

An aerial photograph of the University of Colorado Boulder campus. The foreground and middle ground are filled with numerous red-brick university buildings, green lawns, and parking lots. A large, multi-story building with a curved facade and a large stadium-like structure are visible on the right side. In the background, a large, rugged mountain with rocky peaks and green slopes rises against a clear blue sky. The text "UNIVERSITY OF COLORADO BOULDER" is written in a white, sans-serif font across the upper middle of the image. Below it, the words "Transportation" and "Master Plan" are written in a large, white, serif font, stacked vertically.

UNIVERSITY OF COLORADO BOULDER

# Transportation Master Plan

MAY 2020



# Acknowledgments

The contributions of those people listed are gratefully acknowledged and appreciated.

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# Preface

## PURPOSE OF THE TRANSPORTATION PLAN

The Transportation Master Plan for the University of Colorado Boulder (CU Boulder) identifies the university's long-range vision for transportation, needs for various transportation modes and associated strategies to meet its transportation related goals. The Transportation Master Plan is intended to guide future transportation investments and to inform the 2021 Campus Master Plan which will outline change and growth anticipated for the campus's physical infrastructure.

CU Boulder is a complex environment for transportation. At a regional scale, growth in the Denver region combined with a housing shortage in the City of Boulder have put increased pressure on regional systems for moving people to and from the CU Boulder campus. Within the City of Boulder multimodal transportation systems are strong; however, the City and County both envision a more robust transit system than the Regional Transportation District can provide. And at the university scale, CU Boulder has emerged as an interconnected, multi-property campus where most members of the campus community travel between properties on a given day. East Campus and Williams Village are no longer just Main Campus's neighbors. Rather, all three properties interact with one another in a way that commands transportation between them. These changes at the regional, local and university scales have occurred in a time of rapid technology change across the world. This Transportation Master Plan seeks to identify a vision, needs and strategies that respond to the change that has already occurred while acknowledging that more change will come.

## PREPARATION PROCESS TO-DATE

The Transportation Master Plan was prepared through a 15-month process that began in January 2019. It engaged an Executive Committee of staff who deal with transportation daily through a series of monthly Deep Dives on topics including climate, transit, parking, walking and biking, transportation options, funding and governance. Subject Matter Experts also

participated in relevant Deep Dive meetings. The Transportation Master Plan team met with a Working Group representing students, faculty and staff who are users of the transportation system. This Working Group met quarterly to review analysis and to provide recommendations on the Transportation Master Plan's direction. An all-campus survey of students, faculty and staff was completed in April 2019 and received over 6,000 responses on transportation behaviors and attitudes.

This Transportation Master Plan's recommendations were developed based on the broad feedback received in the survey and based on direction received from the Working Group and Executive Committee.

# Glossary

**Articulated bus** – a long bus consisting of two rigid sections linked by a pivoting joint (articulation) enclosed by protective bellows.

**Bike lane** – a designated lane for people biking without physical barriers that restrict the encroachment of motorized traffic.

**Bikeways** – a general term describing various off-street paths or on-street bike lanes for use by people biking, skateboarding or using a micromobility device.

**Car share** – a service where a customer can rent a vehicle by the hour, day or longer. Car share members usually do not need to interact with employees to rent the vehicle.

**Core campus street** – these are closed off to private vehicles and open to people walking and biking.

**Cutaway vehicle** – a vehicle built on a van chassis. Starting with the chassis, a second stage manufacturers adds specific equipment, often so the vehicle can function as a mini-bus or shuttle bus.

**Designated bike route** – typically on a lightly traveled, local street with minimal traffic hazards that does not have designated bicycle facilities.

**E-bikes** – electric bicycle, privately owned or shared.

**E-scooters** – electric scooter, privately owned or shared.

**GHG emissions** – greenhouse gas emissions.

**Intracampus transit** – transit operating within CU Boulder's campus of three properties.

**Left-turn protected phasing** – a left-turn green arrow at a traffic signal.

**Micromobility** – a category of transportation modes that are very light, including electric scooters, electric skateboards, electric bicycles, etc. Micromobility devices may be privately owned or shared.

**Mobility Hub** – they provide transit terminals with integrated vehicle parking, bike parking and ride hailing zones.

**Pedestrian head start** – also known as a leading pedestrian interval, gives pedestrians the opportunity to enter an intersection three to seven seconds before vehicles are given a green indication.

**Pedestrian only path** – a pathway only for people walking.

**Pedestrian/bicycle mixed path** – a pathway shared between people walking and biking.

**Pedestrian/bicycle separated path** – a pathway with portions designated for exclusive use for people walking and people biking.

**Protected bike lane** – a designated lane for people biking with a physical barrier that separates the bicycle lane from adjacent motorized traffic.

**Queue jump lane** – the combination of short transit lanes with special traffic signal treatments to allow buses to cut to the front of the line.

**Ride hailing** – a service that matches passengers with vehicles via a Web site or mobile app.

**Sharrow** – also known as a shared lane marking, is a pavement marking that shows double chevrons on top of a bicycle. Indicates that a travel lane is to be shared by vehicles and people biking. In some cases sharrows are used to encourage bicycle alignment in a travel lane away from parked cars.

**Shuttle** – at CU Boulder, shuttles serve fixed routes or special events with smaller vehicles.

**Smart Cities** – describes different electronic Internet of Things sensors that collect data and enable gaining insight from that data to manage assets, resources and services efficiently.

**Transit Center** – provides multiple bus bays where regional, local and intracampus transit vehicles can stop to pickup or dropoff passengers, or to layover between runs.

**Transit lane** – a portion of the street designated for the exclusive use of transit vehicles.

**Transportation options** – the set of strategies that promotes the use of modes other than single occupancy vehicles (SOVs) by helping people use existing infrastructure and services. Transportation options includes Transportation Demand Management, or strategies and policies that aim to reduce travel demand.

**Transit Signal Priority** – modifies traffic signal operation when transit vehicles are present or nearby to give transit vehicles priority.





Students crossing the street at 18th & Colorado



# Executive Summary

The University of Colorado Boulder Transportation Master Plan makes recommendations necessary for CU Boulder to achieve its goals for its transportation system. It was developed to guide future transportation investments and to inform the 2021 Campus Master Plan. The Transportation Master Plan is a planning document and nearly all recommendations will require further refinement, study or design prior to implementation. Individual TMP sections, which are mode-specific, were developed to connect to other transportation modes (and TMP sections).





Recommendations of various scales are made within each section, many identified as pivotal strategies, projects or services. Some of the most significant strategies, projects or services include:

- **For transit:** A University-owned and controlled intracampus transit system operated as an essential service, with a fast and frequent network of bus lines to connect CU Boulder's properties.
- **For parking:** New parking co-located with proposed Mobility Hubs at 18th & Euclid, North Campus and Discovery Drive, along with policies and programs to manage demand and to create financing mechanisms for other transportation modes.
- **For walking, biking and micromobility:** streets, in collaboration with the City of Boulder, that move people comfortably to and from properties and intracampus paths and trails designed to move people comfortably and safely within campus.
- **For safety:** collaboration with the City of Boulder to implement the recommendations of the Vision Zero Boulder Safe Streets Report to reduce fatal and serious injury crashes.
- **For transportation options:** consolidation of CU Boulder's existing programs under one roof for streamlined delivery and a more intuitive customer experience, along with expanded programs to further improve options for all users and to reduce transportation demand.
- **For the fleet:** a detailed fleet assessment to identify areas for fleet consolidation and electric charging infrastructure to encourage department-owned vehicles to convert to electric vehicles.
- **Smart Cities technology:** as an incubator of innovation, CU Boulder can apply existing and future technologies to get the most out of its transportation system.
- **Monitoring:** regular monitoring to know how well CU Boulder is tracking towards meeting its Vision and Goals for transportation and to adjust implementation priorities accordingly.

Together, the individual transit, walking and biking networks and associated policy and program recommendations form a complete transportation system for CU Boulder.

Through climate research and analysis completed through the Transportation Master Plan, it was revealed that the mode share of single-occupant vehicle commuters and the distance traveled to campus increased significantly from 2005 to 2018. This occurred despite CU Boulder's intentions to reduce single-occupant vehicle commuting and GHG emissions. The TMP identifies proposed strategies to reduce commuter-related transportation GHG emissions, including supporting the recommendations of the Housing Master Plan to increase the population of students, faculty and staff living on or near campus.







Students walking through campus



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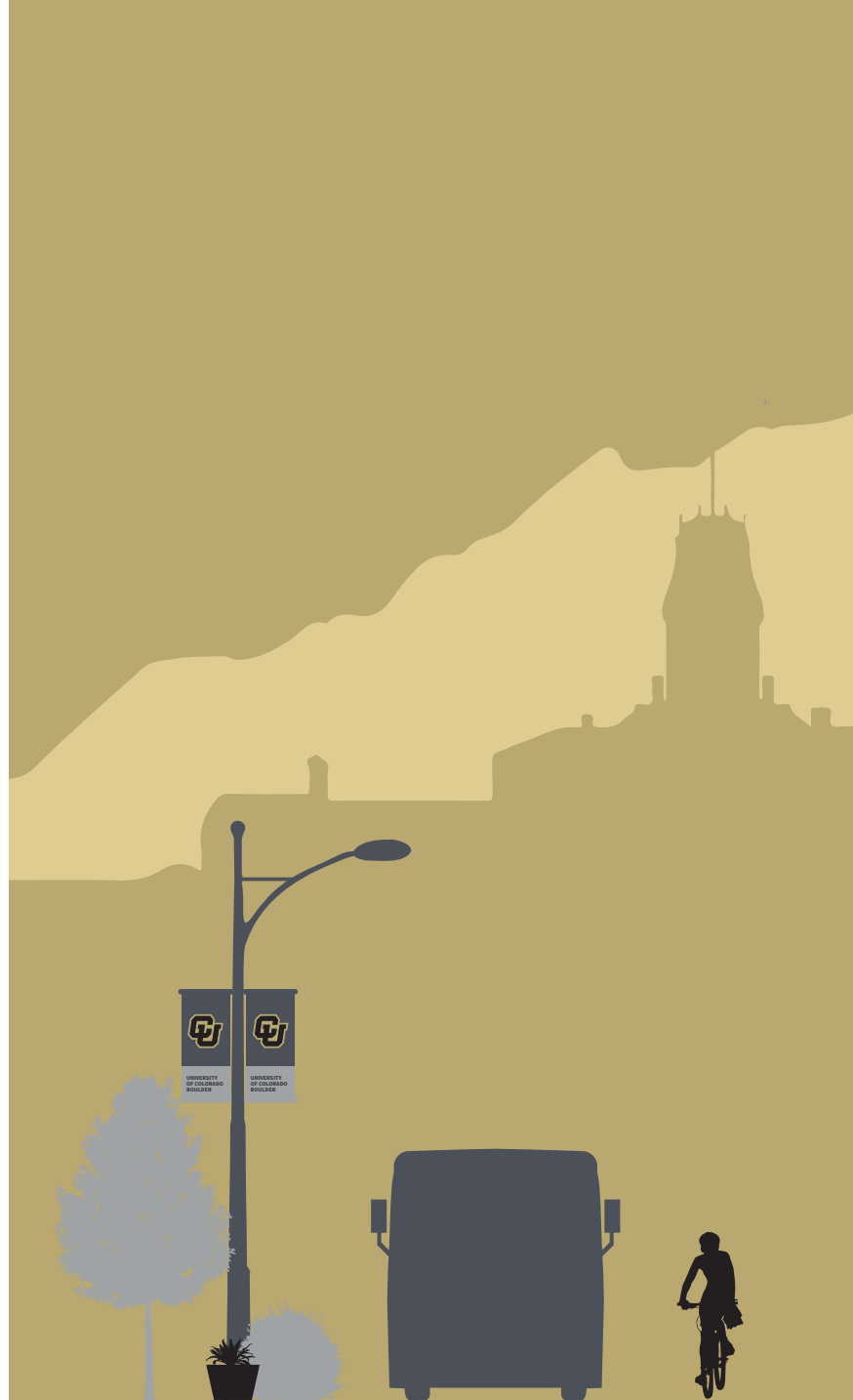
MONITORING

# 01

## VISION & GOALS

The Vision of this plan reflects the future-state for transportation ultimately desired by CU Boulder. Each recommendation of this plan is intended to help achieve this Vision.

The Goals of this plan are intended to guide day-to-day and project-by-project decisions made through the implementation of this plan.







## VISION

*The University of Colorado Boulder's transportation system will serve the education, research, sustainability and community objectives of the university by conveniently connecting people and goods moving by all modes to and from, across, through and between all CU Boulder properties. Users who experience the transportation system will find accessing the campus safe, easy, intuitive, reliable and convenient.*



## GOALS

1. A **safe transportation system** achieved through design, policy and culture.
2. A transportation system that **demonstrates the university's leadership in energy conservation** and helps meet the university's climate commitment.
3. A **transportation system that provides quality mobility and access** to all university constituents including students, faculty, staff and visitors.
4. A transportation system with **dedicated, sustainable funding**.
5. A transportation system that **respects space constraints** in serving growing demand for travel to and between campus destinations, coordinated with the Campus Master Plan.
6. A transportation system **that complements the renowned campus aesthetic**.
7. A transportation system **that can respond to reasonably foreseeable disruptive forces**.

# Pivotal Strategies, Projects and Services

## 02 TRANSIT

Transit moves people both to and from the CU Boulder campus and between CU Boulder's three main properties: Main Campus, East Campus and Williams Village. Creating a fast and frequent transit system between the properties is essential. CU Boulder should continue to work with current and future service providers on local and regional service.

**A University owned and controlled intracampus transit system operated as an essential service.**

The needs of CU Boulder's intracampus system are unique. Owning and controlling the system gives CU Boulder control over the fleet and labor to operate the system in a way that most effectively moves students, faculty and staff. Contracting with a third party for operations is one delivery model that CU Boulder can pursue in controlling the system.





**A fast and frequent network of bus lines to connect CU Boulder's properties.**

Students, faculty and staff would be able to travel from property to property on an intuitive, fast and frequent bus system. This includes everything from high-occupancy, multi-door vehicles to bus lanes and signal priority.

**Transit technology that showcases CU Boulder's role as an incubator of innovation and sustainability.**

Transit apps that tell passengers when the next bus is arriving, transit information screens that give schedule and wait time information and vehicle-to-infrastructure technology would make the system seamless for users.



## Recommendations Summary

Creating CU Boulder's envisioned transit system would take a combination of capital construction projects, capital investments, annual operating expenses and supporting projects.

### CAPITAL CONSTRUCTION OVER \$2 MILLION

- **Mobility Hubs at 18th & Euclid, Discovery Drive and North Campus:** Mobility Hubs would provide transit terminals integrated with parking, bike parking, ride hailing zones and other transportation services. They would connect people traveling various distances, from regionally to locally, between travel modes. They would serve as campus gateways for the regular campus population, for visitors and for event attendees.
- **Transit Centers at Folsom & Colorado, North of Boulder Creek, Williams Village West and Williams Village East:** Transit Centers provide multiple bus bays where BuffBus, regional or local buses can stop to pick up or drop off passengers or to layover between runs as well as bike parking, ride hailing zones and other transportation services.
- **18th & Colorado Core Campus Street, "The Walk":** a Mobility Hub and Transit Center on either

side of this corridor will enable transit service to operate without traveling through 18th & Colorado, improving transit travel speed and reliability, enabling more cost-effective service, improving safety for people walking and biking and creating a signature place on campus.

*Supporting projects:* a Mobility Assistance Shuttle will ensure that people with disabilities can travel building-to-building with the closure of 18th & Colorado and a Regent Drive corridor study and associated improvements will ensure that buses and other vehicles using Regent Drive can operate efficiently.

### CAPITAL INVESTMENT OVER \$2 MILLION

- **Transit fleet upgrades:** CU Boulder's transit fleet is out-of-date and not suited to CU Boulder's needs. Upgrades will allow for high-capacity, articulated buses with multiple doors to expedite passenger loading and unloading.

*Supporting project:* maintenance facility upgrades or a new maintenance facility will ensure that CU Boulder can properly maintain its transit vehicles, based on the outcome of a transit maintenance facility feasibility study.

### OPERATIONS OVER \$2 MILLION PER YEAR

- **Fast and frequent intracampus transit service between CU Boulder's three main properties:** students, faculty and staff would be able to travel from property to property on an intuitive, fast and frequent bus system.

*Supporting projects:* the Mobility Hubs, Transit Centers, Regent Drive corridor study and associated improvements, Colorado Avenue transit lanes, Broadway queue jump lanes and Transit Signal Priority Study and associated improvements will increase transit efficiency and/or reduce operating costs. While these projects support the vision for fast and frequent transit service, they are not necessary for increased investment in fast and frequent intracampus transit.

### OTHER SUPPORTING RECOMMENDATIONS

- **Passenger information technology:** Smart Cities technology including Automatic Vehicle Location (AVL) transponders and Automatic Passenger Counting

(APC) can inform day-to-day operations. Additionally, these technologies can be synced with mobile phone apps and real-time displays at stops and stations.

- **Shuttles to Marine Street, the Center for Innovation and Creativity and North of Boulder Creek:** these shuttles would provide medium-capacity transit to areas of campus where it is not cost effective to operate high capacity transit.

- **Expansion of ride hailing as transit:** CU Boulder already contracts with Lyft to provide service to Wilderness Place and the Wardenburg Health Center. CU Boulder can expand these services to other properties where it is not cost effective to operate high capacity transit or shuttles.

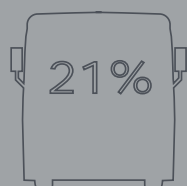
## Existing Conditions for Transit

CU Boulder already achieves a high mode share of students, faculty and staff who travel to campus via transit: 21 percent of the campus community reported using an RTD bus and nine percent of the campus community reported using the Buff Buss to get to campus in September 2018. This high mode share can be attributed to a variety of factors including the provision of a CollegePass to all students through the Student Bus Pass Program and of an EcoPass to faculty and staff as an employee benefit. Each of these trips reduces CU Boulder's parking demand and its GHG emissions.

Several local and regional bus routes currently service the CU Boulder campus. Some of these routes also provide service between CU Boulder's properties. Nonetheless, the future of regional and local transit service serving CU Boulder is uncertain. RTD faces several challenges in providing the service levels desired by the City of Boulder and Boulder County such that both are seeking to increase routes and service levels without RTD.

### EXISTING CONDITIONS FOR TRANSIT SUMMARY

Of the CU Boulder Campus Community:



TOOK AN  
RTD BUS TO  
CAMPUS IN  
SEPTEMBER 2018

Twenty-one percent of the campus community reported using a RTD bus and nine percent of the campus community reported using the Buff Bus to get to campus in September 2018; each of these trips reduced CU Boulder's parking demand and its GHG emissions.

The future of regional and local service is uncertain given RTD's challenges and increased interest from the City of Boulder and Boulder County in alternative transit delivery models.



REGULARLY TRAVEL  
BETWEEN CU  
BOULDER PROPERTIES

A majority, 55 percent, of the campus community already travels between properties. Demand for travel between properties is increasing as East Campus and Williams Village grow. Fast, frequent and reliable intracampus transit is necessary to provide for student quality of life and to maximize the use of CU's space assets.

Dedicated, on-campus infrastructure and a modernized fleet is necessary to effectively move the campus community between properties.

EXISTING LOCAL AND REGIONAL BUS ROUTES SERVING CU BOULDER			
ROUTE	ROUTE DESCRIPTION	PEAK FREQUENCY	ENABLES INTERPROPERTY TRAVEL?
204	Connects Table Mesa to north Boulder via US 36, Baseline Road, Broadway and 19 <sup>th</sup> Street	15-minutes	No
209	Connects Baseline Road west of Foothills Parkway to Main Campus via 30 <sup>th</sup> Street, Colorado Avenue, 18 <sup>th</sup> Street and Regent Drive	30-minutes	Yes, East Campus to Main Campus
225	Connects Louisville and Boulder via Baseline Road	15-minutes	Yes, Williams Village to Main Campus
AB1/AB2	Connect Boulder, at Downtown Boulder Station and Boulder Junction at Depot Square Station, to Denver International Airport	30-minutes	No
BOUND	Connects Broadway at Baseline Road to 28th Street & Iris Avenue via 40th Street	15-minutes	Yes
DASH	Connects Lafayette, Louisville and Boulder via South Boulder Road and Broadway	15-minutes	No
FF	Connects Denver and Boulder with multiple route patterns within the City of Boulder	10-minutes	No
FLEX	Connects Boulder to Fort Collins	Commute-oriented schedule	No
GS	Connects Golden and Boulder via State Highway 93 and Broadway	20-30 minutes	No
HOP*	Boulder circulator connecting Main Campus to 29 <sup>th</sup> Street and downtown Boulder	10-minutes	No
J	Connects Longmont and Boulder via State Highway 119, Foothills Parkway, Arapahoe Avenue, 30 <sup>th</sup> Street and Colorado Avenue	20 minutes	Yes, East Campus to Main Campus
JUMP	Connects Erie and Lafayette to Boulder via State Highway 7 (Arapahoe Avenue)	15-minutes	Yes, East Campus to Main Campus
SKIP	Connects south Boulder to north Boulder via Broadway	10-minutes	No



CU Boulder operates intracampus transit with a fleet of 22 buses. According to the Transportation Master Plan survey, 55 percent of students, faculty and staff indicated that they sometimes travel between CU Boulder's three properties. This number has increased with the opening of the Aerospace Engineering Science Building and greater programming of academic space on East Campus and is expected to further increase as East Campus grows. In addition to walking and biking as options, CU Boulder operates the Buff Bus between Main Campus and Williams Village and the Stampede between Main Campus and Discovery Drive on East Campus. Demand for transit between properties peaks when classes are changing. Many members of the campus community reported regularly being turned away by full buses.

CU Boulder would benefit from a dedicated infrastructure program to ensure fast, frequent and reliable operations. Buses running through the 18<sup>th</sup> & Colorado corridor interact with people walking and biking, which creates potential safety concerns for people walking and biking and delays buses. Transit centers are necessary as a critical element of CU Boulder's transit system to allow for future fleet expansion and predictable scheduling. In the Transportation Master Plan survey, many members of the campus community indicated that the lack of a predictable schedule makes intracampus transit seem inconvenient and unreliable.

No single funding source covers the bulk of CU Boulder's intracampus transit operations and a high percentage of transit funding comes from discretionary sources rather than dedicated sources that recognize transit's importance as a vital campus utility. Increased funding is necessary to modernize CU Boulder's transit fleet to meet its current needs.

Transportation Services maintains vehicles in the intracampus transit fleet as well as other CU Boulder fleet vehicles.

# Recommendations

## MOBILITY HUBS & TRANSIT CENTERS

Mobility Hubs would connect people traveling various distances, from regionally to locally, between various travel modes. At CU Boulder, they would provide transit terminals with integrated vehicle parking, bike parking and ride hailing zones. They would serve as campus gateways for the regular campus population, for visitors and for event attendees. Three Mobility Hubs are proposed: at 18<sup>th</sup> & Euclid, at Discovery Drive on East Campus and at a location to serve northwest campus.

Transit Centers provide multiple bus bays where regional, local and intracampus transit vehicles can stop to pick up or drop off passengers, or to layover between runs. Additionally, local and regional routes such as the HOP or the future State Highway 119 BRT from Longmont to Boulder can stop at Transit Centers to integrate with intracampus transit. Four Transit Centers are proposed: at Folsom & Colorado with a roundabout to turn-around buses, at a location north of Boulder Creek, at Williams Village West and at Williams Village East.

## 18<sup>TH</sup> & COLORADO CORE CAMPUS STREET "THE WALK"

A Mobility Hub and Transit Center on either side of this corridor will enable transit service to operate without traveling through 18<sup>th</sup> & Colorado, improving transit travel speed and reliability between properties, enabling more cost-effective service (either an overall lower cost to deliver service or delivering more service within a set budget), improving safety for people walking and biking and creating a signature place on campus. Although this will increase the walk distance to transit from buildings along the 18<sup>th</sup> & Colorado corridor, it enables CU Boulder to prioritize fast travel between properties so that students and faculty can get to class.

Gates on either side of the 18<sup>th</sup> & Colorado corridor will control access. In general, emergency vehicles, facilities vehicles, some delivery vehicles and vehicles accessing parking for people with disabilities will be allowed within the corridor. However, the movement of these vehicles, with the exception of emergency

vehicles, will be restricted during class change.

The design details of the 18<sup>th</sup> & Colorado Core Campus Street are still to be determined. It is likely that CU Boulder will phase improvements in over time. The Folsom & Colorado Transit Center is necessary prior to closure of the 18<sup>th</sup> & Colorado corridor to buses. A complete re-build of the corridor to create a signature campus place is best completed following the corridor's closure. Monitoring each phase of the 18<sup>th</sup> & Colorado corridor project is recommended to inform future design phases.

A Mobility Assistance Shuttle will ensure that people with disabilities can travel building-to-building with the closure of 18<sup>th</sup> & Colorado. Similarly, while the vision for the 18<sup>th</sup> & Colorado corridor is to eliminate privately owned vehicles from the corridor, some parking for people with disabilities may be accessible by the corridor.

Lastly, a corridor study of Regent Drive is recommended to identify safety and operational improvements for all modes. The corridor study should identify strategies for improving operations of all vehicles to reduce transit vehicle delay.

passenger information technology should be deployed at Mobility Hubs and Transit Centers. By connecting to the Buff Bus and the Stampede Automatic Vehicle Location (AVL) feeds, mobile phone apps can provide real-time bus arrival information. Real-time displays at Mobility Hubs, Transit Centers and transit stops can also provide real-time information including information regarding special schedules during finals, game days, or other special calendar events.

## SPEED & RELIABILITY INFRASTRUCTURE

Transit lanes (also known as business access and transit or BAT lanes), queue jump lanes and Transit Signal Priority are all examples of infrastructure that help buses move quickly and reliably. By moving buses quickly and reliably, CU Boulder can maximize the frequency and span of service it can provide within a given budget. A variety of speed and reliability infrastructure is proposed by the Transportation Master Plan, much of which is consistent with the City of Boulder's plans based on the 30<sup>th</sup> & Colorado Corridors Study:

- Transit lanes on Colorado Avenue from Folsom Street to Discovery Drive.
- On northbound Broadway approaching Regent Drive, conversion of the existing right-turn lane to a queue jump lane. Eventually, a new queue jump lane could be constructed to 18<sup>th</sup> Street or Euclid Avenue.
- Transit Signal Priority at traffic signals on Broadway, Baseline Road and Colorado Avenue.

In addition to this hard infrastructure, a variety of

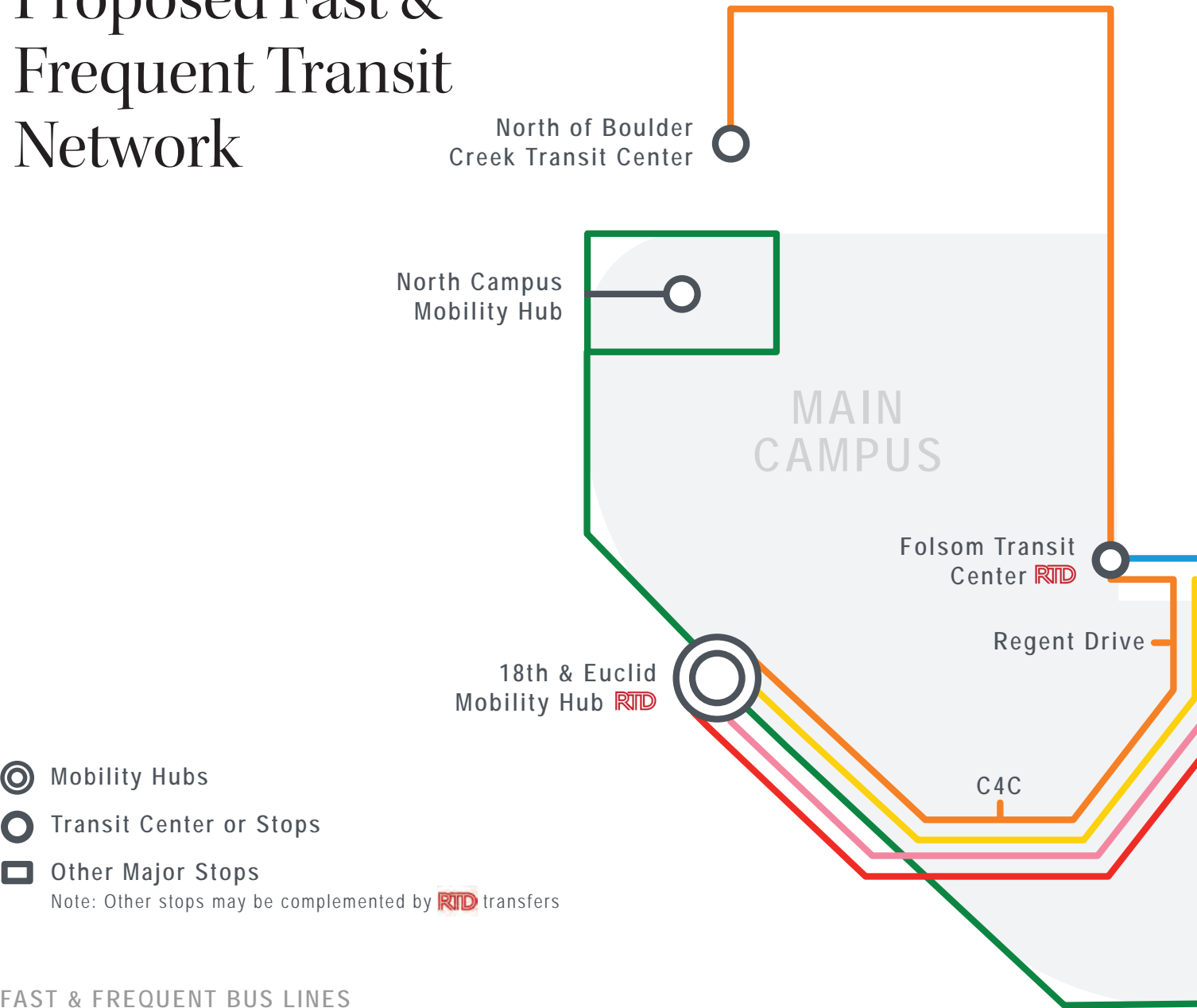




BuffBus at 18th & Euclid



# Proposed Fast & Frequent Transit Network



- ⊙ Mobility Hubs
  - Transit Center or Stops
  - ▭ Other Major Stops
- Note: Other stops may be complemented by **RTD** transfers

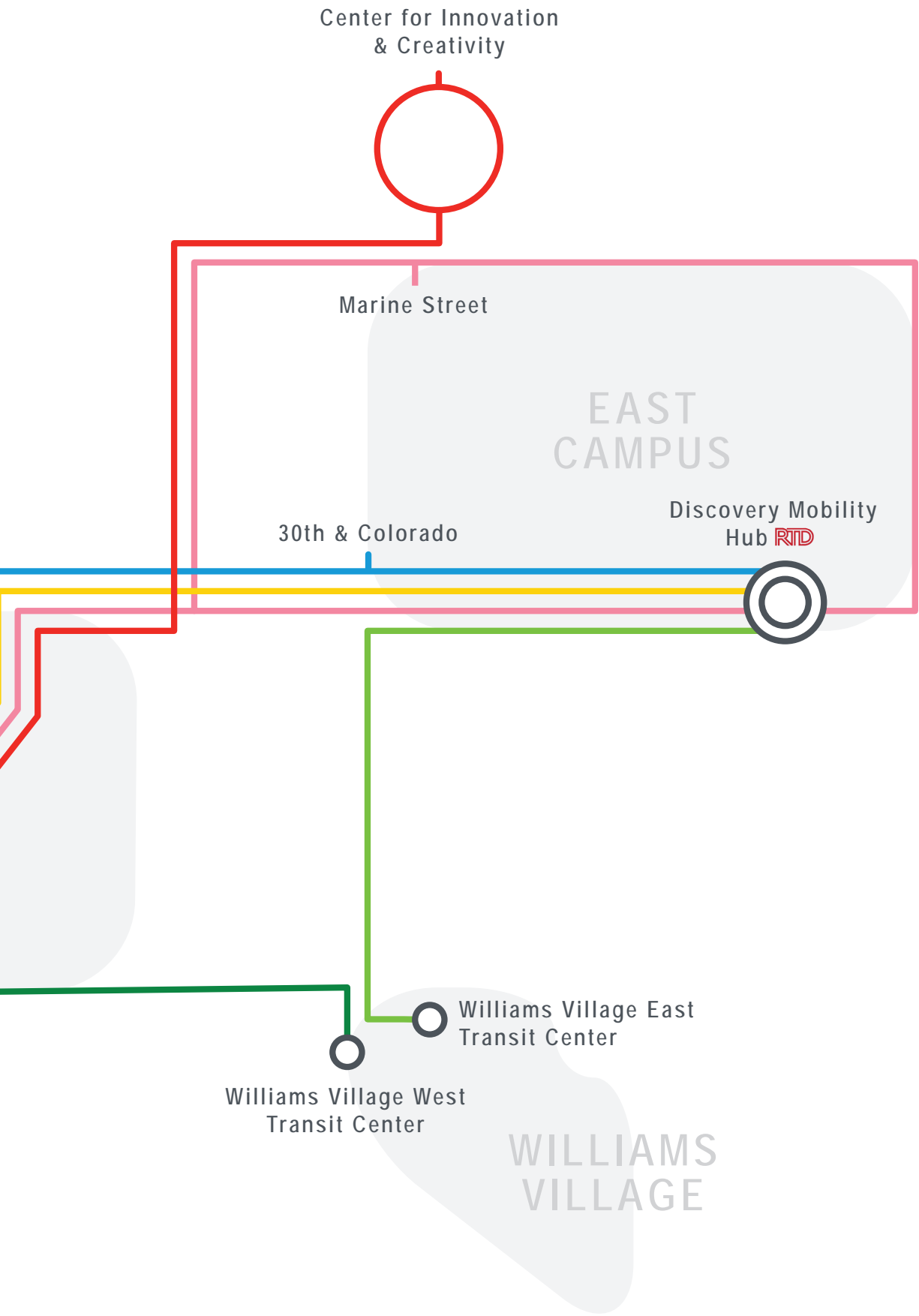
## FAST & FREQUENT BUS LINES

- 18th & Euclid to Discovery
- Williams Village West to North Campus
- Williams Village East to Discovery
- Folsom to Discovery

## SHUTTLE SERVICE

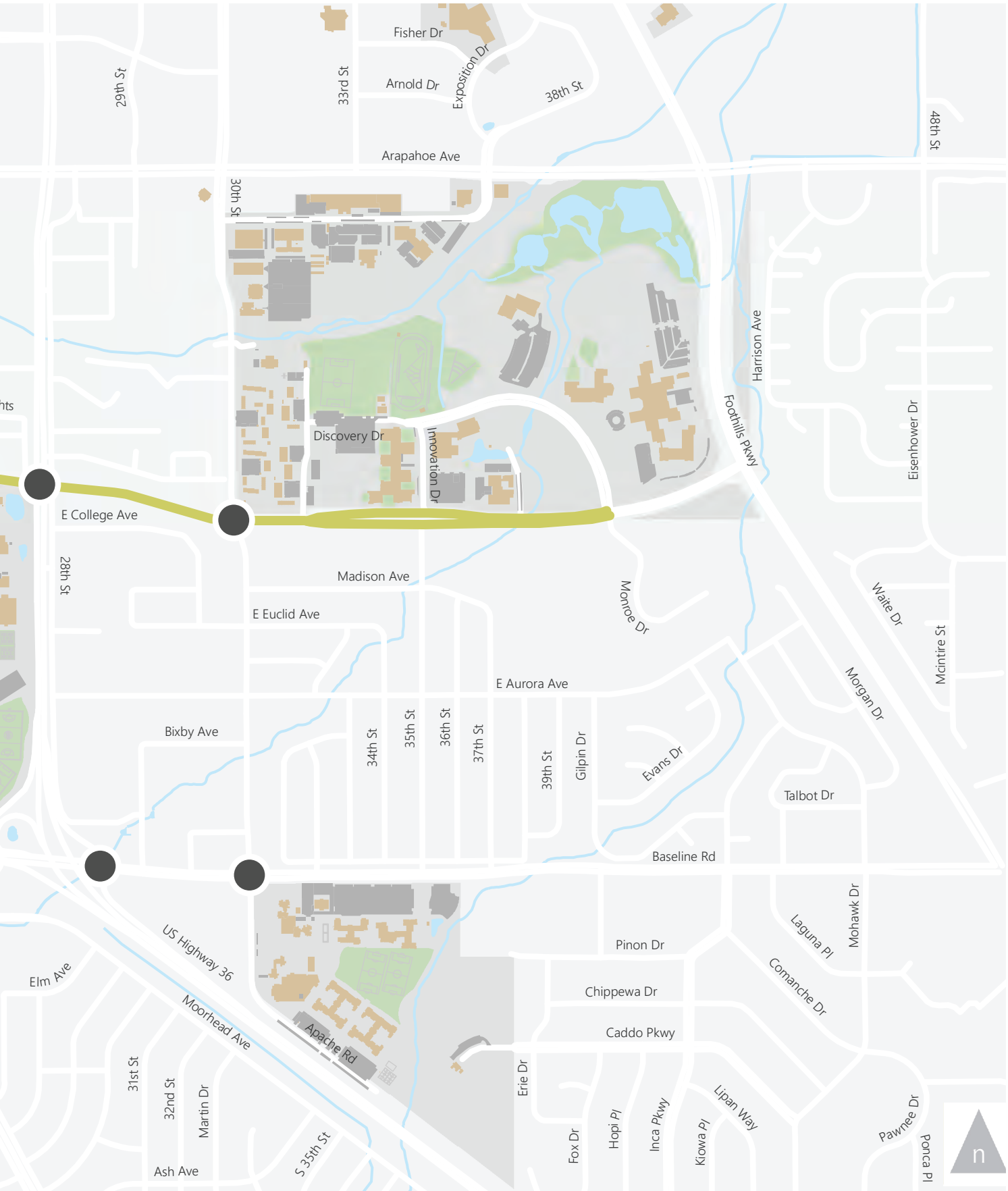
- CINC Express
- Athens Express
- Marine Street Express





# Proposed Speed and Reliability Infrastructure

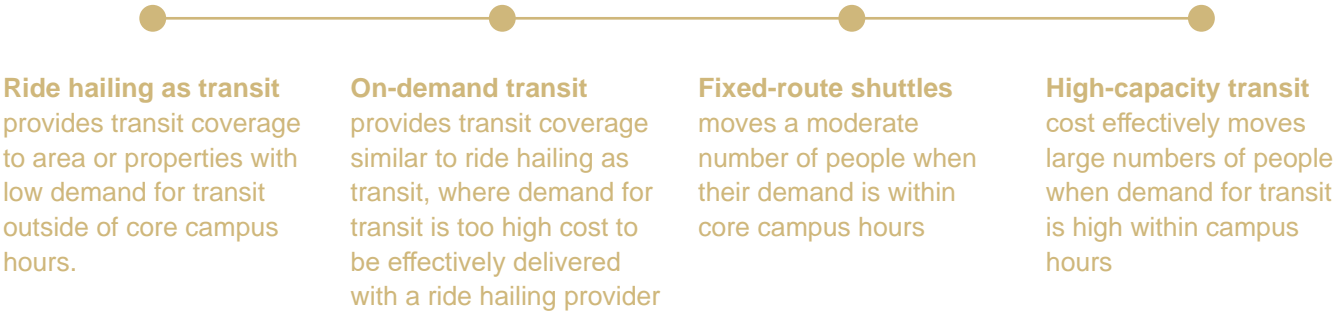






# Alternatives to High Capacity Transit

High capacity transit, as envisioned for much of the fast and frequent transit network, is cost-effective when passenger demand is high within a core set of service hours. For areas of campus or properties that do not generate high passenger demand, or that generate passenger demand outside of core campus hours, shuttles and ride hailing as transit can cost-effectively provide transit between properties.



## SHUTTLES

In addition to the proposed routes of fast and frequent bus service between properties, less frequent shuttle services using cutaway vehicles can improve connectivity to CU Boulder’s three main properties. Proposed routes for shuttle service include Marine Street (currently provided by the Marine Street Express), the Center for Innovation and Creativity and north of Boulder Creek which will be re-evaluated as north of Boulder Creek develops.

### On-demand Transit or Ride Hailing as Transit

CU Boulder already has a partnership with Lyft to serve as a transit provider to Wilderness Place and the Wardenburg Health Center. Similarly, other transit agencies around the country are experimenting in on-demand transit or using ride hailing (Lyft, Uber, etc.) as a subsidized form of transit to serve low-demand areas or to provide service at times outside of core service hours. CU Boulder should continue experimenting with on-demand transit and ride hailing as transit to outlying properties or outside of core service hours, such as late at night. Success could be measured based on the service coverage benefits achieved by such service and its cost efficiency as compared to high capacity transit or shuttles.

## MOBILITY ASSISTANCE SHUTTLE

People with disabilities already have a hard time using the Buff Bus or the Stampede to get between properties and to get between different parts of campus. CU Boulder should establish a mobility assistance shuttle to provide on-campus rides for academic or work-related purposes for students, faculty and staff with disabilities. The vehicle type for this service is not known at this time but other institutions use a range of vehicle sizes, from Neighborhood Electric Vehicles to cutaway vehicles. Beginning operation of a mobility assistance shuttle is likely necessary prior to the closure of the 18th & Colorado corridor to buses and private vehicles as parking for people with disabilities within this area may be more difficult or impossible to access.

## TRANSIT FLEET

The intracampus transit fleet is out-of-date and not suited to CU Boulder's needs. The East Campus and Williams Village routes require high-capacity, articulated buses with multiple doors to expedite passenger loading and unloading. Elsewhere, standard 40-foot buses or shorter cutaway vehicles may be sufficient. With CU Boulder's recent takeover of the Stampede, CU Boulder is quickly learning what types of vehicles it will need on its routes. Future data can inform exactly what vehicles are necessary for each intracampus transit route.

As CU Boulder recapitalizes its fleet, it should consider alternative fuel vehicles, especially electric, as battery technology and costs continue to improve. The viability of certain fuels will depend on available vehicle technology, re-fueling or re-charging infrastructure, ability to perform maintenance and other factors. Eventually, autonomous buses may become available. By eliminating the need for a driver, autonomous buses will significantly reduce operating costs. It is likely that the first applications of autonomous buses will be on streets with exclusive transit lanes, such as Colorado Avenue from Folsom Street to Discovery Drive.

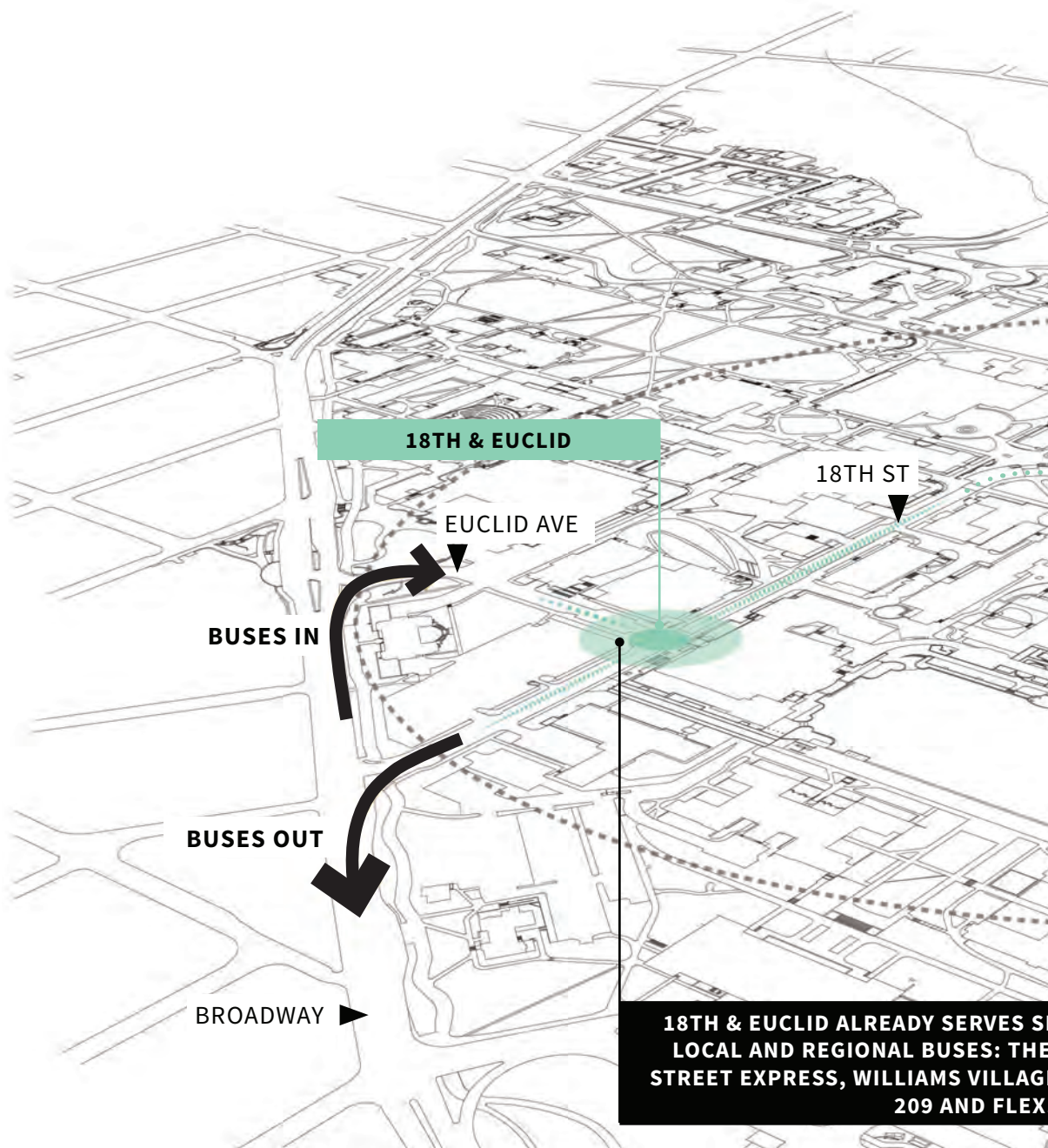
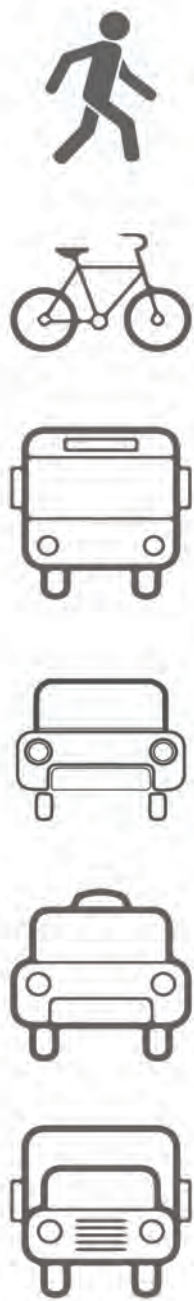
## MAINTENANCE

CU Boulder Transportation Services currently provides intracampus transit vehicle maintenance. However, as the intracampus transit fleet expands and potentially becomes more specialized, CU Boulder should consider whether an expanded or new dedicated transit maintenance facility is necessary. Several options exist for this, including a CU Boulder-specific facility or one shared with the City of Boulder, Boulder County, the Boulder Valley School District or Via. Once CU Boulder has a better projection of its fleet needs, a feasibility study should be completed to determine the best maintenance facility and arrangement to meet CU Boulder's needs.



Buff Bus Station





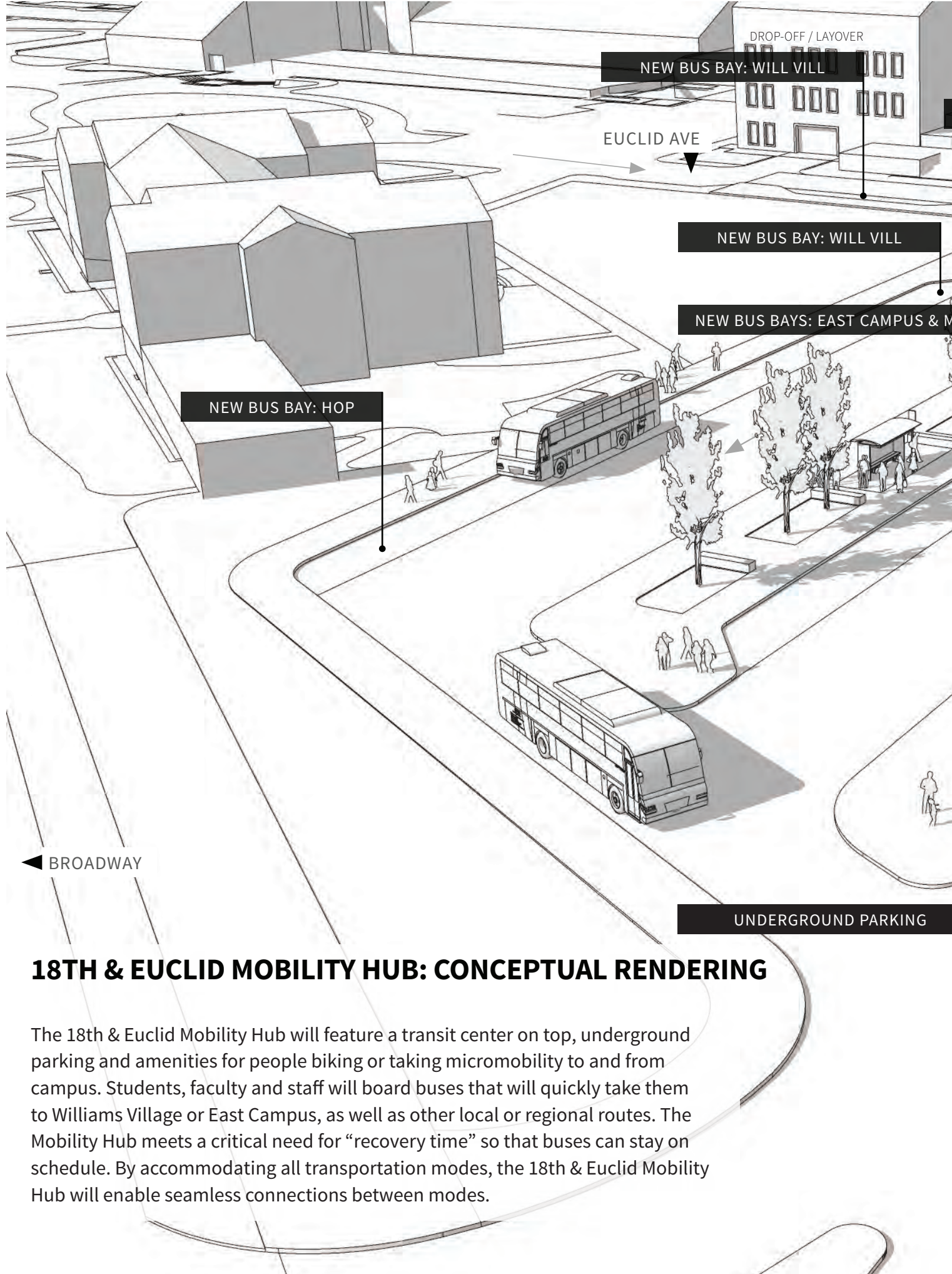
## THE CHALLENGE AT HAND: OPPORTUNITIES & CONSTRAINTS OF THE 18TH &

The 18th & Colorado corridor traverses Main Campus, connecting the 18th & Euclid intersection to the Folsom & Colorado intersection. Currently, this corridor serves people walking and biking, buses, facilities vehicles and in some cases private vehicles. The corridor is overloaded with users and does not serve any especially well.





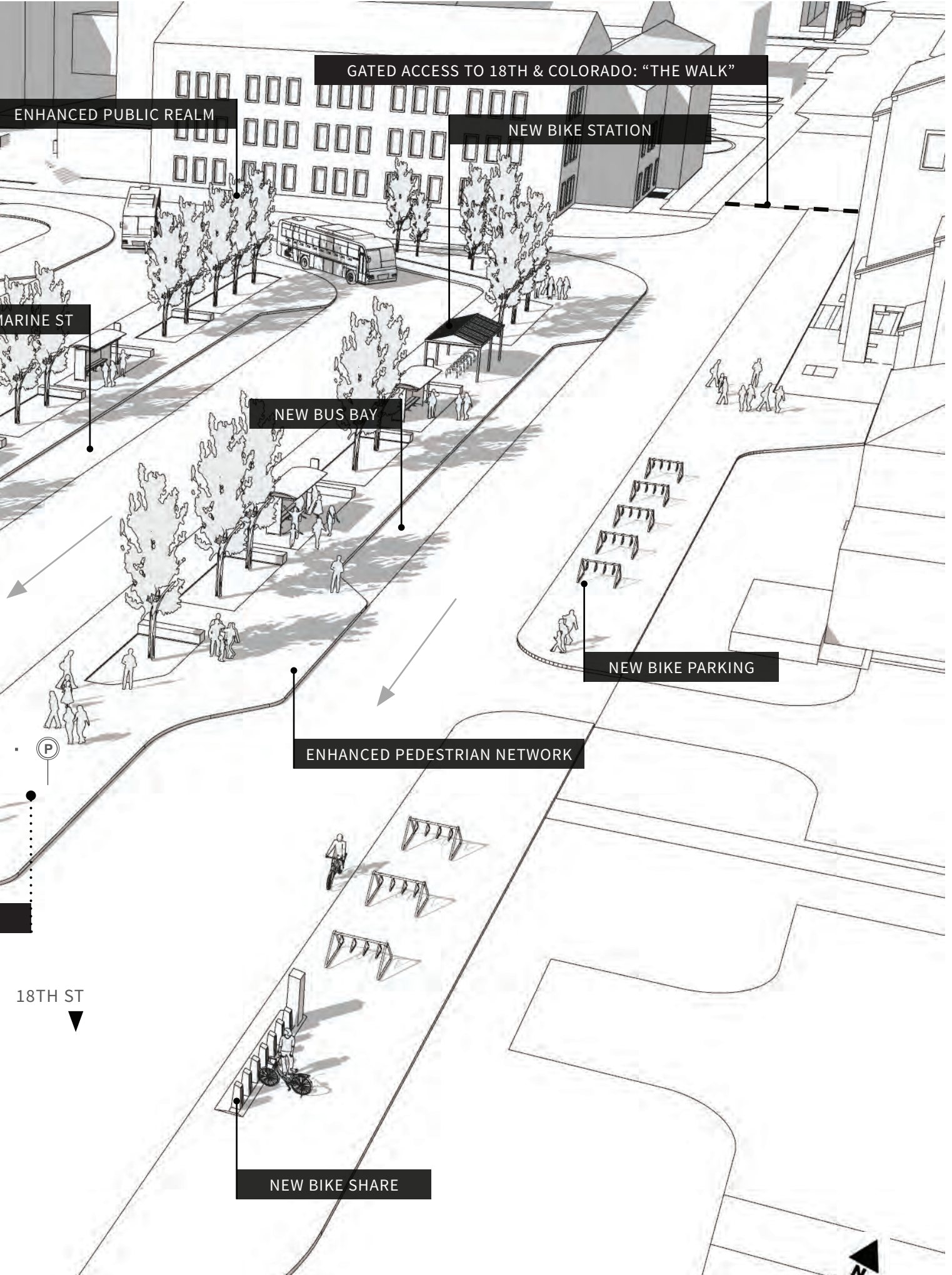




## 18TH & EUCLID MOBILITY HUB: CONCEPTUAL RENDERING

The 18th & Euclid Mobility Hub will feature a transit center on top, underground parking and amenities for people biking or taking micromobility to and from campus. Students, faculty and staff will board buses that will quickly take them to Williams Village or East Campus, as well as other local or regional routes. The Mobility Hub meets a critical need for “recovery time” so that buses can stay on schedule. By accommodating all transportation modes, the 18th & Euclid Mobility Hub will enable seamless connections between modes.





GATED ACCESS TO 18TH & COLORADO: "THE WALK"

ENHANCED PUBLIC REALM

NEW BIKE STATION

MARINE ST

NEW BUS BAY

NEW BIKE PARKING

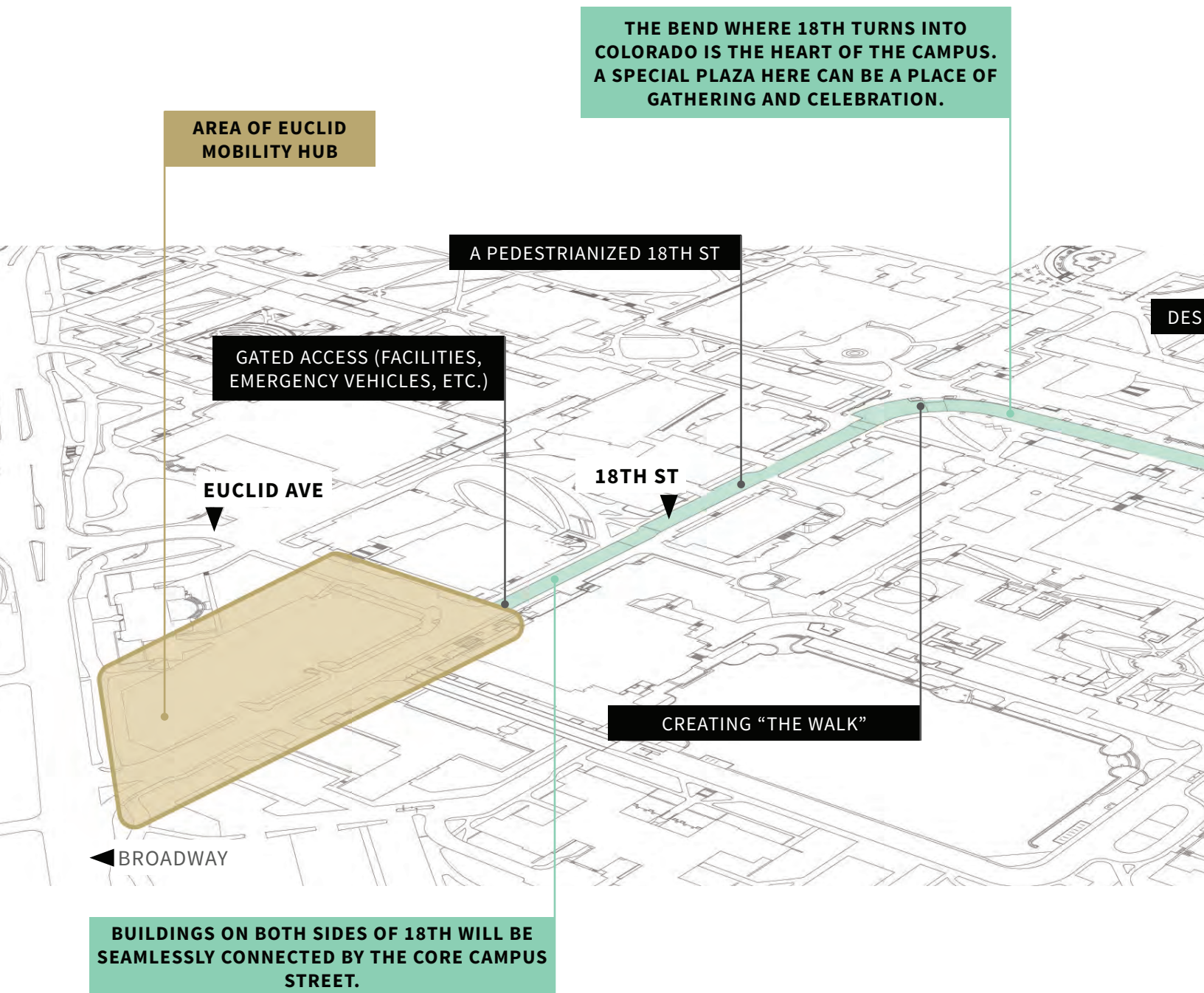
ENHANCED PEDESTRIAN NETWORK

18TH ST

NEW BIKE SHARE

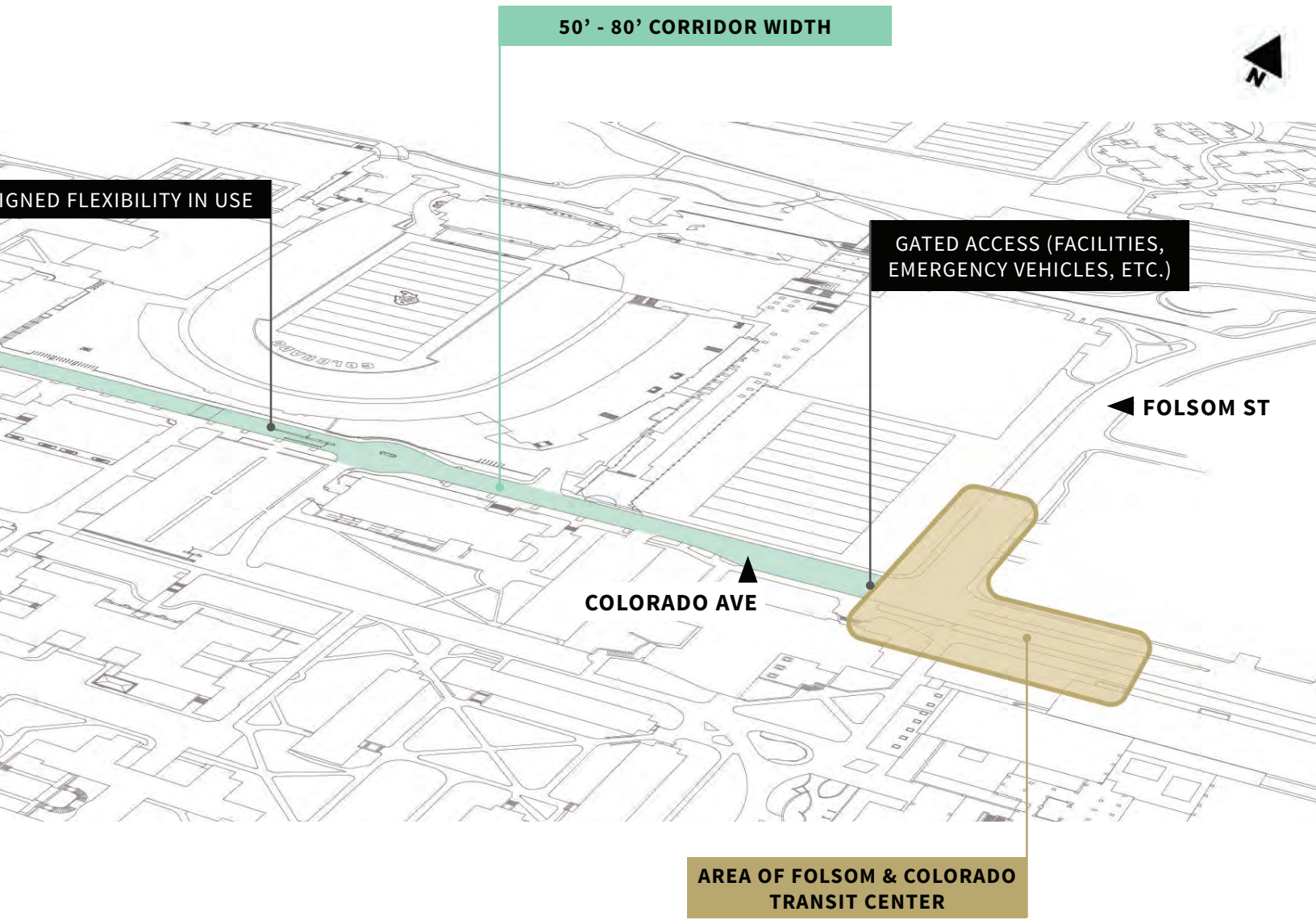






## “THE WALK”: CREATING A CORE CAMPUS STREET & SIGNATURE PLACE

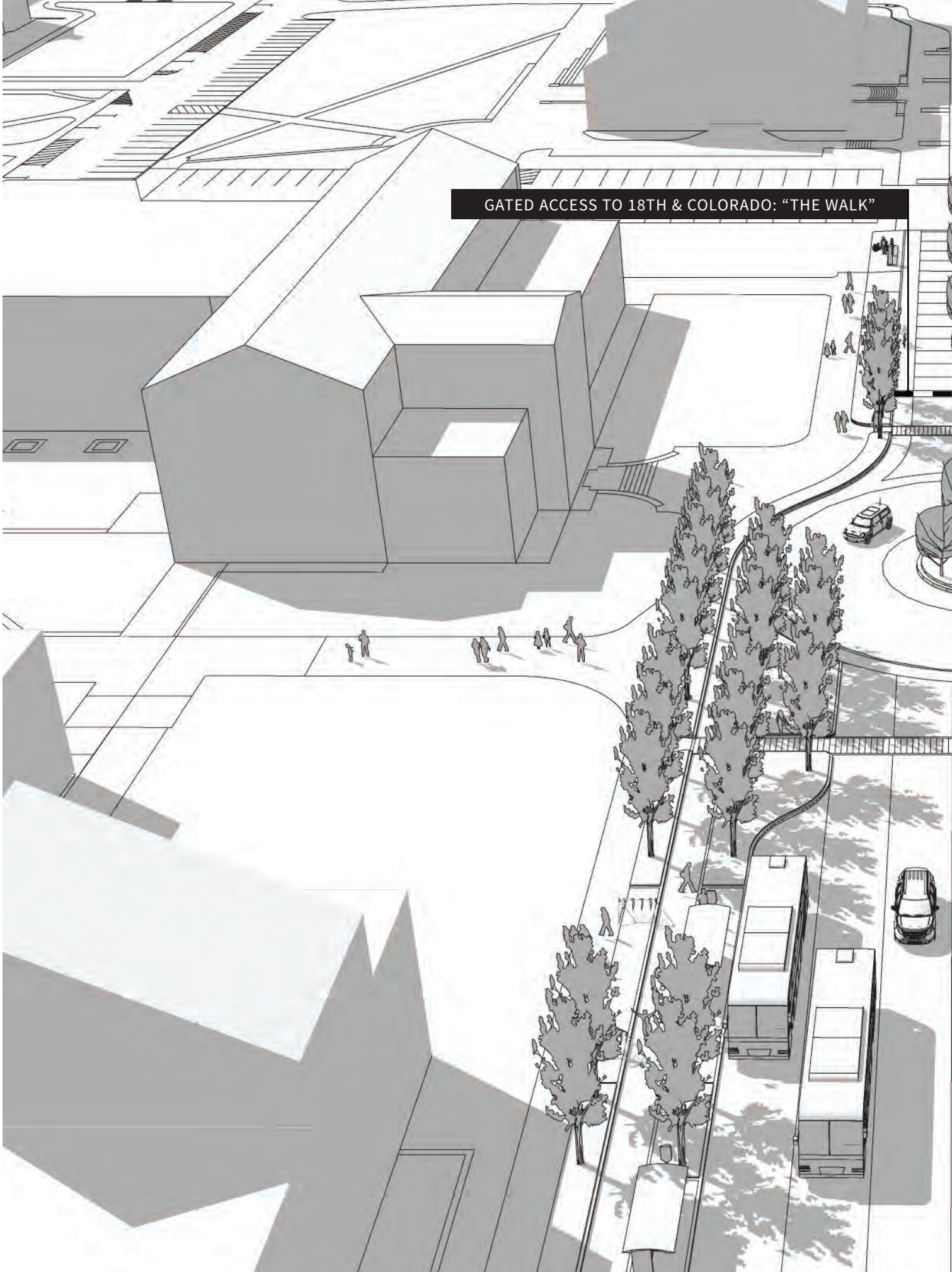
The 18th & Colorado corridor can become a new, signature place on campus for gathering, assembly, events and mobility. By re-designing the corridor as a Core Campus Street, the space will be prioritized for people walking and biking. Emergency vehicles will still have access and facilities vehicles can access the space during off-peak times. Buses will turn around at a Mobility Hub or Transit Center on either side of the corridor, improving bus travel times and creating a more intuitive transit system for users.



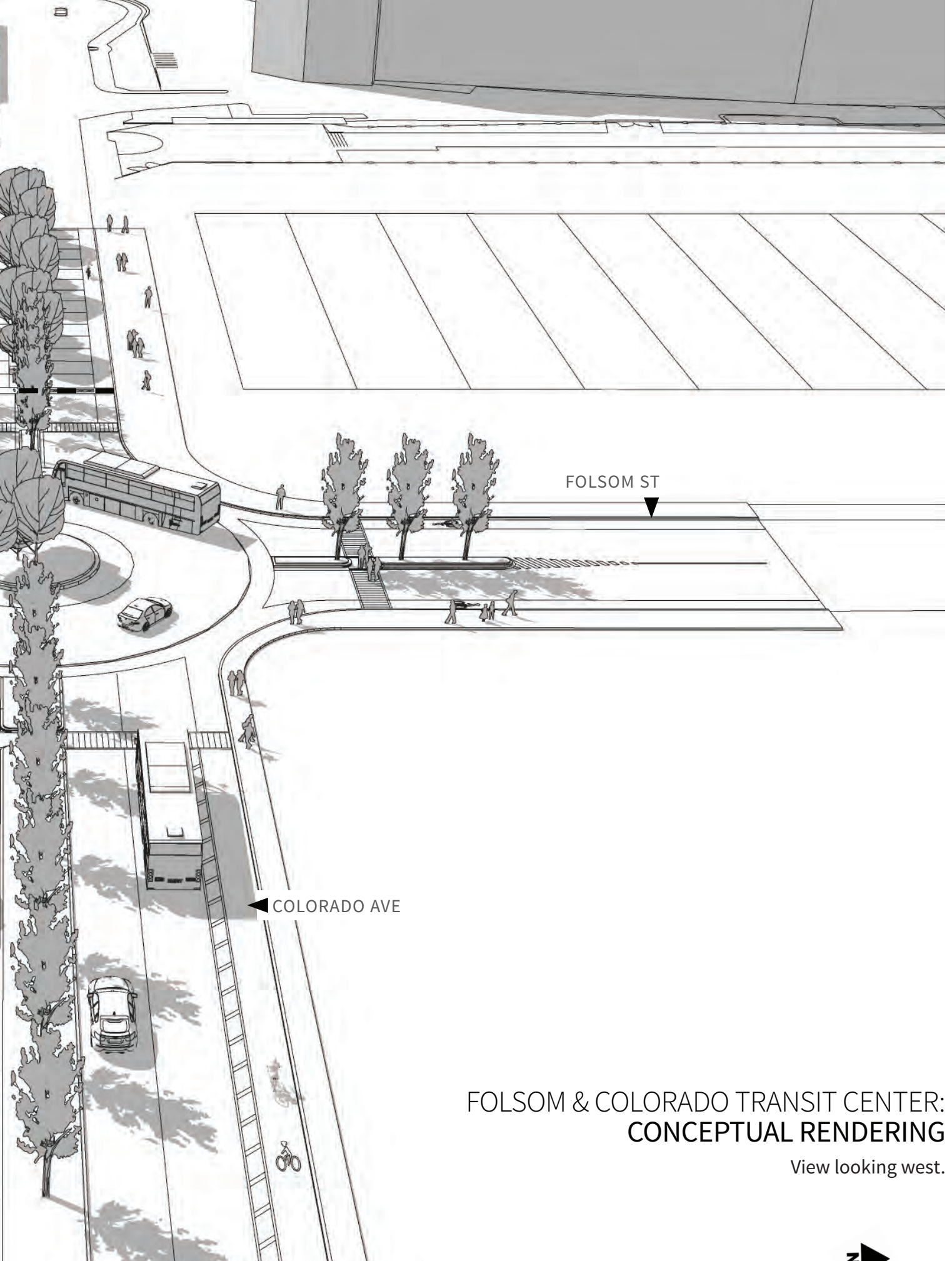
- MOBILITY HUB & TRANSIT CENTER
- PHYSICAL CONDITIONS & POTENTIAL
- THE OPPORTUNITIES



GATED ACCESS TO 18TH & COLORADO: "THE WALK"







## FOLSOM & COLORADO TRANSIT CENTER: CONCEPTUAL RENDERING

View looking west.



# Project List

TRANSIT PROJECT LIST		
PROJECT	CAPITAL OR OPERATING?	COST
Fast and frequent intracampus transit service between CU Boulder's three main properties	Operating	\$\$\$\$ per year
18th & Euclid Mobility Hub	Capital	\$\$\$\$
Discovery Drive Mobility Hub	Capital	\$\$\$\$
North Campus Mobility Hub	Capital	\$\$\$\$
Folsom & Colorado Transit Center, in partnership with the City of Boulder	Capital	\$\$\$
North of Boulder Creek Transit Center, potentially in partnership with the City of Boulder	Capital	\$\$\$
Williams Village West and East Transit Centers	Capital	\$\$\$
18th & Colorado Core Campus Street: "The Walk"	See Walking, Biking and Shared Micromobility section	
Colorado Avenue transit lanes, in partnership with the City of Boulder	Capital	\$
Broadway queue jump lane, in partnership with the City of Boulder	Capital	\$
Transit Signal Priority study of Broadway, Baseline Road and Colorado Avenue with the City of Boulder to identify proposed/priority locations and cost estimate, in partnership with the City of Boulder	Capital	\$-\$
Passenger information technology	Capital	\$
Shuttles to Marine Street (Marine Street Express), the Center for Innovation and Creativity and north of Boulder Creek	Operating	\$\$\$ per year
Expansion of ride hailing as transit	Capital	\$ per year
Mobility assistance shuttle	Operating	\$ per year
Transit fleet upgrades	Capital	\$\$\$\$*
Maintenance facility feasibility study	Capital	\$-\$
Regent Drive corridor study to identify strategies for efficiently moving buses through campus and for improving multimodal safety, in partnership with the City of Boulder	Capital	\$-\$

\$ - less than \$100,000

\$ - \$100,000 to \$1m

\$\$\$ - \$1m to \$5m

\$\$\$\$ - greater than \$5m

\*While a significant fleet upgrade would require a one-time capital budget expense, upgrades to the CU Boulder's intracampus transit fleet can be done over time by incorporating debt for new vehicles into the overall intracampus transit operating cost.

# Implementation

## HIGH-PRIORITY PROJECTS

The highest-priority projects for CU Boulder to implement to achieve its vision for a fast and frequent transit system are:

1. Establish a set of dedicated funding sources or a program for intracampus transit to operate at a service level reflective of the fast and frequent vision. Accounting for debt service on new vehicles within the annual operating budget will allow intracampus transit to replace its out-of-date fleet gradually.
2. Construct the Transit Center at Folsom & Colorado. With this Transit Center in place, buses would no longer need to run on the 18th & Colorado corridor, creating an opportunity to enhance this space as a core campus street. Additionally, removing buses from 18th & Colorado would improve their operations thereby maximizing the service that can be provided within a given budget.
3. Implement the mobility assistance shuttle to launch when the Transit Center at Folsom & Colorado is complete. Buses would no longer use 18th & Colorado which would improve point-to-point travel times for passengers but would increase walk distance to some buildings on Main Campus. The mobility assistance shuttle can help address this distance barrier for people with disabilities.
4. Complete the Transit Signal Priority study to help identify the relative priority of Transit Signal Priority compared to transit lanes on Colorado Avenue and the queue jump lanes on Broadway.
5. Implement passenger information technology at existing transit stops. Where possible, procure passenger information technology that can be relocated as Mobility Hubs and Transit Centers are constructed.
6. Complete the maintenance facility feasibility study prior to, or as a part of, the forthcoming Campus Master Plan to ensure that adequate space for such a facility is set-aside if such a facility is deemed necessary.
7. CU Boulder should frequently evaluate transit ridership, bus travel times and parking demand as these various transit recommendations are completed to inform subsequent phases.

## OTHER CONSIDERATIONS

Over time, CU Boulder should evaluate whether an alternative staffing model can improve the level of transit service provided or reduce costs. Currently, intracampus transit is run by CU Boulder with staff drivers and mechanics (through Fleet Services). Contracting with a service provider is another option. Research completed for the Transportation Master Plan revealed other large, public institutions that contract with service providers.

CU Boulder should consider whether it should become a public agency eligible for Federal funds through the Federal Transit Administration. FTA grants and cooperative agreements can help to support operations, to construct speed and reliability infrastructure, to acquire new vehicles or to construct maintenance or administrative facilities. However, CU Boulder would need to meet several requirements to be eligible for Federal funds. CU Boulder should work with FTA to better understand these requirements and make an informed decision as to whether Federal funding is worth the burden of additional requirements. An alternative may be to partner with other interested agencies such as the City of Boulder and Boulder County to create a city- or county-wide agency.

CU Boulder should coordinate with the City of Boulder and Boulder County as they pursue alternative transit delivery models. In addition to the potential that CU Boulder could work with the city or county to create a city- or county-wide agency, changes to transit delivery in the city or county could provide benefits to CU Boulder. These include opportunities to share resources for intracampus transit or to overhaul the CollegePass and EcoPass payment structures to free up new funding for intracampus transit operations.



# 03

## PARKING

CU Boulder's parking is a valued campus transportation asset and one of its largest occupiers of real estate. With 11,700 parking spaces, many people use parking on a daily basis. As a key asset, parking requires careful stewardship and management to provide transportation access and meet the university's myriad other goals.



## Pivotal Strategies, Projects and Services

### Preservation of high-priority locations for parking beyond the Mobility Hubs

This plan identifies spaces to reserve for structure parking should it be needed in the future. CU Boulder is not committed to building this parking until future analysis warrants it, recognizing parking's role in inducing driving and GHG emissions and that the myriad other recommendations in this plan may decrease demand for parking in the future.

### New parking will be built so that it can be adapted to another use in the future

Transportation experts envision a future where ride hailing, whether through a Transportation Network Company or with a shared autonomous vehicle, results in decreased demand for parking and increased demand for curb space. New parking at CU Boulder will be built with re-purposing in mind for long-term flexibility.

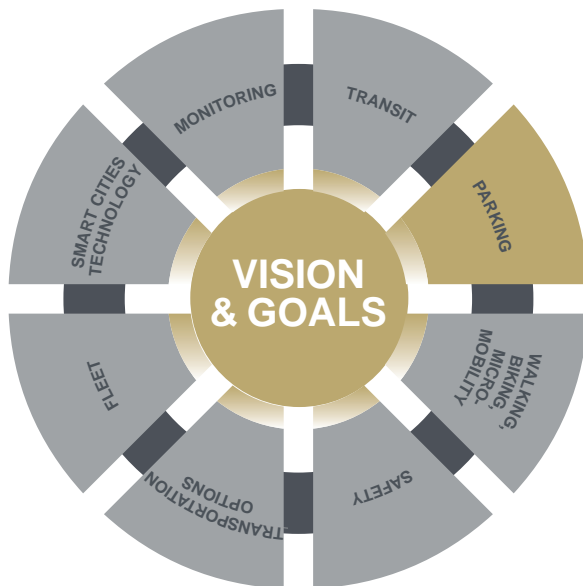


### New parking co-located with the proposed 18th & Euclid and Discovery Mobility Hubs

New parking at the Mobility Hubs and other high priority locations will ensure that CU Boulder's transit and parking systems integrate seamlessly. Additionally, this parking will free up interior surface lots for future development.

### Parking policies and programs to manage demand and create financing mechanisms for other transportation modes

Management consolidation, permitting changes, pricing adaptability, technology and culture change will help maximize utilization of CU Boulder's asset, and contribute to CU Boulder's overall goals for transportation.



## Recommendations Summary

The Transportation Master Plan's parking recommendations include parking supply recommendations, parking management and permitting recommendations, and other recommendations.

### PARKING SUPPLY

- **New parking co-located with proposed Mobility Hubs:** this parking will ensure that CU Boulder's transit and parking systems integrate seamlessly. New parking will be planned in conjunction with future programming of campus properties.
- **Preservation of high-priority locations for parking beyond the Mobility Hubs:** CU Boulder is not committed to building additional parking, but preserving these locations should future analysis warrant it ensures that CU Boulder's parking supply can adapt.
- **Build new parking to be adaptable to other uses in the future:** in a future where more rides are hailed and fewer people drive themselves, parking demand could decrease. Building adaptable parking structures ensures that future re-use is possible.

### PARKING MANAGEMENT & PERMITTING

- **Continued consolidation of parking supply and management:** managing all of CU Boulder's parking supply as one ensures it is used to the greatest campus benefit.
- **Overhaul parking permit model to a more supply/demand sensitive model:** demand-responsive pricing would allow CU Boulder to adjust pricing to manage demand. Additionally, pay-as-you-go models avoid users viewing their parking permits as sunk costs that they must recoup.
- **Apply a consistent hierarchy to the placement of parking spaces in lots and garages:** after parking for people with disabilities, promoted transportation modes should have priority. Faculty and staff parking is typically prioritized over student parking.
- **Carpool and electric vehicle parking spaces, including an electrification strategy:** providing convenient and sufficient parking for carpools and electric vehicles encourages these modes. An electrification strategy would identify steps to implement electric vehicle charging infrastructure across campus.
- **Adjust parking pricing over time:** increasing the cost of parking is a proven strategy for reducing vehicle trips, parking demand and GHG emissions. Parking revenues can also help fund other recommendations in this plan.

- **Invest in Smart Cities infrastructure:** technology can help balance parking demand across CU Boulder's various parking lots and structures and to implement demand-responsive pricing.

- **Discourage parking permit holders from paying to park in visitor spaces:** it is important that visitor parking be available for first-time or repeat visitors to campus. As visitors cannot park in permit spaces, parking permit holders should be discouraged from occupying visitor spaces.

### OTHER RECOMMENDATIONS

- **Evaluate prohibiting cars for first year students:** such a prohibition could increase the parking supply for commuters and encourage multimodal travel behavior in first year students. Evaluation is necessary to determine whether the ends are worth the means.



- **Regulate fleet vehicle parking spaces:**

department-owned vehicles can be parked in most spaces on campus, encouraging driving within or between properties. Regulating these spaces would decrease driving within or between properties.

- **Coordinate with the City of Boulder to regulate off-campus, on-street parking spaces:** parking spillover beyond campus is likely with parking permitting and parking pricing. By working with the City of Boulder, CU Boulder can mitigate negative impacts of its parking strategy on its neighbors.

- **Implement wayfinding near major locations for visitor parking:** visitors should have basic wayfinding information available after they park.

- **Formalize pick-up and drop-off locations for ride hailing:** Lyft and Uber drivers and passengers require spaces to safely pick-up and drop-off. These spaces can also decrease “dead heading”, or drivers circulating while they wait for their next ride.

- **Support the distribution center to reduce deliveries:** vendors or services that are unconsolidated, have a high volume or otherwise significantly impact campus streets and paths are a priority for redirection to the distribution center.



Parking lot 308

# Existing Conditions for Parking

Parking is a critical part of CU Boulder's multimodal transportation system. How the parking system is operated is a policy choice for CU Boulder, recognizing that it is necessary to serve certain uses such as visiting campus, events, and admissions and that parking demand is affected by the myriad other transportation options available.

The parking system is critical to the daily operations and special events that are conducted on CU Boulder's properties. It takes a team of dedicated staff to operate it, manage it and integrate it with the other modes of travel once people park their cars. The parking system serves visitors, students, faculty, staff, special events, athletics and families living on campus. A well planned, funded and managed parking system is critical to achieving a seamless multimodal transportation system.

On a day-to-day basis the large number of students, faculty and staff who live off campus places a high demand on the approximately 11,700 parking spaces at CU Boulder. Approximately 80 percent of students, faculty and staff travel to CU Boulder without their personal car. However, according to the Transportation Master Plan survey, approximately 10 percent of sophomores through fifth year seniors, 15 percent of graduate students, 43 percent of faculty and 58 percent of staff reported driving alone to campus in September 2018; overall, only 18 percent of students, faculty and staff drive alone to CU Boulder.

Eighty percent of CU Boulder's 11,700 spaces are managed by Parking Services while the other 20 percent is managed by Housing Services, Facilities Management, Residential Services and Athletics. This unique management structure provides challenges for all divisions and does not optimize the parking supply's operations. Each division manages their parking for their individual peak use, instead of sharing with other divisions to maximize the limited parking resources for all.

Of the approximately 9,300 of 11,700 parking spaces managed by Parking Services, parking permits are the

most common management system. This system relies on "virtual permits" tied to license plates along with signage and enforcement.

Commuter students, who pay \$221 per semester, currently hold approximately half of parking permits while faculty and staff, who pay up to \$60 per month, hold the other half. Through Transportation Master Plan research, it was determined that CU Boulder's parking costs are on the lower end of Pac-12 schools. Of faculty and staff who hold a permit, approximately 40 percent are registered to a home address within the City of Boulder.

Strong implementation of the multimodal concepts recommended elsewhere in the Transportation Master Plan and other planned improvements in the City of Boulder could affect future demand for parking. As for students, faculty and staff who live outside of Boulder who occupy approximately 6,800 parking spaces, countywide and regional planned high capacity and frequent transit could improve transit access to CU Boulder in the future. Through analysis of Transportation Master Plan data, it was determined that approximately 2,000 people per day drive to CU Boulder but park off-campus.

Approximately 1,300 visitor parking spaces are available for short- and long-term parking in garages, lots and on-street locations. These spaces generate approximately 2,000 parking transactions per day lasting an average of three hours. Half of these transactions are made through the ParkMobile app, an example of CU Boulder's recent successes in implementing new parking technologies. Additionally, CU Boulder already has 40 electric vehicle charging spaces and plans to add more as electric vehicles become more common.

The Transportation Master Plan survey found that 86 percent of students, faculty and staff responded that it was very easy, easy or acceptable to the question "Overall, how easy do you find it commuting to CU Boulder?" Nonetheless, other survey responses reflected the nature of parking that creates challenges for CU Boulder and other institutions and governments: there is never enough parking, parking is never close enough to where you want to go and any parking that is not free is too expensive. Culturally, CU Boulder is challenged by an environment where parking has been treated as an entitlement rather than a finite resource that requires careful management.

## EXISTING CONDITIONS FOR PARKING SUMMARY

CU Boulder has:



11,700  
PARKING SPACES

With 11,700 parking spaces, parking takes up a significant amount of CU Boulder's valuable real estate.

A carefully planned parking system can integrate seamlessly with the proposed fast and frequent transit network, enabling a "park once" environment for people who choose to drive.

Not all parking spaces are managed by the same division which results in a system that is overall less utilized than it could be.

CU Boulder's parking permit system is out-of-date, causes confusion for users and is difficult to administer.

New systems and technologies exist to modernize this system.

Parking costs at CU Boulder are below the market rate in the City of Boulder. Carefully implementing a parking pricing strategy over time is critical to managing demand for parking and potentially raising revenue for other transportation modes and services.

The future of parking is rapidly changing as new, Smart Cities technologies enable new methods of parking management. Additionally, ride hailing and autonomous vehicles require that any new parking built by CU Boulder be adaptable to future re-use.

# Recommendations

## PARKING SUPPLY RECOMMENDATIONS

### NEW PARKING CO-LOCATED WITH THE PROPOSED MOBILITY HUBS

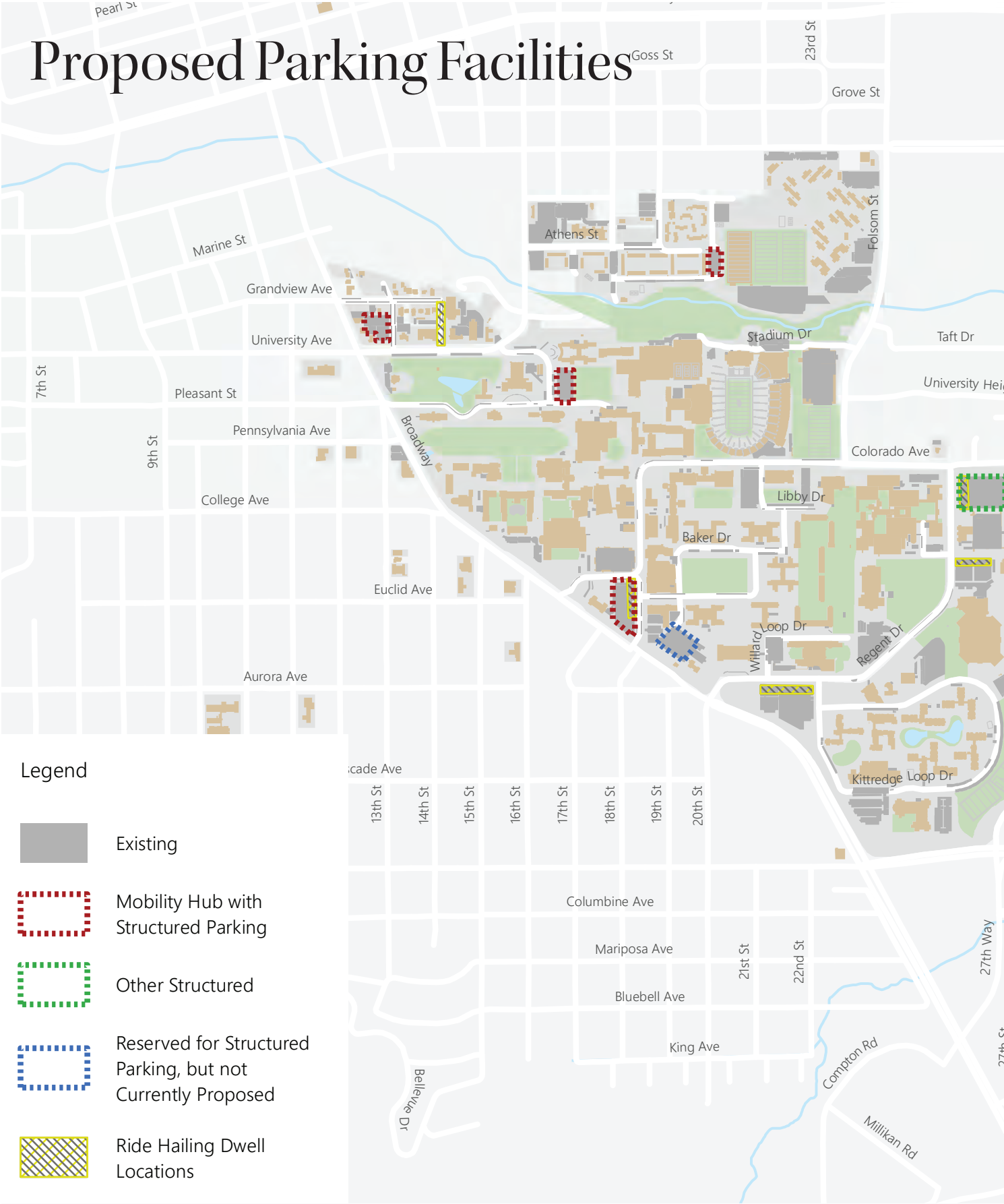
New parking at the Mobility Hubs will ensure that CU Boulder's transit and parking systems integrate seamlessly. Additionally, this parking will free up interior surface lots for future development.

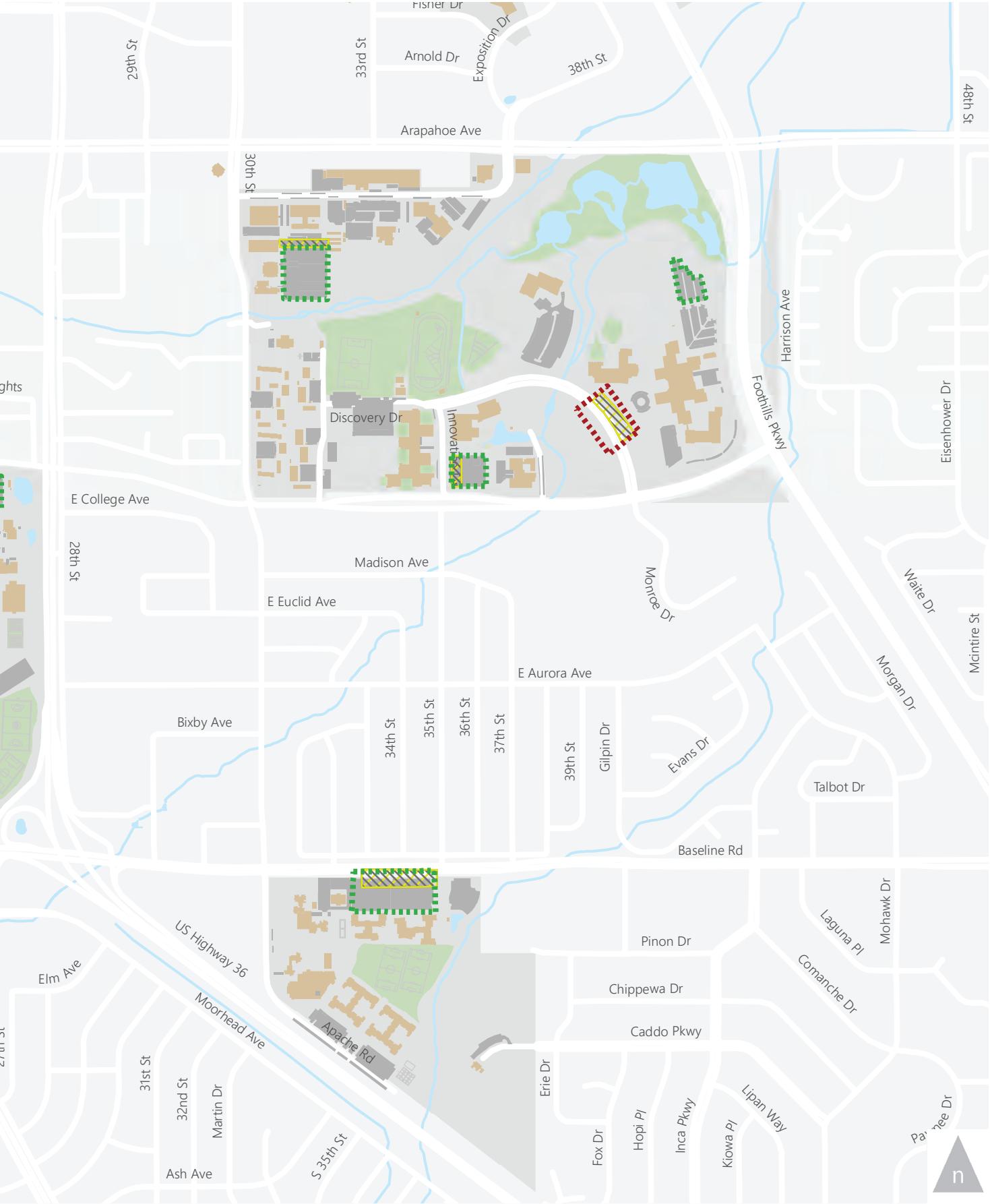
### PRESERVATION OF HIGH-PRIORITY LOCATIONS FOR PARKING BEYOND THE MOBILITY HUBS

This plan identifies spaces to reserve for structure parking should it be needed in the future. CU Boulder is not committed to building this parking until future analysis warrants it, recognizing parking's role in inducing driving and GHG emissions and that the myriad other recommendations in this plan may decrease demand for parking in the future.



# Proposed Parking Facilities





## BUILD NEW PARKING TO BE ADAPTED TO OTHER USES IN THE FUTURE

Transportation experts envision a future where ride hailing, whether through a Transportation Network Company or with a shared autonomous vehicle, results in decreased demand for parking and increased demand for curb space. New parking at CU Boulder will be built with re-purposing in mind for long-term flexibility.

## PARKING MANAGEMENT & PERMITTING RECOMMENDATIONS

### CONTINUED CONSOLIDATION OF PARKING SUPPLY AND MANAGEMENT

Sharing the available parking supply is a cost-effective way to allow all departments to contribute to the goals of the Transportation Master Plan and meet their individual peak travel needs. Efforts to reduce individual parking areas for dedicated uses at peak and off-peak times should continue to be evaluated and consolidated. On-going parking management that provides universal information to users and flexibility is recommended. This includes managing the entire parking supply for the wide range of uses that happen year-round on the CU Boulder properties by having consolidated permits, signage and management.

### OVERHAUL PARKING PERMIT MODEL

CU Boulder's parking permit model is out-of-date, confusing to members of the campus community and requires an extensive amount of staff time to administer. Ultimately, as new technologies are adopted on campus, they can be used to implement more demand-responsive parking pricing and permit models. Peer institutions have experimented with converting some of their commuter lots to "pay as you go" models where rather than semester or monthly permits, users only pay for parking on days that they drive to campus. These types of systems avoid users viewing their parking permits as sunk costs that they must recoup. In the interim, shifting to a simplified, distance-based model where different lots or tiers of lots carry a certain permit price based on their demand level would be an improvement from the current permit method.

### APPLY A CONSISTENT HIERARCHY TO PARKING PLACEMENT

CU Boulder should formalize a hierarchy of where parking spaces are provided within a given lot or

garage. In general, after parking for people with disabilities, promoted transportation modes (carpools, car share vehicles, electric vehicles with charging stations, etc.) should have priority spaces regardless of whether they are students, faculty or staff. At most campuses, faculty and staff parking and visitor parking is prioritized over student parking.

### CARPOOL & ELECTRIC VEHICLE PARKING SPACES

Preferential parking should be provided to encourage CU Boulder students, faculty and staff to use transportation modes that take up less space and that reduce GHG emissions. These parking spaces should be located such that they are the most desirable in lots and garages. Enough of these spaces should be provided so that one is always available to encourage users to switch to these transportation modes.

Electric vehicle parking spaces requires expanding electric vehicle charging infrastructure in CU Boulder's parking facilities, including necessary underground utility expansion. This utility expansion need is also noted in the Fleet section's recommendations. CU Boulder should develop an electrification strategy to identify the best path forward for providing both commuter and fleet electric vehicle charging stations.

### ADJUST PARKING PRICING OVER TIME

At a minimum, allowing parking pricing to increase with inflation or otherwise increasing costs to more closely match the market rate in the City of Boulder is recommended to avoid sub-market pricing. Increasing the cost of parking is a proven strategy for reducing vehicle trips, parking demand and GHG emissions. Additionally, many peer institutions reviewed in this plan's development use revenues generated by parking fees to fund transit infrastructure and operations, walking and biking infrastructure and transportation options.

### INVEST IN SMART CITIES INFRASTRUCTURE

Maximizing use of the available parking supply is critical to the success of the multimodal transportation system. For example, at CU Boulder this could mean encouraging more commuters to park on East Campus rather than Main Campus. Implementing modern parking technologies will be fundamental in optimizing the parking supply for all users and reducing the university's capital costs. Over the last decade Smart Cities technologies have been implemented including



License Plate Recognition technology so that gates are no longer needed. Additional implementation of this technology is recommended at CU Boulder. The Smart Cities section of this plan addresses what CU Boulder can do to work with industry in implementing such technologies on campus.

#### DISCOURAGE PARKING PERMIT HOLDERS FROM PAYING TO PARK IN VISITOR SPACES

Expanding CU Boulder's parking supply would encourage daily users to shift to permit parking, as more permits would become available. Additionally, implementing a more demand-responsive parking pricing and permit model would help ensure that visitor parking spaces are available at all times. CU Boulder should monitor visitor parking utilization and add visitor parking at key entry locations if needed over time. Visitor parking in the Grandview Avenue area and near Macky Auditorium Concert Hall are a high priority.

#### EVALUATE PROHIBITING CARS FOR FIRST YEAR STUDENTS

Prohibiting first year students from bringing a car to campus is common at universities of various sizes in the United States. Such a prohibition would avail parking currently used by students living on campus to other students who drive to campus. Additionally, prohibiting first year students, who live on campus, would help encourage them to use non-auto modes for travel in the first year which would hopefully affect their travel behaviors in future years. Such a prohibition requires new management burdens including to manage the off-campus, on-street parking supply to discourage first year students from bringing a car and parking off-campus. Additionally, universities who have such a policy typically have an exceptions process that requires management. CU Boulder should study this strategy to better understand what outcome this strategy would achieve at CU Boulder and whether it justifies the means.

#### REGULATE FLEET/CONTRACTOR VEHICLE PARKING SPACES

Department-owned fleet vehicles are currently allowed to park in any parking space on campus (with the exception of accessible spaces, unless the vehicle user has a person with disabilities parking placard). This encourages the users of these vehicles to travel by car within or between properties rather than use other transportation modes. While some level of driving within or between properties will likely continue

because of unique needs, increased regulation of fleet vehicle parking spaces is recommended to decrease driving within or between properties.

### OTHER RECOMMENDATIONS

#### WORK WITH THE CITY OF BOULDER TO MANAGE OFF-CAMPUS PARKING

With parking permitting and paid parking comes spillover into adjacent neighborhoods. Based on responses to the Transportation Master Plan survey, it is estimated that approximately 2,000 commuter vehicles are parked off-campus daily. Collaborating with the City of Boulder on parking regulation and enforcement is critical to reduce neighborhood impacts and to encourage commuters driving to CU Boulder to park on-campus.

#### IMPLEMENT WAYFINDING NEAR VISITOR PARKING

Where large numbers of visitors are parking, CU Boulder should implement wayfinding and information stations. This would help visually call-out locations of visitor parking and would be helpful for visitors when they first arrive on campus.

#### FORMALIZE PICK-UP AND DROP-OFF LOCATIONS

As ride hailing, and eventually autonomous vehicles, proliferate at CU Boulder, establishing designated pick-up and drop-off locations will become of increased importance. Already, ride hailing is causing operational challenges on-campus. Pick-up and drop-off locations should be considered with any new campus development projects. Additionally, pick-up and drop-off locations should be planned for, designed and constructed at key campus gateways. As much as possible, designing these locations to be the natural locations for users will decrease the amount of management necessary. However, it is likely that CU Boulder would need to work with ride hailing companies to further encourage drivers and passengers to use these locations. In the near-term, CU Boulder can establish short-term parking that can be used for either visitor parking or for ride hailing dwelling.

#### SUPPORT THE DISTRIBUTION CENTER TO REDUCE DELIVERIES

Deliveries have had a major presence on university campuses for decades. The rise of e-commerce has

accelerated the amount of delivery activity occurring on campus. This puts strain on the campus streets and paths system. Some deliveries will always happen at individual campus buildings; however, supporting the Distribution Center as the receiver of the majority of deliveries can decrease the amount of parking and circulating done on campus by delivery vehicles. CU Boulder has already made significant progress in this area by consolidating delivery or pick-up for some vendors. CU Boulder should build on this success by further consolidating delivery and pick-up of mail, packages and freight, focusing first on vendors or services that are unconsolidated, have a high volume of deliveries or pick-ups or otherwise significantly impact the campus streets and paths system.

## Project List

PARKING PROJECT LIST		
PROJECT	CAPITAL OR OPERATIONS?	COST
PARKING SUPPLY RECOMMENDATIONS		
New parking co-located with proposed Mobility Hubs	See Transit section	
Preservation of high-priority locations for parking beyond the Mobility Hubs	Capital	N/A
Build new parking to be adaptable to other uses in the future	Capital	Varies
PARKING MANAGEMENT & PERMITTING		
Continued consolidation of parking supply and management	Operations	N/A
Overhaul parking permit model to a more supply/demand sensitive model	Operations	\$
Apply a consistent hierarchy to the placement of parking spaces in lots and garages	Operations	\$
Carpool and electric vehicle parking spaces, including electrification strategy <i>Charging and utility infrastructure upgrades are addressed in the Fleet section</i>	Capital	\$\$
Adjust parking pricing over time so that CU Boulder's parking costs are in-line with the market rate; further establish the connection between parking revenues and investments in other transportation modes or services	Operations	N/A*
Invest in Smart Cities infrastructure to enable future parking technologies that can more efficiently monitor supply and demand; in the future these technologies could be used to apply a demand-responsive pricing model	Capital	\$\$\$
Discourage parking permit holders from paying to park in visitor spaces	Operations	\$

## OTHER RECOMMENDATIONS

Evaluate prohibiting cars for first year students	Capital	\$
Regulate fleet vehicle parking spaces	Operations	\$
Coordinate with the City of Boulder to regulate and enforce off-campus, on-street spaces to discourage members of the campus community from commuting and parking off-campus	Operations	\$\$
Implement wayfinding or campus information near major locations of visitor parking	Capital	\$\$
Formalize pick-up and drop-off locations for ride hailing	Capital	\$\$\$
Support the distribution center to reduce deliveries	Operations	\$\$

\$ - less than \$100,000

\$\$ - \$100,000 to \$1m

\$\$\$ - \$1m to \$5m

\$\$\$\$ - greater than \$5m

\*This recommendation should be revenue positive



FedEx vehicle delivering on Colorado Avenue



# Implementation

## HIGH-PRIORITY PROJECTS

The highest-priority projects for CU Boulder to implement its vision for its parking system are:

1. Implement Mobility Hubs at 18th & Euclid, North Campus and Discovery Drive. In addition to providing connections and amenities for other transportation modes, these Mobility Hubs should provide parking. Based on estimates developed for the Transportation Master Plan, the Mobility Hub locations can provide ample parking supply to serve many of the commuter vehicles currently being parked off-campus. Complimenting this strategy with efforts to manage off-campus parking can recapture these vehicles on-campus thereby reducing effects to nearby neighborhoods and increasing CU Boulder's parking supply without significantly affecting vehicle trip generation or GHG emissions. Without efforts to regulate the off-campus supply, new parking can induce new drivers thereby increasing GHG emissions.
2. Work with the City of Boulder to manage off-campus, on-street spaces to discourage members of the campus community from commuting and parking off-campus. This strategy is necessary along with Mobility Hub construction to ensure that additional parking supply does not significantly increase the number of people driving to campus. Rather, the additional parking supply should aim to attract people already driving but parking elsewhere.
3. Adjust parking pricing over time so that CU Boulder's parking costs are demand-responsive and more in-line with the market rate in the City of Boulder. At a minimum, allowing parking pricing to increase with inflation or otherwise increasing costs to match market rate in the City of Boulder is recommended to avoid sub-market pricing. Multiple consecutive years without changes cause parking costs to become significantly less than the market rate. Additionally, making large changes to parking costs are highly unpopular with members of the campus community. Making small changes, year-after-year, ensures that CU Boulder's parking costs keep up with the market rate. CU Boulder may elect to increase parking

costs so that additional revenues can support transit infrastructure and operations, walking and biking infrastructure and transportation options, as described in the Funding section of this plan. Additionally, increased parking costs are associated with a decrease in vehicle trip making, thereby reducing commute-related GHG emissions. According to research from the Victoria Transport Policy Institute and Oregon Department of Transportation, a 10 percent increase in parking costs is associated with a three percent reduction in trip making (and associated VMT/GHG).

## OTHER CONSIDERATIONS

Development on campus has traditionally displaced or removed parking to make way for buildings. Surface parking will be relocated to new garages as development occurs on campus. Moving forward, campus projects should study and address transportation needs, including parking, from the beginning. These projects should incorporate parking into the building program including parking's construction costs. This topic is addressed further in the Funding and Organization section of this plan.

CU Boulder has a history of treating parking as an entitlement available to employees rather than a valuable resource that must be carefully managed for the greatest, campus-wide good. As such, CU Boulder does not currently price its parking in a way to effectively influence demand. This history makes conversations about parking management overly personal and complicates efforts to manage parking supply to meet broader, important goals to the university such as relations with the City of Boulder and the Climate Action Plan. Ongoing planning efforts and outreach should communicate CU Boulder's commitment to a multimodal transportation system that serves all members of the campus community in a way consistent with CU Boulder's goals.

University owned fleet vehicles and "holds" for special events place additional demands on CU Boulder's parking system. While fleet vehicle circulation is inevitable, the recommendations elsewhere in this report to create a fast and frequent transit system between properties and to improve the environment for walking and biking between properties should create alternatives that decrease the need for fleet vehicle circulation. Migrating to a demand-responsive permit



and pricing model and leveraging new technologies would give CU Boulder a powerful tool to manage supply when special events are taking place.

Lastly, this plan recognizes many of the recent successes made to parking at CU Boulder. Constant evaluation of the parking supply, which recently led to permit and visitor parking consolidation, has led to improved utilization without affecting the overall supply. Additionally, alternative enforcement methods such as first-time notifications and the Food for Fines program have been well-received. CU Boulder should continue to evaluate its system over time and enforce its parking regulations in a way that maximize utilization and maintain positive relations with members of the campus community.



Parking lot 430

# Pivotal Strategies, Projects and Services

## 04

### WALKING, BIKING, & MICRO- MOBILITY

CU Boulder will strike a careful balance of moving people within its properties while maintaining its renowned design aesthetic. A series of paths, trails and streets will safely meet the unique needs of those coming to or from CU Boulder's properties, those moving between the properties and those moving around the properties themselves.

*Throughout this section, "people biking" is used to describe people riding non-motorized devices including bicycles, skateboards and scooters. "People using micromobility devices" is used to describe people riding motorized micromobility devices whether privately owned or shared, including electric bicycles, skateboards or scooters. Consistent with industry nomenclature, a "bikeway" includes an off-street trail or path or on-street lane for use by people biking or people using micromobility devices. "People walking" is used to describe people moving on-foot or using a personal mobility device such as a wheelchair.*



#### **Streets that move people to and from properties and between Main Campus and East Campus**

CU Boulder will build and improve high-priority walkways and bikeways along its streets. Additionally, CU Boulder will be a partner with the City of Boulder to build and improve high-priority walkways and bikeways along city streets. Recent collaboration on the 30th & Colorado corridors is already resulting in construction of proposed improvements.



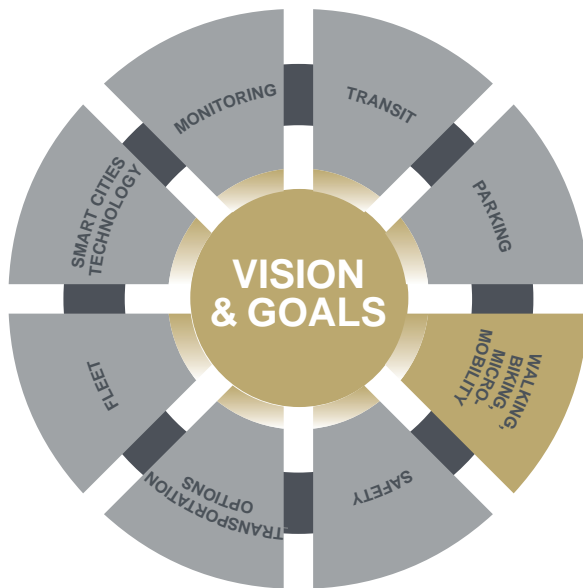


### **Paths and trails designed to move people comfortably and safely within campus**

Paths that separate people walking and people traveling at higher speeds will ensure that people biking or using micromobility devices can access different parts of the campus on dedicated facilities, ensuring comfort and safety for people walking in their own defined space.

### **Core Campus Streets that prioritize people walking, biking, and using micromobility devices and become signature places**

These streets will be closed to through traffic and re-designed exclusively for people walking, biking, and using micromobility devices and as signature places on the CU Boulder campus. Access for facilities and services vehicles and for people with disabilities will be maintained.



## Recommendations Summary

- **18th & Colorado core campus street:** With the construction of a Mobility Hub at 18th & Euclid and a Transit Center at Folsom & Colorado, buses will no longer need to travel through 18th & Colorado. In addition to the benefits of improving bus travel times and reliability, this creates an opportunity to pedestrianize the 18th & Colorado into a signature public space for gathering and people walking, biking and using micromobility.

- **Separated paths:** in areas where the volumes of people walking, biking and using micromobility are high, and where physical expansion of the path is possible, separated paths will improve conditions for all users.

- **On-street bike lanes:** in areas such as Stadium Drive, 18th & Euclid, Kittredge Loop Drive, Marine Street and elsewhere on East Campus, on-street bike lanes will provide a comfortable bikeway, separated from vehicle traffic, for people biking or using micromobility.

- **Education and regulations:** education best-practices from peer institutions can increase awareness of safe walking, biking and micromobility behaviors among all students, faculty and staff.

Working with the Police Department to codify moving violations on campus paths, and increasing the Police Department's resources, can help improve behavior when education and encouragement are not enough.

- **Policy refinement and enforcement of vendor, delivery, facilities and service vehicle circulation:** CU Boulder already has policies on vehicle circulation but refinement is necessary to ensure that reasonable enforcement can take place.

- **Bike parking, bike stations and bike share:** updating CU Boulder's bike parking standards to increase amounts of covered bike parking will improve end-of-trip conditions for people biking. Expanding the number of bike stations on campus will help meet demand for this successful amenity. Increased numbers of bike share stations will make bike share more convenient on campus.

- **Shared micromobility policy:** CU Boulder should continue working with the City of Boulder to ensure that any future micromobility policies will be successful for both parties.

## Existing Conditions for Walking, Biking & Micromobility

A complete network of walkways and bikeways allows for efficient transportation to access CU Boulder's properties. Establishing a network of on-and off-street facilities along with supporting infrastructure is integral to moving students, faculty and staff safely around campus, to or from campus and between CU Boulder's properties via walking, biking and micromobility devices. Additionally, a safe and efficient network of walkways and bikeways can leverage investments made in transit to connect people to and from CU Boulder's proposed Mobility Hubs and Transit Centers.

As CU Boulder grows, East Campus and Williams Village are becoming more developed. In the survey completed for this Transportation Master Plan, 55 percent of students, faculty, and staff reported regularly

traveling between different campus properties. Students, faculty and staff are also living farther from campus, beyond walking distance, often in other Boulder County communities and US 36 corridor communities. Outreach to the campus community has shown that safety while walking, biking or using micromobility is a critical goal for travel to, from or between properties.

While many members of the campus community move between properties by walking, biking or using transit, there is still a large number of people driving, carpooling or ride hailing (Lyft or Uber) to get between properties: 13 percent between Main Campus and Williams Village, 22 percent between Main Campus and East Campus, and 31 percent between East Campus and Williams Village. Improving walkways and bikeways so there are improved connections and intersection crossings between Main Campus, East

Campus and Williams Village would give people better options to travel between the properties. Additionally, unlike transit, walking, biking and micromobility have much lower operational expenses once infrastructure is in place, making walking, biking and micromobility highly affordable travel modes for CU Boulder.

The Transportation Master Plan survey revealed other issues that make walking, biking and using micromobility to, from and around CU Boulder challenging. According to students, faculty and staff, the biggest challenges to walking, biking and micromobility at CU Boulder are: near misses or safety concerns on paths; not having enough space for people walking, biking and using micromobility on paths; conflicts between people walking, biking or skateboarding; paths feeling unsafe or uncomfortable; and snowy or icy paths making it difficult to walk, bike or use micromobility.

## EXISTING CONDITIONS FOR WALKING, BIKING & MICROMOBILITY SUMMARY

Of the CU Boulder Campus Community:



WALKED, RODE A  
BIKE OR SKATE-  
BOARDED TO CAM-  
PUS IN SEPTEM-  
BER 2018



REGULARLY  
TRAVEL BETWEEN  
CU BOULDER  
PROPERTIES

45 percent of the campus community reported walking, riding a bike or skateboarding to get to campus in September 2018; each of these trips reduced CU Boulder's parking demand and its GHG emissions.

Walking and biking have little to no operational expenses once infrastructure is in place, making them highly affordable travel modes.

A majority, 55 percent and growing, of the campus community already regularly travels between properties. High-quality walkways and bikeways to and between properties are necessary to encourage

walking, biking and micromobility and to ensure safety for members of the campus community. Active modes promote health and wellness, contributing to student success.

A significant number of students, faculty and staff, between 13 and 31 percent, drive, carpool or use ride hailing to travel between CU Boulder's properties.

Safety concerns between people walking, biking and skateboarding are common among CU Boulder students, faculty and staff. Infrastructure investments can help minimize conflicts between these users.

*Data comes from the 2019 Transportation Master Plan Survey*



# Recommendations

## PATH, BIKEWAY & WALKWAY TYPES

### Mixed-use Path

The volume of people walking, biking and using micromobility devices is low and sharing a path is still comfortable for all users. Most paths on CU Boulder's campus are mixed-use paths although not all are currently wide enough to comfortably serve the existing or future number of users.



### Separated Path

There is an increased number of people walking, biking and using micromobility devices and the modes need to be separated to achieve safety and comfort given the speed differential among users. Separated paths already exist along Broadway, Cockerell Drive, portions of Pleasant Street and in the Kittredge area.



### Core Campus Street

These streets are designed to a high-quality aesthetic, possibly including street pavers, custom streetscape elements and landscaping. They are closed off to private vehicles and open to people walking, biking and using micromobility devices. Service vehicles are allowed when activity levels are low. No Core Campus Streets currently exist but this concept is successful at other peer institutions.



### Pedestrian Only Path (Dismount Zone)

These paths are only for people walking. People biking or using micromobility devices must dismount and walk to ensure safety for all people moving through the space.

### Protected Bike Lane

A designated lane with a physical barrier that separates the bicycle lane from adjacent motorized traffic.



### Bike Lane

A designated lane without physical barriers that restrict the encroachment of motorized traffic.



### Designated Bike Route

Typically on a lightly traveled, local street with minimal traffic hazards that does not have designated bicycle facilities.



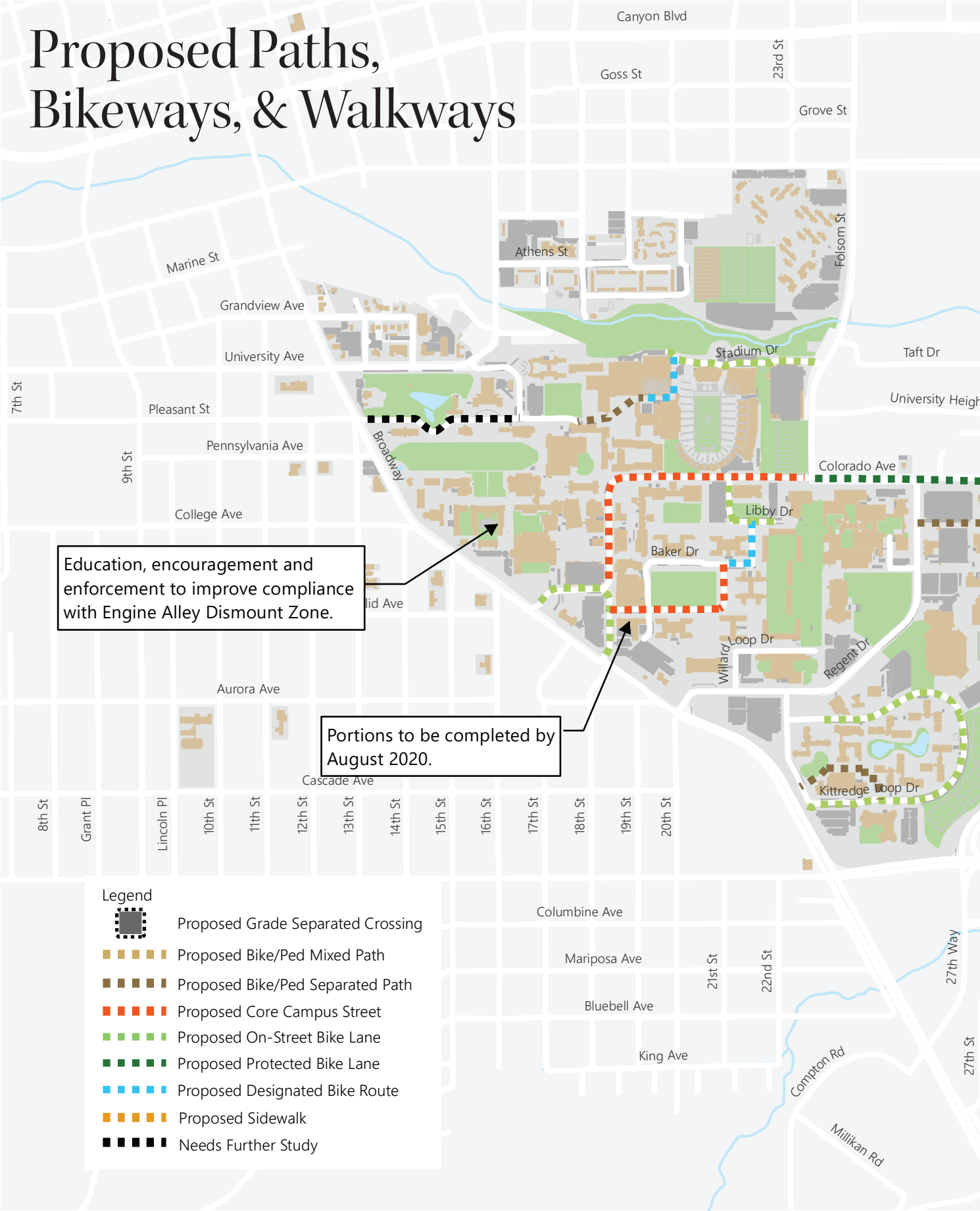
### Sidewalk

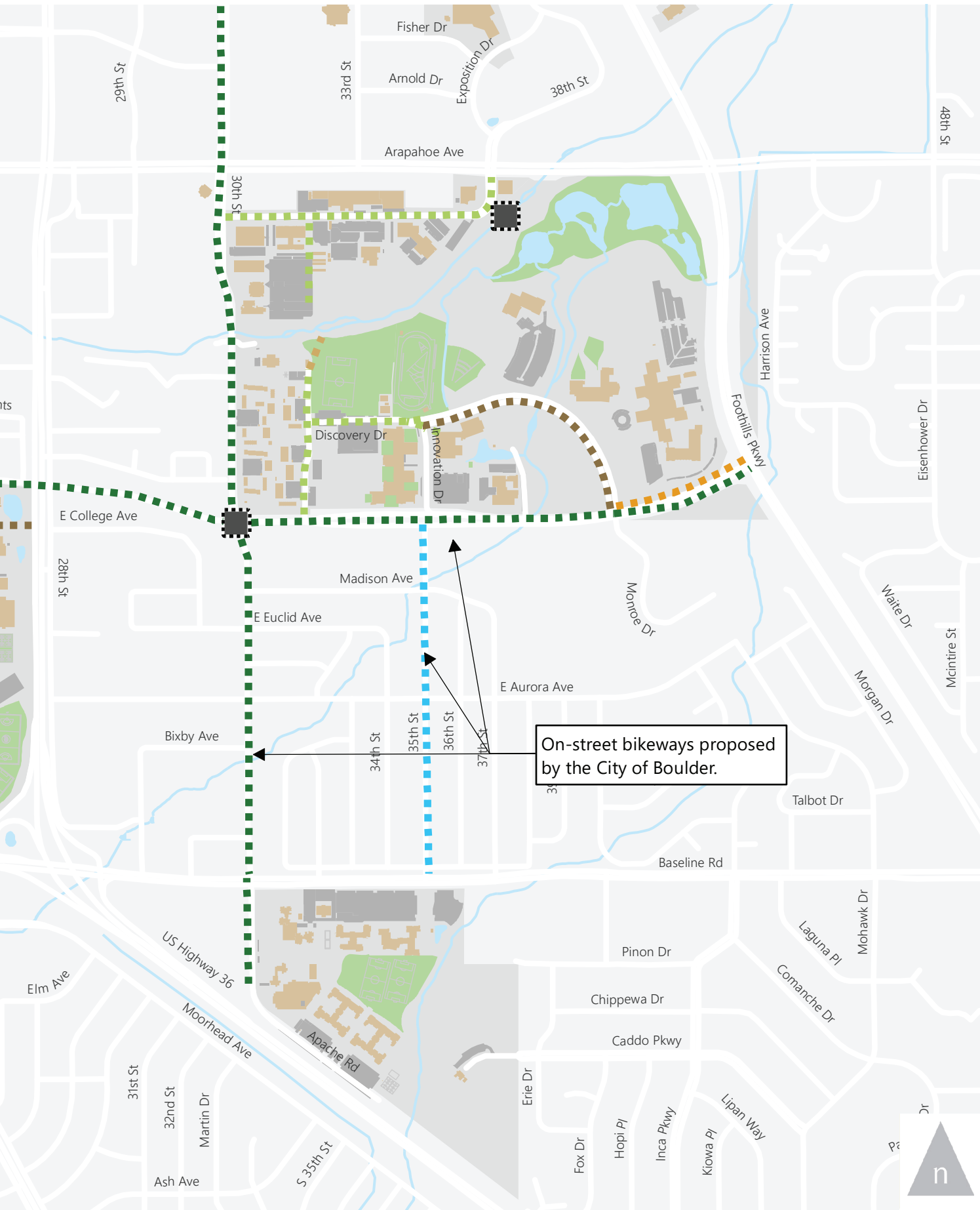
A path along the side of a road, either immediately adjacent to the road or separated by landscaping, intended for the use of people walking.



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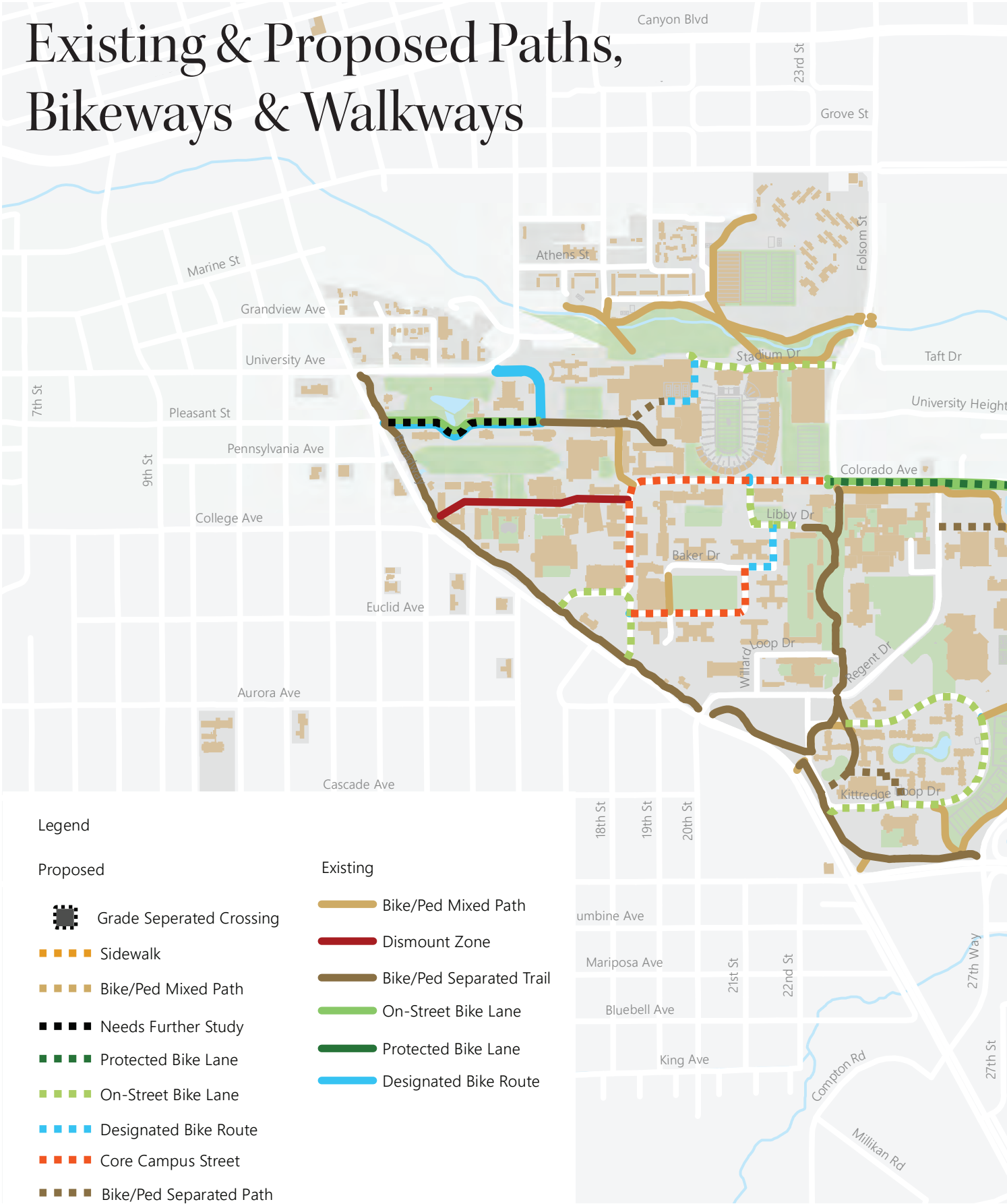
# Proposed Paths, Bikeways, & Walkways

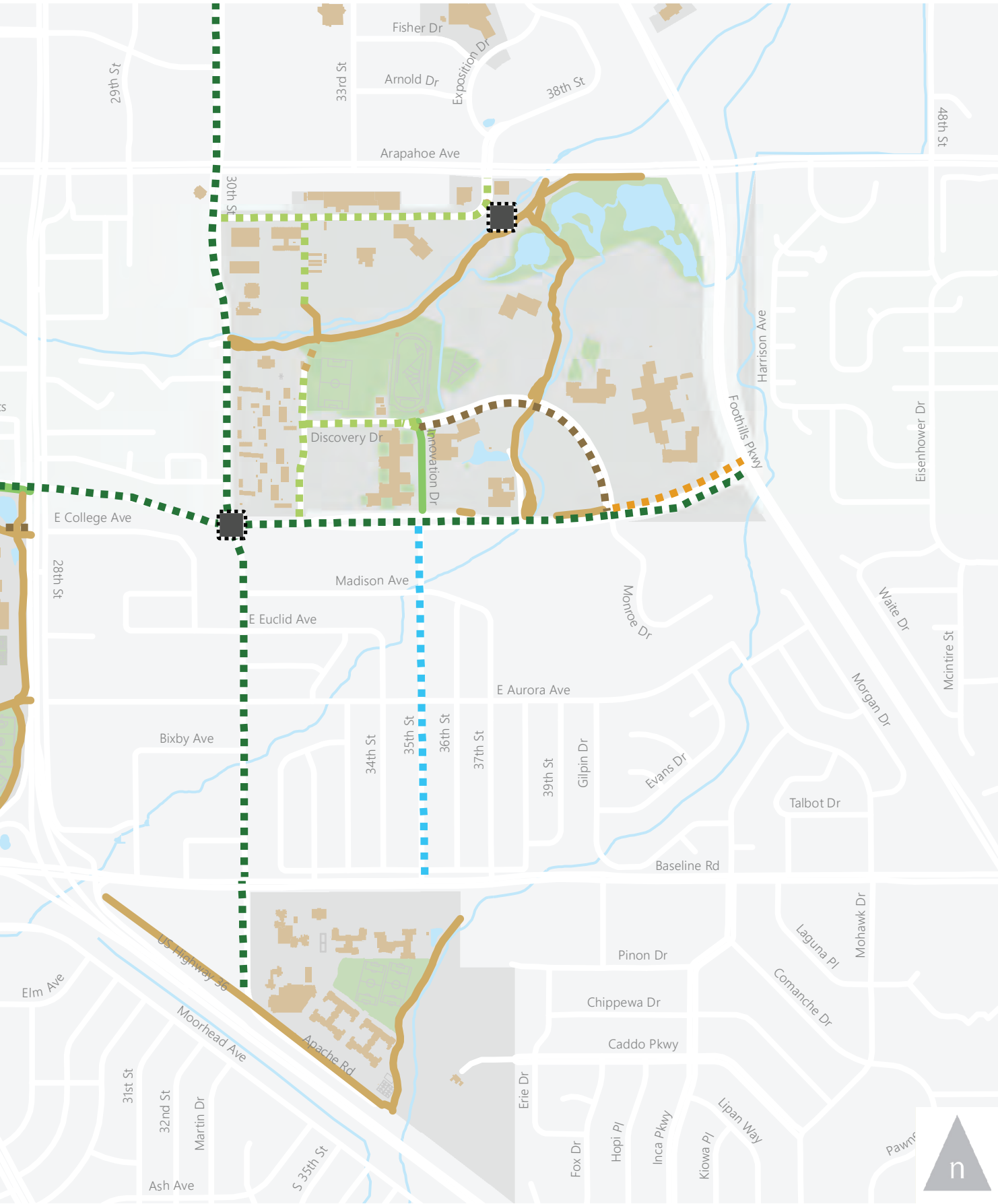






# Existing & Proposed Paths, Bikeways & Walkways





## STADIUM DRIVE

Challenge:

- The environment for people biking or using micromobility devices on Stadium Drive is poor and there is no direct connection to Macky Drive.

Recommendation:

- Provide a clear connection and path of travel for biking or using micromobility devices from Folsom Street to Pleasant Street and Macky Drive along Stadium Drive.
- There should be bike lanes north of Folsom Field, transitioning to a designated bike route on the west side of Folsom Field transitioning to a separated path south of the recreation center.

## PLEASANT STREET

Challenge:

- Between Broadway and where Pleasant Street becomes a Core Campus Street at Eaton Humanities, the street is designated for one-way westbound vehicle travel with sharrows for people biking and an eastbound, contraflow bike lane.
- There is parallel parking on the north side of the street.
- The westbound travel lane and bike lane are narrow and facilities or service vehicles are often parked in the bike lane, on the sidewalk or elsewhere along the corridor, contributing to discomfort for people biking and using micromobility devices.

Recommendation:

There are two potential recommendations for this area, described below. In either option, a separated path is proposed south of the Balch Fieldhouse Complex to provide connectivity between Pleasant Street and the 18th & Colorado core campus street.

- *Option 1:*
  - o Remove parking on the north side of the street and create “bump out” loading zone areas for facilities or service vehicles to load and unload.

- o The roadway would remain one-way westbound with sharrows for people biking and an eastbound, contraflow bike lane.

- o The bike lane would be widened and a painted buffer zone between the bike lane and travel lane would be added.

• *Option 2:*

- o Pleasant Street would become a two-way street between Macky Drive and the drop-off loop in front of Macky Auditorium Concert Hall.
- o West of Macky Auditorium Concert Hall, Pleasant Street would become a core campus street and would be closed to vehicles.

## ENGINE ALLEY

Challenge:

- There are frequently conflicts between people walking, biking or using micromobility devices and driving service vehicles on Engine Alley.
- People biking frequently do not dismount from their bikes even though there is indication that it is a dismount zone.

Recommendation:

- Increase enforcement and education to people biking and using micromobility devices that they must dismount in this area during peak times.
- Restrict contractors, vendors, delivery vehicles and facilities vehicles from moving on paths during the class change period.
- Bike parking should be relocated away from Engine Alley and placed at the entrances of Engine Alley to discourage people from biking or using micromobility devices within the corridor.

## BROADWAY BIKE PATH

Challenge:

- The separated path is often uncomfortable because of conflicts between people walking, biking or using micromobility devices.



- People walking frequently spillover into the bike portion of the path, especially during peak times between classes or after alighting from nearby buses.

Recommendation:

- Consider pavement markings to increase pedestrian attention where they cross the bike portion of the path, such as at bus stops.
- Elsewhere, increase enforcement on speed, wrong way riding or walking or careless or reckless behavior.

## 18TH & COLORADO

Challenge:

- There is not enough space for people walking, biking or using micromobility devices and transit vehicles to operate in this corridor.
- The environment is uncomfortable for people walking, biking or using micromobility devices.
- Transit vehicles experience significant delays trying to move through this corridor while classes are changing.
- People drive personal vehicles through this corridor despite prohibitory signs.
- There is a significant placemaking opportunity for the core of campus if this corridor is de-emphasized as a transportation corridor.
- Existing crosswalks across Colorado Avenue west of Folsom Street were mentioned by Transportation Master Plan survey respondents as a safety concern.

Recommendation:

- Establish 18th & Colorado from Euclid Avenue to Folsom Street as a Core Campus Street.
- As described in the Transit section, the 18th & Euclid Mobility Hub and Folsom & Colorado Transit Center would enable buses to turn around without traveling through 18th & Colorado.
- Implement a high-quality redesign to establish this as a signature place on CU Boulder's campus, enabling the space for event programming while

maintaining it as an emergency, service and delivery vehicle route using gates at either side of the corridor.

- A limited number of students, faculty or staff with special access needs for deliveries or because of a disability can be granted access.
- Service vehicles, delivery vehicles and other vehicle should be restricted from entering the corridor while classes are changing.
- Modernizing the gate system would allow access based on keycards, codes or license plate recognition with remote monitoring.

## 18TH & EUCLID

Challenge:

- This area is congested with buses and with vehicles accessing the various parking facilities.
- These streets connect the Broadway undercrossing at Euclid Avenue to the 18th & Colorado core campus street

Recommendation:

- Install bike lanes on Euclid Avenue and 18th Street south of the core campus street.

## WARDENBURG DRIVE & LIBBY DRIVE

Challenge:

- These former streets provide connectivity between 18th & Colorado, the residence halls south of Wardenburg Drive and the separated path on Cockerell Drive; however, there is not a seamless environment for people walking, biking or using micromobility devices.

Recommendation:

- Upgrade Wardenburg Drive and portions of Libby Drive to a core campus street. West of Cheyenne Arapaho Hall, this will be complete by August 2020.
- Elsewhere on Libby Drive, install bike lanes or establish a designated bike route to make the connection to Cockerell Drive clear.

## 28TH STREET UNDERPASS CONNECTION

Challenge:

- The path from the engineering buildings to the 28th Street underpass (north of Lot 436) is heavily used but is shared between people walking, biking and using micromobility devices.

Recommendation:

- Upgrade this path to a separated path from Regent Drive to 28th Street.

## KITTREDGE LOOP

Challenge:

- The mixed-use path on the east side of Kittredge West Hall does not directly lead to the buildings within the core of the Kittredge Loop.
- There is not designated space for people biking or using micromobility devices on the paths into the core of the Kittredge Loop.
- The crossing of the walkway and bikeway south of the tunnel underneath Regent Drive is confusing to users.

Recommendation:

- Upgrade the existing mixed-use path west of Kittredge West Hall to a separated path and improve its connection to the Regent Drive undercrossing.
- Establish a mixed or separated connection to the core of the Kittredge Loop.
- Create a consistent separated path from the Cockerell Drive bikeway, underneath Regent Drive and through the Kittredge Loop.
- Evaluate whether converting Kittredge Loop Drive to one-way operation has safety and circulation benefits for all street users. Bike lanes are desirable on Kittredge Loop Drive.
- Bike parking should be relocated away from building entrances served by paths where biking and using micromobility devices is not desired. Bike parking should be relocated to be served by separated paths.

## MARINE STREET

Challenge:

- Marine Street serves many of CU Boulder's facilities north of Boulder Creek; however, no comfortable bikeways or continuous walkways exist to serve them.
- Boarding platforms for transit passengers do not exist along Marine Street.
- A comfortable bikeway on Marine Street will help connect facilities north of Boulder Creek to those south of Boulder Creek, including using the proposed crossing of Boulder Creek at 38th Street.

Recommendation:

- Complete the sidewalk network along Marine Street with associated boarding platforms for transit passengers.
- Add bike lanes to Marine Street between 30th Street and Arapahoe Avenue.
- Adding bike lanes would likely require removing parking from at least one side of Marine Street as well as adjusting the curb limits on the south side of Marine Street where curb extensions exist or where the existing cross-section narrows.

## EAST CAMPUS CONNECTIONS TO MARINE STREET, INCLUDING 33RD STREET

Challenge:

- Streets and paths within East Campus do not connect across Boulder Creek to Marine Street.

Recommendation:

- Build mixed paths to connect Discovery Drive and 33rd Street, across the bridge over Boulder Creek, to the paths and streets north of Boulder Creek near Lot 560.
- Add designated bike lanes on Discovery Drive, 33rd Street and the drive aisle on the west side of Lot 560 connecting to Marine Street.

## DISCOVERY DRIVE

### Challenge:

- There are minimal complete, connected bikeways through East Campus.

### Recommendation:

- Convert the north couplet of Discovery Drive to a two-way street.
- Convert the south couplet to a separated path.

## CITY OF BOULDER PROJECTS

The City of Boulder, in some cases through studies that have involved CU Boulder as a stakeholder, proposes protected bike lanes on Colorado Avenue from Folsom Street to Foothills Parkway, protected bike lanes on 30th Street from Arapahoe Avenue to south of Baseline Road and a neighborhood green street (an enhanced form of designated bike route) on 35th Street from Colorado Avenue to Baseline Road. As these facilities connect the CU Boulder properties, these City of Boulder bikeways should be a priority for CU Boulder.

## INTERSECTION PROJECTS

The following intersections were identified through the 2019 Transportation Master Plan survey, meetings with the Executive Committee or meetings with the Working Group. Further study of these locations may not result in proposed improvements; however, CU Boulder should work with the City of Boulder to explore whether improvements are warranted at these locations.

- Pleasant Street/Broadway intersection – Pleasant Street is CU Boulder’s preferred east-west bikeway through the north part of Main Campus and there are designated bikeways on both sides of Broadway. However, due to turn movement restrictions from Broadway, there is not a clear connection for people biking or using micromobility devices to cross at this intersection. It is recommended to work with the City of Boulder on infrastructure improvements to improve this crossing for people biking and using micromobility devices.

- University Avenue/Broadway intersection – people walking indicated that this intersection causes safety concerns. It is recommended to work with the City of Boulder on infrastructure improvements to improve this intersection for people walking.

- 16th Street/Broadway intersection – this intersection has been identified as confusing for people walking, biking or using micromobility devices who are trying to cross Broadway. There is an undercrossing located at this intersection, but there is a lack of signage to direct people to the undercrossing. It is recommended to work with the City of Boulder to increase wayfinding signage in this area. Additionally, people walking indicated that the crosswalks across 16th Street south of Broadway cause safety concerns as people driving do not yield for people walking. It is recommended to work with the City of Boulder to determine if improvements to these crosswalks are appropriate.

- 18th Street/Broadway intersection – there are currently no crossings for people walking, biking or using micromobility devices at the 18th Street and Broadway intersection. However, this intersection provides a north/south connection to campus across Broadway from Cascade Avenue. It is recommended to work with the City of Boulder on a crossing for people walking, biking and using micromobility devices.

- 30th Street/Colorado Avenue intersection – previous planning efforts proposed two undercrossings at this intersection, as well as a protected intersection at-grade. These improvements are scheduled to begin construction in summer 2020.

- Colorado Avenue/Regent Drive intersection – previous planning efforts proposed a protected intersection.



## RECOMMENDED STRATEGIES & SERVICES

### EDUCATION

Educating students, staff and faculty on walking, biking and micromobility safety is an ongoing endeavor. Candidate safety efforts could include a biking and micromobility safety course as a part of orientation for new students. Additionally, a safety marketing campaign (using CU Boulder's various media, social media, etc.) could also be effective. CU Boulder already partners with the City of Boulder on a "Heads Up" campaign and could expand this partnership to address additional behaviors. These recommendations are incorporated into projects associated with the Safety and Transportation Options sections of this plan.

### ENFORCEMENT OF DANGEROUS BEHAVIORS

In developing the Transportation Master Plan, CU Boulder's Police Department noted several key challenges to enforcing behaviors by people biking or using micromobility devices: moving violations on campus paths are not well codified resulting in a lack of legal footing for the Police Department to issue citations, a lack of dedicated resources to train officers and to target enforcement of these behaviors and a desire to maintain a positive police-student relationship. To help resolve these challenges, CU Boulder should complete an effort to give police the legal footing they need to issue citations. Dedicated funding would likely be necessary to regularly assign officers to enforce these behaviors. Several models for behavioral enforcement that maintain police-student relations were identified through this plan's development, including the issuance of warnings before citations, options to volunteer or make donations in lieu of fines, a ticket diversion program with safety classes and positive enforcement campaigns that reward good behavior rather than penalize bad behavior.

### VENDOR, DELIVERY, FACILITIES AND SERVICE VEHICLE CIRCULATION

Vendor, delivery, facilities and service vehicles parking on campus paths was identified as an issue in several meetings with the Executive Committee. Future street, parking and pathway projects should seek to identify practical parking spaces for these vehicles recognizing

that the drivers of these vehicles require parking close to their worksites. Facilities Operations and Services should continue to work to educate and encourage employees and contractors to park in places that do not disrupt circulation for all transportation modes. If design and education are not sufficiently effective, Facilities Management should work with the Police Department to develop a mechanism for enforcing this behavior.

The movement of vendor, delivery, facilities and services vehicles on pathways was mentioned many times through the Executive Committee, Working Group and Transportation Master Plan survey as an issue. Rather than ban movement of these vehicles on certain pathways, which is likely impractical due to the maintenance needs of individual buildings or areas of campus, the recommendation of this Transportation Master Plan is to refine and enforce existing policies prohibiting the movement of these vehicles during class change. Additionally, these policies should require vendor, delivery, facilities and service vehicles to park without restricting the movement of people. These policies must be coupled with education and enforcement for both CU Boulder staff and vendors for it to be effective.

### BIKE PARKING & BIKE SHARE

Through the Transportation Master Plan's development, the topics of bike parking (standard, covered and secure), bike stations and bike share stations came up intermittently. The Transportation Master Plan's recommendation for bike parking is for CU Boulder to continue its current practices regarding overall bike parking quantity but to update its standards regarding bike parking type (standard versus covered and secure).

CU Boulder's bike stations are highly successful and at times over capacity. CU Boulder should work with the operator of the bike stations, currently the Environmental Center, to identify expansion strategies for bike stations.

For bike share, CU Boulder recently increased the number of stations on campus and the Environmental Center funds free memberships for CU Boulder students, faculty and staff. Continued expansion of bike share stations on campus, along with free memberships, is recommended to increase overall bike share system usage at CU Boulder.

## SHARED MICROMOBILITY POLICY

This plan was developed during a period of rapid expansion of micromobility devices, in particular, shared micromobility electric scooters (e-scooters) and electric bicycles (e-bikes). As of early 2020, the City of Boulder is exploring whether they should issue permits to operate shared e-scooters and is also piloting a program for shared, dockless bike sharing. Given the intertwined relationship of CU Boulder's and the City of Boulder's transportation systems, CU Boulder should continue to work with the City of Boulder in developing regulations for shared micromobility in the City of Boulder and on CU Boulder's campus. These regulations will address how, where and when shared micromobility devices can be used, such as on sidewalks versus in bike lanes. Other institutions have made revenue sharing agreements with shared micromobility providers that operate on their campuses and CU Boulder should consider revenue sharing as a part of the development of regulations and, potentially, issuance of permits for operation.

## CLASS CHANGE INTERVAL

CU Boulder should evaluate class change times and schedules to allow more time for students, faculty and staff to travel between classes. Congestion of people walking, biking or using micromobility devices on Main Campus and the time it takes to travel between properties was mentioned through the Executive Committee, Working Group and Transportation Master Plan survey as an issue.

# Project List

WALKING, BIKING, & MICROMOBILITY PROJECT LIST		
PROJECT	CAPITAL OR OPERATIONS?	COST
ON-CAMPUS PATHS AND ON-STREET BIKEWAYS		
Stadium Drive	Capital	\$\$
Pleasant Street – study and construction	Capital	\$\$
Engine Alley	Operations	\$
Broadway bike path	Operations	\$
18th & Colorado core campus street <i>This project can be completed in phases</i>	Capital	\$\$\$
18th & Euclid	Capital	\$\$
Wardenburg Drive & Libby Drive	Capital	\$\$\$
28th Street underpass connection	Capital	\$\$
Kittredge Loop – study and construction	Capital	\$\$
Marine Street	Capital	\$\$
East Campus connections to Marine Street	Capital	\$\$
Discovery Drive	Capital	\$\$

PROGRAMMATIC PROJECTS		
Education program	Operations	\$
Codify moving violations on campus paths	Capital	\$
Increase Police Department resources to enable enforcement of bicycling, skateboarding and micromobility behaviors on campus streets and paths	Operations	\$\$
Vendor, delivery, facilities and service vehicle circulation policy refinements	Capital	\$
Vendor, delivery, facilities and service vehicle circulation policy enforcement	Operations	\$\$
Bike parking standard updates	Capital	\$
Bike station expansion	Capital	\$\$
Bike share system expansion	Capital	\$\$
Shared micromobility policy	Capital	\$
Class change interval evaluation	Capital	\$

\$ - less than \$100,000

\$\$ - \$100,000 to \$1m

\$\$\$ - \$1m to \$5m

\$\$\$\$ - greater than \$5m

\*This project is addressed by the 18th & Colorado Core Campus Street project

\*\*This project is already under construction



# Implementation

## HIGH-PRIORITY PROJECTS

The highest-priority projects for CU Boulder to implement its vision for its network of walkways and bikeways are:

1. Transform the 18th & Colorado corridors into a Core Campus Street. With the 18th & Euclid Mobility Hub and Folsom & Colorado Transit Center enabling the removal of buses in this corridor, there is a significant opportunity to create a signature place in the core of campus. The Folsom & Colorado Transit Center and roundabout are necessary to remove buses from this corridor. Given the need to access Lots 359 and 360, near Benson Earth Sciences, this project could be completed in conjunction with redevelopment of these lots or completed in phases that make circulation changes for access to these lots while maintaining access.
2. Complete a more detailed conceptual design and alternatives analysis process for Pleasant Street, starting with the two options presented in this plan. Improvements to Pleasant Street are critical for creating an attractive alternative to Engine Alley.

3. Partner with the City of Boulder to improve crossings for people walking, biking and using micromobility devices across Broadway, specifically at University Avenue, 16th Street and 18th Street. These intersections are valuable connections for people walking, biking or using micromobility devices from University Hill to campus and it is important to improve the crossing comfort for those users.

4. Work with the City of Boulder to identify funding sources for on-street bikeways on Colorado Avenue (protected bike lanes), 30th Street (protected bike lanes) and 35th Street (designated bike routes). These bikeways are critical for providing comfortable travel between properties by bicycle or micromobility.

## OTHER CONSIDERATIONS

Over time, CU Boulder should consider consolidating pathway ownership and maintenance under one entity. Currently, multiple campus organizations or departments own and maintain pathways. This leads to a dispersion of decision-making regarding operations and improvements to the pathways system. By having a single entity own and maintain the pathways system, decisions regarding changes to the system can be accelerated.

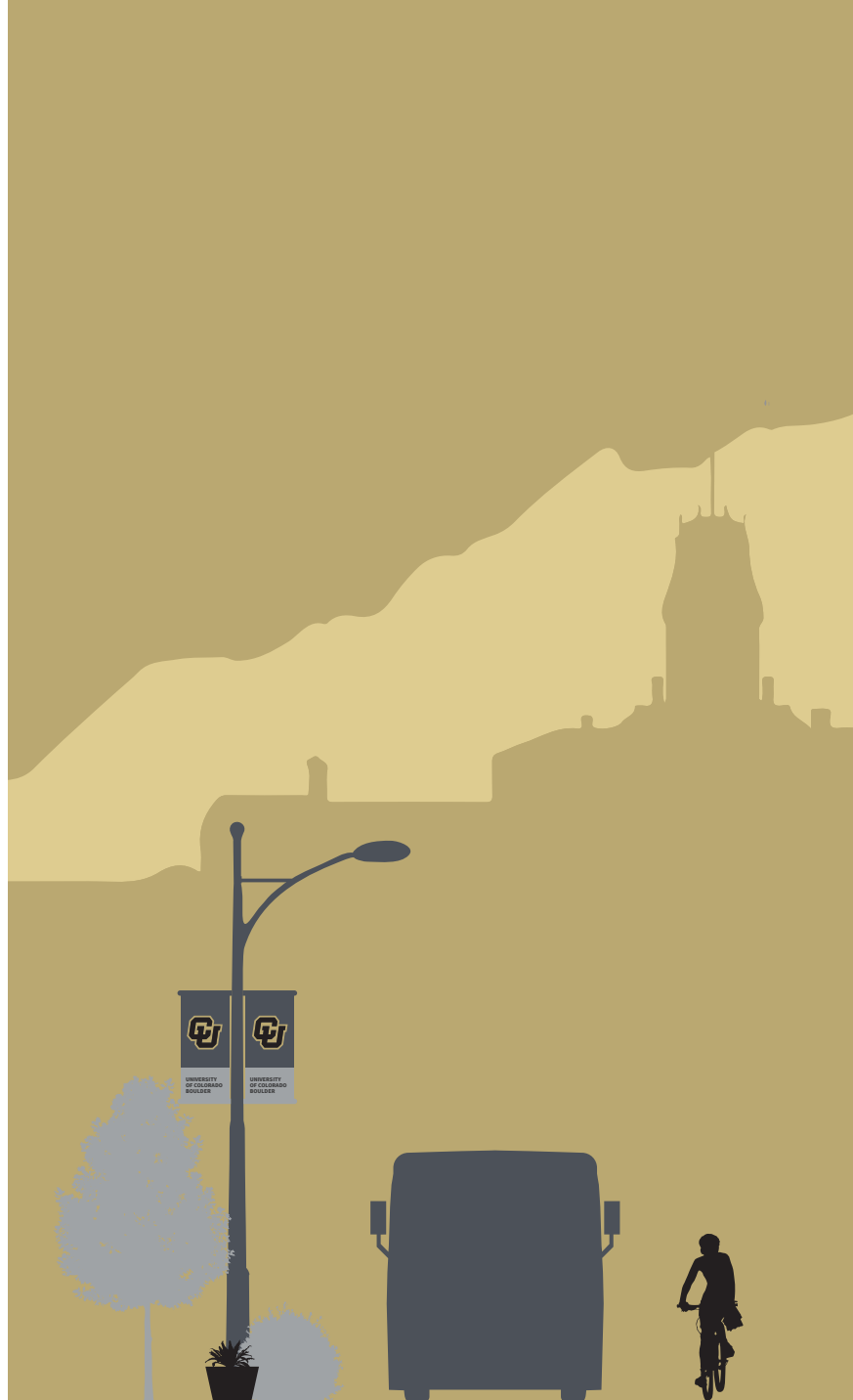


Students crossing the street at 18th & Colorado

## 05

## SAFETY

Safety is CU Boulder's first goal for its transportation system. CU Boulder is supportive of Vision Zero, a strategy to eliminate all traffic fatalities and serious injuries, and will work with the City to implement recommendations from the *Vision Zero Boulder Safe Streets Report*.





# Pivotal Strategies, Projects and Services

**CU Boulder should institutionalize a set of programs to collect and evaluate crash data and to implement projects or countermeasures.**

CU Boulder does not currently collect crash data for University-owned streets and paths. Collecting this data is the first step to better understand where injuries are occurring on the system of campus streets and paths. Through evaluation, collaboration with the University community and funding, CU Boulder can reduce injury crashes on campus. By partnering with the City of Boulder, including bringing financial support to projects, CU Boulder can contribute to citywide efforts to reduce injury crashes on campus.





## Recommendations Summary

Safety is a key consideration of many other infrastructure projects recommended in the Transportation Master Plan. The safety-specific recommendations are focused on programmatic measures to ensure that safety is addressed and prioritized in projects moving forward.

- **Partnerships and funding:** CU Boulder should be a financial partner with the City of Boulder on safety-related projects to ensure that CU Boulder's safety priorities become a priority for the City of Boulder.
- **Crash reporting:** CU Boulder should prepare crash reports for crashes on campus paths and streets, collect data on unreported crashes for travel related injuries logged at the Wardenburg Medical Center, and regularly evaluate this crash data to identify safety improvements on campus.
- **On-campus infrastructure:** Implementing projects in the Walking, Biking and Micromobility section of this plan will improve safety. Additionally, future collaboration with the campus community and CU Boulder's various departments can be done to identify additional locations that would benefit from safety projects.

- **Safety audit:** An audit of traffic control devices on campus can identify needed updates that would result in uniform application of traffic control that enhances safety.

## Existing Conditions for Safety

Safety affects people traveling to and from, between and within CU Boulder's properties: Main Campus, East Campus and Williams Village. In general, crashes that happen while traveling within CU Boulder's properties involve the system of campus paths and streets, though some streets may be owned by the City of Boulder. Crashes that happen while traveling between or to and from CU Boulder's properties more likely involve a City of Boulder street.

### ON-CAMPUS SAFETY

Data regarding crashes on CU Boulder's campus paths and streets does not exist and therefore could not be analyzed in preparing the Transportation Master Plan. The collection and reporting of such data is a high-priority recommendation in this plan. The 2019 Transportation Master Plan survey did ask questions about safety while walking and biking.

2019 Transportation Master Plan Survey Question – The biggest challenge(s) associated with [walking or biking] at CU Boulder is/are (select all that apply):

WALKING			
Snow and ice on pathways make it difficult or unsafe to walk – 41%	I experience crashes, near misses or safety concerns regarding other path users on multi-use paths and sidewalks – 36%	Streets around or through campus are uncomfortable or unsafe <b>to cross</b> – 12%	Streets around or through campus are uncomfortable or unsafe <b>to walk along</b> – 9%
BIKING			
Snow and ice on pathways make it difficult or unsafe to bike – 30%	I experience crashes, near misses or safety concerns regarding other path users on multi-use paths and sidewalks – 27%	<b>Pathways</b> on campus are uncomfortable or unsafe to bike along – 11%	<b>Streets</b> around or through campus are uncomfortable or unsafe to bike along – 10%

Note: additional response options were available.

Open-ended survey responses indicated frequent safety concerns between people walking and people biking or skateboarding. Street crossings were also frequently mentioned as a concern for people walking. For people biking, a lack of comfortable on-street bikeways, lack of lighting at night, conflicts with people walking and street crossings were mentioned as concerns. Many of the walking, biking and micromobility projects recommended in the previous section are in response to feedback received on the Transportation Master Plan survey.

## SAFETY ON CITY OF BOULDER STREETS

The City of Boulder is dedicated to creating and maintaining a safe transportation system so that no one is discouraged from traveling by any mode because of fears about safety. The *Vision Zero Boulder: Safe Streets Report* is the city's comprehensive traffic crash analysis for crashes that occurred between 2015 and 2017 to understand where and how crashes are occurring, understand whom they involve and identify actions to improve safety. Boulder experiences more than four times the national average of walking work commute trips (11.3 percent versus 2.7 percent) and seventeen times the national average of biking work commute trips (10.4 percent versus 0.6 percent). A great number of CU Boulder students, faculty and staff live and commute from within the City of Boulder and benefit from safer streets throughout Boulder.

Boulder is using the "Four E's Approach" to achieve Vision Zero, engineering, education, enforcement and on-going evaluation, to address risky transportation behaviors and to design and operate a system focused on travel safety and comfort.



Euclid Avenue

## THE FACTS

The City of Boulder analyzed crash data from 2015 to 2017 develop a location-specific and system-wide approach that is proactive to improve travel safety for everyone in the community.

21,000 +

BETWEEN 2015 AND 2017, MORE THAN 21,000 PEOPLE WERE INVOLVED IN A CRASH IN BOULDER

Source: 2019 Vision Zero Boulder Safe Streets Report

### There are five Vision Zero objectives:

1. Eliminate crashes resulting in serious injuries and fatalities
2. Reduce other types of crashes
3. Improve travel comfort and security
4. Enhance awareness of community engagement with Vision Zero
5. Improve data and be transparent

7 PEOPLE WERE KILLED



3 WALKING



1 ON A BIKE



3 IN A CAR

161 PEOPLE WERE SERIOUSLY INJURED



35 WALKING



61 ON A BIKE



65 IN A CAR

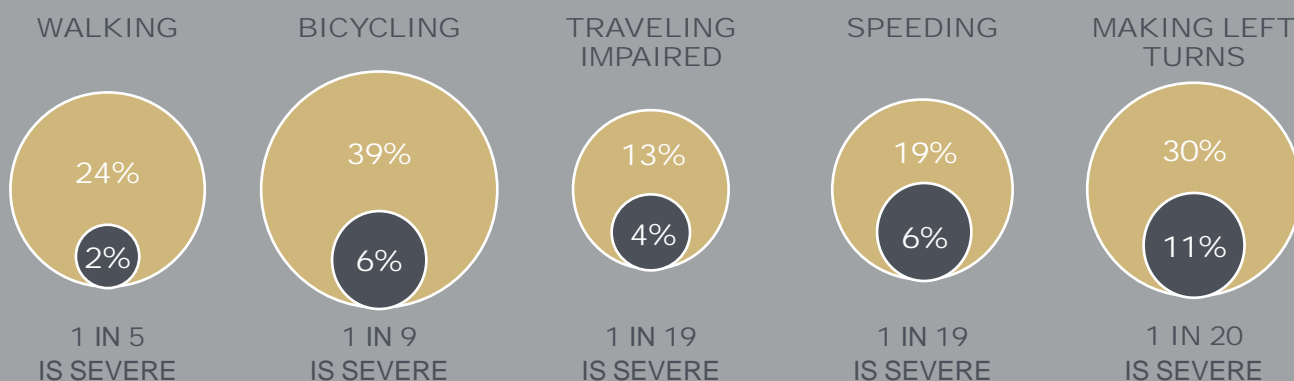




## OVERREPRESENTED SEVERE CRASHES

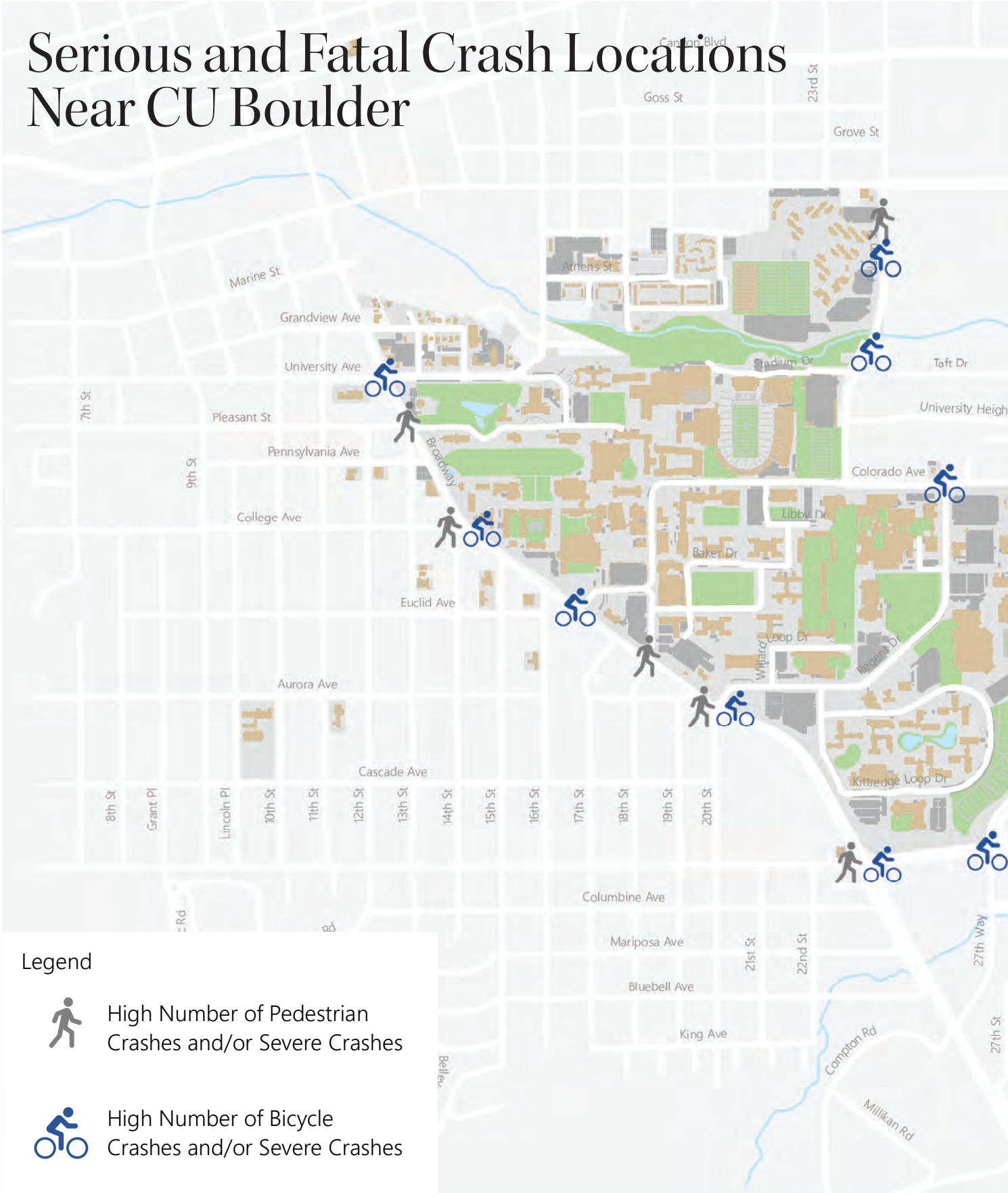
There are several categories that have been identified where there is a disproportionate number of severe crashes in comparison to overall crashes. It is important that students, faculty and staff feel comfortable walking and biking and choose those modes over driving when possible to achieve the university's GHG emissions reduction goals and as a means of improving quality of life and health for all members of the campus community.

*The severe crash data analysis has identified five overrepresented categories of travel where there is a disproportionate number of severe crashes (●) in comparison to overall crashes (●). These areas are our focus to eliminate fatal and serious injury crashes and include people:*

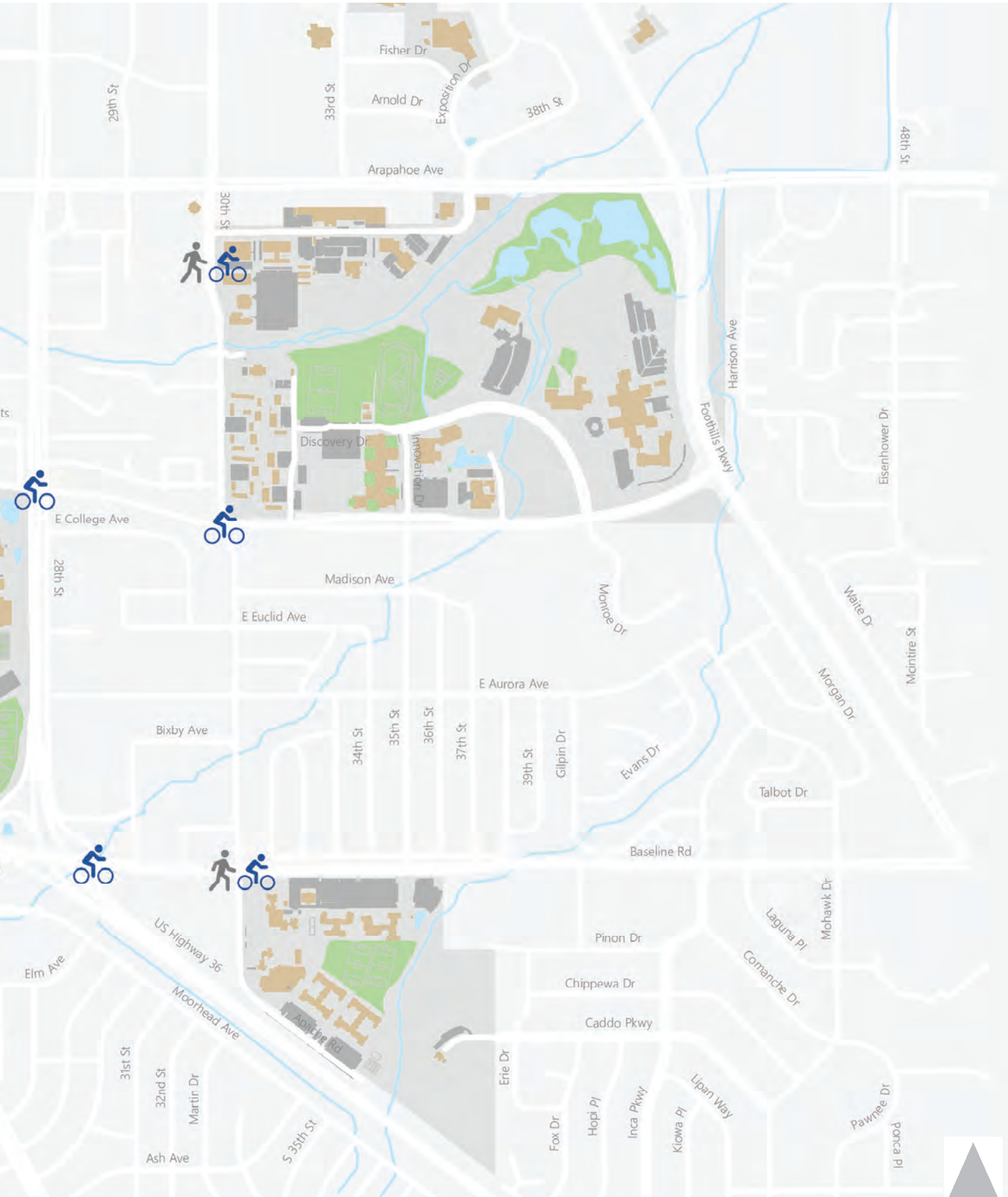


*Between 2015 and 2017, people walking were involved in two percent of all crashes and 24 percent of all severe crashes. One out of every five pedestrian-related crashes is severe.*

# Serious and Fatal Crash Locations Near CU Boulder









## People Walking

People walking in Boulder are among the most vulnerable users in the transportation network. Although pedestrians were involved in only **two percent** of all crashes, they accounted for **24 percent** of all severe crashes. **Over half** of pedestrian crashes occurred within crosswalks (intersections, driveways, marked mid-block crossings).

THE THREE MOST COMMON - AND MORE HARMFUL - TYPES OF CRASHES INVOLVING PEDESTRIANS INCLUDE:

1

### PEDESTRIANS BEING HIT BY LEFT-TURNING VEHICLES

24 percent of all pedestrian crashes, with one out of five severe

2

### PEDESTRIANS DASHING OUT INTO THE STREET AND BEING HIT BY A VEHICLE

14 percent of all pedestrian crashes, with one out of four severe

3

### PEDESTRIANS WALKING ACROSS AN INTERSECTION BEING HIT BY A MOTORIST WHO FAILED TO YIELD

10 percent of all pedestrian crashes, with one out of five severe

#### *Key approaches to achieving the Vision Zero goals:*

- Pedestrian head-starts (leading pedestrian interval)
- “No right-turn on red” restrictions
- Left-turn protected phasing
- Education for people driving and people walking

## People Biking

People biking are also vulnerable users of Boulder’s transportation network. People biking were involved in six percent of crashes from 2015 to 2017, but account for 39 percent of all severe crashes. The majority of bicycle crashes occur within a crosswalk or at another part of the intersection.

**Seventeen percent** - A vehicle fails to yield for a person biking on the cross-street at a stop sign.

**Fourteen percent** - Motorists turning left and hitting a person biking traveling in the opposite direction (one out of four severe).

**Fourteen percent** - Motorists turning right and hitting a person biking traveling in the same direction (one out of nine severe).

#### *Key Approaches to achieving the Vision Zero Goals:*

- Green pavement markings
- Protected intersections
- “No right-turn on red” restrictions
- Left-turn protected phasing
- Education for people driving and people biking

## WHY IS THIS A PRIORITY FOR CU BOULDER?

According to the 2019 Transportation Master Plan survey, 45 percent of CU Boulder’s students, faculty and staff traveled to campus by walking, biking or skateboarding in September 2018. Additionally, according to the survey, a large percent of the campus community walks, bikes or skateboards between properties: 14 percent between Main Campus and Williams Village, 22 percent between Main Campus and East Campus and 39 percent between Williams Village and East Campus. However, overall themes from the Transportation Master Plan survey showed that people who walk and bike often feel unsafe, especially at crossings, due to the conflicts experienced with vehicles. As a result, many people stated that they chose to drive to access campus instead. CU Boulder is a driver of transportation activity in the City of Boulder and with teaming efforts, the University can be a catalyst to promote implementation, enforcement and education around Vision Zero goals and the action plan.

# Recommendations

## PARTNERSHIPS AND FUNDING

CU Boulder should be a partner with the City of Boulder on safety related matters, collaborating at the staff level and bringing financial support to projects on city streets so that CU Boulder's safety priorities can become a priority to the City of Boulder.

## CRASH REPORTING

Within the CU Boulder campus, the CU Boulder Police Department should prepare crash reports (using Colorado Department of Revenue format) for all reported crashes involving all modes of transportation on campus paths and streets. Additionally, to collect data for crashes that are not reported, CU Boulder should require that basic crash reporting data be collected for travel related injuries that are logged at the Wardenburg Medical Center but may not have been recorded in an official crash report. The evaluation of these two crash data sources should be used to identify specific locations on campus where multimodal safety measures are needed. As new Smart Cities technologies become available, CU Boulder may be able to use them to collect data on crashes or near misses.

## ON-CAMPUS INFRASTRUCTURE

Many of this plan's earlier recommendations regarding walkways and bikeways address safety. CU Boulder should implement these projects and work with its community and its various departments to identify additional locations where the interaction of non-motorized travel modes results in safety concerns. This should include a review and modification of the many locations identified for improvement in the Walking, Biking and Micromobility section of this plan, as well as the completion of walking and biking infrastructure in portions of campus that are building out including East Campus. The Pathway Safety Committee should be used to identify new locations over time. And, new funding methods and sources, described in the Funding section of this plan, would allow for some level of improvement to occur on a regular basis.

## SAFETY AUDIT

CU Boulder should complete a campus wide safety audit of all traffic control (signing and marking) along all streets, sidewalks and pathways that provide connectivity through CU Boulder. This effort should review the disjointed and sometimes outdated traffic control that has been implemented over the years. It should then recommend updates and upgrades to result in a uniform application of traffic control that enhances safety. The Pathway Safety Committee and CU Police Department should be engaged in this effort.

# Project List

SAFETY PROJECT LIST		
PROJECT	CAPITAL OR OPERATIONS?	COST
Partnerships and funding	Capital and operations	\$-\$\$\$\$
Crash reporting	Capital and operations	\$
On-campus infrastructure	Capital	\$-\$\$\$
Safety audit	Capital	\$\$

\$ - less than \$100,000

\$\$ - \$100,000 to \$1m

\$\$\$ - \$1m to \$5m

\$\$\$\$ - greater than \$5m





The bend at 18th & Colorado

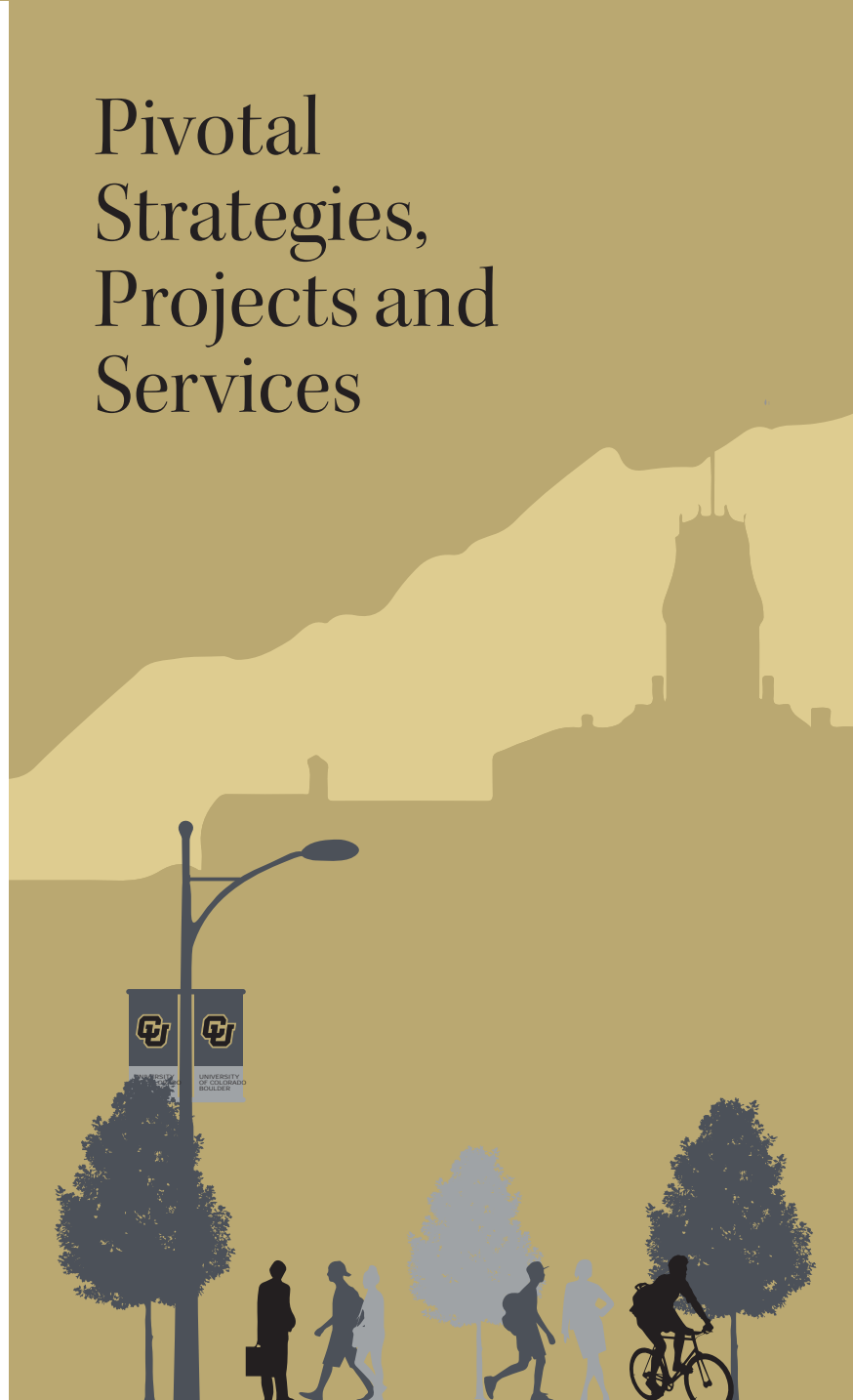


# 06

## TRANSPORTATION OPTIONS

Transportation options include programs and policies that encourage transit, carpooling, walking and biking. Compared to the cost of building infrastructure or providing transit services, transportation services can offer a high return on investment and contribute to a positive culture regarding multimodal transportation.

## Pivotal Strategies, Projects and Services



**Consolidate student and faculty or staff transportation options into one, comprehensive, Transportation Options group.**

Currently, transportation options are administered separately for students and faculty or staff. This causes confusion for users. And, combined, the group will be able to plan more effectively and do more with its existing funding.



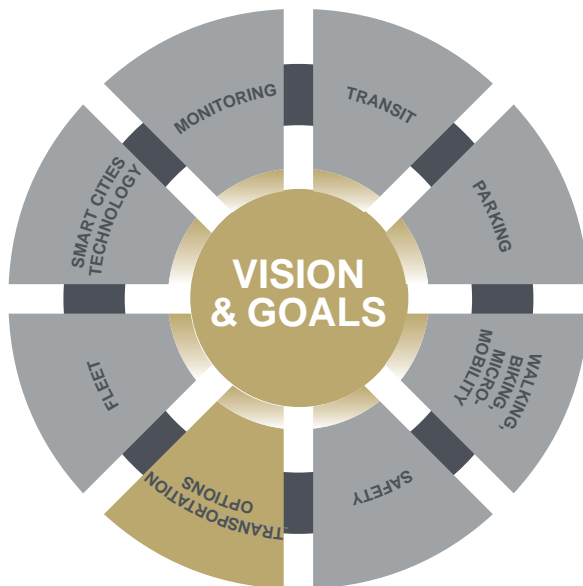
### **Streamline resources and information for all transportation options.**

Members of the campus community and visitors will be able to access all relevant information about options for traveling to and from campus via one simple, consolidated Web site.

### **Promotion of transportation options through branding and on-boarding.**

Establishing a common brand for transportation on campus will help promote messages consistent with CU Boulder's transportation goals. With new students arriving every semester and strong on-boarding processes for faculty and staff, education can help encourage multimodal transportation at the onset.





## Recommendations Summary

Transportation options, often referred to as Transportation Demand Management (TDM), refers to the set of strategies that promotes the use of modes other than single occupancy vehicles (SOVs) by helping people use existing infrastructure and services. This includes education on transportation options, incentives and encouragement to use alternative modes and disincentives for driving. Transportation options aim to accomplish a number of goals where success can be demonstrated. This is achieved by structuring the goals so that they are Specific, Measurable, Attainable, Relevant, and Time-bound (SMART). These goals include:

- Improving multimodal transportation options to encourage transit, carpooling, walking and biking.
- Encouraging alternative ways of going to school or working via rideshare and remote learning/telework.
- Incentivizing mode shift from driving SOV through parking and land use management.
- Marketing the benefits of changing how users travel.
- Improving the environment and reduce emissions

through lessened SOV use and an increase in low emissions vehicles.

In space-constrained environments where land use decisions must be highly strategic, transportation options can be highly valuable for reducing demand for space-consuming parking. Additionally, transportation options typically have a high return on investment for reducing vehicle trips, vehicle miles traveled and GHG emissions compared to infrastructure or transit service investments.

## Existing Conditions for Transportation Options

CU Boulder currently has a number of programs and policies already in place that inform the transportation decisions of faculty, staff, students and visitors. These strategies fall under five primary categories—land use, parking management, infrastructure, transportation improvement strategies and programs. Transportation options are currently delivered separately for students and faculty or staff which can cause overlap among staff efforts and confusion among members of the campus community.

The survey completed for the Transportation Master Plan revealed that student, faculty and staff familiarity with TDM programs varies widely. Most (more than 60 percent) are familiar with CU Night Ride, CollegePass/EcoPass and elements of the bike program. Other programs such as guaranteed ride home, CU Commute and vanpool have low familiarity (less than 20 percent); however, familiarity with these programs may be low if they are primarily oriented towards faculty and staff rather than students. Although the university currently has several strategies in place, there is opportunity for improvement and expansion of these transportation options.



CU NightRide vehicle

## EXISTING CONDITIONS FOR TRANSPORTATION OPTIONS SUMMARY

85%

OF STUDENTS,  
FACULTY AND STAFF  
ARE FAMILIAR WITH  
CU NIGHT RIDE

78%

WITH COLLEGE PASS /  
ECOPASS

70%

**WITH** CU  
BOULDER'S BIKE  
REGISTRATION

Transportation options typically have a high return on investment for reducing vehicle trips, parking demand and GHG emissions.

CU Boulder currently offers several services to members of the campus community; however, these services are delivered separately for students and faculty or staff which can cause confusion.

Familiarity with some programs is very high: CU Night Ride, CollegePass/EcoPass and the bike program all exceed 60 percent familiarity. Familiarity with other programs is much lower.

Based on other institutions' successful, aggressive transportation options implementation, there are many new, effective strategies that CU Boulder can implement.

*Data comes from the 2019 Transportation Master Plan Survey*

# Recommendations

## OVERALL STRATEGIES

### INCREASE AWARENESS

A lack of awareness of existing transportation programs and services is one of the primary barriers keeping students, faculty and staff from using these strategies. As revealed by the Transportation Master Plan survey, a large portion of survey respondents (a statistically significant representation of the university community) have not used and/or are not familiar with many of the transportation-related services offered on campus. Due primarily to a lack of sufficient marketing and promotion, campus travelers are not aware of individual transportation programs or services. In addition to a lack of awareness of individual services, this set of services and department are not branded or promoted to facilitate users' understanding of this holistic set of transportation options. Promotion and branding of these as a holistic set of programs and services should be an early, first step.

### INTEGRATION OF RESOURCES

The university currently has a number of services, policies and programs to encourage and facilitate non-SOV travel. However, many of these strategies operate independently of the others, including Parking and Transportation Services. Packaging these strategies would allow users to leverage the synergy between them and increase the intuitiveness of using a service or program. This integration would also better align with the way that people travel—usually using multiple modes within a week, or even a day. This integration lowers the barriers of entry for users to make choosing and using a transportation program or service easy. Integration should consist of the following: one website, location under one department, a single physical location, one integrated staff, and a singular dedicated budget.

### RECOMMENDATIONS

The university has an extensive set of existing transportation policies, programs and services, such as:

- On-campus student housing
- Faculty Housing Assistance Program loans for eligible faculty

- Flexible work arrangements (e.g. telecommuting, remote working) and online learning

- CU Positive Impact Points (PIPs)

- Parking pricing

- CU Commute

- Carpool and vanpool preferential parking

- Electric vehicle parking

- RTD transit passes: CollegePass and EcoPass

- Guaranteed Ride Home

- CU NightRide

- Bike Registration

- UMC and Folsom Bike Stations

- Buff Bikes

- Boulder B-Cycle bike share

- Semester bicycle rental program

- Carshare

- Vanpool

However, there are additional strategies that have been applied successfully at peer universities that CU Boulder can explore.

**These transportation options recommendations either support or complement the proposed Pivotal Strategies, Projects and Services for transportation options. Following each recommendation is an estimate of how effective a recommendation would be for reducing vehicle trips, parking demand and GHG emissions.**

### BUILDOUT HOUSING MASTER PLAN

Implement recommendations from the Housing Master Plan that reduce travel distance and focus housing along transit routes to make transit, walking and biking convenient transportation options. *High efficacy*

### COMMUTE CLUB

Establish a Commute Club that provides a package of transportation benefits that are available to users who do not purchase a parking permit. The benefits available can include a select number of days of free



parking passes, car share benefits, bicycle shop gift card, “clean air cash”, free vanpool and free carpool permits. **High efficacy**

### **CONSOLIDATE TRANSPORTATION OPTIONS FOR STUDENTS AND FACULTY OR STAFF**

Consolidate the implementation of transportation programs and policies for students and faculty/staff by consolidating funding, staff and building location. **High efficacy**

### **PARKING BENEFITS**

Recommendations for changes to parking pricing, permit structure and location are located in the parking section of the Transportation Master Plan; however, there are many benefits to these strategies that would influence travel behavior. These parking recommendations would impact how users determine how to travel to and through campus by shifting the ease, affordability and decision-making process associated with driving. **High efficacy**

### **REMOTE LEARNING**

CU Boulder wants to provide options and different methods of learning, including distance, online, and remote learning to enhance student success and opportunities. Movement in this direction could relieve demand on the transportation system as well as reduce GHG emissions. **High efficacy**

### **STREAMLINE RESOURCES**

Consolidate all information regarding transportation programs and policies with one easy-to-navigate Web site, printed materials, branding, etc. **High efficacy**

### **TRANSIT BENEFITS**

Recommendations for changes to transit service and related programs are located in the transit section of the Transportation Master Plan; however, there are many benefits to these strategies that would influence travel behavior. Making transit more convenient, accessible, and intuitive would make transit a reliable transportation option that can serve as a viable replacement to driving alone. **High efficacy**

### **ELECTRIFICATION PLAN**

Develop an Electrification Plan that identifies the location and phasing of additional electric vehicle charging locations. **Medium efficacy**

### **ADMISSIONS OFFICE/CAMPUS TOURS EDUCATION**

Incorporate information about transportation as a part of campus tours and the admissions office material in order to educate prospective students and families about the available transportation options. **Medium efficacy**

### **BIKING, WALKING AND WHEELING BENEFITS**

Recommendations for changes to bicycle and pedestrian infrastructure are located in the Walking and Biking section of the Transportation Master Plan; however, there are many benefits to these strategies that would influence travel behavior. Having an intuitive, connected and low-stress network for biking and walking that makes it safe and easy, would encourage users to bike or walk to and through campus. **Medium efficacy**

### **CAR SHARE**

Expand the use of car share by enhancing promotion and providing incentives that encourage the use of car share. Engage in discussions with car share providers to increase presence of car shares on or near campus. **Medium efficacy**

### **COMMUTE CONCIERGE**

Create a customized service where users can call or email a hotline to receive personalized customer service that helps design a commute that best fits the needs of the user. The concierge provides information including route, time, booking and payment. **Medium efficacy**

### **DATA COLLECTION AND EVALUATION**

Collect data annually on transportation behavior and perceptions. Data collected should include information on transit ridership, bike share, bike rental and parking. This data should be evaluated to determine opportunities for reallocating funding and resources that results in the most significant level of impact. **Medium efficacy**

### **EXPAND PIPS**

The university currently has an innovative app-based rewards program where students, faculty and staff can receive points for positive behavior such as volunteering, recycling and bike share. Points can be

used on textbooks, gear, school expenses or even to help pay tuition. This program gamifies the adoption of behavior change. The Transportation Master Plan recommends expanding the existing PIPs program by increasing promotion and marketing, expanding the transportation-related activities that earn points and include transportation-related purchases to spend points on. **Medium efficacy**

### **FLEXIBLE SCHEDULES**

Promote and provide policies to enable flexible schedule options for all users. This may include being on campus for longer hours but fewer days, or shifting time of travel, to help alleviate demand on the transportation system during peak hours. **Medium efficacy**

### **INTEGRATED BUFF ONECARD FOR MULTIMODAL TRANSPORTATION OPTIONS**

Enhance the Buff OneCard's role in transportation by streamlining the booking, payment and ticketing of many transportation options through the card. This can include car share, transit, bike rentals, bike registration, VanPool and Guaranteed Ride Home. This integration would make multimodal trips and transfers more seamless. Some of this integration is already in place; however, integration should evolve as new transportation options are implemented. **Medium efficacy**

### **ON BOARDING**

Collaborate with Human Resources to incorporate transportation options as a part of the on boarding process for faculty and staff. Travel behavior is formed early on, thus it is important to educate new employees on the transportation options available at the university and the transportation benefits associated with their employment. **Medium efficacy**

### **ORIENTATION FOR FRESHMEN AND TRANSFER STUDENTS**

Implement an orientation program customized to incoming freshmen and transfer students that includes available transportation options and programs, as well as associated costs. Travel behavior is formed early on. Learning the transportation system of a new city can be challenging, especially when new students are first acclimating. These tendencies in combination

reveal the importance of educating new students about available transportation options as a part of orientation. Orientation materials can also address safe walking and bicycling behaviors, consistent with the recommendations of the Walking and Biking section of this plan. **Medium efficacy**

### **PARENT EDUCATION**

Incorporate information about various alternative transportation options to driving in the information provided to parents of incoming freshmen. Providing the appropriate information can equip freshmen with the knowledge that bringing their own private vehicle is not necessary. **Medium efficacy**

### **TELECOMMUTING**

Promote and provide the technology and policies to enable faculty and staff to work remotely, as appropriate. Providing this flexibility allows for the reduction of a trip to and from campus, reducing GHG emissions and demand on the transportation system. **Medium efficacy**

### **CARPPOOL PROGRAM**

Develop and promote a strong carpool program. Determine a method to incentivize and provide preferential services for those participating. A strong carpooling program would allow us to use our parking resource much more efficiently. **Medium efficacy**

### **COVERED, SECURE BIKE PARKING, SPECIFICALLY FOR E-BIKES AND E-SCOOTERS**

Provide covered, secure bike and scooter parking, specifically for electric bicycles and scooters that is designed to accommodate larger, heavier bikes/scooters. Parking should include infrastructure for charging scooters. **Low efficacy**

### **ELECTRIC BICYCLE RENTAL**

Incorporate electric bikes into CU Boulder's rental fleet. Electric bikes are becoming more affordable and popular and are a great way for travelers to overcome topography or longer trip distances to making bike commuting a viable option. **Low efficacy**

## END OF TRIP FACILITIES

Implement end of trip facilities such as covered, secure bike parking, showers, lockers and bike repair equipment. These facilities make biking to work or school a more viable option, especially for those with longer commutes.

**Low efficacy**

## WAYFINDING

Enhance CU Boulder's wayfinding to make traveling by all modes easier and more intuitive. Wayfinding should include information about the location of transit stops and pedestrian-focused directions, to make travel by non-auto modes convenient and intuitive. **Low efficacy**

# Project List

TRANSPORTATION OPTIONS PROJECT LIST		
PROJECT	CAPITAL OR OPERATIONS?	COST
HIGH EFFICACY		
Hire consultant to develop and implement the integration of resources; to form this project list into a strategic plan with rational phasing over a timeline and within a defined budget	Operations	\$
Hire consultant to develop and implement a program of improved marketing, promotion and incentives	Operations	\$\$
Buildout Housing Master Plan	Capital and Operations/ Maintenance	\$\$\$\$
Commute Club	Operations/Maintenance	\$\$
Consolidate transportation options for students and faculty or staff	Operations/Maintenance	\$
Streamline resources	Operations/Maintenance	\$
MEDIUM EFFICACY		
Electrification plan	Operations	\$
Admissions office/campus tours education	Operations/Maintenance	\$
Car share	Operations/Maintenance	\$
Commute concierge	Operations/Maintenance	\$
Data collection and evaluation	Tweaking of services accordingly, surveys, before/after	\$
Expand PIPs	Operations/Maintenance	\$\$



TRANSPORTATION OPTIONS PROJECT LIST		
PROJECT	CAPITAL OR OPERATIONS?	COST
Flexible schedules	Capital and Operations/ Maintenance	\$
Integrated Buff OneCard for multimodal transportation options; note that additional overhead costs are associated with Buff One charges	Capital and Operations/ Maintenance	\$\$\$
On boarding	Operations/Maintenance	\$
Orientation for freshmen and transfer students	Operations/Maintenance	\$
Parent education	Operations/Maintenance	\$
Telecommuting	Capital and Operations/ Maintenance	\$
Carpool program	Capital and Operations/ Maintenance	\$
LOW EFFICACY		
Covered, secure bike parking, specifically for e-bikes and e-scooters	Capital	\$\$
Electric bicycle rental	Capital	\$
End of trip facilities	Capital	\$\$
Wayfinding	Capital	\$\$

\$ - less than \$100,000

\$\$ - \$100,000 to \$1m

\$\$\$ - \$1m to \$5m

\$\$\$\$ - greater than \$5m

# Implementation

There are a number of identified transportation options recommendations that are low-cost and can be implemented effectively with limited resources. By collecting data and evaluating existing programs, the university can reallocate existing resources from less impactful strategies to efforts that would result in a great level of impact.

Consolidating transportation options for students and faculty or staff would take an initial investment in resources, but would result in a long-term streamlined approach to providing programs and services that may free up resources. Similarly, streamlining resources such as Web sites, branding and educational information would require initial resources upfront, but would result in increased efficiency and effectiveness in the long-run.

The implementation of the recommendations outlined in this chapter should be incorporated and assessed through a continuous improvement model. In other words, additions and changes to transportation options should be implemented on a small scale, incrementally. This could be through a pilot that is short-term, or to a small subset of the university population. If the change was successful, implement it on a wider scale and continuously assess your results. Evaluation of these changes should be assessed before implementing on a wider scale. Evaluation should look beyond the number of users or reduction of VMT. Not all programs and services deemed valuable will score highly in these two categories, but programs holistically should serve a broad spectrum of the university population with a landscape of mobility options. For example, although Guaranteed Ride Home may have a small number of use cases, it is an important service to offer that will have a synergy and enhance other programs such as EcoPass.

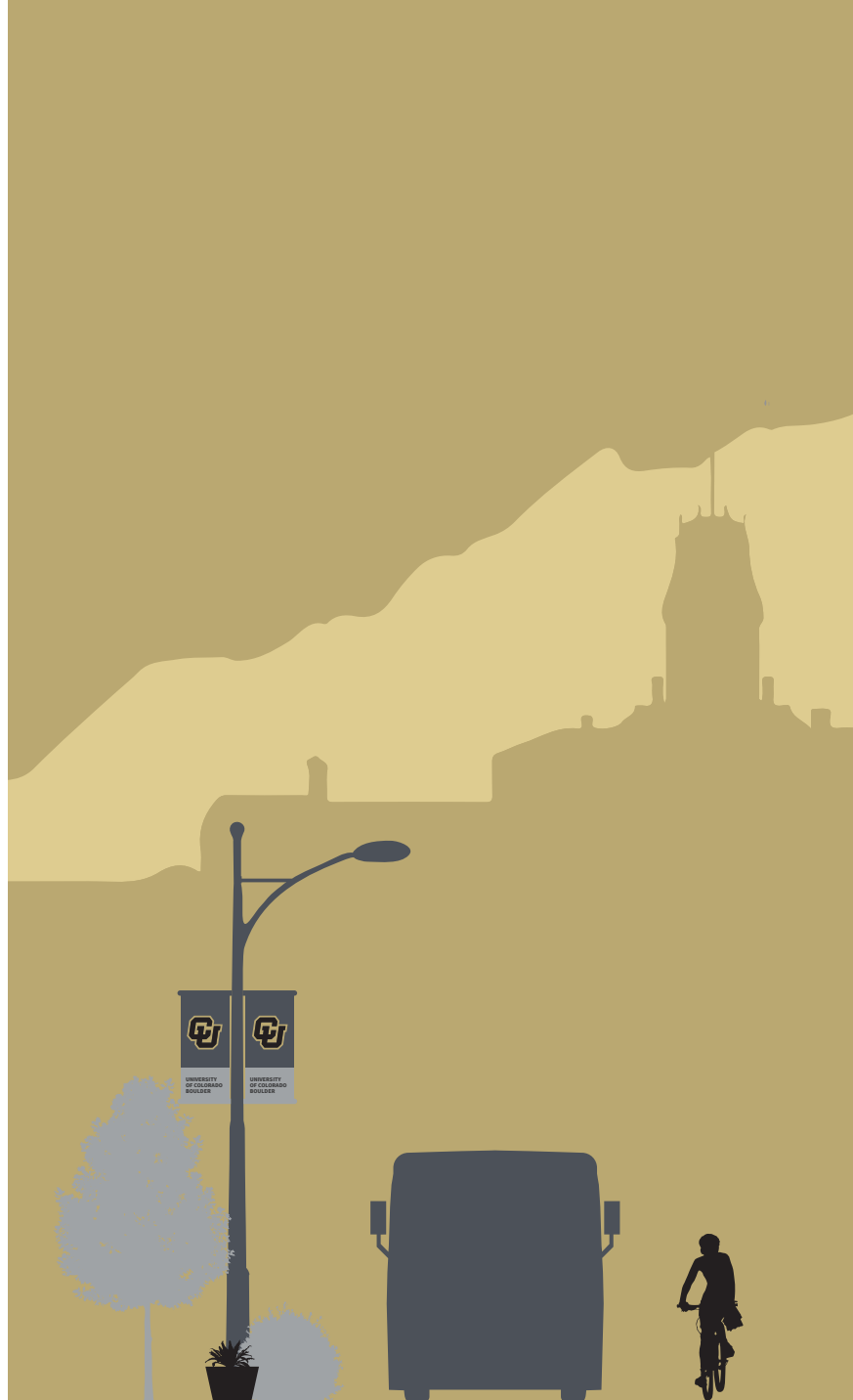


Separated path and bike share station at Cockerell Drive

# 07

## FLEET

CU Boulder's fleet of vehicles, whether operated through the Fleet Services program or owned by individual departments, is extensive. Collectively, the fleet is a significant contributor to GHG emissions and demand for parking spaces. CU Boulder can exert control over the fleet to reduce its GHG emissions and to reduce its demand for parking. The Transportation Master Plan did not complete an exhaustive study of CU Boulder's fleet.



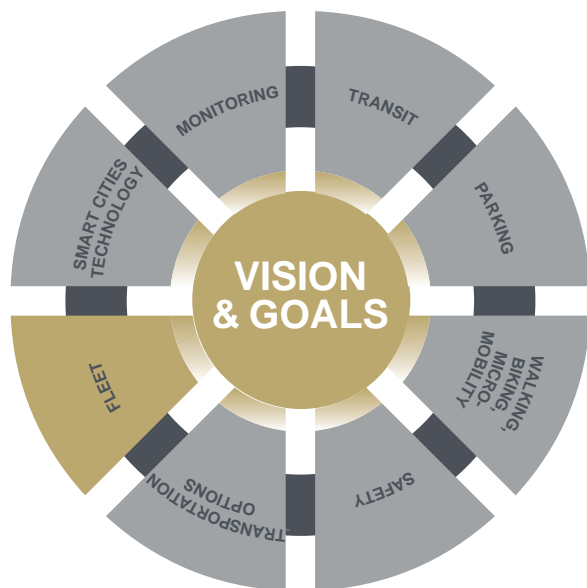




# Pivotal Strategies, Projects and Services

## Encourage electrification of CU Boulder's department-owned fleet by expanding electric vehicle charging infrastructure on campus

CU Boulder can reduce GHG emissions from its fleet by encouraging departments to purchase electric vehicles. This requires installing charging infrastructure and expanding associated underground electric utilities. This presents an opportunity to meter electric vehicle charging infrastructure so that, in the future, departments pay for vehicle electricity similarly to the way that they currently pay for fuel.



## Existing Conditions for the Fleet

There are two major dimensions to CU Boulder's fleet: the Fleet Services program operated by Transportation Services and vehicles purchased and owned by individual departments.

The Fleet Services program uses rental agreements with major companies to make vehicles readily available to CU Boulder departments.

CU Boulder departments can purchase and own their own vehicles if they decide they need them; the ownership of these vehicles is therefore highly decentralized. These vehicles can park without a permit at no cost. Currently, CU Boulder departments own around 450 vehicles. Overhauling the model of individual departments purchasing and owning vehicles is unlikely.

## Recommendations

### DETAILED FLEET ASSESSMENT

As the Transportation Master Plan did not complete an exhaustive study of CU Boulder's fleet, a more detailed fleet assessment is recommended. This assessment should address:

- Department-owned vehicle usage levels and needs
- Existing fuel usage by department
- Methods to reduce the size of the department-owned fleet, such as a combined fleet that can be checked out by various departments
- Targets for fuel usage and/or alternative fuel or electric vehicles with an associated evaluation framework
- Parking permit models and best practices for fleet vehicles from peer institutions
- High-priority locations for electric vehicle charging infrastructure to encourage fleet electrification
- Opportunities to expand the fleet portfolio to incorporate smaller vehicles such as electric bicycles or Neighborhood Electric Vehicles
- CU Boulder Fleet Services' role in overseeing the vehicle fleets at CU Denver and CU Colorado Springs

### ELECTRIFICATION OF PARKING FOR FLEET VEHICLES

Electrifying CU Boulder's vehicle fleet would reduce GHG emissions. However, CU Boulder does not currently have enough electric vehicle charging infrastructure for all department-owned vehicles. Requiring individual departments to pay for both the vehicle and associated charging infrastructure makes electric vehicles prohibitively expensive for departments. To encourage increased electrical vehicle usage by individual departments, CU Boulder should expand electric vehicle charging infrastructure in its parking facilities, including necessary underground utility expansion. As departments currently pay for the fuel used by their vehicles, electric vehicle charging infrastructure expansion can include meters so that departments pay for the electricity used to charge their vehicles.

## INCREASE EMISSIONS REQUIREMENTS FOR FLEET SERVICES PROGRAM

For rental vehicles through the Fleet Services program, CU Boulder can write more stringent emissions requirements into its contracts with rental companies.

FLEET PROJECT LIST		
PROJECT	CAPITAL OR OPERATIONS?	COST
Detailed fleet assessment	Capital	\$\$
Electric vehicle charging infrastructure for department-owned vehicles	Capital	\$\$\$
Incorporate stringent emissions requirements into contracts with rental car companies.	Operations	\$

\$ - less than \$100,000

\$\$ - \$100,000 to \$1m

\$\$\$ - \$1m to \$5m

\$\$\$\$ - greater than \$5m



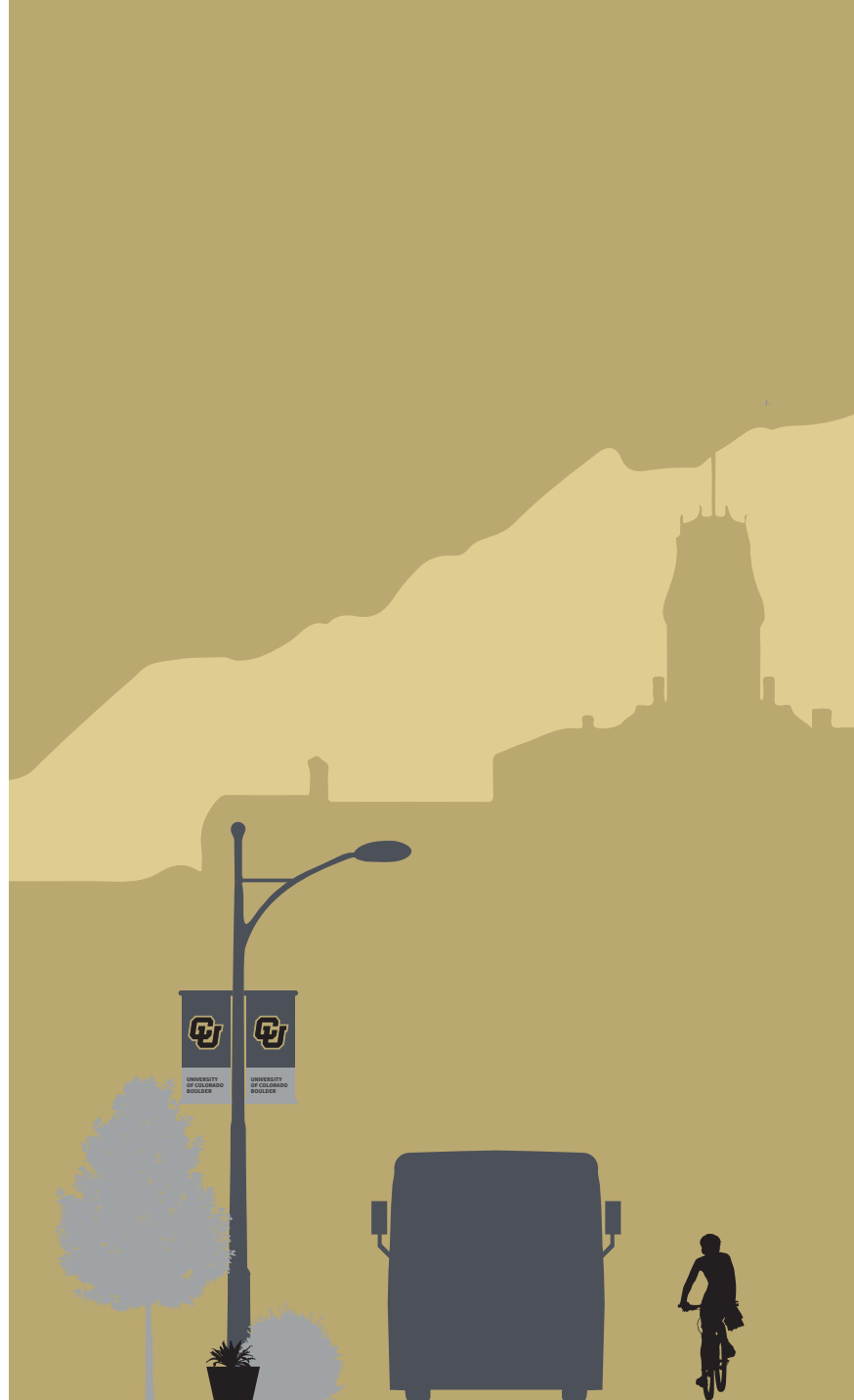
Electric vehicle charging near the Wolf Law building



## 08

TECHNOLOGY  
& SMART  
CITIES

Technology can help CU Boulder maximize the use of its existing assets and decrease the environmental impacts associated with operating its current transportation system.



Pivotal  
Strategies,  
Projects and  
Services



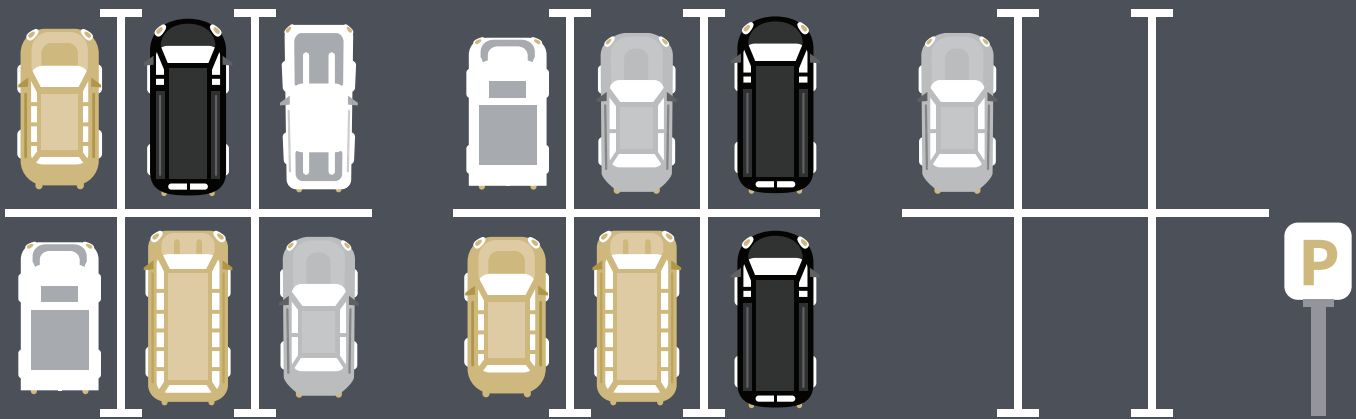
### **Enable Smart Cities technology through expanded network capacity**

Regardless of the product, Smart Cities technology communicates across data networks. CU Boulder must ensure that data networks are in place to maximize the use of future Smart Cities technology.

### **Establish an ongoing Smart Cities program (or programs)**

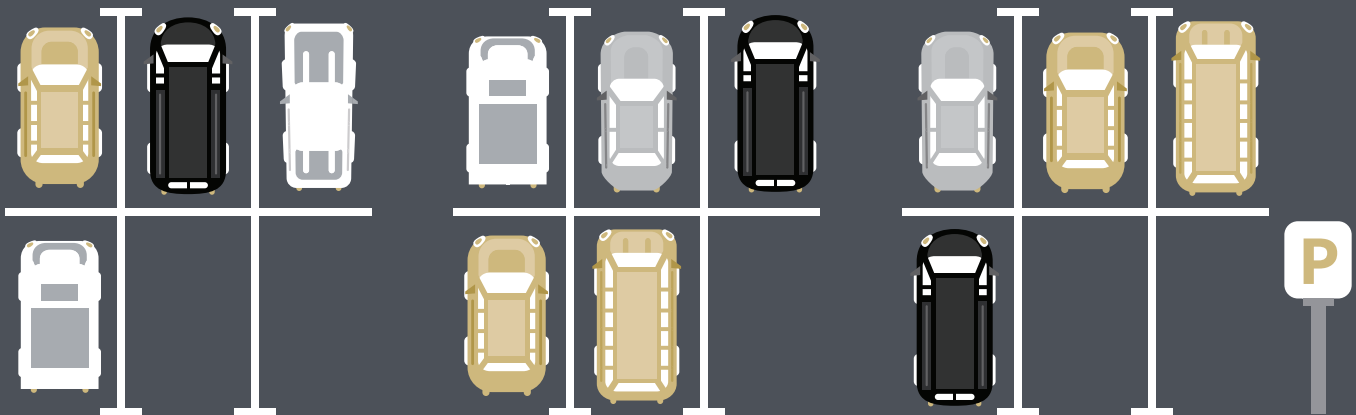
A Smart Cities program or programs would allow CU Boulder to collect and analyze data, make recommendations for how to respond and manage requests or issue solicitations from vendors.

REAL-TIME PARKING OCCUPANCY TECHNOLOGY CAN BE USED TO ALERT PEOPLE TO OTHER AVAILABLE SPACES VIA WEB SITES AND APPS, OR TO FLUCTUATE PRICING IN DIFFERENT PARKING LOTS TO BETTER BALANCE UTILIZATION.

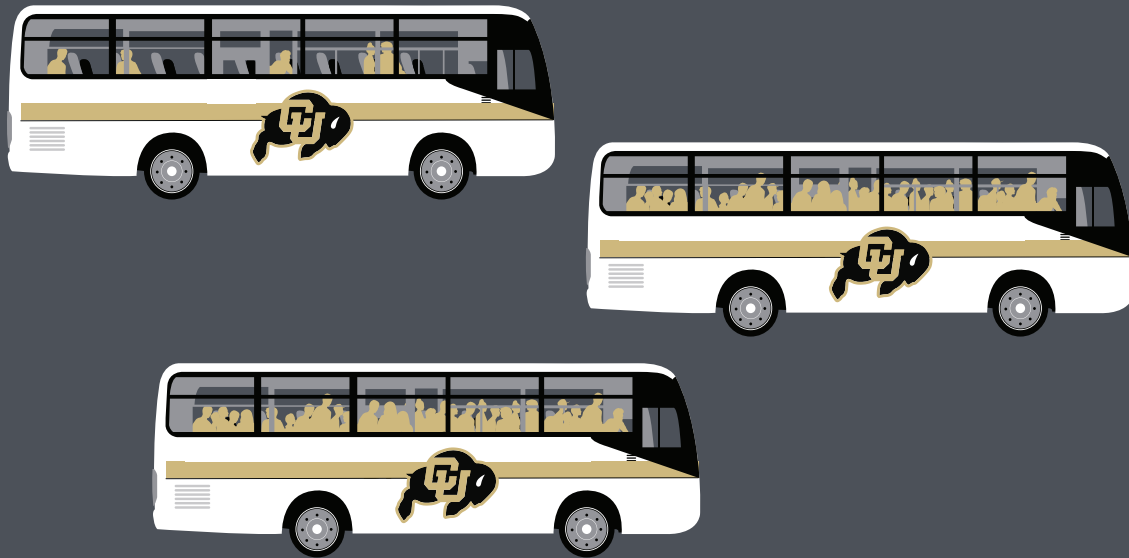


+ SMART CITIES

EQUALS

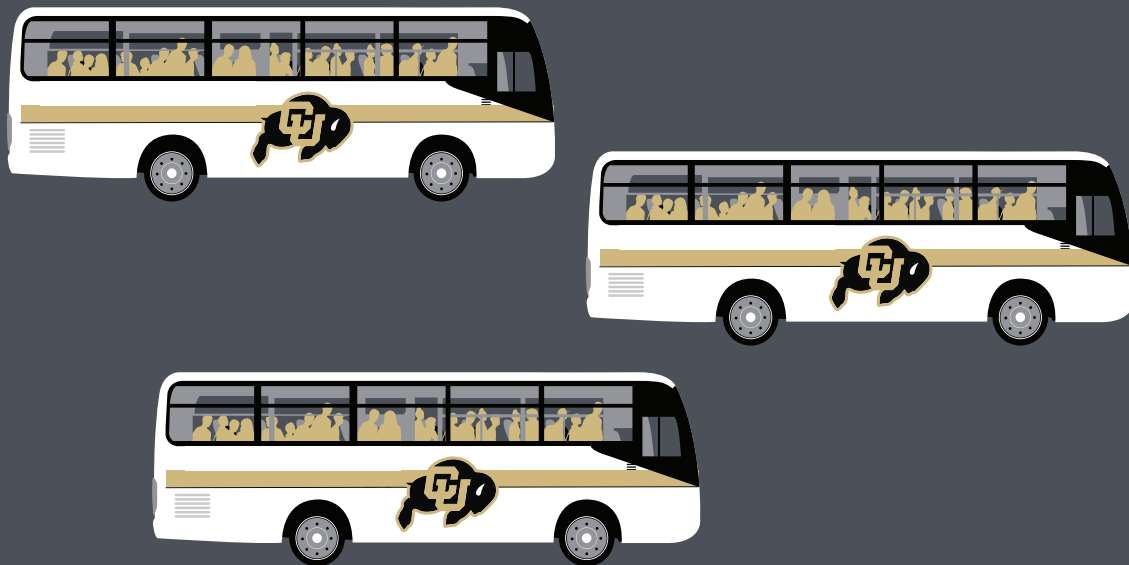






+ SMART CITIES

EQUALS



AUTOMATIC PASSENGER COUNTER TECHNOLOGY CAN BE USED TO MONITOR BUS RIDERSHIP TO OPTIMIZE BUS SCHEDULES SO THAT BUSES ARE HIGHLY UTILIZED AND AVAILABLE WHEN PEOPLE NEED THEM.

VEHICLE-TO-INFRASTRUCTURE TECHNOLOGY COMMUNICATES BETWEEN VEHICLES AND INFRASTRUCTURE. IN SOME CITIES, STREETLIGHTS ARE ALREADY SMART ENOUGH TO BECOME BRIGHTER WHEN CARS ARE NEARBY, THEN DIM ONCE THEY PASS.







Smart Cities vendors are frequently unveiling new products and technologies. And, as a world-class research institution, CU Boulder researchers are similarly developing new innovations. All require a test bed to verify their value. In most cases, it would be a better use of CU Boulder's resources to rely on products and technologies that have already demonstrated success elsewhere, or to help pilot innovations developed by university researchers. CU Boulder should be wary of stipulations associated with offers to deploy technology for free. Nonetheless, there are several things that CU Boulder can do to advance Smart Cities on campus.

SMART CITIES PRIORITIES	
CU BOULDER & CITY GOVERNMENTS	INDUSTRY
<p>Collect, store, analyze and respond to <b>data</b>.</p> <p><b>Dedicate staff</b> to coordinate data collection, analysis and response.</p> <p><b>Build and support infrastructure to support Smart Cities solutions:</b> fiber/5G networks, data centers and control centers, roads and streets.</p> <p><b>Provide reasonable access to infrastructure</b> so that industry can deploy solutions through partnerships.</p> <p><b>Participate in efforts to develop and implement data specifications</b>, such as the Open Mobility Foundation.</p>	<p><b>Develop and implement data specifications</b> to minimize data processing burden on cities and governments.</p> <p>Build Smart Cities <b>products</b>.</p> <p><b>Commercialize data processing</b> by building tools/portals so that governments can access data. Some products may allow for more short-term management, some may lend themselves towards informing long-term decisions, while others may have dual purpose.</p>

CU Boulder will have to evaluate Smart Cities proposals as specific, CU Boulder-derived needs arise, or as proposals are received from vendors. Several Smart Cities technologies may be applicable at CU Boulder.

POTENTIAL SMART CITIES TECHNOLOGIES FOR CU BOULDER		
HARDWARE	SOFTWARE/APPS	STRATEGIES
<p>Parking systems</p> <p>Smart lighting</p> <p>Charging/fueling stations</p> <p>Variable speed limits</p> <p>Bicycle and pedestrian detection systems</p> <p>Autonomous Rapid Transit/ Autonomous Guideway Transit</p> <p>Mobility Hubs</p>	<p>Open Trip Planners</p> <p>Transportation Network Company apps</p> <p>Real-time carpooling apps</p> <p>On-demand transit software</p> <p>Single-mode apps (to purchase parking, view transit schedules, etc.)</p> <p>Multimodal apps</p> <p>Transit fare apps (possible for variable fares)</p> <p>Event/incident management notification systems</p>	<p>Variable costs: parking, transit, streets, curb space, etc.</p>

# Recommendations

CU Boulder's approach to Smart Cities technology should follow the Smart Cities priorities identified earlier in this section.

## EXPAND THE UNIVERSITY'S NETWORK CAPACITY FOR SMART CITIES COMMUNICATION

Regardless of the specific hardware or software solution, Smart Cities technology requires the ability to communicate across data networks. Whether through 5G, fiber or another medium, CU Boulder can prepare for Smart Cities technology by expanding its utility networks. Additionally, data centers and control centers are necessary to store, process and respond to data as it is communicated.

## ESTABLISH A SMART CITIES PROGRAM (OR PROGRAMS)

As CU Boulder's networks increase in capacity, geography and scope, a dedicated program or set of programs could ensure that CU Boulder gets the most out of its technology. These programs would have staff responsible for collecting and analyzing data, making recommendations for how to respond to data, managing requests or issuing solicitations from vendors, managing requests for infrastructure access and providing feedback on data specifications.

SMART CITIES PROJECT LIST		
PROJECT	CAPITAL OR OPERATIONS?	COST
Expand CU Boulder's network capacity	Capital	\$\$\$
Establish a Smart Cities program	Operating	\$\$

\$ - less than \$100,000

\$\$ - \$100,000 to \$1m

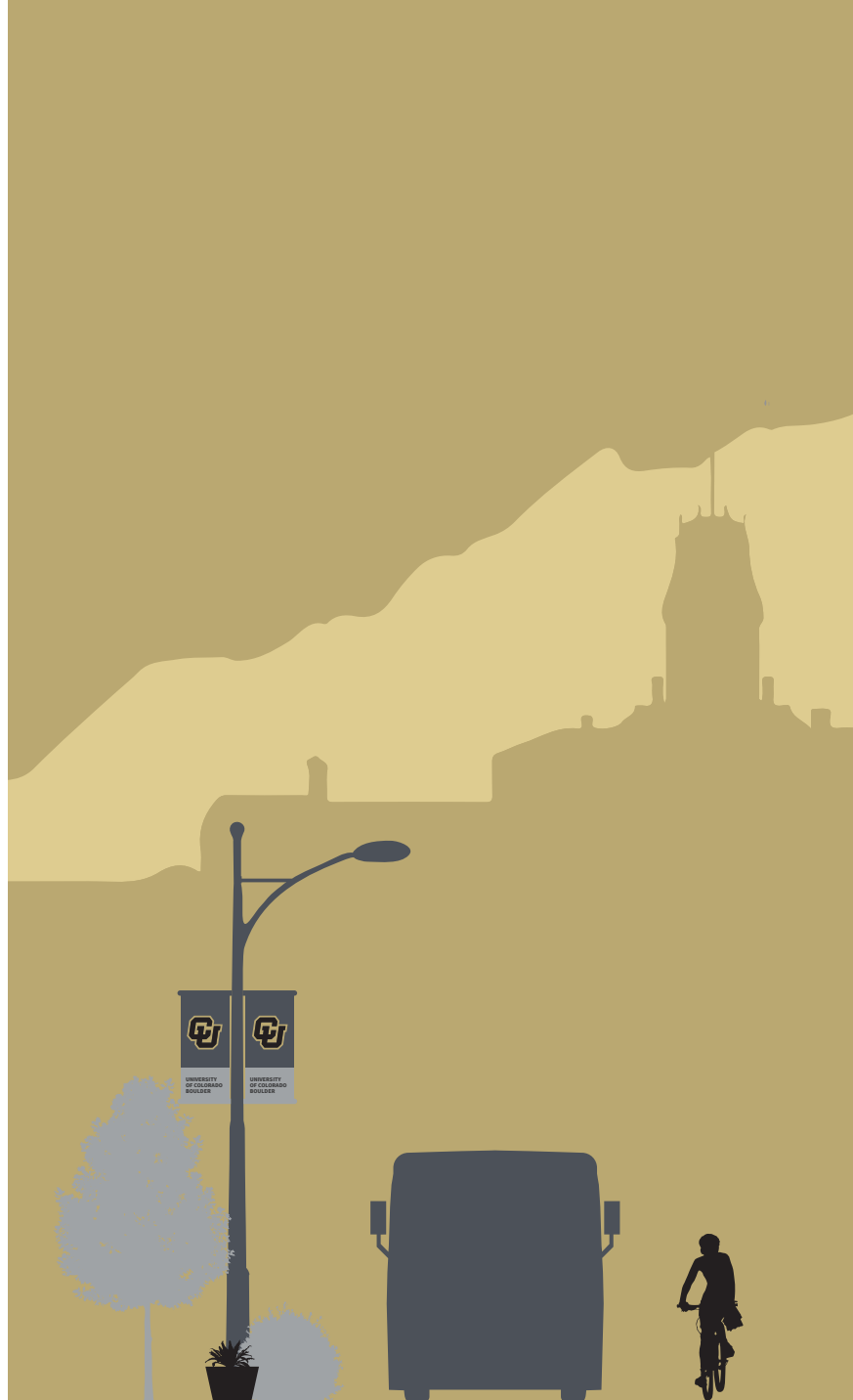
\$\$\$ - \$1m to \$5m

\$\$\$\$ - greater than \$5m

# 09

## CLIMATE

CU Boulder is committed to reducing greenhouse gas (GHG) emissions across the campus, including those related to transportation. Providing fast and frequent transit, converting CU Boulder's fleet vehicles to low and zero emissions vehicles, building new walkways and bikeways, encouraging multimodal transportation and building on-campus housing will all help CU Boulder meet its climate commitment.



## Pivotal Strategies, Projects and Services



### **Ongoing monitoring of its progress towards CU Boulder's climate commitment**

The Monitoring section of this plan recommends an annual transportation survey to form the basis of GHG emissions analysis to understand how CU Boulder is tracking towards the commuter transportation related elements of its GHG emissions targets.

### **A variety of strategies can reduce GHG emissions from commuter transportation to meet CU Boulder's 2050 GHG emission targets**

Increasing walking, biking, micromobility and transit mode share, increased investment in transportation options, parking policies and on-campus housing will all help CU Boulder reduce its GHG emissions.



# Climate Assessment

CU Boulder currently operates under a 2005 based GHG emissions baseline and reduction targets that were adopted for the campus in 2007. Soon, CU Boulder will prepare a Climate Action Plan that potentially revisits these reduction targets and identifies specific actions to achieve the targets.

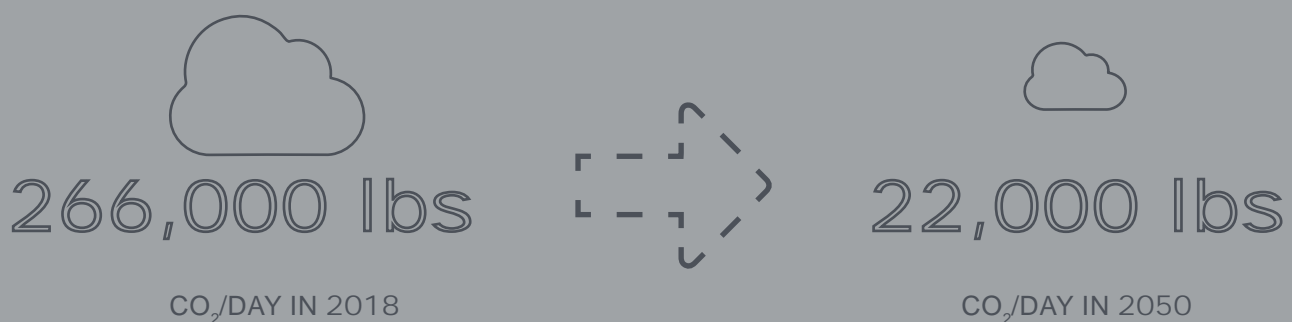
Until the Climate Action Plan is complete, CU Boulder should employ the same 2005 GHG emissions baseline and reduction targets as were adopted for the campus in 2007. These targets apply for both scope 1 (direct emissions under CU Boulder's control) and scope 3 (indirect emission related to CU Boulder's activities) transportation related GHG emissions. Any related targets using proxy metrics should be calculated to support these emission reduction goals.

The current targets for campus GHG emissions reductions overall are:

- 20 percent by 2020
- 50 percent by 2030
- 80 percent by 2050

Of scope 3 transportation related GHG emissions, the Transportation Master Plan focuses on reducing commute related vehicle travel. Vehicle miles traveled (or VMT) can be estimated based on CU Boulder's population of students, faculty and staff, the distances that they commute from home to CU Boulder and their mode share. VMT has a direct relationship to GHG emissions.

## CLIMATE ASSESSMENT SUMMARY



While scope 3 emissions are traditionally considered indirect, CU Boulder can take a higher degree of control of scope 3 emissions than previously committed to through a variety of strategies such as increasing the on-campus housing supply, adjusting parking pricing and improving transit service, infrastructure for walking, biking and micromobility and increased transportation options.

To achieve its goal of reducing GHG emissions by 80 percent of 2005 levels by 2050, CU Boulder must reduce typical daily commute GHG emissions from 266,000 lb CO<sub>2</sub> per day in 2018 to 22,000 lb CO<sub>2</sub> per day in 2050.

	DAILY COMMUTE VMT	DAILY COMMUTE GHGS (LB CO <sub>2</sub> )	DAILY COMMUTE VMT/ CAPITA	SOV MODE SHARE
<b>2005</b>	112,000	110,000	3.14	19%
<b>2018</b>	338,000	266,000	7.66	30%
<b>2050 Projection</b>	338,000 (assumed)	119,000*	7.66 (assumed)	N/A**
<b>(estimated)</b>	7.66 (assumed)	N/A**	N/A**	N/A**
<b>2050 Goal</b>	N/A**	22,000	N/A**	N/A**

Estimates of 2005, 2018 and 2050 VMT and GHG emissions were derived through the Transportation Master Plan's development. To achieve its goal of reducing GHG emissions by 80 percent of 2005 levels by 2050, CU Boulder must reduce typical daily commute GHG emissions from 266,000 lb CO<sub>2</sub> per day in 2018 to 22,000 lb CO<sub>2</sub> per day. GHG emissions reduction can be achieved by increasing walk, bike and transit mode share, increasing parking costs, encouraging non-single-occupant travel through transportation options and increasing the supply of on- or near-campus housing. Key metrics associated with each of these strategies are:

- Increasing walking, biking and transit mode share will be affected by the implementation of new infrastructure or services. Given CU Boulder's setting in the City of Boulder where there are already high-quality walkways, bikeways and local and regional transit services, implementing new infrastructure or services alone can only be expected to have a modest effect on mode share. Instead, parking costs, transportation options and housing strategies are likely to cause spillover into these modes.
- Increased investment in transportation options such as program consolidation, aggressive marketing and promotion, parking cash-out and commute trip reduction programs are likely to reduce commute-related VMT/GHG emissions by

**up to five percent.** These estimates are based on transportation options research published by the California Air Pollution Control Officers Association.

- Increased parking costs are associated with a reduction in trip making and associated VMT/GHG. According to research from the Victoria Transport Policy Institute and Oregon Department of Transportation, **a 10 percent increase in parking costs is associated with a three percent reduction in trip making (and associated VMT/GHG).**

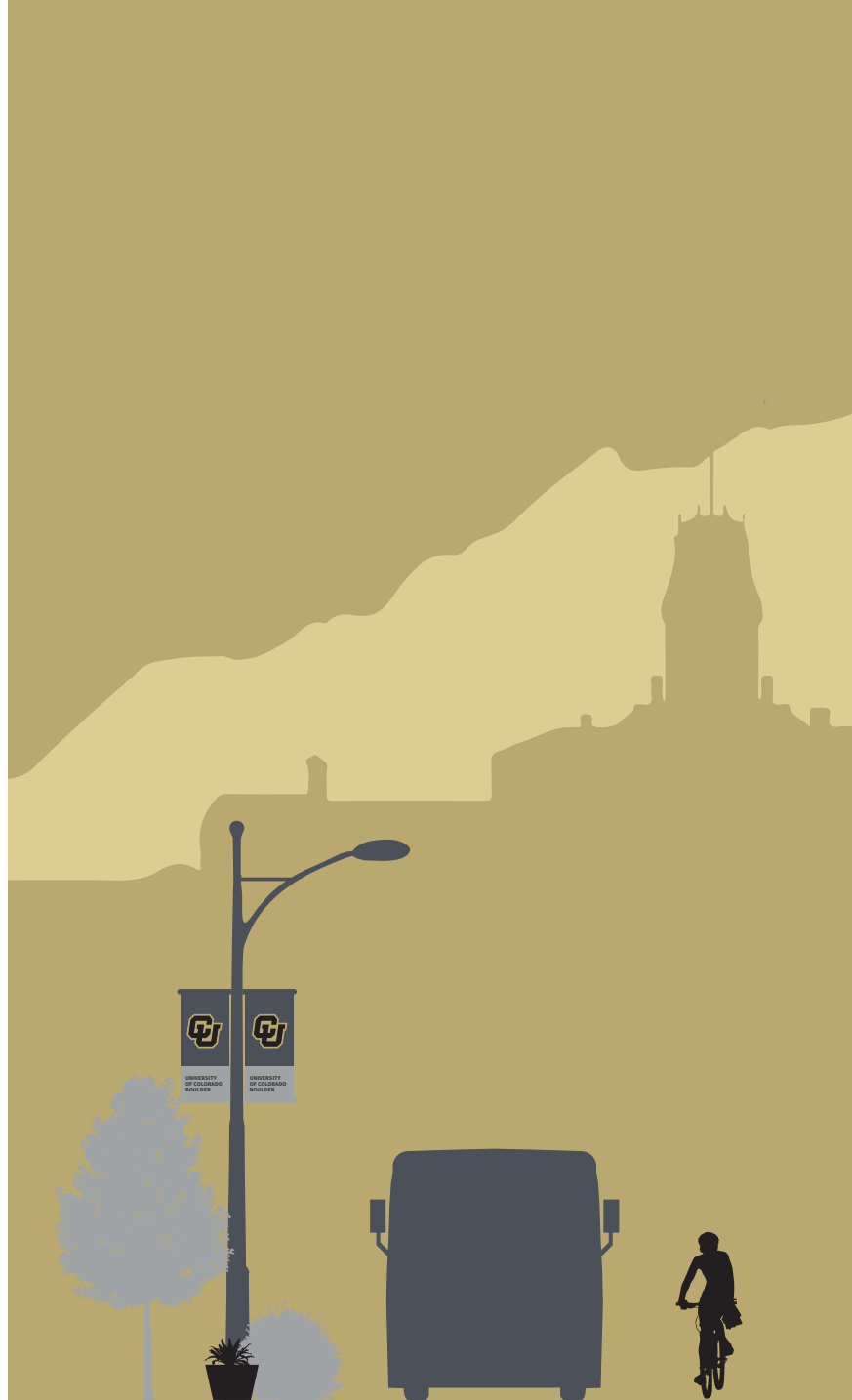
- By providing housing on- or near-campus and not allowing these residents to purchase commuter parking permits CU Boulder can reduce GHG emissions associated with commuting. On- or near-campus housing can eliminate **13.2 lb CO<sub>2</sub> per day per upperclassmen student (sophomore through fifth year seniors), 10.3 lb CO<sub>2</sub> per day per graduate student and 7.8 lb CO<sub>2</sub> per day per faculty member or staff member.** The following section on Housing describes the methodology used to derive these estimates.

Using these various metrics, CU Boulder can analyze transportation options, parking pricing and housing scenarios as it moves forward with comprehensive planning efforts.

# 10

## HOUSING

The Transportation Master Plan supports housing recommendations that help students, faculty and staff live on or near campus to enable access to multimodal transportation, improve quality of life and reduce GHG emissions from commuting.





# Pivotal Strategies, Projects and Services

## **Supporting the Housing Master Plan recommendations that will increase the on-campus housing supply**

As the commute distances for students, faculty and staff have increased, GHG emissions resulting from commuter transportation have also increased. Scenarios evaluated through the Housing Master Plan would reduce daily GHG emission by 23,000-39,100 lb CO<sub>2</sub> per day (2050 emissions). CU Boulder needs to reduce its daily commuter transportation GHG emissions by 97,000 lb CO<sub>2</sub> per day (2050 emissions) by 2050 to meet its climate commitment.



# What is the Transportation Master Plan's Relationship to Housing?

The Transportation Master Plan supports increasing CU Boulder's housing supply for students, faculty and staff as a means of helping CU Boulder reduce single-occupant vehicle commute travel, reduce demand for commuter parking and reduce GHG emissions. While there are myriad equal or greater reasons for increasing CU Boulder's housing supply, such as quality of life, cost of living and equity, CU Boulder must acknowledge the transportation outcomes of its housing decisions.

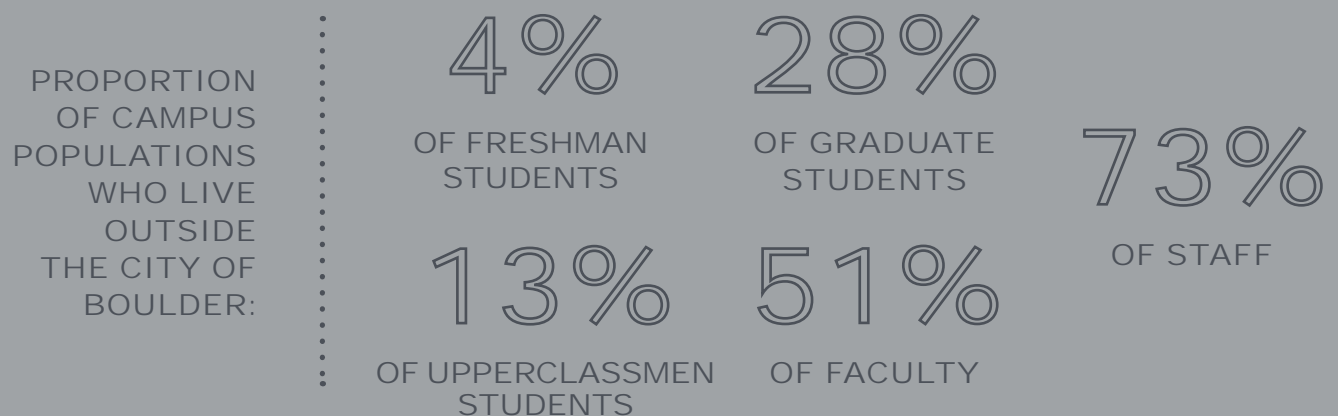
The Transportation Master Plan supports the Housing Master Plan's recommendations that would increase the number of students, faculty or staff living on- or near-campus. By providing housing on- or near-campus, and not allowing residents to purchase a commuter parking permit so that residents walk, bike or take transit to campus, CU Boulder can reduce GHG emissions associated with commuting. To achieve its goal of reducing GHG emissions by 80 percent of 2005 levels by 2050, CU Boulder must reduce typical daily commute GHG emissions from 266,000 lb CO<sub>2</sub> per day in 2018 (119,000 lb CO<sub>2</sub> per day using the 2050 emissions profile) to 22,000 lb CO<sub>2</sub> per day in 2050 (a difference of 97,000 lb CO<sub>2</sub> per day in 2050). Each student, faculty member and staff member who drives generates the following lb CO<sub>2</sub> per day (2050 emissions):

- Upperclassmen students (sophomore-fifth year seniors): 13.2 lb CO<sub>2</sub> per day (37.4 VMT per day)
- Graduate students: 10.3 lb CO<sub>2</sub> per day (29.2 VMT per day)
- Faculty and staff: 7.8 lb CO<sub>2</sub> per day (22 VMT/day)

The Housing Master Plan identified three potential housing scenarios for CU Boulder, two of which included significant expansion of CU Boulder's

housing supply. Scenario A, Strengthen/Reinvest in Core Campus, would add 1,871 beds. Scenario B, Housing as a Catalyst for East Campus Growth, would add 3,049 beds. Both scenarios would help CU Boulder reduce its GHG emissions; however, Scenario B significantly reduces GHG emissions compared to Scenario A. Assuming that residents would not be allowed to purchase commuter parking permits and therefore walk, bike, use micromobility or ride transit to campus, Scenario A would reduce GHG emissions by 23,000 lb CO<sub>2</sub> per day whereas Scenario B would reduce GHG emissions by 39,100 lb CO<sub>2</sub> per day, compared to the needed overall reduction of 97,000 lb CO<sub>2</sub> per day (2050 emissions). While housing is the most effective strategy for reducing commute related GHG emissions, other measures can help further reduce GHG emissions. GHG emissions reductions can also be achieved by otherwise increasing walk, bike and transit mode share, modifying parking policy to increase parking costs and encouraging non-single-occupant travel through transportation options.

## TMP-HOUSING RELATIONSHIP SUMMARY



While a significant majority of undergraduate students live either on-campus or within the City of Boulder, 4 percent of freshmen, 13 percent of upperclassmen students, 28 percent of graduate students, 51 percent of faculty and 73 percent of staff live outside of the City of Boulder.

Once a student, faculty member or staff member lives outside of the City of Boulder, the likelihood that they drive to campus significantly increases.

The mode share of single-occupant vehicle commuters and the distance traveled to campus increased significantly from 2005 to 2018. This occurred despite CU Boulder's intentions to reduce single-occupant vehicle commuting and GHG emissions.

Increases in CU Boulder's housing supply for all cohorts of students, faculty and staff are necessary to reduce vehicle commuting and associated GHG emissions.

*Data comes from the 2019 Transportation Master Plan Survey*

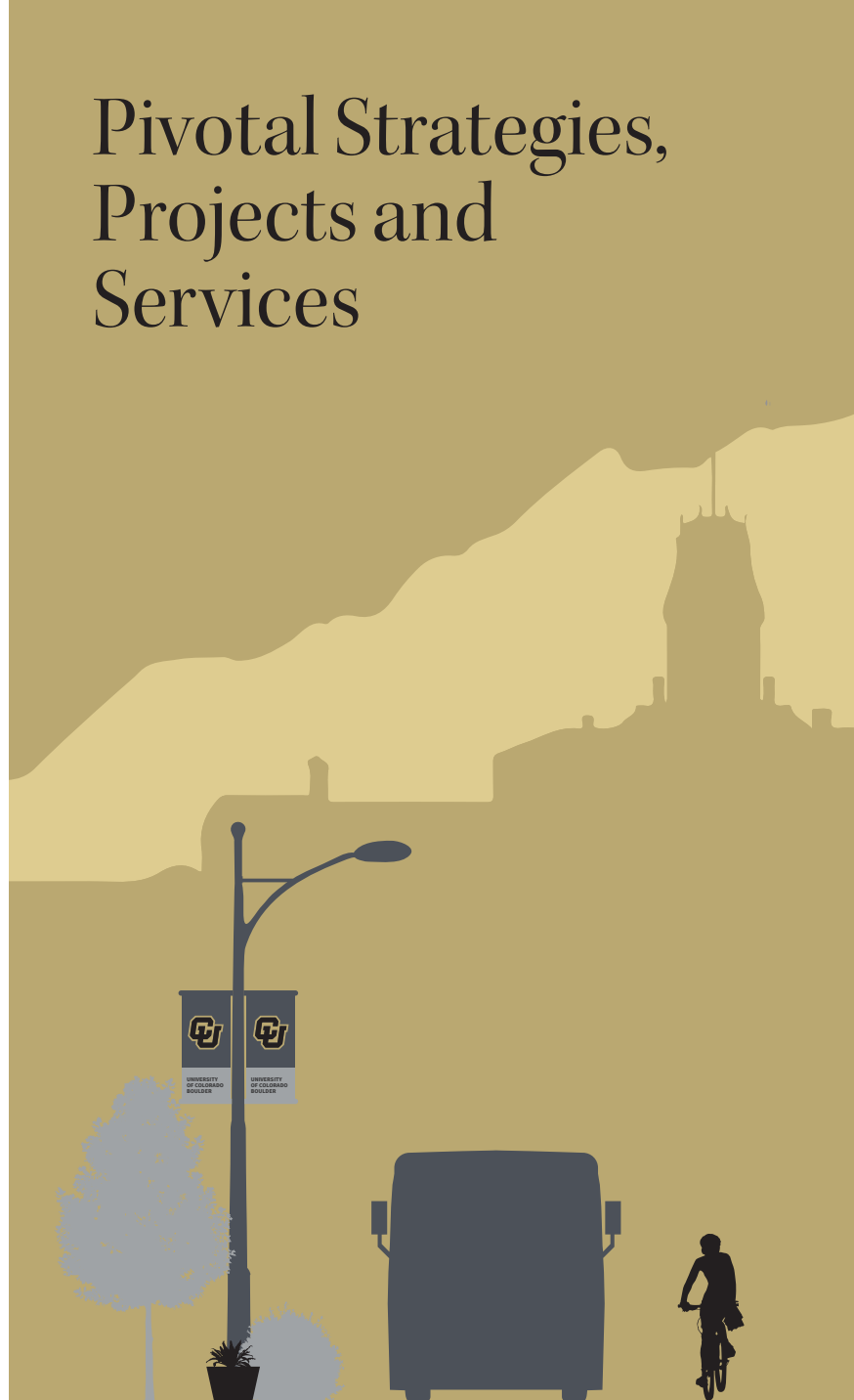
# Pivotal Strategies, Projects and Services

## 11

### FUNDING & ORGANIZATION

To fully implement the recommendations of this plan CU Boulder should develop new funding sources and consider reallocating its current funding sources.

CU Boulder should also consider streamlining its transportation organization. A consolidated transportation department could more efficiently deliver projects and more effectively communicate with external partners. Additionally, a consolidated transportation department could manage CU Boulder's transportation funding to ensure that progress is being made on all of CU Boulder's transportation goals.



#### **Develop reliable, dedicated funding for transportation projects and programs for all modes**

Reliable, dedicated funding is necessary to ensure that the recommendations of this plan are implemented over time.



**Include elements of the transportation system in the building program phase of campus projects**

State funding is most commonly associated with building projects. Connected elements of the transportation system should be included in building projects so that transportation components associated with the building are provided. And, including these elements in the building program helps a project's funding go further over time.

**Consider whether organizing around a consolidated transportation department is of value**

Organizational consolidation may better ensure that leadership has a clear course on how funding and infrastructure decisions are leading to achieving CU Boulder's Vision for transportation.



# Funding & Organization Assessment & Recommendations

Implementation of the Transportation Master Plan ultimately depends on political will and adequate funding.

## FUNDING

Funding is generally needed in two forms: operational funding for year-to-year services such as transit operations, parking operations, bike programs and transportation options; and capital funding for the many recommendations focused on infrastructure, studies and future planning.

At minimum, CU Boulder should dedicate and increase overall funding for transit to operate transit as an essential service. Additional annual funding is necessary to build new walkways, bikeways and safety projects, to expand available transportation options and for other needs such as utility upgrades for electric vehicle charging infrastructure or Smart Cities technologies. Developing project-specific cost estimates for capital projects is beyond the scope of the Transportation Master Plan. Estimates for these projects will be developed over time through more detailed studies or as other campus building or construction projects move forward.

## FUNDING RECOMMENDATIONS & OPTIONS

High-priority funding recommendations are:

- Develop reliable, dedicated funding sources for transit, walking, biking and micromobility, safety, transportation options and fleet projects and programs. Minimizing cross-departmental funding is desirable in the long-term. These funding sources should include an associated budgeting process so that projects and programs are evaluated for continuation year over year. Candidate funding sources revealed through the Transportation Master Plan's development included

redistributing existing funding sources, adjusting parking costs or reviewing use of student fees to cover expenses such as transit operations or transportation options.

- Include transportation during the building program phase of campus projects. New building construction should include the necessary vehicle parking supply, either in whole or its fair share, electric vehicle parking infrastructure, bike parking, pick-up or drop-off for ride hailing and other connected projects from the Transportation Master Plan such as proposed walkways and bikeways. Other options or additional tools for achieving these outcomes could include a Transportation Investment Fee (TIF) or Campus Standards.

- Pursue external funding where possible: CU Boulder should explore whether it is advantageous for intracampus transit to become eligible for Federal Transit Administration funds, it should explore pursuing DRCOG grants either as a direct recipient or in partnership with external partners including, but not limited to, the City of Boulder and Boulder County and it should maintain dialogues with the City of Boulder and Boulder County to implement Transportation Master Plan recommendations in partnership with these governments.

Funding necessary to implement the recommendations of this plan could be achieved in a variety of ways.

- CU Boulder could work with its students to re-balance funds from Student Bus and Bicycle Program to cover intracampus transit operations. By taking over operation of the Stampede, CU Boulder avoided over \$1m of future cost increases to the CollegePass program and associated impacts to the Student Bus and Bicycle Program fee. CU Boulder could either work with the body currently overseeing student transportation fees or form a separate student transportation advisory committee to oversee and recommend how these fees are used.

- CU Boulder could increase parking rates, permit costs or parking fines, diverting new revenue to cover annual operating expenses for transit, bike and micromobility programs or transportation options. New revenue could also contribute to capital projects. Transportation options, in particular, are better funded through parking revenues than student fees as not all strategies or policies that reduce travel demand are attractive enough to be covered through a student fee.

## ORGANIZATION

Through peer university research conducted as a part of the Transportation Master Plan, it became clear that other institutions have had success in achieving their transportation goals by creating comprehensive transportation departments that encompass transit, parking, walking, biking and micromobility, safety, fleet and transportation options. Organizational consolidation may better ensure that leadership has a clear course on how funding and infrastructure decisions are leading to achieving CU Boulder's Vision for transportation. Additionally, consolidated decision-making is helpful when funding crosses over between modes (for example, funding transportation options using parking revenues). Additionally, a challenge identified through the Transportation Master Plan is that CU Boulder's external partners can find it difficult to coordinate on transportation matters with CU Boulder, often as a result of so many departments

and individuals representing different aspects of CU Boulder's complex transportation system.

As CU Boulder moves forward with implementation of the Transportation Master Plan, and as CU Boulder resolves how to best fund its transportation system and what funding crossovers are necessary, it should reconsider how it delivers its transportation system and determine whether consolidation into a comprehensive transportation department would be of value.

While CU Boulder evaluates its organizational structure the Transportation Working Group, which reflects many members of the Transportation Master Plan's Executive Committee, should continue to convene. This team represents the many organizations already contributing to delivering transportation on-campus. Monthly or bimonthly meetings of this group will help ensure that the Transportation Master Plan's recommendations are implemented as smoothly as possible.

## FUNDING & ORGANIZATION SUMMARY

# RELIABLE, DEDICATED FUNDING IS NOT AVAILABLE FOR TRANSPORTATION PROJECTS FOR ALL MODES.

Reliable, dedicated funding is needed for transportation projects and programs for all modes.

As an Enterprise, Parking Services generates its own revenue. In addition to covering parking-related expenses, Parking Services funds Transportation Options' salaries, a variety of Transportation Options' programs, safety projects through the Pathway Safety Committee and other special projects.

Residence Life funds the Buff Bus; however, discretionary funds are currently used to close gaps in the overall intracampus transit operating budget.

Several recent CU Boulder building or construction projects have excluded nearby elements of the transportation system.

Decision-making regarding physical matters and transportation funding currently lies with multiple individuals.

ORGANIZATION PROJECT LIST		
PROJECT	CAPITAL OR OPERATING?	COST
Continue to convene Transportation Working Group either monthly or bi-monthly to coordinate on transportation matters.	Operating	N/A
Evaluate transportation system delivery and determine whether consolidation into a comprehensive transportation department is of value.	Operating	N/A

- \$ - less than \$100,000
- \$\$ - \$100,000 to \$1m
- \$\$\$ - \$1m to \$5m
- \$\$\$\$ - greater than \$5m





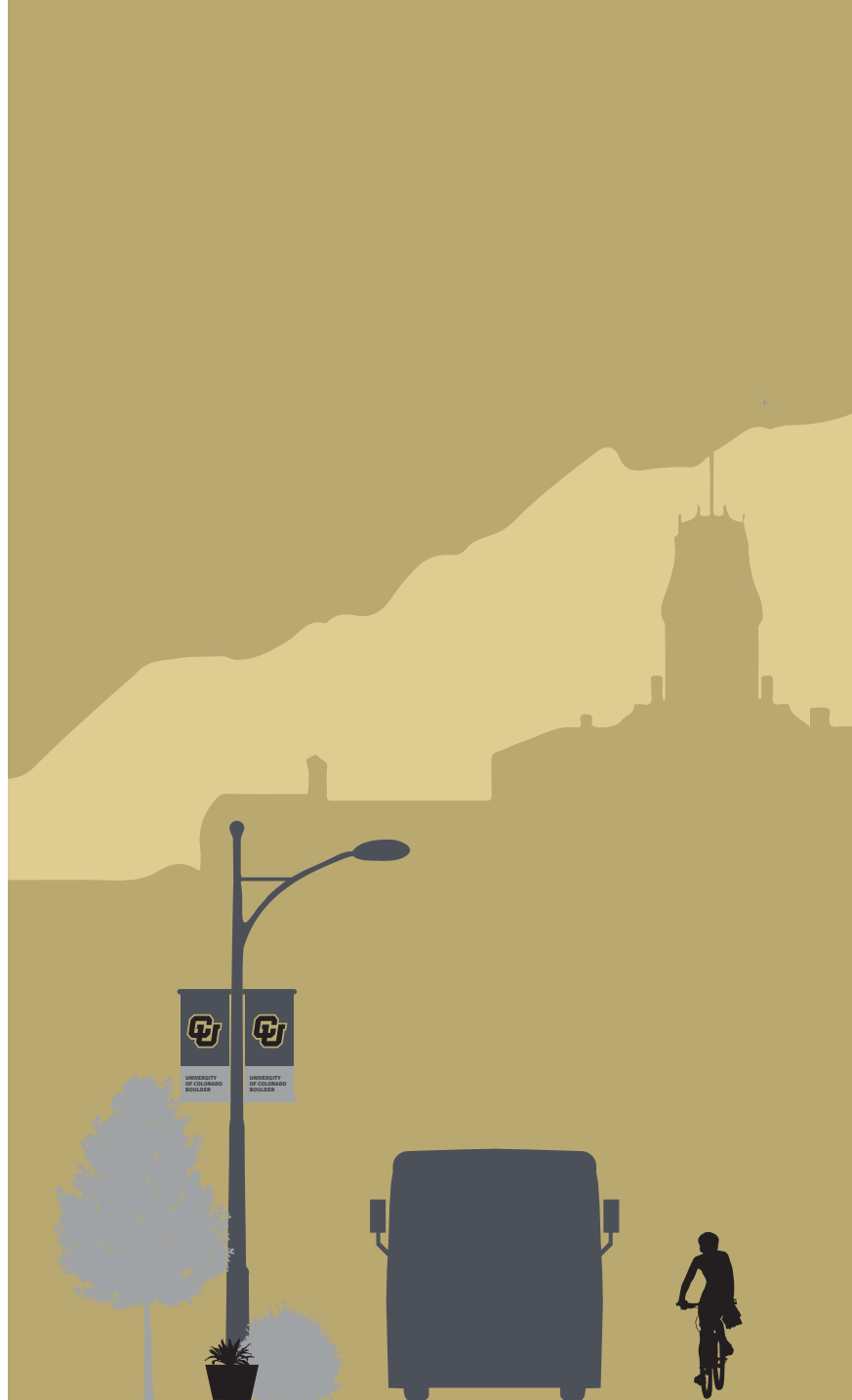
Students walking and biking on 18th



## 12

## MONITORING

CU Boulder should monitor its progress in meeting its goals for transportation and should report on its progress.





# Pivotal Strategies, Projects and Services

## **Administer and publish the results of an annual transportation survey.**

The 2019 Transportation Master Plan survey is a starting point for future monitoring. In the future, this survey should be used alongside other data sources to measure CU Boulder's progress towards meeting its Vision and Goals for transportation.



# Existing Conditions

CU Boulder has administered several transportation surveys over the years. While these surveys have provided valuable data, they have often not been sufficiently comprehensive to address all CU Boulder cohorts (students, faculty and staff) or to measure progress on trends related to CU Boulder’s Vision and Goals for transportation.

CU Boulder’s Vision and Goals for transportation, and its GHG emissions reduction targets in particular, require regular monitoring to ensure that it is tracking towards its ambitions. Through the climate research and analysis completed through the Transportation Master Plan, it was revealed that the mode share of single-occupant vehicle commuters and the distance traveled to campus increased significantly from 2005 to 2018. This occurred despite CU Boulder’s intentions to reduce single-occupant vehicle commuting and GHG emissions.

## RECOMMENDATIONS

Regular monitoring would help CU Boulder verify that it is on-track or to course-correct over the many years that it will take to implement the recommendations of this plan. The Transportation Master Plan Survey, completed in April 2019, can be used as a template for future monitoring of CU Boulder’s mode share and GHG emissions trends, accounting for changes to the vehicle fleet’s emissions over time. It can also be used to understand the attitudes and opinions of users of CU Boulder’s transportation system. This single survey, or some variation of it, should be completed annually. Additional empirical data sources can be developed over time to augment the survey to understand traffic and parking demand, transit ridership, volumes of people walking, biking or using micromobility and transportation option usage.

MONITORING PROJECT LIST		
PROJECT	CAPITAL OR OPERATIONS?	COST
Administer annual transportation survey, process and report the results to the Transportation Working Group and publish the results so they can be accessed by CU Boulder students, faculty and staff.	Operating	\$

- \$ - less than \$100,000
- \$\$ - \$100,000 to \$1m
- \$\$\$ - \$1m to \$5m
- \$\$\$\$ - greater than \$5m