Transportation Toolkit

Welcome to the world of transportation activism!

This guide is intended to give you a sense of what some of the options are for making our communities better places - places where residents can safely and comfortably get around by walking, riding a bike, or riding transit, in addition to driving. Whether you are headed to school, work, the store or entertainment, there are too many places where the infrastructure, land use patterns and available services make it difficult to use your legs, your bike, a bus or a train (on their own or in combination). The good news is that all over Colorado, people have banded together with their local governments to make change. And you can too! Now's a great time to push for multimodal transportation system in your community.

This guide has five main sections. The first section provides case studies of a range of Colorado communities that have made big strides on multimodal transportation. These stories are meant to inspire – to show that we can do big things anywhere in the state.

The next section offers a brief description of some of the key policies that a local government can adopt around transportation and land use planning to enable walkable and bikeable neighborhoods.

The next three sections list some of the key improvements that can be made to walking, biking, and transit systems with a particular focus on the types of changes that can be made at the local level, without big infusions of state and federal funds. Every enhancement that is highlighted in these sections has been implemented somewhere in Colorado, so we know that these are all possible here, as long as there is the political will and community support.

The guide is not meant to be all-inclusive, but we list useful references and resources in each section that will give far more detail.

Use this guide as a starting point for ideas, examples, the direction and the language to be an effective advocate in your community for more and better options to get people safely and efficiently where they want to go.

Let's go Multimodal!

Acknowledgements

CoPIRG Foundation and SWEEP

The Transportation Toolkit

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CoPIRG Foundation is an independent, non-partisan group that works for consumers and the public interest. Through research, public education and outreach, we serve as counterweights to the influence of powerful special interests that threaten our health, safety or well-being. See more at: http://www.copirgfoundation.org/

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Table of Contents

Click on any page number to jump to that section. Use hyperlinked text through the toolkit to access rescources online.

SECTION 1

Case Studies

1.1 "Right-sizing" streets to build bike lanes in Pueblo

In 2014, the City of Pueblo showed just how quickly a city can advance bold action around bicycling.

In early 2014, the city teamed up with a local nonprofit, Pueblo Active Community Environments (P.A.C.E.) to manage a small grant from the Kaiser Foundation[1] to make the city more welcoming to walking and wheeling. As an early action, the city hired its first bicycle and pedestrian coordinator.

At that point, things could have moved really slowly. As anyone who has worked with their local government knows, sometimes "the wheels of government turn ponderously slow". But P.A.C.E. and Pueblo staff realized the importance of achieving some results quickly, and giving residents a taste of the type of change that was possible in their community. They developed and quickly implemented an inexpensive plan to reallocate underutilized space on a number of streets and stripe 10 miles of bike lanes. The whole process kicked off in January, and by September the lanes were striped.

Some of the one-way streets with two car lanes were converted to a street with one car lane and a bike lane. Some two-way streets with a center turn lane were converted to two lanes for cars and bike lanes.

Part of the reason the community was able to make these changes so quickly was that neighborhood residents had long complained about people speeding on the streets. By reconfiguring the layout of the streets to better serve the people who use them, also known as "rightsizing," the city helped to slow down traffic, giving a benefit to the neighbors and helping win broader support for the upgrades.

There was some backlash when the initial changes to the streets were made, with com-

RIGHT-SIZING: *A Pueblo bike lane. Photo: P.A.C.E.*

plaints from motorists who found the new road lay-out confusing. There was even a negative editorial in the Pueblo Chieftain. However, this didn't last long – people quickly became familiar with the new lanes, residents cheered the slower speeds, and more people started cycling on these routes.

The success of this project is nicely summed up by Captain Troy Davenport of the Pueblo Police Department who stated, "Pueblo is moving to become a healthier city and bicycling is a big part of that equation. With new bike lanes Pueblo will have more bicycle riders."[2]

1.2 Transforming a suburb in Lone Tree

Lone Tree is a small suburban community of about 13,000 people at the southern end of the Denver metropolitan area. The town is located near the intersection of C-470 and I-25, and has historically been a pretty auto-oriented community. But change is coming to Lone Tree with a nearby light rail station and a new focus on becoming a place where people can comfortably walk and bike to get around. In the existing parts of town, this means figuring out how to retrofit existing streets that were originally designed in a more car focused era and to ensure new development utilizes complete street values.[3]

Lone Tree seized on getting the roads built right in the new, east RidgeGate development. RidgeGate is a mixed-use development on nearly 3500 acres that includes single family homes, apartments, townhomes, shops and restaurants, in addition to major employers. The city partnered with the private sector and set a road standard that calls for every street built to be friendly to bikes and pedestrians. For the smallest streets, there will be six-foot sidewalks, separated from the road by eight feet of landscape, and there will be five-and-a-half-foot wide bike lanes.

But the biggest innovation comes in their commitment to making sure that even the largest, most heavily trafficked streets are safe and comfortable places for people on foot or bicycle. Their largest roads are planned to have six lanes of traffic – bringing to mind the pedestrian unfriendly arterials that act like barriers in many of our communities. But their road standards call for separated two-way cycle tracks on these roads, in addition to multi-use bike and pedestrian paths that will be separated from the road by a landscaped strip.

A cycle track is more than just a bike lane. It combines the convenience and speed of an

CYCLE TRACKS: *A cycle track is more than just a bike lane. Photo: beyondDC under Creative Commons license.*

on-street bike lane with the comfort of complete physical separation from traffic.

Lone Tree is setting a new bar for how to make suburban development bicycle and pedestrian friendly, showing that active transportation is not just something for big cities and small towns, but that we can design all of our communities in a way that gives people real choices about how they get around.

1.3 Nederland Community EcoPass

Nederland is a town of 1500 people located on the scenic Peak to Peak highway, about 20 miles west of the Denver metro area. Many residents commute to work in Denver or Boulder, and commute down a winding canyon road. The town is located within the boundaries of the Regional Transportation District (RTD), the public transit agency for the Denver metro area. RTD serves Nederland with one bus route, the N bus, which links Nederland to both the metro area and a local ski resort.[4]

In 2011, the town Board of Trustees decided to try an innovative new approach to make it easier for everyone who lived in Nederland to take the bus – creating a community wide EcoPass program. An EcoPass is an unlimited access transit pass, which allows a pass-holder to ride any bus or rail line in the system without paying a fare. They are typically purchased by businesses as a benefit for their employees, but Nederland pioneered a new approach – getting EcoPasses for everyone in the whole town.

The results were impressive.

- Transit ridership increased 45%
- Residents drove 250,000 fewer miles each year
- The pass boosted local business – rental vacancy rates dropped in the downtown due to the easier commute
- Sales tax revenues increased 7%,

In the words of Mayor Joe Gierlach "Because the EcoPass benefits a diverse array of users, our community is more capable of adapting to challenges, and maintaining resiliency."[5]

How did the town do this? They started by applying for transportation funds allocated by the Denver Regional Council of Governments to programs that improve air quality and reduce congestion. They received $108,000, which was enough to fund the first two years of the program. The program was wildly popular, with 1200 of the 1500 residents picking up the pass.

ECOPASS: *An Ecopass allows a pass holder to ride buses and light rail fare-free." Photo: Nedermayor blog.*

In fact, it was so popular that when the grant funding ran out, volunteers collected petition signatures to give voters a chance via the ballot to create a local property tax district to keep the program going. In November of 2013, 55% of residents voted in favor of a small property tax increase, that costs the average property $42 per year. For an individual to buy a similar pass on their own would cost over $1,000 per year!

1.4 Reinventing a local bus system in Boulder

In the early 1990s, Boulder had a network of local transit routes that had low ridership and played little role in the community. Service was designed only to serve the needs of transit-dependent riders rather than choice riders— those who had other options but might use transit for some trips. The route designs maximized geographic coverage so that many people had the option to use the route if they needed to, but the frequency of the routes was quite low. The result was that almost everyone who had other options chose the other options.

Beginning in 1992, the city took the unusual step of actually talking to residents about what would make transit useful for them, and a few key themes quickly emerged. People wanted:

- Easy-to-understand bus destinations
- Fast, direct routes
- A friendly, pleasant experience
- Routes that go where people want to go
- High-frequency service, every 10 minutes if possible, that makes it "schedule-free"
- Cash-free fares so that riders did not need to pay every time they used the system

Based on this feedback, the city redesigned the transit system, creating a network made up of high frequency buses traveling simple routes (either straight lines or loops) that served major destinations like downtown, the local University of Colorado campus, and major shopping areas. They also branded the routes to make them recognizable and easy to understand. Thus the HOP, the SKIP, and the JUMP were born (followed by the DASH, the STAMPEDE, and the BOLT). The names may sound a bit silly – but there is a reason that Coke and Pepsi aren't beverages #42 and #38 – branding matters!

As each route was designed, residents and businesses participated in figuring out where

BRANDING A ROUTE: *A distinctively painted JUMP bus. Photo: Brett VA.*

the route would go, what the buses would look like (each was color coded with a distinctive logo), and how frequently they would run. In addition, the city worked with businesses along the new route to pay half the cost of transit passes for their employees for the first year after a route started.

Most of the changes in service involved simply spending money in different ways and reallocating service, rather than spending a bunch of new money.

The results were astonishing. In less than a decade, transit ridership skyrocketed. Daily ridership quadrupled, while the city's population rose only 13% over that period. Landlords started listing proximity to bus routes as an amenity, and businesses started using transit passes as an employee benefit - including the entire downtown, which uses parking revenues to purchase transit passes for every employee of all of the shops, restaurants and offices in the entire district.

Since then, many other cities have started to redeploy bus routes to make them work for more people, more of the time. It's not just college towns, either – most recently, Houston, TX has redesigned its entire bus system, running buses in straight lines, naming the routes after the streets they run on, and increasing frequencies to once every 15 minutes or better – all at no net increase in operating costs. Sound familiar?

1.5 Singletrack Sidewalks in Eagle

In 2014 the Town Council of Eagle, a community of 7,000 people located between Glenwood Springs and Vail, approved an innovative new program designed to make it fun for kids to get around on their bikes. The plan , which came from kids and parents, calls for building a network of beginner level dirt trails that connect neighborhoods to schools, allowing kids to get to school while experiencing the fun and flow of mountain biking.

The town plans to install ten miles of trails, which will allow kids and grownups to run or bike across town, accessing in-town locations and connecting to trailheads at the edge of town.

The project got permission from both the city and individual homeowners to formalize and connect little informal social trails that has been created just because that was where folks would naturally walk or ride, or where kids would go to mess around on their bikes. Some towns would view this as a problem, which needed to be controlled. Instead, Eagle saw it as an opportunity to add an amenity and encourage active, healthy outdoor lifestyles.

CYCLE TRACKS: *Brush Creek Elementary students and parents listen as Singletrack Sidewalks organizers outline program goals. Photo courtesy of Karen Jarchow.*[6]

SECTION 2

Key Policies

2.1 Transportation Master Plan Supporting Transit, Biking and Pedestrians

A community's Transportation Master Plan (TMP) creates a long-term vision for its transportation system and lays out strategies and programs that build towards that vision while outlining how the community will accommodate expected growth.

It also shows what is currently fiscally possible and identifies desired projects that could be undertaken if additional funding becomes available. TMPs, which often in the past primarily focused on expanding roadways and intersections, are now focusing on all types of users of the transportation system: pedestrians, cyclists, transit riders and motorists.

A TMP is a very important document, as it serves as the roadmap for transportation investment in a community.

Elements of a Transportation Master Plan may include:

- An evaluation of current transportation infrastructure
- A community's long-term transportation goals and objectives. Example: Increase share of transit riders to 10% of all trips
- The policies that will allow them to meet the goals and objectives. Example: Bike, pedestrian and transit infrastructure additions will have priority over roadway enhancements

Examples of Sustainable Transportation Master Plans from Colorado Municipalities

- Fort Collins: **http://www.fcgov.com/transportationplanning/tmp.php**
- Boulder: **https://bouldercolorado.gov/transportation/tmp**
- Durango: **http://www.durangogov.org/index.aspx?NID=360**

- Specific plans for each mode. Example: Pedestrian Plan laying out existing infrastructure and how to best expand the current system
- Major Planned Projects. Example: Planned expansion of transit service

MEASURING UP

COST: $$
IMPACT: Large

APPLICATION: Municipal Planning
BENEFITS: Creates vision and plan for future development
CHALLENGES: It requires a major community outreach process and significant technical work to develop the TMP. It is also important to make sure the plan does not sit on a shelf, but actually guides ongoing decisions and allocation of funding.

2.2 Local Complete Streets Policies

Complete Streets policies aim to make sure that a community's streets adequately serve pedestrians, cyclists, and transit riders as well as motorists.

Complete Streets is more than just adding some additional sidewalks, crosswalks or bike lanes. Complete Streets aims to focus transportation planning efforts so that they consider all means of transportation, without a singular focus on automobile needs.

Complete Streets policies can be especially important for meeting the needs of children, the elderly and those with disabilities, examples of residents and visitors who may have no or limited access to automobiles.

Some of the goals of Complete Streets are:

- Making streets safe and accessible for everyone
- Encouraging active transportation (walking

and biking)

- Reducing dependence on automobile-based travel

The benefits of Complete Streets include:

- Healthier residents (more exercise walking and biking)
- Cleaner air (less pollution from cars)
- Reduced personal transportation costs (less gas purchased or reduced vehicle ownership)
- Reduced traffic accidents (especially those involving pedestrians and cyclists)
- Reduced congestion
- Reduced infrastructure costs due to reduced need for road lanes
- Increased property values and retail sales

A Complete Streets policy might take the form of a resolution, an executive order, ordinance, a transportation plan, or an internal policy. It's up to the community to decide what the best approach is to doing Complete Streets.

A good example of a local jurisdiction's Complete Streets policy is that of Birmingham, Alabama which states: "The City of Birmingham shall scope, plan, design, fund, construct, operate, and maintain all City streets to provide a comprehensive and integrated network of facilities that are safe and convenient for people of all ages and abilities traveling by foot, bicycle, automobile, public transportation, and commercial vehicle."

This policy makes it clear that it applies to all stages of a road's life and explicitly covers all populations and modes.

Over 700 jurisdictions across the United States have adopted some kind of Complete Streets policy including the following Colorado jurisdictions: Basalt, City of Boulder, Colorado Springs, Denver, Fort Collins, Golden and La Plata County. The Colorado Department of Transportation has also adopted a Complete Streets policy.

One of the challenges is translating a general complete streets policy into on the ground change. Key steps include a requirement that planners and engineers be trained on the complete streets policy and that senior transportation or public works staff set expectations that complete streets be incorporated into every road project.

COMPLETE STREETS: *Top photo doesn't show a complete street. Photo: Cumulus Clouds via Wikimedia Commons. The bottom photo show a complete street at Target. Photo: Will Toor.*

Smart Growth America has developed a significant number of resources on Complete Streets, from introductory presentations and fact sheets to step-by-step guides on how to develop and implement a Complete Streets policy in your jurisdiction.

The first link below is to a webpage with comprehensive resources on every stage of Complete Streets policy while the second link is to a Local Policy Workbook that walks through development of Complete Streets' policies by local governments.

http://www.smartgrowthamerica.org/complete-streets/a-to-z
http://www.smartgrowthamerica.org/documents/cs/resources/cs-policyworkbook.pdf

MEASURINGUP

COST: $-$$$
IMPACT: Medium

APPLICATION: Transportation Planning
BENEFITS: Increased walking, cycling
CHALLENGES: Making sure Complete Streets Policy is implemented

2.3 Transit-oriented zoning

In most communities, zoning rules tend to separate the town into residential, commercial or industrial areas. While this has the advantage of making sure that homes aren't next door to factories, it can stymie the development of dynamic mixed-use areas where people can live, work, play and shop without having to get in their car and travel long distances. This is a particular problem around major transit stops since a denser mix of uses is more ideal to maximize the use of the transit service in the area.

At a basic level transit-oriented zoning would allow higher density residential and commercial development (along with employment centers) along with pedestrian friendly designs in the area closest to major transit stops. Retail uses should be easily accessible (on the ground floor of buildings), and the level of parking provided should be much lower than in other parts of town.

The zoning changes would focus primarily on

areas within a quarter mile radius of major transit stops. The densest development should be allowed directly around the transit stop with lower levels of density allowed as you move further away.

In these areas there should be a focus on infrastructure that best serves the needs of pedestrians by allowing wider sidewalks and other strategies to limit pedestrian and vehicle interactions. Requirements around a minimum number of parking spaces could be relaxed (see Smart Parking) to free up valuable land.

The City of Aurora developed a planning guide for its Transit-Oriented Development that addresses "building height and form residential density, land use, parking and public art requirements" for mixed-use developments near transit stations.

https://www.auroragov.org/cs/groups/public/documents/document/012622.pdf

MEASURINGUP

COST: $*
IMPACT: Large

APPLICATION: Areas around major transit stops
BENEFITS: Allows more residents and employment around transit stops, increases property values, increases transit ridership, increases walking and biking
CHALLENGES: Can be politically challenging to increase density, reduce parking, especially if the area has significant existing housing nearby
* this just gets the rules right, the private sector makes the investment

2.4 Smart Parking Policies

Parking rules in zoning codes may not be the first thing you think of when considering what reforms could make your city more walkable and bikeable. But our rules on parking turn out to be one of the most powerful determinants of how much walking and biking actually takes place – and in most cases the problem is that we require too much parking.

Parking requirements (or minimums) in local zoning codes are usually based on the demand for off-street parking at suburban locations with little transit service and poor pedestrian and cycling infrastructure. In areas where a large percentage of trips will be made by modes other than driving, too much parking can actually have a number of negative consequences for the area's vitality. Because parking lots take up so much space, they force buildings much further apart, making it harder for people to walk. They also degrade the pedestrian environment – not many people enjoy walking or biking across big parking lots, leading to a self-fulfilling prophecy where more people drive (and need more parking spots). And big parking lots can be just plain ugly.

Put another way, just imagine how nice it is to walk along, browsing store windows on an old main street, then imagine trying that with acres of parking between the buildings.

Parking can also be really, really expensive. In constrained locations, like a downtown, the only way to add parking is often by either building parking structures or putting in underground parking below buildings. Both of these can easily cost $30,000-$50,000 per space. If the parking structure is built on top of an existing surface lot, the cost per net new space created can be even higher. The cost of a parking space can actually exceed the cost of the cars occupying that space!

This is a particular problem near transit stops and downtowns. Land values downtown or within a quarter mile of major transit stops may already be higher than surrounding areas. Having large parking lots limits the development opportunities, which can push these land values even higher causing rents to be higher than necessary. Land that could have been developed into additional retail outlets or residential units is now wasted on parking spaces. A great resource on the problem and associated solutions is the Sightline Institute.[7]

This can be an issue not only in cities but also in small towns. For example, Niwot is a town of 4,000 people in Northeastern Colorado. Local parking rules required each business to add a prescribed number of off-street spaces, which severely limited the ability of businesses to expand. According to the local standards, the downtown was already short 20% of the number of parking spaces that were required. But in 2012 the town hired transportation consultants who went out and monitored the existing parking – and found that at the peak occupancy only about 60% of spaces were filled. This data was

used to relax parking requirements, allowing businesses more flexibility to expand.

If a city has set off-street parking requirements for different types of businesses it should consider reducing the minimum requirements in areas that are well served by transit, biking and walking. For example, around stops on their MAX bus line, the City of Fort Collins set a minimum parking requirement at 70% of the current standard with additional flexibility if data shows less parking is needed.[8] Around its transit-oriented developments, the City of Aurora has parking requirements that are up to fifty percent less than the rest of the City.[9]

Because many businesses have alternating peak parking times, towns can develop a system of shared parking to minimize the overall number of spaces. This is a really important tool that is too often ignored. Think, for example, of parking at a church, which might be full only on Sundays, while parking at nearby businesses may be largely empty on Sundays. Each might not need a big parking lot. Local ordinances can allow an agreement to share parking, instead of requiring each to install their own.

Smarter approaches to parking can benefit us all. Smart parking reform can be cheap – in fact it will usually save money, both public and private – and can be one of the most effective steps we can take to improve the environment for walking and biking in our towns and cities.

MEASURINGUP

COST: $
IMPACT: Large

APPLICATION: Areas around major transit stops or dense areas with high numbers of cyclists and pedestrians; downtowns
BENEFITS: Frees up high-value land for development, improves pedestrian and cyclist experience, increases transit ridership, can increase retail sales
CHALLENGES: Can be politically challenging to embrace less parking; can require neighborhood parking districts to limit spillover into surrounding areas

2.5 Parking Pricing

Imagine for a moment that local government and businesses provided free food at supermarkets and restaurants. The stores would run out of food, there would be long lines, and obesity rates would rise. Well, that is pretty much the way we treat parking – 98% of car trips in this country begin and end at a "free" parking space. Just as a free all you can eat buffet would both create long lines and incentivize us to eat too much, free parking creates a shortage of parking and incentivize us to drive too much.[10]

Free parking has costs, they are just hidden - hidden in sales and property taxes, hidden in the costs of goods and services, hidden in building rents, and hidden in reduced wages and benefits. The annual costs of providing parking in the United States are estimated at $4400 per vehicle.[11]

In addition, large parking lots create a lot of problems for our towns and cities (**see Smart Parking Policies**). They create much larger distances between buildings and increase pedestrian/vehicle interactions, which makes walking less safe and less pleasant.

Charging directly for parking impacts the variable cost of driving, and leads to different travel choices – choices that both would make us healthier, our air cleaner, and our economy stronger.

Some cities and towns have approached this by setting up parking districts downtown or near major transit stations, and charging for parking within the district boundary. Usually they couple this with relaxed requirements for how much parking is required. For example, Boulder is creating a parking district around a new transit station on the east side of town, and using parking revenues to buy everyone in the district transit passes.

Another approach is to require that parking costs be "unbundled". In many cases, the cost per parking space can be hundreds of dollars per month. When these costs are just hidden in the rent or sales price, it drives up costs for everyone, even if they have no or few cars, and encourages more driving. Unbundling does not increase the costs, but separates them from the underlying rent so that those who choose to drive pay for their spaces, and others do not. This a powerful tool in multifamily housing like apartments and condominiums, where it can lower rent rates, and allow more housing to be built on the same land area by lowering parking demand.

Politically, however, it is very hard to shift from free to paid parking. One tool that employers have for employee parking is known as "parking cash-out" developed by UCLA Planning professor Don Shoup. Professor Shoup's idea: instead of giving a hidden subsidy to employees who choose to drive to work, an employer can give a travel allowance to all of their employees. Any employee who still chooses the option to drive to work and park pays this right

back as a parking charge. For example, the City of Boulder instituted this for employees at their downtown offices around 2003. They paid employees $2.00 a day as a transportation allowance. Folks who walked or biked or took transit to work got to keep the money – folks who drove to work used the allowance to pay for parking. There is no net increase in what employees who drive actually pay – but in a study of parking cashout by multiple employers in California, Shoup found an average 12% drop in employee car travel after implementation of parking cashout. Because many people still do drive to work, the employer receives much of the travel allowances back, so the net cost to the employer is small.

MEASURINGUP

COST: $*
IMPACT: Very Large

APPLICATION: Downtowns, areas around major transit stops, new multifamily housing, major employers
BENEFITS: Exposes hidden subsidies that commutes by car receive, leads to less driving, more walking, biking, and transit use; generates revenue that can be used to improve the neighborhood
CHALLENGES: It is politically challenging to start charging for something perceived to be "free."
* Could generate significant revenue that can be invested in sidewalks, bike lanes, transit, etc.

2.6 Living labs – how to try things out, move quickly, and learn from our mistakes

Anyone who has worked on transportation knows that it can take an awfully long time to make changes to our infrastructure. One of the authors of this guide used to wear a baby pack to carry his infant son to early meetings on US 36 bus rapid transit (BRT) - and when the BRT line opens in 2016 his son will be graduating from high school! But not all transportation transformation has to take years. In the last decade, a new approach has developed, going by the name of tactical urbanism, in which ordinary citizens and city staff can team up to try things out, see how they work – then grow them if successful or retool them if they don't work.

The basic idea is to make quick, inexpensive changes, which can be changed back if they don't work. Many of the changes that this guide

describes – things like protected bike lanes, improved street crossings, and road diets – will be unfamiliar changes in many communities. Getting buy-in from citizens and city officials for something new can be a challenge. So if cities can give people a real life opportunity to see how a proposed change might work by simply using some paint, moveable planters and temporary barriers, they should offer a "living lab."

For example, the Downtown Denver Partnership decided to test out a protected bike lane on Arapahoe Avenue by creating a "pop-up" lane for one day, letting cyclists and drivers get a feel for the idea. People loved it, and they moved forward by getting local businesses and foundations to contribute funds - and then held a crowdfunding campaign to raise the rest of the money needed for a permanent lane.

Examples abound – creating intersection art, adding pop-up libraries to enliven the pedestrian environment, creating temporary pedestrian bulb-outs and crosswalks, and many more. The key is that the projects are cheap, reversible, and allow the community to try out something new.

LIVING LABS: *University Avenue cycle track "living lab" – all it cost was some paint. Photo: City of Boulder.*

MEASURINGUP

COST: $*
IMPACT: Low to Medium

APPLICATION: Local transportation department
BENEFITS: Innovation for cycling, walking, transit
CHALLENGES: Local agency culture; permission to innovate
* Although can be more expensive if it leads to more permanent change if the pilots are successful

Working with the Colorado Department of Transportation (CDOT)

It can be challenging to retrofit a street designed solely to speed traffic through a corridor into a complete street that is comfortable for cars, transit riders, cyclists, and pedestrians. Many important town roads are also state highways – from Alamosa's Main Street (which is also Highway 160) to Colfax Avenue in Denver (which is also Highway 40) – which means that the Colorado Department of Transportation (CDOT) must be a partner in any changes. This can add an additional challenge.

There are plenty of examples of success. Alamosa was able to work with CDOT to implement a road diet and Denver has big plans for bus rapid transit and pedestrian improvements on Colfax.

Historically, CDOT saw its mission as moving cars. In fact, until 1991 CDOT was actually named the Colorado Division of Highways. Since then CDOT has evolved towards a more multimodal approach. CDOT now describes their mission in a much broader fashion than they once did – the graphic to the right, taken from a round of presentations CDOT made in 2014, depicts this well:

A CHANGING AGENCY: *CDOT now describes their mission in a much broader fashion than they once did.*

However old attitudes can still prevail in some pockets across the state. Some communities that want to tame a state highway (by narrowing lanes, adding bike lanes, adding on-street parking, or other changes designed to slow traffic and encourage walking and biking) have run into roadblocks when working with local CDOT engineers.

There are several things that can help make this process go more smoothly. One is to be aware of and refer to policies that CDOT has adopted in support of multimodal transportation. Some key ones are:

CDOT Bike and Pedestrian Policy (https://www.codot.gov/programs/bikeped/documents/1602-0-policy-bike-pedestrian). It is the policy of the Colorado Transportation Commission to provide transportation infrastructure that accommodates bicycle and pedestrian use of the highways in a manner that is safe and reliable for all highway users. The needs of bicyclists and pedestrians shall be included in the planning, design, and operation of transportation facilities, as a matter of routine. A decision to not accommodate them shall be documented based on the exemption criteria in the procedural directive.

The CDOT Bike and Pedestrian Procedural Directive:
https://www.codot.gov/programs/bikeped/documents/1602-1-2013-bicycle-and-pedestrian-policy
Gives more detail on how the agency should implement the policy.

The CDOT Shoulder Policy:
https://www.codot.gov/programs/bikeped/documents/0902-0%20Shoulder%20Policy.pdf
Encourages shoulders to be constructed that provide adequate space for cyclists.

The NACTO Urban Street Design Guide:
http://nacto.org/usdg/
The NACTO guide includes many innovative types of bike lanes and bike and pedestrian crossings that may be unfamiliar to many traffic engineers. CDOT's endorsement means these innovative treatments may now be implemented on state highways.

Finally, it is always important to develop strong local political support. If the local support is weak, it is easy for a CDOT engineer to miss the value of certain changes to the community. Strong local support will only build momentum.

It is important to recognize that the agency really is changing, and many communities have had great experiences working with CDOT recently – just take a look at the **chapter on road diets**.

SECTION 3

Making our communities more walkable

3.1 Walk and Bike audits

One of the problems with a lot of planning and engineering decisions is that they are made from the perspective of a driver. When the people who make the plans experience our roads from behind a steering wheel, the plans they come up with tend to reflect that. It is important to base plans on information that reflects the real experience of walking and bicycling in an area.

One great tool is to conduct a walk and bike audit of the community. Ideally, this will be organized in cooperation with the local government, so that key planners and decision makers will be part of the process. But it can also be a community organizing tool, as a step towards getting the local government engaged.

At the most basic level, a group of participants can meet and walk or ride a marked route, taking notes on what works well and what doesn't, what is missing, and where there are major barriers. This can be used to brainstorm solutions, and feed these into the planning process.

At a more sophisticated level, there are a variety of tools to formalize these audits. For example, many folks in the Denver metro area have been using a tool called WALKscope, developed by WalkDenver and PlaceMatters to provide an easy way to collect data on sidewalks, intersections and pedestrian volumes. Volunteers simply walk an area, using their mobile phones to record information on the sidewalk and crossing conditions at particular locations, and the information is then uploaded to a database that displays this information on a map.

WALKING THE WALK: *Volunteers on a walk audit in Paw Paw, Michigan. Photo: Michigan Municipal League.*

SAMPLE BICYCLE AND WALKING AUDIT CHECKLIST

Excerpted from the Berkeley guidebook

The University of California at Berkeley Institute for Transportation Studies put together a great guide to doing sophisticated walk and bike audits, available at **http://www.techtransfer.berkeley.edu/sites/default/files/file_uploads/bsa_guidebook_2013.pdf**. *There are lots of options for how to conduct an audit – the key is to use this as a tool to get the community engaged and to educate decision makers on what the world looks like from the perspective of a person on foot on or a bicycle.*

Great Places

- Is there street activity (sidewalk cafes, vendors, bicycle amenities, wayfinding, etc.)?
- Are activities and uses, such as newspaper racks or sidewalk cafes, organized?
- Is traffic calmed with bulbouts, roundabouts, chicanes, etc.?
- Are links to transit provided?
- Are medium- to high-density land uses present?
- Is the street network a grid?
- Are street widths between two and four lanes?
- Is street parking back in or head out?
- Do motorists have visibility when exiting the parking space?
- Is there a buffer zone between on-street parking and bicycle travel lanes to protect cyclists from "dooring"?
- Is a bike lane used on the street?
- Is there public art?
- Do buildings provide a sense of enclosure (positioned near or at the sidewalk)?
- Do buildings provide sufficient transparency (70%–90% window glazing and set proximate to the street)?
- How many people do you see in this space?
- Is there a tree canopy or other means to achieve shade and create a sense of place?
- Is there an absence or minimal number of interrupting driveways? If there are driveways, are they designed for safe use by cyclists traveling in bicycle lanes or on the roadway?

Good Streets

- Are lanes narrow (10–11 feet) and appropriate for the area type (neighborhood, commercial, downtown, etc.)?
- Is the riding surface smooth, stable, and free of debris? Is drainage adequate, and are drainage grates designed for cyclists?
- Are bicycle accommodations (bicycle lanes, signs, etc.) provided on both sides?
- Are the provisions for cyclists suitable given the characteristics of the roadway or path (speed, volume, traffic, and functional classification)?
- Are bicycle facilities continuous?
- Are transition areas designed with logical termini or do they end abruptly, potentially contributing to sudden and difficult merges, mid-block crossings, or behaviors such as wrong-way riding?
- On one-way streets, are motorists' speeds supportive of bicycling?
- Is through access provided for bicycles at cul-de-sacs or streets with restricted vehicular access?

Good Intersections

- Are intersections compact?
- Are intersection accommodations designed to reduce conflicting movements and communicate proper bicycle positioning through the crossing?
- At intersections with heavy right-turning traffic volumes, do facilities help reduce the risk of right-turning vehicles colliding with bicycles that might be in the vehicle's right-rear blind spot?
- Are there medians to protect left-turning bicyclists?
- At signalized intersections:
  - Are bike boxes provided?
  - Are advance limit lines provided?
  - Are conflicts in crosswalks limited by prohibiting right turns on red or with protected left-turn phases?
  - Are countdown signals provided?

3.2 Filling in the missing links

Because sidewalks and other pedestrian infrastructure may not have been standard when many areas were initially developed there are often gaps in sidewalks or missing links. And, many communities use public funds for streets but require property owners to pay for sidewalks, which tends to lead to a fractured sidewalk system. Due to lack of continuous sidewalks, pedestrians are often forced to transition from sidewalks to road shoulders, grass or dirt "paths" along the sides of roadways. This discourages walking because it is inconvenient and raises a number of safety concerns when pedestrians must share streets with motor vehicles.

A program to fill in the gaps in sidewalks can play an important part in developing effective pedestrian infrastructure. The first step of such a program is developing an inventory of existing sidewalk infrastructure that identifies gaps. Gaps could be identified using aerial maps and on site investigations or by relying on residents to identify areas lacking sidewalks.

Once gaps have been identified a prioritization system should be developed to determine in what order missing links should be addressed.

Criteria for prioritization might include:

- Current pedestrian volumes
- Whether an area is already undergoing or has planned infrastructure improvements
- Existing utility and roadway conditions
- Current compliance with the Americans with Disabilities Act
- Location

Funding for such missing links programs has come from capital improvement bonds, sales tax revenue and programs like Safe Routes to Schools. Fort Collins and Boulder each have programs focused on filling in Missing Links. https://bouldercolorado.gov/transportation/missing-sidewalk-links-program

WHERE THE SIDEWALK ENDS: *An example of a fractured sidewalk system. Photo: City of Seattle.*

MEASURINGUP

COST: $$-$$$
IMPACT: High

APPLICATION: Areas lacking sidewalks
BENEFITS: Increased walking, safety
CHALLENGES: Prioritizing sidewalk improvements, identifying funding, if volunteer driven than you might need a bunch of volunteers

3.3 Safe Crossing for Pedestrians

One of the big problems that many of our communities have are wide streets, with multiple lanes of fast moving traffic, and no safe, comfortable crossings for people on foot. These function as barriers, effectively cutting pedestrians off from neighborhoods, schools and businesses, and posing real safety risks for those who do dare to walk. Nearly 5,000 pedestrians a year are killed in the US by collisions, and most of these accidents occur when pedestrians cross the street. In 2013, there were 50 pedestrian fatalities in Colorado.[12]

Safe pedestrian crossings at roads are key to keep people safe. Crosswalks, signals for pedestrians and motorists, and median refuges are tools to make pedestrians safer and more comfortable and will lead to increased levels of walking in a community.

Crosswalks

Pedestrian zones should be distinct so they are not perceived as just another part of the street by motorists. The greater distinction between the roadway and the pedestrian area, the safer the environment. From basic painted crosswalks to a fully grade separated crossing, there are a variety of ways to differentiate pedestrian areas from the rest of the roadway.

Painted Crosswalks mark a space for pedestrians to cross streets and provide a visual indication to drivers to anticipate pedestrians.

Textured Crossings are not only painted but actually uses different materials such as bricks, cobblestones or concrete to create a physical difference between the road and the pedestrian crossing.

Raised Crossings raise the pedestrian crossing to the level of the sidewalk and act as a speed "bump" for vehicles which must go up and down the bump to cross the intersection. In addition to slowing vehicles down, raised crossings also improve the visibility of pedestrians.

Mid-Block Crossings makes sense in areas with long blocks or where pedestrians frequently cross the road to get between major destinations. They should be paired with painted crosswalks, signage and even signals to ensure pedestrian safety.

Bulb-outs, or curb extensions, extend the sidewalk into an intersection which makes pedestrians more visible and reduces crossing times.

Crossing Islands and Median Refuges

It's not always easy to make it all the way across a busy road especially if there are not signals to

provide pedestrians with the right of way. Crossing islands and median refuges give pedestrians a safe place to wait so they don't have to cross both directions of traffic at the same time.

Signals

Pedestrian activated signals may be as straightforward as a pushbutton to activate a Walk/Don't Walk signal or more advanced such as flashing lights to give vehicles a clearer warning of a pedestrian crossing. One key element that should be considered is having the "Walk" sign turn on a few seconds before the green light for the adjoining cars, allowing pedestrians to be clearly visible in the crosswalk before cars start turning.

Grade Separation with Overpasses or Underpasses

Overpass and underpasses completely separate pedestrians from vehicle traffic when crossing the street. They tend to be expensive and are most appropriate for crossing the widest streets or major roadways.

Inclusion in Transportation Master Plans

Improved pedestrian crossings should be a part of any pedestrian or transportation master plan.

RESOURCES

A report, Costs for Pedestrian and Bicycle Infrastructure Improvements, provides details on the range of costs for the pedestrian improvements discussed above.

http://www.pedbikeinfo.org/data/library/casestudies_details.cfm?id=4876

The City of Boulder developed a report on different types of pedestrian crossing treatments which includes a worksheet and a flowchart to help make decisions about which treatments make the most sense under different conditions.

https://www-static.bouldercolorado.gov/docs/pedestrian-crossing-treamtment-installationguidelines-1-201307011719.pdf

The Pedestrian Safety Guide and Countermeasure Selection System provides details on these and other pedestrian treatments and provides guidance to help make decisions about which treatments make the most under different conditions.

http://pedbikesafe.org/

MEASURINGUP

COST: $ - $$$
IMPACT: High

APPLICATION: Dangerous intersections
BENEFITS: Increased walking, greater safety
CHALLENGES: Identifying funding

3.4 Road Diets

This may sound like a new approach to weight loss, but it is actually much more - it is a technique to make roads safer for all users, and increase walking and biking, for little more than the cost of some paint.

So what is a road diet? Many of our towns and cities have four-lane arterial roads where traffic is heavy and cars are turning at many locations. There is an increased risk of injuries because there is no safe and comfortable spot to ride a bike and high speed traffic right next to the sidewalks makes for an unpleasant place to walk. In the last decade, many towns have begun to put these roads on a diet, going from two through lanes in each direction to one lane in each direction, combined with a center turn lane, and using the extra space for some mix of bike lanes, wider sidewalks, and on street parking.

If there are technical or political obstacles that make it challenging to remove through lanes, sometimes a road diet can be implemented by narrowing the lanes to make room for bike lanes. It turns out that many streets have wider lanes than they need – and that wider lanes encourage people to dive faster, making the streets more dangerous. Narrowing lanes from 13 feet to 10.5-11 feet can allow you to leave two lanes of traffic in each direction and still stripe 4-5 foot wide bike lanes.

While reducing the number of lanes might seem like it would worsen traffic and make the road less safe, when done right the results are the opposite. According to the US Department of Transportation, "studies show that road diets reduce all traffic crashes by an average of 29 percent, and when used on rural highways that pass through small towns, they can reduce crashes by almost half – 47 percent."[13]

The researchers found that road diets work best on roads that have a volume of under 20,000 cars per day. Studies have shown that at these volumes, road diets don't increase congestion and that neighboring businesses see no negative impacts.

You can spend a lot of money on a road diet if you have it – for example, in downtown Denver

ROAD DIETING: *Before and after a road diet in Colorado Springs. Photo: National Complete Streets Coalition.*

in 2011, local businesses chipped in $4 million to a $14 million rebuild of 14th Street, to widen the sidewalks, add street trees, add bike lanes, and go from two lanes in each direction down to one. It was worth it to the businesses because the quieter, nicer street meant more people walking down the street, browsing in shops and eating in restaurants. In Alamosa, the city and CDOT spent about $4 million to rebuild Highway 160 through downtown, narrowing it from four through lanes to two lanes, a center turn lane, bike lanes, and wider sidewalks with "bulb-outs" at the intersections to help slow traffic and make for safer crossing on foot.

But road diets can also be cheap. If you aren't widening the sidewalks, it is often possible to implement a road diet for little more than the cost of paint and labor for restriping the traffic lanes. If you do this at the time the street was getting repaved or restriped anyhow, the incremental cost can be close to zero.

MEASURINGUP

COST: $ - $$$
IMPACT: Large

APPLICATION: 4 lane arterials, main streets
BENEFITS: Reduced accidents, increased walking and biking
CHALLENGES: Harder to do if traffic volumes over 20,000 cars/day

3.5 Safe Routes to School

The Safe Routes to School (SRTS) program is a national effort to support safe walking and biking to school. Over the last 50 years, there has been a huge decrease in the percentage of children who walk or bike to school- from about half of all kids to only 10%– even as childhood obesity has increased to dangerous levels. The goal of SRTS is to help reverse this trend by making it easy for kids to get exercise as part of their daily routine of getting to school.

CDOT administers the program, allowing local governments and school districts to apply for funding for non-infrastructure programs - things that focus on education and encouragement. These are typically projects that may cost $20,000-$50,000. For example, in 2014 the top scoring program that was funded by CDOT was

SAFE ROUTES TO SCHOOL

The federal government supported the program with dedicated funds for every state from 2005-2012; in 2012 Congress cut dedicated funding but still allowed states to allocate some federal funds to SRTS programs. Colorado has been allocating a very small amount of state funding to keep the program going. Interestingly, in polling conducted in early 2014 by the Colorado Transportation Coalition, SRTS was listed by voters across the state as the top priority area where they would like to see state transportation funding increased.

a partnership in Gunnison and Crested Butte to organize bike rodeos at schools, hold a "We love to bike" week, and ensure that every elementary school kid gets education on safe walking and biking.

Experience across the nation shows that SRTS is effective at increasing active transportation to schools. National surveys show that they increase walking and biking by about 30% at participating schools. At the most successful schools in Colorado about 30% of students are walking or biking, compared to the 10% national average.

As of spring 2015 Colorado does not fund SRTS programs that build infrastructure, like missing pedestrian or bicycle links to a school, because of limited funding. Given the strong public support for SRTS, this may change, so make sure to check the guidelines.

For more information, check out the CDOT Safe Routes website at https://www.codot.gov/programs/bikeped/safe-routes.

MEASURINGUP

COST: $
IMPACT: Medium to High

APPLICATION: Elementary and middle schools
BENEFITS: More students walking and biking; decreased traffic near schools
CHALLENGES: Involvement from town and school districts; limited state funding available

SECTION 4

Making our communities bikable

4.1 Making the case for bicycles

One of the biggest reasons towns and cities across the country are embracing bicycles is because it just makes good business sense. Simply speaking, bikes are good for the bottom line. And, when you are talking with local officials about making your community more bikeable, this carries a lot of weight.

There are five major ways that bicycles contribute to local economies.[14]

Reduced healthcare costs. The fastest growing health problems in America are all related to inactivity. Fitting exercise into busy lives can be a real challenge. But when you use a bicycle as the way to get around town, you don't have to fit in an extra trip to the gym – your commute to work or school just became your exercise. Studies show that there is a huge health benefit from a community designed in a way that supports active transportation – and this translates into lower healthcare costs.

Savings for individual bike commuters. If your destination is beyond walking distance, there really isn't another option that comes close to the savings from biking. The average cyclist spends about $300/year on cycling; the average driver spends about $8,000.[15] And most of that money spent on driving goes outside of our communities, whereas much of the money saved by cycling will be respent on goods and services locally, multiplying the economic impact.

Savings on infrastructure. Bikes have huge advantages compared to cars when it comes to how much money it costs to provide places to ride and park. This is pretty obvious – you can

BIKE SENSE: *Making room for bikes makes financial sense. Photo: Bike to Work blog.*

fit a lot of bikes in the space it takes to park one car. And because bikes are so light, they do virtually no damage to the streets. If we can shift trips from cars to bikes, then we can spend less money providing parking and less money on maintaining our roads.

Benefit for local businesses. Multiple studies have shown that people on bikes tend to spend more in local stores. They are travelling more slowly, which makes them more likely to notice shops and restaurants and more likely to stop. Plus, they are far less likely to leave town for the big box retailer the next town over. And because you can fit more bike parking in front of a store, customers can often bike right up, rather than having to park a car far away. Martha Roskowski, director of the Green Lane Project, quotes a business owner saying "We like to see credit cards going by at less than 35 miles per hour…."

Attracting employees and businesses. The quality of life benefits of good bicycle infrastructure - the opportunity to get around town without having to drive, to get exercise, to skip the hassles of congestion and parking – are a powerful consideration on where many people choose to live, and many businesses choose to locate. Chicago Mayor Rahm Emanuel embraced bicycles, not out of some feel-good ethic but because protected bike lanes are "an integral part of my economic development strategy."

On the other side, you may hear the argument that cyclists don't pay taxes and should have extra registration or license fees. It turns out this argument is just plain wrong. As Elly Blue documents in the book Bikenomics, most local road funding does not come from gas taxes, but from sales and property tax that are paid by everyone, whether they have a car or not. And because bike infrastructure is cheap (less than 1% of transportation funds go to bikes in the US), and since bikes do almost no damage to the roads, a cyclist without a car probably overpays about $250 a year in transportation taxes. So don't feel guilty when you ride and don't let cycling opponents get away with this argument!

Will Colorado residents support cycling?

Over the last decade, many Colorado cities and towns have begun making significant efforts to make their towns more bikeable – and it shows. As of 2014, Colorado had twenty cities and counties that had been awarded a Bicycle Friendly Communities designation by the League of American Cyclists, including two of only four cities in the nation that reached the Platinum level designation (Boulder and Fort Collins). And Colorado was ranked the 6th best state for cycling by the League in 2014.

But there is still lots of room to grow! In the US as a whole, about 1% of all trips are by bicycle. Colorado is doing well by US standards – about 2% of commute trips are by bicycle. The most bicycle friendly countries in the world in Northern Europe have rates as high as 25%.

One of the barriers to improving cycling is the perception that only a small core of residents

are interested in cycling. One mayor of a prominent city in Colorado (to go unnamed!) has gone so far as to state that "Bicycles are toys that don't belong on public streets."

This does not reflect the attitudes of most people. There has been quite a bit of work done over the last few years to survey attitudes towards cycling in lots of different towns and cities. Researchers typically divide respondents into four categories: strong and fearless riders, enthused and confident riders, interested and concerned (people who would like to bike but are worried about safety), and no how/no way- people who have no interest in biking for transportation. While the results vary by region, typically about 25 or 30% are no how/no way, while 50 -60% are interested but concerned. Then there are the 15% or so of the population who are already at least occasional riders. So two-thirds of the population is interested in getting around on bicycles.

The point of improving cycling is to make it easier for those two-thirds to get around by bicycle – especially that big group of interested but concerned riders.

Polling in Colorado also shows that residents all across the state want to see better conditions for walking and cycling. In January of 2014, the Colorado Transportation Coalition hired a polling firm to conduct a statistically significant phone survey of 600 voters across the state, while exploring the feasibility of a tax increase for roads. To their surprise, the top three improvements that voters wanted to see were safe routes for kids to walk and bike to school, improved public transit, and expanded bicycle and pedestrian infrastructure. While support was strongest on the Front Range, only 39% of voters on the western slope and eastern plains thought that bike/ped infrastructure was not important.

4.2 Bike lanes and protected bike lanes

There are a number of treatments that should be explored to make bicycling on existing roadways safer and more pleasant. Communities should pay particular attention to upgrades that provide "low-stress" bicycle routes and networks, which allow interested but more novice riders to feel safe and comfortable.

Bike lanes are sections of the road marked exclusively for the use of bicycles. Adding a painted bike lane is often the first step in creating separate facilities for cyclists as it involves minimum labor and capital costs compared to more protected or separated bike lanes. Having a designated place on the road makes riders more comfortable and informs drivers that they can expect to see bicycles using the road. There are some downsides, however. If bike lanes run parallel to parked cars, bikers need to be cautious of car doors opening and blocking their path, which can push them out into the passing cars to avoid the door.

One innovation is buffered bike lanes, which add a 1.5 foot painted buffer between the bike lane and traffic, giving greater separation from moving traffic, and more room to avoid the doors of parked cars. This is a relatively cheap approach, costing approximately $8,000-$16,000 per mile.

Because many potential riders express concerns about the safety of cycling next to moving vehicles, more protected bike lanes encourage more riders than the bike lanes described above. These go by a lot of different names – cycle tracks, green lanes, and protected bike lanes - but they all put some kind of physical separation between cyclists and car traffic. These can be plastic posts, concrete curbs, planters, parked cars, or even a bikeway raised to sidewalk level. The costs range from quite low (approximately $8,000-$16,000/mile for moving parking from the curb and putting the bike lanes between the parked cars and the curb) up to millions of dollars for the raised bikeway.

A great resource describing the different options is an infographic from People for Bikes that shows fourteen methods to improve on the standard painted bike lanes and rates each method by its safety, costs, durability and aesthetics: **http://www.peopleforbikes.org/blog/entry/14-ways-to-make-bike-lanes-better-the-infographic**

SAFE LANES: *The 15th street protected bike lane in Denver. Photo: Downtown Denver Partnership.*

While protected bike lanes are a relatively new innovation in this country, they are spreading across the mountain west, with protected lanes installed in cities like Colorado Springs, Denver, Salt Lake City, and Boulder.

A lack of familiarity can make developing protected bikeways difficult and until recently innovative bike designs were sometimes discouraged by the state. However, in 2014 the Colorado Department of Transportation officially endorsed the National Association of City Transportation Officials design guidelines, making Colorado one of seven states that endorses these innovative approaches.

When considering improving bike lanes, we recommend looking for opportunities to quickly and inexpensively try protected bike lanes, so that your community can see how they work and become comfortable with them before making big commitments of money or right of way.

MEASURINGUP

COST: $ - $$$
IMPACT: Large

APPLICATION: Arterials, main streets
BENEFITS: Increased biking and reduced accidents
CHALLENGES: Need to allocate existing roadway space to create bike lanes; unfamiliarity with designs

4.3 Bike boulevards

Sometimes, the best way to get cyclists where they need to go in a way that allows even the most novice rider to feel comfortable and safe isn't to add a bike lane to a busy street but is instead to improve cycling on a parallel street with slower speeds and lower traffic volumes. This is often an inexpensive approach as well.

One way to do this is to develop bicycle boulevards. Bike boulevards are local roadways, often in residential areas, that have been optimized for cycling rather than for regular vehicle through traffic.

They work best in streets with very low traffic volumes (under 1500 cars per day), although they can be used on streets with up to 4,000 cars/day. Travel speeds on these streets should be 25 mph or lower.

Design of the roadway, traffic calming and reduction, signage and intersection treatments can all be used to optimize the street for cyclists without creating a separate space for them. There is not one ideal design – rather, a bike boulevard can be tailored to the needs along a particular corridor.

Some of the types of improvements may include signage making it clear that bicycles are

BICYCLE BOULEVARD *Riders on the Corona Street Bicycle Boulevard, which opened in 2014 in Colorado Springs. Photo: City of Colorado Springs.*

RESOURCES

The city of Denver has developed a great design guide for bike boulevards, available online at

https://www.denvergov.org/Portals/193/documents/DLP/knox court/BikeBlvdDesignGuidelines.pdf

A comprehensive guide to planning bike boulevards was developed by Portland State University:

http://www.pdx.edu/ibpi/bicycle-boulevard-planning-design-guidebook

expected, two way stops rather than four way stops signs, to allow bikes to travel continuously, traffic calming devices such as circles to slow down traffic, and bollards at intersections that allow bicycles through access, but only allow cars access to short sections, to keep traffic volumes low.

MEASURINGUP

COST: $ - $$
IMPACT: Medium

APPLICATION: Low speed, low volume streets in key places for a bicycle network
BENEFITS: Increased cycling, greater safety
CHALLENGES: Unfamiliarity with the idea; building neighborhood support

4.4 Cycling in Rural Areas

It is important to make biking as accessible in rural areas as much as urban areas. The general idea in both urban and rural areas is to create a 'safe space' where cyclists are comfortable riding without concern about vehicle traffic.

While there are some opportunities to build new multi-use paths parallel to rural roads (think of the route parallel to I-70 near Vail Pass), a less expensive option for most rural roads is to provide shoulders to create a space for cyclists.

Adding shoulders to rural roads can appeal to many constituencies, as it increases safety for all users, including vehicle drivers, and safety funds can be used for these purposes. An important time to advocate for safe shoulders for cyclists is during repaving or reconstruction projects. Communities should adopt a policy that requires that anytime repaving is planned, shoulders or bike lanes should also be considered.

Rural roads will generally be overseen either by

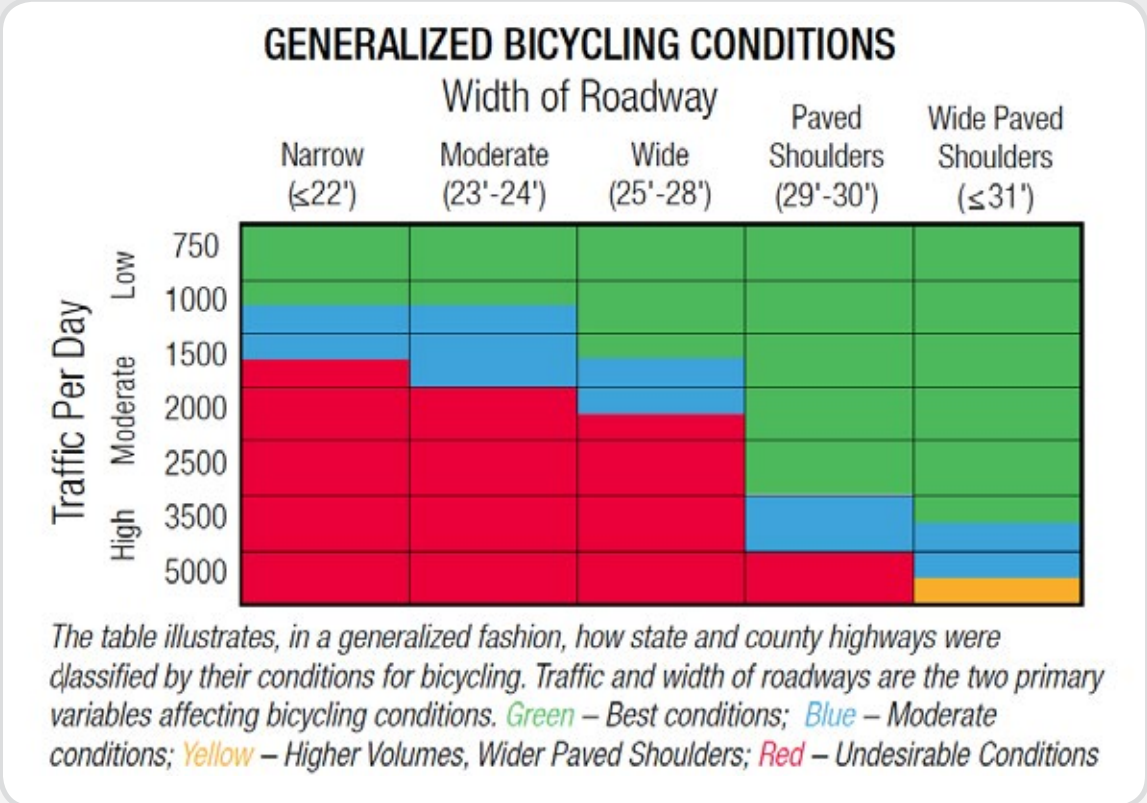
the county or the state. If they are county roads, you will need to work with the county transportation department. If they are state highways, they will fall under the jurisdiction of the Colorado Department of Transportation (CDOT) and you will need to work with the regional engineer. CDOT has adopted a policy requiring consideration of safe shoulders on rural roads: **http://www.pdx.edu/ibpi/bicycle-boulevard-planning-design-guidebook**. However, there is a lot of variation across the state in how vigorously this is applied, so it is important for local citizens speak up.

There are certainly times when it may be pretty cheap and easy to add shoulders or bike lanes during a repaving project, either by slightly narrowing lane widths or slightly extending the pavement width. In other cases where there are tight physical constraints it may be very expensive.

Here are some best practices around using shoulders as cycling infrastructure from the Georgia Department of Transportation: "Rural Roadways: the 4-ft bicycle lane (or "paved shoulder") is incorporated into the overall width of a 6.5-ft wide paved shoulder which includes a 16-in rumble strip offset 12-in from the traveled way. The shoulders are designed with a skip pattern rumble strip to allow bicyclists to smoothly enter and exit the bicycle lane."[16]

If sufficient shoulder space is available it may not be necessary to designate the shoulder as a dedicated bike lane.

Rather than striping, signage can be used to indicate the shared nature of the roadway/shoulder for vehicles and bicycles. One challenge can occur at intersections, where turning vehicles may not yield to bicyclists. Special attention should



The table illustrates, in a generalized fashion, how state and county highways were classified by their conditions for bicycling. Traffic and width of roadways are the two primary variables affecting bicycling conditions. Green – Best conditions; Blue – Moderate conditions; Yellow – Higher Volumes, Wider Paved Shoulders; Red – Undesirable Conditions

Source: Wisconsin Rural Bicycle Planning Guide, Wisconsin Department of Transportation, April 2006.

be paid to striping at these locations, to make it clear to cyclists where they should travel, and make it clear to turning vehicles that cyclists will be proceeding through the intersection.

Shoulder widths should vary depending on the roadway's posted speed:[17]

Posted Speed	Width (in feet)
0 to 30 mph	4
35 to 40 mph	6
45 or more mph	8

Source: Appendix A of the Wisconsin Rural Planning Bicycle Guide has an Appendix that allows planners to classify a rural roadway's suitability for bike traffic based on the road's traffic, pavement width, % of truck traffic and the percent of solid yellow line.[18] The Matrix below is a shorter version of the Appendix and gives a general idea of a rural roads suitability for cyclists.

MEASURINGUP

COST: $ - $$$
IMPACT: Low to medium*

APPLICATION: Rural Roads
BENEFITS: Increased cycling
CHALLENGES: Availability of right of way; cost; prioritization from CDOT or county transportation department
* Impact is low to medium in ridership; high in increased safety

4.5 Bicycle Crossings

Intersections and crossing major roads are some of the major challenges for making bicycling safe and comfortable for all levels of riders. A lot of accidents happen when a car turns across the path of a cyclist heading through an intersection. The best bike lanes and boulevards will only work if thought is also given to the intersections along the way.

Fortunately, there have been many innovations in the last decade designed to make cyclists more visible and make it clear to everyone where the bicycles will be.

We'll describe a few of these here; for an in-depth description of all the options, check out the NACTO Design Guide chapter on intersection treatments.[19]

One simple approach is to provide markings for

the bike lane through the intersection, to provide a clear expectation for where bicycles can be expected, and to make it clear to turning cars that bikes have the right of way.

Another approach is to install bike boxes at signalized intersections. A bike box is a designated area, typically painted green, which allows bicycles to get ahead of traffic, including turning traffic, at the intersection. This speeds up bike travel, by giving cyclists priority at intersections, and makes it very visible where they will be and decreases conflicts with turning vehicles.

Another useful innovation is bicycle specific traffic signals, giving cyclists a chance to cross without conflicts with other vehicles. These can even be used to allow bicycles to cross diagonally.

Another thing to think about is signal timing. Traffic signals are often timed in order to maintain maximum flow for cars. But instead signals could be timed to benefit the bicycle and pedestrian experience. This can facilitate uninterrupted flow of bicycles on a major bike corridor, ensure adequate time for pedestrians to cross, or give pedestrians and cyclists the ability to begin crossing a few seconds before cars – which tends to reduce accidents significantly.

Some of this can be expensive, requiring new signal heads and new software, but some of it is just a matter of how the signals are programmed – a policy choice, not a budget decision.

BEST FOR BIKES*: Bike box at 15th/Cleveland in Denver. Photo: City of Denver. Bicycle signal on Bannock Street in Denver. Photo: Denver Urbanism.*

MEASURINGUP

COST: $ - $$
IMPACT: Medium to high

APPLICATION: Intersections along bike lanes
BENEFITS: Increased safety, increased cycling
CHALLENGES: Unfamiliarity among planners and engineers; modest budget challenges

4.6 Bike Parking

To support and encourage bicycle trips by residents, employees and customers options for bike parking should be widely available, convenient, secure and visible.

Availability

To ensure availability, local jurisdictions can require that new and existing buildings that provide off-street vehicle parking, also provide a certain amount of bike parking.

The City of Aurora requires all non-residential buildings to provide two bike parking spaces (one inverted U bike rack) for every 66 vehicle parking spaces provided. In addition, for each two bike parking spots provided, the required number of vehicle parking spots may be reduced by one (up to 5% of the spaces).

The City and County of Denver has developed detailed requirements for the amount of bike parking required based on the density of the area and a building's zoning.

For a building in denser areas, such as the downtown or urban centers, bike parking requirements are higher than for more suburban areas. For example, libraries in suburban areas are required to provide one bike space per 10,000 square feet while offices are required to provide one bike space per 20,000 square feet, and 60% of the spaces provided must be in an enclosed facility such as a bike locker, a room in the building or in a parking garage. For urban areas, one bike space is required per 7,500 square feet of office space. Denver also requires bike parking be provided by apartments.

Convenience and Visibility

Generally, the location of bike parking should be close to building entrances (within 50 feet) to allow for easy access and highly visible to allow for monitoring and to deter thieves.

Security

For outdoor and short term usage the 'Inverted U' is the standard type of bike rack required by Denver and Aurora and for Denver any other type of rack would need to meet the following specifications:[20]

- "Supporting the bike frame at two locations

PARKING SOLUTIONS: *At left, a bike corral in front of the Trident bookstore, Boulder. Photo: Will Toor. At right, low-cost but effective bike parking at a multifamily location. Photo: Boulder Housing Coalition.*

RESOURCES

Denver's 'Bike Parking in the Right of Way' page shares some general information on their requirements for bike parking with links to more detailed documents.
https://www.denvergov.org/bikeprogram/BicyclinginDenver/BikeParking/tabid/438244/Default.aspx

Lakewood bike parking standards offer another example of how much bike parking to provide for each type of land use in the zoning code.

https://www.lakewood.org/City_Clerk/Codes_and_Laws/Municipal_Code/Title_17_-_Zoning/Article_8_-_Parking_and_Loading_Standards/Article_8_-_Parking_and_Loading_Standards.aspx

(not just a wheel)

- Allowing both the frame and at least one wheel to be locked to the rack (without requiring that the lock be placed near the bicycle chain)
- Allowing the use of either a cable or "U-type" lock
- Allowing all types and sizes of bicycles, including various types and sizes of frames, wheel sizes, and tire widths."

Even more secure bike parking can be provided by bike lockers or indoor bike parking which is better for longer term users (such as employees or commuters parking at bike and rides).

For businesses, having good bike parking located near the business is a clear winner. Cyclists are more likely to shop locally and tend to stop at stores more often than motorists. Since they are moving more slowly, it is easier to see storefronts, and it is so much easier to park. In Madison, WI, retail sales went up 3% when the city installed good bike parking near shops.[21]

Some businesses have gone further, and asked to convert on-street parking spots in front of their stores into "bike corrals", which are clearly designated bike parking located on the street right in front of a store. This means that instead of only one customer being able to park at the front door, 12-15 customers can park right there.

MEASURINGUP

COST: $
IMPACT: Medium

APPLICATION: Zoning Code; Building code
BENEFITS: Increased number of cycling trips
CHALLENGES: Upgrading parking at existing buildings

RESOURCES

The Pedestrian and Bicycle Information Center released a comprehensive guide to bike sharing in the United States which reviews many of the best practices from bike share programs across the country.
http://www.pedbikeinfo.org/programs/promote_bikeshare.cfm?/bikeshare

The Institute for Transportation and Development Policy examined bike share programs from across the world and offers additional best practices for bike shares. The same report also features the graphic below outlining different stages of setting up a bike share.
https://www.itdp.org/the-bike-share-planning-guide-2/

4.7 Bike Share Programs

Bike sharing gives people an easy and flexible way to make roundtrip or point-to-point trips around a town/city's core area that may be too long for walking and inconvenient for driving. Bike share users rent bicycles at self-service bike stations that are set up around the city and then return the bicycle to any of the bike stations. Users pay for an annual, monthly or daily membership in addition to paying for longer periods of use.

Benefits of bike sharing include reduced traffic congestion, less need for parking, and less use of fossil fuels and their related greenhouse gas emissions and other air pollutants. They can also bring economic benefits, by making it easier for customers and employees to get to shopping and jobs. Finally, more people out on the street on bikes can translate into higher property values.

One advantage of implementing a bike share program compared to other transportation options is that the costs to implement a bike share are relatively modest and the time from planning to implementation is relatively short.

The capital costs (bikes, stations, staff time) to set up a bike share can fall between $4,200 to $5,400 per bike with annual operating and maintenance costs between $100 and $200 per bike.[22]

Bike share programs work well when combined with transit as they allow easy access to a wider area around major transit stops. When people are on foot, they are usually willing to walk about a half mile to transit; bike share at transit stations can easily increase this to a mile or more.

Three cities in Colorado: (Denver, Boulder and Aspen) have implemented bike share pro-

BIKES FOR ALL: *A bike share program in Boulder. Photo: Danny Katz.*

grams. Bike share tends to work best in areas where there are substantial numbers of visitors or in-commuters, who may be interested in using a bicycle to get around but are unlikely to have one with them. So resort towns, tourist destinations, and cities that function as employment centers for the surrounding area are all good candidates.

PLANNING

- Conduct feasibility study
- Evaluate integration with public transportation
- Select business model
- Identify and secure funding
- Procure equipment
- Consider issues of equity
- Consider infrastructure improvements

IMPLEMENTATION

- Select service hours and seasonal availability
- Program marketing and sustainability
- Safety and liveability
- Bicycle redistribution
- Theft and vandalism

PROGRAM EVALUATION

- Program sustainability
- Integration with transit network
- Bicycling visibility
- Healthy living
- Accessibility
- Data analysis

MEASURINGUP

COST: $ $
IMPACT: Medium

APPLICATION: Core areas, regional destinations, transit station areas
BENEFITS: Reduced accidents, increased walking and biking
CHALLENGES: Need organization to operate it; often operated by nonprofit organizations with local government support

4.8 Making the connection between bikes and transit

One of the challenges with public transit is how to address the "first and final mile" connection between the transit stop and the destination. Lots of research shows that people are willing to walk about a quarter mile to and from transit, but use drops off quickly beyond this distance.

However, it is pretty easy for people to ride a bike a mile or more in the time it would take to walk a quarter mile. So good bike connectivity at transit stops increase the reach of a bus or rail line stop to an area 16 times larger!

Of course the basic bicycle infrastructure around transit plays a big role in the success of expanding transit's reach. Expanding bike infrastructure was described in in **other sections of this guide**. However, the usability of transit with a bike also will play a big role, ensuring that people can make the first and final mile of their trip on a bike.

First, it needs to be easy and convenient to bring bicycles onto buses. There are three ways to do this – external bike racks on the front or rear, luggage racks under the bus on larger regional buses, and allowing bikes on the bus.

The transit agency in Colorado that is leading the way is the Roaring Fork Transit Authority (RFTA), which has introduced two key innovations to serve bike riding passengers.

First is exterior racks that can carry four bikes, unlike the two-bike racks that are common on most buses run by other transit agencies in Colorado. This doubles the capacity on their regular routes.

In addition, RFTA introduced a Bicycle Express route. This serves an area with very high bicycle demand – and RFTA responded by taking out half the seats and allowing patrons to bring their bikes on board, allowing ten more.

Another important element is secure bicycle storage at transit stops and stations. At a minimum this means having bike racks at the stops. However, secure parking that is protected from both thieves and the weather is even better. Along the US 36 corridor between Denver and Boulder, many "Bike Then Bus" shelters have been installed. Riders get keycard access to secure bike parking.

Facilitating the bus-bike connection makes

CONNECTING TO TRANSIT: *14th St. Transit Center Bus-then-Bike Shelter. Photo: Danny Katz.*

both public transit and cycling work better, extending the reach of each mode, and increasing ridership. There is an important case to make to the local transit agency that first and final mile solutions, including better connections between bicycles and the bus or train, are important to the transit agency mission. Transit agencies often spend millions of dollars on a bus route – or maybe a billion dollars or more on a train route – but do not invest in the modest improvements that would be needed to maximize use of these investments by making the walk and bike connection to transit a safe and pleasant experience.

MEASURINGUP

COST: $-$$
IMPACT: Medium

APPLICATION: Transit agency, local jurisdiction
BENEFITS: Increased cycling and transit use; addresses first/final mile challenge
CHALLENGES: Engaging a transit agency if they do not have a lot of public engagement capacity; getting local government and transit agencies to work together to address the transit-bicycle interface.

SECTION 5

Public Transit

5.1 Expanding Rural and Small Urban Transit

In smaller urban and rural areas, transit service may consist of call and ride systems offering on demand trips to local destinations and regional centers or a small number of fixed route services. Much of the services offered by rural and small urban systems are often directed at populations such as the elderly and disabled. While smaller in scale than large urban area transit service, these rural and small urban transit systems offer important economic and social benefits to the communities they serve.

A challenge for many rural and small urban transit systems is how then can improve mobility in their area and expand their services to a larger population. As a first step to expand service communities should evaluate the current system and decide what steps will be most effective at expanding service within expected budgets.

Conveniently, the Colorado Department of Transportation (CDOT) recently completed its first Statewide Transit Plan. As part of the overall statewide plan there are ten regional rural transit plans that provide specific recommendations on how to improve mobility both in the short and long terms.

Each regional plan assesses the current transit offered in the area by both public transit providers and human service transit providers (such as those serving populations like veterans, dis-

RESOURCES

The full Statewide Transit Plan and each regional plan is available at:
http://coloradotransportationmatters.com/other-cdot-plans/transit/plan-documents/

CDOT offers information on the state and federal grants it distributes to local transit agencies at:
https://www.codot.gov/programs/transitandrail/transit/transit-grant-programs

abled or the elderly) and identifies how these services are currently funded.

The report then identifies the current and projected needs and gaps in service and what strategies can help to address these needs along with the requisite funding.
Most importantly, the report offers suggestions on potential funding sources to help fund the recommended improvements.

MEASURINGUP

COST: $$ - $$$
IMPACT: Medium to high

APPLICATION: Rural and small urban areas transit systems
BENEFITS: Increased transit ridership; access to jobs, healthcare
CHALLENGES: Identifying funding; identifying agency home for the program

5.2 Getting Better Transit in your Community

One of the challenges in many communities in Colorado is a lack of good transit service. In some places there is simply no local transit; in others the transit service is so underfunded that only limited service is possible. Even communities where there is some reasonable level of service, there are opportunities to make the service function much better.

First, it is important to recognize that transit agencies have a dual mandate that can pull them in competing directions. One mandate is to provide coverage – to have some service available for people who need it to get to work or school or the doctor – even if the service is slow and infrequent. The other mandate is to be efficient – to run frequent, fast service on routes where ridership will be high. These are hard missions to reconcile, and there is no one right answer.

However, many communities around the nation have begun to rethink this balance, and try to focus more of their resources on frequent service on routes that are likely to carry large numbers of people. By creating a grid of high frequency lines, it is possible to reach many destinations

with only one transfer and minimal wait time – thus making transit useful for many more people. This can translate into increased ridership and more constituents who support better funding and expansion of the system.

In the case studies section of this guide, we profiled the successful effort in Boulder to reallocate funding from infrequent, meandering bus routes to a grid of buses that come every 10 to 15 minutes. Just to show that this is not limited to liberal college towns, the city of Houston, Texas has just done the same thing on a massive scale. Houston found that there was so much duplication of service and services that were carrying very small numbers of people, that they could reallocate service and create a far more functional system – with no increase in operating costs!

The way to get started in your community is to begin by thinking of where people travel - where are the major destinations? Is it a school, a major employer, a downtown? Where do people travel from? Does the local bus service do a good job serving these trips? Does it come often enough that people believe they can leave their car behind and get to where they need to go? Review the data on how many riders per service hour each route has and look for routes that are extremely low ridership. Then ask questions – why do these routes exist? Maybe there is a good reason – perhaps they are providing essential lifeline service to a low income or senior area – but sometimes these routes are just historical artifacts. Could the funding be reallocated to provide better service that would attract more riders?

Typically, there is no group of citizens outside the transit agency who are taking this kind of look at the system. Usually, input comes from a particular neighborhood or interest that wants service; so if you instead take this big picture system wide look at how the whole system could be optimized, you may find insights that no one has thought of before – and compelling opportunities to make transit better in your community.

MEASURINGUP

COST: $ - $$$*
IMPACT: Low to high

APPLICATION: Any transit system
BENEFITS: Increased transit ridership; access to jobs, healthcare
CHALLENGES: Balancing increased frequency with lifeline coverage; lack of ridership data; additional funding may be required.
* depending on the changes you identify

5.3 Transit Pass Programs

Since the early 1990s there has been an explosion in the creation of "unlimited access" transit pass programs - often going by the name of EcoPass or U-Pass– where every member of some population, such as employees of a company or business district, or students at a university, receive passes allowing them fare free access to public transit.

Transit use tends to increase dramatically when unlimited access pass programs are introduced – one study indicates people with these passes are 9 times more likely to use transit. The higher ridership associated with these passes can justify higher levels of transit service, which in turn support higher levels of ridership – a virtuous cycle instead of a vicious one.

Transit pass programs tend to cost much less per person than an individual transit pass would, because they are purchased for everyone in the group, including those who don't use transit very much. Having a transit pass then encourages those folks to ride more. In many cases they are just filling empty seats on existing buses, so there is very little additional cost to the transit agency. Because of this, transit pass programs can be a very cost effective tool to maximize the use of existing transit service.

There are lots of different mechanisms that are used to fund transit pass programs. At universities students have often voted to assess themselves a small student fee to pay for these programs. Many businesses provide these as an employee benefit. Some school districts partially fund EcoPasses for teachers, then require teachers who want one to pay part of the cost.

In some areas, parking revenues are used to pay for transit passes for employees within the parking district. Some neighborhoods in the Denver metro area have created neighborhood pass programs, where volunteers go door-to-door to raise the funds. And as we highlighted in our **case studies,** voters in at least one town in Colorado, Nederland, voted for a community wide property tax to buy everyone in the town a transit pass.

ECOPASS: *An Ecopass allows a pass holder to ride buses and light rail fare-free." Photo: Nedermayor blog.*

If you are within the Denver metro area, you can use the existing EcoPass program structure by organizing a funding mechanism at your school, business or neighborhood. In other areas, you may have to work with your transit provider to get the program started.

MEASURINGUP

COST: $$
IMPACT: Large

APPLICATION: Communities with transit service
BENEFITS: Increases transit ridership, makes better use of existing transit service
CHALLENGES: Can be challenging to raise the funds; funding is ongoing, not one-time capital

5.3 First and Final Mile Programs

One factor that can discourage people from using transit is not having an easy and convenient way to get from their home to a transit stop (first mile) and then from the end transit stop to their final destination (last mile).

They may feel that it is too far to walk or that making an additional transit connection will add too much time to the trip. Safety may also be a concern if pedestrians and cyclists lack adequate infrastructure to access the transit stops. For example, there are cases where there are not even sidewalks accessing transit stops. When this is the case people are more likely to use their car to drive from point A to point B.

There are a number of ways to address the first/final mile challenge and several are discussed in greater detail in this document.

Overall you should begin thinking about first and final mile planning as early as possible in any transit planning process. Agencies often focus on the big transit investment, leaving the station area planning and funding to individual communities – even though the first and final mile can make the difference for high ridership and a successful service.

This has been a particularly important issue in the Denver metro area as the FasTracks plan builds out a network of rail and bus rapid transit lines. The organization 36 Commuting Solutions recently completed a study on how to address first and final mile barriers at the major transit stations along the US 36 corridor between Boulder and Denver. While the solutions proposed by the report are tailored to the transit stations on the US 36 corridor they reflect best practices around providing first and final mile solutions specific to Colorado.

In addition, station specific strategies proposed in the report focused on improvements in cycling and pedestrian infrastructure and included: "grade separated crossings of major roadways, connections to the planned US 36 Bikeway, enhanced on-street bike facilities, trail extensions or conversions, and intersection and midblock crossing enhancements."

Top First and Final Mile Strategies Identified as Priorities:

- Secure long-term bike parking at major transit stops
- Way finding and signs indicating routes to major destinations close to major transit stops
- Offer Ecopasses (unlimited use transit passes) that allow users fare free access to feeder buses in addition to the rapid transit line.
- Expansion of private (eGo, Zipcar) and peer-to-peer carshare services (Uber and Lyft)
- Real time information on bus arrival times
- Secure scooter parking
- Bike share programs
- A mobile app to plan and coordinate trips among modes
- Adoption of land use policies that support transit

http://36commutingsolutions.org/us-36-projects/us-36-first-and-final-mile-study/

A first and final mile plan for the City of Los Angeles identified a number of potential strategies to address first and final mile challenges as well as a framework for planning around the first and final mile.
http://media.metro.net/docs/sustainability_path_design_guidelines.pdf

MEASURINGUP

COST: $-$$$
IMPACT: High

APPLICATION: Areas around major transit stops
BENEFITS: Increased transit ridership
CHALLENGES: No one size fits all, area planning needed to maximize effectiveness; lack of clarity over whose responsibility it is (the local government or the transit agency)

5.4 Carshare

Car sharing provides people with convenient short-term access to vehicles giving them an alternative to owning their own vehicle. Estimates vary, but one carshare vehicle is expected to remove anywhere between five and twenty other vehicles from the roadway.[23] Several carshare companies (eGo CarShare, car2go, Zipcar) are already operating in different Colorado municipalities including the Denver metro area as well as Boulder and Fort Collins.

Carshare works by having users pay a membership fee and also pay for the amount of time they use the car and how far they drive, which can be much less expensive than owning and operating one's own vehicle. There are two major variants of car-sharing – ones where the cars must be dropped off at particular locations, and one-way carsharing, where vehicles may be dropped off anywhere within a designated zone. Users access the location

RESOURCES

For a detailed discussion of the policy choices that a local government should consider around carsharing see "Carsharing and Public Parking Policies":
http://transweb.sjsu.edu/MTIportal/research/publications/summary/0909.html

City CarShare has developed a number of resources including a guide to starting a carshare and case studies and best practices for carshare programs.
https://citycarshare.org/why-city-carshare/our-programs/education-advocacy/

using smartphone apps. In Colorado, the largest one-way system is car2go in Denver.

Some of the benefits of carsharing include:[24]

- Reduced vehicle ownership costs;
- Reduced vehicle travel;
- Reduced demand for parking;
- Increased transit use;
- Increased cycling and pedestrian trips.

In order to develop carshare programs, the municipality should work with carshare companies to allow carshare vehicles to make use of parking spaces currently under the control of the municipality (such as metered parking spots). These discussions include deciding what types of spaces to allocate, how many spaces to allocate to each carshare operator, how much the carshare operator must pay to use the spaces and parking enforcement of those spaces.

The City and County of Denver leases the use of 30 parking spaces in downtown for different car share companies. The leasing of spaces and the selling of permits can actually help to increase a municipalities' revenue. The first year of permit sales generated nearly $300,000 in revenue for Denver.

To encourage the adoption of carshare in a community, developers could receive a parking bonus (a reduction in the minimum number of required parking spaces) if they offer a certain number of carshare spaces along with unbundling of the parking spaces. For example, the City of Seattle allows a reduction of up to 5% in the total number of spaces required for a new development if the development provides parking access for carshare.

MEASURINGUP

COST: $*
IMPACT: Medium

APPLICATION: Downtowns and transit hubs
BENEFITS: Reduced parking demand, reduced vehicle trips, enhanced access to and from transit
CHALLENGES: Negotiating parking spaces for carshare vehicles
* Little cost to the public sector

5.5 Bus rapid transit

Beyond local and regional bus service, the next step to great public transit is rapid transit. In the Denver area, voters have invested via RTD in a network of light rail and commuter rail lines. These are great services but the lack of funding could make it hard for other parts of the state to make similar investments. However, that does not mean that the rest of the state (or those parts of the Denver area that don't have rail) can't get many of the benefits of rapid transit, through a much more inexpensive innovation known as Bus Rapid Transit, or BRT.

BRT offers riders faster transit than regular bus service and greater flexibility compared to fixed guideway systems such as light rail and commuter rail at a far lower capital cost

Several BRT projects already operating or under construction in Colorado include the MAX BRT along the Mason Street corridor in Fort Collins, the VelociRFTA BRT line along State Highway SH 82 between Glenwood Springs and Aspen, and the Flatiron Flyer BRT service soon to open along the US 36 corridor between Boulder and Denver.

The most important element of BRT is a right of way that allows buses to travel faster than general automobile traffic, giving a travel time advantage to transit. The best service will come from a dedicated BRT right of way for the length of the corridor. However, due to space limitations and the potential high cost of expanding roadways, it may not always be possible to create new capacity for BRT lanes. Even without using new capacity, it is possible to achieve meaningful travel time savings by incorporating BRT service into existing roads in the following ways:

- Operating in High Occupancy Toll (HOT)

BRT deserves serious consideration for the following reasons:

- Initial capital costs approximately one-fifth that of rail systems.
- Additional flexibility allows BRT to address first and final mile challenges and makes suburb-to-suburb routes feasible.
- BRT stations have the potential to spur significant amounts of new residential and commercial transit-oriented development (TOD).
- BRT fits in well with the stated goals of the Colorado Department of Transportation (CDOT).
- BRT can provide essential service to important populations such as the elderly, millennials and low-income residents.

lanes

- Operating on the shoulder of highways (often only during peak periods)
- Operating in a physically separated median
- Using dedicated right of way for portions of a corridor
- Using bidirectional lanes that share one lane for both directions
- Using peak-hour only lanes, where BRT uses a dedicated lane during peak travel times only.
- Transit "queue jump" lanes that allow buses to bypass congestion at intersections.
- Transit signal priority at signalized intersections

Several communities in Colorado are gaining experience with the benefits of BRT.

RFTA's BRT service, branded as VelociRFTA, began service in 2013 along SH 82 from Glenwood Springs to Aspen. This service uses a mix of general purpose lanes, HOV lanes along a portion of the highway, and peak period bus-only lanes on Main Street in Aspen.

The US 36 Flatirons Flyer BRT service will begin service in 2016, after the completion of HOT lanes from Denver to Boulder. Buses will operate both in the managed lanes and on the shoulders of the highway. There will be slip ramps, queue jumps (which are short bus-only lanes at intersections), transit priority at signalized crossings near stations, branded service, prepaid fares at stations, real time passenger information, and wi-fi available on the buses. Peak period frequencies will start at 3-15 minutes, depending on location, increasing to 2-5 minutes by 2035. The Northwest Area Mobility Study (NAMS) projects 2035 ridership of 18,800 trips per day.[25] Rush hour bus riders from Table Mesa to Union Station are projected to arrive 24 minutes faster than drivers in the general purpose lanes.

The MAX BRT along the Mason Street Corridor is a five-mile BRT line that recently opened in Fort Collins. It serves the main north-south arterial in the city, College Avenue, which experiences daily traffic volume of around 30,000 vehicles. The BRT line was developed in response to increasing vehicle

BRT IN ACTION: *RFTA's BRT service, branded as VelociRFTA, began service in 2013 (left). Photo: 36 Commuting Solutions. First phase BRT on US 36 (right). Photo: Boulder Daily Camera.*

congestion which often led to delayed bus service along the College Avenue corridor. The BRT has its own right of way for the majority of the corridor. This is an example of a BRT line operating in an urban area, which presents a different set of challenges and opportunities than the highway-based BRTs along the US 36 and Highway 82 corridors. It is expected to have 3,900 daily boardings in its first year of operation.

MEASURINGUP

COST: $$ - $$$
IMPACT: High

APPLICATION: High traffic corridors
BENEFITS: Cheaper than rail; spur economic development; traffic relief; improves service and increases ridership
CHALLENGES: Major investment of time, planning and money; needs right of way or other strategies to beat traffic.

SECTION 6

Key Resources

6.1 Organizations and Government

Colorado Department of Transportation Division of Transit and Rail
https://www.codot.gov/programs/transitandrail

HEAL Colorado
http://livewellcolorado.org/healthy-policy/heal-cities-and-towns

Bicycle Colorado
http://bicyclecolorado.org

CASTA, Colorado Association of Transit Agencies
http://www.coloradotransit.com

NACTO Urban Street Design Guide
http://nacto.org/usdg

Green Lane Project by People for Bikes
http://www.peopleforbikes.org/green-lane-project

Smart Growth America
http://www.smartgrowthamerica.org

6.2 Carsharing Resources

Carsharing and Public Parking Policies:
Assessing Benefits, Costs, and Best Practices in North America. Mineta Transportation Institute.
http://transweb.sjsu.edu/MTIportal/research/publications/summary/0909.html

Getting More with Less: Managing Residential Parking in Urban Developments with Carsharing and Unbundling. City Car-Share.
https://citycarshare.org/wp-content/uploads/2012/06/CITY-CARSHARE-best-practices-010212_lowres.pdf

Bringing Car-Sharing to Your Community. City Car-Share.
https://citycarshare.org/wp-content/uploads/2011/12/CCS_BCCtYC_Long.pdf

6.3 Bike and Pedestrian Combined Resources

Colorado Statewide Bicycle and Pedestrian Plan. CDOT.
https://www.codot.gov/programs/bikeped/building-a-bike-ped-friendly-community/Bike_Ped_Plan/BikePedStatePlan/view

Costs for Pedestrian and Bicycle Infrastructure Improvements. Pedestrian and Bicycle Information Center.
http://www.pedbikeinfo.org/data/library/casestudies_details.cfm?id=4876

Bicycle and Pedestrian Guides and Countermeasure Selection Systems. FHWA.
http://www.pedbikesafe.org

Colorado Bike and Pedestrian Policy. CDOT.
https://www.codot.gov/programs/bikeped/documents/1602-0-policy-bike-pedestrian

Colorado Bike and Pedestrian Procedural Directive. CDOT.
https://www.codot.gov/programs/bikeped/documents/1602-1-2013-bicycle-and-pedestrian-policy

6.4 Pedestrian Resources

Walkscope http://www.walkscope.org

Missing Sidewalks Links Program. City of Boulder.
https://bouldercolorado.gov/transportation/missing-sidewalk-links-program

Pedestran Crossing Treatment Installation Guidelines. City of Boulder.
https://www-static.bouldercolorado.gov/docs/pedestrian-crossing-treamtment-installation-guidelines-1-201307011719.pdf

Pedestrian Safety Guide and Countermeasure Selection System. FHWA.
http://pedbikesafe.org/PEDSAFE/index.cfm

6.5 Bike Resources

A Technical Guide for Conducting Bicycle Safety Assessments for California Communities. UC Berkeley.
http://www.techtransfer.berkeley.edu/sites/default/files/file_uploads/bsa_guidebook_2013.pdf

Bicycle Safety Guide and Countermeasure Selection System. FHWA.
http://pedbikesafe.org/BIKESAFE/index.cfm

Getting the Wheels Rolling, A Guide to Using Policy to Create Bicycle Friendly Communities. Change-Lab Solutions.
http://changelabsolutions.org/sites/default/files/Getting_the_Wheels_Rolling_Toolkit-FINAL_20130823_0.pdf

Bikenomics: How Bicycling Can Save The Economy. Elly Blue.
http://takingthelane.com/bikenomics

14 Ways to Make Bike Lanes Better. People for Bikes.
http://www.peopleforbikes.org/blog/entry/14-ways-to-make-bike-lanes-better-the-infographic

Bike Boulevard Design Guidelines. City and County of Denver.
https://www.denvergov.org/Portals/193/documents/DLP/knox%20court/BikeBlvdDesignGuidelines.pdf

Bicycle Boulevard Planning & Design Guidebook. Portland State University
http://www.pdx.edu/ibpi/bicycle-boulevard-planning-design-guidebook

Colorado Highway Shoulder Policy. CDOT.
https://www.codot.gov/programs/bikeped/documents/0902-0%20Shoulder%20Policy.pdf

NACTO Design Guidelines Chapter on Intersection treatments
http://nacto.org/usdg

Bike Parking in the Right Way. City and County of Denver
https://www.denvergov.org/bikeprogram/BicyclinginDenver/BikeParking/tabid/438244/Default.aspx

Parking Standards. City of Lakewood
https://www.lakewood.org/City_Clerk/Codes_and_Laws/Municipal_Code/Title_17_-_Zoning/Article_8_-_Parking_and_Loading_Standards/Article_8_-_Parking_and_Loading_Standards.aspx

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