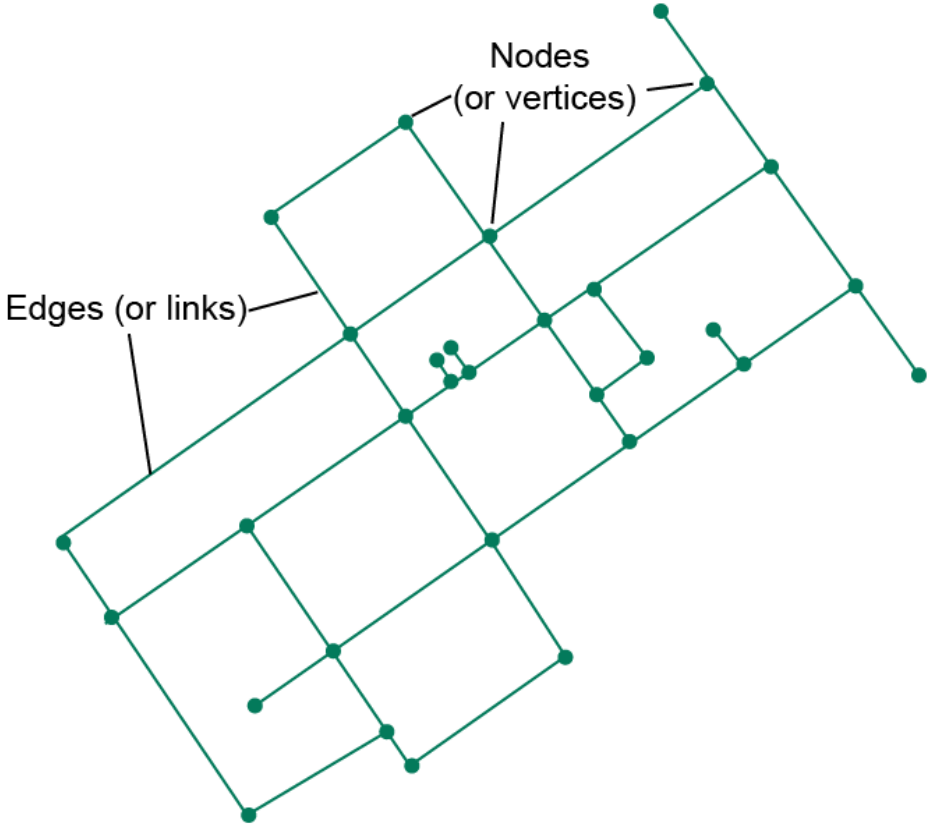
General Active Transportation Infrastructure Specification

Version 1.0

What is a routable network?



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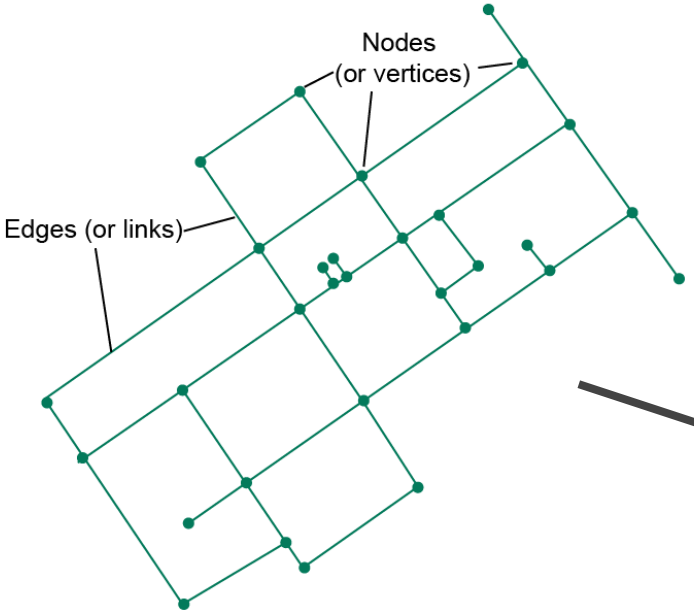


Tier Model

	Tier 1	Tier 2	Tier 3	Tier 4
Features	Sidewalk/ crosswalk centerlines or road centerlines; curb ramps nodes; bikeways	Sidewalk/ crosswalk centerlines; curb ramps (as nodes); bikeways; multi-use paths; trails, traffic islands	+ steps, escalator, elevator, object, transit stop, traffic calming, counter, pushbutton, detector	+ issue, sign, bike parking
Routability	May be routable	Routable with some user pre-processing	Routable via spatial topology	Routable spatial topology or metadata
Attributes	Small defined set; Likely to have gaps	Larger attribute set; Complete or mostly complete across most attributes	Many recommended attributes, with mostly complete rows	Even more recommended attributes, near-perfect completeness
Geospatial Precision	Lower	Medium	Higher	Highest
Use Cases	Bike: Basic facility mapping Ped: Basic mapping	Bike: Road inventory / basic segment LTS Ped: Basic routability, basic accessibility info	Bike: Routable LTS analysis Ped: Accessibility profile routing	Bike & ped: Door-to-door routing to points of interest based on mobility profiles

Data Management

- GATIS data will be available in the feed-based GATIS Registry.
- GeoJSON and JSON format
- No requirement on how frequently to update.
  - “Freshness” may become part of tier model
- Tools to help:
  - Schema in JSON and geodatabase formats
  - Playbook
  - GATIS Validator
  - Sample datasets
  - Sample Python scripts and ArcGIS tipsheets

Image: Freepik

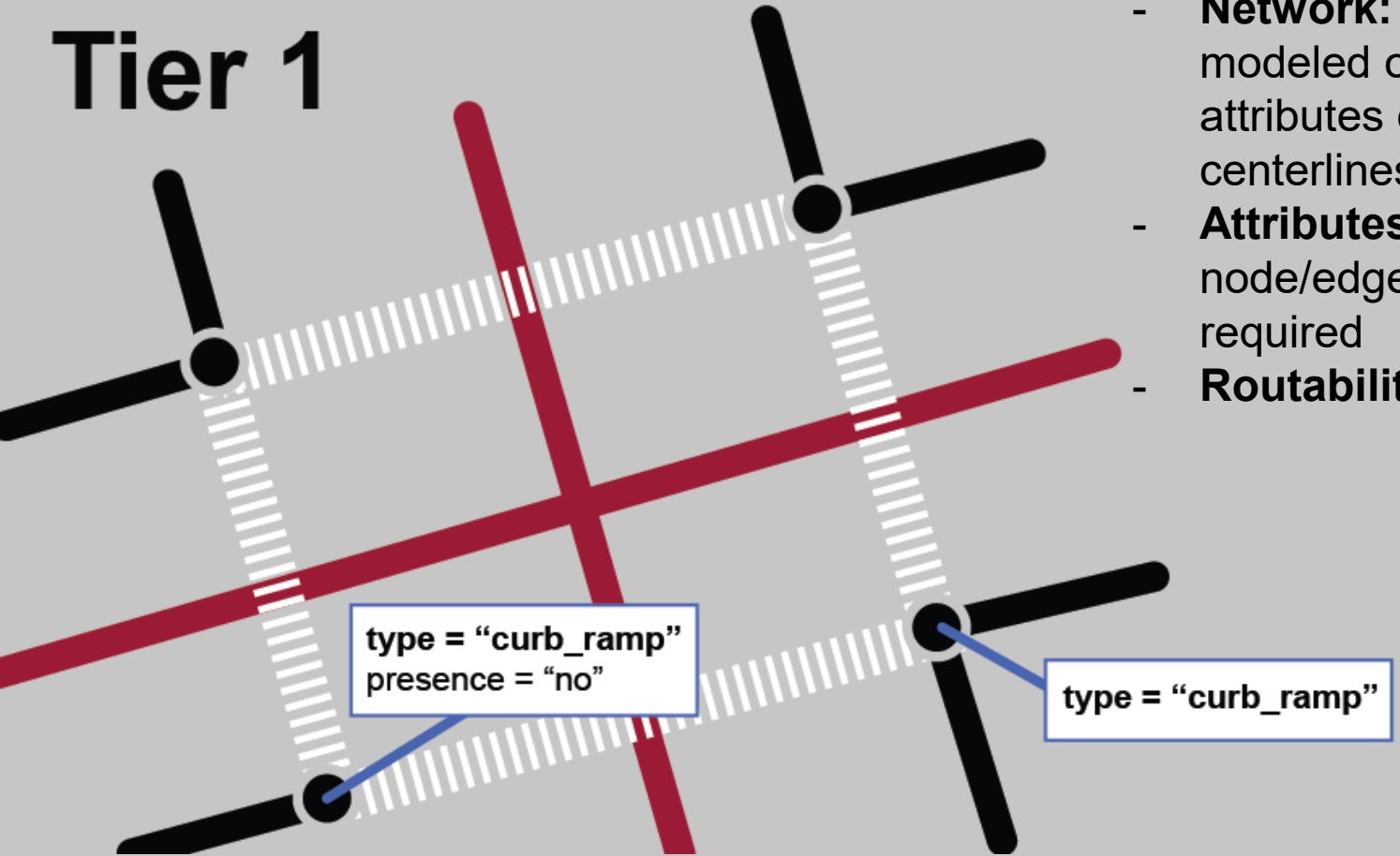
Field Testing

- More than 30 completed field tests
- Five state DOTs, ten cities, three regional governments, seven research institutions, a handful of for profit companies and transit agencies.
- Two-thirds data producers and one-third data consumers.

Thank you to all the field testers for a ton of great feedback!

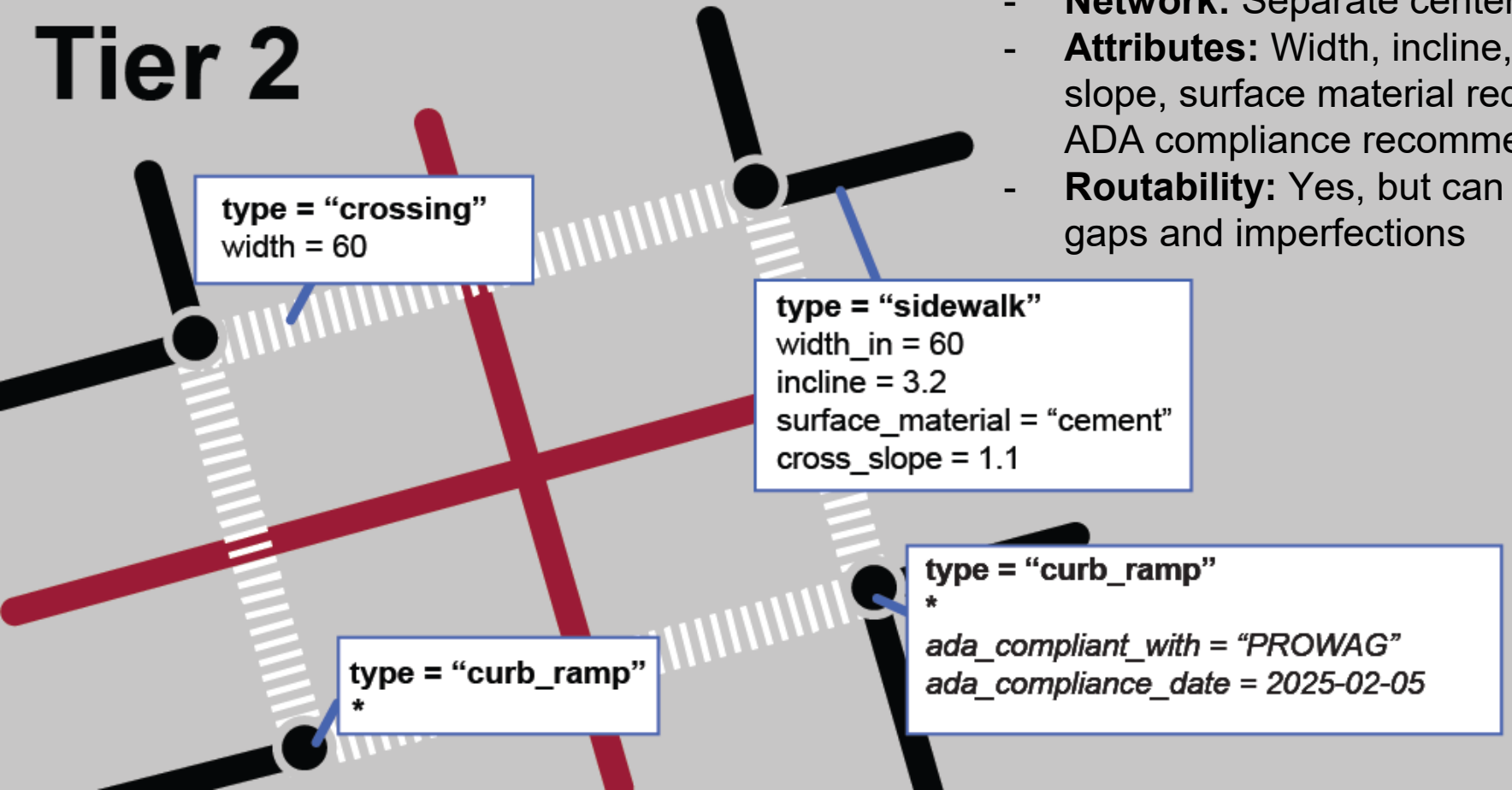
Pedestrian Network Overview

Tier 1



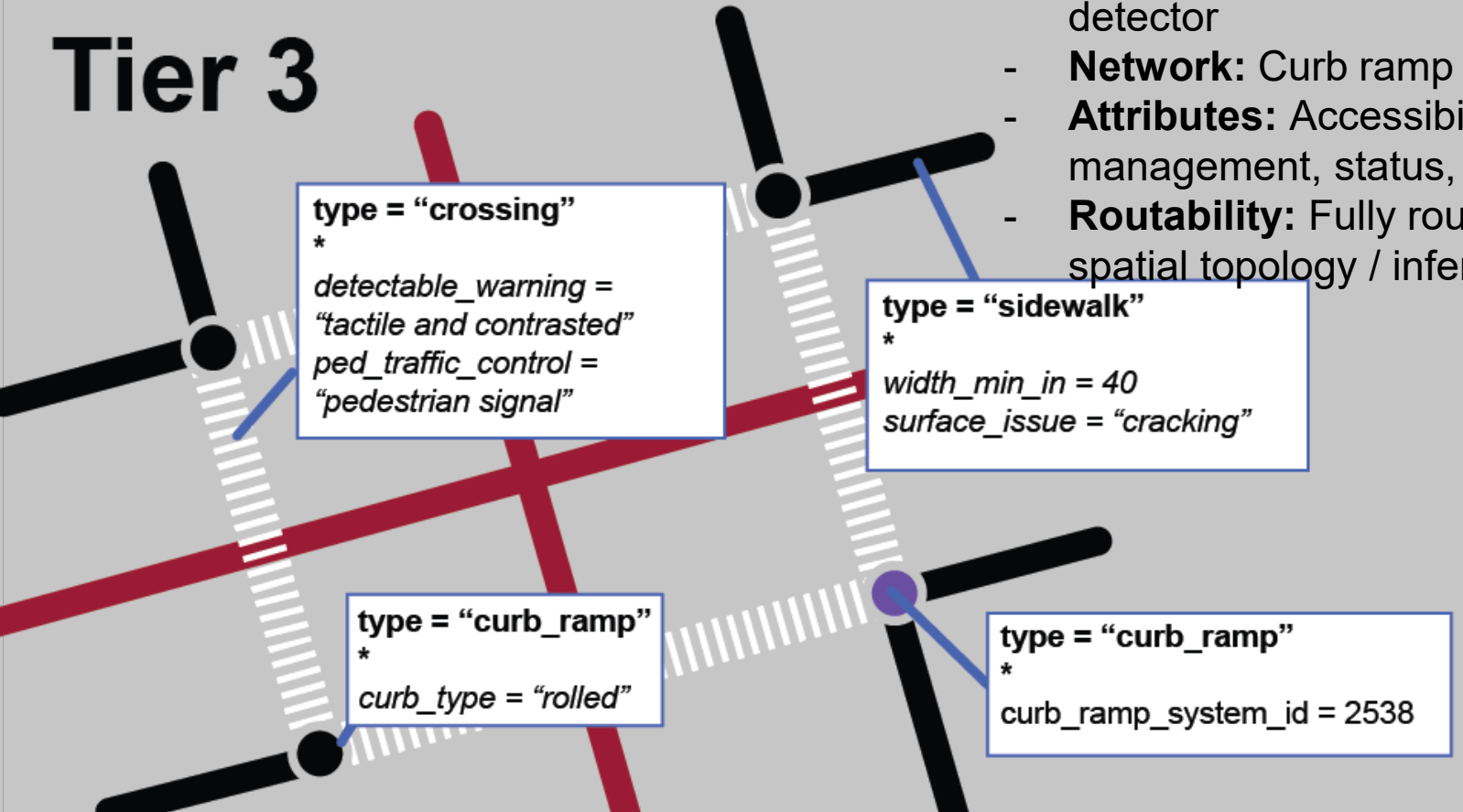
- **Features:** Sidewalks, crossings and curb ramps
- **Network:** Sidewalks modeled on road edges as attributes or as separate centerlines
- **Attributes:** minimal; node/edge id and type required
- **Routability:** Optional

Tier 2



- **Features:** + trails, multi-use paths, traffic islands
- **Network:** Separate centerlines
- **Attributes:** Width, incline, cross slope, surface material required; ADA compliance recommended
- **Routability:** Yes, but can have gaps and imperfections

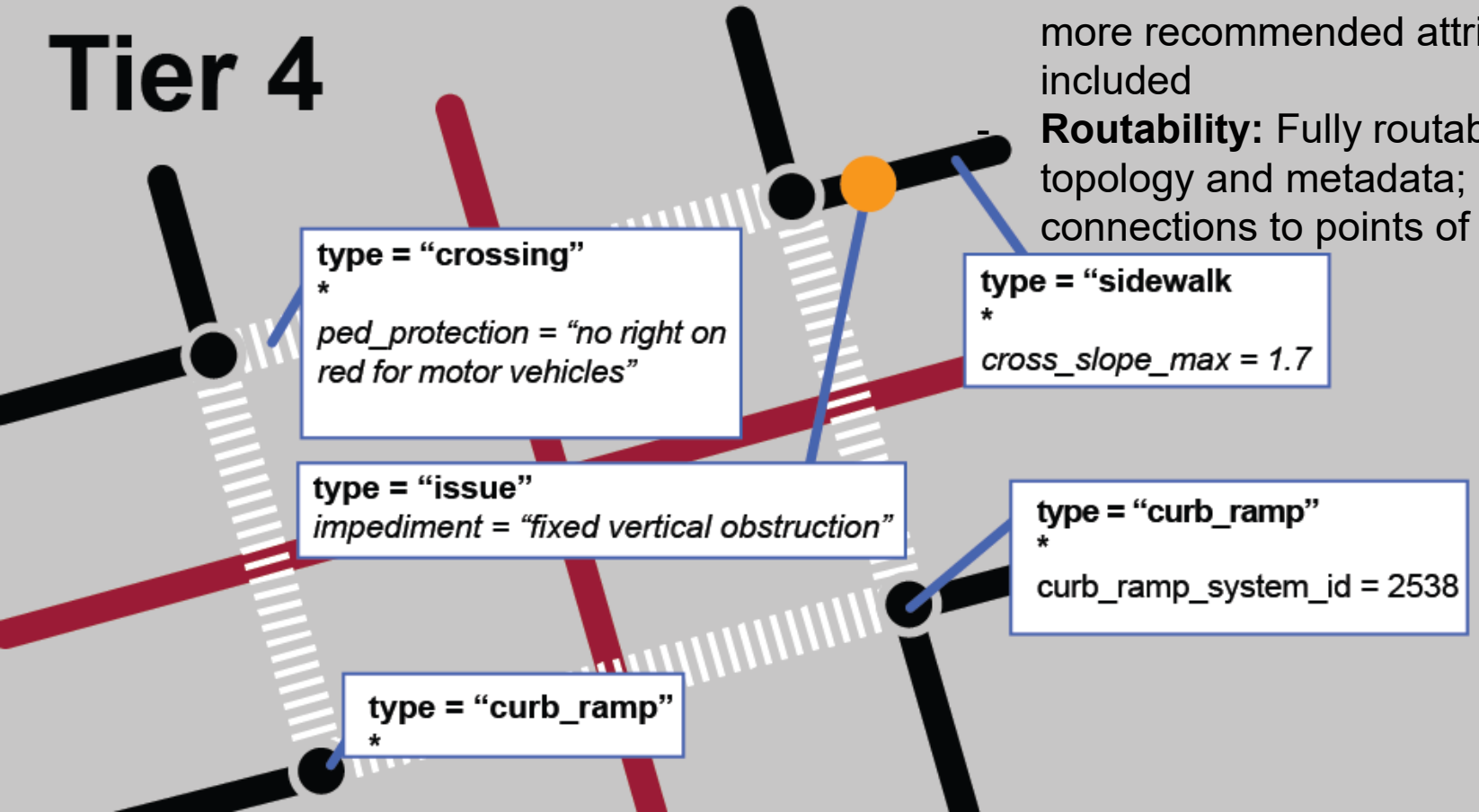
Tier 3

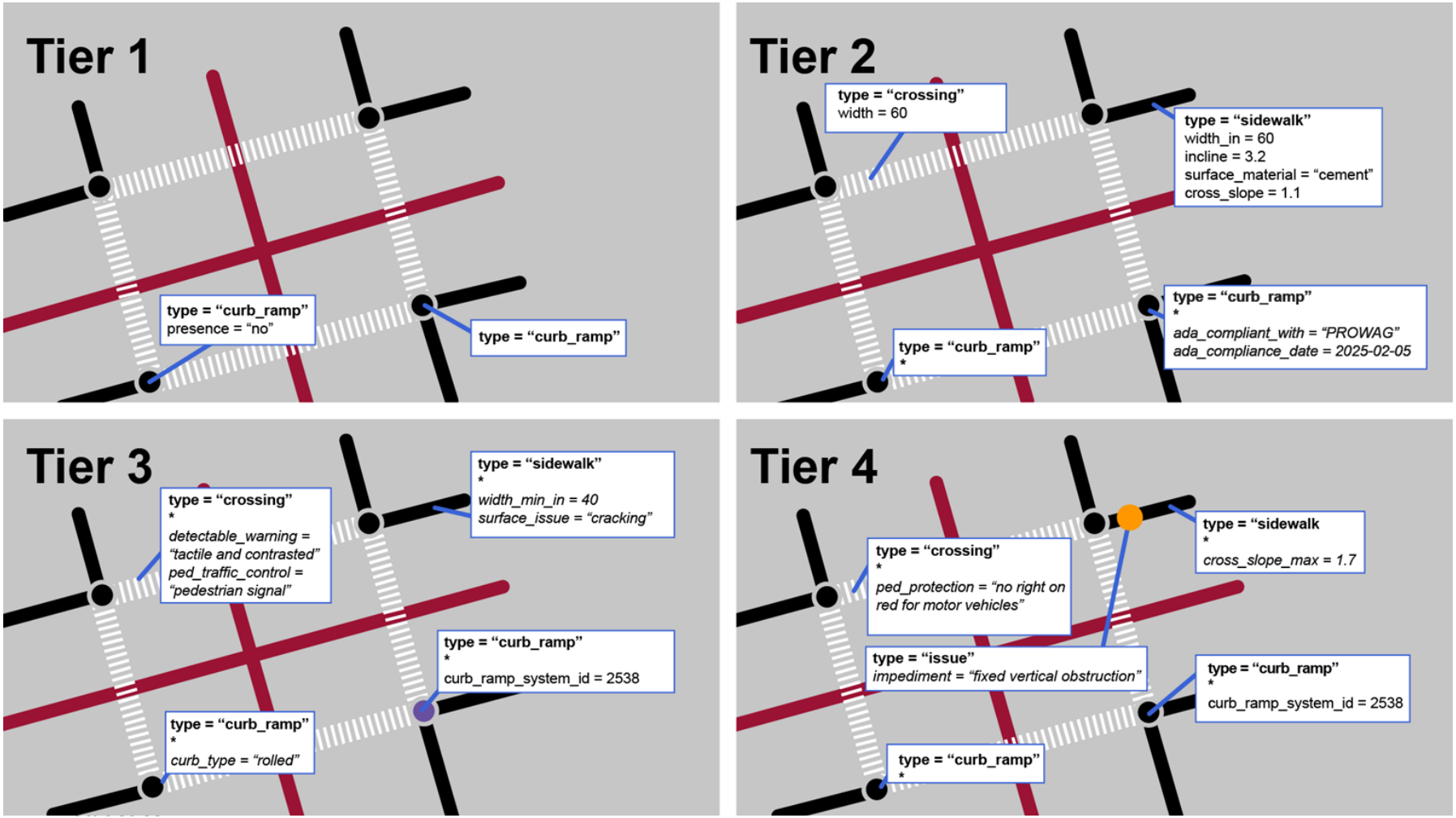


- **Features:** + steps, escalator, transit, elevator, object, traffic calming, counter, pushbutton, detector
- **Network:** Curb ramp detail added
- **Attributes:** Accessibility, asset management, status, signals, issues
- **Routability:** Fully routable by spatial topology / inference

Tier 4

- **Features:** + sign, issue, bike parking
- **Network:** Curb ramp detail improved
- **Attributes:** Same as T3, but with more recommended attributes included
- **Routability:** Fully routable by spatial topology and metadata; include connections to points of interest

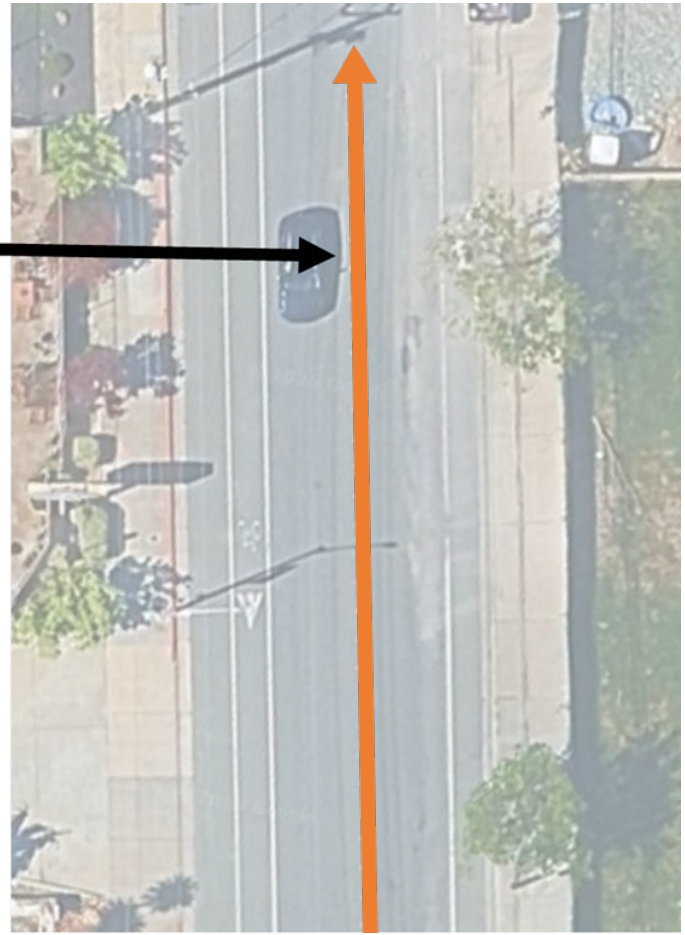



Tier 1
type = “curb_ramp”
presence = “no”
type = “curb_ramp”
Tier 2
type = “crossing”
width = 60
type = “sidewalk”
width_in = 60
incline = 3.2
surface_material = “cement”
cross_slope = 1.1
type = “curb_ramp”
*
ada_compliant_with = “PROWAG”
ada_compliance_date = 2025-02-05
type = “curb_ramp”
*
Tier 3
type = “crossing”
*
detectable_warning = “tactile and contrasted”
ped_traffic_control = “pedestrian signal”
type = “sidewalk”
*
width_min_in = 40
surface_issue = “cracking”
type = “curb_ramp”
*
curb_ramp_system_id = 2538
type = “curb_ramp”
*
curb_type = “rolled”
Tier 4
type = “crossing”
*
ped_protection = “no right on red for motor vehicles”
type = “sidewalk
*
cross_slope_max = 1.7
type = “issue”
impediment = “fixed vertical obstruction”
type = “curb_ramp”
*
curb_ramp_system_id = 2538
type = “curb_ramp”
*

Bicycle Network Overview

Road Centerline Representation

Name	Value
edge_type	road
bikeway:left:presence	yes
bikeway:right:presence	yes

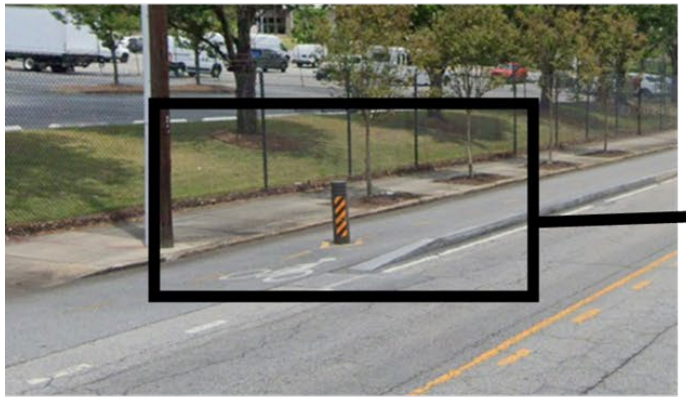


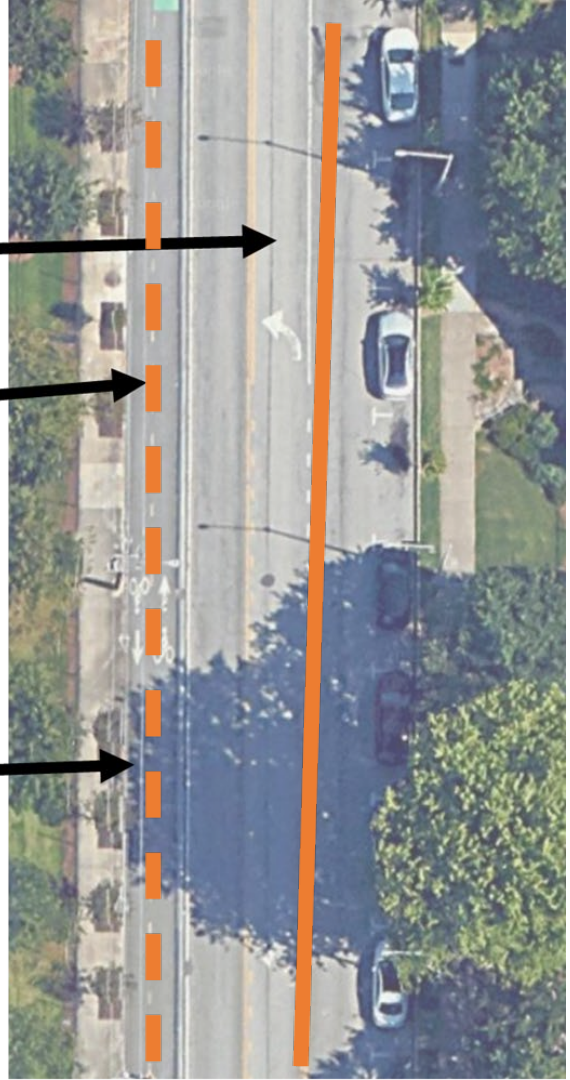
Road with bike lanes

Network Representation

Name	Value
edge_type	road

Name	Value
edge_type	bikeway





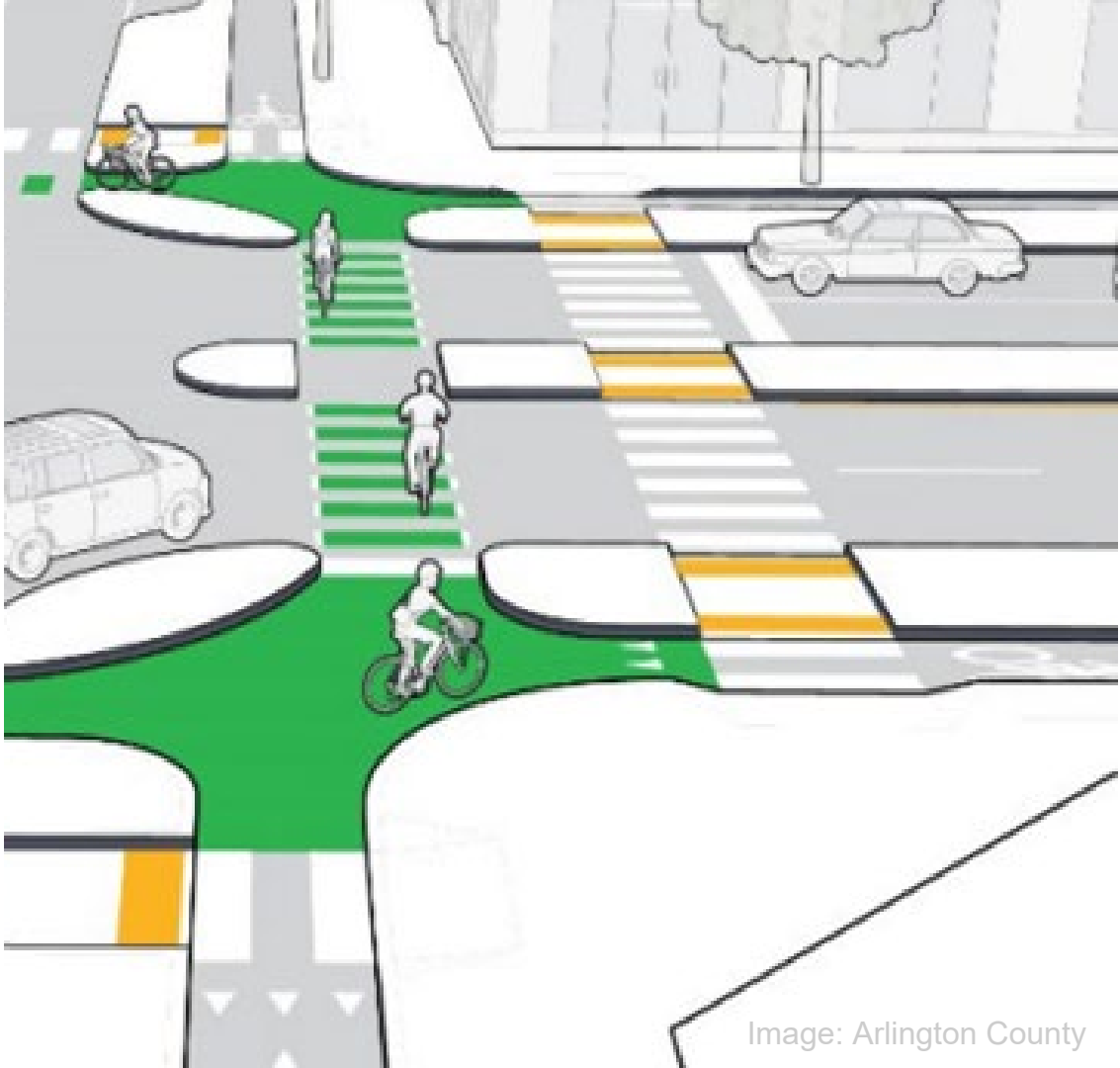
Road with a two-way separated bike lane (Google Maps)

Road

Separated Bike Lane

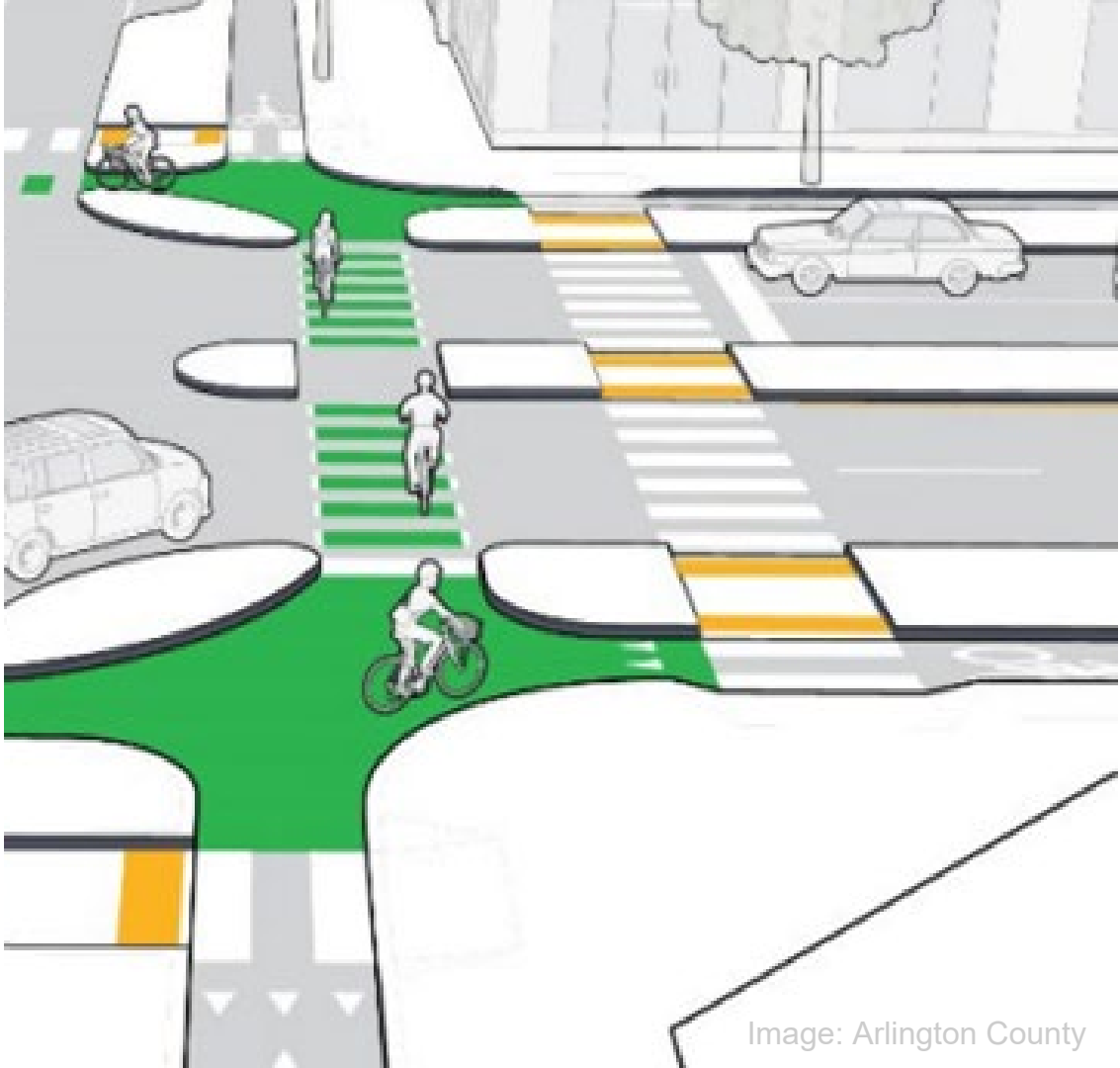
Tier 1

- **Features:** Bikeway, road
- **Network:** Roadway centerlines or separate centerlines
- **Attributes:** Edge id, edge type, directionality and bikeway type required; separation elements and permeability recommended.
- **Routability:** Optional



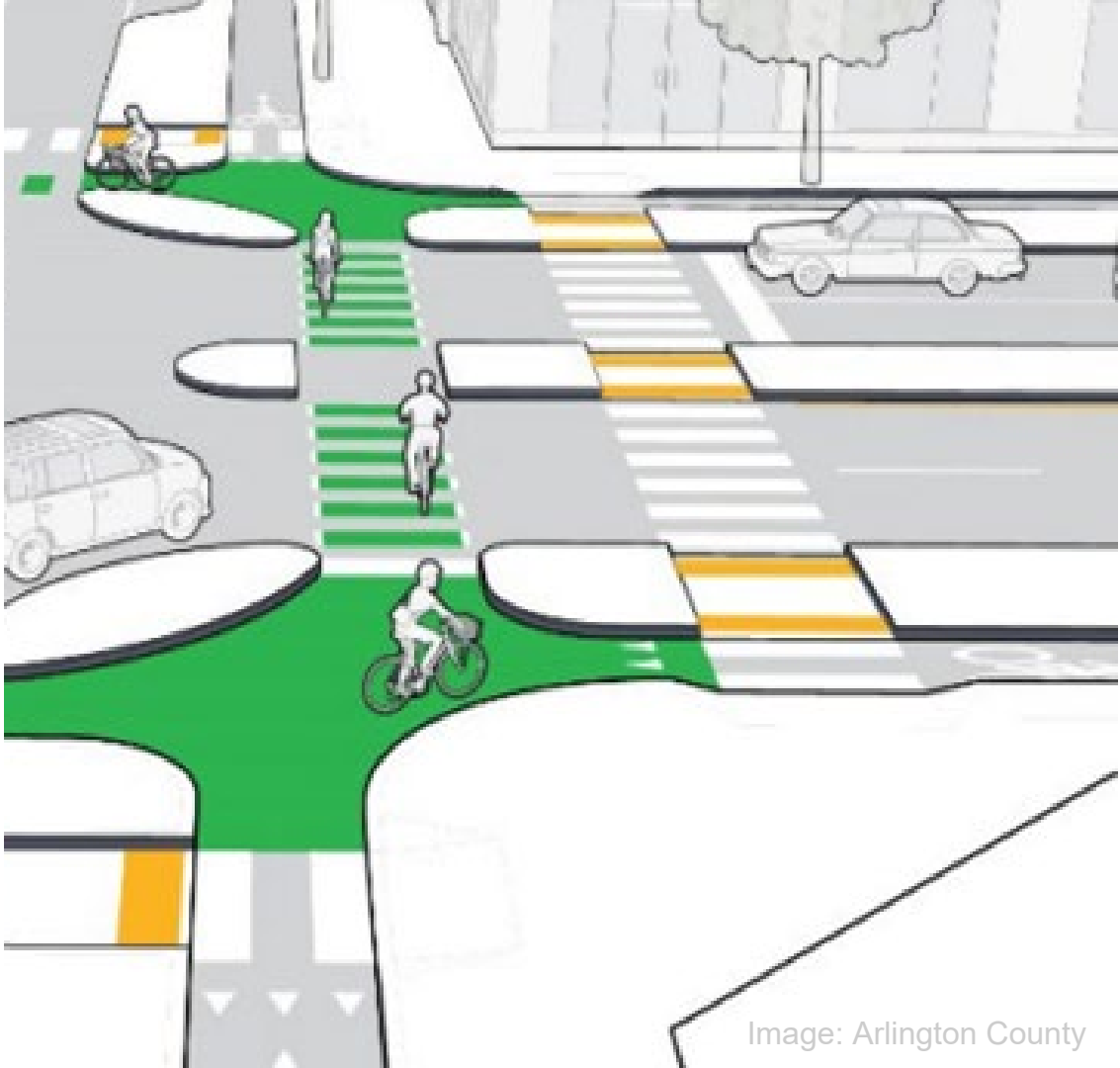
Tier 2

- **Features:** + generic node
- **Network:** Road centerlines if unseparated, separate centerlines if separated
- **Attributes:** Left/right/both tags; width, separation, permeability, surface material, incline, “from node” / “to node” required; street & facility name, status, grade separation, street parking buffer
- **Routability:** Yes, but can have gaps & imperfections



Tier 3

- **Features:** Same
- **Network:** Same
- **Attributes:** Status, grade separation, traffic info required; date built & inspected, buffer width, street parking, asset management, lighting, centerline, max/min passable recommended.
- **Routability:** Fully routable by spatial topology / inference



Tier 4

- **Features:** Same
- **Network:** Same.
- **Attributes:** Same, but with more recommended attributes included.
- **Routability:** Fully routable by spatial topology/inference and metadata; intersections and relation tables; better door-to-door coverage for points of interest; better local roads data.

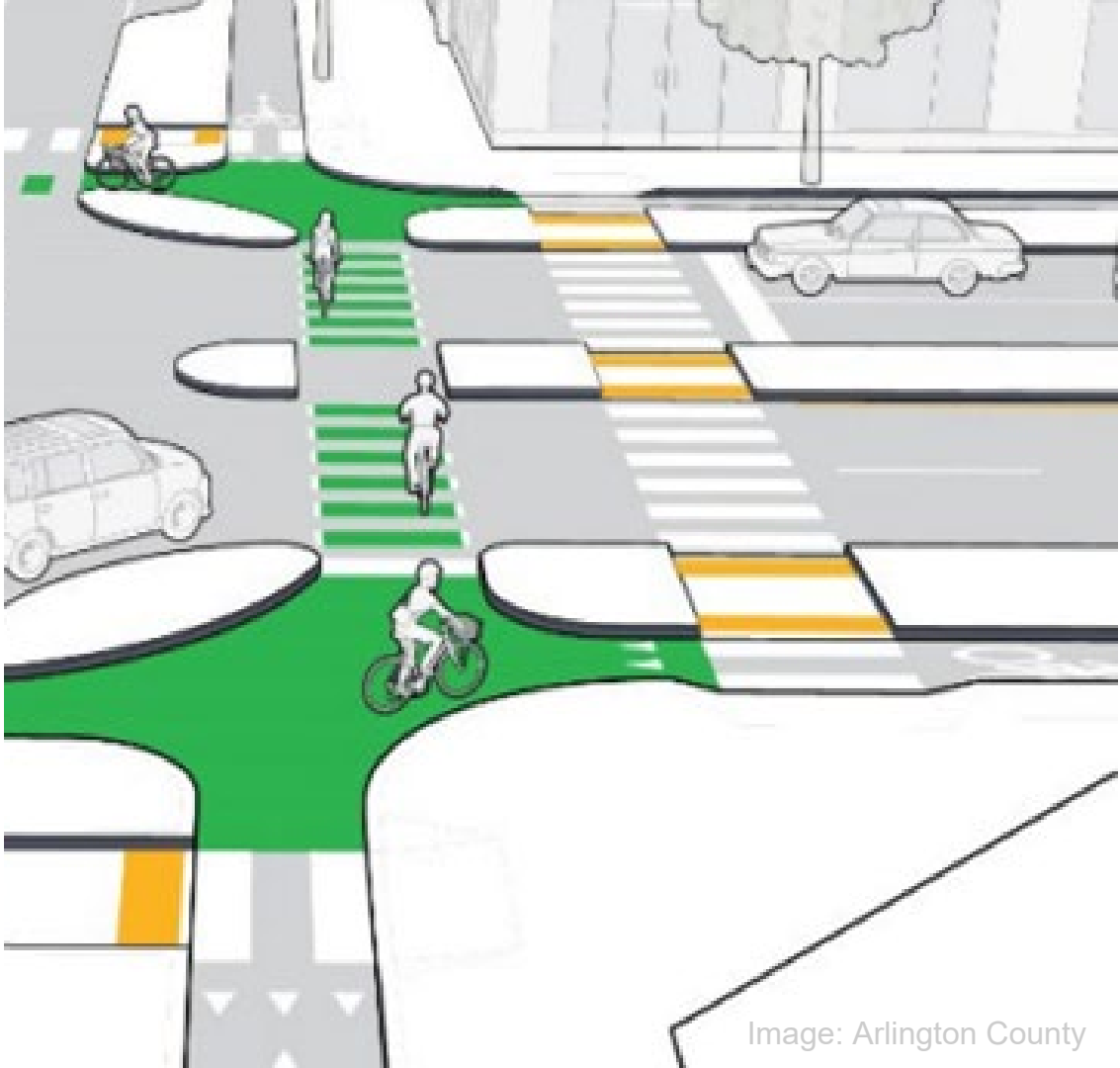


Image: Arlington County

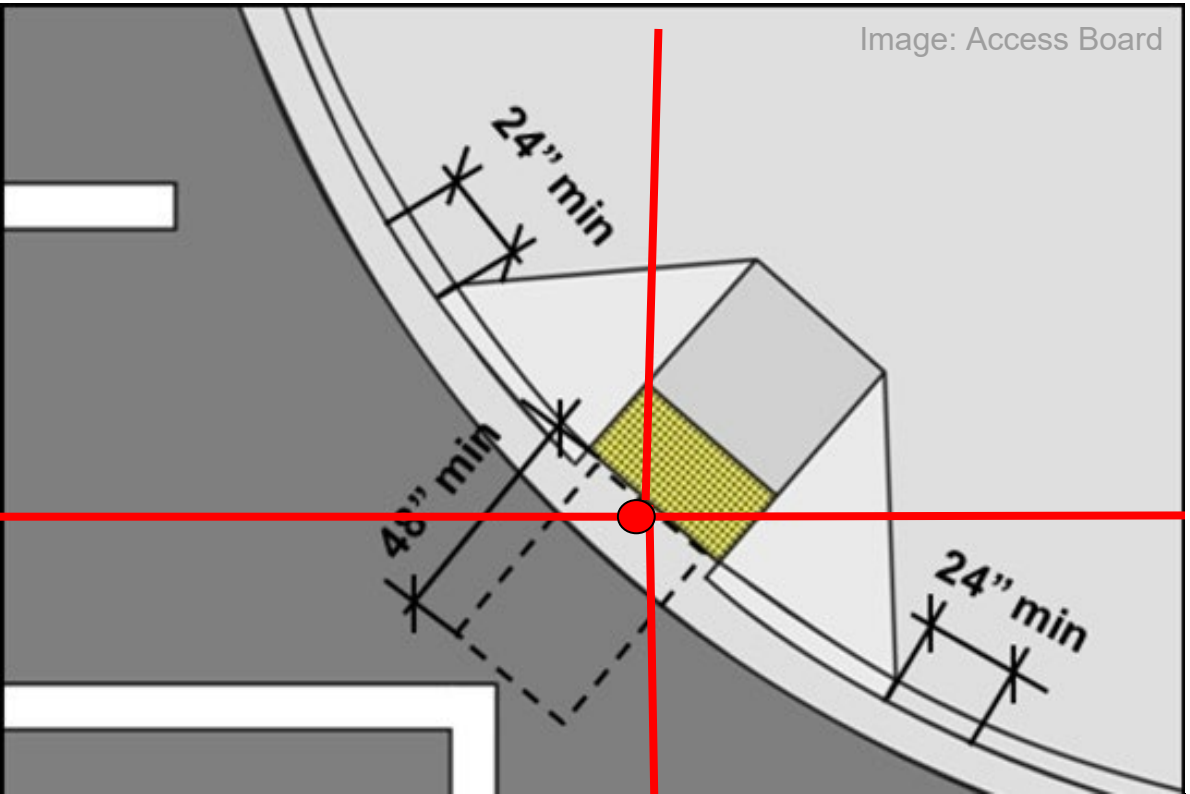
Revisions Since Draft #2

Curb Ramps - Tier 1

- Not geospatially precise
- May not be fully connected
- Curb ramp node can be anywhere in the curb ramp space

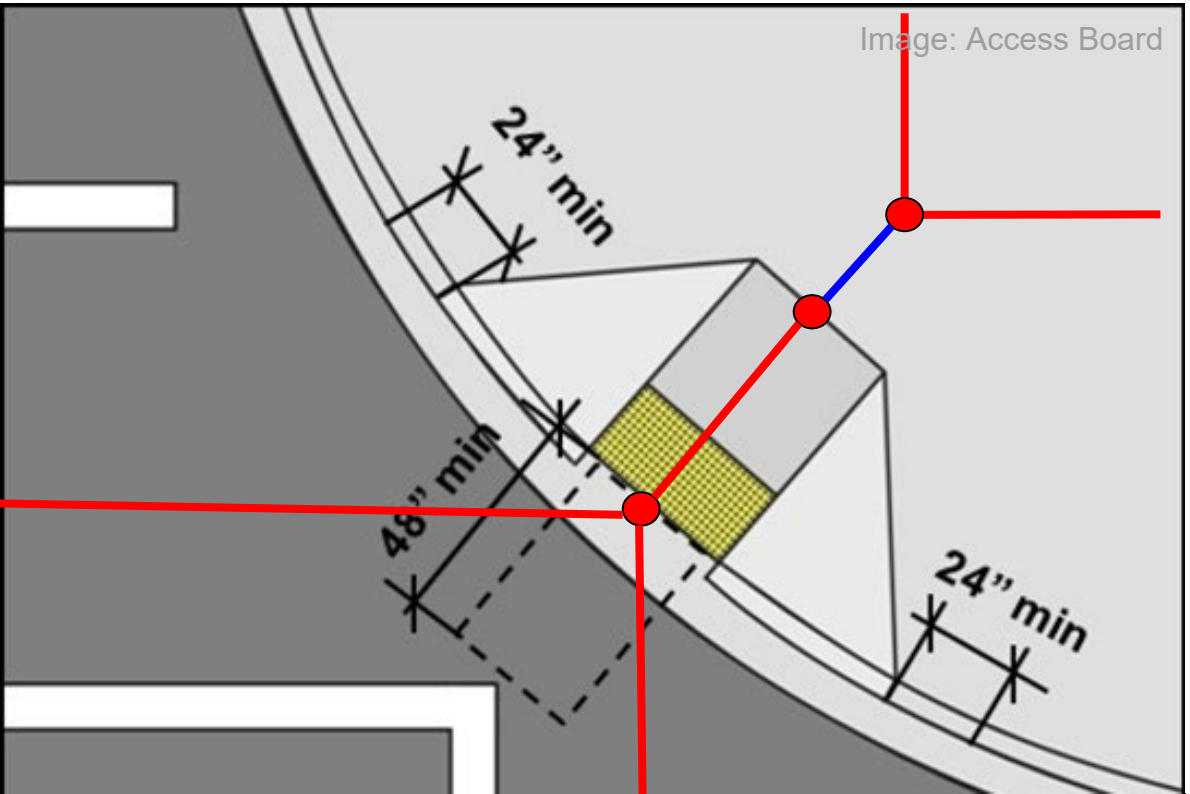
Image: Access Board

Curb Ramps - Tier 2



- Mostly connected
- Curb ramp node moves towards the transition point
- Generic nodes and footways can fill in connections

Curb Ramps - Tiers 3&4



- More spatial precision
- Fully routable
- Transition points identified
- Landing area(s) identified

Driveways

- Didn’t need new features or attributes
- GATIS maps larger / high volume commercial driveways. Smaller / residential may be mapped if desired.

New Extensions

Events Table

- Captures asset maintenance, construction, removal, ADA, planning history.
- Each row is an event.

LRS Extension

- Simple crosswalk aligning GATIS features with milepoints of an LRS system

Relation Table

- Two main use cases: Turning movements & associating signals w/ crossings.
- Simple mapping of attribute connections, with detail on turning movements.

event_id	event_type	gatis_id	event_location	description	costs	downtime	funding_source
4920	repair	49580	POINT (-77.0947 38.9838)	repaint faded crosswalk paint	2000	4 hours	General Maintenance Fund

Signs & Signals

Signs

- Optional; geospatial point. Captures sign content and accessibility features.

Signals

- Two points: pushbutton and detector.
- Attributes for tracking verbiage, how pedestrian interacts, accessibility. Integrates with MUTCD types. In tier 4, map edges to these points.
- Attributes related to ped protection & nearby vehicle traffic clarified.

point_id	button	tactile_ message	auditory_ message	actuation_type	crossing_time_ sec
56893	yes	vibration walk signal	auditory walk signal	pedestrian actuated	45

Point and Node Changes

- Node types reduced, point types increased
- Having less nodes simplifies the network graph and speeds up computation.
- Points can be converted to nodes.

nodes:	generic, curb_ramp (tiers 1-2), sidewalk_to_ramp_transition and ramp_to_street_transition (tiers 3-4)
points:	object, sign, transit_stop, issue, counter, bike_parking, traffic_calming, pushbutton, detector

Other Changes

- Added geospatial data precision, which increases by tier.
- Added “_in” and “_ft” to attribute names to show units.
- Introduced ways to track grade separated infrastructure.
- Minimized use of “virtual” node and “virtual” edge.
- ADA compliance reduced to two fields; focused on conveying the standard met and the date.
- Cleaned up issue attributes: impediment, surface, and other.
- Shifted traffic calming into point and polygon features based on the shape of the feature.

Huge thanks to our subgroup leads!

Jeff Maki

Paul Moser

Ryan Westrom

Bahar Dadashova

Jonah Chiarenza

Krista Nordback

Josh Roll

Ellwood Hanrahan

Ximon Zhu

Q&A

Voting on V1.0

Voting Process

- Vote online and asynchronously
  - Quorum not required
- Supermajority vote - 75% of those voting must vote yes for specification to be approved
- Only voting members may vote.
- **Not sure if you're a voting member? Vote anyway!**
- See Approval Types in the Collaboration Framework for more information

Image: Freepik

How to Vote

- We will email you the voting form.
- 4-week period, from 2/2 through 2/27
- Draft will not be changed during voting.
  - Form allows feedback; minor feedback may be incorporated, major feedback roadmapped
- You will be voting on the specification:
  - Features, attributes and tiers on GATIS Explorer
  - Front matter and other materials
- You will NOT be voting on the playbook draft yet. You can review and suggest edits.

Image: Freepik

After the Vote

If approved:

- Specification will be fully published to the GATIS Explorer as V1.0.
- Playbook will be completed and released on GATIS Explorer.
- GATIS registry will be built and opened.
- Adoption can begin.

If not approved:

- Specification will go back into revisions. New plan for development will be created.

Image: Freepik