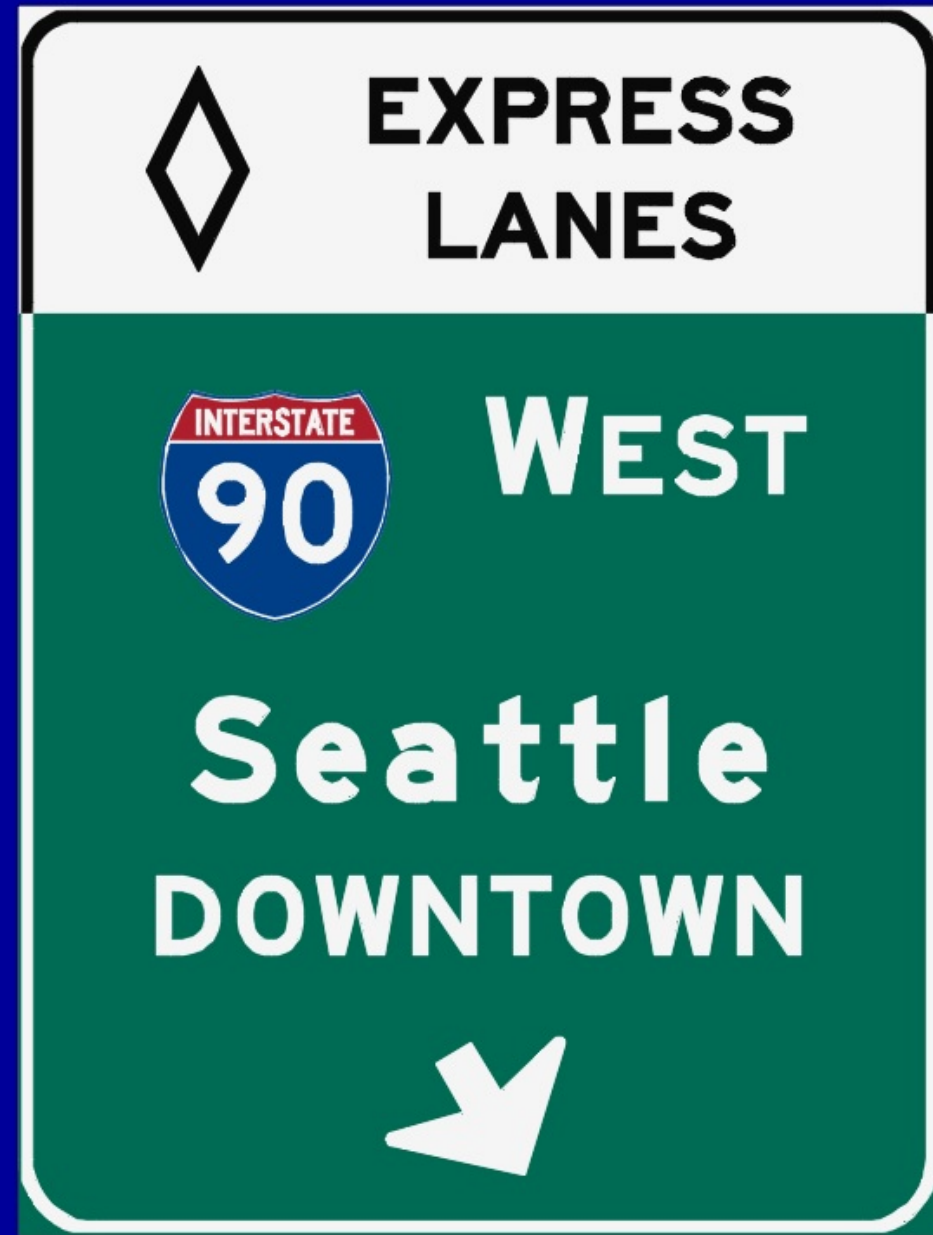




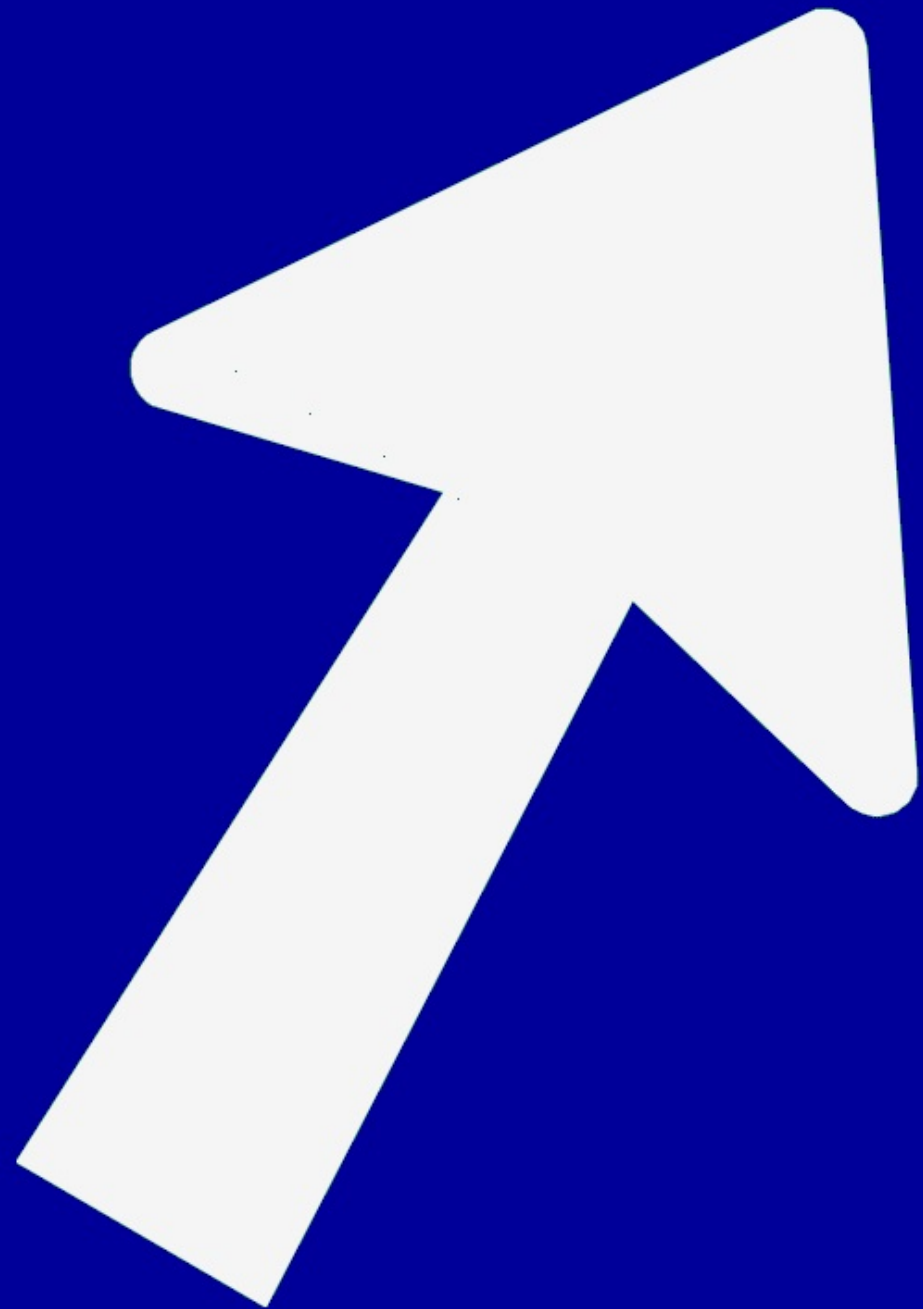


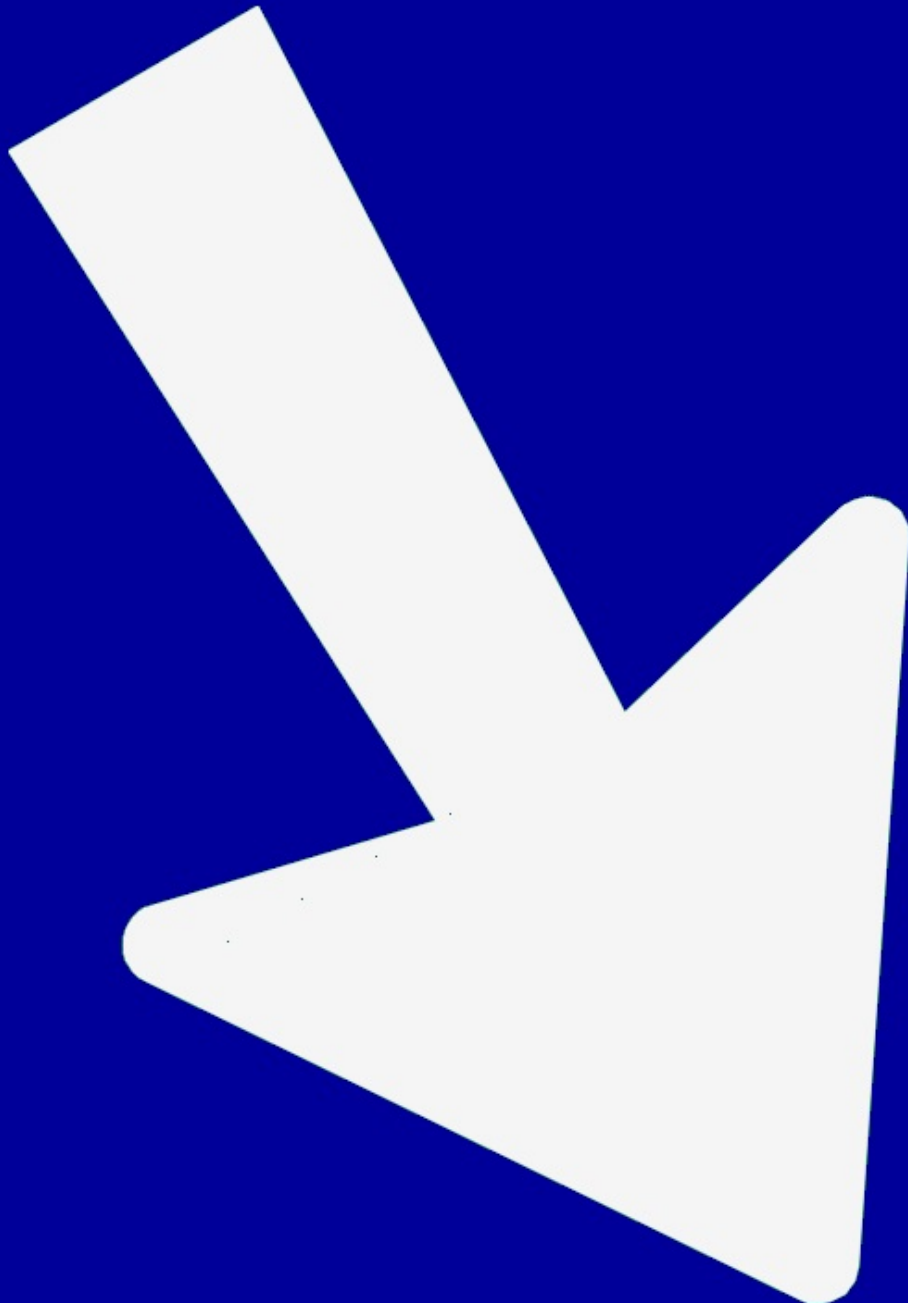






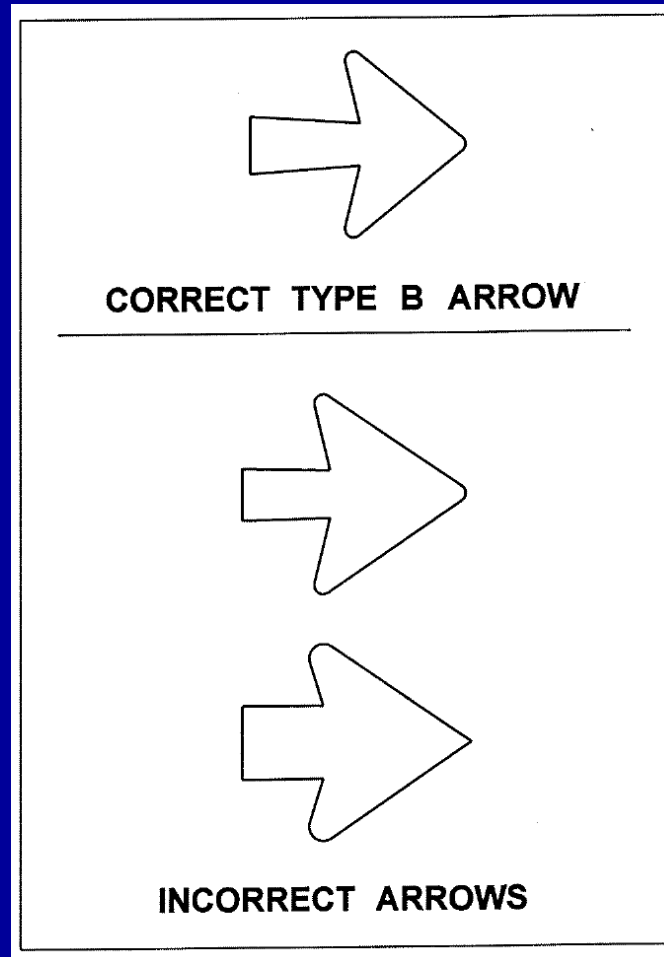
WHAT DOES THIS MEAN?

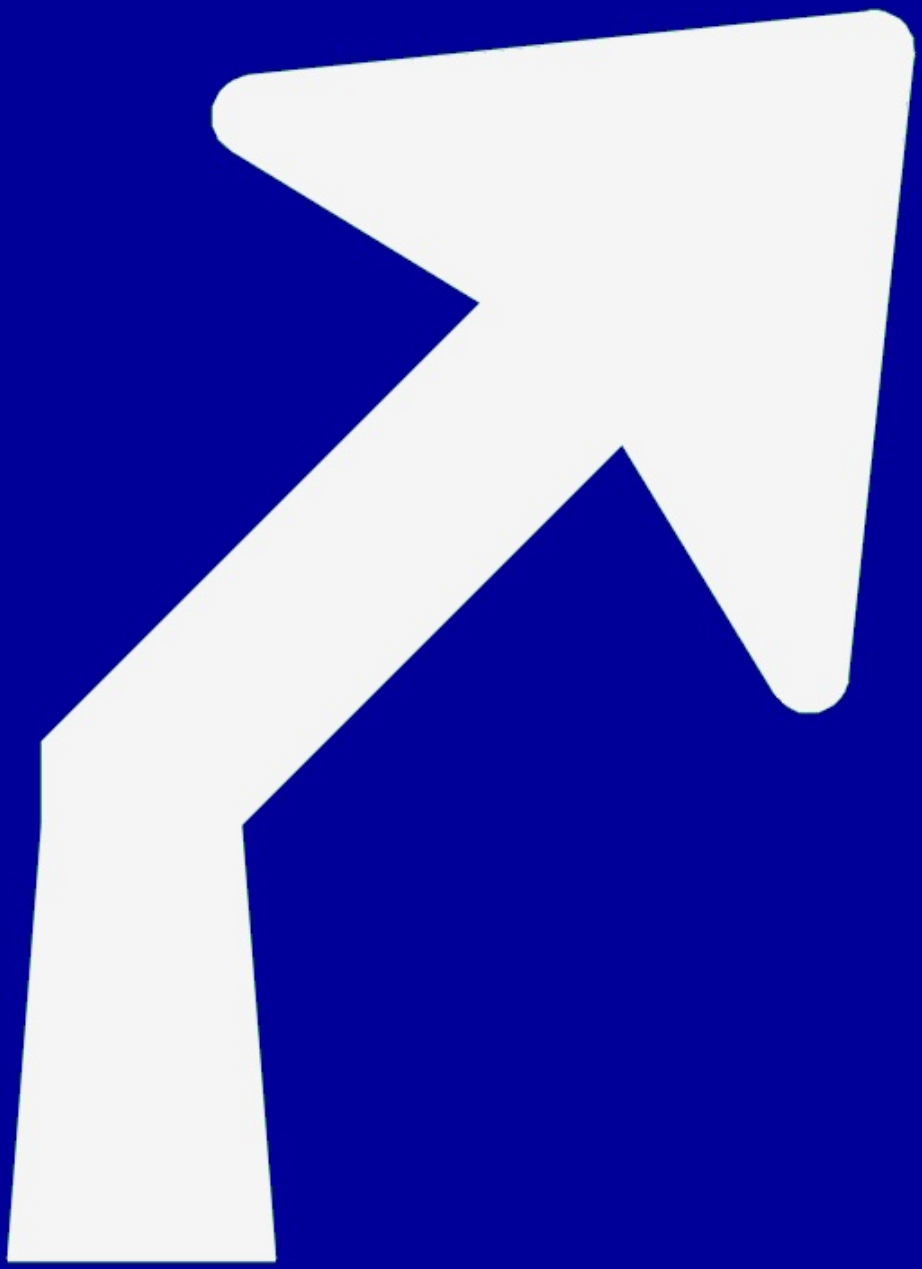


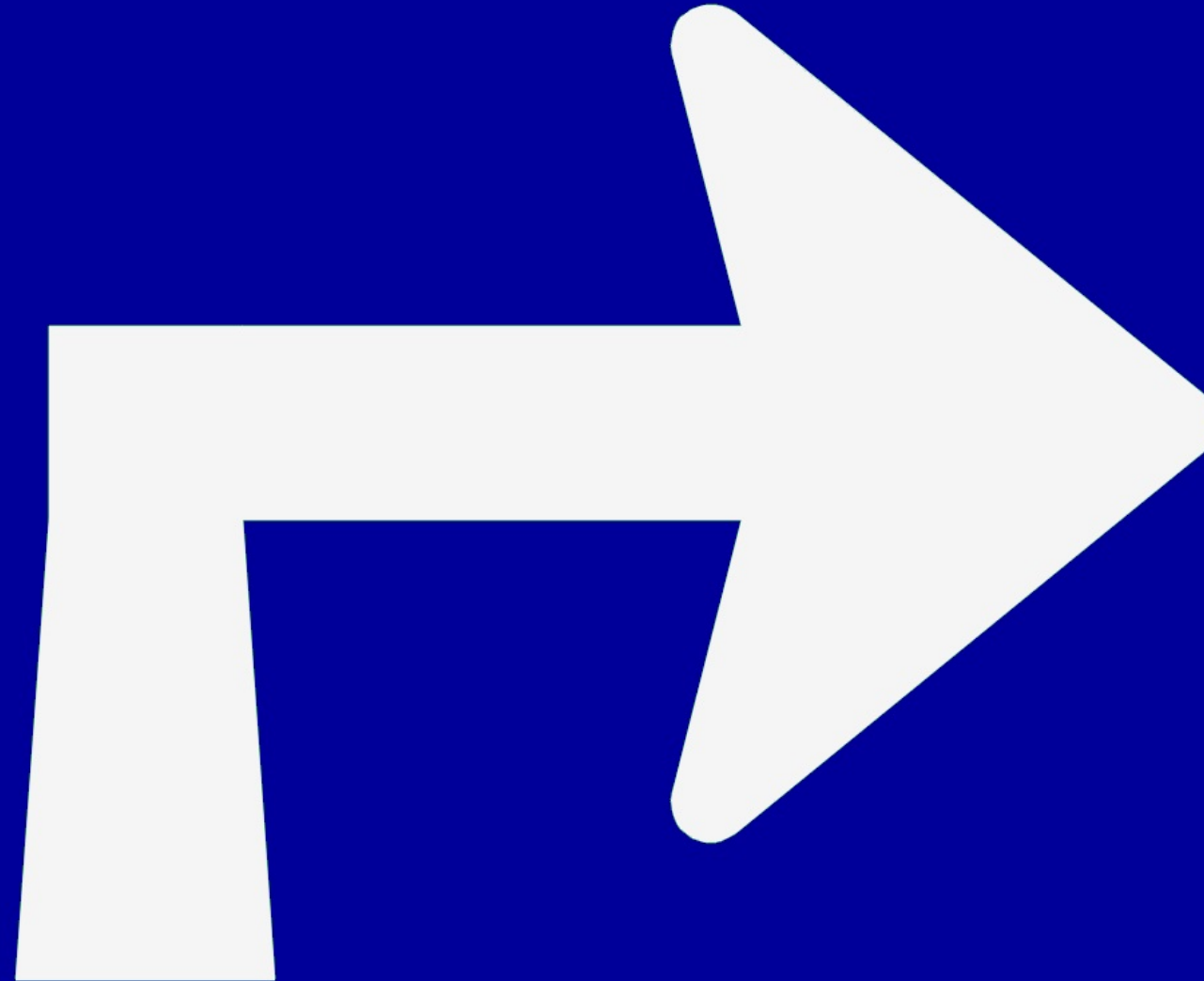




STANDARD ARROWS

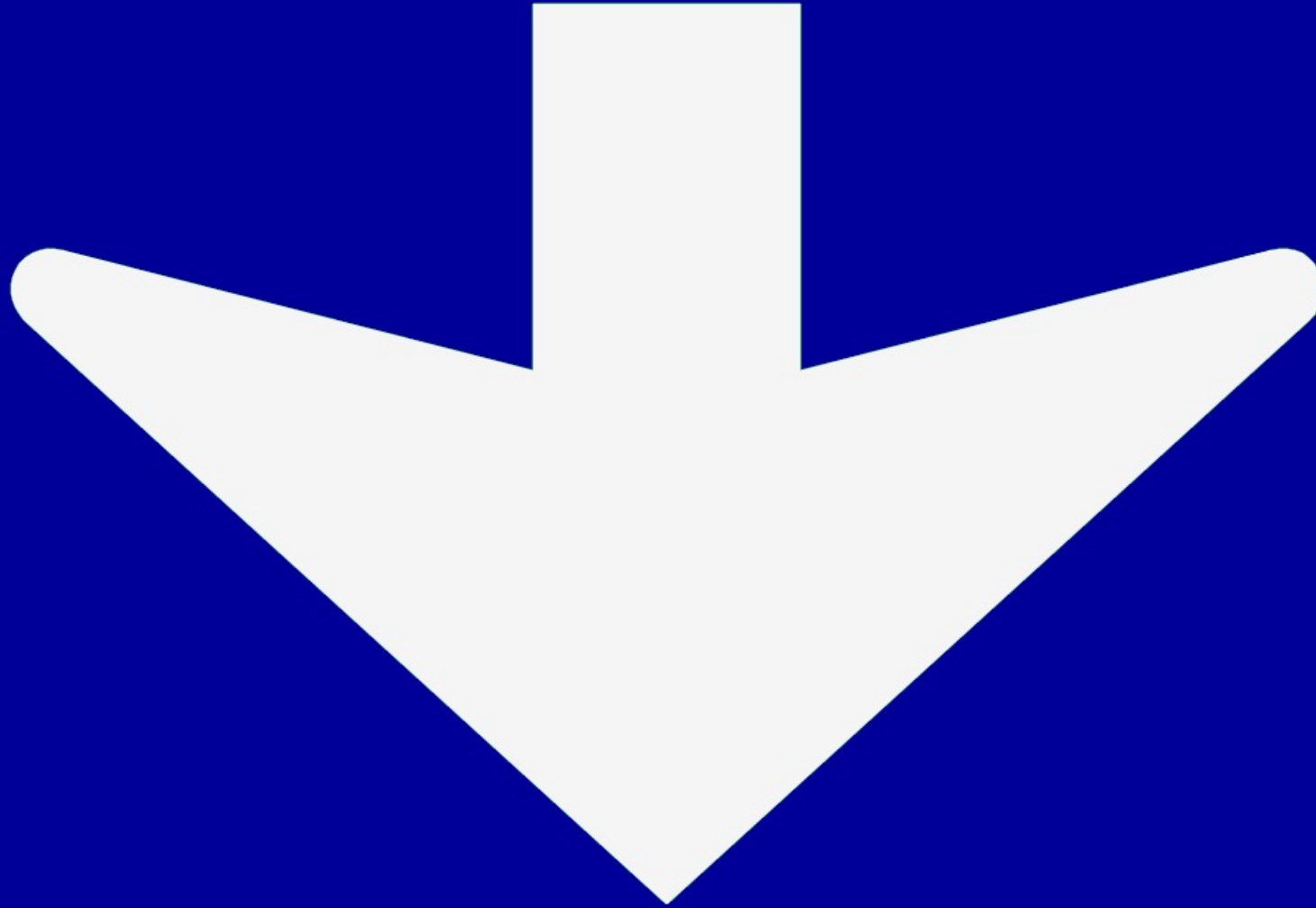


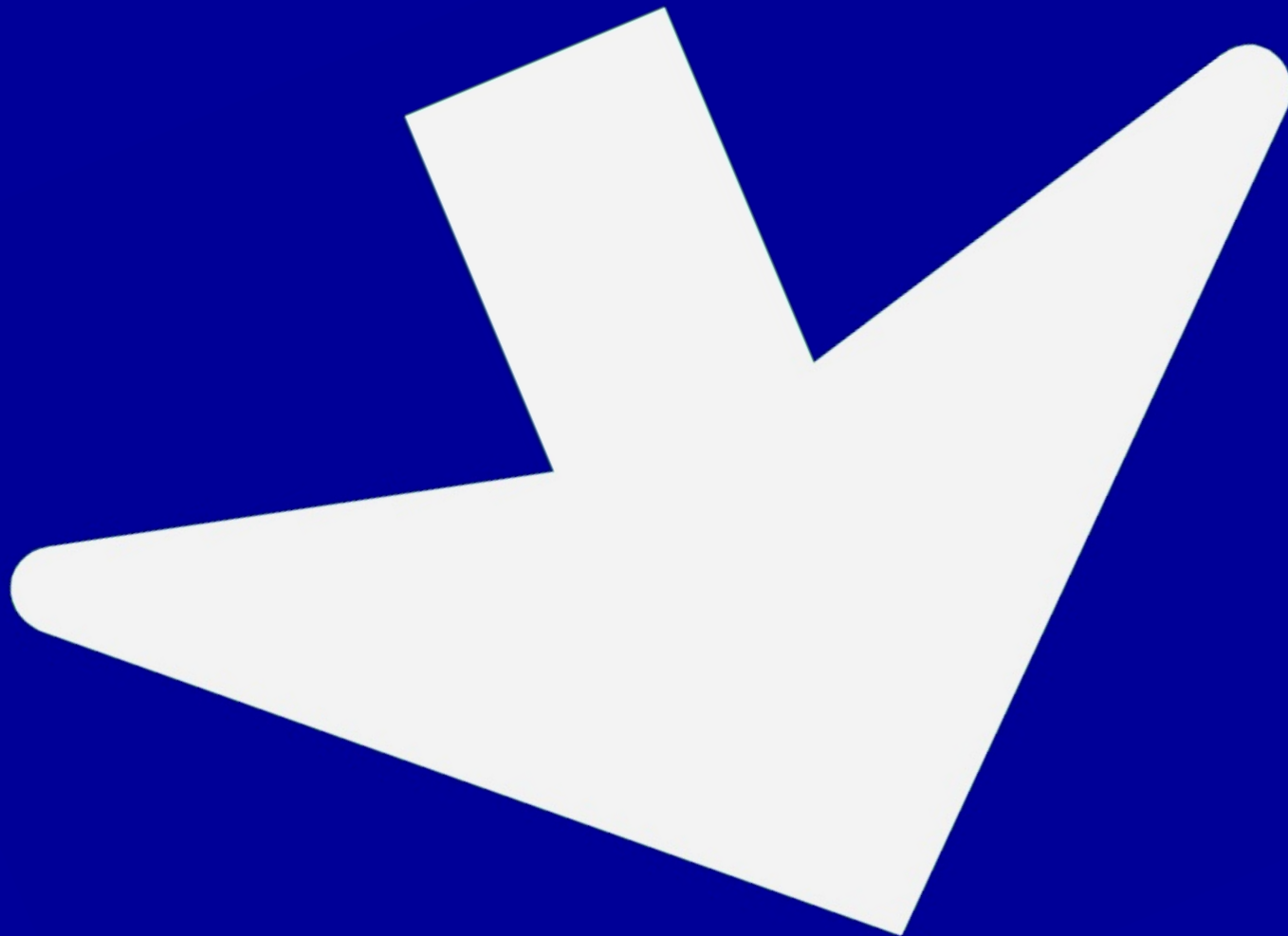




DIRECTIONAL ARROWS

- **An upward arrow pointing to a direction at or above a horizontal line indicates a departing movement**
- **The upward angle Type A or Type B arrow installation is indicative of the severity of the exiting movement**
- **Type A and Type B arrows never point down into a lane from an overhead sign**
- **Type A and Type B arrows are typically restricted to use on Exit Direction Signs at service interchanges**
- **Type A and Type B arrows may point downward into the nearest lane to which a message applies so as to provide positive guidance for route marking and regulatory signing**



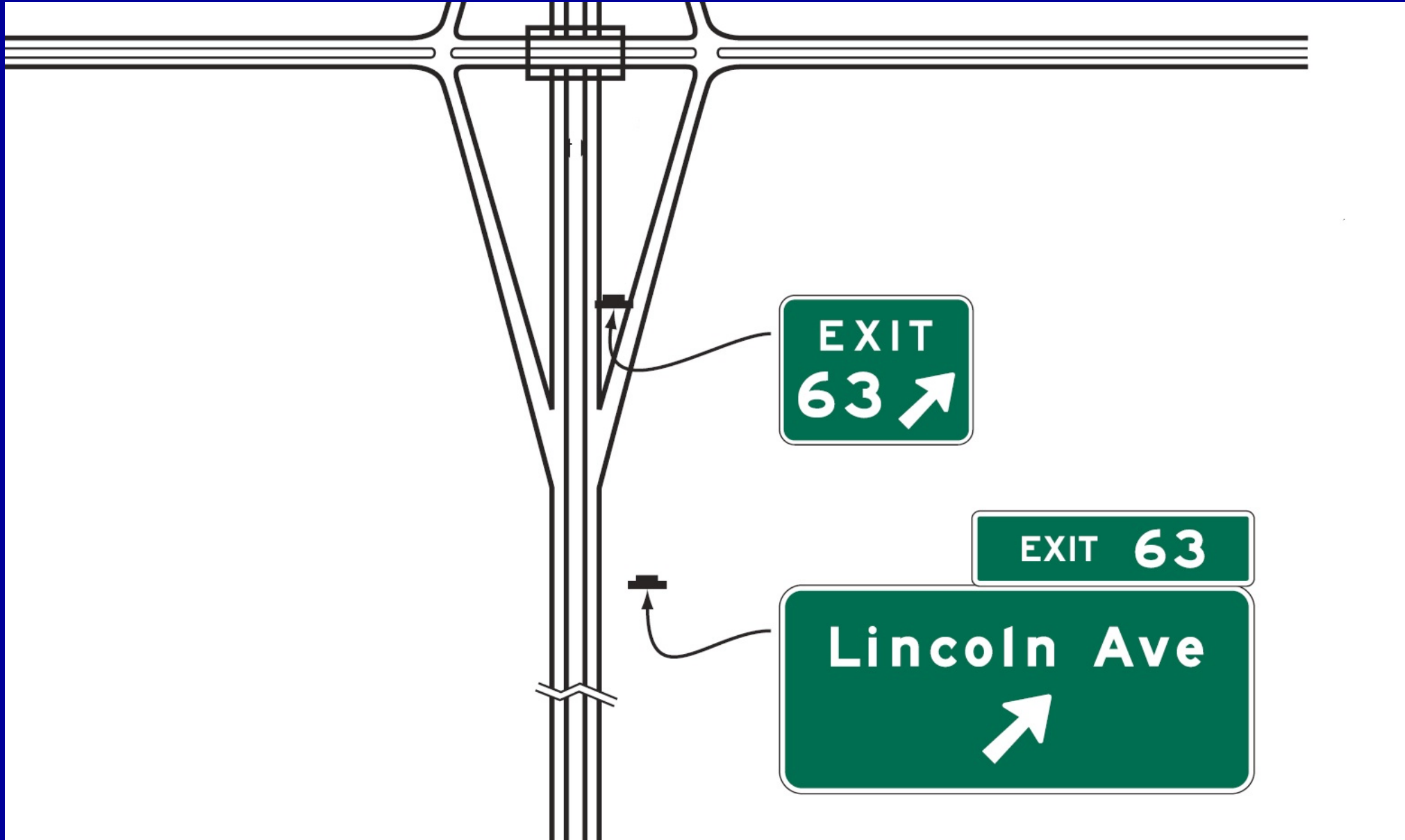


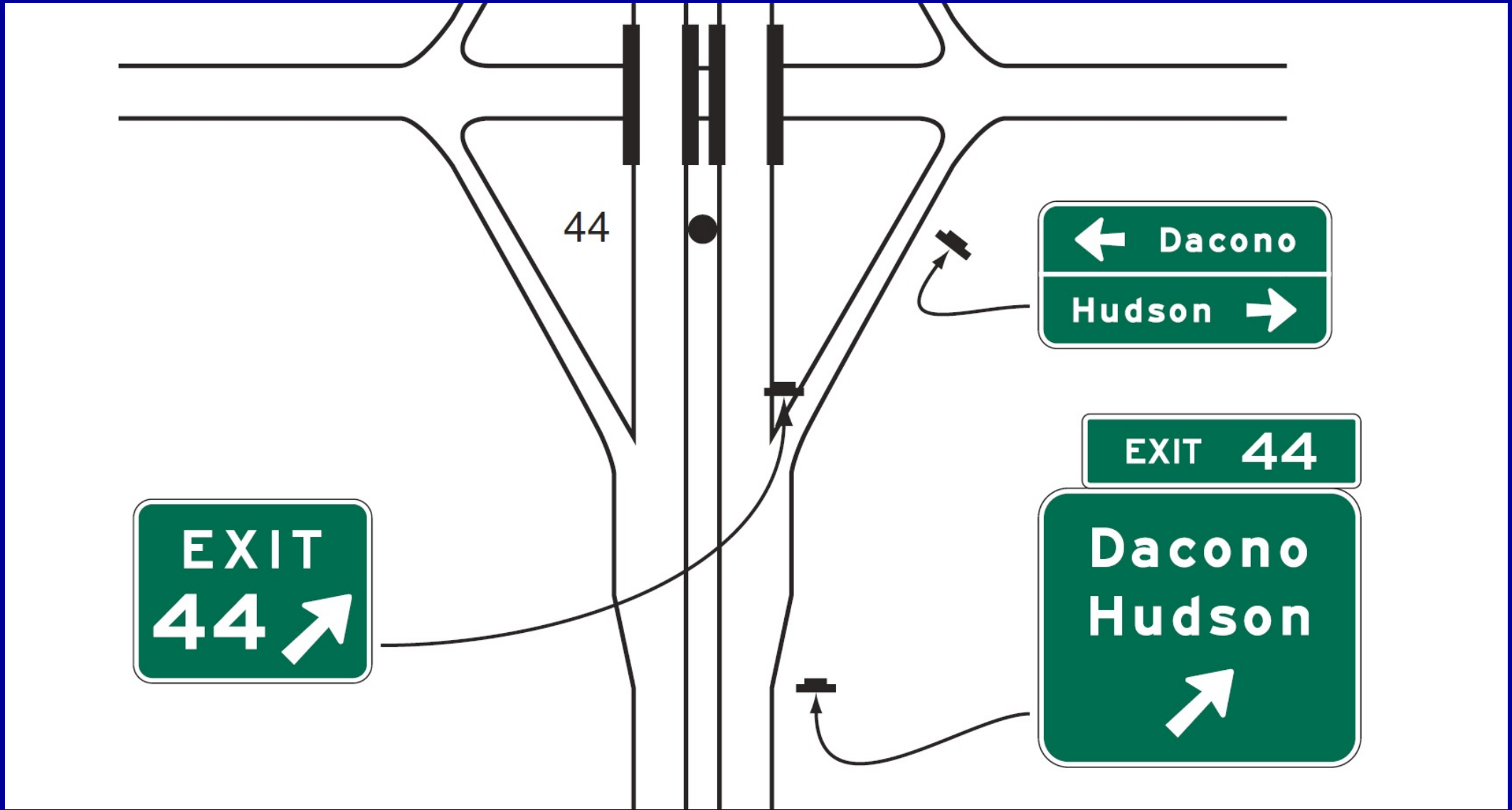
DOWN ARROWS

- **A Down Arrow always indicates a lane that continues on along the mainline, even if that lane terminates downstream in a service interchange**
- **The degree of the angle of installation of a Down Arrow, when not 0° off the vertical, indicates the curvature of the mainline movement or primary movement(s) within an interchange, used only on signs placed at the decision point**
- **Down Arrows may be used on more than one sign at a junction if the additional movements are considered primary movements, such as at a major split of two marked routes of equal importance along a motorway corridor**
- **Angled Down Arrows are only applied in conjunction with overhead Exit Direction Signs**

**ARROW ORIENTATION AND TYPE
MATTERS . . .**

**. . . AS DOES THE LOCATION
OF THE SIGN!**





**ARROW ORIENTATION AND TYPE
MATTERS . . .**

**. . . AS DOES THE LAYOUT
OF THE SIGN LEGEND!**

EXIT 26



NORTH TO



Selah



EXIT 26

NORTH TO



Selah



ROOT CAUSES?

- **CONFLICTING AND AMIBIGUOUS REGULATIONS**
- **POOR UNDERSTANDING OF HUMAN FACTORS PRINCIPLES**
- **LACK OF RESOURCES**
- **APATHY AND DEFEATISM**
- **POOR EXAMPLES IN NEARBY AREAS**
- **[YOUR IDEA HERE!]**

W9-2 Lane Ends Hybrid Symbol Signs



W9-2L



Information

The Lane Ends hybrid symbol sign, number of lanes, either through lane or the Lane Reduction symbol sign alone in locations, such as short a

The Lane Ends hybrid symbol sign. Generally, the placement will be reduction taper by a distance equ between multiple locations in simi

Policy

Standard The Lane Ends warning sign.

The Lane Ends hybrid symbol sign is intended for placement just prior to the beginning of the lane reduction taper. Generally, the placement will be at the beginning of the lane reduction taper or in advance of the beginning of the lane reduction taper by a distance equal to no more than a multiple of 1.5 times the posted speed limit. Uniform placement between multiple locations in similar facility types is desirable.

Policy

Standard The Lane Ends hybrid symbol sign shall not be used in advance of any other lane reduction advance warning sign.

Guidance

Use of the Lane Ends hybrid symbol sign should be standardized between locations of similar geometric and operational conditions.

Option

The Lane Ends hybrid symbol sign may be installed in advance of the beginning of lane reduction tapers to warn motorists that the subject lane is ending and that a taper will begin at the location of or closely following the sign.

History


The Lane Ends Hybrid Symbol sign was developed for use in work zones by the Minnesota Department of Transportation. Use of the sign in permanent installations was tested in 2009 and its use expanded to several other states. This sign was first included in the 2016 Edition of the MUTCD.

Succession

This sign replaces the LANE ENDS MERGE LEFT (RIGHT) sign, which last appeared in the 2009 edition of the MUTCD.

References

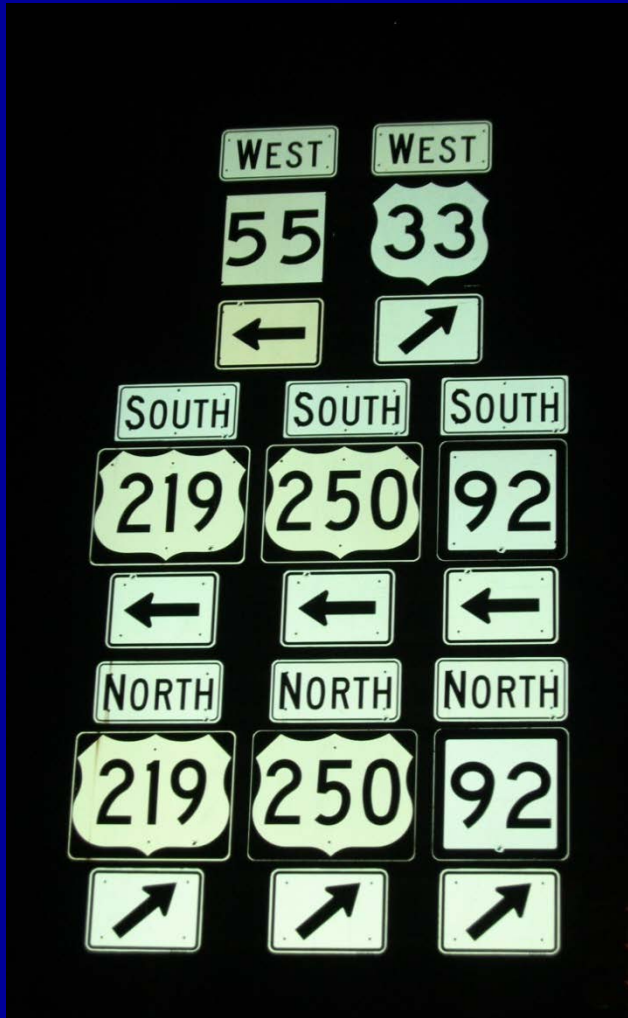
- W4-2 Lane Ends symbol sign (Section 2C.42)
- W9-1 RIGHT (LEFT) LANE ENDS sign (Section 2C.42)
- Pavement Markings for Transition Areas (Section 3B.08)
- Typical Applications for Lane Reductions (Figure 2C-9)



“Rather than throwing more regulations at people and creating highly-prescriptive environments where flexibility cannot be understood, let alone applied, it would be more advantageous were we to teach them how to apply the principles we want them to use and give them practical case studies from which they can learn.”

ADDRESSING THIS ISSUE

- MORE INFORMATION ON HOW TO APPLY THESE PRINCIPLES
- IMPROVED STRUCTURE FOR DISSEMINATING INFORMATION TO LOCAL AGENCIES
- IMPROVED OVERSIGHT OF LOCAL AGENCIES
- USING TECHNICAL SPECIALISTS
- PROVIDING CERTIFICATION PROGRAMS FOR CONSULTANTS AND GOVERNMENT AGENTS WHO PERFORM THIS WORK
- MORE OPPORTUNITIES FOR CONVERSATION
- AN OPEN MIND



THANK YOU

Scott O. Kuznicki, P.E.

scott.kuznicki@toxcel.com

Bryan J. Katz, Ph.D., P.E., PTOE

bryan.katz@toxcel.com