



# Central Office Traffic Engineering Updates

Marc Lipschultz, P.E., PTOE  
VDOT Traffic Engineering Division

Signal Design/Construction Forum | October 16, 2017 | Fairfax, VA

# Agenda

- ➔ ■ ATC/CSS Procurement
  - LED lighting
  - Standards & Specs Updates
  - Accessible Pedestrian Signals
  - Signal Justification Reports
  - Questions & Answers

# ATC/CSS | *Advanced Traffic Controllers*

- VDOT is migrating statewide to the Advanced Transportation Controller Platform (ATC)
- Benefits:
  - Leverage the latest controller technology
  - Gain additional features and operational flexibility
  - Reduce vendor dependencies
  - Prepare for connected/autonomous vehicle era
- Contracts – 3 awarded, all available to localities
  - Controller hardware – McCain (2070EX) and Aegis (Cobalt)
  - Controller firmware – ATS D4



# ATC/CSS | *Statewide Traffic Signal System*

## Purpose

- Create statewide consistency that streamlines VDOT's way of doing business
- Improve interoperability among regions and with localities
- Support VDOT's mission today & prepare traffic signal control for future advances (e.g. Connected Vehicles, cybersecurity)



# ATC/CSS | *Statewide Traffic Signal System*

## Timeline

- Procurement – **Spring 2018**
- Software Implementation – **Summer 2018**
- Transition will follow controller replacement schedule – **Fall 2018**

**2018**

January	February	March	April																																																																																																																																																																															
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<https://www.vertex42.com/calendars/printable-calendars.html>      Printable Yearly Calendar © 2017 by Vertex42.com. Free to Print.

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# LED Lighting | *Current Status*

- LEDs shall be used for all new lighting designs
- Standard special provisions status:
  - Conventional & high mast – specs completed; currently under consideration for updating
  - Sign lighting – spec is being finalized
- Energy Performance Contract (EPC) under consideration to replace 9,627 lights throughout Fred-Rich-HR Districts
- VDOT is exploring multiple other options for replacing other existing lights

# LED Lighting | *Color Temperature*

- In June 2016, the AMA released a report alleging that LED lights with CCT > 3000K cause health problems (melatonin suppression → poor sleep → cancer, etc.)
- Very contentious issue
- Characteristics of VDOT lights:
  - Freeway/interchange lighting, not street lighting
  - Negligible contribution to light compared to other outdoor and indoor sources
- Current VDOT policy is to use CCT of 4000 as that provides best illumination for roadway safety

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# Standards & Specs | *Background*

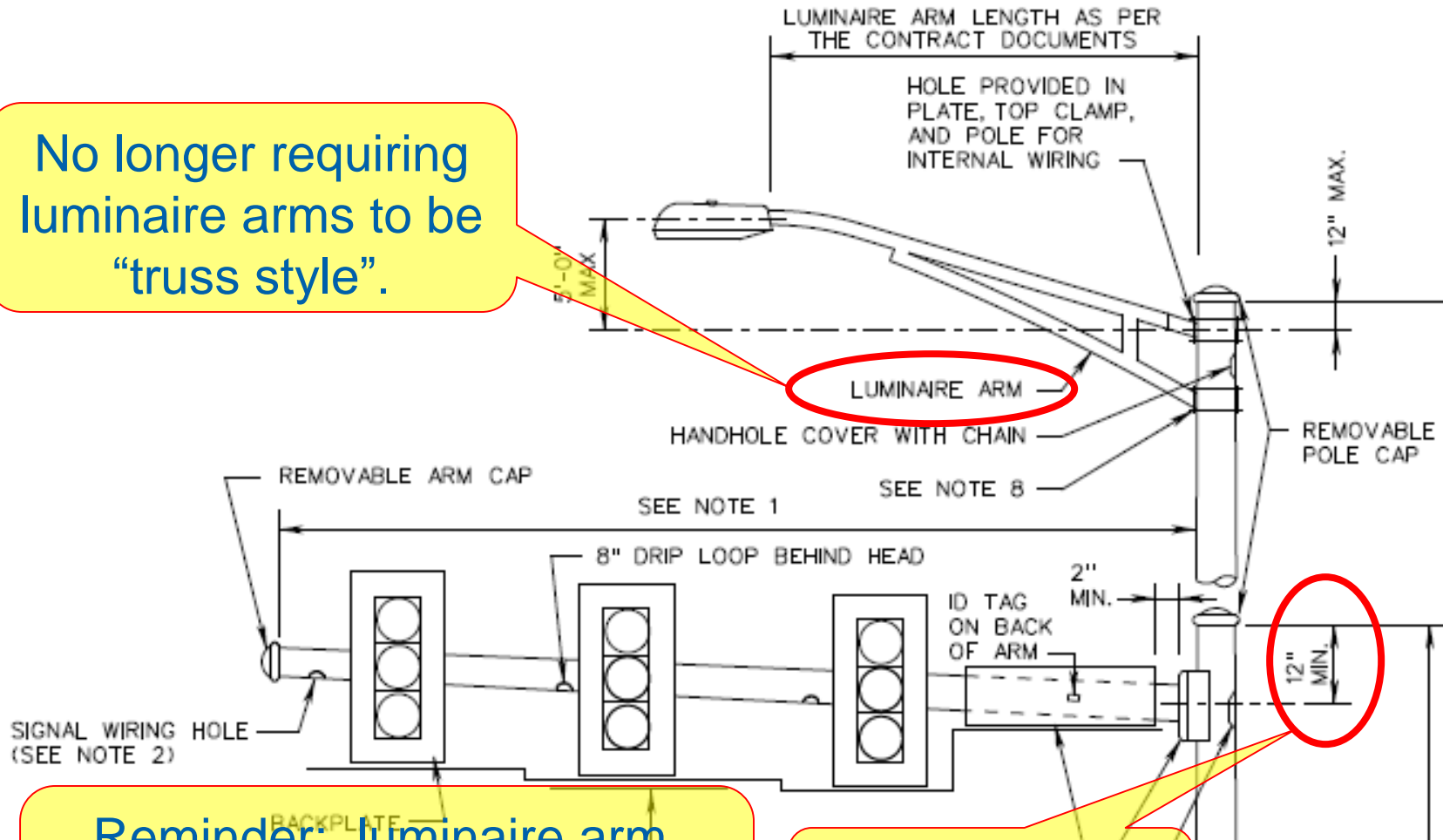
- 2016 Road & Bridge Standards
  - First released summer 2016
  - Online-only publication - no printed copies
  - No more “Insertables”
  - Periodically updated – see external website
- 2016 Road & Bridge Specifications
  - First released summer 2016
  - Still a printed book
  - Printed supplements printed at end of each year; 2017 Supplement released in January 2017

# Standards & Specs | 2017 Revisions

- New changes released in August/September 2017:
  - MP-2 (minor change), MP-3
  - AB-1, VS-1 (minor changes)
  - Deleted Standard PA-3
  - LF-1, LP-1
  - JB-R and JB-S series
  - WSP-1, STP-1, and new ISD-1 St'd
  - Guardrail st'ds (numerous major revisions)
- Effective dates:
  - Tier 1 projects – ad date  $\geq$  12/26/17
  - Tier 2 projects – ad date  $\geq$  4/10/18

# Standards & Specs | MP-3 Signal Poles

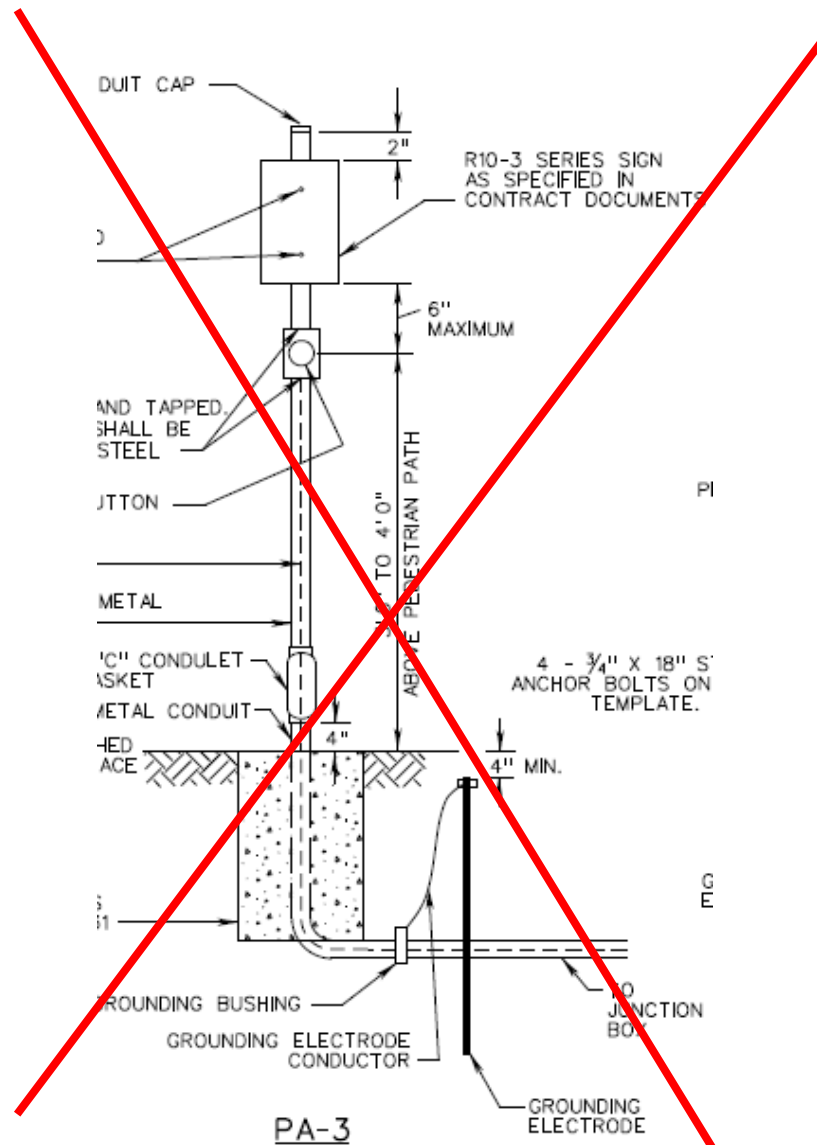
No longer requiring luminaire arms to be "truss style".



Reminder: luminaire arm, mast arm, and signal pole are now 3 separate pay items

Was 12", now 12" min.

# Standards & Specs | PA-3 pushbuttons

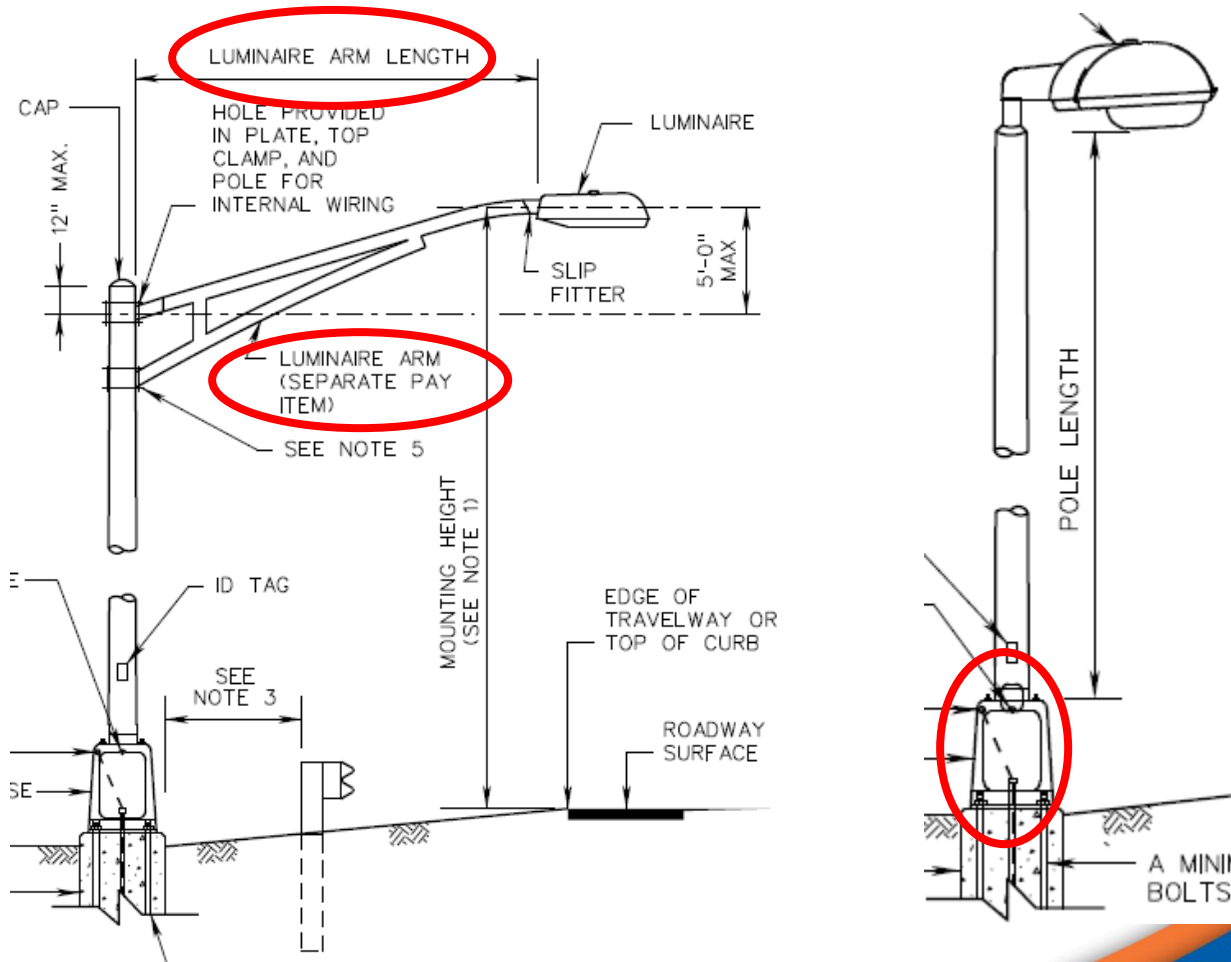


# Standards & Specs | LF & LP light poles

## LF-1 Revision

8. IF POOR SOIL CONDITIONS OR HIGH WATER TABLE IS ENCOUNTERED DURING EXCAVATION, THE CONTRACTOR SHALL NOTIFY THE ENGINEER PRIOR TO PROCEEDING WITH FOUNDATION INSTALLATION.

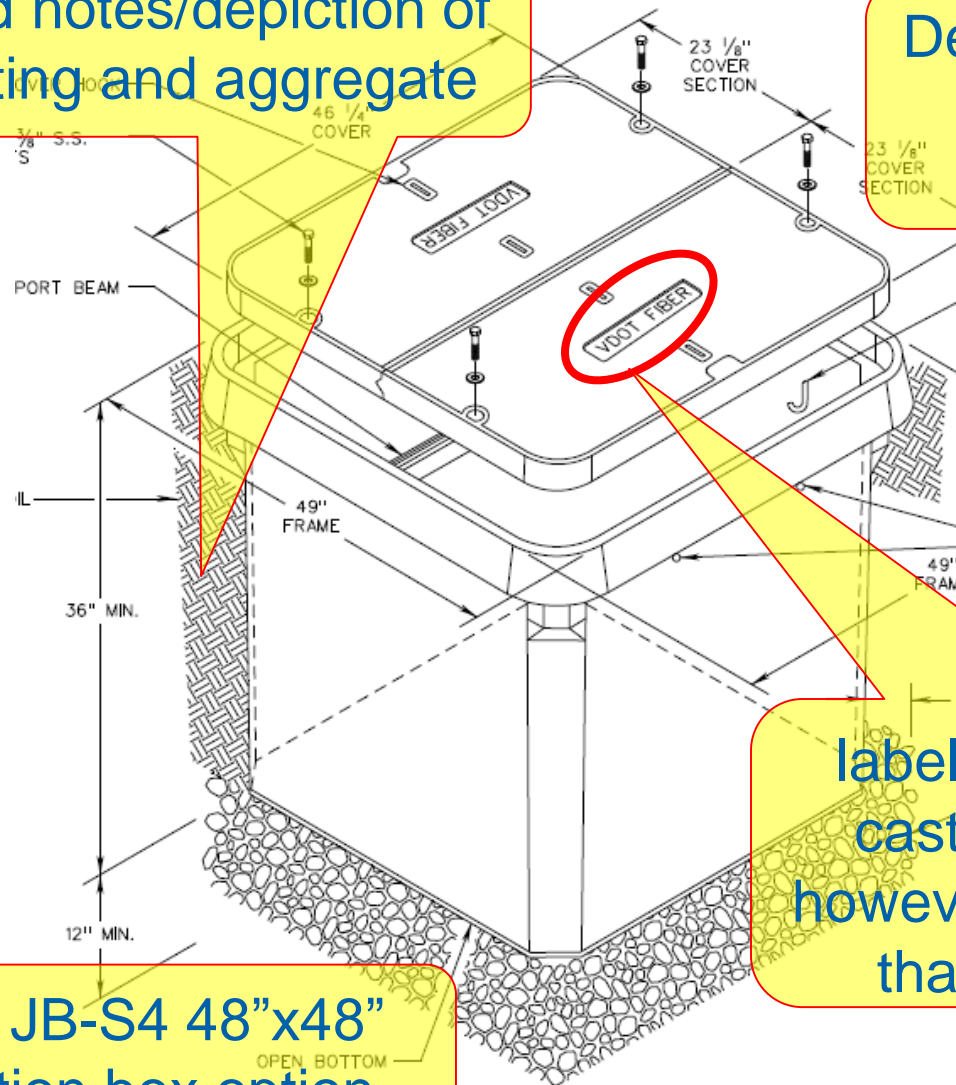
## LP-1/LP-2 Revisions



# Standards & Specs | JB-S junction boxes

Improved notes/depiction of compacting and aggregate

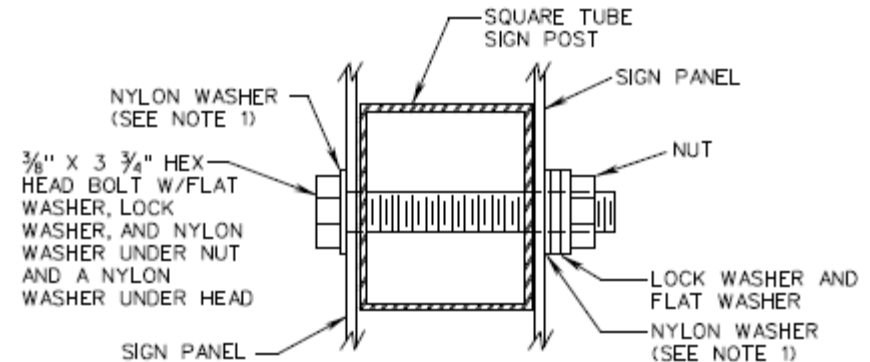
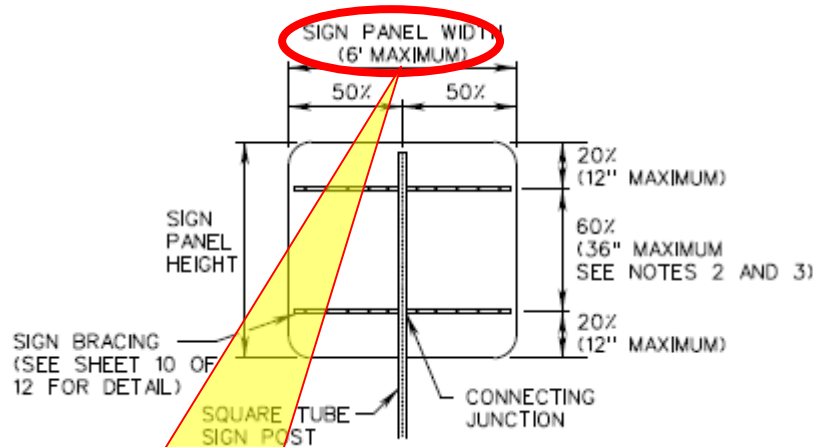
Deleted note requiring JB to be a 1- or 2-piece design



labels not required to be cast directly into cover, however still disallow labels that require adhesive

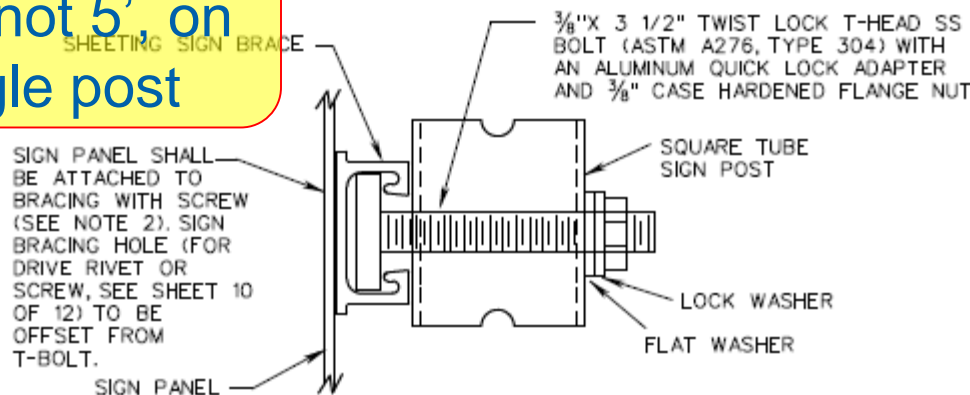
New JB-S4 48"x48" junction box option

# Standards & Specs | STP & WSP posts



BACK-TO-BACK SIGN PANEL DETAIL

Maximum width of 6', not 5', on single post



SINGLE SIGN PANEL ALTERNATE METHOD DETAIL

# Agenda

- ATC/CSS Procurement
- LED lighting
- Standards & Specs Updates
- ➔ ■ Accessible Pedestrian Signals
- Signal Justification Reports
- Questions & Answers

# APS | Background

- Pushbuttons with audible and vibrotactile messages for the blind & visually impaired (B&VI)
- Long-time VDOT policy was to install when requested by a member of the B&VI community
- Moving towards programmatic implementation of APS through existing & new signal investment activities

Location	# Signals	# Signals w/ ped heads	# signals w/ APS
NOVA	1,430	1,287 (90%)	75 (5%)
Statewide	3,068	1,481 (48%)	88 (3%)

*“Fill the Gap”*

# APS | Programmatic Implementation

- New IIM being finalized
- New & Rebuilt Signals: APS will be required when pedestrian signals used
- Alteration Activities: APS will be required for signal changes that affect pedestrian use
- ADA Phase 2: Programmatic implementation of APS based on community stakeholder identified locations within defined annual funding allocation
- Signal Maintenance: No APS installation required

# APS | Programmatic Implementation

- New APS special provision that takes into account:
  - Latest advances in technology
  - Feedback from BVI community
  - Flexibilities to minimize noise impacts
- Guidance to support implementation being created:
  - Design & engineering – how to incorporate into design plans, training on ADA requirements, etc.
  - Installation & inspection – system set-up, fine-tuning, etc.
  - Maintenance – troubleshooting, addressing noise impacts, etc.

# APS | Basic MUTCD & PROWAG features

- Locator Tone
- Pedestrian activation message
- Walk interval – capable of both rapid percussive ticking and speech messages
- Informational speech message after extended push
- Vibrotactile arrow
- Sign
- Braille/tactile info (if specified on plans)
- See MUTCD Section 4E for detailed requirements

*“Wait to cross Park at St. James”*

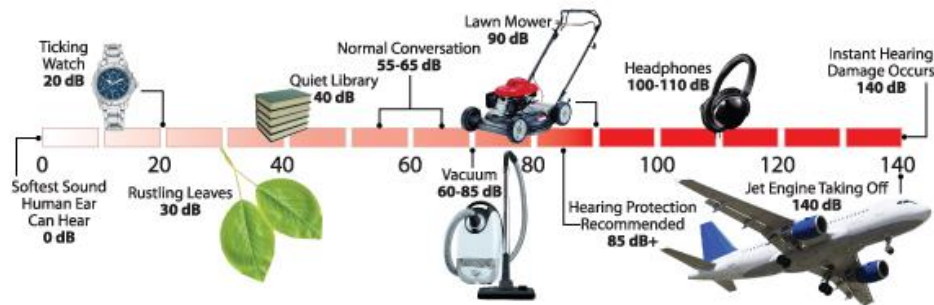
*“Baltic; walk sign is on to cross Baltic”*

# APS | *New Spec Requirements (General)*

- Contractor's choice whether to provide 2-wire or 3-wire/4-wire systems, unless plan notes say otherwise
- Ability to rotate arrow left or right in the field
- Pay items:
  - Pushbutton units – each per unit – includes central control unit and/or pedestrian head control units, if required by manufacturer
  - Mounting extender
  - PA-4 pedestal
  - PA-4 foundation

# APS | Noise requirements

- Ability to remotely change audible messages and noise levels
- Program a maximum noise level between 0-100 dBa
- Capable of automatic adjustment to 5 dBa above ambient noise AND ability to disable automatic adjustment
- Ability to customize preprogrammed max volume levels by time of day/day of week
- Simple field-testing requirements



# Agenda

- ATC/CSS Procurement
- LED lighting
- Standards & Specs Updates
- Accessible Pedestrian Signals
- ➔ ■ Signal Justification Reports
- Questions & Answers

# SJR | *Arterial Preservation Program*

- Virginia's economy depends on preserving and enhancing mobility on critical arterial corridors
- CTBs goal is to manage signal proliferation and median breaks to preserve our arterials, while still balancing needs for economic development, safety, and multimodal accommodations
- **Signal warrant  $\neq$  signal justification!**
- A SJR includes all the elements of a traditional warrant study.



# SJR | *DRAFT Arterial Preservation Network*

## ON THE MAP:

- Mobility enhancement segment
- Mobility enhancement segment (non-CoSS)
- Mobility preservation segment
- Mobility preservation segment (non-CoSS)
- Not part of Arterial Preservation Network
- Urbanized area
- Urban center



[www.virginiadot.org/programs/vdot\\_arterial\\_preservation\\_program.asp](http://www.virginiadot.org/programs/vdot_arterial_preservation_program.asp)

# SJR | *Necessary elements as per IIM-TE-387*

- Signal warrant analysis
- All SJRs – “consideration” of roundabouts
- SJRs on multilane divided roads – “consideration” of unsignalized Innovative Intersection (I.I.) designs
- SJRs on APN – “consideration” of signalized I.I. designs
- Use VDOT Junction Screening Tool (VJuST) tool for screening **viable** alternatives



# SJR | Approvals

- All SJRs require DTE approval
- SJRs on APN\*\* require State Traffic Engineer & District Administrator concurrence
- New median breaks on the APN\*\* require State L&D Engineer and District Administrator concurrence
- SJRs required for future SmartScale applications



*\*\*once the APN is officially approved by the CTB*

# SJR | Draft Template

## VDOT Signal Justification Report Northern Virginia District Traffic Engineering

Date \_\_/\_\_/\_\_

Note: Text in gray is sample input for guidance only & should be removed from final document upon conversion to PDF.

### Study Intersection

Major Street Route # and Name: Marvin Gardens

Minor Street Route # and Name: Ventnor Ave

County or Locality: Atlantic City

Intersection on Arterial Preservation Network (APN)? Yes

If on APN, type of APN Corridor? Mobility Enhance Segment

DRAFT

# SJR | “Consideration” of I.I.’s

- “Consideration” DOES NOT necessarily mean:
  - Geometric design of obviously infeasible alternatives
  - Anything more than concept-level layouts
  - consideration of all umpteen I.I. “flavors”
- “Consideration” DOES mean:
  - VJuST analysis
  - Use of engineering judgment
  - Not casually dismissing viable I.I. alternatives
- Template is under development

# SJR | *Selecting the Right Alternative*

- Why might an alternative be infeasible?
  - Does not make sense given width/# of lanes on through road/geometry of approaches
  - Significant ROW/utility impacts
  - VJuST demonstrates an obvious disbenefit
- Engineering judgment is necessary!

# SJR | *Innovative Intersections (I.I.s)*

[www.virginiadot.org/innovativeintersections](http://www.virginiadot.org/innovativeintersections)



INNOVATIVE INTERSECTIONS

**Restricted Crossing U-Turn (RCUT)**



INNOVATIVE INTERSECTIONS

**Continuous Green-T (CGT)**



INNOVATIVE INTERSECTIONS

**Roundabout**



INNOVATIVE INTERSECTIONS

**Quadrant Roadway (QR)**

# SJR | VJuST Introduction

- Sketch-planning tool for screening
- Advance configuration(s) for additional analysis and design
- Only applicable to isolated intersections and interchanges
- Does not consider ROW or costs

**VJuST**  
VDOT Junction Screening Tool



## VDOT Junction Screening Tool

### Input Worksheet

Project Title:	
E-W Facility:	
N-S Facility:	
Date:	

### Traffic Volume Demand

Direction	Volume (veh/hr)			Truck Percent (%)
	U-Turn / Left	Through	Right	
Eastbound	0	0	0	0.00%
Westbound	0	0	0	0.00%
Northbound	0	0	0	0.00%
Southbound	0	0	0	0.00%
Adjustment Factor	0.80	0.95	0.85	
Suggested	U - 0.8	L - 0.95	0.85	
Truck to PCE Factor	Suggested = 2.00			2.00
Critical Lane Volume				1600

### Equivalent Passenger Car Volume

	Volume (pc/hr)			Approach
	U-Turn / Left	Through	Right	
Eastbound				
Westbound				
Northbound				
Southbound				

Left-turn Adjustment Factor	
Right-turn Adjustment Factor	
U-turn Adjustment Factor	
Truck to PCE Factor	
Critical Lane Volume Sum	

Consider?	Justification
Y	
Y	Not feasible for roadway facility type
Y	Insufficient intersection spacing
Y	Financial constraints identified
Y	Right-of-way restrictions identified
Y	Unable to accommodate traffic patterns
Y	Unable to accommodate magnitude of traffic volumes
Y	Unable to accommodate heavy vehicles
Y	Unable to accommodate alternative transportation modes

## VDOT Junction Screening Tool

### Possible Configurations

Indicate with a "Y" or "N" if each intersection or interchange configuration should or should not be considered. Use the information links for guidance. Then, click the "Show/Hide Configurations button" to hide the worksheets for the configurations that will not be considered.

#	Intersections	Information	Consider?	Justification
<b>Signalized Intersections</b>				
1	Conventional	-	Y	
2	Bowtie	Link	Y	
3	Center Turn Overpass	Link	Y	
4	Continuous Green-T	Link	Y	
5	Echelon	Link	Y	
6	Full Displaced Left Turn	Link	Y	
7	Median U-Turn	Link	Y	
8	Partial Displaced Left Turn	Link	Y	
9	Partial Median U-Turn	Link	Y	
10	Quadrant Roadway N-E	Link	Y	
11	Quadrant Roadway N-W	Link	Y	
12	Quadrant Roadway S-E	Link	Y	
13	Quadrant Roadway S-W	Link	Y	
14	Restricted Crossing U-Turn	Link	Y	
15	Single Loop	Link	Y	
16	Split Intersection	Link	Y	
<b>Unsignalized Intersections</b>				
17	50 Mini Roundabout	Link	Y	
18	75 Mini Roundabout	Link	Y	
19	Roundabout	Link	Y	
20	Two-Way Stop Control	-	Y	
#	Interchanges	Information	Consider?	Justification

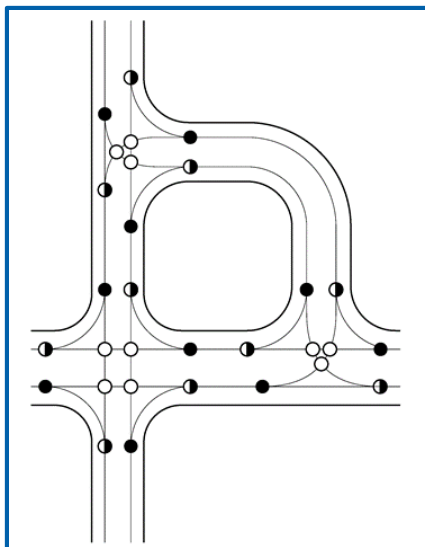
Show/Hide Configurations

Unhide All Configurations

# SJR | VJuST (cont.)

## Interchange Results

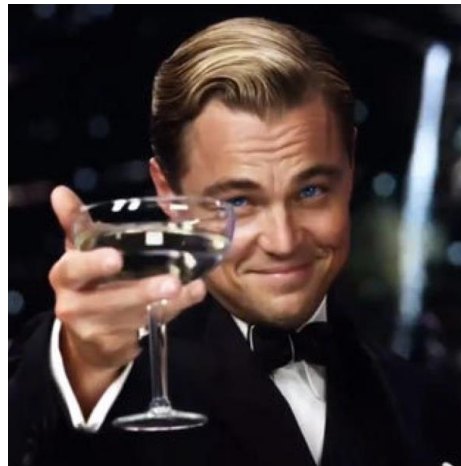
		Congestion			Pedestrian		Safety		Notes	
Type	Dir	Maximum V/C	Accommodation Compared to Traditional Diamond		Weighted Total Conflict Points					
Traditional Diamond	-	0.92	[Dotted Pattern]		28					
Contraflow Left	-	0.94	[Yellow]		32					
Displaced Left Turn	-	0.74	[Red]		28					
Diverging Diamond	-	0.66	[Red]		20					



- Crossing
- ◐ Merging
- Diverging



**Thanks!**



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