Bicycle and Pedestrian Subcommittee of the TPB Technical Committee
CTC-Sponsored Discussion on Regional Alignment for Road Crossing Designs

17 November 2026

Introduction and goals

- We’re gathered here because **this group cares** about the safety, predictability, and lawfulness of our regional trail users and motorists/others crossing trails
- **Changes in laws, engineering best practice,** the extent of the regional bicycle network, and recent new builds raise questions about how to best design the places where regional trails cross roadways
- This is an **exploratory conversation** with to surface ideas, questions, and stakeholder considerations - we don’t need a decision today
- We’ll use the slides as a brief introduction but hope to have an **open conversation**
- We’ll reserve time at the end **to determine what, if anything, this group should do next**

Similar situation, different control: minor road (local)

W&OD & N Spring St: STOP for road and trail



Cross Country Trail & Hunter Village Drive: Crosswalk only



Mt. Vernon Trail & Fort Hunt Rd: STOP for trail



All have / could have clear sightlines, mix of crossing controls is most varied for these low volume (under ~7k ADT) roads

Similar situation, different control: intermediate road

Cross County Trail & Prosperity Ave: STOP for trail in series of these



NW Branch Trail & 38th St: Crosswalk only



CCT at Little Falls Parkway: STOP for trail ⅓ mile from an all-way STOP



All have / could have clear sightlines, the use of STOP signs at nearby crossings influences how users perceive them here

Intersection control differs most on minor roads

	Major trail / system	Authorities	Minor road control	Intermediate road control	Major road control
VA	**W&OD Trail**	NOVA Parks + VDOT + multiple VA localities	**Mixed:** ~90% trail STOP, some road STOPs in Reston, Herndon, Falls Church	**Trail STOP** (e.g., Shreve Rd)	**Trail STOP / Signal / Bridge**
	Cross County Trail	Fairfax Parks + VDOT	**Mixed:** trail STOP on thru roads; often crosswalk markings only in subdivisions	**Trail STOP** (e.g., Prosperity Ave)	**Signal / Bridge**
	Bluemont Junction Trail	Arlington DPR + DES	**Trail STOP** on two crossings	—	—
	Arterial sidepaths incl. Custis, I-66, Route 7, Fairfax Co. Pkwy, Ox Rd, Mt. Vernon Hwy	VDOT, Arlington for Custis	**Side road STOP + crosswalk markings** (explicit VDOT policy on this)		**Signal / Bridge**
	Mount Vernon Trail – Alexandria	Alexandria T&ES	**Road STOP** on 3 crossings (since '23)	—	—
DCish	**Mount Vernon Trail – NPS portion**	NPS + DDOT/VDOT interfaces	~90% **Trail STOP** (one exception)	**Trail STOP**	**Trail STOP / Signal** (GWP crossings)
	Met Branch Trail	DDOT	**Mixed:** one road STOP, one trail STOP for SUP+cycletrack+road intersection	—	—
	Rock Creek Park Trail – DC	NPS + DDOT	**Side road STOP + crosswalk markings** (one signalized driveway, one solo STOP)	**Trail STOP** (Shoreham Dr, Parkway Dr)	—
MD	**Rock Creek Trail – MD**	Montgomery Parks + MCDOT/MDOT	**Mixed:** ~1/3 trail STOP, ~1/3 crosswalk markings, ~1/3 both STOP	**Trail STOP / Signal** (e.g. Knowles, Jones Mill)	**Signal / Bridge**
	Sligo Creek / NW Branch / NE Branch	Montgomery & PG Parks + MCDOT/PG DPW&T/MDOT	**Crosswalk marking only** (except at all way stop-controlled road intersections)		**Mixed:** crosswalks, signals, bridges
	Capital Crescent Trail	Montgomery Parks + MCDOT/MDOT	**Road and Trail STOP** (Dorset Ave)	**Trail STOP** (Little Falls Pkwy)	**Signal / Bridge**

Unlike other safety treatments, there is no apparent consensus on unsignalized intersection control: similar trail crossings can require the trail user to stop, require the driver to stop, or rely on ordinary crosswalk rules, with little obvious relationship to risk. Consistency also breaks down when the lines blur between a small SUP (may have STOP) and a large walking path (never STOP).

Reminder: Legal requirements for a SUP crosswalk

Trail users are treated as pedestrians for purposes of crosswalk laws. Trail users should enter predictably and with due care; drivers should yield predictably once the crossing is occupied.

- **Trail users do not have an unconditional right to enter the roadway:** they must not enter when an approaching vehicle is too close for the driver to safely yield
- **Once a trail user is lawfully in the crosswalk, drivers must yield or stop as required by law.**
- **Drivers should approach expecting someone may enter the crossing** and be prepared to yield.
- Virginia, DC, and Maryland use somewhat different statutory language, but create broadly similar practical expectations at an ordinary crosswalk.

Trail-facing STOP signs complicate this and have different legal effects across the region:

- **DC: STOP generally means yield for cyclists.** DC's stop-as-yield law allows cyclists to proceed through a STOP without making a complete stop after slowing, assessing hazards, and yielding as required. Virginia and Maryland have considered similar “Safety Yield” legislation.
- **Maryland: STOP appears to require a stop, but its effect on crosswalk priority is less straightforward.** Cyclists on public bicycle facilities generally have vehicle-driver duties, including obedience to lawful traffic controls; but cyclists in or through a crosswalk expressly have pedestrian rights and restrictions. Thus a cyclist may have to **stop at the sign and then apply the ordinary crosswalk rules for entering the roadway**, not necessarily yield until roadway traffic has cleared, though we could use more clarity on what MD courts or police expect.
- **Virginia: the General Assembly created a specific mechanism for requiring SUP users to stop.** A locality may adopt an ordinance requiring **all SUP users** to stop before an unsignalized marked crosswalk and install STOP signs accordingly. We have found **no relevant locality that has adopted** one. NOVA Parks has separate statutory rulemaking authority, but we have found no adopted regulation requiring compliance with its trail STOP signs. Where §46.2-924(E) is used, the legal rule is explicit: **stop first, then enter under the statute's ordinary crosswalk constraint, not “yield until the road is clear”** like a road STOP sign requires.

Why control consistency matters

Legal clarity

Road users and trail users should be **able to understand their respective duties** from the crossing treatment

Regulatory traffic control should **correspond to an actual legal obligation** and to the authority of the entity establishing it

This can become **complicated where a single trail passes through multiple roadway jurisdictions**, as on the W&OD, if legal obligations differ by locality

A **marked crosswalk already establishes specific yielding duties that are practically equivalent in VA, MD, and DC**; additional regulatory control should have a clear legal and engineering purpose rather than repeating or potentially obscuring those duties

Engineering credibility

Traffic control should **solve an identified problem** and clearly communicate priority

MUTCD calls for considering relative speed, volume, and facility importance and using the least restrictive appropriate control on the lower-priority approach

STOP control should be intentional, suited to the site context, supported by engineering judgment, legally meaningful, and likely to produce the intended behavior (**not simply a precaution**).

Overused or poorly justified STOP signs fail to "command respect," undermining predictability and the effectiveness of STOP control where it is truly needed.

Predictable user behavior

Regional trail users should not need to understand **invisible jurisdictional boundaries** to interpret a crossing.

Similar minor-road crossings can communicate conflicting expectations:

- Motorists expected to yield at one
- Trail STOP-controlled at the next
- RRFB emphasizing another
- No clear priority at another

This variation can undermine predictable behavior by **both motorists and trail users**. The goal is not uniformity for its own sake, but ensuring **similar situations communicate similar expectations**.

Potential next steps, for discussion

- **Review current standards** by jurisdiction (state / county / park system), identify differences, and assess if any create barriers to a more aligned regional approach to SUP-Road intersection control (note: these are likely to be pretty aligned with recent PROWAG, MUTCD, and AASHTO updates or this review could be a reminder to adopt these). *(Outside engineering firm support to do this?)*
- **Develop regional guidelines on interaction design** to simplify the job of the engineer and improve the odds of regional consistency - as a guideline that draws from state laws, MUTCD, etc. but connects the dots across all of them so individual engineers or other stakeholders do not have to. *(Outside engineering firm support to do this?)*
- **Review and prioritize deficiencies vs. current standards on a region-wide basis** to inform the TPB and individual stakeholder agencies so that there is a unified list but individual agencies own their individual actions and priorities. Could include a list of: midblock all-way stops, mixing stop signs with yield or signals, trail-facing stop signs on very low volume roads (e.g., <1000 ADT), trail-facing stop signs at crash-prone intersections to reevaluate (e.g., Great Falls) *(Could be an advisory review by Capital Trail Coalition?)*

Illustration of what regional guidelines could cover

Guidance to tie together MUTCD guidance and MD/VA/DC law in the specific context of shared use paths crossing roads; does not supersede those requirements or site-specific engineering judgement though variance from these should come with justification made public for the awareness of other regional trail owners

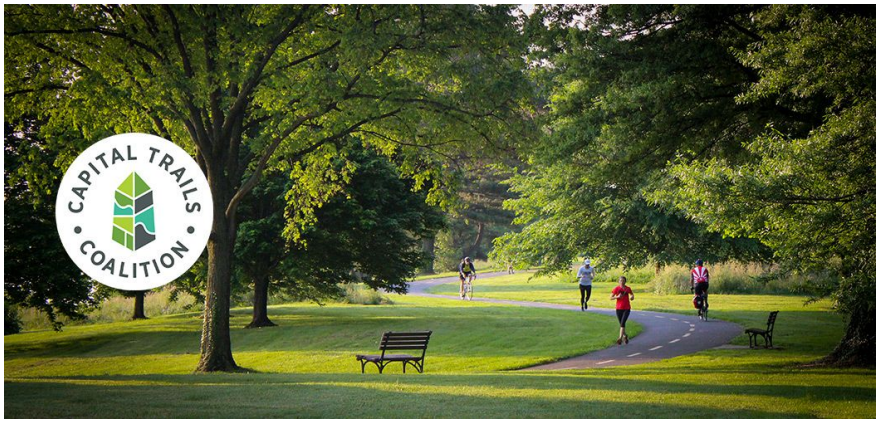
- **Start with the legal crosswalk relationship, not an assumption that the trail should stop.** At ordinary unsignalized crossings in MD, DC, and VA, trail users must enter with due care and drivers must yield/stop once the crossing is occupied
- **Treat minor-road crossings differently from difficult crossings.** On low-volume, low-speed roads with modest trail user volumes ordinary crosswalk rules may be enough; as risk increases, add visibility, speed management, refuge, or positive control
- **Assign priority deliberately based on context.** MUTCD/AASHTO point to relative speed, volume, and facility importance.
- **Use the least restrictive control that serves a need.** A STOP sign should reflect a need to require a full stop, not “be careful”.
    - **On busier trails crossing smaller roads, consider road stop signs**, e.g., if trail volume > 500 average daily users and road volume is <7500 ADT (or a typical 2-way stop threshold rule of thumb), a rule of thumb like “road stops if trail volume is >1/3 of road volume” may help
    - **On busier roads, consider trail stop signs** with possible rules of thumb: 85th percentile speed >30mph, trail volume <1/3 of road volume, rarely need a stop sign if ADT < 4000, possibly need one at ADT 4000-7500, more likely to need a stop or signalization with >7500 ADT
    - **When a busy trail enters a highway** (e.g. SUP with >500 daily users ends but bike route continues) place Stop signs (“vehicle entering a highway”)
    - **Avoid STOP or YIELD control that does not fulfill a clear need or command respect.** Avoid: (1) all-way stops at midblock crosswalks, (2) yield signs at crosswalks for either approach, (3) using stop signs on trail-trail intersections when only a yield is necessary to control right of way, and (4) placing trail-facing stop signs in VA where there is no implemented law for their placement under 924E, VDOT Authority, or Park Authority Regulations. Very low STOP sign compliance should trigger a design re-evaluation as it would on a roadway.
- **Use signals, PHBs or grade separation when ordinary yielding behavior is no longer adequate** and risk becomes high
- **Aim for similar expectations in similar situations across the regional network.** Trail users should not face materially different expectations solely because ownership or jurisdiction changes.

Where do we go from here?

Our goal is safe, predictable, and lawful behavior.

The regional trail/SUP network is increasingly viewed as a single system. Can its crossings can begin to operate like one?

Similar crossings across one regional trail network should produce fundamentally similar user expectations. Can we create a more consistent experience without needing to change established regional driver and bicyclist culture/behaviors? DOT and AASHTO guidance gives our region a common starting point. We propose it's worthwhile for the agencies that operate the network to compare practices and agree on where greater design consistency is valuable.



Appendix

One regional trail network, many owners



Major regional trails with numerous at-grade crossings:

- **W&OD Trail**: NOVA Parks, VDOT, multiple VA cities/towns/counties
- **Cross County Trail**: Fairfax County Park Authority (FCPA), VDOT, FCDOT
- **Bluemont Junction Trail**: Arlington DPR, Arlington DES
- **Arterial Sidepaths in VA** *(e.g., Custis, I-66, Fairfax County Pkwy, Ox Rd, Braddock Rd, Lorton Rd, Route 7, Mt. Vernon Hwy)*: VDOT, FCDOT, Arl. DES
- **Mount Vernon Trail:** Alexandria T&ES, NPS, VDOT, DDOT
- **Metropolitan Branch Trail**: DDOT
- **Rock Creek Park Trail**: NPS, DDOT, MG Parks, MCDOT, MDOT SHA
- **Capital Crescent Trail**: MG Parks, MCDOT
- **Sligo Creek / NW / NE Branch Trails**: MG Parks, PG Parks, MCDOT, PG DPW&T, MDOT SHA

Note, we'll use "trails" here since that's how most of these are named, recognizing that the legal and engineering term is more accurately "shared use paths"

Setting the historical context

1970-80s Build the Trails: Surge in bicycling (fitness, oil shock, environmentalism). “Vehicular cycling” becomes influential in law and engineering guidance: bicyclists are expected to behave like vehicle operators. W&OD and Mount Vernon are built largely as separate recreational facilities. A trail STOP where a recreational trail crosses the road system becomes an intuitive treatment (uncontrolled vehicle intersections are rare in the DC area)

1990s Trails Become Transportation: Trails gain importance as transportation infrastructure (W&OD Citizens Bridge opens in 1992, Capital Crescent Trail built explicitly as a transportation connection), but vehicle-oriented bicycle design remains influential and most design philosophy is unchanged.

2000s-2010s Laws and Design Modernize: Laws increasingly give bicyclists on sidewalks, trails, and crosswalks pedestrian rights and duties (VA in 1999, DC in 2013, MD in 2017) however most installed trail STOP signs remain. New crossing tools such as RRFBs and PHBs emerge, while MUTCD/AASHTO guidance recognizes that priority should reflect relative speed, volume, and facility importance - not automatically favor the road.

2020s Built Environment Catching Up: All Ages & Abilities, Safe System, Complete Streets, and Vision Zero become mainstream design frameworks. Virginia strengthens crosswalk law to require motorists to stop rather than merely yield (similar to DC ‘05 and ‘13 laws). Virginia 2019 law provides localities a mechanism to require trail users to stop at marked crosswalks, but we’ve found no NOVA jurisdiction using it. DC passes “stop as yield”. FHWA, MUTCD, AASHTO Bicycle Guide treat trail crossings as an engineering system in which design, not simply user caution, should produce safe, predictable behavior.

Today Agreement on Safety Treatments, Unresolved Legacy on Control: There appears to be broad regional agreement on escalating crossing-safety treatments as risk increases, constrained by site conditions, traffic volumes, project timing, and funding. But major trail-to-trail and crossing-to-crossing differences remain in who is assigned priority, especially when STOP signs are used at what would otherwise be unsignalized crosswalks.

Across trails, there are three recurring crossing situations

A. Minor-road crossing

Typical characteristics: Low speeds (e.g., 20-30mph limits), relatively low vehicle volumes (e.g. under ~6k ADT), two lanes, manageable crossing distance, a regionally significant trail crossing a comparatively minor road

Treatments users may encounter include: marked or high-visibility crosswalk, STOP sign for trail or roadway, raised crossing, geometric speed control, advanced warning signs

B. Intermediate-road crossing

Typical characteristics: Higher traffic volume or speed, greater crossing distance, or more difficult gap selection, but conditions that can still support an unsignalized crossing

Treatments users may encounter include: high-visibility crosswalk, RRFB, median/refuge, curb extensions or geometry changes, roadway speed reduction, STOP sign for trail, advanced warning signs

C. Major-road crossing

Typical characteristics: Multiple lanes, higher speeds or volumes (e.g., >20k ADT or >40mph), limited usable gaps, complex movements, or unacceptable crossing exposure

Treatments users may encounter include: full signalization, pedestrian hybrid beacon, bicycle-specific signal treatment, substantial geometric changes or grade separation

These are intentionally defined as broad categories to aid a discussion, not hard lines to categorize each crossing by.



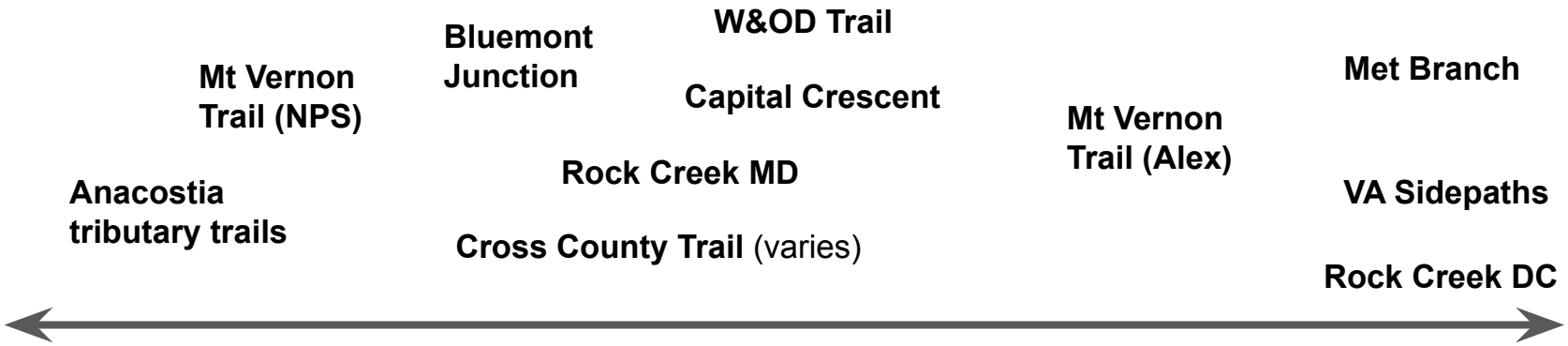
Appears to be alignment on escalating safety treatments

Observations from review of regional trail-road intersections:

- **Apparent broad regional alignment on the basic escalation:** as crossing risk and complexity increase, agencies generally add stronger treatments, from visibility and markings, to geometric speed control/refuge, to road diets, to RRFBs, signals/PHBs, and ultimately grade separation
- **Differences in treatment appear to be site-specific rather than philosophical:** roadway width and speed, sight distance, drainage/topography, turning movements, relative trail and road volumes to support signal warrants, and available right-of-way can make treatments such as raised crossings or medians feasible in one location but not another
- **The installed network also reflects when a crossing was last rebuilt:** older crossing designs often predate widespread use of treatments such as RRFBs, PHBs, raised crossings, and newer geometric approaches
- **Funding and project opportunity matter:** major upgrades often occur when a roadway or trail is reconstructed or when relevant funding becomes available, leaving otherwise similar crossings with different levels of treatment

Most of these treatments do not fundamentally change the decision facing road or trail users. They make the crossing more visible, reduce speeds, improve sight lines, or increase yielding behavior. They generally do not assign a different legal priority or require a fundamentally different action from road or trail users. That is categorically different from a STOP sign, traffic signal, or PHB, which explicitly tells one party when to stop or proceed, overriding the default legal requirement for a crosswalk.

“Recreation or transportation” may have guided designs



Similar situation, different control: minor road (driveway)

W&OD & Jackpit Ln: no intersection control, driveway w/ fences



Met Branch Trail & T St NE: 3 stop signs for cars using driveway



Rock Creek Trail & Zoo: Stop for trail southbound only at driveway



Even where road traffic approaches zero there is inconsistency about intersection control

Proper use supports credibility: is the sign intended as intersection control or an informal “use caution” message?

W&OD & Ruritan Road: Conflicting signs: STOP for road, YIELD for trail



Rock Creek MD: Mini waist-high STOP, no stop bar, at a driveway



W&OD and Old Reston Ave: Trail STOP sign at signalized intersection



In many cases these stop signs are not standard size or placement and are not maintained or missing, which sends a message to users

Possible From-To: Spring, Oak, and Little Falls Streets

Current state fails MUTCD criteria

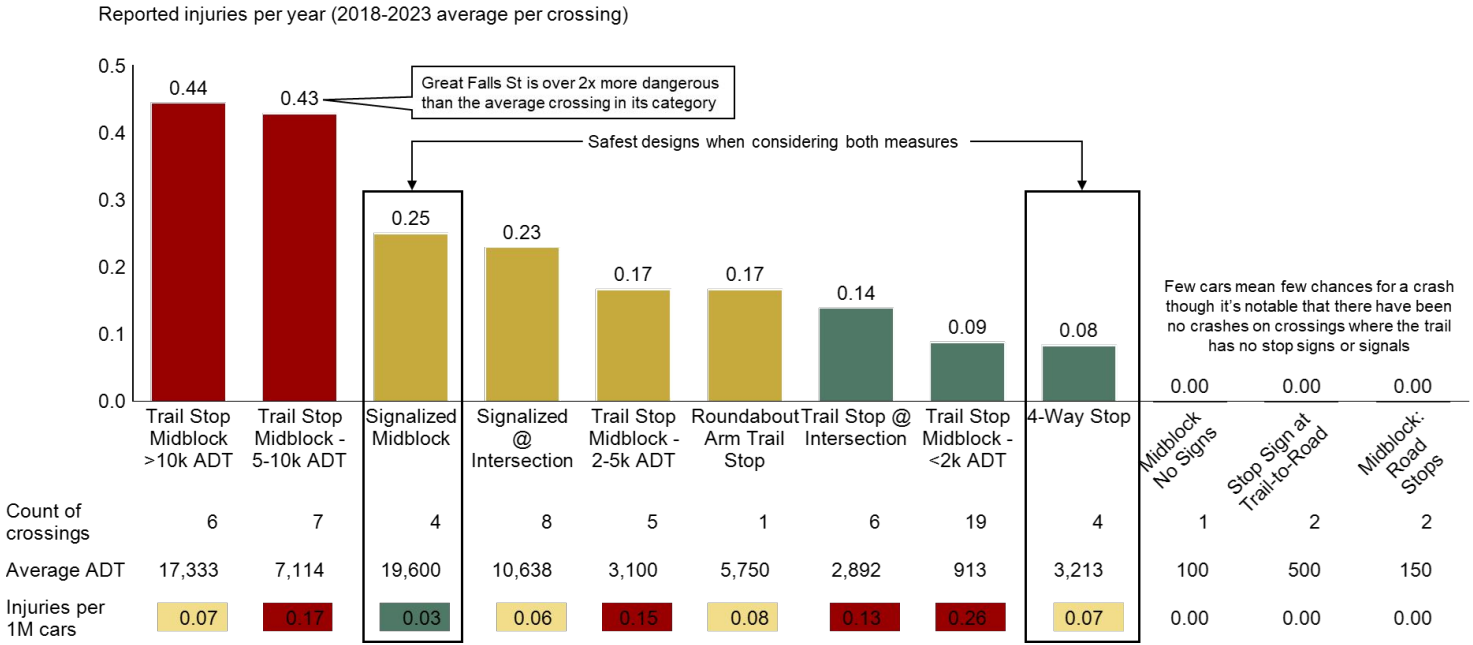


Proposal mirrors Toole Design recommendation



Target behavior change: Minimal; less confusion over right of way (peds > bikes > cars), more cyclist awareness/respect for trail stop signs elsewhere (i.e., where stopping is a must for safety)

W&OD Trail users navigate a wide variety of crossing situations; trail-only STOP signs are most dangerous



Other observations from reviewing regional trail crossings

- **Stop-as-Yield**, under consideration in MD and VA, will add an additional complication, e.g. DE now has special bike-specific stop signs (though these appear over-used as well and do not command respect)
- **W&OD Trail looks to be setting the standard on investing for safety** with grade separation, most likely to use midblock signals, most likely to use stop signs for cars on lower volume roads
- **High-risk / high-crash** unsignalized crossings almost always have STOP signs for the trail, suggesting that this is not an effective countermeasure to reduce risk and the prevalence of STOP signs likely reduces the effectiveness of critical ones
    - **Crossings without STOP signs** (e.g., on Rock Creek DC, Anacostia Tributary Network, VDOT Sidepaths) do not seem to be the ones making headlines for crashes
    - **Other local trails** (e.g., Levee Trail in the Anacostia Tributary system in MD, Berman Park Trail in Falls Church, VA) typically do not use STOP signs for road crossings and Protected Bike Lanes match the control of the intersection and do not use special STOP signs for the bicycle facility alone.
    - **Trail-trail intersections** are usually uncontrolled but when they are it is a STOP sign - **should these be YIELD** (least restrictive control) to avoid degrading the impact of STOP signs in higher-risk situations with real need (e.g., sight lines)
- Anacostia Tributary Network using trail **stop signs where the trail crosses at a road 4-way stop** intersection which could be a standard worth copying - all approaches stop, which is different from midblock crosswalks or a trail paralleling a major road and crossing a stop-controlled minor road
- **Capital Crescent** has done a lot of creative design and re-design on their two at-grade midblock crossings, likely with lessons applicable for the region. Both have STOPs for the trail with long-running very low compliance.
- **Legal e-bikes with sustained 15-20mph+ speeds** suggest that geometric or other speed control for trail approaches may become more important and legacy trail widths/radii may become more challenging
- Road STOP signs for trail crossings appear effective once **trail ADT > 1/3 road ADT** for roads under ~7k ADT; further data review and study of existing conditions may produce a useful engineering guideline