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## POLICIES AND BEST PRACTICES



# POLICIES AND BEST PRACTICES

Mobilizing Tomorrow is a plan to guide the future development of the transportation system. This chapter outlines policy recommendations and best practices to move the region towards achieving the goals and performance targets outlined in this plan.

## Policy Toolkit

MPO member governments have a prime opportunity to mold the transportation network into a more robust system that offers more choices. This Chapter identifies a number of policies that the region and communities can adopt to improve the transportation system. While the MPO recognizes these policies may work differently in different communities, MPO members are encouraged to consider them and adopt them in full or part, which may streamline and thus decrease the cost of development, expand transportation choices, and mitigate environmental issues.

This chapter includes the policies related to the following topics:

- Multimodal Access
- Environmental Resiliency
- Electric Vehicles
- Parking Management
- Smart City Solutions
- Intergrated Corridor Management

## Multimodal Access

Looking to the year 2050, Greater Des Moines will experience significant demographic changes. The “graying” of the region will have implications for the transportation system, land use, and the placement of homes, businesses, and stores. Perhaps an even larger impact, though, could come from Generations X, Y, and Z — generally those under the age of 45 and who comprise nearly two-thirds of the region’s population. These generations have demonstrated different lifestyle choices and preferences than older generations. With these anticipated demographic shifts, creating a region where walking, biking, and using public transportation are as viable as driving will be imperative.

The region’s roadway network observes very low levels of congestion today, and forecasts indicate it will maintain a low level of congestion into the future. Even without roadway capacity additions, projections for the year 2050 do not show any significant deterioration in commute times or increased congestion around Greater Des Moines. Given this abundance of roadway capacity, Greater Des Moines can still grow while shifting funding priorities to those modes that increase transportation choice.

Creating a region where walking, biking, and taking public transportation are as viable as driving will be an incremental process to create a greater mix of transportation choices, including a robust transit network, an active carpool culture, multiple Transportation Demand Management programs, and land use and design that support walkability. Multiple steps are necessary to achieve this shift, as summarized in the following sections.

### Investment Policies

While the road network provides efficient commutes and creates conveniences for motorists, this oversupply of capacity hinders the further development of other transportation modes. Greater Des Moines must invest in a complete transportation system — beyond one geared towards automobiles only — if it is to become a more sustainable region. The region should:

- Invest in the rehabilitation of existing infrastructure in order to maintain regional traffic operations and to make the most of significant investments made over the past decades.
- Reprioritize transportation funding to maintain the current transportation infrastructure but also increase the availability of funding that can be used to improve the transit, pedestrian, and bicycle networks. Applying transportation funds across the whole system will allow travelers the option of using multiple modes. This gives drivers additional options for getting around and gives non-drivers a feasible way to move through the region. The goal of reprioritizing transportation funding is to ensure that travel times in the region remain at or near current levels and population growth doesn’t lead to increased traffic.

### Land Use/Transportation Coordination

The region can place new emphasis on walking, biking, and public transportation such that they become more viable options. Transportation and land use directly affect one another; the placement of a roadway has implications for the adjacent land uses and vice versa. The same is true for other modes, including public transportation, biking, and walking. As we move toward 2050, we have the opportunity to take advantage of this relationship.

Pedestrians who can walk to different land uses, such as retail establishments, parks, and community facilities, in under 10 minutes are more likely to visit those places. Placing daily goods and services, as well as recreational destinations, within walking distance of residences increases the incentives for residents to avoid using their cars, thereby reducing traffic and wear-and-tear on the roads.

Matching transit service with where people live and work is the best way to maximize access and to operate a system most efficiently. This not only results in a better transportation system, but also is more supportive of affordable housing policies and can strengthen economic development. It is also important that the transit stops are accessible by bicycle and by foot. In both the short- and long-term, the geography of future development across the region should align with the region's transit routes, and it should be linked to the bicycle and pedestrian networks. To accomplish these aims, Greater Des Moines should:

- Promote employment and residential infrastructure along transit corridors to ensure a critical mass of riders.
- Increase transit service as density increases.
- Reduce municipal parking requirements as transit service schedules increase.
- Promote regional equity through increased access to public transportation and multimodal options in neighborhoods where automobile ownership is at reduced levels.
- Promote the use of shorter block lengths in new developments, resulting in a fine-grained street network that features more intersections.
- Minimize the use of cul-de-sacs in order to maximize connectivity.
- Implement the Nodes + Corridors initiative as outlined in The Tomorrow Plan.
- Coordinate the location and availability of affordable housing with public transportation services.

## Freight and Goods Movement

The freight and goods movement network within Greater Des Moines should be safe, reliable, and efficient. Freight is critical to the success of the economy of Greater Des Moines and of the State of Iowa. Greater Des Moines sits at a crossroads of North American freight traffic through the intersection of Interstates 80 and 35. Providing the freight industry with a safe, reliable, and efficient freight network can keep Greater Des Moines on a path of economic viability. To achieve these aims, Greater Des Moines should:

- Promote air, rail, and truck freight options, and explore the development of an inland port where goods can transfer among modes.
- Work with the freight industry to reduce regional impediments to freight and goods movement.
- Maximize the efficiency of goods movement in Greater Des Moines.
- Identify opportunities to expand the goods movement system.

## Bicycle and Pedestrian System

Not only are walking, biking, and using public transportation key to increase the mobility of residents, they are central to furthering health and well-being. Every walk or bike ride is a chance for exercise and social interaction, which create a healthy and welcoming community. Additionally, walking and biking require little space for each person engaged in those activities; the more people who walk and bike, the more space can be dedicated to other uses chosen by each community. People who use wheelchairs also benefit from increased pedestrian facilities when designed to Americans with Disabilities Act (ADA) standards. The region should build upon its existing bicycle and

pedestrian networks to enhance multimodal transportation options. Linking these networks with public transit will also ensure that these facilities serve as viable commuting options in addition to being recreation outlets

## Pedestrian Facilities and Policies

Every trip starts and ends as a pedestrian trip. As a result, improvements to the pedestrian experience benefit everyone. Additionally, no forms of travel are healthier than walking and bicycling. Providing all residents with the option of walking and biking is at the heart of supporting the region's health and wellbeing. To do so requires safe, comfortable environments with all users in mind. The following six fundamental pedestrian conditions should be provided, especially in mixed-use districts, around schools, and at connections to transit. It should be noted that these conditions benefit cyclists and users of other transportation modes as well.

- **Safety:** Pedestrians are well protected from road hazards such as vehicles.
- **Security:** Pedestrians are not susceptible to real or perceived robberies or other crimes.
- **Directness:** Pedestrian paths minimize distances traveled. People will always find the most direct route anyway, regardless of where a path leads.
- **Ease of Entry:** Walking is not onerous, so steep inclines and staircases are avoided.
- **Comfort:** Paths provide high quality space appropriate to the location and destinations.
- **Aesthetics:** Environments are pleasing to the eye and inspire a person to walk to the next corner.

The following steps can help create a more walkable region:

- Ensure good conditions of existing sidewalks.
- Identify and complete gaps in the sidewalk system, including ensuring the presence of sidewalks on both sides of existing and future roadways.
- Plant and maintain trees and landscaping to provide a more aesthetically pleasing and shaded walking experience.
- Build wide sidewalks in areas of high pedestrian activity.
- Improve street crossings near schools and commercial areas.
- Enforce right-of-way priority and motorist travel speeds in high pedestrian volume areas.
- Review pedestrian planning procedures, particularly concerning construction of sidewalks in new residential and commercial developments.
- Provide land use opportunities that allow people to be within walking distance of commercial and retail activity destinations.
- Improve pedestrian accessibility at and to transit facilities.
- Implement traffic calming methods to create pedestrian-friendly corridors.
- Improve intersection traffic signalization and crossing times for all users, including persons with disabilities, children, and the elderly.
- Install street furniture to create a more inviting pedestrian environment.

- Work with DART to ensure that transit stops are more accessible to pedestrians.

## Bicycle Facilities and Policies

Greater Des Moines has already made significant investments in its local and regional trail network which is enjoyed by many. However, this system is largely directed toward recreational riding. The ability to use a bicycle for commuting or other non-recreational purposes can still be difficult for many. Bicyclists can be grouped into four main categories of different comfort levels (corresponding percentage of riders falling into these categories shown in parentheses)<sup>1</sup> :

1. **Strong and Fearless:** People willing to bicycle with limited or no bicycle-specific infrastructure (7%)
2. **Enthused and Confident:** People willing to bicycle if some bicycle-specific infrastructure is available (5%)
3. **Interested but Concerned:** People willing to bicycle if high-quality bicycle infrastructure is available (51%)
4. **No Way, No How:** People unwilling to bicycle regardless of infrastructure availability (37%)

The following steps can help create more bike facilities and accommodate the majority of cyclists for whom the availability of bicycle-specific infrastructure is important:

- Conduct an analysis of what types of bicycle facilities are appropriate on roadways throughout the region.
- Reconfigure roads to allow all bicyclists to ride comfortably and safely, including the addition of side paths, shared lanes, bike lanes, or cycle tracks, as appropriate, throughout the region.
- Install more short- and long-term bicycle parking facilities.
- Provide clearly defined, safe, comfortable, and accessible bicycle commuter routes.
- Provide bicycle commuter amenities such as parking, showers, dressing rooms, and other end-of-trip facilities.
- Establish short- and long-term bicycle parking facilities near bus stops.
- Encourage the presence of paved shoulders on rural roadways.
- Locate directional and informational signage along trails, as lane markings, and adjacent to roads.
- Implement traffic calming methods to create bicycle-friendly corridors.
- Complete identified gaps in the regional trail system.
- Adopt a uniform bicycle ordinance throughout the region to provide consistent regulations across multiple jurisdictions.

<sup>1</sup> Jennifer Dill and Nathan McNeil, "Four Types of Cyclists? Examination of Typology for Better Understanding of Bicycling Behavior and Potential" Transportation Research Record: Journal of the Transportation Research Board, 2387: 129-138, 2013.

## Public Transit

While many of the elements discussed in this section related to transportation/land use coordination as well as the bicycle and pedestrian system will also support public transportation, additional transit-specific efforts also can help bolster the public transportation system.

### Ease of Use

Riding transit should be easy for everyone to use. Schedules and maps should be available at all stops, online, via phone, and in hard copy at prominent locations like libraries. Employers, residential brokers, and building managers/superintendents should provide schedules and maps to new employees and new residents. Material should be available in all of the major languages spoken in the region. Anyone who moves to Greater Des Moines should be able to understand the system.

Efforts already have been made by DART to make transit use easier through the development of a smartphone application that can be used for fare payments and trip planning, as well as through initiatives such as the Unlimited Access Program. DART is also exploring partnerships with other transportation services such as Transportation Network Companies (TNC) like Uber. Continuing to explore opportunities such as these will lead to increased service coverage, operating hours, and ultimately ridership.

### Transit Infrastructure and Amenities

Bus stops that are easy to find and use are critical to passengers getting on and off the vehicle. Adequate pedestrian accessibility and enhanced passenger amenities at bus stops are critical to attracting people to transit. Provision of stop infrastructure is frequently tied to the number of riders who board and alight at each stop. The greater the number of riders, current or planned, the greater the capital investment.

All stops should have:

- A level concrete pad
- Reliable pedestrian access
- Adequate lighting for safe and comfortable night use
- Route and schedule information

Stops with a medium number of boardings (including transfers) should have:

- Bus shelter with bench
- System map
- Trash receptacles

Stops with a high number of boardings (including transfers) should also have:

- “Super stop” shelter
- Real time travel information

These amenities support transit service by making the bus riding experience comfortable and convenient. As described in TCRP Report 46: The Role of Transit Amenities and Vehicle Characteristics in Building Transit Ridership, provision of certain physical amenities will draw more riders.

Another important component of bus stops consists of safety and security measures, which increase transit effectiveness. Safety and security requires transit operators to provide a predominantly controlled environment so riders perceive that the agency is protecting them. In addition, it also requires emergency planning for when uncontrolled events occur, so that responses are planned and procedures are in place to answer unforeseen incidents. These preparations provide riders with both an actual and perceived safe environment, preventing public concerns that would limit the effectiveness of the transit system.

Providing a safe and secure environment requires a combination of design features, response plans, evaluation of public perception, and coordination between the multiple transit services and levels of government. All stops should be well-lit and provide clear sight lines with no blind spots. Placement of stops in view of active uses is recommended. Wherever possible, stations and stops should be accompanied by clearly marked crosswalks and traffic control devices to provide a safe, controlled roadway crossing.

### **Stop Location**

Transit stops may be placed at intersections or mid-block. Connecting bus routes, significant trip generators, and the urban form of the destination will all impact the locations of stops.

On urban streets where traffic is intended to travel 35 mph or less, buses should stop in the travel lane rather than pull out of traffic, since pulling out results in bus delay and merge conflicts as the bus re-enters the travel lane. Wherever on-street parking is present, use a curb extension to delineate bus stop spaces.

There are three choices for location of bus stops: near-side, far-side, and midblock. Near-side stops are located on the approaching side of an intersection in relation to the direction of travel. Far-side stops are located on the departing side. Midblock stops are not close enough to an intersection to be affected by the intersection. Far-side stops are generally more desirable than near-side stops from the perspective of the pedestrian and motor vehicle operators, but near-side stops can be successfully designed to adequately accommodate pedestrians. Bus stop locations are not limited to only one correct placement; multiple options may work for any individual placement.

## **Shared Micromobility**

Shared micromobility<sup>2</sup> is an emerging topic in the world of multimodal transportation. Around 84 million trips were taken on shared bikes and scooters across the United States in 2018. This was almost twice as many trips as the previous year. Electric scooters, docked and dockless shared bikes, and other vehicle types appear to be shrinking the physical footprint needed to move people over relatively short distances. Collectively dubbed as micromobility, these services have resonated with consumers, as indicated by their rapid adoption over just the last year. Communities across the nation are focusing their attention and preparing to manage and regulate shared micromobility systems in different ways in order to achieve the best public outcomes. E-scooters, in particular, pose unique challenges and opportunities as a new vehicle type, with emerging regulatory standards.

### **What is shared micromobility?**

These include shared-use fleets of small, fully or partially human-powered vehicles such as bikes, e-bikes and e-scooters. These vehicles are generally rented through a mobile app or kiosk, are picked up and dropped off in the public right-of-way, and are meant for short point-to-point trips.

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<sup>2</sup> NACTO Guidelines for Regulating Shared Micromobility, Version 2, September 2019



Bikes

Credit: Tony Webster



E-Bikes

Credit: City of Orlando



E-Scooters

Credit: NACTO

### Benefits of a Shared Micromobility Program

When implemented well, a shared micromobility program can provide several benefits to a community:

- Enhances a community's multimodal transportation options
- Improves congestion and reduces greenhouse gas emissions by reducing short, single occupancy vehicle trips
- Complements public transportation/bridges the first mile last mile gap
- Provides a cheaper alternative to driving
- Reduces per capita carbon footprint

### Options for Regulation

Local governments have the authority and responsibility to protect public health, safety, and welfare, and ensure safe passage on and govern commerce in the public right-of-way. To date, cities have taken varied approaches to managing shared micromobility on their streets and have chosen to exercise their authority in different ways. While cities typically use competitive bidding processes and requests for proposals to manage station-based bike share systems, most cities have started using short-term pilots and time-limited permits to explore options for shared bikes and e-scooters in their city in a controlled manner. Such programs have enabled cities to be proactive in addressing their concerns and to implement something that works for their community.

### Shared Micromobility Challenges and Opportunities

**Public Safety:** Each time a new mode is introduced within the public realm, it is important to ensure that they operate well and do not pose safety issues to themselves and other travelling public. E-bikes, scooters, and other micromobility modes are no exception. This is particularly true for e-scooters since they are fairly new and unfamiliar to most people. Communities looking at implementing a shared micromobility program should clearly lay out regulations and requirements that address the safety of all roadway users. Developing clear guidelines for vendors and users upfront will go a long way in the success and sustainability of shared micromobility programs. Additionally, investment of resources toward the program including adequate funding and dedicated staff are all critical to developing a robust safety element within such a program.

**Infrastructure Deficiencies:** To fully realize the potential of shared micromobility, cities must redesign their streets so that everyone has a safe, low-stress network of places to ride. Poor or inadequate infrastructure leads to increased injuries and fatalities. In places without clearly marked, safe places to ride, riders often report feeling safer riding on the sidewalk even though sidewalk riding is often illegal. Cities must build out bike lane networks that encourage and protect riders. They must also decide where in the right-of-way shared micromobility vehicles should be parked and what locking requirements are appropriate for their city. Working with companies, cities must develop ways to clearly articulate information to the public about where to ride and park to ensure that shared micromobility vehicles do not impede people using the sidewalk, especially people with disabilities. Finally, cities and companies must determine how to clearly identify and communicate to the public the places where riding shared micromobility vehicles is restricted or banned.

**Mobility Data and User Privacy:** Cities need access to the data generated by shared micromobility and other mobility service providers. This information ensures that city governments can effectively regulate and make informed decisions about what is happening on the public right-of-way and how it might impact safety, health, equity, environmental outcomes, and the distribution of people and resources. Cities should require that operators provide trip data at a level of detail and frequency that allows them to accurately determine permit compliance, evaluate system performance and impact, and answer other planning, research, regulatory, and compliance questions. Additionally, communities should require operators to develop, implement, and share a privacy policy that complies with relevant state and federal laws and acts.

## Complete Streets

A way for local governments to begin incorporating many of the policies and strategies identified in this section is through Complete Street policies, complemented by roadway design standards. Complete Streets are roadways designed to safely and comfortably accommodate all users, of all ages and abilities, including but not limited to motorists, cyclists, pedestrians, transit users, school bus riders, delivery and service personnel, freight haulers, and emergency responders. Complete streets have been implemented around the globe and result in safer streets with better multimodal access to the places we live, work, learn, and play.

Building complete streets provides many benefits to residents, business owners, developers, and the community as a whole. First and foremost, embracing the complete streets concept will help create balanced transportation systems by providing accessible, safe, and efficient connections between destinations. It will bolster economic growth and stability while increasing property values. It will enhance job growth, improve safety, improve public health and fitness, reduce harmful emissions, and reduce the overall demand on our roadways by allowing people to replace motor vehicle trips with active transportation options. Secondly, integrating sidewalks, bike facilities, transit amenities, and safe crossings into the initial design of a project spares the expense and complications of retrofits implemented at a later date. Thirdly, proactively planning for a multimodal transportation system can promote its integration with land use policies to encourage sustainable development.

A proposed Complete Street Policy, as well as recommended street design criteria, can be found in **Appendix A**.

### Education

Realizing a more accessible, multimodal transportation system requires change, not only to the physical transportation system and policies, but also to attitudes and practices of planners, engineers, elected officials, and the public. The following are recommended to help ease the implementation of the various strategies and policies outlined in this section:

- Adopt nationally-accepted standards on bicycle and pedestrian facilities.
- Encourage the development of municipal-level bicycle and pedestrian plans.

- Implement a public education and marketing campaign to increase understanding and awareness related to a multimodal transportation system and to increase the knowledge of the relationship between the built environment and health and well-being.
- Offer a share-the-road educational series as part of a larger marketing campaign.
- Implement procedures at the municipal level that consider the needs of and impacts to all transportation modes when developing comprehensive plans and zoning regulations and also when reviewing plats, site plans, rezoning requests, building proposals, and similar efforts common in the development process.

## **Prepare for Change**

Mobilizing Tomorrow looks 30 years into the future. Much can change in that time. We are potentially at the cusp of major transportation shifts — in terms of what the system looks like and how it is powered. The Greater Des Moines region must be able to adapt to these changes by tracking shifts in technology and related trends and by forming teams to address future infrastructure needs. Local governments and transportation providers are encouraged to experiment with changes to the transportation system and roadway design through short-term, pop-up mobility tests as well as longer-term pilot projects that support enhanced multimodal opportunities.

## Environmental Resiliency

### Floodplain Management

Greater Des Moines has seen significant damage from floods. The adoption of a floodplain management policy can help the region prepare for more extreme weather events that cause flooding and increase water flow along creeks and rivers. Floodplains provide beneficial natural functions essential for water resources, wildlife habitat, and human interaction. Some of these functions include temporarily storing flood waters; filtering sediments and nutrients to improve water quality; recharging the groundwater supply; supporting natural vegetation that reduces soil erosion; and, providing fish and wildlife habitat. A floodplain management policy should consider and protect these functions.

No Adverse Impact (NAI) Floodplain Management is an approach that ensures the actions of any community or property owner, public or private, do not adversely impact the property and rights of others while protecting natural and beneficial functions of floodplains. An adverse impact can be measured by an increase in flood stages, flood velocity, flows, the potential for erosion and sedimentation, degradation of water quality, or increased cost of public services. NAI promotes responsible floodplain development through community-based decision making. Principles of NAI include:

- Prevent the worsening of flooding and increase flood peaks / stages
- Avoid diverting flood waters onto other properties
- Prevent reducing the size of natural channel and overbank conveyance areas
- Prevent altered water velocities
- Prevent increased erosion and sedimentation
- Prevent filling in floodplain storage areas
- Reduce the community's liability

Implementing NAI principles when planning roads can result in cost savings over time due to reduced infrastructure damage. The MPO encourages local community to integrate NAI principles in the development of the community's transportation system and comprehensive plan in order to manage development that identifies acceptable levels of impact, specifies appropriate measures to mitigate adverse impacts, and establishes a plan for implementation.

### Green Infrastructure Introduction

Local governments from across the county face serious challenges in managing urban stormwater. Aging infrastructure, changes in precipitation patterns, watershed development, and impervious surfaces such as roadways and parking lots cause urban flooding that pollutes water ways. will exacerbate these flood risks in many places, like the Des Moines Metro due to more intense storms that could overwhelm existing infrastructure systems. If we fail to adapt these systems, severe repetitive flooding will increasingly affect community health, safety, and welfare as the consequences of flooding often impose a disproportionate toll on the most vulnerable and disadvantaged populations and communities.

Green infrastructure is an approach to water management that protects, restores, or mimics natural water cycles by retaining and treating water where it falls. Green infrastructure, unlike gray infrastructure, which is designed for the single-purpose of moving water through a sewer system, is designed to treat rainwater at the source through enhanced infiltration. It is a dynamic, multi-benefit, effective, efficient, and economical tool that has the ability to enhance community safety and quality of life at multiple scales of land area and rainfall amounts.

## Green Infrastructure Best Practices for Transportation Systems

The following is a summary of the best stormwater management practices that can be scaled to any transportation system or built environment. Any community could mix and match a patchwork matrix of these across their public land. Doing so would lead to better management of stormwater.

### Bioswales & Biocells

Bioswales are a type of stormwater retention that use an open-channel shape and vegetation to slow runoff and filter pollutants, reducing strain on stormwater infrastructure and improving water quality. Often integrated into streetscapes or used to convey stormwater away from critical infrastructure, bioswales can also reduce the need for gray stormwater systems to be installed by capturing and storing some of the stormwater. Bioswales can also reduce temperatures, increase habitat for urban wildlife, and improve air quality. As an added benefit, they are often aesthetically pleasing and can potentially increase property values.

### Constructed Wetlands

A constructed wetland is an artificial wetland built to treat stormwater from primarily agricultural drainage systems but is also developed for urban runoff scenarios. According to the Natural Resource Conservation Service, “the constructed wetland system is designed to reduce nutrient and sediment loading and provide other water quality benefits while providing wildlife habitat.” This type of installation would be best for larger scale project as the ecological function typically can handle large amounts of water to filter through and eventually leave the system.

### Permeable Pavers

Permeable pavements have spaces for air and water to pass through; the spaces allow water to infiltrate into the ground, reducing runoff. Asphalt and concrete can both be made porous by omitting the smaller aggregates that are usual components. More specialized forms of porous pavements include interlocking concrete pavers, in which water drains through the gaps between precast blocks, and grass or gravel pavers, in which fill materials are laid on top of a plastic grid. Permeable pavements also have cooling properties due to evaporation and reduced heat storage. Permeable pavements are appropriate for sidewalks, parking lots, alleys, and streets. Some concerns about whether permeable pavements are appropriate for cold climates or high-traffic areas are being monitored and evaluated in cities like Chicago and Washington, D.C., with positive results to date.

### Tree Boxes & Trenches

The value of trees in communities is immeasurable. Trees provide shade on a hot summer’s day. They clean the air and provide habitat and food for wildlife and they play an important role in managing urban stormwater. Trees are mini-reservoirs for rain and reduce urban stormwater runoff at the source by:

- Intercepting rain on leaf canopies and evapotranspiring moisture back into the air
- Increasing infiltration and uptake of rainwater through the tree’s root system
- Uptake of nutrients such as nitrogen and phosphorus
- Reducing soil erosion by slowing rainfall before it strikes the soil

Tree boxes are containment systems like small bioretention cells that include trees as vegetation. They include an engineered soil mix, underdrain, over flow and are usually tied to the storm sewer system or connected in a stormwater treatment to other stormwater BMPs. There are specific tree species that thrive in these systems.

Tree trenches are typically elongated surface systems in sidewalk areas that consist of engineered soils placed within

a plastic network of support that can be placed beneath permeable pavers. The tree roots have a large subsurface area to expand rather than be confined in a very small containment system.

## **Rain Gardens**

Rain gardens are small gardens that are designed to survive extremes in precipitation and help retain or reduce stormwater runoff through infiltration or storage. The gardens are often small and placed strategically in areas where stormwater currently overwhelms drainage capacity. They can be incorporated as part of general landscape design or as part of a larger streetscape. In addition to managing stormwater and reducing nutrient pollution, rain gardens can also reduce temperatures, provide wildlife habitat, and improve aesthetics. Rain gardens can be installed in many different areas and do not need to take up much space, including street curb cuts like this example from Anoka County, Minnesota.

## **Green Streets, Alleys, and Parking Lots**

Green streets, alleys, and parking lots can combine all of the above strategies into a coherent package. By combining the strategies, green streets can provide multiple benefits, including runoff and pollutant reduction, air quality improvement, and urban heat island mitigation. Local governments primarily install green streets in the public right-of-way, but green alleys and parking lots can be installed on both public and private land. For all three, a critical element can be to minimize pavement in the first place.

## **Green Infrastructure Policies**

### **Stormwater Management Plans**

A stormwater management plan is a comprehensive long-term plan that integrates stormwater management within a community's broader plans for economic development, infrastructure investment and environmental compliance. Through this approach, communities can prioritize actions related to stormwater management as part of capital improvement plans, integrated plans, master plans or other planning efforts. Early and effective stormwater planning and management by communities as they develop will provide significant long-term cost savings while supporting resilience, economic growth and quality of life.

The U.S. Environmental Protection Agency (US EPA) has a guide for any city seeking to create a Stormwater Management Plan.

### **Stormwater Management Ordinances**

As development of land occurs, the importance of managing stormwater is increasingly apparent. Stormwater discharges can be responsible for water quality degradation, flooding, and stream channel erosion. Approaches to the management of these problems have been piecemeal at the state and local level, ranging from trying to prevent development to extrapolating stormwater management authority based on existing subdivision, zoning, flood control, and/or erosion control ordinances. These approaches have been largely inadequate for two reasons. First, ordinances for other purposes are not easily adapted. Second, enforcement has been difficult because the courts have been reluctant to rule in favor of ambiguous regulatory authority and against well-established private property rights. This strongly suggests the need for local stormwater ordinances.

The components of stormwater management ordinances fall into four major categories: legal authority and context, technical basis, administrative apparatus, and enforcement provisions. The ordinances also generally address both

stormwater quality and quantity. However, there are differences in the way a stormwater management ordinance should be written to emphasize water quality. USEPA and Iowa Stormwater Education Partnership have a set of guidelines and model ordinances available to create an effective stormwater management ordinance for either focus.

### **Cost-Share Programs**

Green infrastructure projects are not only for public lands. Homeowners and businesses can help to reduce stormwater runoff and improve water quality through the use of best management practices on their own property. Since green infrastructure is scalable and dynamic, implementing best practices can be specialized, placed, and sized to accommodate the needs of any property or any neighborhood to address specific issues.

A local cost-share program can help reduce the cost burden of installing green infrastructure on private lands. Just like the practices they promote, a cost-share program can be scaled to the community's stormwater needs and funds allotted for such a program. Many Des Moines area communities have cost-share programs in place for stormwater best practices. They range from aiding in the purchase of rain barrels up to \$75 to providing funds for projects up to \$4,000, and they also range in practices that are covered. Some communities target neighborhoods with extensive stormwater infrastructure expansion needs and are provided specialty cost-share programs where the specific practices are promoted and the community takes on the whole cost of installation.

In addition to the list of best practices, rainwater harvesting and soil quality restoration are a affordable and great gateway practice to introduce property owners to the amount of water their property takes on during a rain event and the capacity of water storage turf can hold. If property owners are willing to take a step forward to more intense practices towards native landscaping, rain gardens, and permaculture. In any case, a community can aid property owners to manage water on their lands through this simple and efficient program.

### **Watershed Management Authorities and Plans**

In 2010, Iowa lawmakers passed legislation authorizing the creation of Watershed Management Authorities. A Watershed Management Authority (WMA) is a mechanism for cities, counties, soil and water conservation districts (SWCDs) and stakeholders to cooperatively engage in watershed planning and management.

In Iowa a watershed management authority is formed by a Chapter 28E Agreement by two or more eligible political subdivisions within a specific eight-digit hydrologic unit code watershed. A board of directors governs the WMA, which may undertake the following activities:

- Assess and reduce flood risk;
- Assess and improve water quality;
- Monitor federal flood risk planning and activities;
- Educate residents of the watershed regarding flood risks and water quality; and
- Allocate moneys made available to the Authority for purposes of water quality and flood mitigation.

A WMA does not have taxing authority and may not acquire property through eminent domain.

Currently there are 26 watershed management authorities in the state of Iowa, six of which are located in the Des Moines Area MPO planning area. Of the 26 statewide, nearly a dozen have approved active watershed management plans. Three of these approved and active plan are within the Des Moines Area MPO planning area.

A Watershed Management Plan is an important tool for any group looking to improve their local lake, river or stream. Put simply, a Watershed Management Plan identifies water quality problems in a watershed, proposes

solutions, and creates a strategy for putting those solutions in action. Watershed Management Plans take a long-term, comprehensive approach, which has proven to be successful in a number of watersheds.

### **Climate Action & Resilience Plans**

A Climate Action & Resilience Plan provides evidenced-based measures to reduce greenhouse gas emissions and preventative measures to address the negative outcomes of extreme weather events. This type of plan demonstrates how a community or region will adapt and improve its resilience to climate hazards that impact today, as well as risks that may increase in the coming years.

Developing a Climate Action & Resilience Plan allows a community to develop strategies that will not only help minimize its carbon footprint but can help save money and improve the quality of life of residents. Co-benefits associated with climate action planning include decreased traffic and congestion, improved air quality, better access to parks and green spaces, and cost savings through energy efficiency projects.

Green infrastructure is a critical piece to any climate action plan developed in Iowa due to the pattern of intensifying precipitation events and droughts due to extreme weather events. Dubuque Iowa has the most prominent and effective climate action and resilience plan in the state of Iowa. The many strengths of this plan and lessons learned from the process should be taken into consideration by any city or region that plans to create and adopt their own.

## **Electric Vehicles**

### **Electric Vehicle Readiness**

The future of transportation is in a fundamental shift to cleaner, more efficient fuels. Energy consumption affects air quality and impacts global climate as a result of emissions. The Tomorrow Plan recommended a strategy of promoting the use of renewable energy and reduced energy consumption. One of the more efficient and sustainable fuels is that of electric drive systems. Des Moines area cities and counties can play a critical role in promoting strategies to decrease transportation related greenhouse gas emissions through the deployment of both public and private charging infrastructure. It is important to acknowledge that increasing electric vehicle usage will have an impact on Road Use Tax Fund revenues. Given this, the MPO will continue to monitor the evolution of electric vehicle technology and its impact on transportation funding and policies.

## **Parking Management**

### **Parking Management**

The provision and management of parking play an enormous role in the look and feel of streets, traveler mode choice, and congestion levels. Parking spaces are a valuable commodity; like any commodity, they are subject to the laws of supply and demand. Typically, however, parking has been supplied without much thought to actual demand — or demand for any form of parking other than free parking — resulting in swathes of real estate being reduced to asphalt that sits largely empty for much of the day.

The concept of parking management starts from the understanding that the conventional approach has resulted in too much asphalt and distorted transportation markets, which make it almost impossible to run efficient transit systems or to simply walk or ride a bike safely across much of the country. This approach must be shifted to strategies that acknowledge the true costs of accommodating driving at the expense of alternate modes.

On-street parking and municipal parking lots and garages typically represent just a small portion of the overall supply of parking in any community. These spaces, however, tend to have an outsized impact on travel behavior and traffic impacts. These spaces are usually found downtown, or in other significant commercial centers, and tend to include

the most popular parking options in these areas. This is particularly true of on-street spaces, which, more often than not, include the space that is closest to the front door of any given driver's destination. The following overarching principles should guide parking policy and implementation.

- Manage supply as a comprehensive system. On-street, off-street, public, and private resources should be managed collectively. Standardizing pricing and payment mechanisms makes the system easier to understand for the user.
- Share parking. Most parking is sized to cater to a single use or business, resulting in oversized lots. The customer wants to be assured of a parking space; whether that space is in front of the destination or 50 feet to one side in front of a different retailer makes no difference. In mixed-use areas, different land uses have different peak periods; thus, shared parking accommodates peaks for both uses.
- Use parking as a tool to manage congestion. Each parking space encourages at least one trip on the region's roads; thus, managing parking is a powerful way of controlling congestion.
- Incorporate good design. Zoning codes can include design standards for parking facilities to reduce parking garage blank walls and large parking lots in front of buildings, and to increase pedestrian access. Environmental innovations such as porous pavements can also be incorporated.

Parking management is not a one-size-fits-all technique. Strategies for suburban areas do not work in downtowns and vice versa. Rather than applying suburban parking requirements on mixed-use places, let the strengths and weaknesses of a location determine its parking supply. For instance, people are attracted to downtown mixed-use areas precisely because the streets are walkable and blocks compact; building parking lots in these places ruin their character.

## Smart City Solutions

### Introduction

As cities and metropolitan regions grow, their transportation systems become more complex and challenging. Conventional transportation planning has resulted in disparate modes of travel and sprawling urban environments that have not been conducive to meeting the lifestyles and expectations of twenty-first century citizens. Smart Cities seek to integrate information-communication technologies (ICT) with the built environment to deliver enhancements to current urban systems and services, such as increased public safety, greater efficiency, more engaged community participation, and better-informed public decision making. As a more focused component of the Smart Cities movement, Intelligent Transportation Systems (ITS) incorporate ICT into transportation infrastructure and vehicles to improve the safety, accessibility, mobility, and sustainability of urban areas.

Smart Cities and ITS require a robust ICT infrastructure to operate effectively. Interconnected sensing and communication devices installed in city infrastructure such as roadways, streetlights, and traffic signals serve to connect and relay information with connected vehicles, personal devices, and traffic operations management centers. According to the American Planning Association (APA)'s "Smart Cities and Sustainability Initiative<sup>3</sup>," the transmission of data for Smart Cities operations would require not only a wireless network because of its flexibility and convenience but also a fiber network for its capacity, security, and reliability. To prepare for developing additional ITS and Smart Cities capabilities, cities in the Des Moines metro region can begin to document existing ICT infrastructure for ITS and prepare an ITS Master Plan. The City of Des Moines approved its first ITS Master Plan<sup>4</sup> for future traffic management and communication systems infrastructure in November 2018, and several surrounding communities are collaborating on an ITS Master Plan to determine the potential for shared traffic management services.

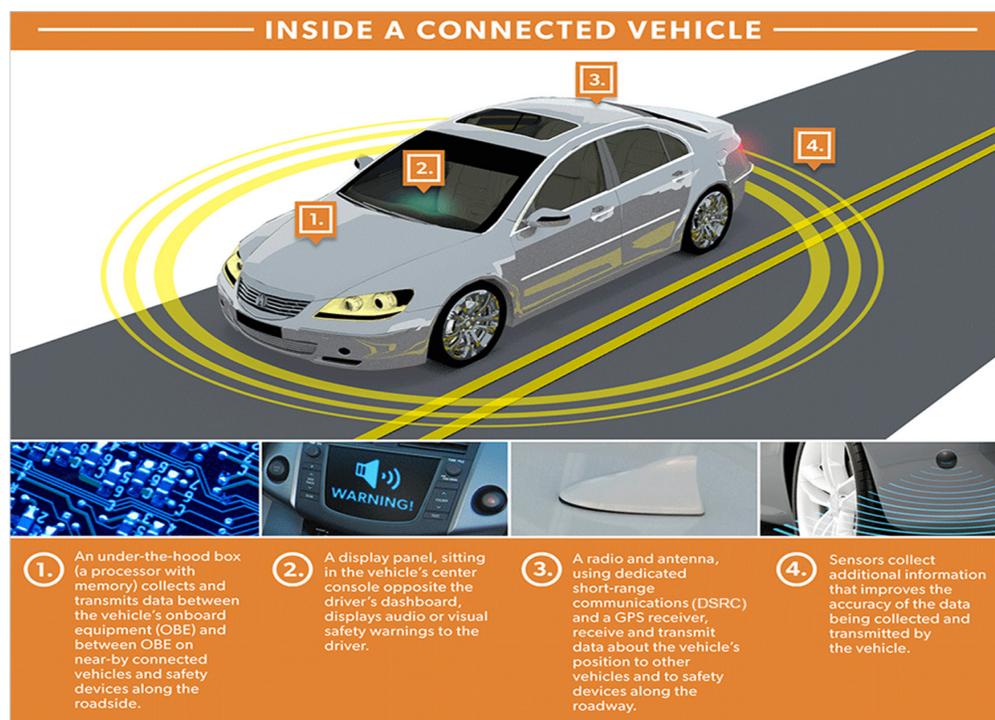
<sup>3</sup> American Planning Association. "Smart Cities and Sustainability Initiative." April 2015. [https://planning-org-uploaded-media.s3.amazonaws.com/legacy\\_resources/leadership/agendas/2015/spr/pdf/SmartCitiesSustainabilityFinal.pdf](https://planning-org-uploaded-media.s3.amazonaws.com/legacy_resources/leadership/agendas/2015/spr/pdf/SmartCitiesSustainabilityFinal.pdf).

<sup>4</sup> Iteris. "City of Des Moines ITS Master Plan: ITS Master Plan Report." June 22, 2018. [https://www.dsm.city/Final%20ITS%20Master%20Plan\\_COMBINED.pdf](https://www.dsm.city/Final%20ITS%20Master%20Plan_COMBINED.pdf).

Nationally, the Federal Highway Administration's Every Day Counts (EDC) program<sup>5</sup> identifies vetted transportation technologies and innovations that can be immediately adopted in local communities and the metro region. Strategies from the EDC program for developing ITS and Smart Cities include:

- Adaptive Signal Control Technology
- Automated Traffic Signal Performance Measures
- Data Driven Safety Analysis
- Data Driven Traffic Incident Management
- Integrated Mobile Observations and Pathfinder Implementation Plan for Road Weather Management
- Queue Management Systems and Variable Speed Limit Systems for Smarter Work Zones
- Unmanned Aerial Systems
- Crowdsourcing for Operations

As a regional entity, the MPO has noted it can explore the Regional Models of Cooperation strategies.



Source: U.S. Department of Transportation

In 2015, the U.S. Department of Transportation inaugurated the Smart City Challenge and elicited the responses of 78 applicant cities with similar transportation challenges. These cities envisioned new means of:

- providing first-mile and last-mile service for transit users to connect underserved communities to economic opportunities
- assisting freight transportation into and within urban environments

<sup>5</sup> Federal Highway Administration. Every Day Counts. <https://www.fhwa.dot.gov/innovation/everydaycounts/>.

- coordinating data collection and analysis across transportation systems
- reducing parking and payment inefficiencies
- limiting impacts of carbon emissions and optimizing traffic flow on congested roadways

The Smart City Challenge and subsequent publication, “Smart City Challenge: Lessons for Building Cities of the Future,” provide a starting point to survey the spectrum of Smart Cities efforts and to review how ICT are utilized to address transportation challenges. The MPO with the City of Des Moines has a Smart City Challenge entry submission that other communities in the metro may reference.

The large data needs of Smart Cities and ITS require a systematic, open and transparent, and regionally collaborative and cooperative approach. The Smart Cities Council presents the process on how Smart Cities utilize data through the 3 C’s and 3 P’s:

- Collecting data through sensors in infrastructure and objects or through shared data
- Communicating data through networks for working with real-time data
- Crunching data
- Presenting information for decision makers and the public
- Perfecting systems through automated adjustments and optimizations
- Predicting phenomena through analyzing historical data to make decisions and to take actions in real-time

Facing the implementation of the 3 C’s and 3 P’s are data challenges identified by the Royal Institution of Chartered Surveyors in their report, “Smart Cities: Big Data and the Built Environment: What’s Required?” These challenges that Smart Cities may face are interoperability and common standards, opening access to data, and security and privacy. In addition, other considerations should be given to addressing the energy needs behind Smart Cities and ITS technologies and ensuring that equity is maintained, especially with existing environment justice (EJ) areas. In meeting the challenges of interoperability, common standards, and open access to data, it makes little sense for cities in the Des Moines metro to work on these topics separately and create redundancies and inefficiencies in the process. As an existing regional facilitator, the MPO plans to coordinate Smart Cities and ITS projects and activities of its members. As such, the MPO recognizes the need for a systematic, open and transparent, and regionally collaborative and cooperative approach to Smart Cities and ITS.

Smart Cities have primarily developed independently, but the MPO seeks to move beyond the convention of isolated Smart Cities. The MPO envisions the development of a Smart Region where the technologies and innovations of Smart Cities and ITS not only serve the transportation system of one community but improve the entire region’s associated systems, such as the regional environment, housing, land use, public health, and economic development. Other areas across the United States have already begun expanding their focus from Smart Cities to Smart Regions. For instance, the North Florida Transportation Planning Organization outlined its vision to become the nation’s first Smart Region in its 2017 “Smart Region Master Plan.”

It is recommended that members of the MPO pursuing Smart Cities and ITS align their projects and activities with the MPO’s existing goals within The Tomorrow Plan and the Mobilizing Tomorrow plan. Some Des Moines metropolitan area cities have already started through the goals and action items identified in their comprehensive and transportation plans. Additionally, projects and activities developing Smart Cities and ITS should assume a regional approach and incorporate the appropriate communities. Community engagement and positive public reception and

feedback are instrumental for sustaining the vitality of Smart Cities and ITS projects, as well as, igniting excitement and enthusiasm for continued activities.

There are a variety of Smart Cities opportunities for communities and the region to consider. The following provides a brief but not exhaustive list of examples:

### **Expanding Mobility Sharing Options**

Existing carshare options, such as Zipcar, and rideshare options, such as DART's RideShare program or transportation network companies (TNC) such as Uber's UberPool, could be expanded to reduce personal automobile usage, emissions, and parking needs. Aside from automobiles, other micro-mobility options, including bicycle-sharing with B-Cycle and scooter-sharing, can be expanded to provide active transportation options. These alternatives are beginning to be connected to existing mobility options, such as through DART's mobility hubs in which transit stations and shelters are located next to B-Cycle stations. The interconnection between the different transportation modes can be more seamless through developing a universal smart transportation payment system that allows for transfers between different transportation modes. For example, at existing mobility hubs, a universal system can integrate the transition from DART's bus service to B-Cycle's bike sharing. The continued electrification and automation of vehicles present future vehicle sharing prospects as well.

### **Electric Fleets and Electric Charging Infrastructure**

Existing vehicular fleets of MPO members are primarily operating from fossil-fuel sources. Alternative fuel vehicles, such as electric and hybrid fleets, are a more sustainable alternative. To assist this transition, communities can support electric charging infrastructure to encourage the increased usage of electric vehicles. Additionally, the experiences gained from installing electric charging infrastructure can spur other Smart Cities and ITS device installation projects, such as LED streetlights with sensing capacity or smart parking monitors.

### **Connected and Autonomous Vehicles**

The deployment of connected and autonomous vehicles is still in its infancy. While these technologies are still in development, MPO members have a chance to become innovators through pioneering experimentation. Current connected and autonomous vehicles should first be piloted within a confined area, such as on automated circulation routes containing healthcare, shopping, education, or first-mile/last-mile connections to airports and bus stations. Various agencies in Iowa are currently studying connected and autonomous vehicles, though their full utilization would require supporting connected infrastructure for communications.

### **Smart Parking**

Though primarily the larger cities in the metro area are faced with parking challenges, increased population growth in the region and technological developments prompt other communities to re-examine parking as they continue toward more dense developments. Devices and sensors installed in infrastructure can indicate whether a parking space is available and broadcast the information to connected vehicles. These technologies help to reduce congestion from roaming vehicles searching for parking, provide connected and autonomous vehicles the ability to locate and self-park, and ease parking demands on land-use. For example, the Des Moines International Airport installed a parking guidance system which uses ultrasound to detect available parking spaces and then updates signage to notify drivers of available parking spots. Additionally, the Iowa DOT is currently studying smart parking for freight through the Truck Parking Information Management System (TPIMS). Smart parking, especially in parking structures, may be paired in proximity with mobility hubs to provide drivers with convenient access to other transportation modes.

### **Connected Infrastructure and Improved Data-backed Trip Decisions**

Along with smart parking, other connected infrastructure can collect and relay real-time data to support and enhance trip decisions. The current movement of vehicles can be better facilitated with smart traffic signals that are connected

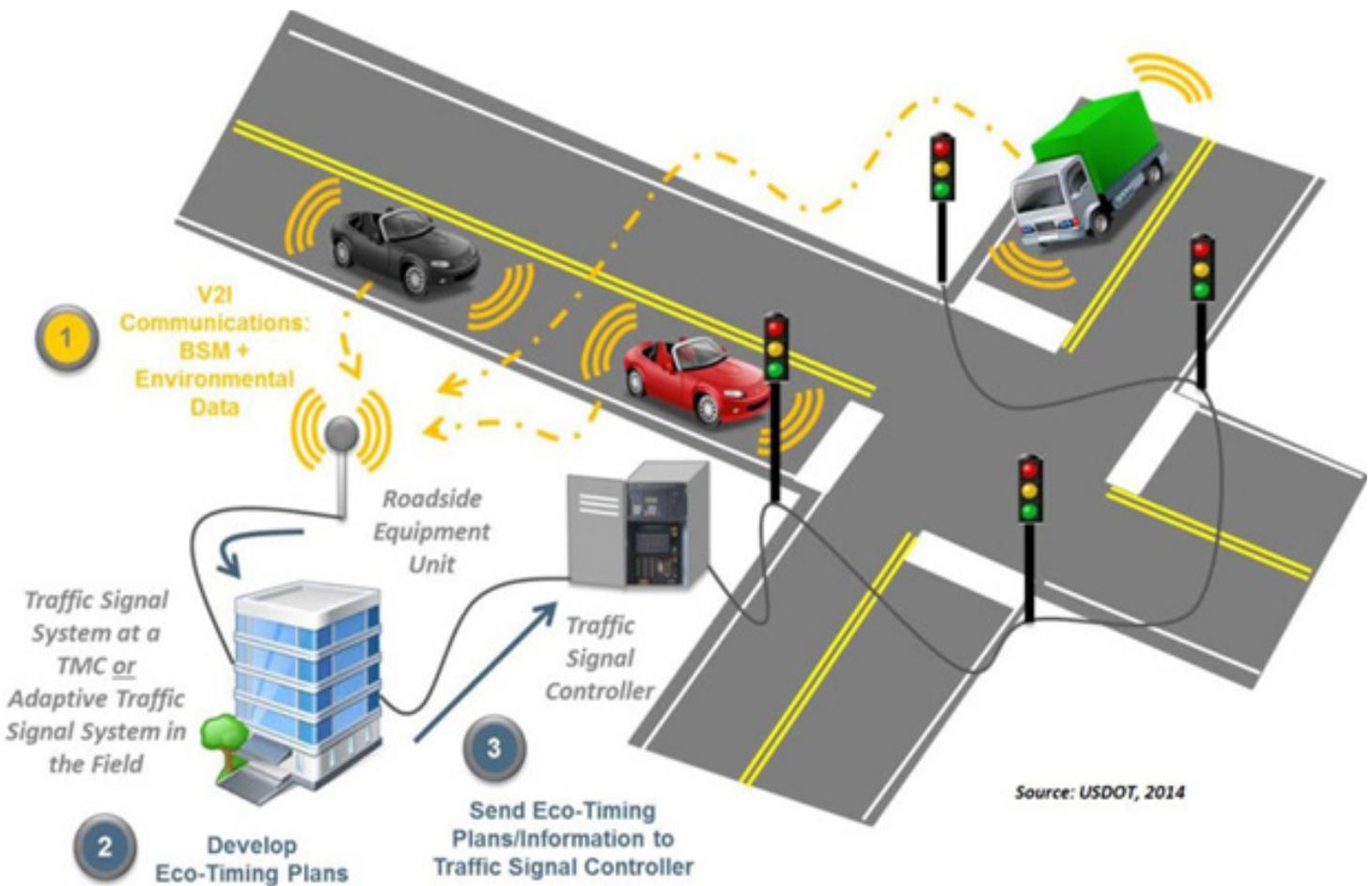
and provide performance data and responsive roadway management. Bicycle and pedestrian needs can be improved through understanding their flows with bicycle and pedestrian counters and the identification of safety improvements through crowdsourcing tools. Priority at signals can be given to freight, emergency vehicles, and public transit to improve their efficiency as well as to provide better detection and safer and longer crossing times for pedestrians, those with disabilities, or bicyclists. The City of West Des Moines has experience with adaptive traffic signal systems as well as preparing advanced traffic signal detector units for bicyclists. Other examples in the metro include:

- Des Moines' bicycle detection projects on Martin Luther King Jr. Way and Ingersoll Avenue
- Clive, Urbandale, and Windsor Heights installation of adaptive traffic signal control along Hickman Road
- Pleasant Hill upgrading to adaptive signal controls along IA 163 and Waukee upgrading to adaptive signal control with performance measures

Operations of connected infrastructure are powered on electricity and a communication network connection through wireless or fiber. MPO members can first coordinate on adopting common infrastructure and data standards before embarking on trial connected infrastructure projects. An example of such a project is the National Operations Center of Excellence's 2019 SPaT (Signal Phase and Timing) Challenge to deploy communications infrastructure and broadcasts in one corridor or network of approximately 20 signalized intersections by January 2020 to support vehicle to vehicle (V2V) and vehicle to infrastructure (V2I) traffic operations.

### **Regionally Integrated Smart Transportation**

As a potential component of a Smart Region, a regional transportation operations and communications coordination center (traffic management center) for the Des Moines metro has been suggested. In 2016, the Iowa DOT opened a statewide traffic management center in Ankeny which can lend support for a local center more focused on the specific transportation conditions within the Des Moines metro. A nearby example is the Transportation Management Center (TMC) of the Ozarks in Springfield, Missouri that has been operating with the Missouri Department of Transportation (MoDOT) for management of the signal system and Advanced Traffic Management System (ATMS) devices. A regional TMC would also support the Iowa DOT's current Integrated Corridor Management (ICM) study to integrate individually managed roadways into a coherent transportation network. Regionally integrated smart transportation management would not only improve travel efficiency but safety as well. In collaboration with the Institute for Transportation (InTrans) at Iowa State University (ISU), the Iowa DOT is developing smart work zones which communicate with the TMC in Ankeny to detect queues at work zones and to display the appropriate messages on message boards. These improvements in communications give road closure information to the general public, first responders, and public transportation to better inform their routes or detour selections.



Source: U.S. Department of Transportation

To embark on the regional Smart Cities initiative, the MPO is proposing the following action items for its member communities and for the region as we continue towards the goals of The Tomorrow Plan and the Mobilizing Tomorrow plan:

1. Coordinate with the MPO's Smart Cities Roundtable Transportation Subcommittee to identify and prioritize regional transportation challenges and corresponding Smart Cities and ITS solutions addressing regional integration for MPO funding and staffing
2. Conduct a regional inventory of ITS architecture and prepare a regional ITS plan
3. Expand existing data collection and communication capacities among communities, such as through permanent bicycle and pedestrian counters, adaptive traffic signals with automated traffic signal performance measures, or the installation of other Smart Cities and ITS data collection and communication devices
4. Establish and implement regional agreements and standards on data sharing, data privacy, and digital security to encourage communications among communities
5. Identify sustainable partnerships with businesses, technology enterprises, non-profits, academic institutions, start-ups, and other organizations

## Integrated Corridor Management

An opportunity to implement many of the concepts discussed in this chapter is through Integrated Corridor Management (ICM). The ICM concept provides a framework for coordination among various modes of transportation and jurisdictions to deliver a safer, more reliable, and more convenient transportation system for all users in a more cost-effective manner compared to adding more lanes. The ICM approach is based on proactively managing and operating the regional transportation system as an integrated network rather than individual roadways.

ICM strategies that promote integration among freeways, arterials, and transit systems can help balance traffic flow and improve performance of the entire corridor. The benefits of ICM include:

- Fewer traffic incidents, particularly ones that occur as a result of another event, also called secondary incidents.
- Reduced amount of time an incident has the potential to impact traffic, in turn increasing safety and mobility.
- More predictable travel times.
- The ability to more quickly make incident information available on traveler information sources.
- Increased or more complete information about other routes or travel options if an incident or traffic congestion does occur.
- Increased use of other routes or travel options to meet the demand of traffic.
- Reduced vehicle emissions and fuel consumption resulting from congestion.

The Iowa DOT began undertaking an ICM concept study within the MPO area in 2018. While the study will not conclude until 2020, some initial strategies have been identified. These strategies, grouped into the categories listed below, are undergoing further analysis and refinement.

- Arterial Traffic Management Strategies
- Event Management Strategies
- Freeway Traffic Management Strategies
- Infrastructure Enhancement Strategies
- Public Transportation Management Strategies
- Travel Demand Management Strategies
- Traveler Information Strategies

The MPO will continue to be involved in the Iowa DOT's ICM effort and will update this plan, as necessary, to incorporate the final strategies that result from the effort. Additional information about the ICM project can be found at <https://iowadot.gov/desmoinesicm/>.

