COMPLETE STREETS
INFRASTRUCTURE GUIDE

September 15, 2015

DES MOINES AREA
MPO
METROPOLITAN PLANNING ORGANIZATION

Using this guide

These are only some of the available solutions

This is not an exhaustive list of infrastructure out there. The important thing is an authentic process that addresses the needs of the entire community, both now and in the future. This guide is intended to kick-start the conversation and get the ideas rolling.

The goal is to shift towards safer transportation options

Take a close look at where people need and want to go. Are there safe ways to get there for people who cannot or will not drive? Is there a safe route for a child to walk or bike to school or a friend's house? Can older residents still feel independent and active? Are the current streets a barrier to the quality of life your community craves?

Not every street will have X, Y or Z

A complete streets approach does not mean that every single street must have bike lanes or bus shelters. This can actually lead to overbuilt streets that are too wide and actually more difficult for people walking or biking. Look for options that complement the needs of the street and form a cohesive network of options for the community. This may include the creation of specific priority corridors for transit, walking or biking.

Cost categorizations in this guide are based on actual project costs and estimates from US examples.

LOW COST means less than $10,000
MEDIUM COST means $10,000–30,000
HIGH COST means more than $30,000

This guide contains:

Key Concepts

Slow down traffic and reduce speeding

Nothing is more detrimental to the health and safety of our streets than drivers speeding in front of our homes, businesses and schools. It is essential to create 20-30 mph streets for commercial and residential corridors.

The built environment influences behavior

Essential to understanding complete streets is understanding that the way the street is designed actively influences people's behavior. Wide lanes, wide turn paths, large clear zones have been proven to encourage people to drive over the speed limit. People drive as fast as they feel comfortable. Changing streets changes behaviors and makes everyone more safe.

Create networks and priority streets

Every street has an inherent modal hierarchy for walking, biking, transit, driving and freight. Plan intentionally for this hierarchy with priority streets for the appropriate mode rather than trying to do everything everywhere.

Manage speed differentials

What makes walking and biking so uncomfortable is the difference in speed between them and the cars and trucks around them. If a street will have a mix of users traveling at significantly different speeds, than traffic needs to be slower to ensure the safety of everyone.

Improving walking and biking improves driving

More people walking and biking means fewer cars on the road, less congestion and a more resilient transportation network. Improving walking and biking safety can improve driving safety and reduce crashes and injuries for everyone on the road. Complete streets are for all people, not simply a fringe minority or special interest groups.

Try things

Once a leader, Greater Des Moines has since fallen behind on walking, bicycling and transit investment. If we wait until something has been tried everywhere else first, Greater Des Moines will end up building for yesterday instead of tomorrow.

Example streets

When talking about complete streets, often what comes to mind are the bigger commercial streets. While these are crucial to any network, they tend to overshadow the supporting streets around them. How do you complete a street where there's not a lot of room, or through a neighborhood, or in a small town? Here are two on-the-ground examples.

Downtown Camas, WA

This small-town main street features angled on-street parking, bump-outs, street trees, wide crosswalks, and minimal building setbacks to keep automobile speeds low and foot traffic high. These improvements have resulted in a popular main street district that draws in visitors and supports a vibrant business community of shops, services, and restaurants with welcoming cafe seating.

Neighborhood Greenway in Portland, OR

Using a combination of automobile traffic diverters, speed humps, sharrows and bump-outs, Portland has developed a network of neighborhood greenways on quieter residential streets. For effective greenways, automobile through–traffic needs to be discouraged and travel speeds kept slow to make it comfortable and safe for people walking, biking and living in the neighborhood. It also allows emergency responders to still access these intersections and neighborhoods.

Design tools

There are many design and infrastructure tools available to make streets safer and more comfortable for people. This list is not exhaustive, nor is it a prioritized guide. The list is a starting point for looking at streets as public infrastructure used by many people everyday to facilitate access and mobility beyond moving as many automobiles as fast as possible.

Raised crosswalks

What: Raised crosswalks are slightly elevated crossings intended to slow vehicle speeds where people will be crossing the street. This tool combines the visibility of traditional crosswalks with the traffic calming effect of speed tables.

Where: Raised crosswalks are effective and appropriate on local streets and rural roads that are not primary emergency response routes. Raised crosswalks are especially useful near schools, parks and senior facilities to slow traffic near children, families and the elderly.

How: Raised crosswalks are usually constructed at three to four inches above the elevation of the street. They can be used for mid-block crossings or as elevated intersections. Markings and/or signage is necessary to notify vehicles of the elevation change in the roadway.

This is a **LOW** cost tool at mid-block and a **LOW to MEDIUM** cost tool as a raised intersection.

Speed cushions

What: Speed cushions are either speed humps or tables that include wheel cutouts to allow wide-base vehicles to pass unaffected, while reducing automobile speeds.

Where: Speed cushions are best used on urban or suburban streets with closed drainage and curbs that prevent drivers from bypassing cushions on the shoulder. They are most often used on streets with a speed limit of 30 mph or less on local, and sometimes, collector streets with two lanes of traffic. They are most effective near schools, parks and in residential neighborhoods.

How: Speed cushion location should involve input from relevant emergency response and transit providers. They need signage and/or markings to notify vehicles and are typically 10–12 feet in length and rise three inches.

This is a **LOW** cost tool.

Curb extensions

What: Curb extensions come in a variety of forms, including bump-outs, gateways, chicanes and chokers. Curb extensions physically and visually narrow the street creating safer and shorter crossing for people. They also make people walking more visible before entering the roadway and can be implemented with transit bulbs and stormwater management improvements such as bioswales.

Where: Curb extensions can be used in many situations, both mid-block and at intersections. Curb extensions are especially valuable for streets with on-street parking and walkable commercial corridors. They can also act as gateways to mark the transition to a slower speed street such as a residential neighborhood.

How: Curb extensions should generally be one to two feet shorter than the parking lane. They should also be at least equal to the width of the sidewalk, but is recommended to extend to the advanced stop bar. Curb extensions can also be achieved using a combination of striping, bollards and planters, but do not provide the same level of protection.

This is a **LOW to HIGH** cost tool.

Traffic diverters

What: Traffic diverters are islands or barriers built at a residential street intersection that prevents certain through and/or turning movements for automobiles. They leave paths open for people walking and bicycling while keeping traffic volumes low on residential streets. They can be divert one or all lanes of through traffic. Diverters prevent automobiles from using neighborhood streets and bikeways as shortcuts or bypasses.

Where: Traffic diverters are suitable for residential streets or other streets where traffic volumes should be kept low. They are particularly valuable when designing a bikeway primarily along residential streets.

How: Traffic diverters can be achieved through curbs, islands, planters, bollards and other materials depending on the situation. Space and markings should direct people walking and bicycling through the diverter while directing automobiles to turn. Diverters will have the largest impact on neighborhood residents, who should be consulted on the impacts and benefits of a potential diverter.

This is a **LOW to HIGH** cost tool.

Neighborhood traffic circles

What: Traffic circles are circular islands found at the intersection of two residential streets, used to reduce vehicular speeds through the intersection.

Where: Traffic circles should be considered at residential intersections that are wide enough for vehicles to travel in a circular direction and where speeding is a persistent problem.

How: Traffic circles can be used for landscaping, so long as it does not block sight lines. Since they are primarily used to reduce speeding, avoid making generous allowances in turning radii, as this compromises the safety and traffic calming effects of the circle. Emergency response vehicles can be accommodated by providing a mountable curb on the outer portion of the traffic circle.

This is a **LOW to MEDIUM** cost tool.

Traffic signals and strategies

Coordinated signal timing	Leading pedestrian intervals	Accessible pedestrian signals	Countdown pedestrian signals
What:			
Coordinated signal timing synchronizes traffic movements and manages the progression of speed along a corridor. A "green wave" can be set where vehicles traveling at a set speed will catch a green light at each signal through the corridor.	Leading pedestrian intervals (LPI) gives pedestrians a head start into an intersection before vehicles. The WALK signal is turned on approximately three seconds before vehicles are given a green signal.	Accessible pedestrian signals (APS) are signals that provide auditory and/or vibrotactile information to pedestrians who are blind or have low vision.	Pedestrian countdown timers provide information on the amount of time remaining to cross the street at signalized intersections.
Where:			
Coordinated signal timing is often used on corridors with closely spaced intersections, on a bicycle corridor, or through walkable areas.	LPI are most beneficial in crash areas, T-intersections, intersections with high conflict b/t right turns and pedestrians, and near parks and schools.	APS should be installed where needed such as where geometry or phasing makes crossing difficult for people who are blind or have low vsion.	The MUTCD states that countdown signals shall be used at signalized crosswalks where the pedestrian change interval is more than seven seconds.
How:			
Progression speed through the corridor should be at or below the target speed and can be set for bicycle speeds, walking comfort or transit headways. Develop off-peak signal timing to account for lower traffic.	LPI are installed by re-timing a traffic signals. Right turns on red should be prohibited wherever LPI are installed. Leading bicycle intervals can also be used or combined with LPI in areas of right hook crashes.	APS requires push buttons and speakers to provide auditory feedback. The MUTCD provides guidance on the appropriate location of devices.	The timer begins with the flashing "DON'T WALK" interval and should be timed for a max walking speed of 3.5 ft/sec., or slower at locations near children, seniors and people with disabilities.
This is a **LOW** cost tool.	This is a **LOW** cost tool.	This is a **LOW to MEDIUM** cost tool.	This is a **LOW** cost tool.

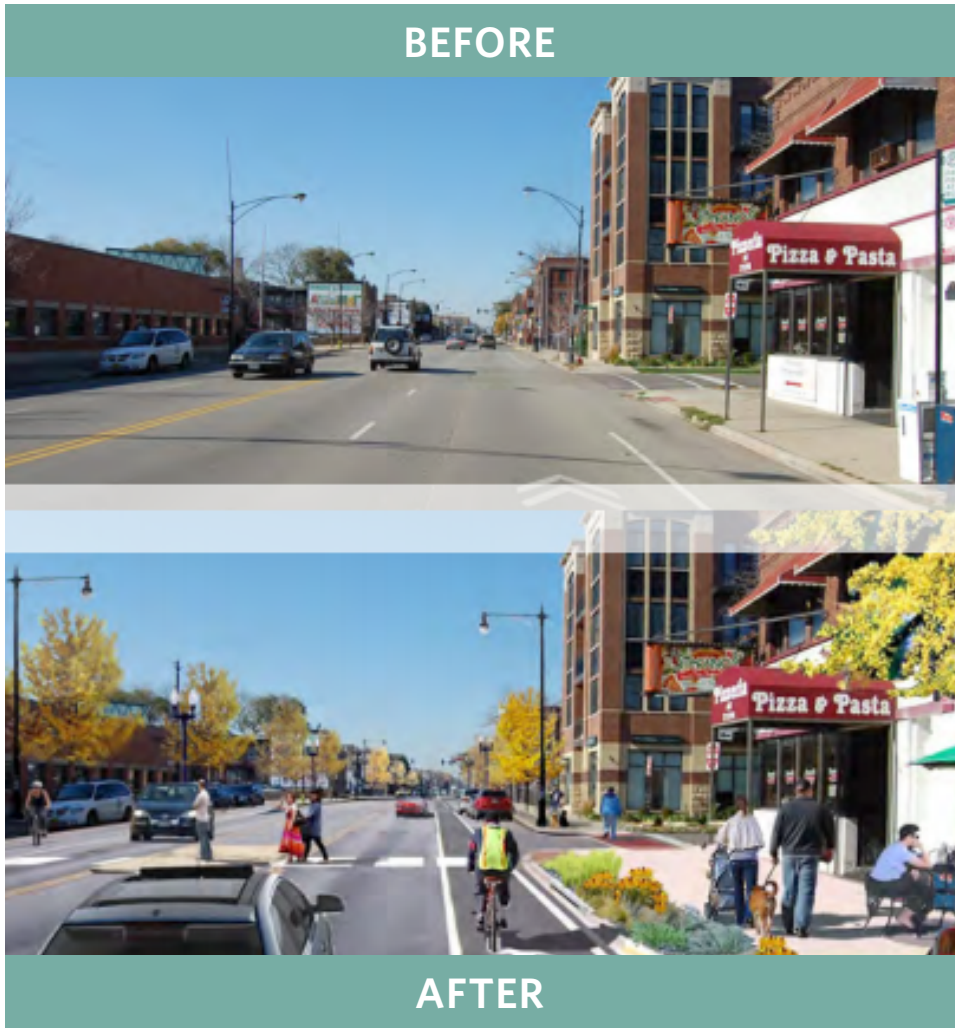
Road diets

What: Road diets reduce the amount of space dedicated to motor vehicles by eliminating lanes and/or shrinking the width of lanes. The reclaimed space is reallocated for other uses, such as bike lanes, bus lanes, pedestrian refuge islands, turn lanes, or more sidewalk space. The most typical conversion is from a four lane roadway to a three lane with a center turn lane. Road diets provide more reliable travel times and speeds, reduce dangerous jockeying, improve the safety of all users, improve the streetscape, and can often carry the same volume of traffic after the conversion.

Where: A road diet can be considered on all streets with four or more lanes and less than 20,000 vehicles traveling on it daily. Counts can be found on the Iowa DOT website.

How: Vehicular capacity analyses and simulation are necessary to understand the effect of road diets on the street itself, as well as on adjacent roadways.

This is a **MEDIUM to HIGH** cost tool.



Skinny streets and shared streets

What: Skinny streets are also known as yield streets and queue streets. They are two-way streets with on-street parking on one or both sides and a narrow through-way. Motor vehicles need to slow down, yield or pull into the parking lane in order to pass on-coming traffic.

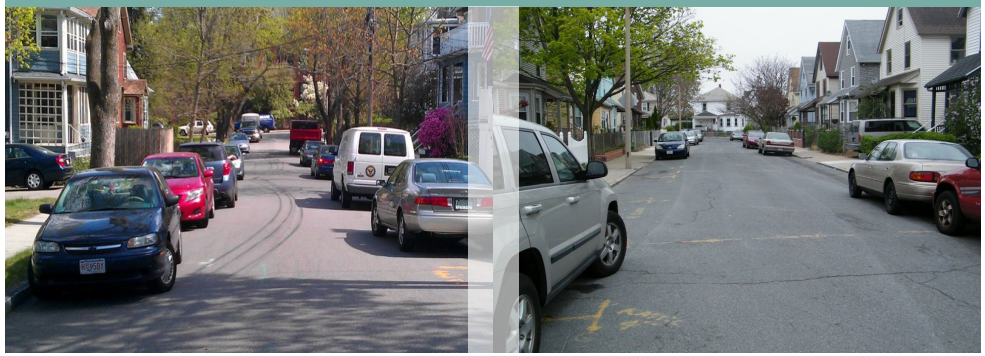
Shared streets can be residential or commercial spaces where the roadway is shared by all users with minimal to no physical separation. Both street types are low-speed roadways.

Where: Skinny and shared streets can be applied to low-speed streets with narrow right-of-ways. Skinny streets are most effective at 24-28′ in width with on-street parking utilization of less than 60%. Skinny street and residential shared streets should have low motor vehicle traffic volumes. Commercial shared streets are destinations where high foot traffic is desired or present.

How: Skinny streets can be converted one-way residential streets and requires changes to striping, signage, and possibly traffic signals. Designs should reduce cut-through traffic, mitigate the effects of driveway conflicts, and maintain slow traffic speeds. Shared streets can use textured or pervious pavements that are flush with the curb. Street furniture can help define a shared space while staggered landscaping, parking and bollards can create a chicane effect. More info can be found in the NACTO Urban Street Design Guide.

This is a **LOW to HIGH** cost tool.

SKINNY STREETS



SHARED STREETS

On-street parking

What: On-street parking provides a buffer between motor vehicle traffic and pedestrians, improving the walkability of the street. Off-street surface parking lots deaden spaces and damage the streetscape. Consider bike corrals as on-street parking as well. Corrals typically take up one car parking space and provide 8-10 bike parking spaces.

Where: Residential and commercial areas where there are, or where you want there to be, people walking, biking, shopping, etc. Look for opportunities to reduce off-street surface parking with on-street parking.

How: Keep space at the ends of blocks clear for pedestrian visibility, look to move bike lanes to the curbside of the parking lane for greater protection, and limit length of meters for greater turnover near commercial uses.

This is a **LOW to MEDIUM** cost tool.

Bus shelters, bulbs and pads

What: Everyone who takes transit is a pedestrian too. Building pedestrian support for transit is essential to success. Bus shelters and paved pads leading from the sidewalk to the stop make transit accessible and more pleasant. Bus bulbs combine curb extensions to improve bus operations and create a safer and more welcoming experience.

Where: Every bus stop should be accessible to people walking or with mobility aids such as wheelchairs or walkers. Bus bulbs can be developed in conjunction with curb extensions and locations should be identified in collaboration with DART.

How: Contact DART for proposed transit improvements.

This is a **LOW to HIGH** cost tool.

Bike lanes, buffers and sharrows

What: Adequate bike facilities provide a safe and comfortable experience for new riders, families and older adults. Design facilities for these groups, and they will serve everyone.

Where: Commercial and residential corridors, networks connecting homes to businesses, parks, schools, employers and other destinations. The MPO's 2013 Bikeway Feasibility Report highlights many streets that could add facilities.

How: The NACTO Urban Bikeway Design Guide and the FHWA Separated Bike Lane Planning and Design Guide are available free online and detail context-sensitive design guidelines that cover planning, engineering and design specifications.

This is a **LOW to HIGH** cost tool.

Street trees

What: Street trees correlate with fewer motor vehicle accidents, reduce dangerous speeding, decrease stormwater pollution, provide natural cooling, produce more positive public health outcomes, raise property and commercial values, and make streets a better and more attractive place for people.

Where: Main streets, boulevards, commercial corridors, residential areas...street trees benefit most streets.

How: Use native species and appropriate spacing to create a sense of enclosure for the street with a continuous, overhead canopy. Put them in the planting strip alongside the road instead of back of sidewalk to better define the

This is a **LOW to MEDIUM** cost tool.

Parklets, planters and plazas

What: Use temporary materials like planters, paint, bollards to create new plazas and public space in underutilized spaces. Change one or two on-street parking spaces into cafe seating or mini respites where people can sit and converse.

Where: Commercial, pedestrian and bicycle corridors that benefit from more street activity.

How: Look for spaces that are underutilized or inactive and dedicate that space to people. This will slow down speeders, improve the pedestrian environment and transform storefronts. Identify potential partners in the business community that would fund these improvements in front of their store/restaurant and support them.

This is a **LOW to MEDIUM** cost tool.

Sources referenced

- AASHTO *Green Book*
- ITE *Designing Walkable Urban Thoroughfares: A Context Sensitive Approach*
- NACTO *Urban Street Design Guide*
- NACTO *Urban Bikeway Design Guide*
- FHWA *Separated Bikeway Design Guide*
- City of Chicago *Tools for Safer Streets Guide*
- Virginia DOT *Traffic Calming Guide for Local Residential Streets*
- Portland Bureau of Transportation *Traffic Calming Resources*
- Safe Routes to School Guide
- Pedestrian and Bicycle Information Center *Facility Design*

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