



# **Pedestrian Tunnels**

## **The Mode of the Future**

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# Pedestrian Tunnels

**Potentially the most transformative  
and meaningful transportation projects  
being constructed today**

Suwanee Pedestrian  
Tunnel – Suwanee, GA



Pedestrian and bicycle tunnel  
underneath Amsterdam Central station



## ADDING A 3RD DIMENSION!

**Surface areas** in urban areas have been or will be fully occupied in the near future

Public **use of underground spaces** has become a common practice

Underground construction provides a **solution** to surface congestion by introducing a practical **3<sup>rd</sup> dimension** to limited two-dimensional urban surfaces

More Important in **highly populated centers** where over-ground space is very **limited** and super **expensive**

### Common issues to address:

- **Ground settlement**
- **Interference with adjacent existing structures,**
- **Construction impacts on resident lifestyles and traffic flow.**



Location: UK

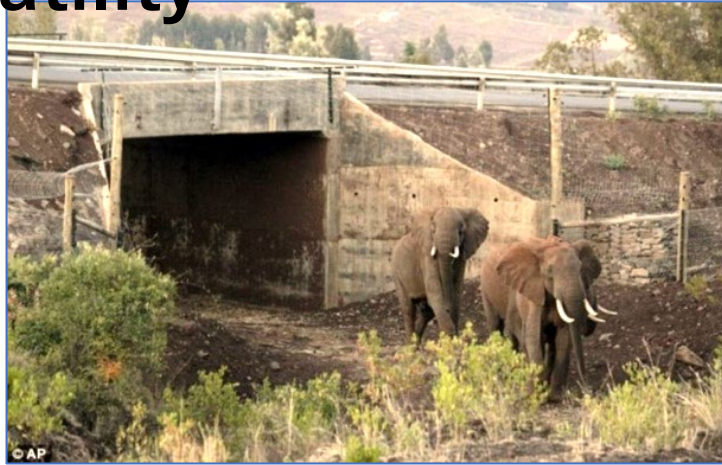




# Pedestrian Tunnel Versatility

Fort Collins, CO

- ATV's
- Wildlife
- Pets
- Cyclists
- Joggers
- Marathoners
- Equestrian – Carver Tunnel
- Snowmobiles
- Golf Carts
- Fish Channels



Malvern Station AMTRAK and SEPTA  
Pedestrian Crossing



Knowles Ave. Pedestrian  
Underpass

# Primary Genesis for Bike/Ped Tunnels

## Trails!

- Bike/Ped trail programs in all 50 states\*
- Scores of trails in Europe and Asia\*
- Over 617 trails in the US\*
- Over 278,000 km of trails in Canada\*\*
- 77 rail to trail tunnels\*\*\*



\* Wikipedia as accessed September 27, 2017

\*\* Canadian Trails Study, December 2010, National Trail Coalition

\*\*\* Rails to Trails Conservancy, 2001



# Risk Factors

- Complex & Widely Varying Subsurface Conditions
- Limited Horizontal Investigation Methods
- Non-engineered Embankments
- Debris
- Excessive Settlement
- Thin Cover
- Bad Ground
- Loss of Commerce
- Tunneling Technology Limitations – Exotic Methods
- DOT & RR Experience Gap
- Protracted Permitting Process
- Construction Impacts
- Socio-Economics
- Stakeholders Acceptance

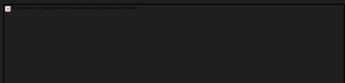




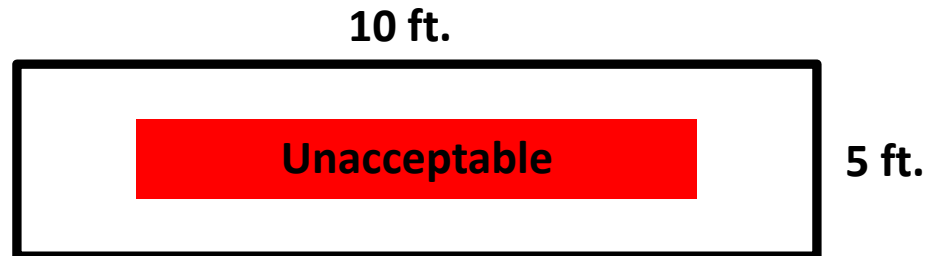
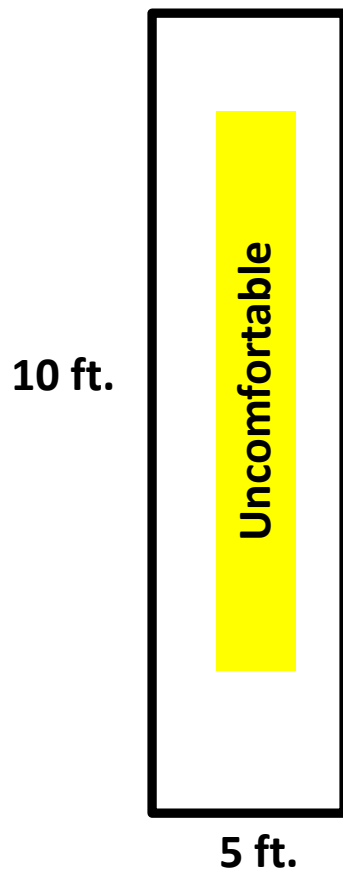
# Human Tolerance Factor Rating System (HTFRS)

## HTF Rating System

- Unacceptable – Pedestrians Avoid Tunnel
- Uncomfortable – Periodic Use Only To Avoid Other Temporary Blocked Route
- Comfortable – Tunnel used often
- Welcoming – Tunnel is an Attraction



# Human Tolerance Factor Rudimentary Example



Height stronger factor in “friendliness” than the width



# Human Tolerance Factor



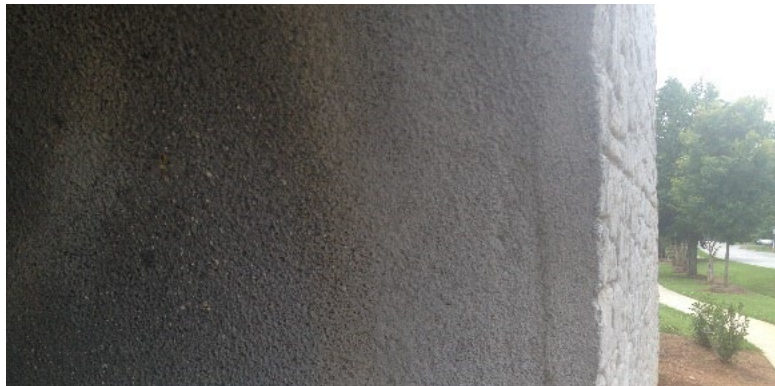
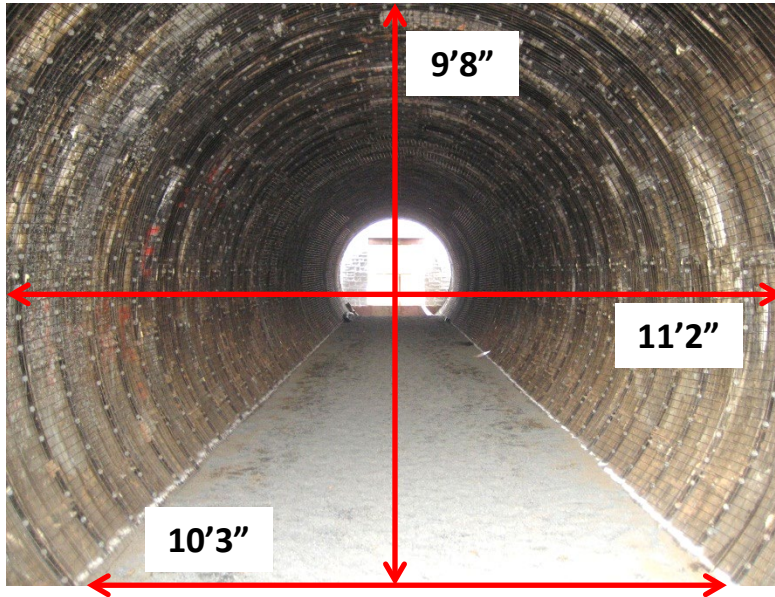
Pedestrian/Equestrian Tunnel – 600 ft. Long, Approx. 20 ft.  
High and 16 ft. Invert

## Rating

**Unacceptable**

- A horse in the tunnel will almost completely block the opening
- No lighting
- Length creates a claustrophobic feeling
- Timber finish nice feature

# Human Tolerance Factor



Pedestrian/Bike Tunnel

## Rating

**Uncomfortable**

- A bike in the tunnel creates an unsafe feeling
- The final finish is rough shotcrete





# Human Tolerance Factor



## Rating

**Comfortable**

- Wide invert
- Good height
- Rock face will attract users
- Good lighting

**Pedestrian/Equestrian Tunnel – 1,500 ft. Long, 24 ft., Wide,  
30 ft. plus Height**



# Human Tolerance Factor



**Welcoming**

- Nice façade
- Safe
- Architectural features
- Artistic features
- Relatively short length
- Trees

Location: Georgia, US



# Q&A

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Thank you very much!

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