A path towards a resilient and integrated mobility ecosystem

SMART MOBILITY

Stantec

SMART MOBILITY

Innovation is changing the way we move—for the better. Our communities are ready to realize a new vision for transportation, and that means it's our job to empower change. We believe smart mobility brings solutions that will lead to a safer, resilient, economically-vibrant, and equitable world. At Stantec, our global smart mobility experts are shaping the future by merging existing transportation approaches with next generation mobility solutions. We're focused on helping our communities develop the policies, test solutions, leverage data, and understand data governance. Together, we're creating the plans and implementing forward-thinking, people-focused designs.

SMART MADE SIMPLE

The technology may be complex, but introducing it doesn't have to be. We can make integration simpler because we've done this across a variety of markets and sectors. Our team has implemented mobility solutions in communities around the world, so we have a process in place—a proven methodology developed by our in-house experts. We make things easier and more efficient when we bring best practices, lessons learned, a multi-discipline team, and valuable partnerships to mobility projects.

THE JOURNEY TO SMARTER MOBILITY

Smart mobility solutions look different for each community. Whether it's contactless deliveries using automated shuttles and drones, curbside management for fewer parked cars, prioritizing the use of right-of-way to support shared transportation options, or zero-emission bus programs—we're providing solutions fueled by innovation to enhance mobility for all.

What is Smart Mobility: We consider smart mobility to be the interconnection between policy, technology, infrastructure, and transportation mode to enhance communities by creating economically viable, environmentally-friendly, and socially equitable transportation networks that put people first.

The Smart Mobility Market - why so critical right now: COVID-19 has demonstrated the value of transportation and that mobility access is so much more than just a trip. Having access to safe, reliable, and affordable transportation options is critical to economic opportunity, health, and community interaction.

Rethinking streets: streets should be designed for moving people and providing goods and services, not inefficient single-occupancy trips. Design should be people-focused with mobility options, particularly shared mobility, at the core to support equity, accessibility, and community access.

Using next generation mobility solutions to unlock a new era of opportunity, access, and equity

Smart mobility aims to reduce congestion, pollution, and cost while increasing safety, equity, and transparency by leveraging breakthroughs in technology. More efficient mobility networks create new opportunities:

- **Enhanced access to transportation services:** Service for non-drivers, elders, underserved populations, and people with limited mobility or disabilities
- **Complementing and enhancing public transit investments:** Creating a first-mile/last-mile solution that can increase transit ridership and reduce traffic through multi-modal alternatives
- **Infrastructure that prioritizes people, not cars:** Repurposing underused parking to serve more uses and unlock new value
- **More efficient use of space or dynamic use of right-of-way:** Creating new places of engagement for our communities by rethinking the operation and design of our streets, curbs, and public realm
- **On-demand services that consider unbanked and wireless services access:** Convenience and flexibility through the use of digital applications
- **Ensuring future-ready infrastructure:** Reduce both emissions and congestion by using electric vehicles
- **Creating a more resilient transportation network:** Solution for ensuring a more resilient transportation system post-COVID with considerations around public health, equity, and corridors that support mobility needs
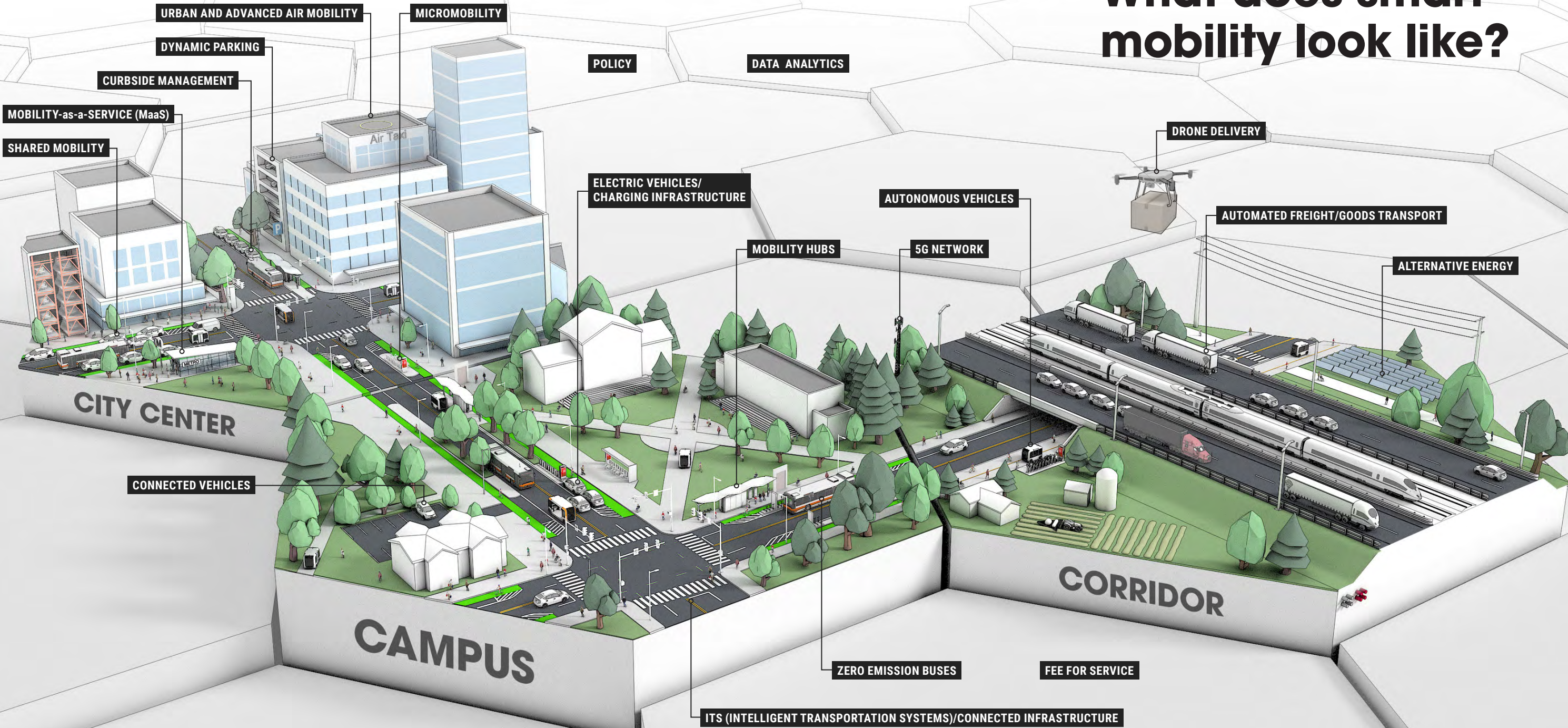
We use mobility as a connector and a foundation to ensure the adaptability of our communities for generations to come.

A note on policy and data: The foundation of smart mobility
One of the important policy issues emerging around the use of technology in communities is the collection and use of data, which poses privacy considerations that need to be managed and mitigated. As more data from the use of new mobility innovations is collected, considerations around anonymization and avoiding reidentification become more important due to sensitivities around geolocation data.

It is crucial to have the right policy foundations in place that track the integration of technology into communities. Transparency should be a cornerstone of such policies, including a data management framework, since public trust is a key element for the adoption of technology focused mobility solutions.

What does smart mobility look like?

URBAN AND ADVANCED AIR MOBILITY

DYNAMIC PARKING

CURBSIDE MANAGEMENT

MOBILITY-as-a-SERVICE (MaaS)

SHARED MOBILITY

MICROMOBILITY

POLICY

DATA ANALYTICS

DRONE DELIVERY

ELECTRIC VEHICLES/ CHARGING INFRASTRUCTURE

AUTONOMOUS VEHICLES

AUTOMATED FREIGHT/GOODS TRANSPORT

MOBILITY HUBS

5G NETWORK

ALTERNATIVE ENERGY

Air Taxi

CONNECTED VEHICLES

CITY CENTER

CAMPUS

CORRIDOR

ZERO EMISSION BUSES

FEE FOR SERVICE

ITS (INTELLIGENT TRANSPORTATION SYSTEMS)/CONNECTED INFRASTRUCTURE

Smart mobility elements

Shared Mobility

Provides travelers with transportation modes on an as-needed basis without having to own a vehicle. Can include transit, carsharing, ridesharing, mircromobility, and automated shuttles.

▶ Project

Policy

Data use and governance, equity, and managing the right-of-way requires an adaptable policy framework that minimizes disruption, maximizes opportunity, and flexes as technology advances.

▶ Report

Connected Vehicles

A future with vehicles that communicate with other vehicles, traffic signals, smartphones, and various systems to access maps, road conditions, and emergency messages can improve efficiency and safety.

▶ Project

Zero Emission Buses

Zero emission buses (electric or hydrogen-powered) provide the opportunity to create a more sustainable transit system and help a city meets its long-term emissions goals.

▶ Press Release

Curbside Management

Dynamic right-of-way management creates flexible zones for more efficient management of goods delivery, parking, and shared mobility pick-up and drop-offs.

▶ Project

Alternative Energy

Incorporating alternative energy such as solar, wind, tidal, biomass, and geothermal into smart mobility promotes sustainability, resilience, and emissions reduction.

▶ Blog

Data Analytics

Pairing big data and visualization with data governance helps generate more effective services for users and enables data driven planning decisions.

▶ Project

Micromobility

Integration of small, low-speed vehicles for human transport or goods delivery. Supports first/last-mile mobility connections.

▶ Project

Mobility Hubs

Built around high-frequency transit, mobility hubs integrate multi-modal and shared mobility options into a single location to connect users to their destination.

▶ Project

Drone Delivery

Managing unmanned aerial and ground vehicles can enrich and enable public services and enable time-sensitive, contact-less deliveries, operated autonomously or remotely.

Automated Freight/ Goods Transport

Automated deliveries and goods movement (both aerial and ground) assist with meeting growing demand for sustainable and efficient transportation.

▶ Blog

Electric Vehicle Charging Stations

Planning and analysis around charging station placement, including on public and private property, is important to promoting the adoption of electric vehicles.

▶ Blog

Dynamic Parking

Dynamic parking creates maximum efficiency by recognizing that different parking spaces have different peak usage times, which means one parking space can serve two or more purposes in a given day. Data and technology are used to structure pricing based on demand.

▶ Blog

ITS/Connected Infrastructure

Enhances the operating environment for mobility modes such as AVs, connected buses, and personal vehicles with smart features, creating a safer and more efficient overall transportation system that leverages data and promotes communication.

▶ Project

Autonomous Vehicles

Vehicles guided by advanced sensors (e.g. LiDAR, RADAR, ultrasonic), cameras, and mapping that navigate without human intervention (i.e. SAE Level 4 or 5) offer opportunities for safer and more efficient passenger and goods movement.

Learn about our AV-focused team, GenAV™ here, and view our AV Deployment Playbook here.

Urban and Advanced Air Mobility

The possibility of moving people and cargo via unmanned low altitude vehicles continues to advance both in concept and planning, including from a policy and regulatory perspective.

Mobility-as-a-Service (MaaS)

A platform that provides integrated access to mobility choices for a trip, maps the best route based on your preferences, and allows you to pay in advance for the end-to-end trip, which supports an integrated transportation system.

5G Network

A more connected operating environment requires a strong and resilient telecommunications network. The rollout of 5G into our communities involves consideration around the placement and integration of new infrastructure to support increased digital connectivity.

Fee for Service

Fee for service allows for payment of mobility services and use of transportation infrastructure to be unbundled and paid for separately. Pricing can be based on demand, which can aid in more dedicated funding to support maintenance and modernization. Potential models include tolling, dynamic parking pricing, and decongestion pricing.

The path to smarter mobility

We have the knowledge and experience for every step needed to realize a carefree and seamless transportation solution that harmonizes mobility, land use, and innovation.

Your journey to smart

Implementing smart mobility solutions looks different for each community. For some, it may be starting at the beginning—writing policy or developing a vision and strategy—and for others, it may be determining the feasibility of a solution, like electric vehicle infrastructure or e-scooter programs. In some communities it may be looking at first-mile/last-mile on-demand solutions that consider microtransit or transportation network company partnerships, or it could be testing and piloting autonomous vehicles. There are so many different stages and aspects of smart mobility, and every community has their own unique path. Wherever you are in your journey, we can help you arrive at your destination, smartly, safely, and with the needs of users at the forefront.

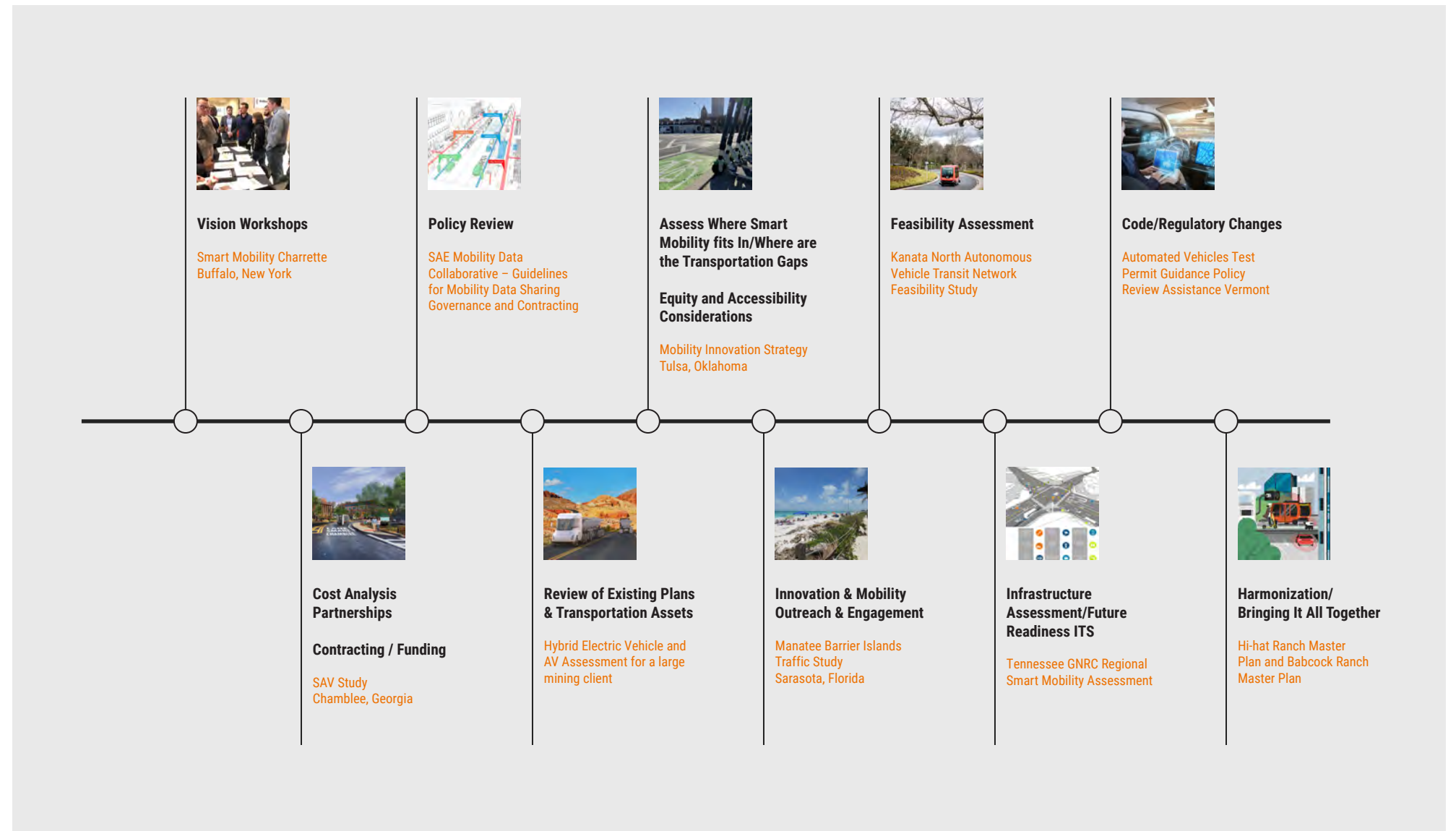## Smart Mobility at Stantec

Service Offerings
- Policy, Planning & Regulatory
- Feasibility Assessments
- Infrastructure & Technology Risk & Readiness Assessment
- Partnerships, Procurement, & Funding
- Deployment & Operations Advisement
- Data Analytics & Governance
- Research & Education
- ITS

Project Types
- Freight & Delivery
- Curbside & Parking
- Shared Mobility & MaaS
- Electric Vehicles & Charging Stations
- Micromobility
- Automated & Connected Vehicles

Client Types
- Transportation & Transit Agencies
- Metropolitan Planning Organizations
- DOTs
- Airports & Ports
- Municipalities
- Universities
- Healthcare
- Corporations
- Federal Governments
- Private Land Developers
- AV Suppliers & Manufacturers (Private Only)
- Military
- Energy

Vision Workshops

Smart Mobility Charrette
Buffalo, New York

Policy Review

SAE Mobility Data Collaborative – Guidelines for Mobility Data Sharing Governance and Contracting

Assess Where Smart Mobility fits In/Where are the Transportation Gaps

Equity and Accessibility Considerations

Mobility Innovation Strategy
Tulsa, Oklahoma

Feasibility Assessment

Kanata North Autonomous Vehicle Transit Network Feasibility Study

Code/Regulatory Changes

Automated Vehicles Test Permit Guidance Policy Review Assistance Vermont

Cost Analysis Partnerships

Contracting / Funding

SAV Study
Chamblee, Georgia

Review of Existing Plans & Transportation Assets

Hybrid Electric Vehicle and AV Assessment for a large mining client

Innovation & Mobility Outreach & Engagement

Manatee Barrier Islands Traffic Study
Sarasota, Florida

Infrastructure Assessment/Future Readiness ITS

Tennessee GNRC Regional Smart Mobility Assessment

Harmonization/ Bringing It All Together

Hi-hat Ranch Master Plan and Babcock Ranch Master Plan

Merging mobility and land-use

Mobility and land-use go hand in hand. However, policy development is not always coordinated. When we reduce silos and merge planning for development and transportation together, we realize the value of transportation and its positive impact for a community. Transportation is more than just a trip, it's understanding the connection between where we live, work, play, and get essential services.

Smart doesn't just mean technology. It's also about innovative governance structures and the way we approach projects. Through a focus on planning that integrates land use and mobility, we can design infrastructure that incentivizes shared mobility, promotes dynamic use of right-of-way (that prioritizes user needs), and creates efficiencies around the movement of passengers and goods. Through smarter planning and design, we can influence mode shift and reduce vehicle trips while enhancing access to jobs, education, and health care; promoting safer streets; and increasing access to social opportunities.
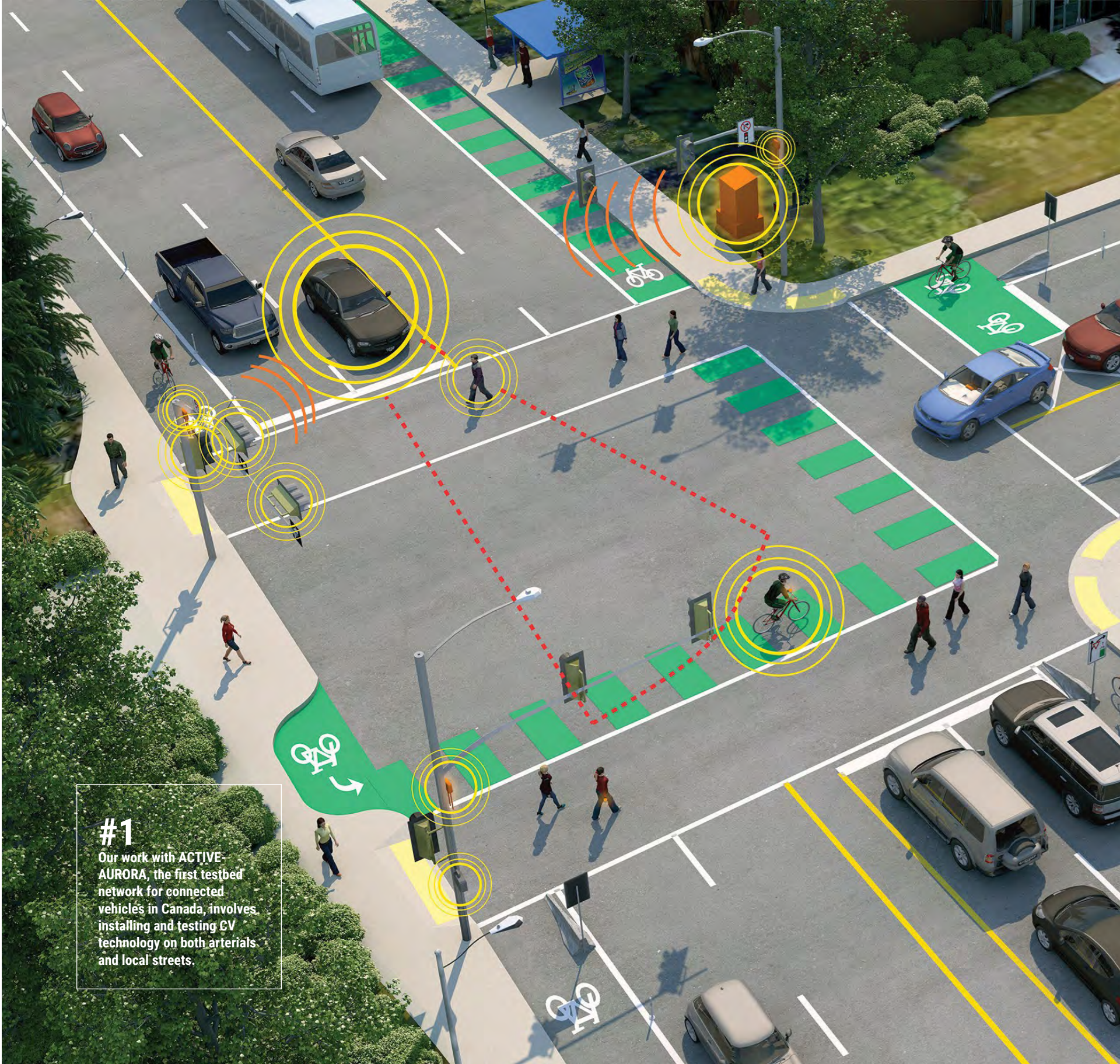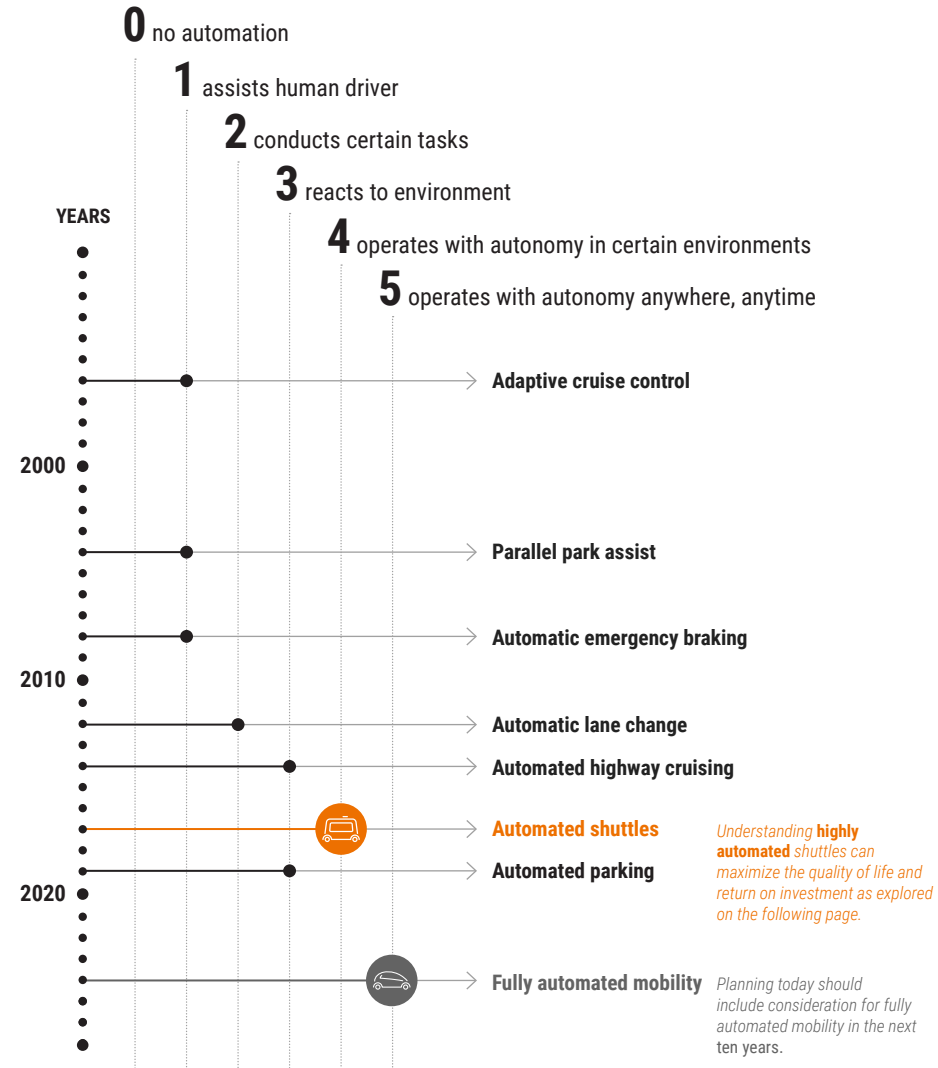
By using policy to establish foundations, we can leverage next generation mobility solutions to enhance access to safe, reliable, and affordable mobility options for all.

Merging mobility and land use supports an integrated and smarter transportation system. With a carefree and seamless mobility network, less time is spent commuting and more time is spent living.

Highly automated vehicles are here

AV technology continues to improve through more testing and pilot projects. With low-speed autonomous shuttles already operating, we expect fully autonomous fleets to enter wide use on public roads in the near future. To help monitor its evolution, the SAE International (formerly the Society of Automotive Engineers) established six levels of automation based on "who does what, when."

0 no automation
1 assists human driver
2 conducts certain tasks
3 reacts to environment
4 operates with autonomy in certain environments
5 operates with autonomy anywhere, anytime

YEARS

Adaptive cruise control

2000

Parallel park assist

Automatic emergency braking

2010

Automatic lane change

Automated highway cruising

Automated shuttles
*Understanding **highly automated** shuttles can maximize the quality of life and return on investment as explored on the following page.*

Automated parking

2020

Fully automated mobility
Planning today should include consideration for fully automated mobility in the next ten years.

#1
Our work with ACTIVE-AURORA, the first testbed network for connected vehicles in Canada, involves installing and testing CV technology on both arterials and local streets.

STANTEC
GENERATION AV™

Within Stantec's Smart Mobility team is an arm of highly-specialized AV experts called Stantec GenerationAV™

There are many paths on the road to automation, and Stantec GenerationAV™ aims to safely accelerate that journey. GenerationAV™ is developing and deploying customizable tools and technology to advance automated mobility systems for any use case (along with related planning, assessment, and consulting products).

We've worked on automated mobility since before most people knew it even existed. That experience has given us a deep perspective on what lies ahead for the industry, and what that future means for clients and communities everywhere. GenerationAV™ brings together our Stantec autonomy team with best-in-class industry partners to help clients deploy AVs safely, for the good of our communities.

Products and Services
- Advisory Services
- Cybersecurity
- Infrastructure Consulting Services
- Learning Center
- Pilots
- Planning and Engineering Services
- Playbook
- Policy Development and Guidance
- Research
- Safety Verification
- Supplier Portal

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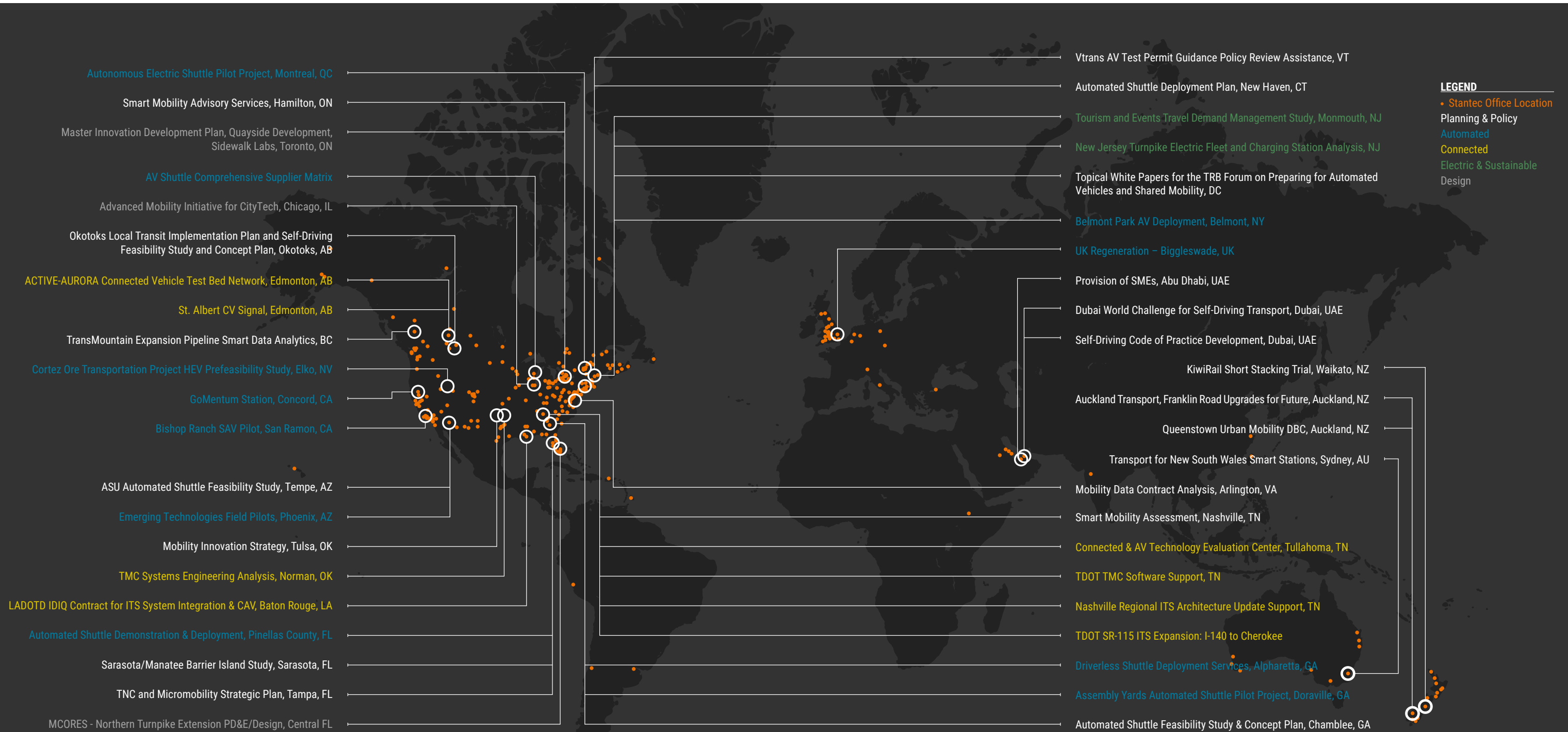Transit Advisory Lead
(Zero Emission Buses)

SECTOR & REGIONAL LEADS

SUBJECT MATTER EXPERTS

ADDITIONAL KEY COLLABORATORS

KEY EXPERIENCE

Vtrans AV Test Permit Guidance Policy Review Assistance, VT

Autonomous Electric Shuttle Pilot Project, Montreal, QC

Automated Shuttle Deployment Plan, New Haven, CT

Smart Mobility Advisory Services, Hamilton, ON

Tourism and Events Travel Demand Management Study, Monmouth, NJ

Master Innovation Development Plan, Quayside Development, Sidewalk Labs, Toronto, ON

New Jersey Turnpike Electric Fleet and Charging Station Analysis, NJ

AV Shuttle Comprehensive Supplier Matrix

Topical White Papers for the TRB Forum on Preparing for Automated Vehicles and Shared Mobility, DC

Advanced Mobility Initiative for CityTech, Chicago, IL

Belmont Park AV Deployment, Belmont, NY

Okotoks Local Transit Implementation Plan and Self-Driving Feasibility Study and Concept Plan, Okotoks, AB

UK Regeneration – Biggleswade, UK

ACTIVE-AURORA Connected Vehicle Test Bed Network, Edmonton, AB

Provision of SMEs, Abu Dhabi, UAE

St. Albert CV Signal, Edmonton, AB

Dubai World Challenge for Self-Driving Transport, Dubai, UAE

TransMountain Expansion Pipeline Smart Data Analytics, BC

Self-Driving Code of Practice Development, Dubai, UAE

Cortez Ore Transportation Project HEV Prefeasibility Study, Elko, NV

KiwiRail Short Stacking Trial, Waikato, NZ

GoMentum Station, Concord, CA

Auckland Transport, Franklin Road Upgrades for Future, Auckland, NZ

Bishop Ranch SAV Pilot, San Ramon, CA

Queenstown Urban Mobility DBC, Auckland, NZ

Transport for New South Wales Smart Stations, Sydney, AU

ASU Automated Shuttle Feasibility Study, Tempe, AZ

Mobility Data Contract Analysis, Arlington, VA

Smart Mobility Assessment, Nashville, TN

Emerging Technologies Field Pilots, Phoenix, AZ

Mobility Innovation Strategy, Tulsa, OK

Connected & AV Technology Evaluation Center, Tullahoma, TN

TMC Systems Engineering Analysis, Norman, OK

TDOT TMC Software Support, TN

LADOTD IDIQ Contract for ITS System Integration & CAV, Baton Rouge, LA

Nashville Regional ITS Architecture Update Support, TN

Automated Shuttle Demonstration & Deployment, Pinellas County, FL

TDOT SR-115 ITS Expansion: I-140 to Cherokee

Sarasota/Manatee Barrier Island Study, Sarasota, FL

Driverless Shuttle Deployment Services, Alpharetta, GA

TNC and Micromobility Strategic Plan, Tampa, FL

Assembly Yards Automated Shuttle Pilot Project, Doraville, GA

MCORES - Northern Turnpike Extension PD&E/Design, Central FL

Automated Shuttle Feasibility Study & Concept Plan, Chamblee, GA

LEGEND

• Stantec Office Location
Planning & Policy
Automated
Connected
Electric & Sustainable
Design

Planning & Research

Shared Autonomous Vehicle Feasibility Studies

- Multiple use cases for low speed automated shuttles, partnered with public clients
  - Arizona State University
  - New Haven Parking Authority, CT
  - Pinellas Suncoast Transit Authority, FL
  - Town of Okotoks, AB
  - City of Chamblee, GA
- Including site analysis, stakeholder interviews, public engagement, route alternatives, route costs, and feasibility

Topical White Papers for the TRB Forum on Preparing for Automated Vehicles and Shared Mobility

- Analysis of ongoing research and deployment efforts for 10 topics related to automated vehicle and shared mobility deployment, including safety and equity
- Identification of current knowledge gaps
- Presentation of topics for future research suitable for large research programs

Operations & Implementation

Montreal AV Shuttle Deployment

- 1.4 km public route in mixed traffic, connected Metro Station and Olympic Stadium to Marchée Maisonneuve
- 5 stops with an average speed 15 km/h
- 3 traffic signals with DSRC connected vehicle communication

Testbeds

ACTIVE AURORA

- Partnership with University of Alberta
- Canada's first connected vehicle hardware and software testbed
- Rural freeway, urban expressway, and urban arterial environments

Bishop Ranch SAV Pilot Program

- From 2017 to 2018, Stantec tested SAVs in mixed traffic through the Bishop Ranch business park with two EasyMile EZ10 self-driving shuttles.
- The testing started in a closed parking lot, and later expanded throughout the entire Bishop Ranch campus, including public streets.
- This is the first pilot program of its kind in California and the first driverless shuttle to test on U.S. public roads.
- In May 2018, the California Transportation Foundation recognized the program with its Advanced Technology Program of the Year award.

Multi-modal Design

Master Innovation and Development Plan, Quayside Development

- Key innovation partner for infrastructure design to Sidewalk Labs
- 12-acre site on Toronto waterfront
- Advanced modeling, design, and integration to support walkable mixed-use environment
- Bike shares, e-bike docks, and e-scooter docks all within a 5-minute walk of every building
- Integrated dynamic curbs opening up valuable spaces to be used as drop-off zones or as public space

Policy & Assessment

Dubai RTA Self Driving Vehicle Code of Practice

- Best practices for implementing, operating, and regulating highly automated vehicles
- Legislative framework to govern new technologies, safely and efficiently
- Partnered with Virginia Tech Transportation Institute

Greater Nashville Regional Council Smart Mobility Assessment

- Seven county region framework for emerging technologies
- Helping government understand how they can improve and optimize transportation system
- Partnership with Vanderbilt University

Vermont Automated Vehicle Testing Permit and Guidance

- Provided support on the finalization of the AV permit and guidance that received approval by the Traffic Committee
- Supporting a virtual forum called the "AV-Xchange Forum" to discuss opportunities and challenges for AV testing in Vermont

DESIGN WITH COMMUNITY IN MIND

Communities are fundamental. Whether around the corner or across the globe, they provide a foundation, a sense of place and of belonging. That's why at Stantec, we always design with community in mind.

We care about the communities we serve—because they're our communities too. This allows us to assess what's needed and connect our expertise; to appreciate nuances and envision what's never been considered; to bring together diverse perspectives so we can collaborate toward a shared success.

We're designers, engineers, scientists, and project managers innovating together at the intersection of community, creativity, and collaboration. Balancing these priorities results in projects that advance the quality of life in communities across the globe. Stantec trades on the TSX and the NYSE under the symbol STN. Visit us at stantec.com or find us on social media.