Sidewalk and Accessibility Attributes in GATIS

NC-BPAID

U.S. Department of Transportation
Office of the Secretary of Transportation

Bureau of Transportation Statistics

“GATIS”?

“General Active Transportation Infrastructure Specification”

It’s a proposed name we’re trying on.
Let us know what you think!

Tier Model & Attribute Presence

The Tiers

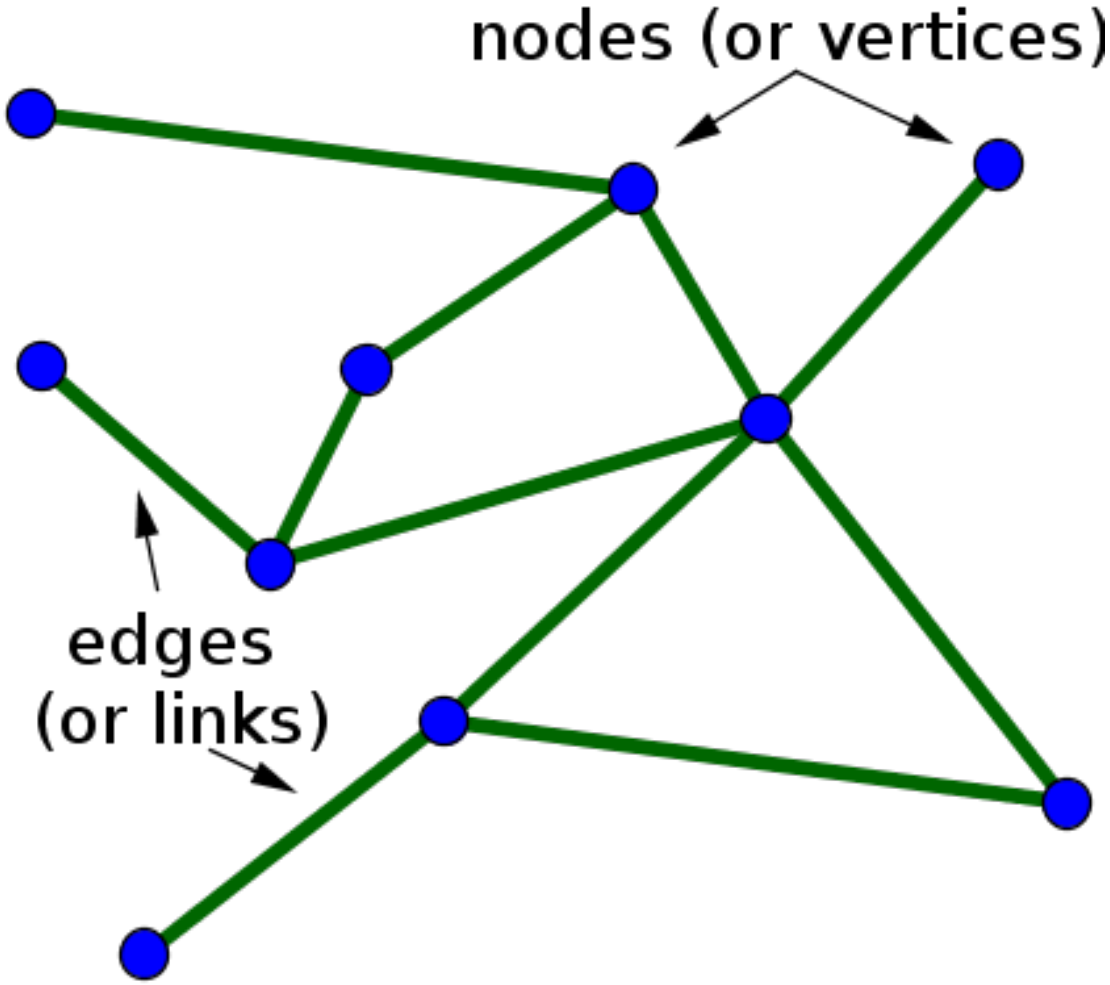
Tier 1 Map/network creation; routing and linkability to other networks optional; attributes minimal; may be using road centerlines instead of separate sidewalk centerlines; no segmentation
Tier 2 More complete spatial coverage; routable but may have some gaps; more attributes for accessibility and route knowledge; optional linkages to other data; has some segmentation
Tier 3 Consistently routable via spatial topology; dedicated network features where separated from the roadway; richer attributes that can be used in routing; tracking of impediments
Tier 4 Consistently routable via graph metadata; very complete attributes; network features include turn movement info; consistent segmentation for attribute changes, impediments, etc.

Attribute Presence

- Recommended – should include attribute
  - Example: Traffic control type
- Required – must include attribute
  - Example: Edge ID
- Conditionally Recommended / Required / Forbidden – depends on the value of other attributes
  - Example: ADA compliance date conditionally required when ADA compliance status filled in
- Optional – attribute can be included (not a priority)
  - Example: HPMS reference to an edge
- Forbidden – attribute must not be included
  - Example: presence of bike lane on a sidewalk

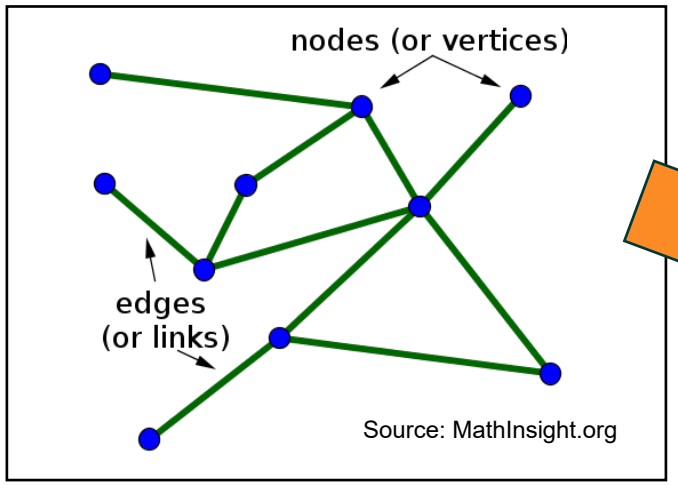
Required fields are minimal. Harder-to-record attributes are assigned to higher tiers.

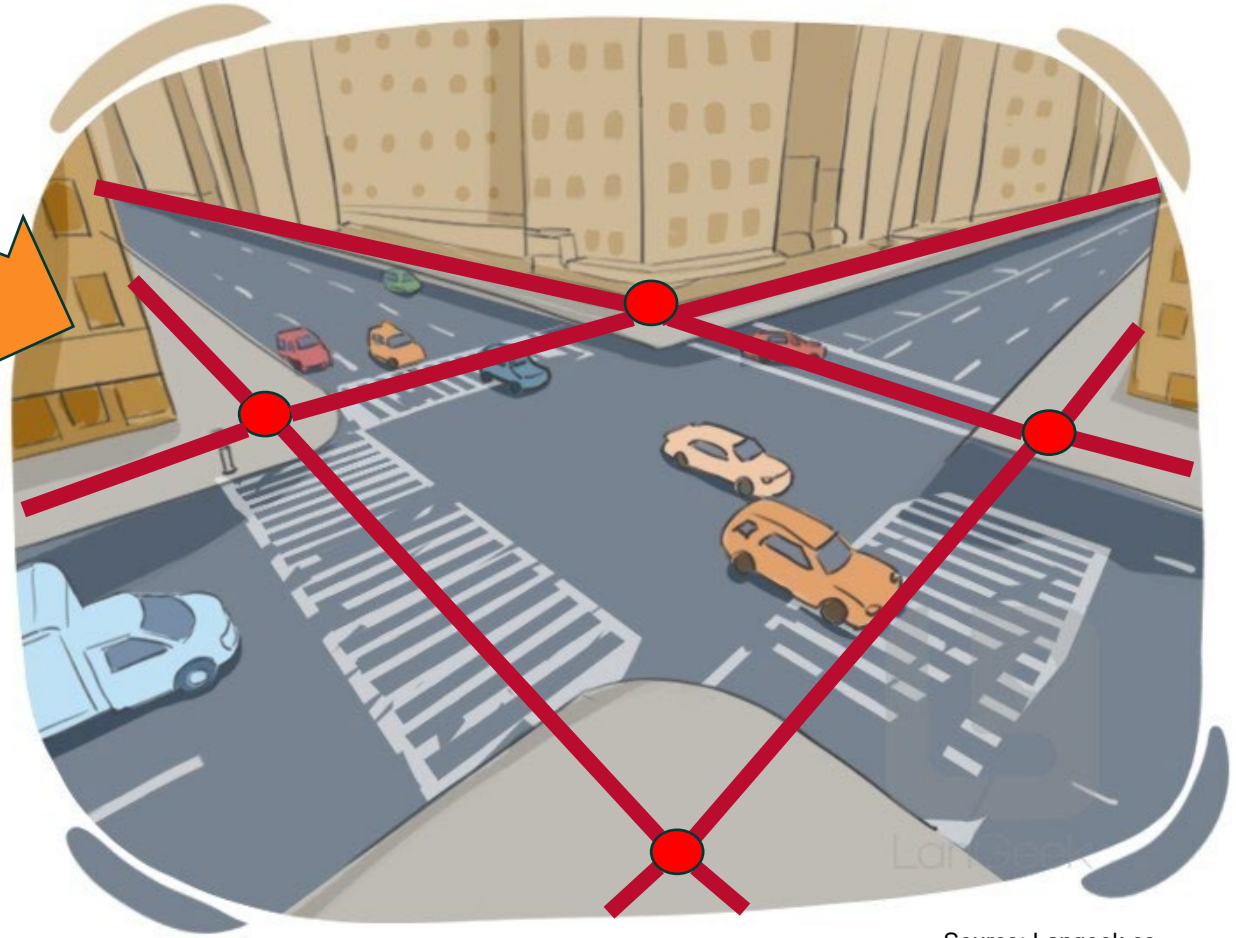
What Is a Routable Network?



Source: MathInsight.org

What Is a Routable Network?





Source: Langeek.co

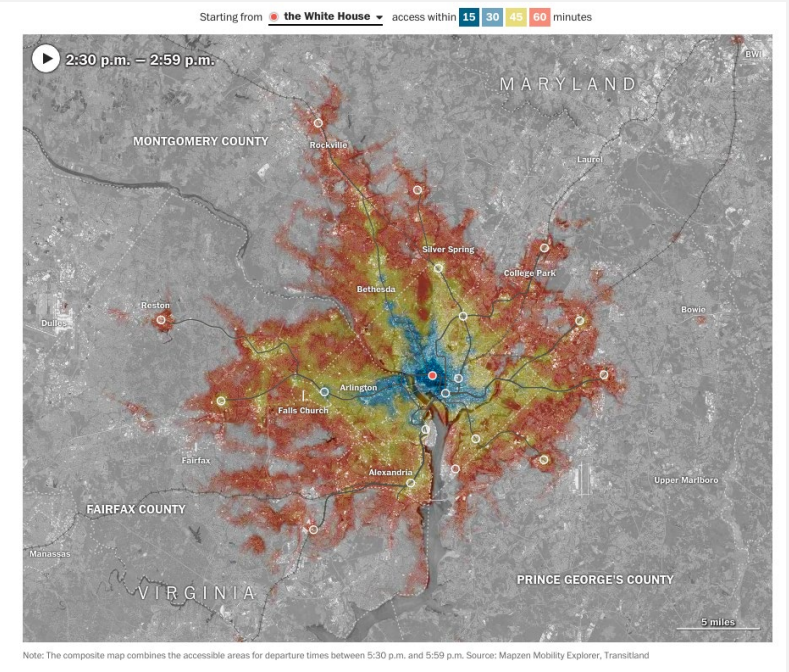
Accessibility Use Cases

Why are sidewalk accessibility and routing important elements to consider within the specification?

Improved Mobility

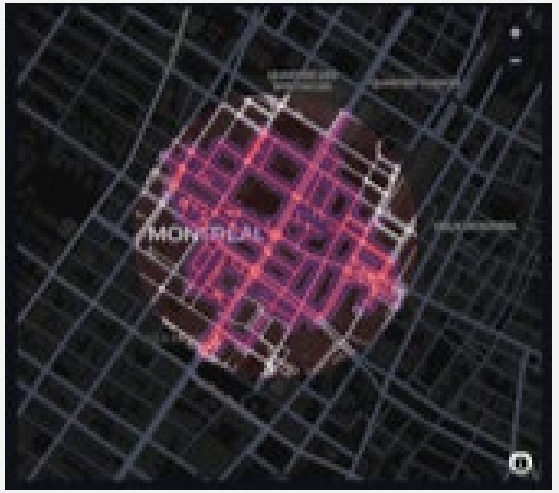
Better Routing and Navigation

- Enables accessible, door-to-door route planning for people with mobility or visual impairments
- Supports mobile app wayfinding and turn-by-turn directions that consider surface quality, slope, and crossings



Improved Accessibility Metrics

- Enables spatial access analyses (e.g., isochrone maps) that consider sidewalk connectivity
- Identifies gaps in network access for transportation planning and equity studies



Improved Infrastructure and Policy

Prioritization and Asset Management

- Pinpoints sidewalk and curb ramp deficiencies for targeted maintenance and investment
- Supports ADA transition planning and compliance efforts

Policy, Analysis, and Research

- Enables data-driven policymaking for pedestrian infrastructure
- Supports academic and agency research on walkability, safety, and accessibility impacts

Integration with Smart Cities and New Mobility Services

- Provides foundation for services relying on precise data (e-scooters, robot deliveries, MaaS platforms)
- Enables better design of “curb spaces” and first-last-mile connections

Sidewalks & Accessibility Data

The Tiers: Sidewalks & Accessibility

Tier 1 **Network location:** Separate networks or roadway centerline tagging; sidewalks, crossings and curb ramps
Tier 2 **Routable network with some gaps:** Separate edges and nodes; core attributes such as width, slope, surface material, status and ADA info
Tier 3 **Complete network supporting some traveler profiles:** All infrastructure located; deeper attributes like minimum width, surface quality, and traffic control, with impediments on edges
Tier 4 **Complete network supporting a range of traveler profiles:** Rich attributes; impediments as nodes; segmentation where attributes and accessibility change

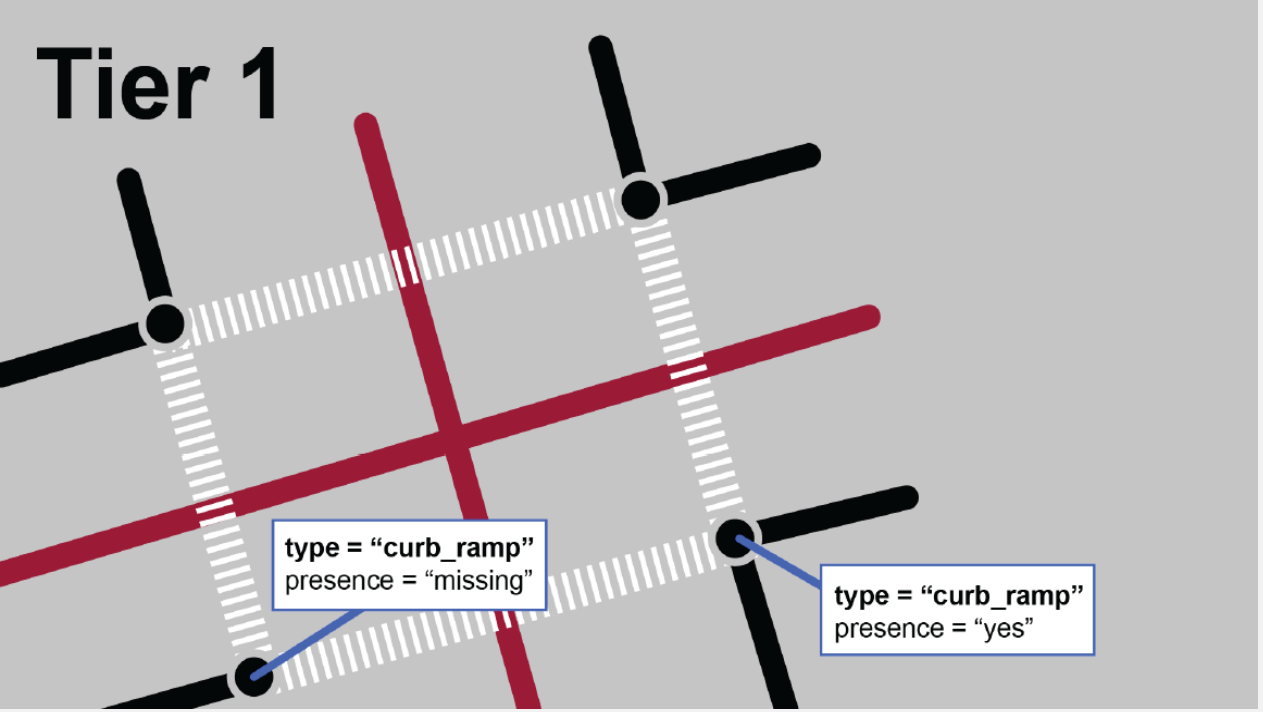
Feature Types

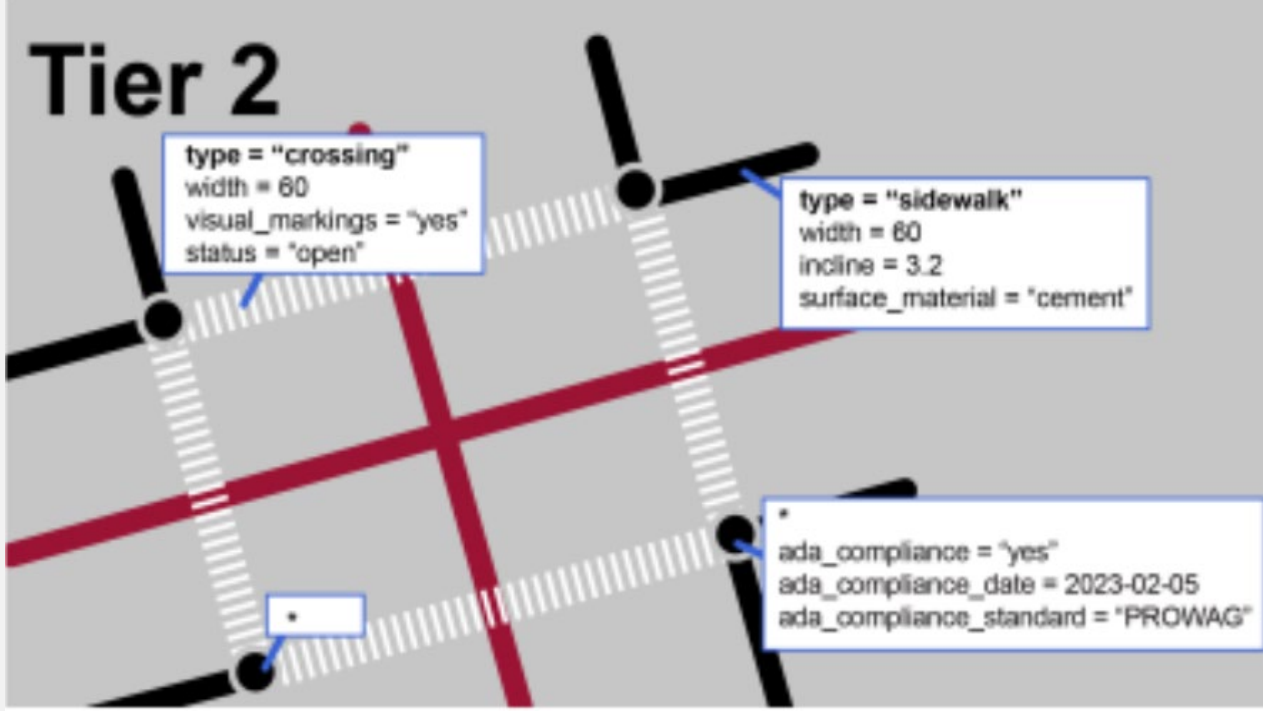
Nodes: curb_ramp, ramp, elevator, transit_stop, traffic_calming, issue, virtual (for routing connections)

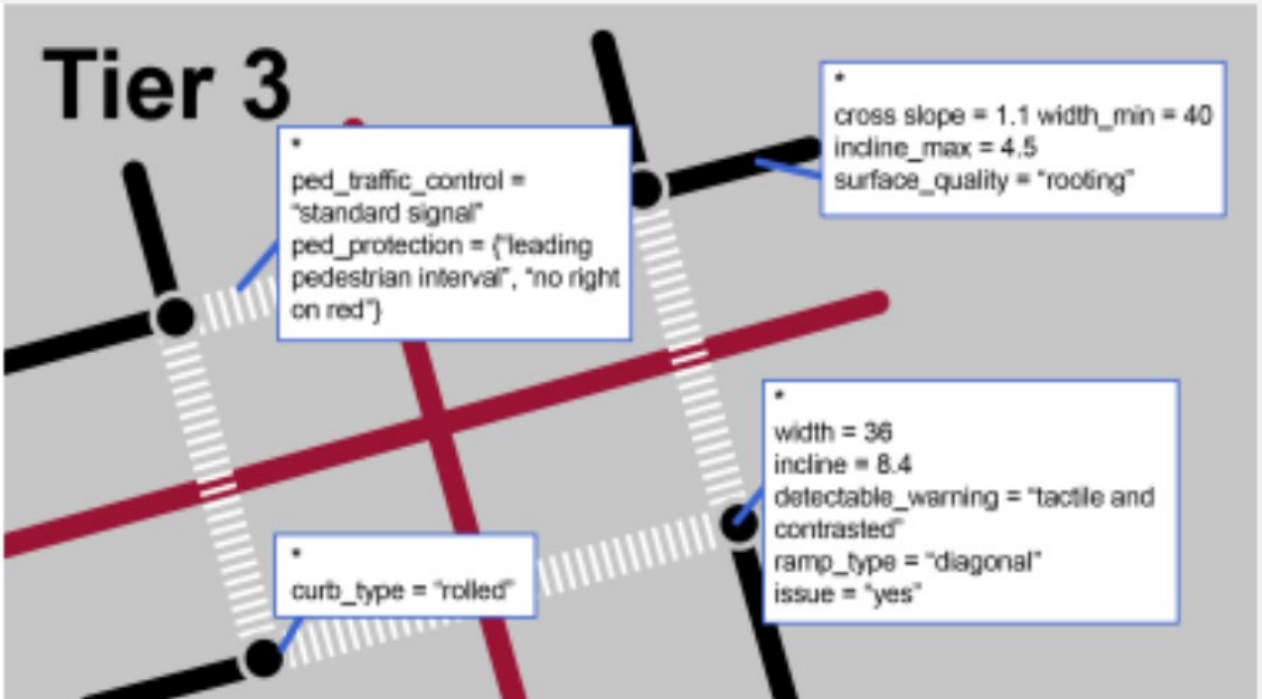
Edges: road, sidewalk, footpath, crossing, traffic_island, steps, escalator, bikeway, multi_use_path, trail, virtual_link (for routing connections)

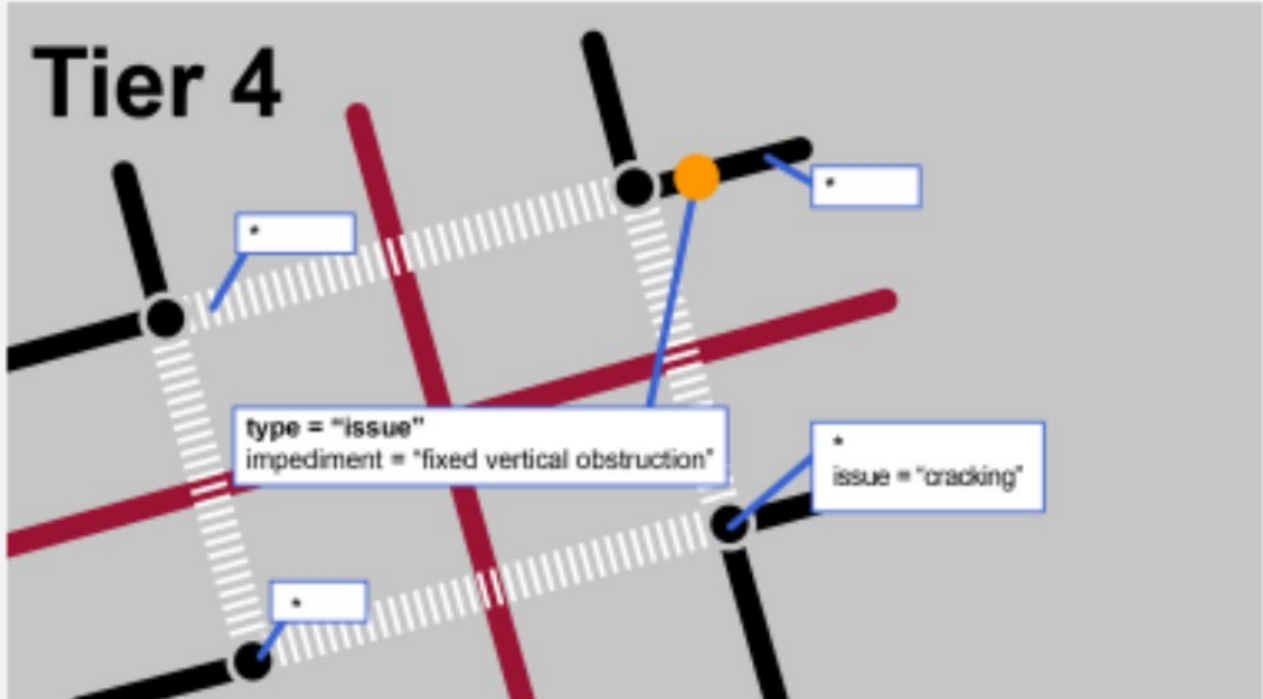
Points: object (ex. street furniture not on the pedestrian way)

Zones: pedestrian (ex. park or plaza)


Tier 1
type = “curb_ramp”
presence = “missing”
type = “curb_ramp”
presence = “yes”


Tier 2
type = “crossing”
width = 60
visual_markings = “yes”
status = “open”
type = “sidewalk”
width = 60
incline = 3.2
surface_material = “cement”
ada_compliance = “yes”
ada_compliance_date = 2023-02-05
ada_compliance_standard = “PROWAG”


Tier 3
ped_traffic_control = “standard signal”
ped_protection = {“leading pedestrian interval”, “no right on red”}
cross slope = 1.1 width_min = 40
incline_max = 4.5
surface_quality = “rooting”
width = 36
incline = 8.4
detectable_warning = “tactile and contrasted”
ramp_type = “diagonal”
issue = “yes”
curb_type = “rolled”


Tier 4
type = “issue”
impediment = “fixed vertical obstruction”
issue = “cracking”

Tier 1:
Network Location

Identify location of sidewalks, crossings and curb ramps
Use either separate networks or roadway linear referencing system

Tier 1: Network Location

Feature Type	Required	Recommended
curb_ramp (node)	**node_id, node_type, presence** *required if other fields blank -- mark all ramp locations, including "missing" and "unknown"*	--
sidewalk (edge)	**edge_id, edge_type** *Either sidewalk centerlines or sidewalk tags on a roadway linear referencing system*	--
crossing (edge)	**edge_id, edge_type** *Either crossing centerlines or crossing tags on a roadway linear referencing system*	--

Tier 2:
Routable Network with Some Gaps

Maintain separate network for sidewalks
Collect greater detail on sidewalks, crossings and curb ramps
Begin collecting other edges and nodes

Tier 2: Routable Network with Some Gaps

Feature Type	Required	Recommended
curb_ramp (node)	node_id, node_type, presence *required if other fields blank*	date_built, ada_compliance, ada_compliance_date, ada_compliance_standard
ramp (node); elevator (node)	node_id, node_type	--
sidewalk (edge)	edge_id, edge_type, status, width, length, incline, cross_slope, surface_material, street_name, status	ada_compliance, ada_compliance_date, ada_compliance_standard, visual_markings, detectable_warning, pedestrian_lane
crossing (edge)	edge_id, edge_type, status, width, length, incline, cross_slope, street_name, visual_markings, detectable_warning	rail, ada_compliance, ada_compliance_date, ada_compliance_standard
road (edge)	edge_id, edge_type, street_name	separation_permeable_car, buffer_width, traffic_volume, posted_speed_limit, car_freeflow_speed, thru_lanes, shoulder_width, status

Tier 2: Routable Network with Some Gaps

Feature Type	Required	Recommended
footpath (edge); traffic_island (edge)	edge_id, edge_type	status, ada_compliance, ada_compliance_date, ada_compliance_standard, detectable_warning, visual_markings, street_name, width, length, incline, surface_material
multi_use_path (edge)	edge_id, edge_type	width, length, separation_elements, surface_material, incline, separation_permeable_car, ada_compliance, ada_compliance_date, ada_compliance_standard, detectable_warning, visual_markings, street_name, facility_name, street_parking_buffer, bridge, mup_modal_delineation, status, cross_slope
trail (edge)	edge_id, edge_type	status, surface_material, incline, width, length, street_name, facility_name, bridge, ada_compliance, ada_compliance_date, ada_compliance_standard
virtual_link (edge)	edge_id, edge_type	--
steps (edge)	edge_id, edge_type	status, ada_compliance, ada_compliance_date, ada_compliance_standard, detectable_warning, visual_markings, surface_material, step_count, handrail, wheel_channel
escalator (edge)	edge_id, edge_type	detectable_warning, status, ada_compliance, ada_compliance_date, ada_compliance_standard

Tier 3:
Complete Network
Supporting Some Traveler Profiles

Collect richer attributes for various nodes and edges
Begin tracking issues, impediments and surface quality on edges
Begin tracking traffic control and traffic calming
Enhance routability, including for specific travelers' needs
Begin tracking points and zones

Tier 3: Complete Network Supporting Some Traveler Profiles

Feature Type	Required	Recommended
curb_ramp (node)	node_id, node_type, date_built, incline, width, cross_slope, issue, detectable_warning, presence *required if other fields blank*	check_date, ada_compliance, ada_compliance_date, ada_compliance_standard, ramp_type
ramp (node)	node_id, node_type, incline, width, cross_slope, status	date_built, ada_compliance, ada_compliance_date, ada_compliance_standard, detectable_warning, issue, check_date
elevator (node)	node_id, node_type, status	check_date, date_built, ada_compliance, ada_compliance_date, ada_compliance_standard
transit_stop (node)	agency_id, stop_id	--
issue (node)	node_id, node_type	impediment, surface_issues, check_date
traffic_calming (node)	node_id, node_type	date_built, check_date, traffic_calming_type
virtual (node)	node_id, node_type	curb_type

Tier 3: Complete Network Supporting Some Traveler Profiles

Feature Type	Required	Recommended
sidewalk (edge)	edge_id, edge_type, width, length, incline, cross_slope, surface_material, status, street_name, impediment, surface_issue	width_min, cross_slope_max, bridge, pedestrian_lane, ada_compliance, ada_compliance_date, ada_compliance_standard, issue, from_node, to_node, detectable_warning, visual_markings, date_built, check_date
crossing (edge)	edge_id, edge_type, status, width, length, incline, cross_slope, rail, visual_markings, detectable_warning, ped_traffic_control, impediment, surface_issue	street_name, width_min, bridge, cross_slope_max, ada_compliance, ada_compliance_date, ada_compliance_standard, date_built, check_date, traffic_calming, vehicle_traffic_control, cross_vehicle_traffic_control, ped_protection, from_node, to_node
road (edge)	edge_id, edge_type, street_name	buffer_width, traffic_volume, posted_speed_limit, car_freeflow_speed, thru_lanes, shoulder_width, traffic_calming, curb_height, separation_permeable_car
footpath (edge); traffic_island (edge)	edge_id, edge_type, width, length, incline, cross_slope, surface_material,	ada_compliance, ada_compliance_date, ada_compliance_standard, width_min,

Tier 3: Complete Network Supporting Some Traveler Profiles

Feature Type	Required	Recommended
steps (edge)	edge_id, edge_type, status, detectable_warning, visual_markings, surface_material, step_count, handrail	ada_compliance, ada_compliance_date, ada_compliance_standard, wheel_channel, issue, from_node, to_node
escalator (edge)	edge_id, edge_type, detectable_warning, status	ada_compliance, ada_compliance_date, ada_compliance_standard, issue, from_node, to_node
multi_use_path (edge)	edge_id, edge_type, width, length, surface_material, incline, detectable_warning, visual_markings, status, cross_slope	separation_elements, separation_permeable_car, ada_compliance, ada_compliance_date, ada_compliance_standard, street_name, facility_name, street_parking_buffer, bridge, mup_modal_delineation, from_node, to_node
trail (edge)	edge_id, edge_type, surface_material, width, length, cross_slope, incline, status	street_name, facility_name, bridge, ada_compliance, ada_compliance_date, ada_compliance_standard, from_node, to_node
virtual_link (edge)	edge_id, edge_type	from_node, to_node
object (point)	point_id, point_type	--
pedestrian (zone)	zone_id, zone_type, surface_material,	--

Tier 4:
Complete Network Supporting A Range of Traveler Profiles

Begin tracking issues and impediments as nodes rather than on edges
Continue to enhance attributes for accessibility and routing

Tier 4: Complete Network Supporting A Range of Traveler Profiles

Feature Type	Required	Recommended
curb_ramp (node)	node_id, node_type, incline, width, cross_slope, issue, detectable_warning, ramp_type, status, presence *required if other fields blank*	ada_compliance, ada_compliance_date, ada_compliance_standard, date_built, check_date
ramp (node)	node_id, node_type, incline, width, cross_slope, detectable_warning, issue, status	ada_compliance, ada_compliance_date, ada_compliance_standard, date_built, check_date
elevator (node)	node_id, node_type, status	ada_compliance, ada_compliance_date, ada_compliance_standard, date_built, check_date
transit_stop (node)	agency_id, stop_id	--
issue (node)	node_id, node_type, impediment, surface_issue	check_date
traffic_calming (node)	node_id, node_type, traffic_calming_type	date_built, check_date
virtual (node)	node_id, node_type	curb_type

Tier 4: Complete Network Supporting A Range of Traveler Profiles

Feature Type	Required	Recommended
sidewalk (edge)	edge_id, edge_type, width, length, incline, cross_slope, surface_material, detectable_warning, status, street_name, width_min, cross_slope_max, impediment, surface_issue	bridge, pedestrian_lane, ada_compliance, ada_compliance_date, ada_compliance_standard, date_built, check_date, from_node, to_node
crossing (edge)	edge_id, edge_type, width, length, incline, surface_material, status, cross_slope, rail, visual_markings, detectable_warning, ped_traffic_control, impediment, surface_issue	street_name, width_min, bridge, surface_quality, cross_slope_max, ada_compliance, ada_compliance_date, ada_compliance_standard, date_built, check_date, traffic_calming, vehicle_traffic_control , cross_vehicle_traffic_control , ped_protection, from_node, to_node
road (edge)	edge_id, edge_type, street_name	buffer_width, traffic_volume, posted_speed_limit, car_freeflow_speed, thru_lanes, shoulder_width, traffic_calming, curb_height, separation_permeable_car, from_node, to_node
footpath (edge); traffic_island (edge)	edge_id, edge_type, width, length, incline, surface_material, status, cross_slope, street_name,	ada_compliance, ada_compliance_date, ada_compliance_standard, width_min, bridge, cross_slope_max, date_built, check_d

Tier 4: Complete Network Supporting A Range of Traveler Profiles

Feature Type	Required	Recommended
steps (edge)	edge_id, edge_type, status, detectable_warning, visual_markings, surface_material, step_count, handrail, wheel_channel, impediment, surface_issue	ada_compliance, ada_compliance_date, ada_compliance_standard, date_built, check_date, from_node, to_node
escalator (edge)	edge_id, edge_type, detectable_warning, status	ada_compliance, ada_compliance_date, ada_compliance_standard, from_node, to_node
multi_use_path (edge)	edge_id, edge_type, width, length, surface_material, incline, detectable_warning, visual_markings, status, cross_slope, bridge, mup_modal_delineation	ada_compliance, ada_compliance_date, ada_compliance_standard, street_name, facility_name, separation_elements, separation_permeable_car, street_parking_buffer, from_node, to_node
trail (edge)	edge_id, edge_type, width, length, cross_slope, surface_material, incline, status	street_name, facility_name, bridge, ada_compliance, ada_compliance_date, ada_compliance_standard, from_node, to_node
virtual_link (edge)	edge_id, edge_type	from_node, to_node
object (point)	point_id, point_type	--

Path Map

Got an emerging or ambitious idea?

Anything that doesn't fit in V 1.0 can have a home in a map for future developments.

Image: All Trails

Thank you!

Luke Sky on Flickr