Executive Summary

This Executive Summary contains the highlights of the full Draft Cook DuPage Smart Corridor Plan and Design Technical Report. The report (and this summary) contain sections describing preliminary results of some tasks which are ongoing.

Introduction

Smart Corridor projects are intended to improve travel for all modes (passenger traffic, freight, and transit) through low-cost solutions and Intelligent Transportation Systems (ITS) along a specified roadway facility. Smart Corridor projects have become an attractive transportation option for local and regional transportation planners and engineers. There are a broad range of potential Smart Corridor improvements, including signal interconnects, time-of-day parking restrictions and other right-of-way capacity improvements, real-time transit information, Transit Signal Priority (TSP), intersection improvements, information technology, Ethernet-based communication systems, crossover improvements, safety improvements, transit service and upgrades including route and stop locations, and policy issues to promote multijurisdictional coordination. These investments are typically focused around a single arterial roadway corridor and are focused on improving corridor performance.

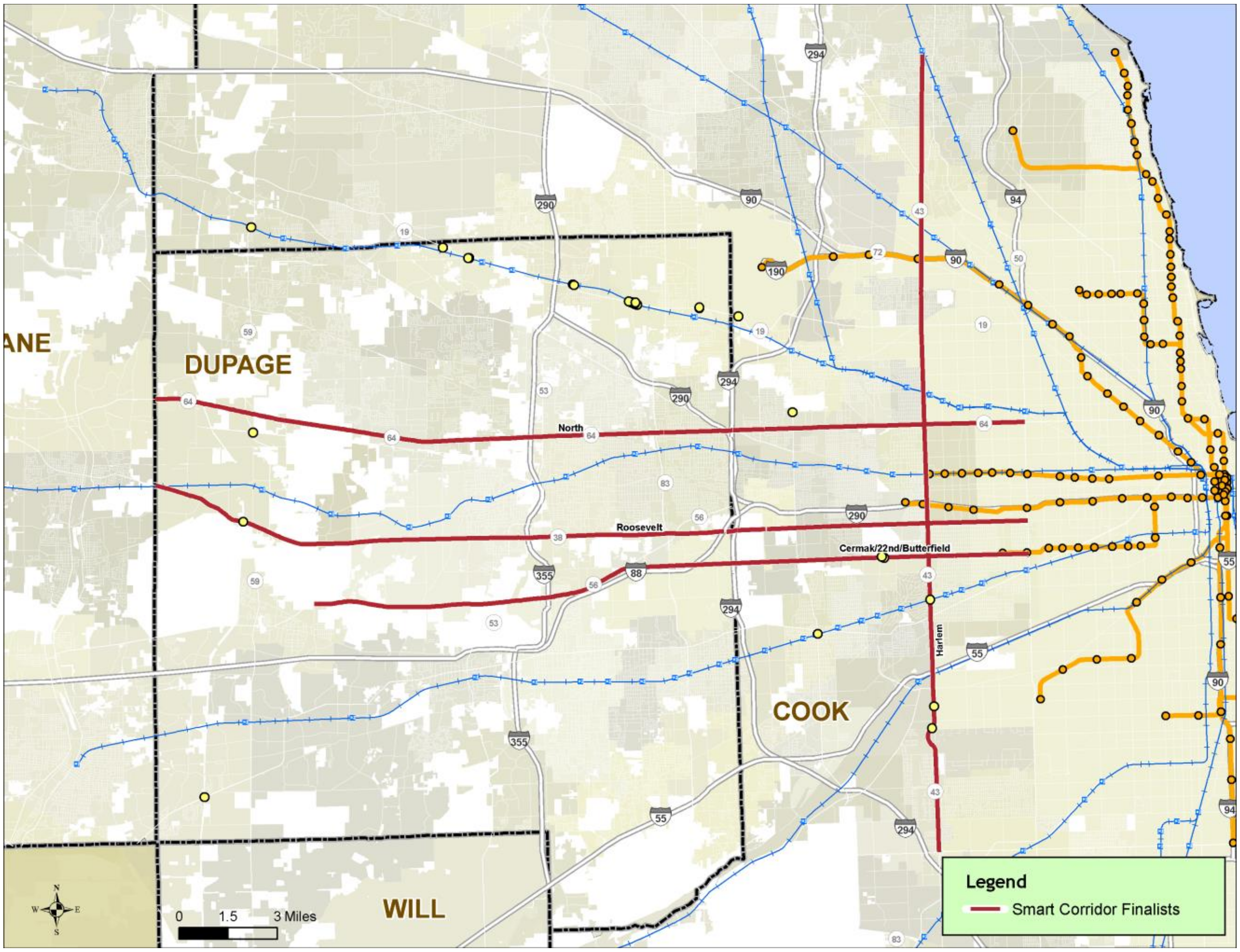
The Options Feasibility Stage of the Cook DuPage Corridor Study identified 46 proposed Smart Corridors as a recommended Network Enhancement. The subsequent Smart Corridors Plan and Design project identified the four best candidates to focus these improvements on, developed a conceptual design and concept of operations for these pilot corridors, and developed an evaluation tool to monitor program success. The study area for this project, which was the same as in the previous studies referenced, included parts of Cook and DuPage Counties in northeast Illinois. It extended from Cicero Avenue west to the Kane County line, bounded on the north by the Metra Milwaukee West line and on the south by the Metra BNSF line.

Based on the work conducted in the Smart Corridors Plan and Design project including prioritization results, the guiding principles, the visual displays of corridor data, and their own expertise about the Cook DuPage Corridor, the Technical Committee was able to make a recommendation for the following four corridors to advance to conceptual design.

Four Corridors with Endpoints

Corridor Name	Beginning Point (N or E)	End Point (S or W)
Cermak/22nd/Butterfield Rd	Cicero Ave	Winfield Rd
Harlem Ave	Glenview Rd	95th St
North Ave	Cicero Ave	DuPage/Kane County Line
Roosevelt Road	Harlem Ave	DuPage/Kane County Line

Map of Corridors for Conceptual Design



The overall objective of the study is to develop conceptual designs and plans for four Smart Corridors in the Cook DuPage Corridor in order to improve travel for all modes through low-cost solutions and ITS. Conceptual design is intended to provide enough detail on potential Smart Corridor projects that they could be advanced to a grant application or preliminary engineering phase.

Existing Conditions

An existing conditions review was conducted for each of the four corridors. It included, among other elements:

- Land use and major trip generators
- Number of lanes and traffic volumes
- Planned projects
- Transit service
- Congestion and delay
- Existing signal systems and signal interconnects
- Review of safety performance
- Key findings of previous phase

The results were mapped to provide detailed input into the conceptual design phase. Some key findings are summarized below.

The **Harlem (IL-43)** corridor runs from 95th Street up to Glenview Road. It varies in character several times during this length. There is heavy transit usage of this corridor. Harlem is an important Arterial Rapid Transit (ART) corridor for Pace. Harlem has several signal interconnects and is a strong candidate for TSP technology. It has numerous locations of high crash frequency and high traffic volumes.

The **North Avenue (IL-64)** corridor is of regional importance due to the traffic it currently carries and its significant truck volumes, among other reasons. It has a primarily six-lane configuration and there should be available capacity to implement some Smart Corridor strategies. It often serves as an alternate route for I-290. It may be valuable to coordinate with IDOT for temporary or permanent enhancements to provide relief during the congestion which will accompany the I-290 construction period. There are several projects planned to improve North Avenue.

Roosevelt Road (IL-38) is a four-lane facility except for occasional six-lane stretches. It has a broad range of traffic volumes at different stretches and a few significant bottlenecks. This corridor is a Strategic Regional Arterial with good transit coverage by Pace and CTA. It has several signal interconnects in place. The Technical Committee recommended that Smart Corridor technologies focus on Roosevelt to the west of Harlem and also noted that Cermak and Roosevelt are close together and may provide an opportunity to manage traffic between parallel corridors. Roosevelt also serves as an alternate route for I-290.

The **Cermak/22nd/Butterfield (IL-56)** corridor changes character several times. It links several key landmarks including Morton Arboretum, Yorktown Mall, Oakbrook Center Shopping Mall, Westbrook Corporate Center, the Woodlawn Cemetery, and the Cook County Forest Preserve among others. It is a Strategic Regional Arterial with several long signal interconnects in place, regular Pace bus service, and a few high frequency crash locations. It is close to Roosevelt.

Best Practices in Smart Corridor Development, Operation, and Management

Tackling the operations of large-scale regional signal smart corridor projects can be challenging due to the number of municipalities involved and the wide variety of technical expertise from city to city. The team evaluated best practices for operations of a Smart Corridor system in a regional context. The case studies include: Operation Green Light, Kansas City, MO; Advanced Traffic Management System, Central Broward County, FL; Freeway and Arterial System of Transportation, Las Vegas, NV; Gateway Cities Arterial Smart Corridors, Los Angeles, CA; Gateway Guide, Saint Louis, MO; and Program for Arterial Signal Synchronization and Travel Guidance, Lake County, IL.

Successful Advanced Traffic Management Systems come in many shapes and forms. There is no exact formula to determine what institutional framework must be present for a project of this type to be successful. However, we have identified key considerations that need to be addressed for a successful Smart Corridor project:

- A strong project requires a defined institutional framework.
- The project needs to have a common vision across all the stakeholders.
- A successful traffic management project needs a realistic funding plan. This plan needs to consider important costs throughout the project's life cycle, including operation costs, maintenance, training, among others.
- Having clear and precise documents stating roles and responsibilities of different stakeholders is key for success.
- A successful transportation management system relies heavily on the operability of the project. For this reason, it is important to consider and include staff members or external consultants with a desired level of expertise in the field.

Based on these findings and discussions with the Technical Committee, the following draft institutional framework is proposed.

- The best chances for deployment would be a phased implementation of the key corridors the Committee has already identified.
- The Committee wants the flexibility to build "logical segments" of any of the corridors based on funding opportunities. Therefore, the design concepts being developed as part of this project are grouped in these "logical segments".
- To increase the chances of funding and deployment, the first phase for deployment should be developed as a Pilot Project. A pilot provides an opportunity to demonstrate how these projects can be deployed in the region. A pilot also can highlight Smart Corridor benefits without having to commit to a larger programmatic commitment as outlined in many of the national best practice examples.

- The Technical Committee wants to look for opportunities where this pilot project could be attached to a larger capacity/infrastructure project. For example, any of these corridors could be included as part of the traffic mitigation element of a larger freeway project in the region. The study team will explore where smart corridor projects overlap with regional large scale projects in the region such as the reconstruction of I-290 and recommend joint opportunities where available.

- Once a pilot project is agreed upon, the stakeholders involved need to be identified. The stakeholders considered should include jurisdictional, infrastructure ownership, and transportation operations considerations.

A draft concept will be presented to the Technical Committee during their June meeting. This concept will include who owns and/or operates the infrastructure and services involved in the pilot project, MOEs can be designed to provide adequate institutional framework, developing a strong and sound project structure for future funding considerations.

Technology Scan

The Cook DuPage Smart Corridor Plan and Design Technical Report examines ITS field devices that would enable Smart Corridor functionality on the four corridors. These ITS devices represent a cross-section of technologies that have proved their effectiveness for enhancing mobility and safety along busy road corridors. The report provides high-level evaluation criteria to gauge the appropriateness of a certain technology, noting that corridor-specific details—such as roadway geometrics, existing infrastructure, traffic conditions, community opinions, and environmental elements—may ultimately refine the final design.

The comprehensive ITS solutions explored meet the goals of the Complete Streets approach by offering improvements to all modes of transportation. Most notably, pedestrian, bicycle, transit, and personal vehicle traffic capture benefits of improved mobility and safety through investment in these technologies.

The table on the following page summarizes the technologies, their planning level cost estimates, and their benefits.

SMART CORRIDOR – SUMMARY TECHNOLOGIES

	Technology	Installation Costs	Benefits
TRAVELER INFORMATION	**Dynamic Message Sign (DMS)**	• $70,000 to $100,000 per deployment site	• Reductions in travel delay
	Travel Time System	• $45,000 + 10,000 per mile (*purchased system*) • $4,500 per mile per year (*leased system*)	• Reductions in travel delay
SIGNALS	**Signal Coordination Study**	• $2,500 to $3,500 per intersection	• Benefit-Cost Ratio of 40:1
	Intersection Monitoring and Detection	• $5,000 to $35,000 per intersection (*no pedestrian crossings*) • $7,000 to $40,000 per intersection (*pedestrian crossings*)	• Increases in throughput, reductions in delay
	Adaptive Traffic Signal Control	• $20,000 to $60,000 per intersection	• Travel Time – 10+% Improvement
	Traffic Signal Interconnect	• $150,000 to $600,000 per mile (*fiber - underground*) • $50,000 to $75,000 per mile (*fiber - aerial*) • $40,000 per mile (*wireless*)	• Travel Time – 15-25% Improvement • Stops – 25%-50% fewer
ROAD MONITORING	**CCTV Cameras**	• $10,000 to $15,000 per intersection • $60,000 to $80,000 per new pole site	• Reductions in incident clearance times • Improvements to traveler information
TRANSIT	**Bus Stop Relocation**	• $1,500 per bus shelter relocation + $500 concrete work (*if needed*) • $150 per flag stop relocation + $500 concrete work (*if needed*)	• Reductions in travel delay (transit and car)
	Transit Signal Priority (TSP)	• $10,000 to $15,000 per intersection + $1,000 per bus	• Bus Travel Time – 7-20% Improvement • Delay – 40% Improvement
EMERGENCY SERVICES	**Emergency Vehicle Preemption (EVP)**	• $10,000 per intersection + $3,000 per vehicle	• Emergency Vehicle Response Time – 30 to 120 Seconds of Improvement • Improved safety
PEDESTRIANS	**Automated Pedestrian Crossing Detection**	• $15,000 to $20,000 per intersection	• Increases in pedestrian safety
	Pedestrian Countdown Signals	• $10,000 to $20,000 per intersection	• Increases in pedestrian safety
PARKING	**Smart Parking Monitoring System**	• $50,000 + $70,000 per block	• Reductions in traffic (circulating)
	Peak-Hour Parking Restrictions	• $6,000 to $10,000 per mile	• Increases in traffic throughput
SIGNING	**Sign Survey**	• $5,000 to $10,000 per mile	• Increases in traffic throughput
ADVANCED	**Connected Vehicles**	• No standardized costs available	• 82% reduction (projected) of non-impaired crashes.

Conceptual Design for North Avenue

This section summarizes the draft conceptual design for the North Avenue Corridor. The other three corridors will be added at a later stage. A listing of draft projects for each of the eight segments of North Avenue are available under separate cover entitled: ***CDP_SmrtCor_NorthAveProjects_2015-05-30_DRAFTv1****. The project listings include details on design elements, scope of work, project justification, project costs, project priority, and others.*

The conceptual design for North Avenue follows guidance employed along parallel arterial routes that are part of a larger urban corridor. Paralleling I-290 for most of its length, mobility on this route is heavily influenced by traditional time-of-day traffic, day-to-day traffic increases due to recurrent congestion on I-290 that balances traffic between freeway and arterial, and intermittent surges from incidents on I-290 that force motorists to use alternate routes. With this influence, improvements to mobility require increased driver awareness and traffic management strategies that can completely evolve based on need.

Traveler Information Systems

En-route traveler information systems are recommended to provide motorists a real-time assessment of travel conditions along North Avenue. Given the low availability of traffic sensors, a Bluetooth-based travel time system is recommended along the corridor in areas of recurrent variation in travel time or areas prone to surges of traffic bypassing an incident on I-290. Four investment zones are identified:

- Swift Road to IL-83
- IL-83 to I-290
- I-290 to Harlem Ave
- Harlem Ave to Cicero Ave

To provide this information to en-route motorists, arterial dynamic message signs (DMS) are recommended at strategic locations in advance of key decision points. Although DMS can be a useful asset alone by providing detailed information regarding incidents or events, a supplementing travel time system can allow the DMS to continuously provide travel-related information during the times when no incident or event is occurring. Recommended locations and some associated message sets are included in the full report.

Traffic Signal Enhancements

To accommodate the high variability of traffic demand due to rerouting of traffic from I-290, use of adaptive traffic signals is strongly recommended, focusing efforts on areas where North Ave serves as an alternate route. Historical traffic data and field observations both confirm that the variance in traffic demand occurs most often along the segment of North Ave between IL-83 and Harlem Ave, a segment that experiences surges in traffic seeking alternate routes when I-290 is congested. Similarly, the interchange with I-355 generates traffic that may increase or decrease based on freeway conditions. Such environments are good candidates for small systems of adaptive traffic signals.

Adaptive traffic signals are recommended at all intersections along North Ave between:

- IL-83 to Harlem Ave
- Swift Rd to IL-53

The segment of North Ave between Harlem Ave and Cicero Ave may benefit from an adaptive signal system, but to a much lesser degree. Field observations indicate that congestion does appear along this segment, but is not as heavily influenced by unexpected surges. Many of these traffic signals appear to operate as a fixed-time system, which frequently gives unneeded red lights to accommodate an empty side street and may be the primary generator of this congestion. A lower-cost improvement over an adaptive signal solution would be to add intersection monitoring where needed as part of a larger signal coordination and timing (SCAT) study to help reduce the number of unneeded red lights.

SCAT studies are recommended at most intersections to provide a base timing plan that effectively accommodates today's traffic demand. Exceptions include certain signals that were retimed in 2013 or later, although a SCAT study may still be recommended if a major land-use or traffic pattern change has occurred since that retiming. SCAT studies are otherwise recommended for traffic signals that were retimed more than five years prior.

IDOT's existing traffic signal interconnect system provides good coverage for the existing signal systems today, but would be more effective if unified under a single backbone communications system. It is recommended to deploy fiber optic cable or wireless radios to join the various interconnect systems into a single system, allowing access along the corridor limits for traffic signals and other ITS assets. It is also recommended to tie this communications network into the IDOT or Illinois Tollway fiber optic cables at I-355 and I-290 to provide dedicated agency access (no third-party subscriber service necessary) and provide communications redundancy.

Road Monitoring

Closed-circuit television (CCTV) cameras are recommended at key intersections that service traffic between North Avenue, I-290, and other east-west alternative routes. CCTV cameras at these locations allow the governing agency to monitor traffic signal performance during periods where traffic is seeking an alternative route, allowing that agency to post alerts in advance of the intersection or deploy other countermeasures if congestion becomes a problem at the traffic signal.

CCTV cameras are primarily recommended to cover the routes that serve between I-290 and North Avenue, which include:

- Austin Ave
- Harlem Ave
- 1st Ave
- 25th Ave
- Northwest Ave (I-290)
- York Rd

- IL-83

CCTV cameras are also primarily recommended at the I-355 interchange, which includes:

- Rohlwing Rd
- I-355 NB Exit/Entrance Ramp
- Swift Rd

A CCTV camera is recommended at North Ave/Cicero Ave due to the high use of either arterial, which may indirectly experience congestion due to changing traffic conditions. In the west, CCTV cameras are suggested at IL-59 and at County Farm Rd due to being prominent routes in the area.

Transit Improvements

With the presence of CTA and Pace routes, transit signal priority is recommended from York Rd to Harlem Ave. West of York Rd, no Pace routes are currently marked in the field, and no express bus service was noted during field observations.

A review of the listing of 2012-2016 CMAQ-Funded TSP Corridors on the Regional Transportation Authority Mapping and Statistics (RTAMS) website showed North Avenue from I-355 to Berteau Ave (near York Rd) as being a potential candidate for TSP at some point in the future. The recommendation made in this report against TSP west of York Rd may change depending on the installation of a new route or service, and should be re-evaluated when such an installation occurs.

Near-side bus stops are recommended for relocation to the far-side, where existing infrastructure allows.

Pedestrian Improvements

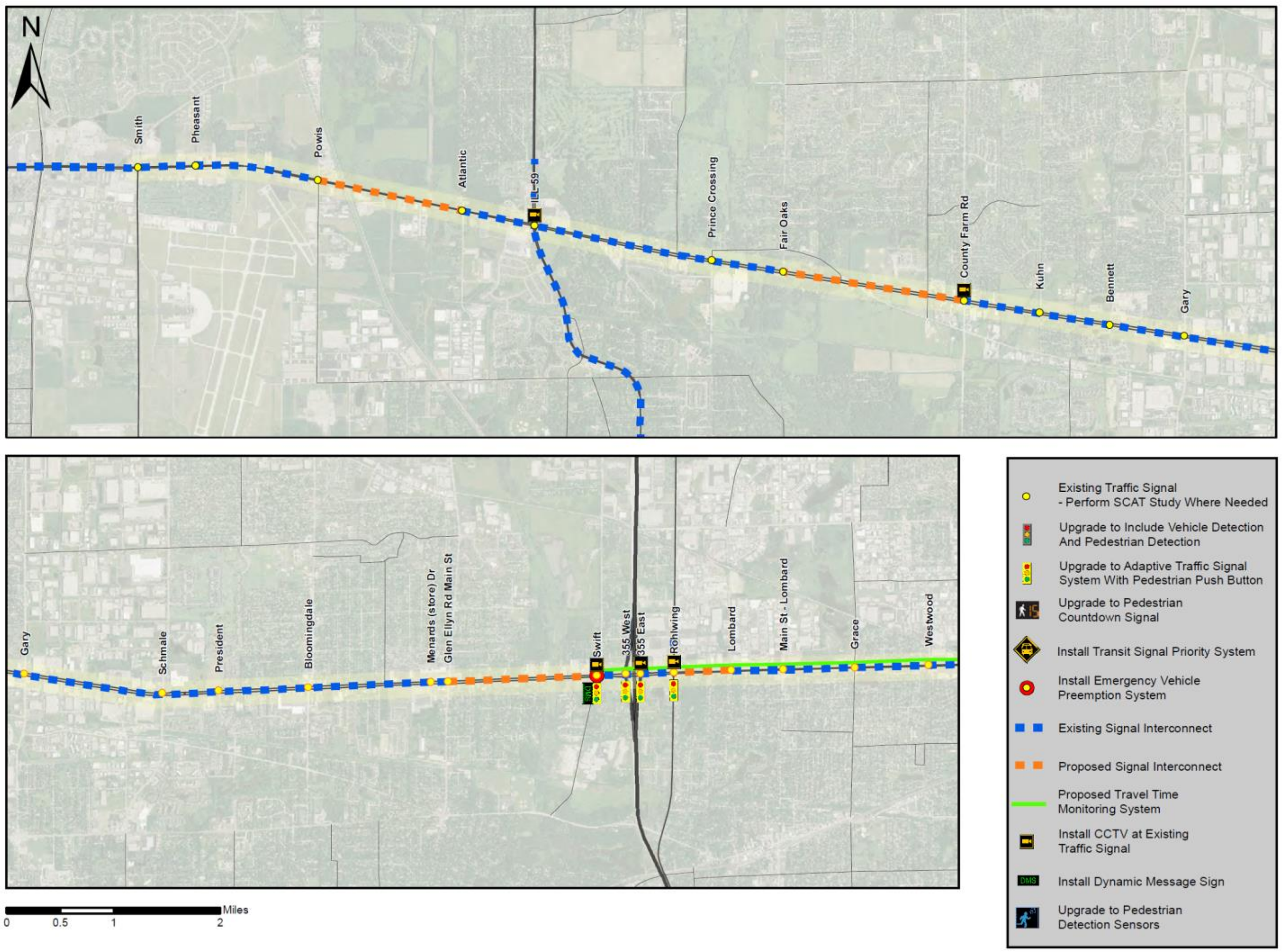
Traditional pedestrian signals (walking man/flashing hand) noted during field observations are recommended to be upgraded to the pedestrian countdown signals. At intersections where vehicle monitoring or adaptive systems are recommended, the necessary pedestrian push-buttons are included as part of the recommendation.

Two schools were identified as being adjacent to a traffic signal along North Ave (Banner Academy West in Chicago at North/Leclaire and Field Elementary School in Elmhurst at North/Melrose/Emory). Given the safety concern for school students crossing streets and the general low compliance for pedestrian push-button use, an automatic pedestrian detection system is recommended at these two locations.

The draft Smart Corridor recommendations are shown in map format on the following two pages.

Western North Avenue – Smart Corridor Recommendations

Smart Corridor Recommendations - North Ave



Eastern North Avenue – Smart Corridor Recommendations

Smart Corridor Recommendations - North Ave