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or scan QR code:



*Session C5: Scoping Your Active  
Transportation Plan for Success*

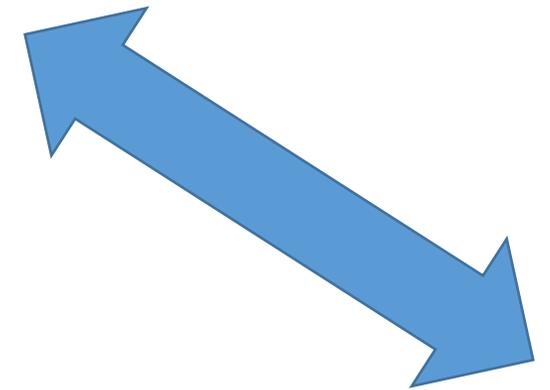
*Matt Ludwig, AICP, PE, WEDG*

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# Active Transportation Development Process



Destination

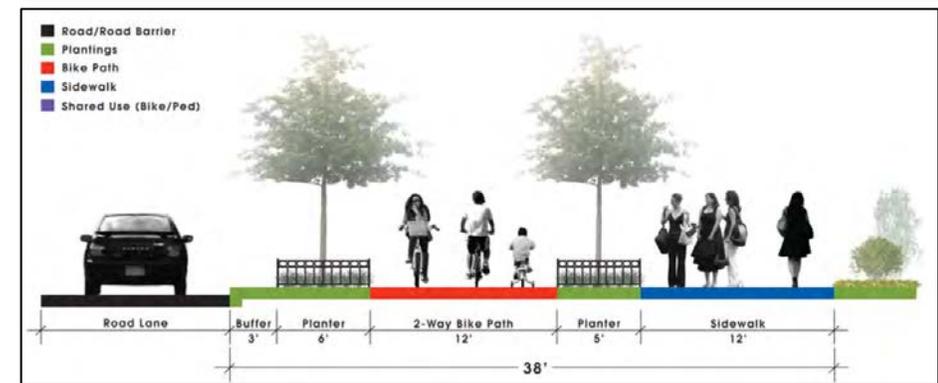
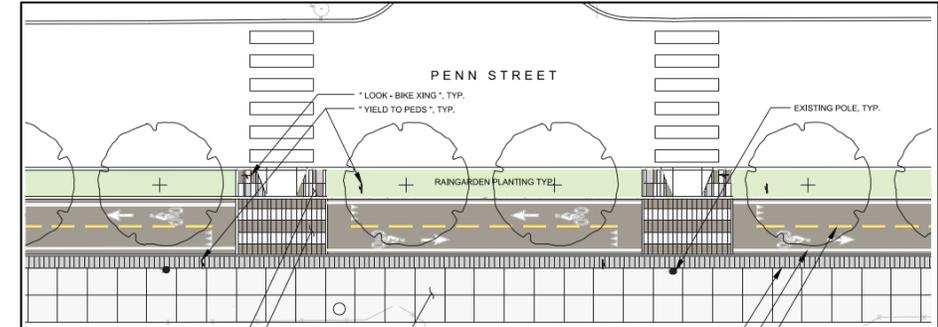
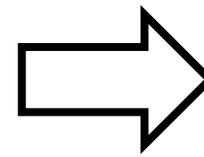


Destination

# Active Transportation Development Process



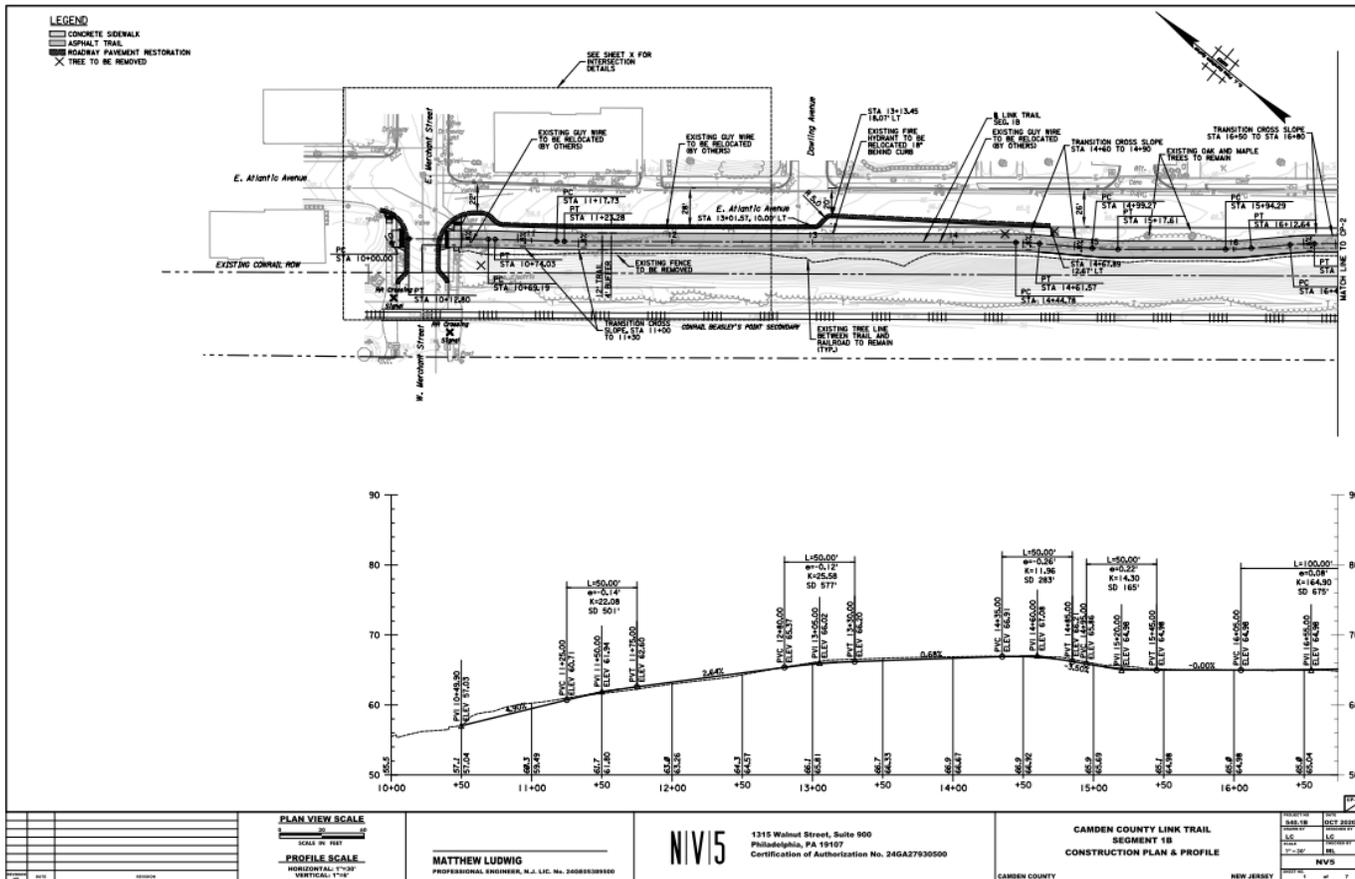
**MASTER PLAN FOR THE CENTRAL DELAWARE**  
TRANSFORMING PHILADELPHIA'S WATERFRONT



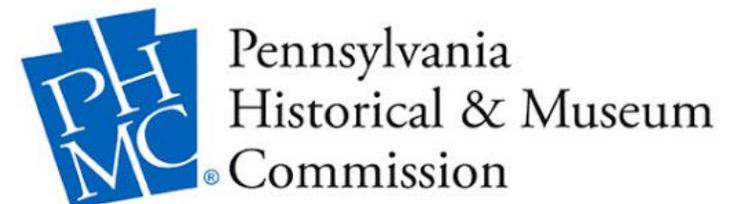
# Active Transportation Development Process



# Active Transportation Development Process



**US Army Corps of Engineers.**



# Active Transportation Development Process



# Active Transportation Development Process



# Scoping for success!

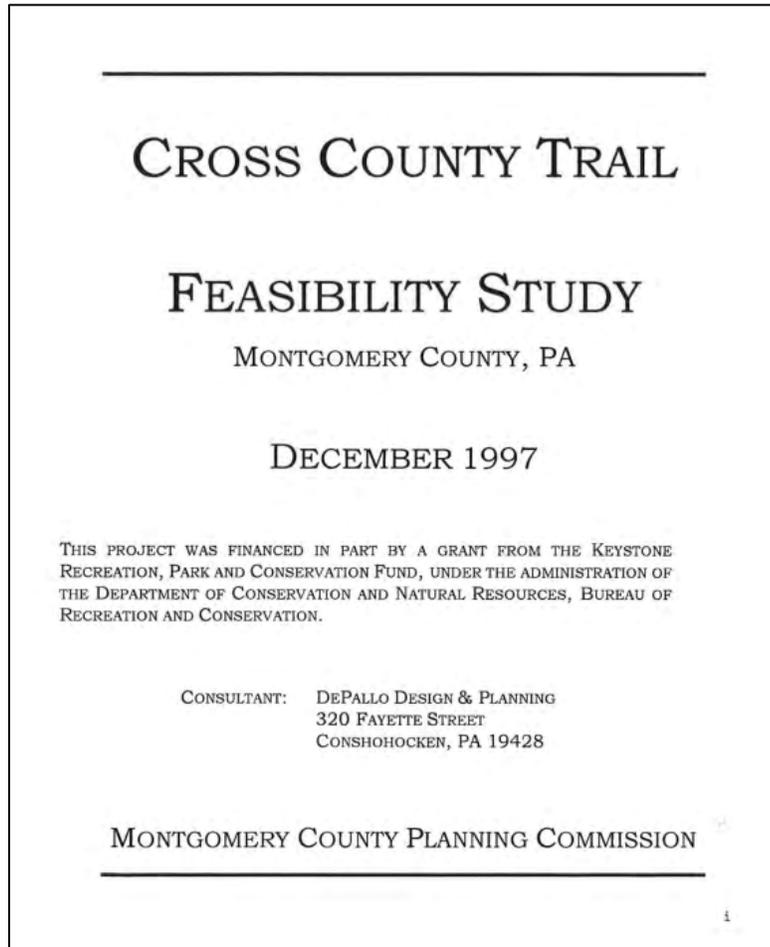


Proper investment in each phase makes the next phase easier!



# Consideration #1: Trail Routing

## Cross County Trail, Montgomery County



# Consideration #1: Trail Routing

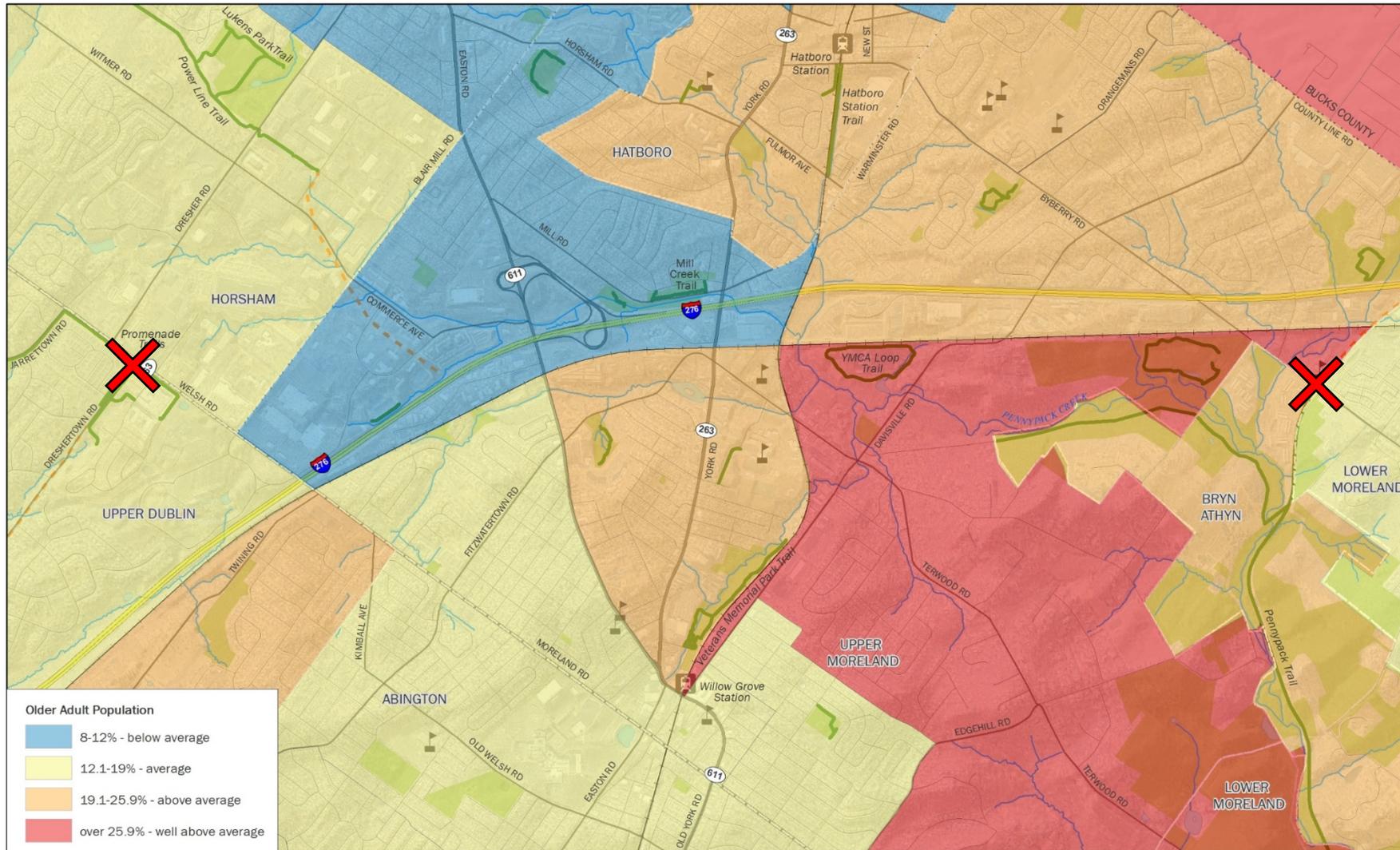
Cross County Trail, Montgomery County

**The New York Times**

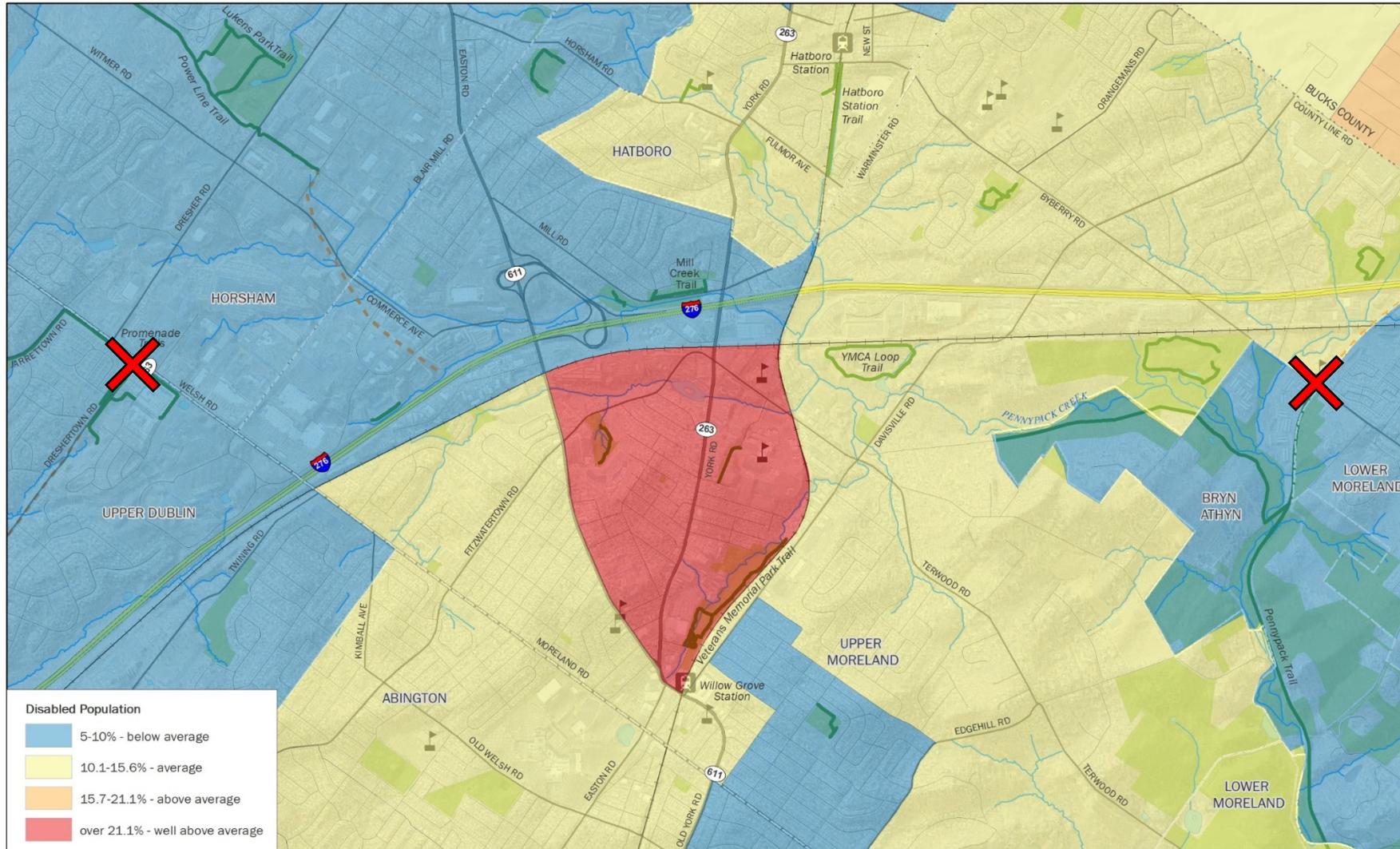
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***Rival Railroads Agree on Conrail's  
Assets***

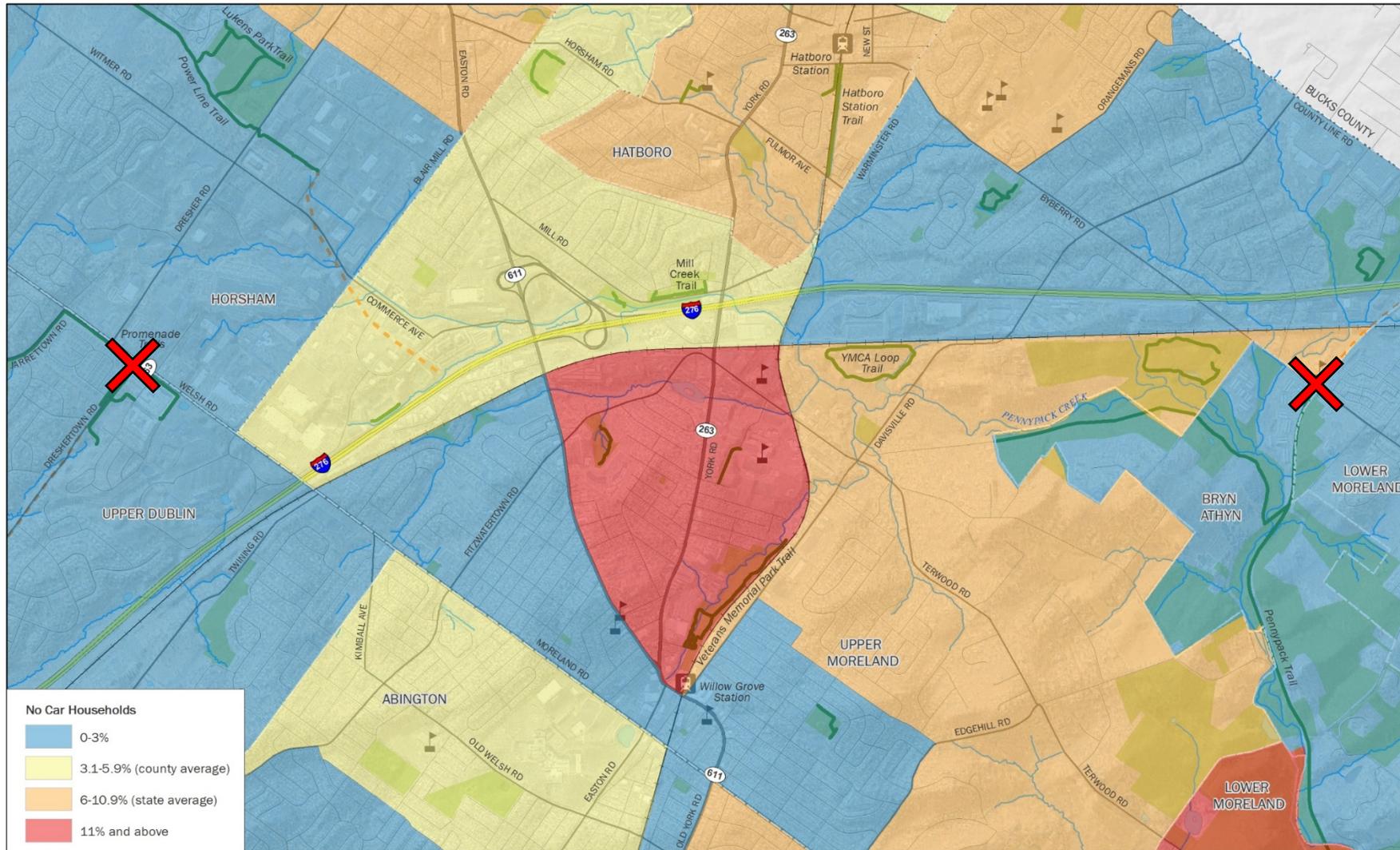
# Consideration #1: Trail Routing



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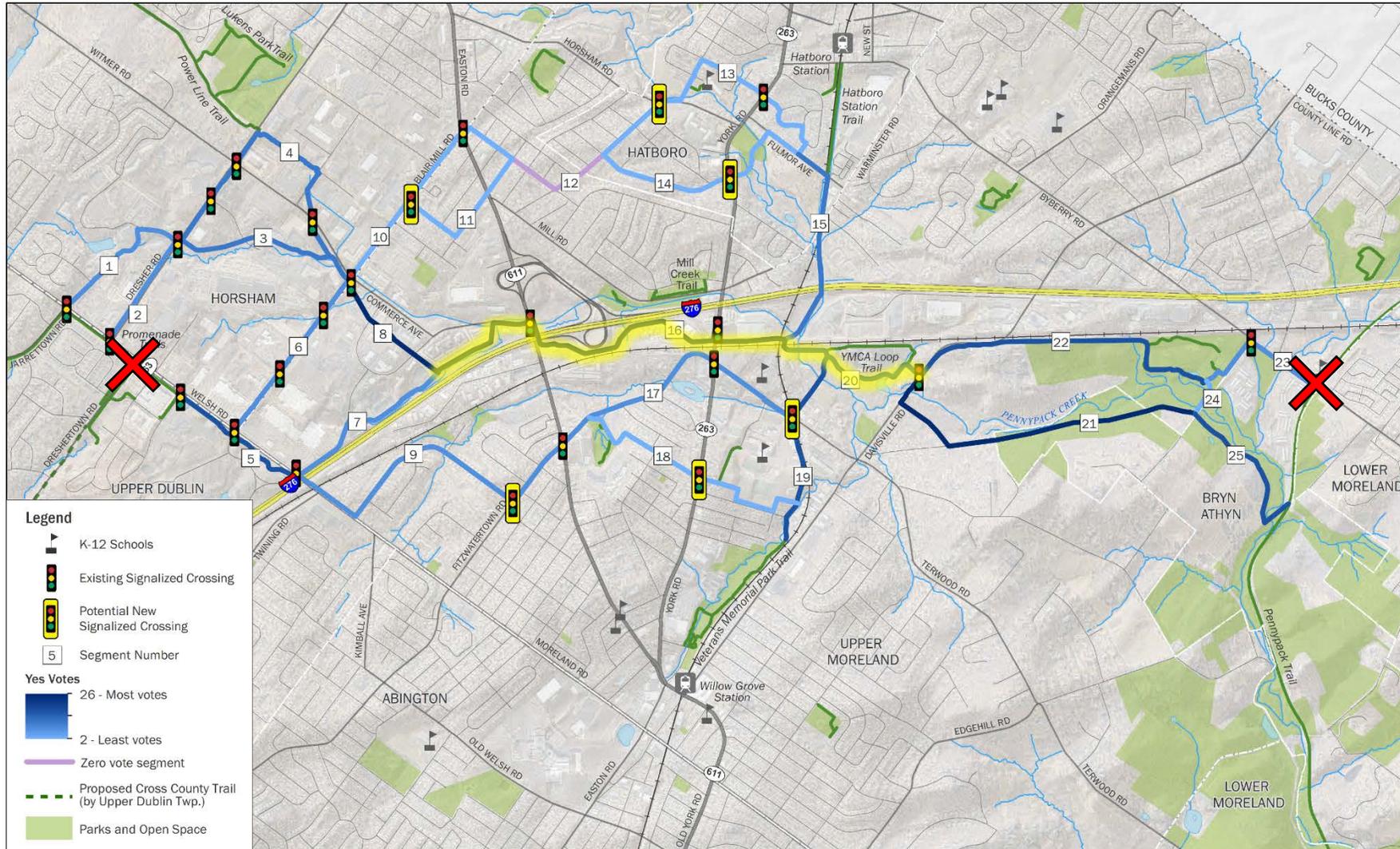
# Consideration #1: Trail Routing



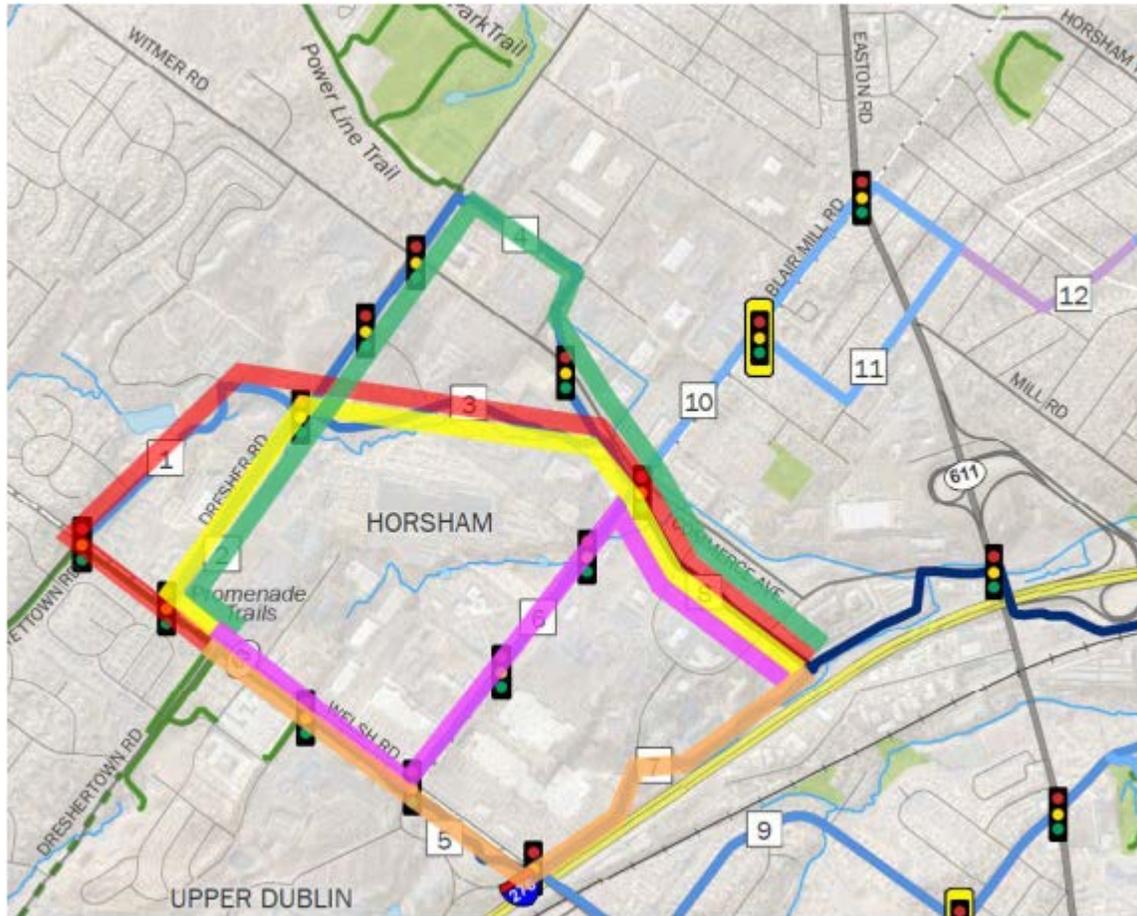
- Legend**
- K-12 Schools
  - Existing Signalized Crossing
  - Potential New Signalized Crossing
  - Existing Trail
  - Potential Separated Trail
  - Potential Sidepath
  - Potential Neighborhood Greenway
  - Proposed Cross County Trail (by Upper Dublin Twp.)
  - Parks and Open Space



# Consideration #1: Trail Routing

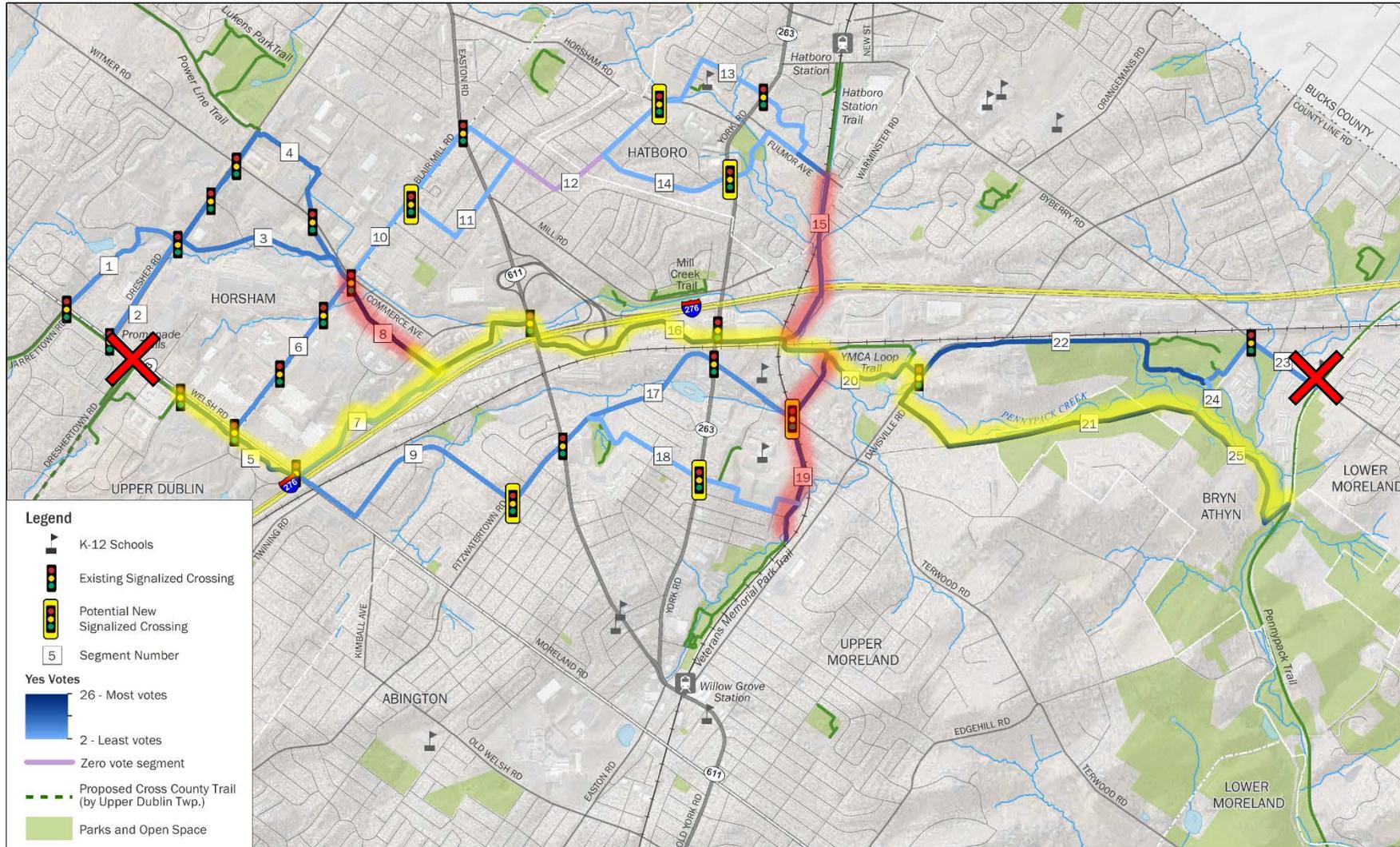


# Consideration #1: Trail Routing



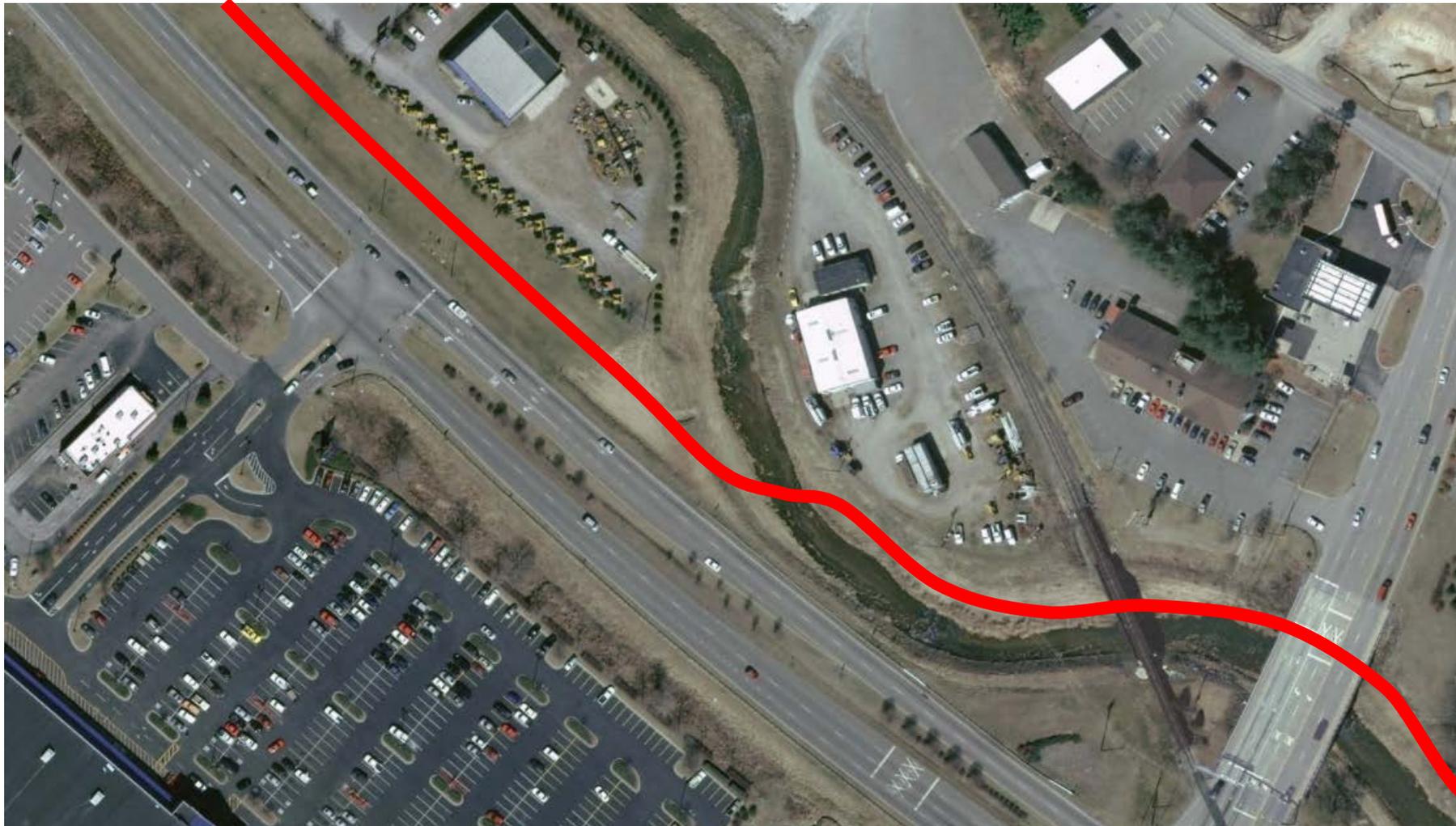
Route	Consists of Segments	Signalized Crossings	Driveway/non-signalized street crossings	Privately Owned Parcels Affected*	Separate Property Owners Affected*	Parcel Notes
Red	1, 3, 8	4	7	14	8	7 Workspace Property Parcels
Yellow	2, 3, 8	4	9	16	7	6 Workspace Property Parcels
Green	2, 4, 8	7	14	14	9	5 Workspace Property Parcels
Pink	5, 6, 8	4	8	10	9	
Orange	5, 7	4	2	9	6	One parcel already likely has easement (apartments)

# Consideration #1: Trail Routing



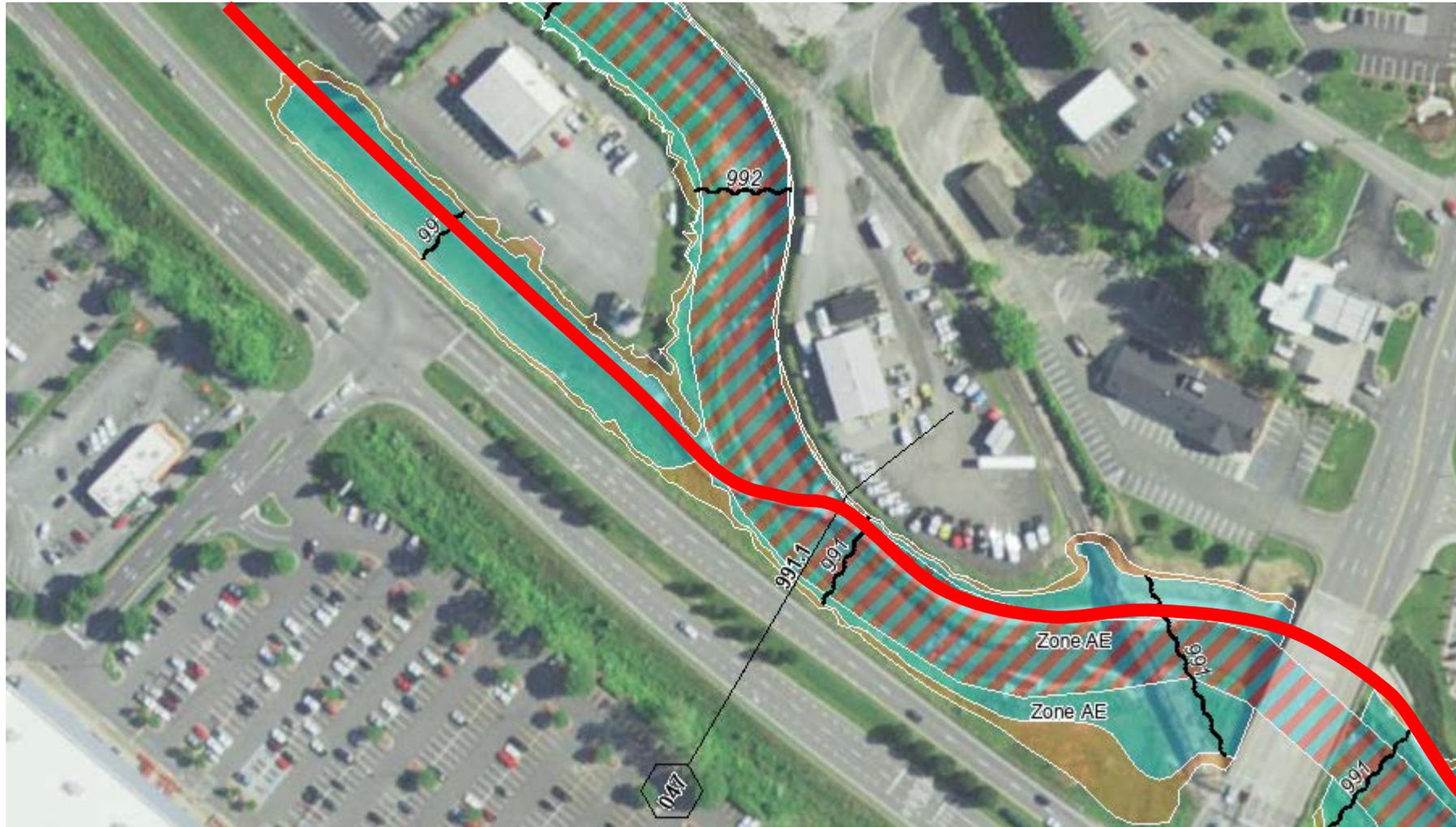
# Consideration #2: Structure Identification

## Bridge and Boardwalk Lengths



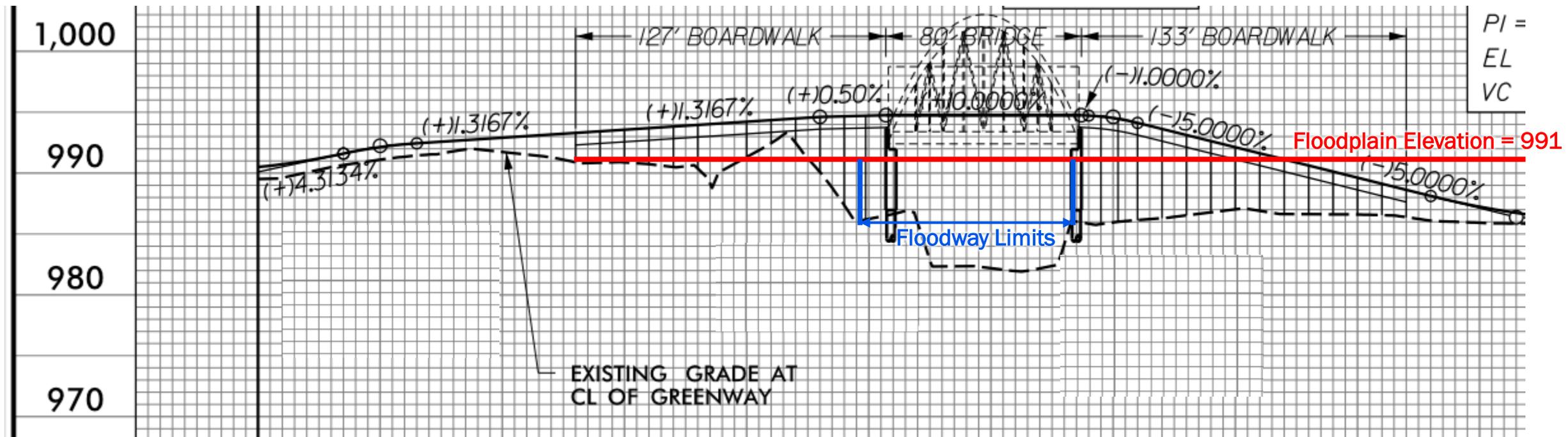
# Consideration #2: Structure Identification

## Bridge and Boardwalk Lengths



# Consideration #2: Structure Identification

## Bridge and Boardwalk Lengths



# Consideration #2: Structure Identification



# Consideration #2: Structure Identification



# Consideration #2: Structure Identification



# Consideration #2: Structure Identification



# Consideration #3: Climate Change



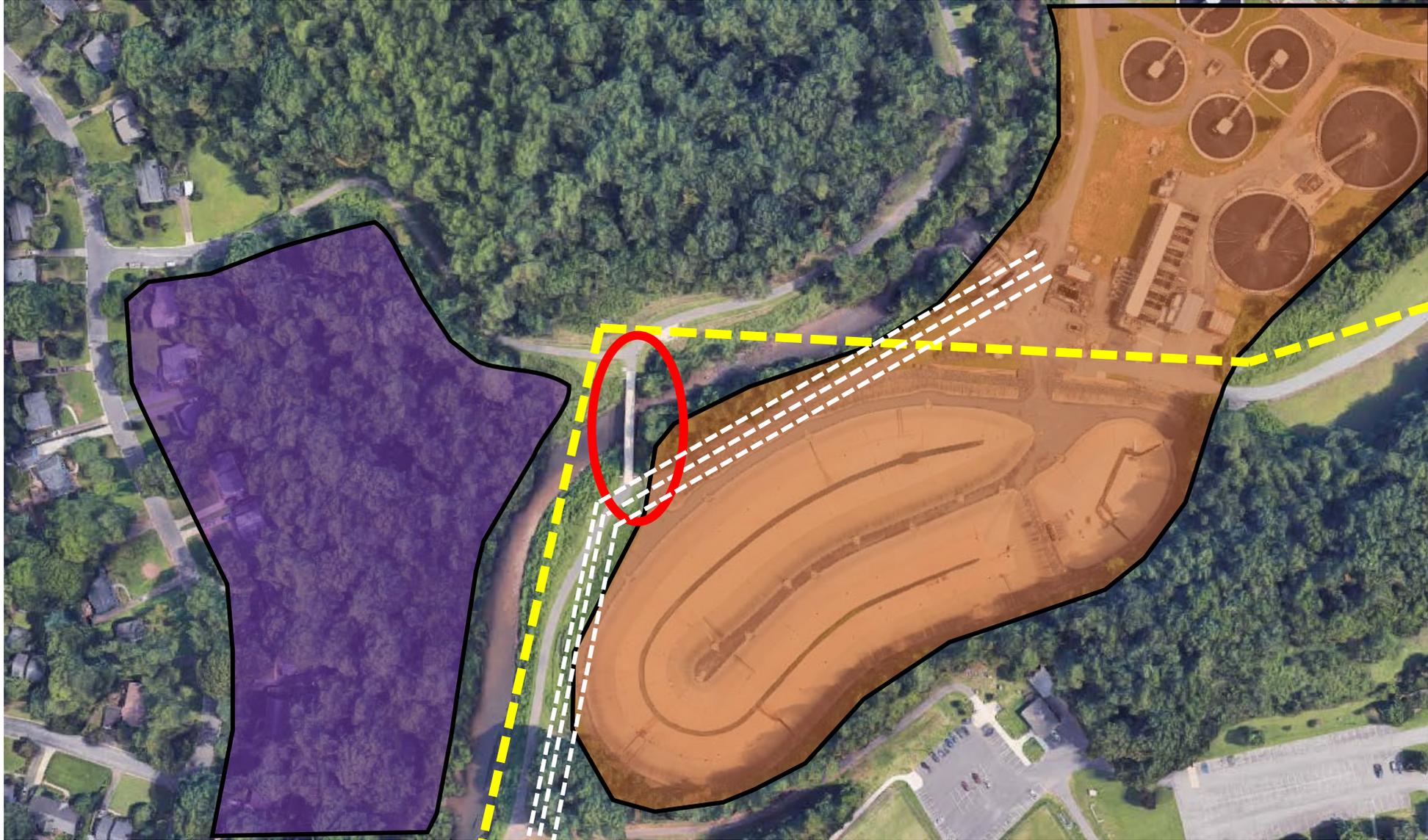
# Consideration #3: Climate Change



# Consideration #3: Climate Change



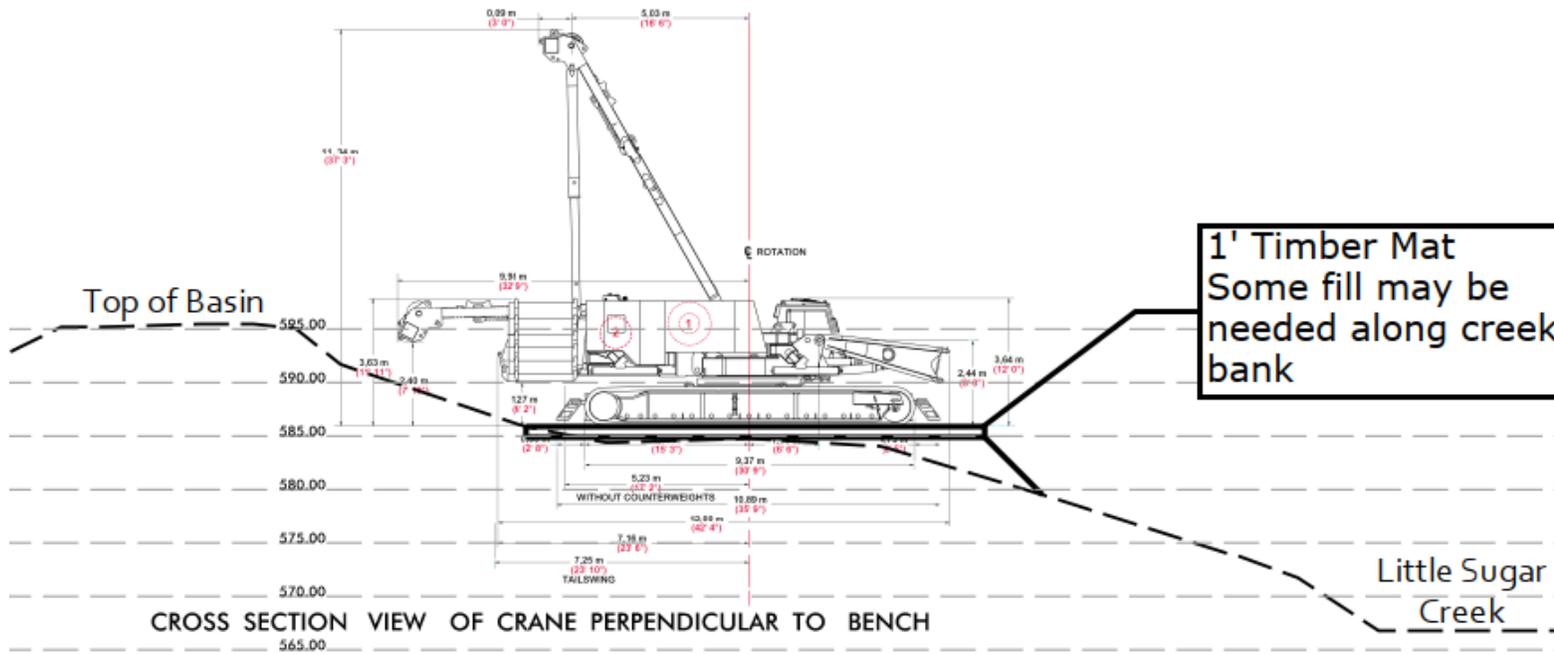
# Consideration #4: Utilities and Constructability



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# Consideration #4: Utilities and Constructability



**Pipe Data:**

Pipe $\phi_{\text{INNER}}$	36 in.
Pipe $\phi_{\text{OUTER}}$	48 in.
Pipe Class	Class III
Pipe Depth	9.5 ft.

**Truck Data:**

Crawler Wt., Front	225.8 k	Estimated Bridge lifting weight = 81.6k (from CONTECH)
Crawler Wt., Rear	225.8 k	Est Crane wt = 370k (from Manitowac site)
Crawler Spa.	22 ft.	1/2 load per crane crawler; distribute load to crane pad
$L_{\text{PAD}}$	420 in.	Assumed Pad = 35' x 35' (Conserv. Influence Area)
$W_{\text{PAD}}$	420 in.	Distribution of Live Load: AASHTO 3.6.1.2.6

References

IM	0	Eq. 4.11 - Concrete Pipe Design Manual
Spread A	44.50 ft.	Illustrations 4.12 & 4.13 - Concrete Pipe Design Manual
Spread B	44.50 ft.	
Area <sub>SPREAD</sub>	1980.3 sq.ft.	Le=effective supporting length of pipe, Concrete Pipe Design Manual Eq. 4.14
$L_e$	49.75 ft.	

P	451.60 k	Eq. 4.12 - Concrete Pipe Design Manual
w	0.23 k/ft <sup>2</sup>	Eq. 4.13 - Concrete Pipe Design Manual
$w_1$	40.59 k adjusted for crane load in place of lane load	Eq. 4.14 - Concrete Pipe Design Manual
$w_2$	0.82 k/ft	Eq. 4.14 - Concrete Pipe Design Manual

**Soil Load:** (Assumes embankment fill)

Prism Load =  $\gamma_s \left[ H + \frac{D_o (4 - \pi)}{8} \right] D_o$  Eq. 4.2 - Concrete Pipe Design Manual

$\gamma_s$  = 120 pcf

Prism Load = 4.77 k/ft

V.A.F. = 1.35 Assumes Type I Installation V.A.F.=Vertical Arching Factor  
Illustration 4.7- Concrete Pipe Design Manual  
Eq. 4.1 - Concrete Pipe Design Manual

$w_3$  = 6.43 k/ft

**Fluid Load:**

$w_4$  = 0.44 k/ft Assumes Pipe Flowing Full

**Bedding Factor:**

$BF_{11}$  = 2.2 Illustration 4.25

$BF_{10}$  = 4 Assumes Type 1 Installation Illustration 4.22

**D-Load:**

D-Load =  $\left[ \left( \frac{W_e + W_r}{B_f} \right) + \frac{W_e}{B_{\beta \pm}} \right] X \frac{F.S.}{D}$  Eq. 4.24 - Concrete Pipe Design Manual

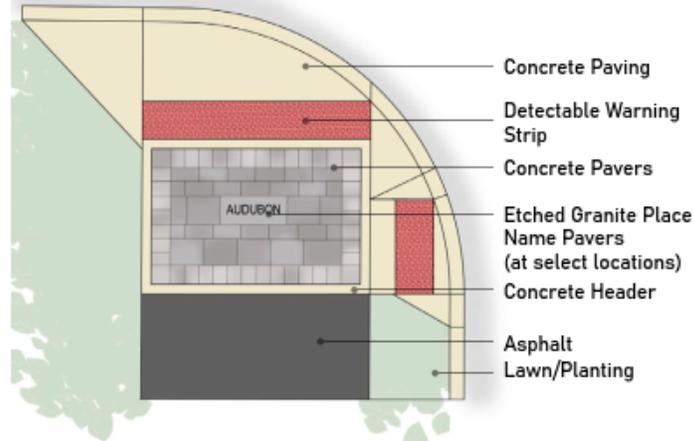
D-Load	0.6966 k/ft/ft	Pipe Is Satisfactory	Pipe Allowable Strength	1.35 k/ft/ft
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# Consideration #5: Placemaking & Standards

## GUIDELINE 1 - CELEBRATING TOWN IDENTITY

Hardscape accents and site furniture selection create a continuous trail identity while respecting the diverse town and city environments. Etched "place name" pavers strengthen the relationship between trail and town

### HARDSCAPE ACCENTS



At trail transition points, such as intersections, concrete pavers indicate a change. These concrete pavers serve as a sequential element throughout the trail. In select locations, etched "place name" pavers inform trail users of their location, especially when proximate to business districts

### SITE FURNITURE



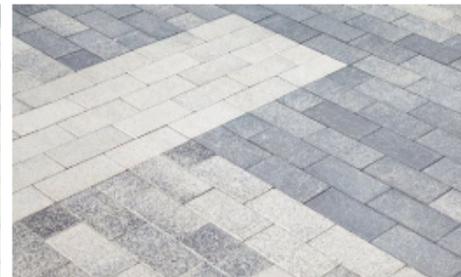
Site furniture form is traditional enough to blend into unique town environments, while wood provides warmth and material consistency throughout the trail



Plainwell bench and litter receptacle, Ring bike rack, all from Lanscape Forms



Techobloc Westmount concrete paver



Unilock Umbriano concrete paver



Etched paving precedent



DESIGN  
GUIDELINES  
FOR  
KEY  
NODES

N|V|5

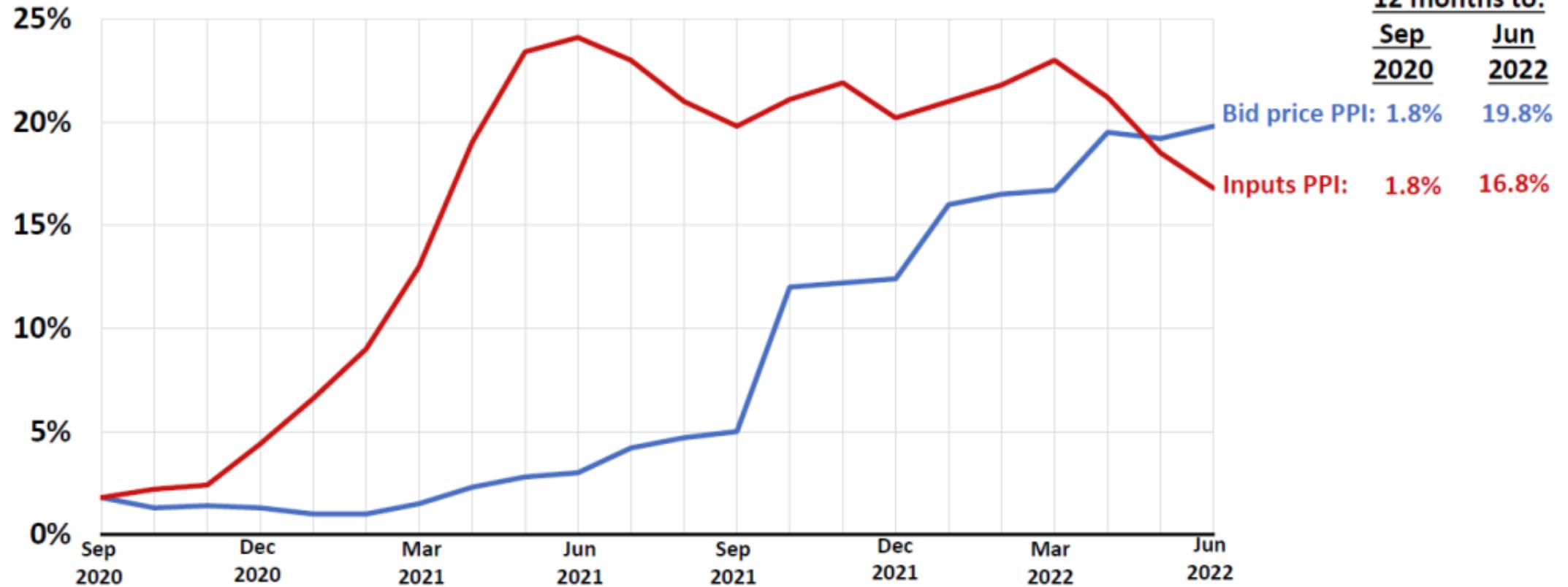
camden county  
Making It Better, Together.

N|V|5

# Accurate Cost Estimating

## Costs vs. bid prices for new nonresidential construction

Year-over-year change in PPIs, Sep 2020-Jun 2022, not seasonally adjusted



Source: Bureau of Labor Statistics, producer price indexes, [www.bls.gov/ppi](http://www.bls.gov/ppi)

# What can be done?

- **Maximize project size**
- **Combine projects**
- **Consider source of funds**
- **Public-private partnerships**

# Grants

## Local

- Regional Trails Program (DVRPC)
- Transportation and Community Development Initiative (DVRPC)
- Non-Profits
- Counties
- Private Developers or Corporations

## State (non-Federal)

- **Community Conservation Partnerships Program (DCNR)**
- Multimodal Transportation Fund (DCED)
- Multimodal Transportation Fund (PennDOT)
- Act 13 (DCED)
  - Greenways, Trails, & Rec
  - Watershed Restoration
  - Flood Mitigation
- Redevelopment Assistance Capital Program (RACP)

## MPO/PennDOT (Federal)

- Transportation Alternatives Set-Aside (TASA)
- Congestion Mitigation and Air Quality (CMAQ)
- Safe Routes to School/Transit
- Highway Safety Improvement Program (HSIP)

## IIJA Discretionary (Federal)

- RAISE (up to \$25m)
- Safe Streets and Roads for All (SS4A)

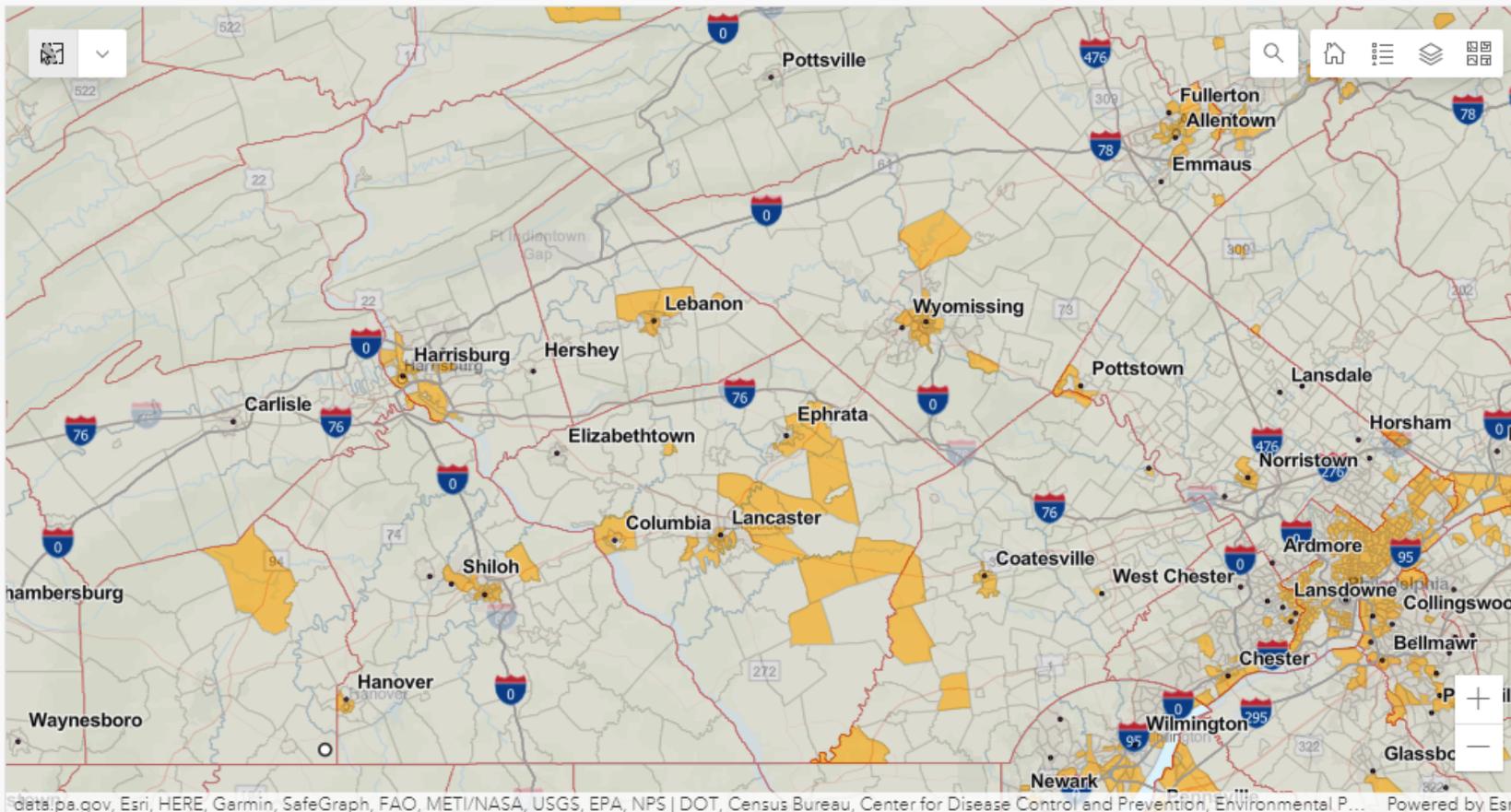
[www.fhwa.dot.gov/environment/bicycle\\_pedestrian/funding/funding\\_opportunities.pdf](http://www.fhwa.dot.gov/environment/bicycle_pedestrian/funding/funding_opportunities.pdf)

[www.build.gov](http://www.build.gov)

# Federal Discretionary Grant Emphasis

## SS4A Underserved Communities Census Tracts (Historically Disadvantaged Communities)

**User Instructions:** Select state of interest on the list on the right. Use the magnifying glass tool to search for an address, city or county. Use the +/- icons or mouse wheel to zoom into the map. Click and drag the map area to pan. Use the select tool on the left to select US Census tracts within your area of interest. Use the dropdown on the left to draw a circle, rectangle or lasso around



Consistent with OMB's Interim Guidance, DOT has developed a definition for highly disadvantaged communities using existing, publicly available data sets and where source data did not exist (Tribal lands,

### Transportation Disadvantaged Tracts by State

- Alabama: 601
- Alaska: 33
- American Samoa: 1
- Arizona: 519
- Arkansas: 357
- California: 4168
- Colorado: 208
- Connecticut: 32
- Delaware: 39

# Contact Information:

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