Traffic Signal Design Considerations

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Agenda | *Signal Design Considerations*

- Designing with the new standards & specifications
- Designing for pedestrians
- Recent TE policy
- Common design challenges
- New NRO file repository

Designing for the New Standards and Specifications

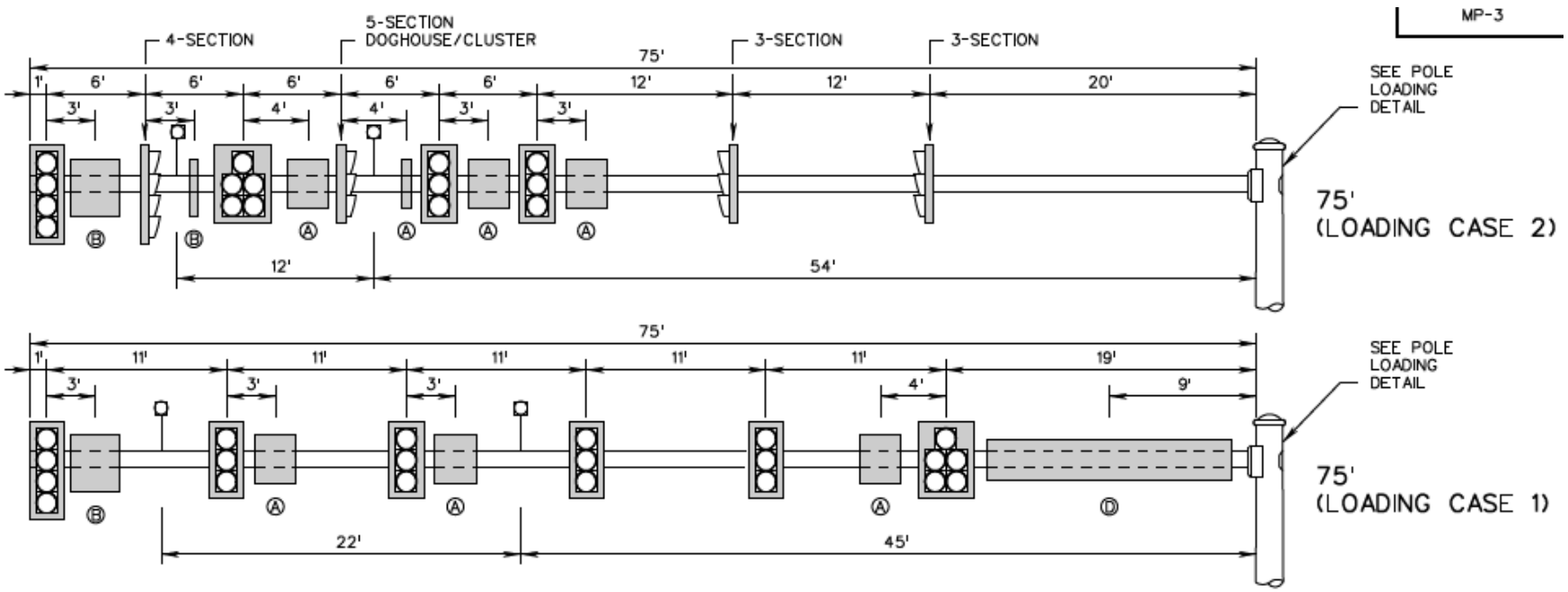
Signal Poles | *Signal Design Considerations*

- New MP-3
- Mast arms and poles are now separate pay items
- New pay items for different arm lengths

Pole Types – Poles without Luminaire Arm

Pole Type	# of arms	Maximum Allowable Loading as per Standard MP-3	Length of Pole (tip to bottom of base plate)
A	1	49 ft Loading Standard	19
B1	1	75 ft Case 1 Loading Standard	19
B2	1	75 ft Case 2 Loading Standard	19
C	2 (mounted at 90 degrees to each other)	70 ft Loading Standard & 60 ft Loading Standard	19

Signal Poles | *Signal Design Considerations*



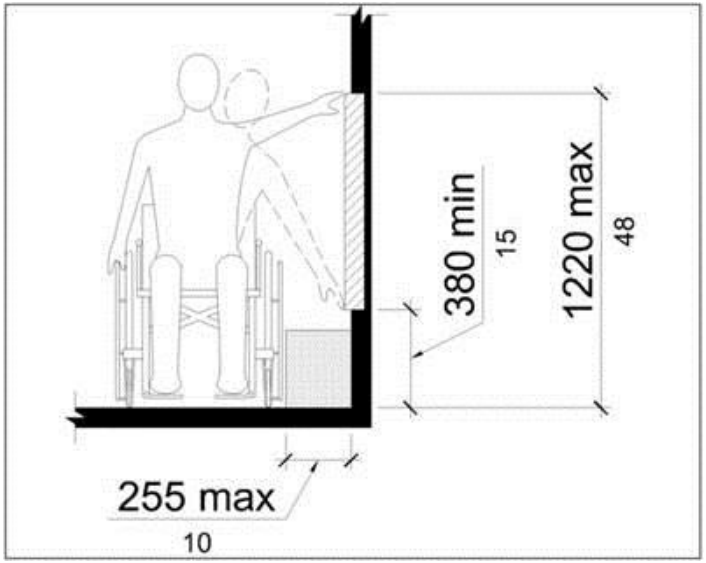
- Standard loadings applied for different arm lengths
- When using standard poles/arms, the designer is responsible for verifying the actual loadings do not exceed standard loadings

Pole Foundation | *Signal Design Considerations*

- New PF-8
- Foundations are elevated 1-ft above grade
- When constraints make meeting the 1-ft requirement impractical, document rationale
- Ongoing NRO pilot project using smaller diameter foundations & poles (≤ 49’ arms)

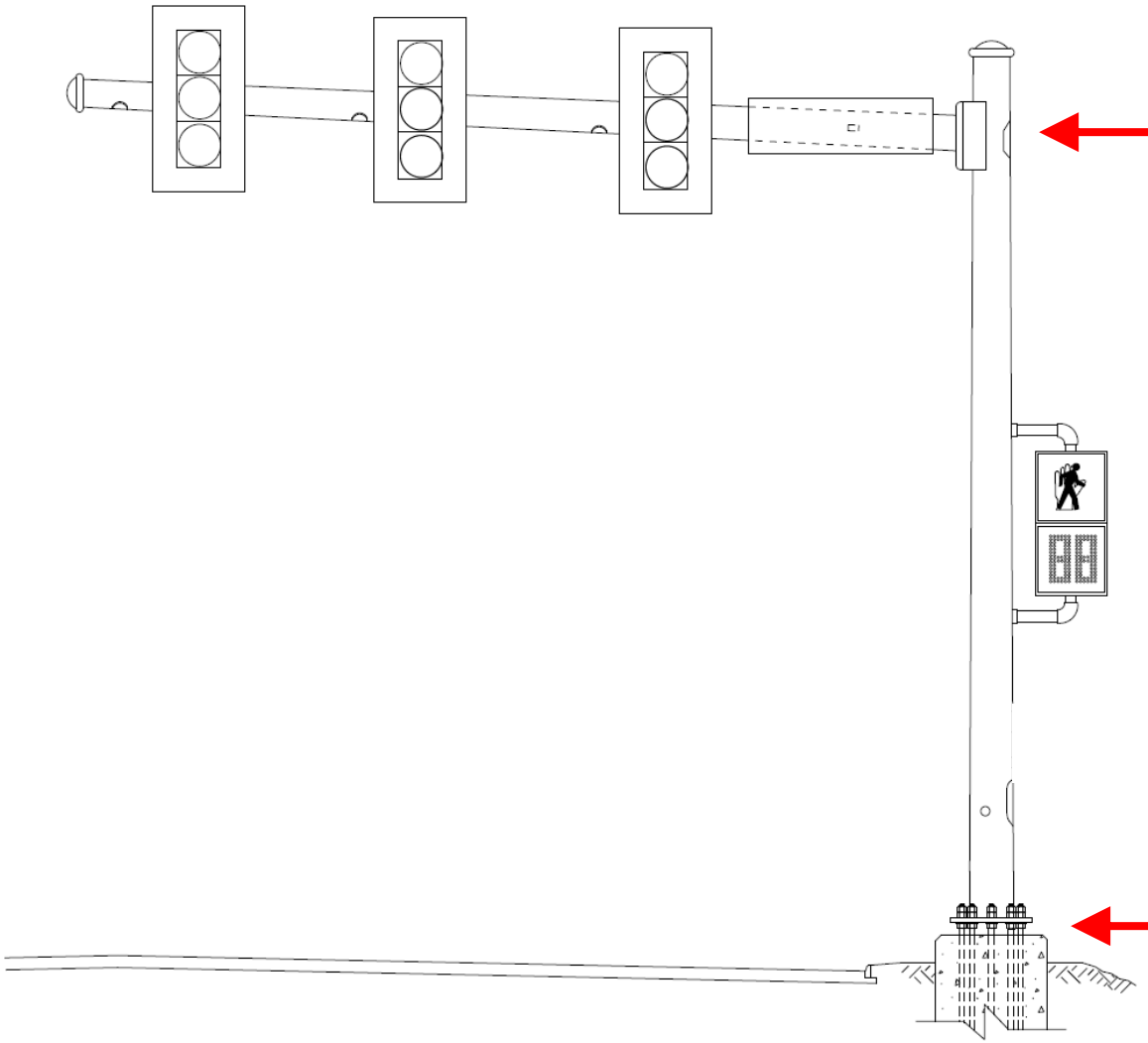
Pole Foundation | *Signal Design Considerations*

- Fixed object is the face of foundation now
- Edge of foundation
  - 1-ft from pedestrian paths
  - 3-ft from shared use paths
- Pushbuttons on separate pedestals to achieve lateral reach distance



PROWAG, Figure R406.3 Unobstructed Side Reach

Signal Poles | *Signal Design Considerations*



18-ft arm attachment (mounting height to base plate)

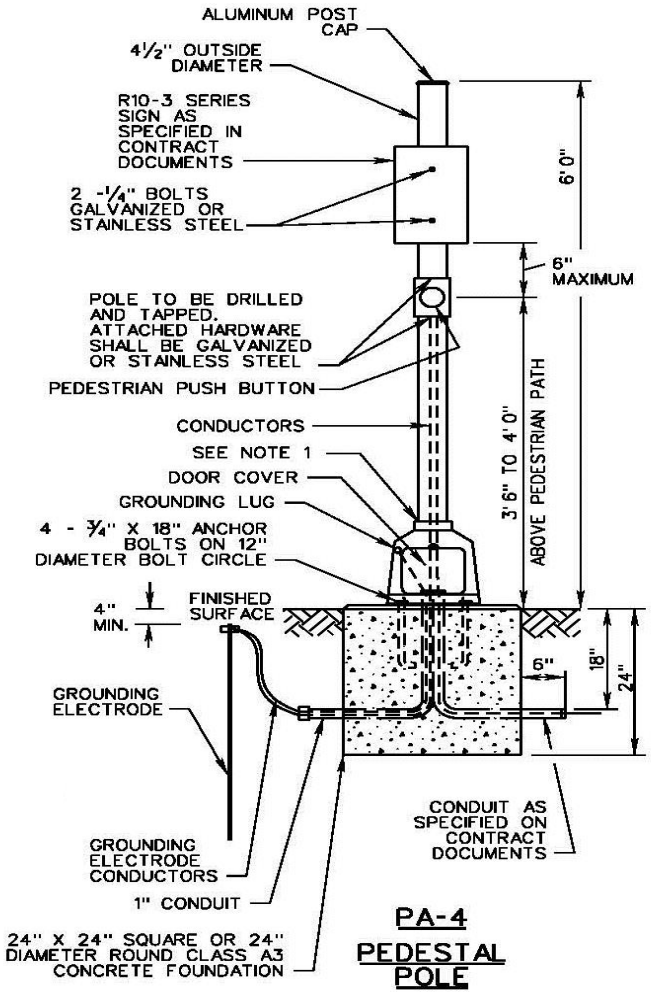
1-ft raised foundation

Electrical Service| *Signal Design Considerations*

- Electrical service work pad – *a separate pay item*
- The designer should specify this on the design plans when it is needed under:
  - Safety switches
  - Breaker boxes
  - Pole-mounted controller cabinets

New PB Option | *Signal Design Considerations*

- PA-4 standard with breakaway transformer base
- Remember upcoming change in pay item (pole and foundation separate)



Designing for Pedestrians

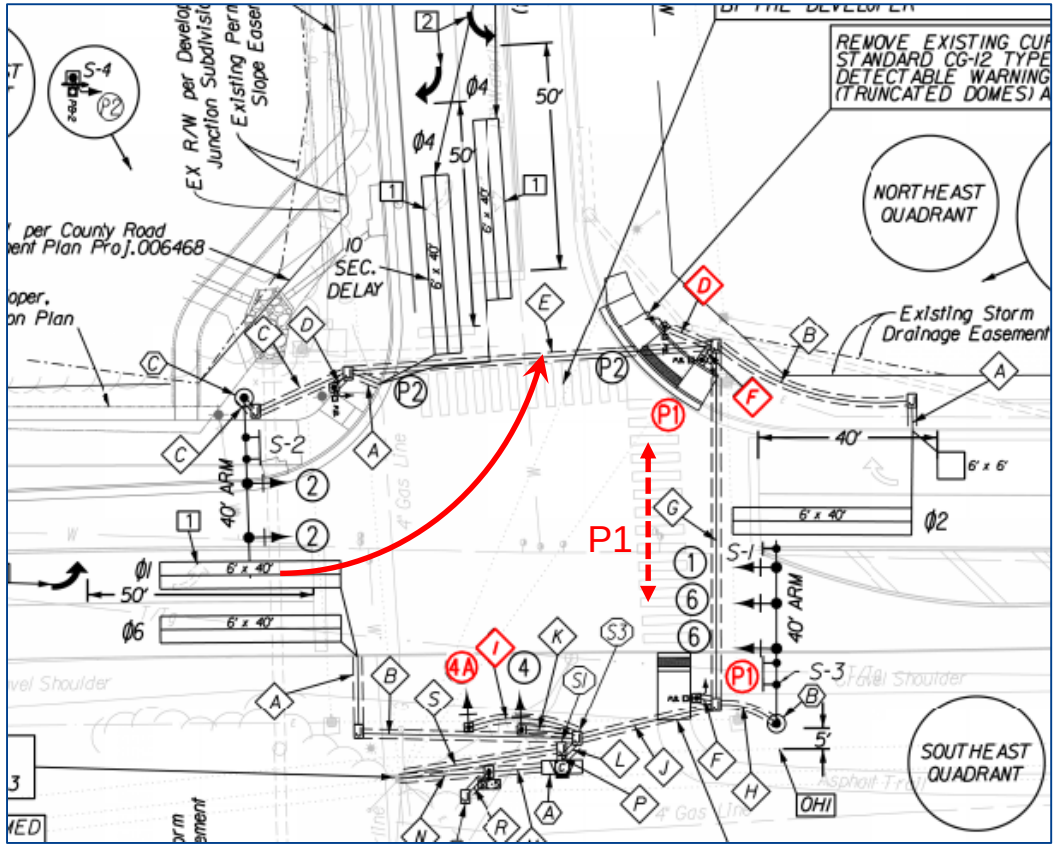
Pedestrians| *Signal Design Considerations*

VDOT Northern Region Traffic Engineering Practice	No. 403.1
Pedestrian Accommodations at Traffic Signals	August 7, 2014

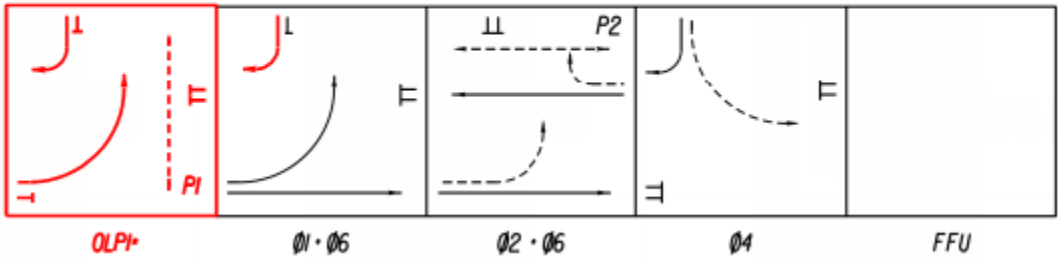
- Pedestrian signal heads **shall be provided to serve pedestrians crossing all legs of all intersections, except where one or more noted exceptions applies.**

- Leading Pedestrian Interval (LPI) - *should be used when a pedestrian phase is served at the same time as a conflicting permissive only left turn.*

Pedestrians| *Signal Design Considerations*



Phasing Diagram



T-intersections with signalized pedestrian crossing on the left side of minor road traffic

- ✓ General preference: operating pedestrian crossing with mainline left turn vehicular movement

Pedestrians| *Signal Design Considerations*

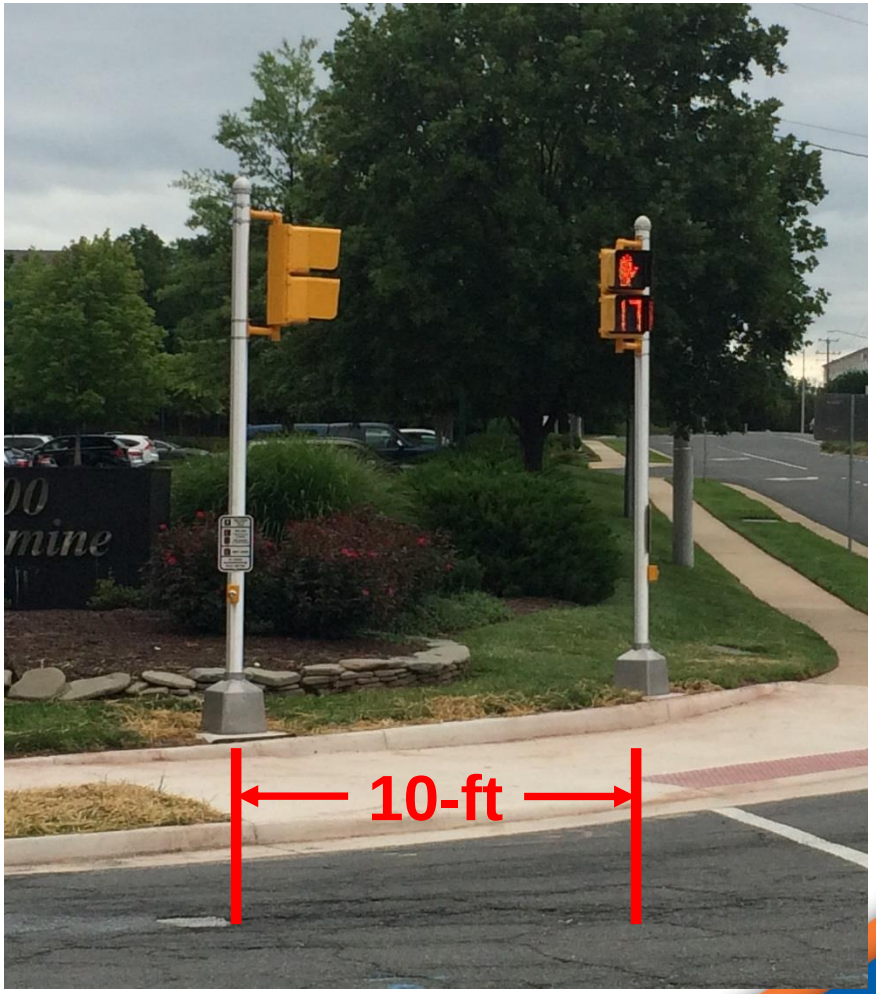
- Signal pole hand hole located on side opposite the mast arm attachment
- No pushbuttons on this side of pole – use separate pedestal pole instead
- Pushbutton exceeds maximum height

Pedestrians| *Signal Design Considerations*

- Coordinate signal design with road and streetscape design
- Pushbutton extenders have become more widespread and durable

APS | *Optimal Pushbutton Placement*

- Two poles separated by 10-ft minimum
- 1.5-ft to 6-ft from edge of curb, shoulder, or pavement (no more than 10-ft)
- Less than 5-ft from the edge of crosswalk line extended
- On the side of crosswalk farthest from the intersection (i.e., the outside)



NCHRP Project 3-62, Guidelines for Accessible Pedestrian Signals

Signal Design -
Recent Policy Updates

IIM-TE-381 FYA | *Design Considerations*

- Recommends FYA for all protected/permissive left turns when exclusive turn lane exists
- Option for permissive-only left-turn movements when an exclusive turn lane exists
- Recommends use of regulatory sign

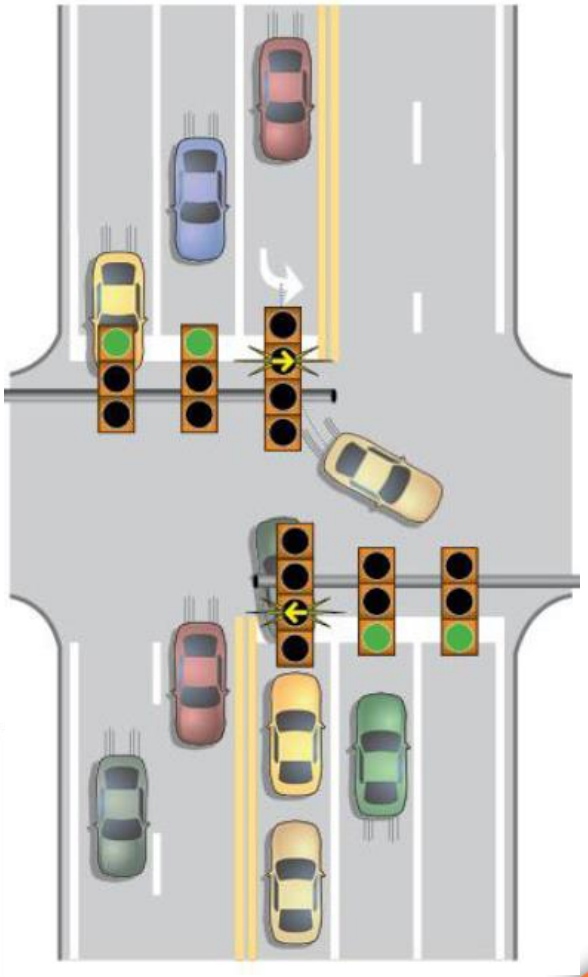
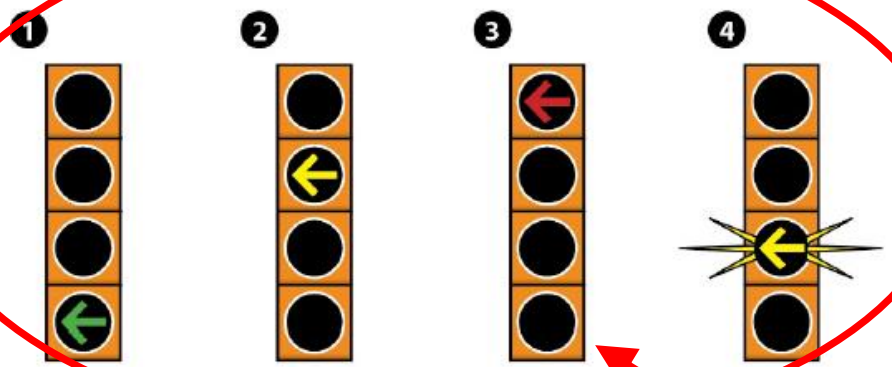


Figure 6 - R10-V1

FYA | *NoVA Preferred Transition*

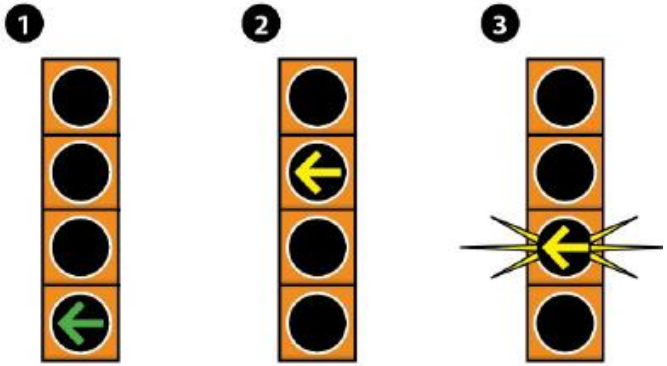
Figure 4 - Type 1 Transition



Clearance Chart

R/W	CLEARANCE		NEXT PHASE
	1	2	
~~G~~	~~Y~~	~~R~~	~~FY~~

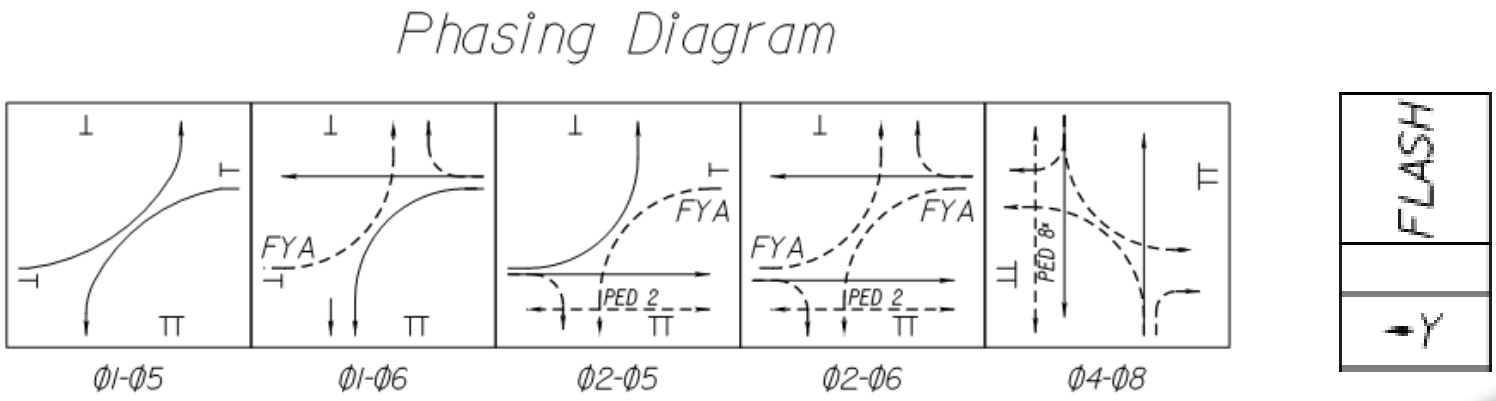
Figure 5 - Type 2 Transition



Include full all-red time, calculated per latest IIM-TE-306

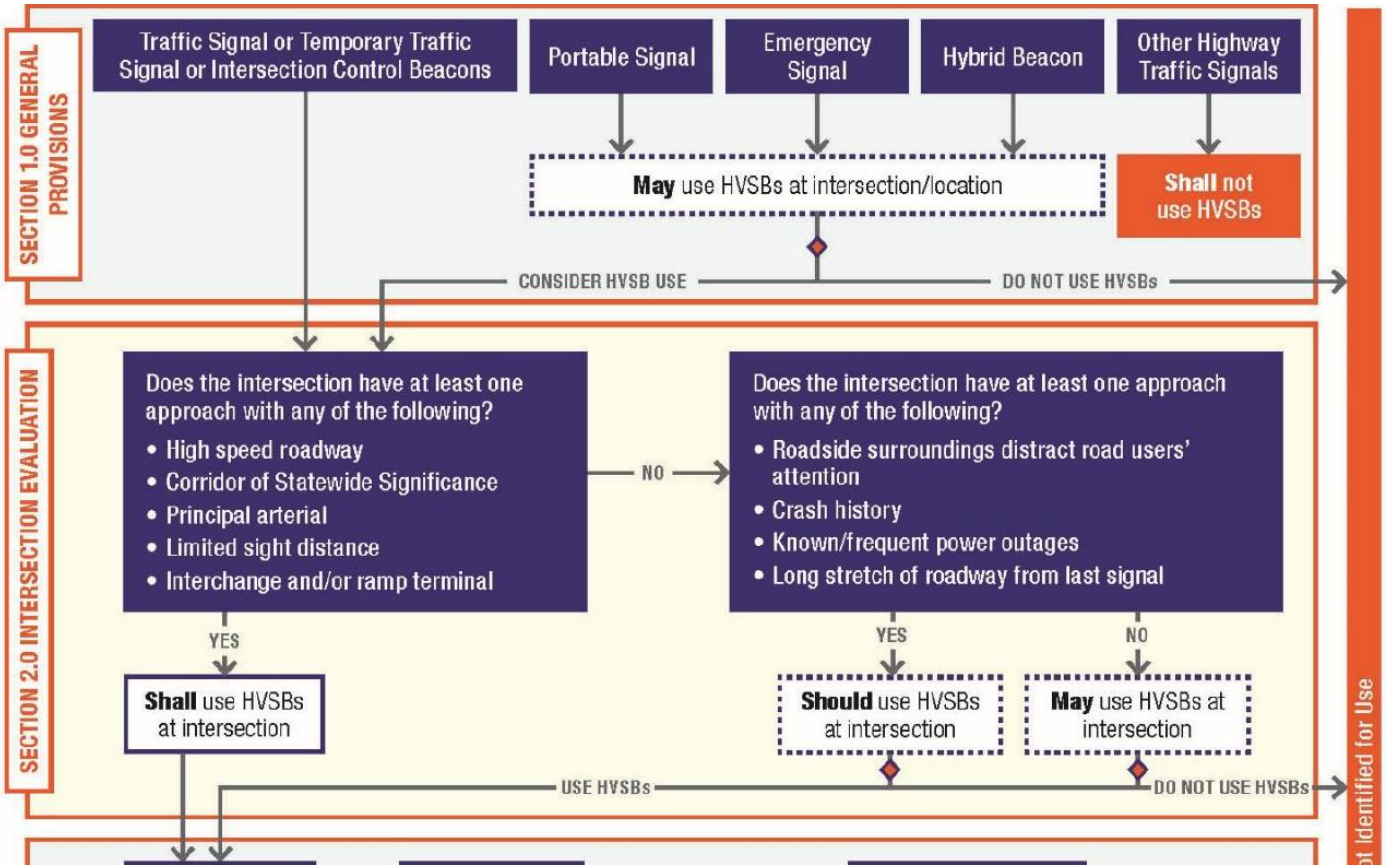
FYA | *Things to Remember*

- Protected-permissive no longer a shared signal face with the adjacent through movement
  - Ability to operate permissive phase during opposing approach phase
- When operating on FLASH, the steady yellow indication is the one to flash (not the FY)
- 2070 controller needed (not 170)



TE-378 HVSB | *Design Considerations*

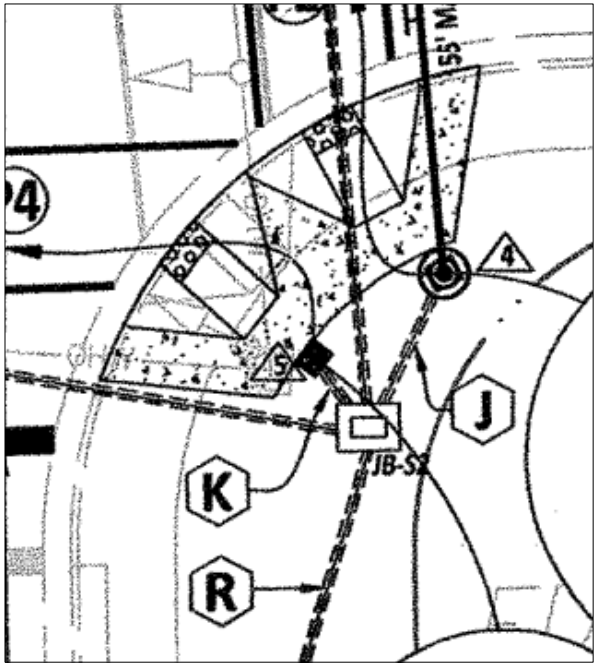
- Requirements, recommendations, and options for use of High Visibility Signal Backplates (HVSBs)



Common Challenges in Signal Design

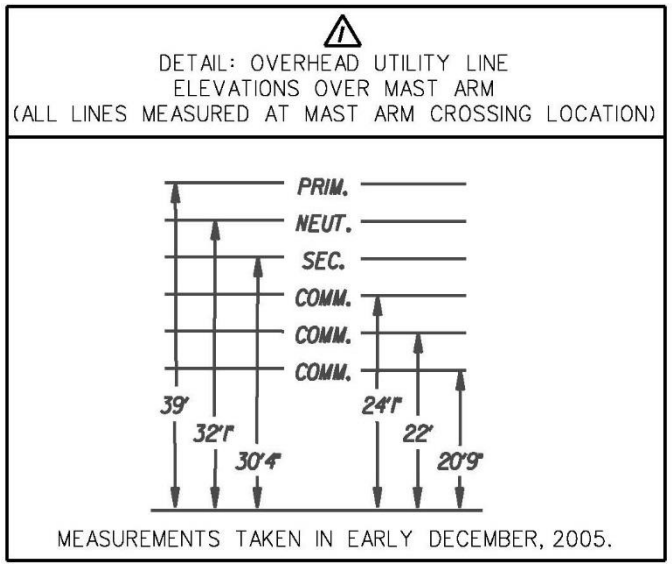
Common Design Challenges | *Signal Plans*

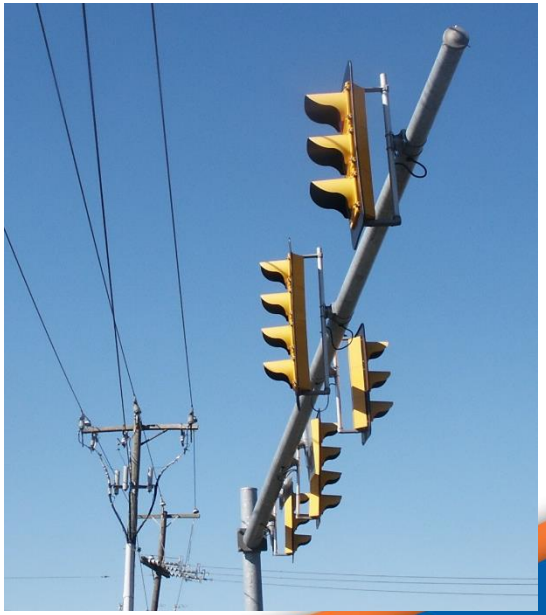
- Consideration of vertical conditions



Common Design Challenges | *Signal Plans*

- Clearance to overhead utility lines
  - NESC
  - Consider potential sag of heavier lines during warmer temperatures
  - Range of mast arm rise
  - Equipment that extends above the arm
- Clearance to underground utilities
  - Virginia Underground Utility Damage Prevention Act



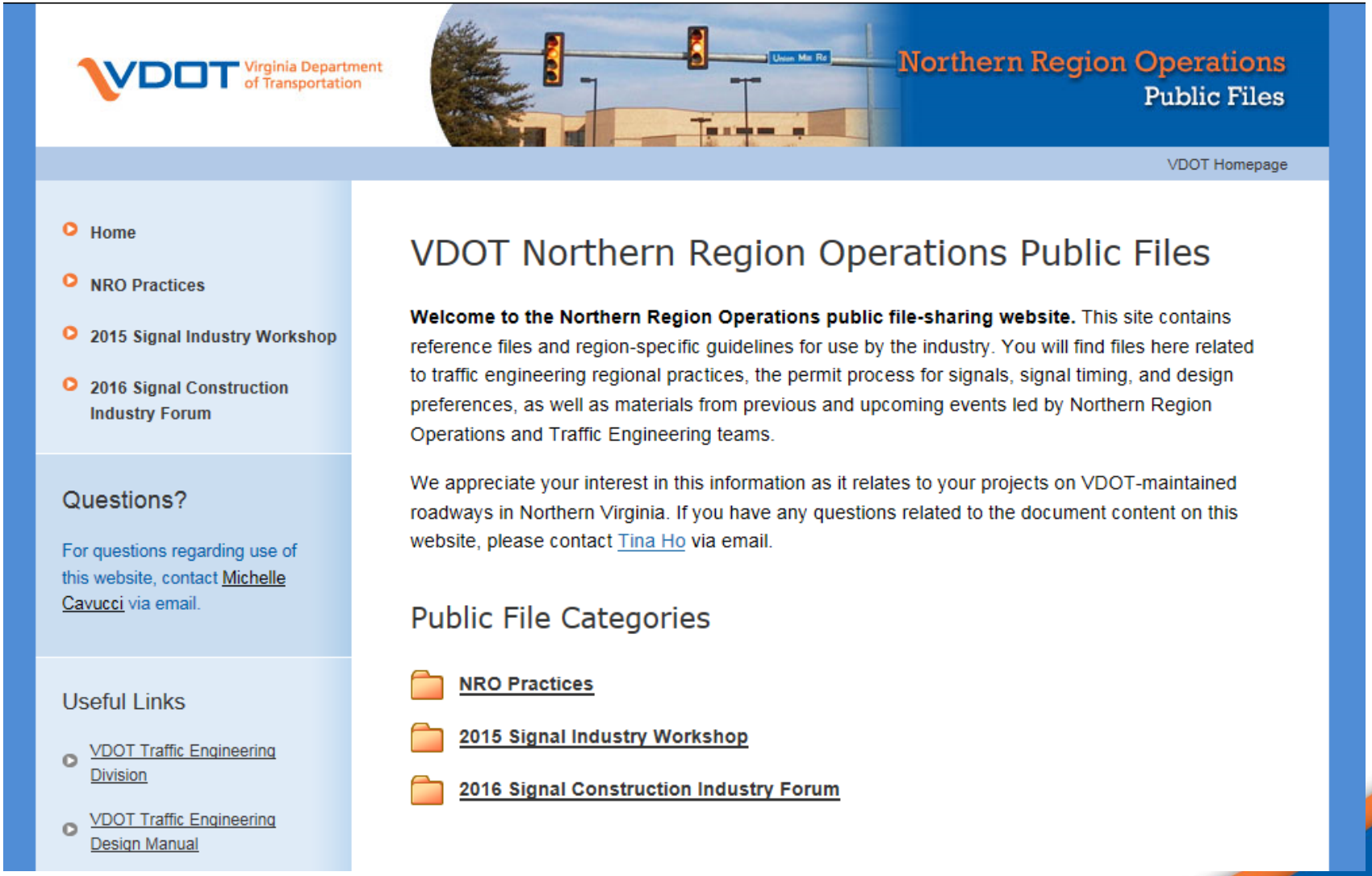


Common Design Challenges | *Signal Plans*

- Street name signs on diagonal arms

New NRO Website for Public Files

NoVA Documents | *NRO Public Files Website*



NoVA Documents | *NRO Public Files Website*

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Questions – save for later!