1993 DENVER BICYCLE MASTER PLAN

CITY AND COUNTY OF DENVER

City and County of Denver
Mayor Wellington E. Webb

PROJECT MANAGER: JAMES MACKAY, P.E., WITH THE MAYOR'S BICYCLE ADVISORY COMMITTEE • PRIME CONSULTANT: DESIGN VENTURES, INC.

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August, 1993

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We dedicate this Master Plan to our friend
Randy MacMillan
1954-1993
for his invaluable assistance and his committment to improving bicycling in Denver.

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Project Manager

James Mackay, P.E

Consultants

Prime Consultant: Design Ventures Sara Jane Maclennan, Gary Zehnpfennig, James Cromar, Lucy Graca. Assisted by Shayne Brady and Robert D. Shedd.

Statistical Consulting – Kyle Davis
Watt Communication – Scott Watt
Phil Flores Associates – Phil Flores, Frank Miltenberger

With assistance from:
Denver Parks and Recreation – Neil Sperandeo, Jed Wagner
Denver Public Works–Dennis Royer, Bob Dorroh, Ed Ellerbrock, Terry Searles, Terry Rosapep, Nelson Ho, ABel Shaw, Judy Rapp
Denver Planning–Dick Farley, Doug Wheeler, and the neighborhood planners
Mayor's Office – Andrew Wallach
And: Dave Van Abel, Bill Degroot, Stuart Black, Jared Moore, Diane Short, Berma Benson, Judy Curtis, Mark Hughes, and Arne Leonard
Special thanks: U.S. West Direct for their base map - MDS Cartography

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Dear Fellow Citizens:

We are pleased and proud to be publishing this Bicycle Master Plan, containing the goals for the development of bicycling in Denver. This is intended to be used by City officials, property owners, educators, planners, and bicycle advocates now and in the future, as they make decisions that effect bicycling throughout the City.

Denver has the potential to be recognized among the best major cities for bicycling in the United States. Currently, bicycles are popular as recreational vehicles in Denver. The Plan seeks to increase the means to bicycle for utilitarian uses, like commuting, running errands or keeping appointments.

The Bicycle Master Plan fulfills the charge of the Denver Comprehensive Plan to improve access and mobility in the City of Denver. Bicycling is a cost-effective way to achieve this goal while reducing the "Brown Cloud" and contributing to a better quality of life.

The Mayor's Bicycle Advisory Committee, representing a variety of organizations, interests, neighborhoods, and communities, was appointed by the Mayor in 1991. This Committee has been working on the Plan for more than one year, reviewing and guiding the work provided by the consultant team headed by Design Ventures, Inc. The Committee monitored the development of the Master Plan, and was instrumental in leading a public process that included hundreds of bicyclists.

The Plan does more than simply present a shining image of the future. It is based solidly on the insights we have gained from studying bicycling throughout the nation, and our experience as regular bicyclists on the streets of Denver. It contains the steps necessary to improve the bicycle system, and identifies the priority projects necessary to accomplish the Plan. A complete bicycle system can serve double duty as a utilitarian transportation network and a recreational system.

The bicycle system described in this Plan will not emerge overnight, but it is achievable. The Plan is rooted in the realities of limited budgets and cost-effective solutions. As you read the Plan, you will find that the emphasis goes beyond the scope of physical facilities to address all aspects of bicycling in Denver. The Plan draws on the strength of an integrated program of encouragement, enforcement, engineering, and education – the Four E's of bicycle planning. We realize that the key to a better bicycling environment will come about when bicyclists and motorists know how to "Share the Road" safely and respectfully. Our recommendations are practical, affordable, and necessary to make bicycling an attractive option for more and more people.

The Committee has great faith in the future of bicycling in Denver. We are prepared to add to the one hundred year tradition of bicycling in Denver. We hope you will join us and be part of building tomorrow's legacy. Join the *bicycle revolution*.

Sincerely,
The Denver Bicycle Advisory Committee

MASTER PLAN OVERVIEW

Denverites have always been avid bicyclists. In 1971, Denver significantly improved its bicycle facility system. In 1979 the City adopted its first Bicycle Master Plan, updated in 1987. Today, Denver enjoys an outstanding network of off-street bicycle trails and a good system of on-street bicycle routes.

In 1992, the City initiated this Master Plan to continue the legacy. Along with facility recommendations, it includes plans for promotion, interagency cooperation, increased enforcement, and education and training programs. The Plan focuses on encouraging commuting and utility trips by substantially upgrading the bicycle system mainly through improvements to the on-street system. The Mayor's Bicycle Advisory Committee, the City Bicycle Planner, interested citizens, bicycle experts, and the Plan consultants worked together to produce a Master Plan that is a "giant step" toward making Denver's bicycle system one of the best in the country.

The Master Plan identifies specific projects that work together to improve bicycling and encourage it as an attractive form of transportation, thus reducing pollution and congestion. The Plan will be used over the next ten years to guide decisions about bicycling and bicycle facilities.

PUBLIC PARTICIPATION

The Plan takes its direction from information gathered from seven public meetings, an extensive computerized survey, the Mayor's Bicycle Advisory Committee, and the bicycling community. Meetings were held with City Council members, Department heads, neighborhood planners, and others interested in bicycling. During the process, articles appeared in the major and neighborhood newspapers. Over 500 neighborhood organizations, bicycle clubs, bicycle shops, City officials, and citizens were on the public meeting mailing list. The issues that surfaced as a result of this process are the basis for the development of this Plan.

- Gaps in the system: How to complete the bicycle system and connect destinations
- Parking: How to get parking facilities that allow bicyclists to lock their bikes securely
- Institutionalization: How to include staff "bicycle thinking" in all City projects and coordinate efforts among City Departments such as Parks and Recreation, Transportation, and Public Works
- Enforcement: How to cooperate with the Police Department to discourage motorists and bicyclists from committing moving violations which compromise public safety
- Signage: How to improve signage, add directories, and provide maps for bicyclists
- Education: How to teach bicyclists good riding habits and advanced skills
- Promotion: How to promote commuter bicycling and reduce motor traffic levels by encouraging businesses to provide facilities for bicyclist employees and clients
- Attitude: How to promote the concept of "share the road" (and bike trails) to motorists, bicyclists, pedestrians, and in-line skaters

PLAN COMPONENTS

Facilities: (page 22) The plan outlines over 200 projects that will complete a one-mile grid system of bicycle facilities. The majority of the projects are on-street bicycle route designations and improvements. Twenty-nine projects are designated as major capital improvements with preliminary cost estimates ranging from $60-$800 thousand. The remaining are smaller projects, such as signage and other minor improvements with lower capital costs. The criteria for prioritizing facility projects includes safety needs, cost, and expected levels of use for commuting and recreation. Projects include:

- completing bike trails and connecting them to the overall system;
- overpasses at Dahlia & Iliff at I-25, Santa Fe & Iliff, and West 43rd & Jason Street;
- surface improvements to existing trails at Highline Canal, Cook Park, Cherry Creek, and Weir Gulch;
- inclusion of bike trails and parking at new and redeveloped areas such as Stapleton, Lowry, Coors Field, Flitch's, and Rockmont Park;
- a "way-finding" system of bicycle route, with destination markers, directories, and safety warnings;
- bicycle arrows painted in the street to indicate bike lanes; and
- traffic actuation loops to respond to bicycles.

Enforcement: (page 55) The public survey indicated a strong interest to improve public safety by enforcing traffic laws for both bicyclists and motorists. The Plan recommends that the Police respond to the following moving violations, particularly on main arterial roadways where most accidents occur: running a red light, running a stop sign, riding without lights, or riding the wrong way.

The Plan calls for developing guidelines for messenger services to help them regulate their own industry.

Education and Training: (page 58) The Denver Public Schools are planning to include bicycle programs (both classroom and on-street) as a part of their curriculum in all grades.

The Plan recommends that health clubs, museums, bicycle clubs, and other appropriate groups provide bicycle training for children and adults. Bicycle advocates, working through the Mayor's Bicycle Advisory Committee, could be trained to provide these programs.

Promotion, Encouragement, and Information: (page 61) Getting the word out is critical to increasing bicycling. The idea of "share the road," and "its wheely easy to bicycle to work" are two examples of the messages that could be used in a promotion campaign. Getting corporate sponsors for "Bike-to-Work Day" and encouraging employers to accommodate bicyclists with adequate parking, lockers, and changing facilities is all part of the promotion package. Maps should be provided so that bicyclists can understand how easy it is to use a bicycle for transportation. Television, newspapers, and other media provide opportunities for education about safe bicycling habits and the route system.

Institutional Policy: (page 67) The Plan calls for coordinating bicycle accommodations in construction plans. This "check-off for bikes" system should be part of the normal design and construction process. Generally, this does not add significantly to a project budget, but rather optimizes designs so that they are "bicycle friendly." To implement and coordinate this effort and implement the Plan, it is imperative to have a full-time Bicycle Planner.

IMPLEMENTATION STRATEGIES

Priorities have been assigned to the projects described in the Plan. (page 72) These are based on public opinion, the considerations of the Bicycle Advisory Committee for the greatest civic good, budget realities, and benefits realized. These priorities include:

- designating additional on-street routes, implementing major capital improvements (page 73), improving signage, standardizing maintenance practices, and painting bicycle lane arrows;
- issuing tickets to motorists and bicyclists for infractions that could lead to serious accidents;
- coordinating a Denver Public School bicycle training program using community advocates and college students;
- distributing a bicycle map, developing a promotion campaign to encourage commuting, and creating a training program to pair bicyclist who want to commute with those who are experienced; creating a way-finding system of route signs, destination signage, and directories located along bikeways throughout the City; and
- retaining a full-time Bicycle Planner; coordinating interdepartmental bicycle planning and creating an evaluation system to test the effectiveness of improvements.

FUNDING AND COSTS

Potential funding sources have been identified. (page 70) Preliminary cost estimates associated with major capital improvements are included in the Appendix. The Master Plan is the basis for guiding decisions so that the bicycle program can be logically implemented over time, using public and private funds. Ω

History of Bicycling in Denver

Long before the first bicycle was sold in Denver, the people of the area adapted transportation to their needs. Early inhabitants probably walked, carrying their goods by hand or on their backs. The Native Americans used *travois*, a blanket wrapped around two long sticks, dragged by a horse. The Spaniards travelled through the region with *carretas*, two-wheeled carts pulled by oxen. The American settlers travelled in covered wagons, prairie schooners, and later stage coaches, either to gather supplies in the Mile High City for further travels or to settle in Denver.

RULES

From *Useful Information for the Bicyclist*, a phamplet published in 1896 by Hedley Salmon, Rambler Bicycles Shop, 1721 Stout Street, Denver, Colorado.

Don'ts for Men

Don't get "bike" crazy.
Dont ride like a monkey.
Don't try to "show off."
Cycling is not a cake walk.
Dont wear a black sweater in summer.
Don't try to appear "sporty" when you are not.
Don't wear a silk hat on a wheel.
Don't try any dishonest scheme in a race. You'll get caught every time.
Don't be discourteous to lady riders.

Don'ts for Ladies

Don't race.
Don't coast.
Don't chew gum.
Don't wear a man's cap.
Don't use bicycle slang.
Don't forget to dress with becoming modesty.
Don't go out without needle and thread.
Don't undertake long journeys at first.
Don't wear a garden party hat with bloomers.
Don't forget that this is leap year.

Don'ts for Both Sexes

Don't forget your tool bag.
Don't cultivate a "bicycle face."
Don't ride with your mouth open.
Don't try to ride through a flock of geese.
Don't forget to take blue glass spectacles on a journey.
Don't start for an early morning ride without a slight breakfast.
Don't forget to take a wrap on a journey to the country. A summer cold is a stubborn thing.

In 1879 the first bicycles were offered for sale in Denver. The "wheels," as they were called, had a large wheel in front and a smaller wheel in back for support. Only one or two were sold the first year. By 1881, there were about 15 in the city. Due to the difficulty of mounting and riding these wheels, instructional classes were offered. But some people did not like the wheels, and on several occasions, the cycling instructor was arrested for scaring the horses with his bicycle.

The wheels were not popular initially, but within a few years a number of bicycle groups were formed. The Denver Wheel Club was formed in 1881, and several others followed, including the Rambler's Wheel Club, the Arapahoe Wheel Club, and the Burlington Wheel Club, composed of Burlington Railroad employees. One club was open only to bicyclists who had completed a 100-mile journey in twelve hours.

Bicycle trails were created to enable two-wheeler enthusiasts to ride throughout the region. Popular 100-mile century routes included a Denver-Greeley loop and a Denver-Palmer Lake loop. Many people rode to Palmer Lake on Sunday morning, arrived in time for a luncheon and a couple hours of rest, before pedalling back to Denver in the afternoon. Others avoided the uphill ride to Palmer Lake, opting to load their bicycles on one of the trains to Palmer Lake, and returning by bicycle, coasting much of the way back.

In 1900, *The Denver Times* reported that Denver had more bicycles in proportion to its population than any other city. Thousands were seen on the streets, used in every line of business, from delivering goods to transporting people. An undertaker in Greeley invented a bicycle to carry funeral layouts.

Since bicycles shared the road with horses, carriages, and pedestrians, the competing demands for road space created the need for orderly use of bicycles. In 1880 an ordinance prohibiting bicycles on sidewalks and streets of Denver was considered. In 1899, Mayor Johnson signed a bicycling ordinance for the City of Denver in which bicyclists were not allowed to ride on the sidewalks, and had to ride with at least one hand on the handlebars and both feet on the pedals. Bicyclists could not ride in the downtown commercial core, and "scorching", riding at speeds exceeding 10 miles per hour, was prohibited.

Newspaper reports from 1900 said, "Bicycle thieves did a flourishing business last year," when 1,149 were stolen. In a similar vein, a 1971 newspaper headline said, "Thieves do thriving business in city, 2300 bicycles stolen this year."

By the 1920s automobiles had begun to replace bicycles as the mode of choice. Bicycling was left mainly to newspaper carriers and delivery boys. Many of the paths that were formerly used by bicyclists to ride to other cities, like the Denver-Greeley loop, were widened to accommodate automobiles and closed to bicycles.

After years of ever-increasing automobile use, the needs of bicyclists were left behind. The bicycle was relegated to the status of a toy, ridden only by children and eccentrics. Automobile interests declared that bicycles should stay off the roads, giving various reasons for this opinion. The concept of sharing the road was secondary to ensuring the smooth flow of motor vehicle traffic.

Nonetheless, many people still enjoyed bicycling as a form of recreation, seeing the natural beauty of Denver from the seat of a bicycle. As a result of this interest, Mayor Tom Currigan in 1965 commissioned a bicycle trail connecting City Park, Cheeseman Park and Washington Park. The new trails and paths were created to keep bicycles as far from automobiles as possible. A 1969 City of Denver map of bicycle trails shows mainly park loops with a recreational emphasis.

The environmental movement and the increased awareness of physical fitness combined to give a new push to bicycling in the 1970s. In 1971, the Denver City Council authorized the creation of a bicycle network to serve commuting as well as recreational needs. Joe Shoemaker was an ardent advocate of the Platte River Greenway as the spine of a network of bicycle trails and on-street routes, working like the interstate highway with its system of feeder roads. The energy crises of the 1970s underscored the importance of the bicycle as a legitimate form of transportation.

Based on national statistics, it has been estimated that nearly half of all the adults and children in Denver own a bicycle, but most rarely use them.

The last Denver Bicycle Master Plan was adopted in 1979 and revised in 1987. The introduction of new bicycle technologies, and continued emphasis on fitness and environmental concerns make a new Bicycle Master Plan an exciting opportunity to make Denver one of the most bicycle-friendly cities in the United States.

Inventive bicycle riding in Lower Downtown, circa 1900

Use of the Plan

The Denver Bicycle Master Plan was created under the authority of the Transportation Planning Section of the Department of Public Works. It is an amendment to the Denver Comprehensive Plan sections on transportation and mobility. The City has made a commitment to reducing vehicle miles traveled, thus reducing pollution and congestion. Encouraging bicycling as a serious mode of transportation, making it easier and safer, is part of meeting this commitment and inherent in this Plan. This is the second Bicycle Master Plan to be prepared for the City and County of Denver. The first Plan was adopted in 1979 and updated in 1987.

The Master Plan is a strategy for developing a comprehensive bicycling program to be implemented over the next ten to fifteen years. The Master Plan is not a capital improvement list nor is it a detailed bicycle program budget. It does not include construction documents. Further design and analysis will be needed befor specific projects can be completed. The Plan gives direction to the development of the physical bicycle system as well as education, promotion, enforcement, public policy, and information distribution.

Funding and Costs

The Plan's facility recommendations were developed based on City funding levels for bicycle projects over the last ten years. Preliminary estimates were done for facility projects, such as bridge construction, that will require significant capital funding to ensure that these recommendations are fiscally responsible based on the City's past performance. Material costs, construction pricing and methods, and construction schedules all significantly contribute to the final price for each project and can vary greatly over time. The Master Plan is intended to be implemented over a ten to fifteen year period during which all of these costs will vary. Therefore, it is neither appropriate nor possible to assign a construction and implementation cost to the Master Plan. Preliminary estimates for specific projects are contained in the Appendix and can be used to set budgets and priorities, and secure funding.

Beyond facility improvements, the recommendations focus on policy, procedures, and standards that do not require a large capital infusion. These recommendations can often be incorporated as part of the day-to-day business of various City Departments, schools, bicycle advocacy groups, and others interested in bicycling. Other policy recommendations may require professional assistance beyond what can be reasonably provided by the City's Bicycle Planner. The key to making the Bicycle Master Plan reality, is the aggressive pursuit of all parts of the Plan by public and private interests working together toward a common vision.

Denver Bicycle Plan Components

The adoption of the Master Plan puts bicycle projects in line for funding from the City's Capital improvement Projects budget as well as State and Federal funding sources. This does not imply or guarantee a specific funding level. Furthermore, the overall strategy outlined in the Plan provides the logic to persuade potential private funding sources to finance individual projects. As Denver heads toward the year 2000 and beyond, funding sources that we cannot now anticipate are

likely to become available. Many (like ISTEA, the new Intermodal Surface Transportation Efficiency Act) will require communities to have an adopted Master Plan before applying for grants. With a Master Plan in place, Denver will be poised to take advantage of these opportunities and direct funds to priority projects. Likewise, funding restrictions, such as the recent tax limitation amendment passed by voters in November 1992, can significantly change the funds available. Therefore, the Master Plan is written as a guide to policy and priority in the use of funds, and is intentionally flexible to respond to changing conditions.

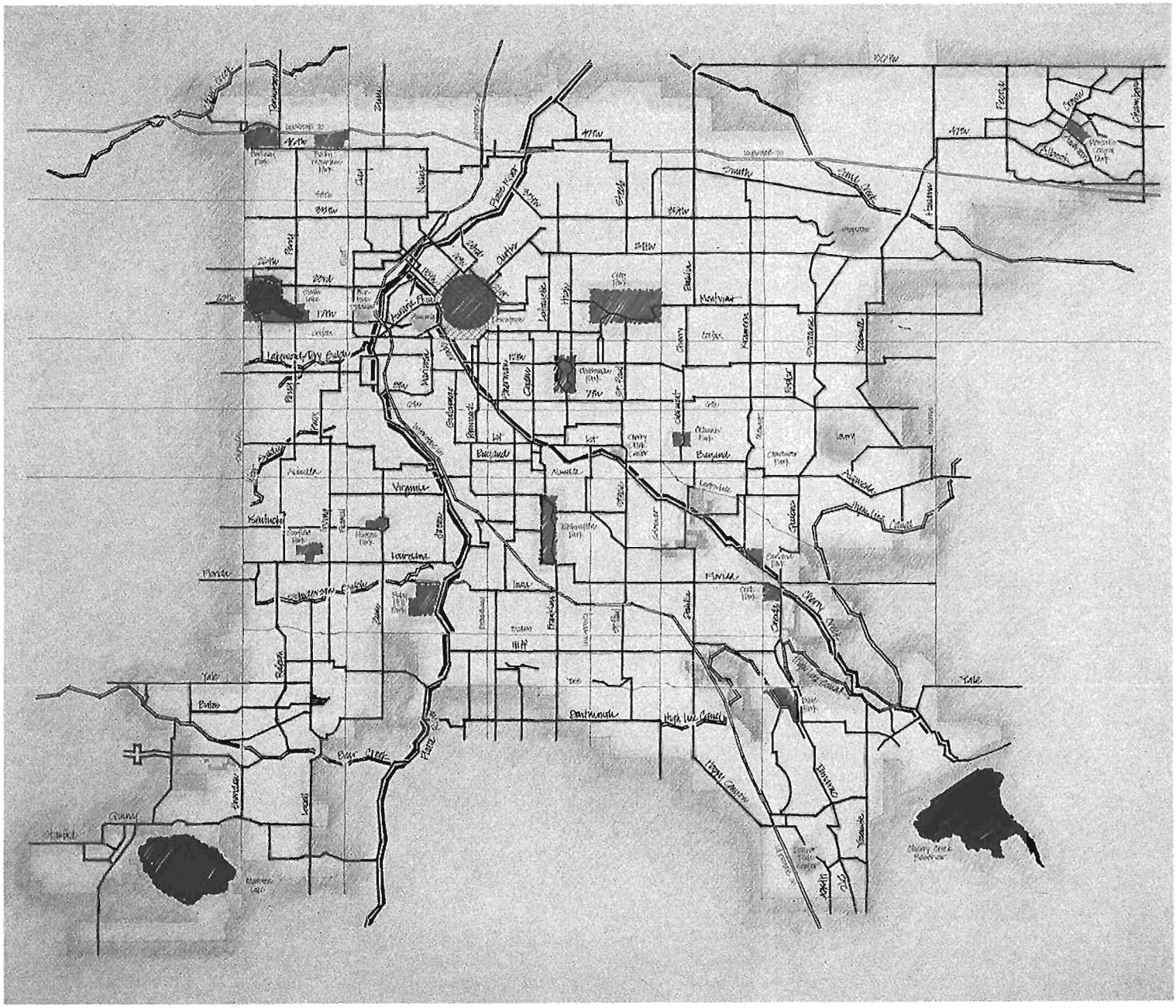
Why have a Plan?

Beyond addressing funding concerns, the Plan provides guidance for the development of a bicycle program. For over 100 years, bicycling has been a part of the transportation and recreational life of Denver. The City of Denver has had a variety of changing bicycle policies, ranging from prohibiting bicycles in the Downtown commercial core to adding many miles of on- and off-street routes. Over the past twenty years, the City has worked with such groups as the Platte River Greenway Foundation to build the off-street paths along Cherry Creek and the Platte River. The on-street system has been built up over the years by adding route signs, bridges, and other improvements that make it easier for bicyclists to navigate along City streets. These improvements were a response to both previous master plan efforts and the need to fix individual problems.

Taking its start from the City's Comprehensive Plan, the Bicycle Master Plan describes the bicycling system as it should be in ten to fifteen years. Furthermore, it describes the individual tasks necessary to accomplish this vision. With the Master Plan in place, the tasks can be logically assigned and a coordinated effort to realize the full Plan can be launched.

The Master Plan provides the framework for decision-making on the described projects as well as those that may come up in the future and which we do not now anticipate. Every year the public and private sectors of the City spend millions of dollars on development and improvement. The Bicycle Master Plan is the catalyst to allow these plans to incorporate a bicycle component wisely and add to the City-wide bicycling system. Ω

Downtown bicycle commuter



The Vision Map shows the bicycle system with all proposed improvements, and Denver as a city where all trips can be made by bicycle.

VISION MAP
Denver's Future Bicycle System

Purposes of the Plan

As many Denverites realize, bicycling can be an enjoyable, invigorating, and healthy pursuit. The City currently has many good recreational bicycle routes, and this plan proposes extensive improvements to them. The primary purpose for creating the Plan, however, is to significantly increase bicycling options as an alternative to use of the private automobile. To do this, the Plan contains a set of complementary educational, facility, encouragement, and enforcement strategies to make it easier and safer to bicycle. In line with this purpose, the overall goals of the Denver Bicycle Master Plan are as follows:

- —To increase the level of commuting and utilitarian bicycling
- —To create a conveniently-spaced system of high-quality bicycle routes
- —To improve bicycle safety
- —To provide better information about bicycling to cyclists and non-cyclists
- —To increase acceptance of bicycling as a legitimate transportation mode
- —To achieve recognition for Denver among the best major cities for bicycling in the country

Goal: Increase levels of bicycling ridership, especially for commuting and utilitarian trips.

Even though many people in Denver bicycle for recreational purposes, few people ride their bicycles for utilitarian trips, such as commuting to work, going shopping, or running errands. Census data from 1990 show that only 1% of commute trips in Denver are made by bicycle. The Bicycle Master Plan proposes to increase the percentage to 2% by 1996, and to 3% by the year 2000. These goals will be reached not only through improvements to the physical bicycle facilities, such as the trail system and on-street bicycle routes, but also through promotional and educational programs to better inform the people of Denver about bicycling, and through efforts to improve bicycle safety. Further, the Plan recommends methods to encourage "bicycle-thinking" in City agencies.

To increase utilitarian bicycling options, the Plan recognizes the many activity centers in the City of Denver, like Downtown, the Denver Tech Center, and Cherry Creek; identifies bicycle connections to these areas; and recommends these connections for route designation. Employers and business owners can be enlisted to help improve the bicycle experience. Installing bicycle parking fixtures at the workplace and retail centers is one way to facilitate bicycling. Promotion of health and fitness goals, and emphasis on quality of life issues also encourage utilitarian and commuting cycling.

Integrating bicycles and public transit enhances the possibilities of both modes. Bicycling can be an efficient and convenient distributor mode to extend the range of bicycle commuting between transit stations and destinations. Accommodating bicycles at transit facilities encourages bicyclists to ride for at least part of the trip, extends the practical commute range for bicyclists, and facilitates an arangement by which bicyclists can station bicycle(s) at one or both ends of the trip for easy mobility. Recently, RTD has worked with the bicycle community to seek ways to combine bicycling and

Bikes on Transit
Related issues can be found on pages 48 and 63.

transit. Some of the options being investigated include better bicycle access to transit boarding points, bicycle parking at transit stations, and space for bicycles on transit vehicles. Carrying bicycles on transit vehicles provides a means to use bicycles at both ends of the trip.

Goal: Create a conveniently-spaced system of high-quality bicycle routes throughout the city.

To cost-effectively create a comprehensive bicycle system for the entire City, the Plan recognizes that the streets of Denver need to be made safer for bicyclists. Since new off-street bicycle paths are not economically justifiable in most developed parts of Denver, the Plan recommends the designation of over 100 miles of new routes, mainly on-street, to complete the one-mile grid. The purpose of a one-mile grid is that a person anywhere in the City who wants to bicycle will be a half mile or less from a designated bicycle route.

Bicycle System Mileage
Current conditions - 1993
180 miles of routes and trails

Proposed additions
Over 100 miles of new facilities, mainly on-street routes

Although bicycles are allowed on virtually every street in Denver, arterial streets with higher volumes of higher-speed traffic present conditions that are dangerous for all but experienced bicyclists. The streets recommended for bicycle route designation have lower traffic volumes and lower traffic speeds than arterial streets, and adequate road width to accommodate bicycles and cars. The Plan recommends that limited bicycling funds be spent on bicycle-oriented improvements to lower-speed, lower-volume streets rather than arterial streets. Identification of a one-mile grid system provides the focus for these improvements. Implementation of the improvements contained in the Plan will result in a bicycle system with safe bicycle access to all parts of the City for all skill levels.

Goal: Improve safety for bicyclists.

Superimposing a bicycle transportation system on the existing road system creates opportunities and challenges. The bicycle system should not put bicyclists in dangerous situations. Safe access is critical throughout the system. Bicycling can be made acceptably safe through a combination of facility improvements and training.

Safety was an important consideration in the designation of streets as bicycle routes, and in the recommendation of capital improvements to make the bicycle network safe for all skill levels. The selection and marking of bicycle routes is carefully conceived so that bicyclists are not guided into unsafe conditions, especially at intersections. The imperative to "Share the Road" should encourage cooperation between motor vehicles and bicycles on the road, and between bicycles and other users on the multi-use trails.

The Denver Police Department is willing to assist in the safety effort by ticketing bicyclists for dangerous offenses. Increased enforcement of traffic laws applying to bicycles will lead to safer, more predictable traffic behavior. Signage improvements and painted directions on the road surface can inform motorists and bicyclists of local conditions.

The Plan addresses security for bicyclists. A program to coordinate volunteers to serve as bicycle ambassadors will encourage safer riding on the trails and roads, and provide a level of security for bicyclists. Better lighting on trails will improve security in areas with low levels of nighttime traffic. Th e

Plan recommends an increased police presence on bicycle routes and paths, especially where security problems exist. Police bicycle patrols should ride the paths regularly.

Goal: Provide better information about the bicycle system.

The best bicycle facilities are underused if people are not aware of them and are not encouraged to use them. The off-street bicycle trails in Denver are well-known and well-used. If the on-street bikeway system were as easily recognized and understood, people would be more likely to use it. Distribution of easy-to-read maps of the bicycle system can create greater awareness of the on-street bicycle system.

The Bicycle Master Plan recommends the creation of a "bike-wayfinding" system to guide bicyclists to all areas of the City. Directional and informational signage as well as safety signage is also recommended.

Promotional and educational efforts to make bicycling habitual should be targeted at the most likely riders. A training format that is "bite-sized and enjoyable" can reach a wider audience than time-intensive training courses. Bicycling education should be targeted at bicyclists of all skill levels, including commuters, recreational riders, school-age children, and motorists. Courses can teach how to ride safely with automobile traffic and how to commute to work by bicycle with the least hassle. As riders gain experience, instruction on how to deal with specific situations, such as the safest ways to make left turns at intersections, is useful.

Education, encouragement and promotion are needed to create "bicycle thinking" among the general population. Even those who do not bicycle should be aware that they need to share the road with those who do. Non-bicyclists can be educated to accommodate bicycles on the road, and bicyclists can recognize the need to ride predictably to avoid conflicts with motor vehicles. Public awareness campaigns can help make the roads safer for everyone.

Goal: Gain greater acceptance of bicycling as a legitimate transportation mode.

State and local laws recognize the bicycle as a legal road vehicle. Increased levels of bicycling combined with greater use of alternative modes like transit and carpooling can reduce traffic congestion, air pollution, and the use of non-renewable energy sources. The Bicycle Master Plan recognizes the role of bicycling in meeting transportation needs.

Meeting bicyclists' needs should be an institutional objective within City departments. Design standards to safely accommodate bicycles should be applied to all new street and highway projects. The creation of this Bicycle Master Plan indicates a renewed commitment to bicycle planning efforts in the City.

The Plan emphasizes projects that relieve congestion and improve the general perception of commuter bicycling opportunities. A cost-effective way to increase ridership levels is to make on-street bicycling conditions better for commuters. Providing adequate street width to accommodate both bicycles and automobiles safely can encourage more commuting and

utilitarian bicycle trips. Facility improvements such as intersection modifications, connections between routes, signal actuators, and comprehensive signage improvements can make bicycling more inviting. Streets designated as bicycle routes can be restriped or otherwise modified with wide outside lanes and a minimum number of stop signs.

A program to provide regular maintenance of all on- and off-street facilities, and associated amenities including snow plowing and street sweeping, can increase the year-round viability of bicycling in Denver.

Goal: Achieve recognition for Denver among the best major cities for bicycling.

A comparison of major-city bicycle programs shows Denver in position to reach the levels of success found in places like Seattle, Tucson,and Minneapolis. The success of their programs is directly attributable to good planning and promotion. Seattle, for example, has a high percentage of bicyclists, although the topography and climate would lead one to assume otherwise. The Seattle Bicycle Planner and staff monitor the day-to-day needs of bicyclists and promote cycling not only as recreation but as a viable means of transportation.

BICYCLE COMMUTING

Denver Bicycle Commuters*

Workforce:	230,000
Bicycle Commuters:	2,000
Percentage:	<1%

Other Major Cities**

Tucson:	3.5%
Phoenix:	2.4%
Seattle:	2.3%
Minneapolis:	2.0%
Portland:	2.0%

*Source: 1990 U.S. Census
** Source: Goldsmith, Stuart A., *Reasons Why Bicycling and Walking are not being used more extensively as Travel Modes*, p. 82, FHWA 1992.

Denver has the ingredients — favorable topography and climate, health-conscious population, a good basic system of on- and off-street bikeways — to become one of the best major cities for bicycling in the country. In its setting at the base of the Rocky Mountains, Denver has a strong outdoor orientation. During most of the year, the climate is conducive to outdoor recreational activities. The City's bicycle system was developed in part because of the desires of the people of Denver to appreciate the natural beauty of their surroundings. The bicycle trails along waterways and gulches are popular for recreational riding, and their proximity to employment centers make them useful commuting routes.

Creation of a permanent staff position for a full-time Bicycle Planner can help ensure that bicycling in Denver achieves its potential. The Bicycle Planner should direct the implementation of the Bicycle Master Plan, and serve as an effective voice for the bicycle community as City projects are planned and as bicycling needs are incorporated into all applicable city agency construction and reconstruction projects.

Future funding for bicycle improvements is expected to be similar to existing levels and will continue to be modest compared with general highway funding. But careful use of funds for bicycle improvements, as proposed in this Plan, can make bicycling more important to the general public and will translate to increased funding in the future.

Implementation of the 1993 Denver Bicycle Master Plan recommendations will make Denver's bicycle system more comprehensive, will make bicycling safer and more inviting, and will encourage more people to bicycle for utilitarian trips. Coordinated improvements in facilities, training, enforcement, and encouragement can substantially increase bicycle usage in Denver to the levels found in the best U.S. cities for bicycling. Ω

Analysis and Methodology

The first task for the Master Plan team was to analyze existing conditions and establish baseline data. The analysis of the status of bicycling in Denver itself was supplemented by looking at bicycling programs around the United States.

National trends

In the last twenty years, bicycling has increased for both recreation and commuting purposes. Improvements in gear mechanisms, tire durability, and comfort have also contributed to greater bicycle use. Bicycles originally designed for off-road riding are now popular for use on rough city streets because of their sturdiness and stability. Other factors adding to the popularity of bicycling are sensitivity to the environment and increased interest in physical fitness.

Cities, nationally and internationally, are working to increase bicycle usage, particularly for commuting and utility trips—to the grocery store, appointments, business meetings—which might otherwise be made by car. They are motivated for several reasons:

- bicycling can reduce congestion by reducing the number of cars on the streets;
- bicycling instead of driving can decrease the amount of carbon monoxide emissions by one pound, on average, for every mile; and
- a good bicycling system is an asset that adds to the quality of life of the city.

Throughout the country, cities are taking steps to make bicycling a more integrated part of the transportation system. The wide variety of improvements range from simple adjustments to major construction. Sometimes improvements are as simple as adjusting lane striping or selecting a storm grate that prevents bicycle wheels from getting stuck. Other accommodations include traffic detection loops (to change the light to green) that are sensitive to bicycles. Some bicycle facilities solutions call for adding a bridge over a highway or other barrier.

Education, encouragement, and promotion encourage "bicycle thinking" among the general population. Messages like "Share the Road," programs like "Bike to Work," and training programs like "Effective Cycling" work in conjunction with facility improvements to make general bicycling conditions better.

Local Trends and Conditions

Denver is an outdoor city. Its favorable climate and natural beauty draw people who enjoy recreation and seek physical challenges. Bicycling is an integral part of this health-conscious attitude. The popularity of bicycling in Denver goes back many years to the late 1800s. Today, Denver can boast of having one of the finest major-city bicycle route systems in the nation. Its combination of on-street routes and off-street trails covers over 180 miles.

Denver's first Bicycle Master Plan was created in 1979. It was updated in 1987 and a series of new facility improvements were suggested. A review of the status of these recommendations shows that the City of Denver has been diligent about its commitment to bicycling. All of the recommendations have been completed, are funded, or have been re-evaluated in the 1993 Master Plan. The following is an analysis of the status of those projects.

This list illustrates that the City of Denver continues to make significant improvements to its bicycle system. Currently, however, the City does not have a policy to routinely provide adequate space for bicycles on new road construction projects. The result is that bicycle facilities are not always designed properly for safe bicycling and there is a lack of consistency within the bicycle system. Standards for facilities, detours, trail construction, and maintenance contained in the Appendix and the Technical Supplement should be adopted as part of the Master Plan.

Status of Projects Recommended in the 1987 Bicycle Plan

Completed:

- Hire a Bicycle Coordinator
- Appoint a Bicycle Advisory Committee
- Build an up-to-date bicycle-related library
- Design and implement capital improvements:
  - –Platte River Greenway replacement – 8th Avenue to 13th Avenue
  - –W. 8th Avenue viaduct connection
  - –Alameda underpass, Santa Fe Drive to Cherokee Street (replaced Bayaud Avenue bridge at I-25)
  - –Auraria Parkway
  - –Cherry Creek Channel Bikeway
  - –Berkeley Park/Clear Creek connection
  - –North High School connection
  - –Cherry Creek underpass at University Boulevard
  - –Cherry Creek/Speer Boulevard bike path at Country Club
  - –Cherry Creek shopping center improvements and replacement with 10' wide concrete path to Holly Street
  - –Adams County connection to Platte River Greenway
  - –Pierce Street bridge at Bear Creek
  - –Washington Park connection to Franklin Street
  - –Sanderson Gulch/Ruby Park connection
  - –Colorado Boulevard underpass reconstruction
  - –East Florida Avenue connection
  - –On-Street Routes:
    Bear Creek bike path through Bear Valley area
    Tamarac Parkway from Yale to Quincy

Funded:

- Design and implement capital improvements:
  - –Overland Golf Course connection
  - –West Harvard Gulch connection
  - –Sanderson Gulch crossing at Federal Boulevard
  - –Yosemite Street connection
  - –Bear Creek connection to Pierce Street
  - –Iowa Avenue from Franklin Street to Santa Fe Drive

Re-evaluated for this Plan:

- Establish a data collection and record-keeping system
- Develop an aggressive bicycle education program
- Enforce traffic regulations
- Draw up a maintenance plan
- Implement high quality bicycle parking
- Adopt a bicycle parking ordinance
- Review standard street sections for inclusion of bicycle provisions
- Upgrade bikeway signage and include destination information
- Design and implement capital improvements:
  - –Colfax viaduct
  - –Sloan Lake
  - –Weir Gulch crossing at Alameda Avenue, install signal
  - –Alameda Avenue from Platte River Greenway to Cherokee Street
  - –Pearl Street connection (at Cherry Creek bike path)
  - –City Park
  - –Montbello connection
  - –Highline Canal
  - –East Yale Avenue connection
  - –Tamarac Parkway connection
- On-Street Routes: Various projects identified in the document.

Public Participation

The contents of the Master Plan are largely based on direction from Denver's bicycling community and those who would like to bicycle more. Ideas were collected in the following ways:

—a computer survey of those who ride frequently, occasionally, and never (including motorists);
—a bicycle workshop for those who have expertise in bicycle programming facility design; and
—eight public meetings and work sessions.

Survey

During the beginning stages of this Master Plan, a survey was conducted to establish a baseline of information about bicycling habits, concerns, impediments, and preferences. Six hundred and ninety-five people participated at seven locations. Survey locations were:

—the Denver Zoo on Bike-to-Zoo Day;
—Civic Center and Skyline Park on Bike-to-Work Day;
—the 16th Street Mall on several occasions;
—Denver Bicycle Touring Club meetings;
—a neighborhood shopping center; and
—the Bicycle Master Plan public meetings.

To get a good cross-section of Denver citizens, respondents were categorized according to those who ride frequently, occasionally, and those who never bicycle. The responses were analyzed among these groups to determine if there were diverging opinions.

The following is a summary of the survey results.

—The most important issues were the desire for adequate street width, enforcement of laws for both bicyclists and motorists, and secure bicycle parking.
—Daily bicyclists gave a high priority to allowing bicycles on public transit vehicles.
—In most categories, there was no significant difference in responses between occasional and frequent bicyclists.

Bicycle survey on the 16th Street Mall

—Bicyclists taking the survey expressed frustration with the lack of information about the on-street system or maps to explain it.
—Potential bicycle commuters were concerned about needing a car during the day, dress standards, and personal cleanliness.
—Inclement weather was seen as an impediment to bicycle commuting.

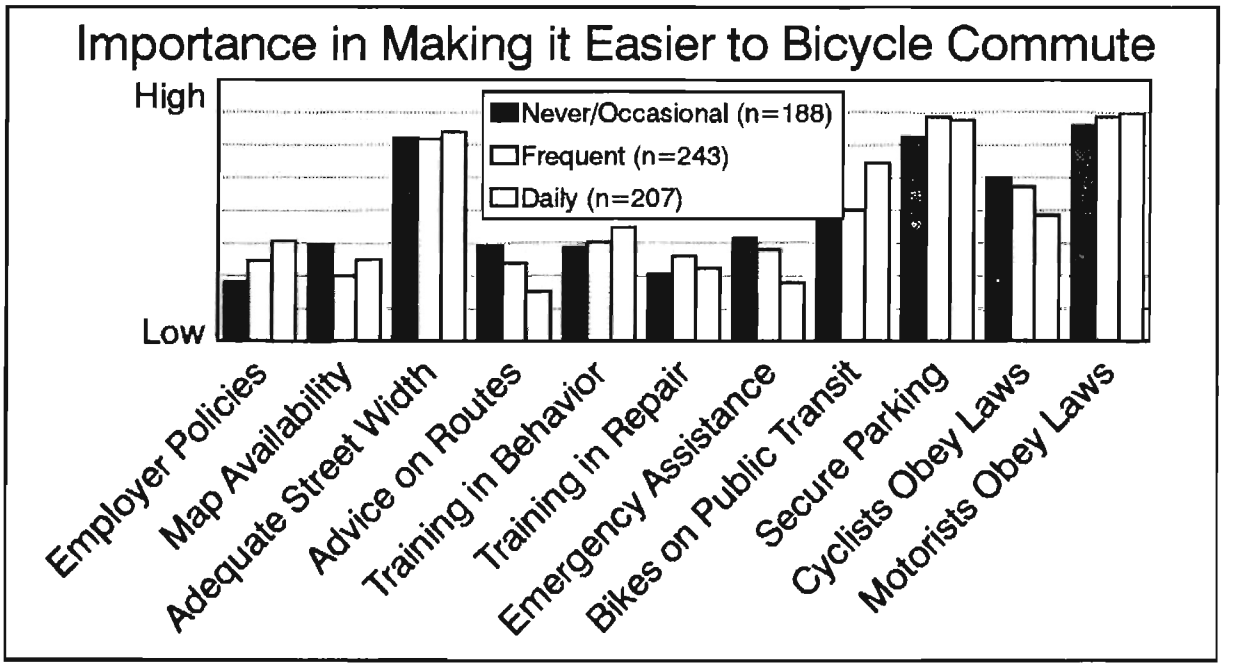
The survey findings were used as a basis for Master Plan recommendations. Concerns highlighted by the survey were addressed in all aspects of the Plan. The survey was integral to evaluating the problems as perceived by the general public and then testing solutions for those problems in the public meetings.

Apparent problems with one aspect of bicycling were examined from several perspectives for additional solutions. For example, survey respondents cited weather conditions as a greater inconvenience to bicycling than distance or lack of route information. While the weather itself cannot be controlled, its effects can be addressed. Among methods of dealing with changing weather conditions are to guarantee proper route maintenance, educate bicyclists to carry appropriate gear, or to provide options for bicycle commuters to take the bus during inclement weather. Examining the survey information in this way illuminated possible solutions that were not otherwise obvious.

Workshop and Public Meetings

Mailings about meetings and the project were sent to over 500 people, including leaders of neighborhood associations, print and broadcast media outlets, public officials, and interested citizens.

The public meetings were held in a workshop format where participants were asked to contribute ideas and opinions on the development of the Master Plan. The format ensured that the Master Plan was truly produced by the citizens of Denver to reflect their needs and goals.



Informal ratings on specific issues were also gathered at public meetings. Among other activities, attendees were given a specified number of green dots that were called "bicycle bucks" and asked where they would spend available resources. Unlike the survey instrument, this was not a "scientific" evaluation, but it did give clear indications of people's preferences. The planning process was guided by this information and the survey results.

Facilities Analysis

During the course of this study, members of the Denver Bicycle Advisory Committee and the consultant team rode their bicycles on every trail and bicycle route in the City. The on-street and off-street routes were analyzed for strengths and weaknesses. This information was augmented by comments and maps produced from the public meetings that highlighted specific areas for further study.

A map of the current bicycle route system prepared for this Plan showed the beginnings of a system of designated bicycle routes on a one-mile grid. This system, however, is incomplete and has many gaps. Some of the gaps are at significant barriers such as I-25 or the Platte Valley. Limited access, narrow bridges and underpasses, and missing connections between on- and off-street facilities were often the reason for the lack of continuity.

Bicycle traffic was counted at key locations throughout the City during the morning commute period. The counts were analyzed to verify perceptions of trail use. The counts will also be used as a baseline to determine the effects of bicycle system improvements on ridership figures.

Denver Police Department records of accidents between bicyclists and motor vehicles for the last three years were used to develop an accident location map. Sites where accidents were frequent were studied to determine how to reduce the likelihood of future accidents. Bicycle routes with heavy traffic were noted as well as areas where there were recurring maintenance problems.

The analysis showed fewer accidents between bicyclists and motor vehicles on streets currently designated as bicycle routes, even though the bicycle routes carry higher levels of bicycle traffic. The lower accident rate on bicycle routes can be attributed to better bicycling conditions, such as lower volumes of motor traffic and lower speeds. Motorists may also be more aware of bicyclists on these streets and may share the road more safely.

Many accidents occurred at intersections, and on major thoroughfares and arterial roads that carry high levels of automobile traffic. Efforts to improve safety conditions at the sites of frequent accidents are identified in the Master Plan. However, many of these arterials are not conducive to safe bicycling, and making them safe for bicycling would require many resources that could be better spent for less expensive improvements over a greater area.

Although bicyclists are legally considered as vehicles on City streets, the lower incidence of accidents on bicycle route streets indicated the need for additional streets that are safe for bicycling to be designated as bicycle routes. Official route designation may encourage bicyclists to ride on streets that are safer for bicycling.

Education, Information, and Promotion Analysis

Locally, bicycle education, information, and promotional efforts are few. Some schools offer bicycle safety lessons as part of their general curriculum. During special programs, such as "Bike to the Zoo," bicycling is promoted. A local bicycling club offers a metro-area map, and other groups produce urban trail maps for the region. The City of Denver Bicycle Planner's office currently has a "Bicycle Hotline" (640-BIKE) for bicycling information.

Better educational and informational programs do not require large investments of capital and could significantly influence more people to ride bicycles, ride safely, and leave their cars at home more often.

Bicycle Parking Analysis

Survey respondents considered the provision of secure bicycle parking very important. Many potential bicyclists fear their vehicles will get stolen if they are parked on bike racks. The reality is that most bicycles are stolen from homes and garages. According to police records., those that are stolen from other locations are often improperly locked or not locked at all.

The solution to the bicycle parking problem is a combination of sturdy, easy-to-use parking facilities and education about securely locking bicycles. New or replacement bicycle racks can make it easy to lock a bicycle securely.

Public Policy Analysis

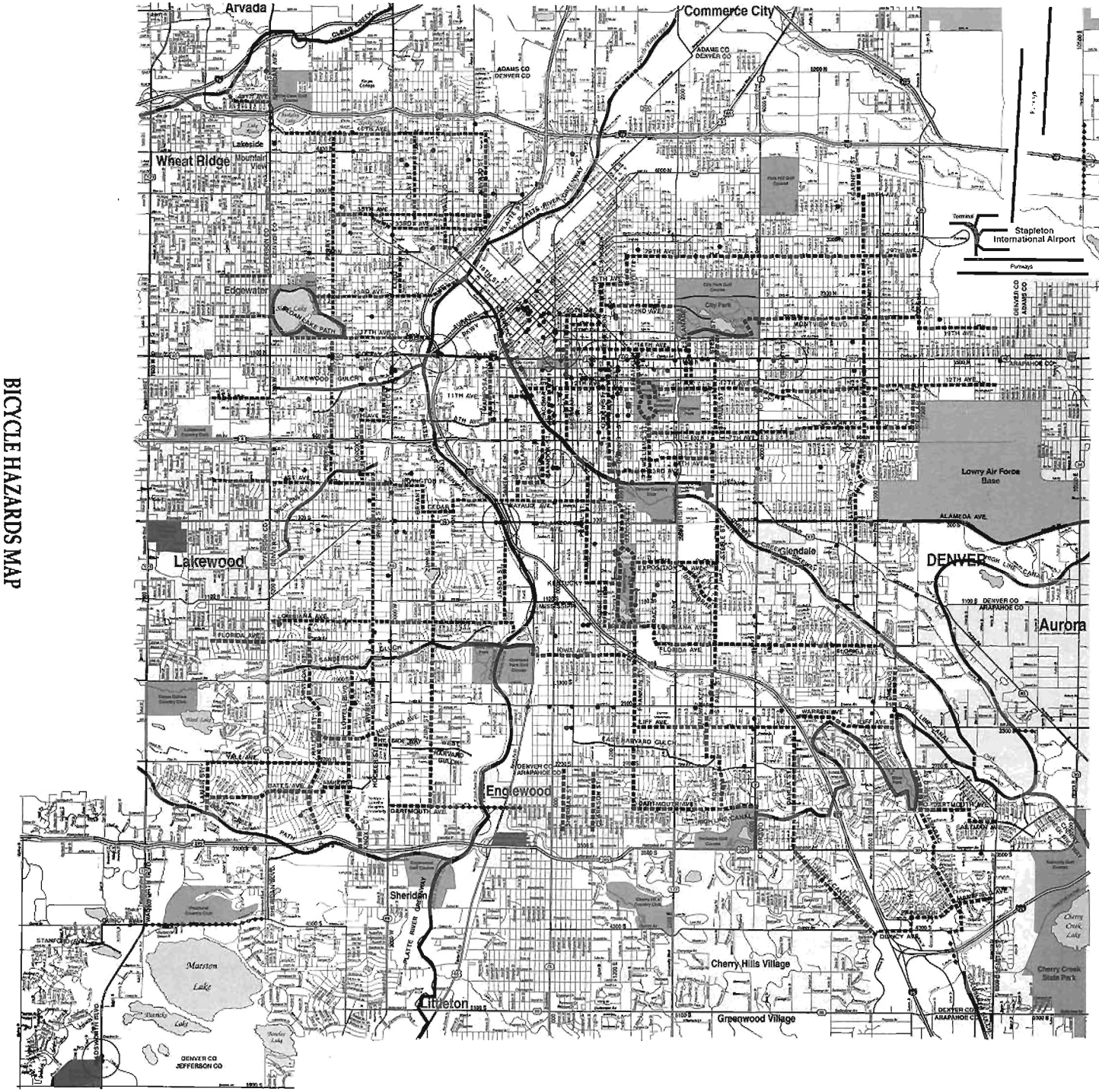
Many bicyclists do not know that legally, bicycles are considered vehicles and are expected to obey traffic laws as they would when driving an automobile. Analysis showed that enforcement of traffic laws for bicyclists could be stronger, and bicyclists' respect for the law could be greater.

The City maintains road capacities adequate to meet the needs of motorists. City resources are concentrated where they are demanded and where they are most effective to meet established goals. Since only 1% of commute trips in Denver are on bicycle, the City is not likely to reappropriate funding or close traffic lanes on major arterials to meet the needs of bicyclists. Only as the demand is proven, such as by an increase in bicycle ridership levels or greater levels of bicycle advocacy, will the City allocate more resources to bicycling.

Among City departments, jurisdiction over issues effecting bicycling is dependent on the project or issue. Responsibility and coordination of bicycle-related concerns is not clearly assigned, particularly for maintenance of on-street bicycle facilities. Some bicycle facilities are not assigned to any City department for responsibility. Retention of a full-time Bicycle Planner will strengthen the coordination of bicycle aspects of City projects and ensure that bicycle interests are addressed.

An example is maintenance of bicycle trails. The Parks and Recreation Department provides maintenance for the multi-use trails in the City park system. The separated trails on viaducts, however, are not plowed or swept regularly because the City did not have the proper equipment and maintenance responsibility was unclear. Better coordination between the Public Works Department and the Parks and Recreation Department will ensure that the issue will be addressed and not forgotten. Additionally, maintenance commitments should be firmly agreed upon before construction starts on any new bicycle facility.

BICYCLE HAZARDS MAP



SPECIAL THANKS TO U.S. WEST DIRECT FOR PROVIDING THE BASE MAP FOR THIS PROJECT.

DENVER PUBLIC WORKS DEPARTMENT
WELLINGTON E. WEBB, MAYOR
JAMES MACKAY, P.E., PROJECT MANAGER

City and County of Denver, Colorado

DENVER BICYCLE MASTER PLAN

NORTH

SCALE MILES
0 .25 .50 1.0 1.5
0 2000 4000 6000
FEET

KEY TO SYMBOLS

EXISTING BIKEWAYS & CONDITIONS 1993

- PRIMARY OFF-STREET BIKEWAYS
- SECONDARY OFF-STREET BIKEWAYS
- SIGNED ON-STREET BIKE ROUTES

HAZARDOUS AREAS

- HEAVY TRAFFIC AREAS: ION BIKEWAYS!
- ACCIDENT SITES

CONSULTANT: DESIGN VENTURES, INC.

WITH: STATISTICAL CONSULTING SERVICES
PHILIP E. FLORES ASSOCIATES INC.
WATT COMMUNICATIONS

BASE MAP PRODUCED BY MDS CARTOGRAPHY JANUARY 1993.

FACILITIES

Overview

The citizens of Denver are fortunate to have a very good system of bicycle paths and routes. The climate and natural topography invite bicycling. The on-street system currently provides access to most parts of the City. Many bicycle routes are located on approximately a one-mile grid. They are complemented by several high-quality off-street greenways with multi-use paths. The combination of on-street routes and off-street bicycle paths provides safe and direct access between many destinations in the City.

On-Street Routes

In Denver, as in most cities, bicycles are allowed on almost every street. In addition, numerous streets have been specifically designated as "bicycle routes." The on-street routes are located on approximately a one mile grid so that from any location in Denver a bicyclist is less than a half mile from a designated bicycle route. The routes are specifically on streets with low traffic speeds and volumes, wide outside lanes, and minimal stop signs, stop lights, curb cuts, driveways, and interference with turning traffic.

Major arterial roads that carry high volumes of automobile traffic are generally not selected for designation as bicycle routes because making them safe for bicycling would be very difficult. Instead, Denver's designated bicycle routes are located on streets running parallel to and between the arterials, providing a safer, more pleasant atmosphere for bicycling. Fewer bicycle/automobile accidents occur on bicycle route streets than on streets that are not designated.

Off- Street Routes

The Platte River and Cherry Creek provide the spine of the off-street bicycle trails. The drainage gulches and parks have their own trail systems, some of which connect directly to the Platte River Greenway and Cherry Creek Path. Bicyclists in Denver are particularly well-served because the natural layout of most of the trails serves commuter as well as recreational bicycle trips.

Trail along Cherry Creek

Street Standards

Issue

The perception that there are few good roads for safe, comfortable bicycle riding in Denver is an impediment to increased bicycling. Survey results showed that adequate road width and personal safety while bicycling are major concerns for bicyclists. Many people find it difficult to locate acceptable streets for bicycling that will take them where they want to go.

Striping bicycle lanes is one way to provide discrete on-street space for bicyclists. But bicycle lanes can be dangerous for various reasons. If stripes are painted all the way to the intersection, inexperienced bicyclists may ride too close to the curb through the intersection and increase their chances of collision with turning motorists. Bike lanes also tend to accumulate sand and gravel because the "sweeping" action of cars blows debris to the sides of the road.

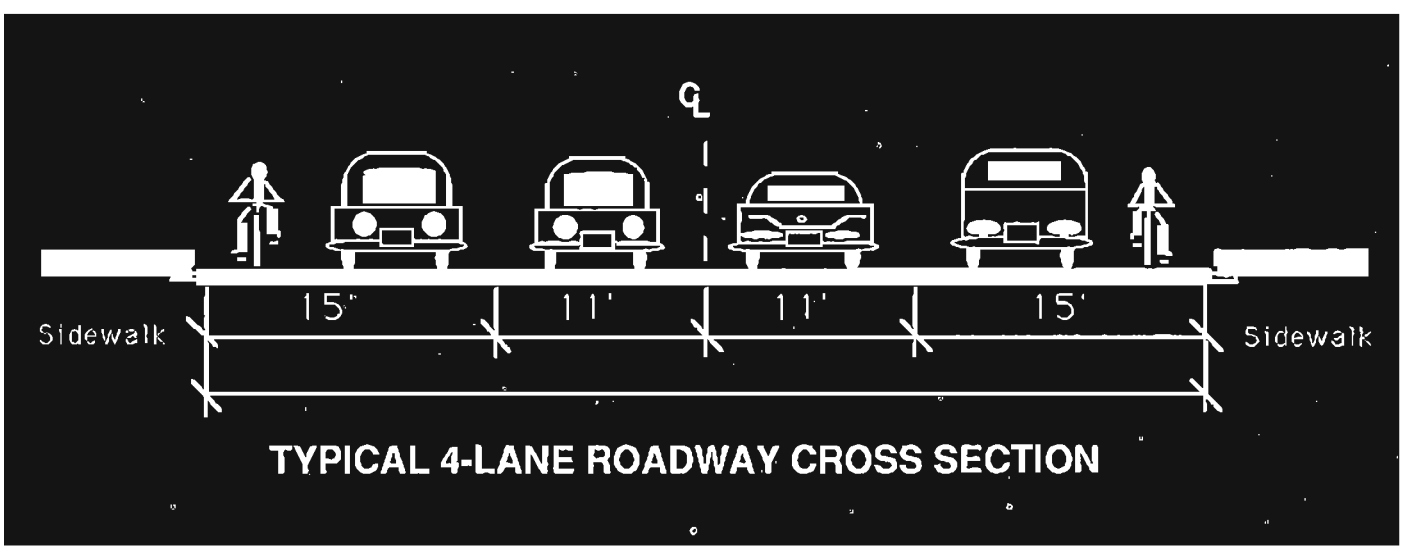
Even where the street width is adequate, bicyclists and motorists need to share the road. Motorists should be prepared to encounter bicyclists, and to leave adequate space for the bicycles to ride safely, not too close to parked vehicles.

Analysis

Bicyclists riding on the street need to feel safe as well as be safe. Providing adequate road width makes it possible for bicyclists and automobiles to share the road safely with a minimum of conflict.

Inadequate road width and related safety concerns are frequently cited as impediments to more frequent bicycling. The provision of discrete bicycle lanes on roads is often perceived as a way to improve safety and enhance rider confidence. Integral to the expressed need for "separation" from motor vehicles is the requirement for adequate road lane width for both bicycles and automobiles. The purpose of this width is primarily to permit cars and cyclists to pass safely without having to shift into adjacent traffic lanes. It also tends to help cyclists feel more secure and comfortable about riding on the street.

Recommended street standard.



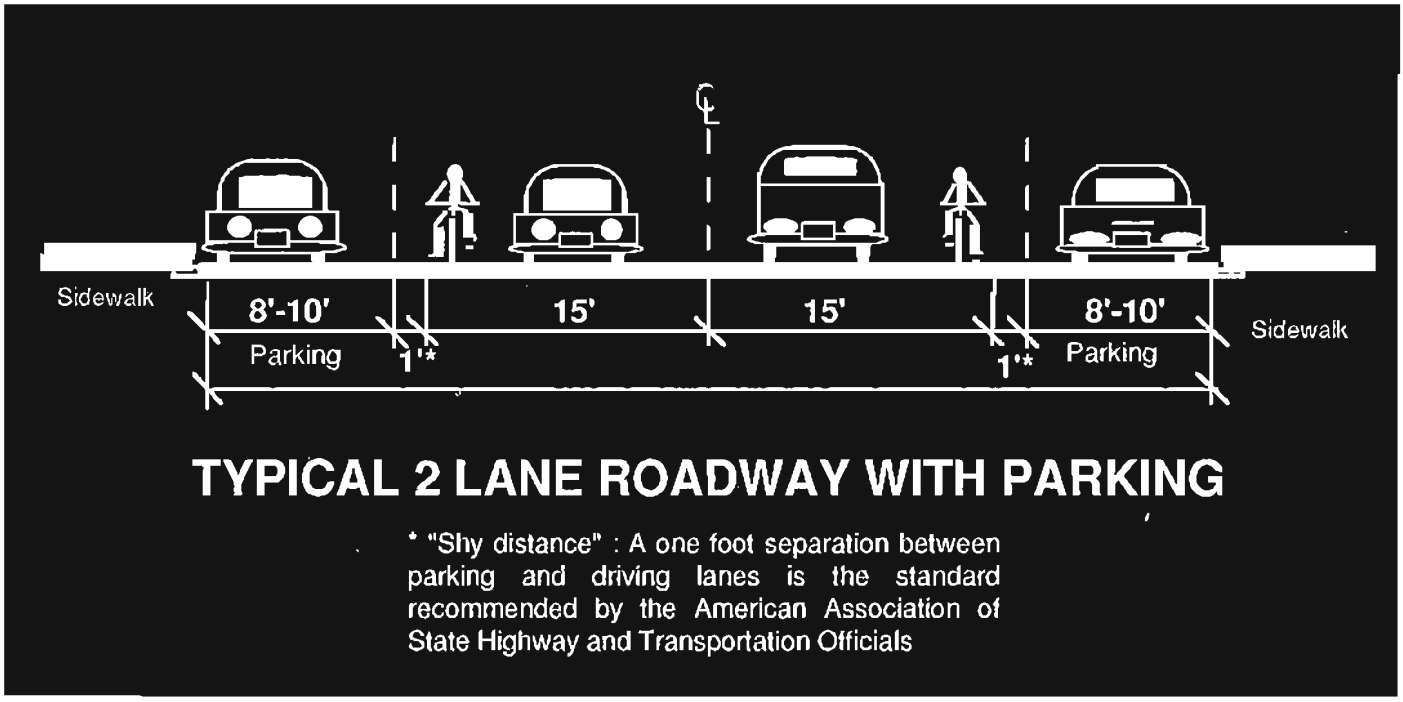
The lane width bicyclists need to ride safely on the road is four feet, as determined by the American Association of State Highway and Transportation Officials (AASHTO). The typical automobile lane in Denver is eleven feet. Thus the recommended width of a traffic lane that can safely accommodate an automobile and a bicycle is fifteen feet.

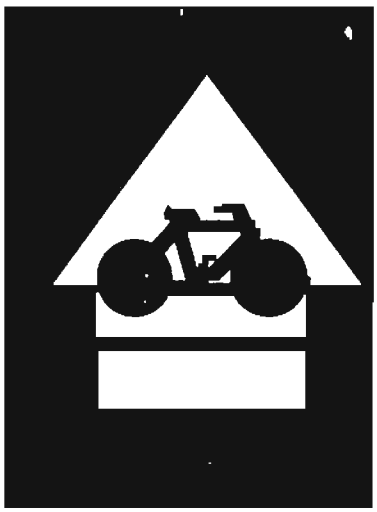
The existing right-of-way on many Denver streets is adequately wide for bicycles and automobiles to share the road. In some cases, however, the road space is not efficiently allocated. Traffic lanes should be striped to allow a fifteen-foot wide outside lane or curb lane so that bicyclists have adequate space to ride safely. Streets that have more than one traffic lane can be striped so that the inside traffic lanes are eleven feet wide. Restriping is less costly than widening the pavement and is more effective in discouraging high traffic speeds.

Recommendation

- *Adequate road width:* Apportion street width to provide space for bicycles and motor vehicles to operate safely side-by-side. Restripe traffic lanes to provide fifteen-foot wide outside traffic lanes with space for bicycles on streets where there are additional opportunities that are not specifically identified in this plan. When selecting existing streets for bicycle route designation, select streets that have adequate width or that can be easily modified for bicycles. On new road construction and reconstruction projects, design and construct the roads to safely accommodate bicyclists on the road. Exercise caution in allocating road width adequately since wider roads can encourage greater automobile traffic speeds, creating conditions that are potentially more dangerous to bicyclists.

Standard to accommodate bicycles safely on a two-lane street.





Bicycle Arrow Stencil
To be used instead of stripes for bicycle lanes.
Characteristics:
- To be placed along designated on-street bicycle routes
- Three or more to be placed mid-block
- Back from the intersection at least 50 feet
- Application: spray-painted from the stencil

· *Stencils and placement:* Where discrete bicycle lanes are not safe or practical on streets designated as bicycle routes, paint the bicycle-and-arrow stencil pattern three per block face. The direction of the arrow indicates to bicyclists the direction they should travel on the road. The repetition of the bicycle pattern alerts motorists that they are more likely to encounter bicyclists on that street.

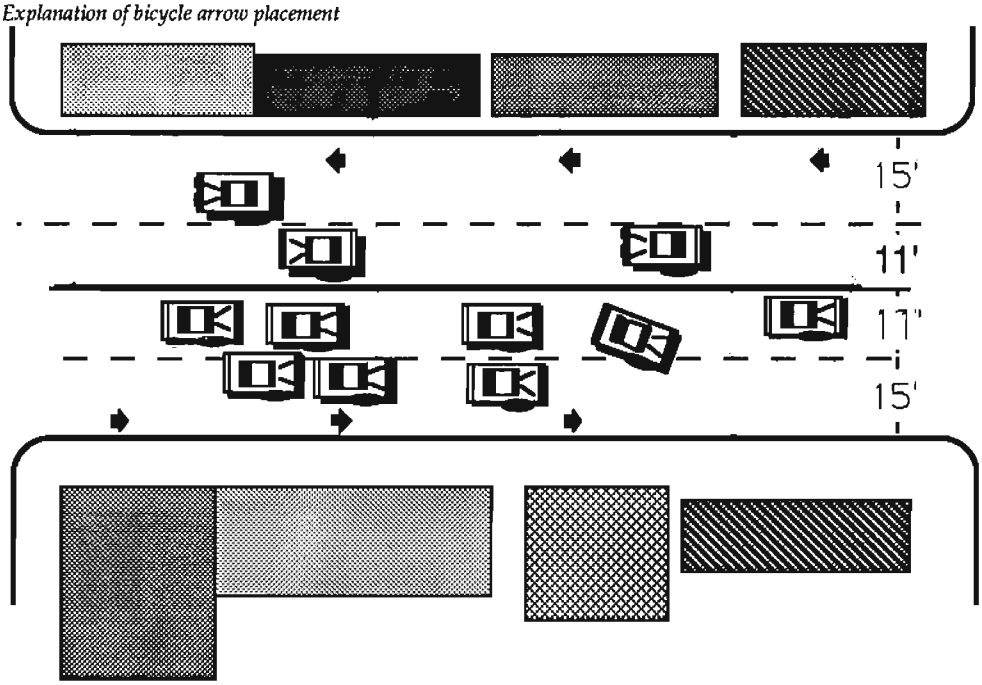
· *Safe striping of bicycle lanes:* If bicycle lane stripes are determined to be necessary, the design and placement of the stripes should not induce bicyclists to ride unsafely. The customary striping of bicycle lanes is adequate on roads that are wide enough to accommodate separated bicycle facilities. The stripe should end 75 feet before the intersection to signal to the bicyclist the need to merge with traffic if continuing through the intersection.

Exercise care and restraint in the placement of bicycle lane stripes. Instead of lane striping, consider the use of painted "bicycle arrows" instead.

· Design on-street bicycle facilities to minimize maintenance needs and reduce the hazards associated with maintenance limitations. Ensure that any public or private improvements adjacent to or effecting existing and planned bicycle facilities are designed and constructed not to compromise the use of those facilities or expand maintenance requirements.

· Authorize the City Bicycle Planner to review all City and applicable private development plans that add to or effect the operation of bicycle facilities. Include the Bicycle Planner in the review process of applications to vacate rights-of-way and exceptions or variances to these.

Explanation of bicycle arrow placement



Multi-Use Trails & Bicycles

Issue

Multi-use trails provide integral links in the bicycle system for the City of Denver. They are heavily used by bicyclists, in addition to walkers, joggers, and in-line skaters. Denver is fortunate to have major off-street trails located in places that permit practical use by commuter as well as recreational bicyclists. The multi-use trails were created as recreational links that also serve as functional connections.

Some of the existing multi-use trails were designed and constructed several years ago, when usage levels were much lower than they are today. Some of these trails are narrow and of poor quality paving materials, and are difficult to use because of maintenance concerns. They are in need of repaving or reconstruction.

Analysis

Practical opportunities for major new off-street bicycle trails are limited because existing transportation systems and developments dominate surface land use patterns. Major redevelopment projects, such as at Lowry Air Force Base, Stapleton Airport, and the Central Platte Valley, as well as new developments at Denver International Airport and the related Gateway area present opportunities for new multi-use trails.

Bicycle and pedestrian bridge *connecting Bible Park and the High Line Canal*

Off-street multi-use trails are inviting to novice riders. A standard 10- to 12-foot wide trail is recommended. Concrete is a more cost-effective trail surface than asphalt when resurfacing and maintenance costs are considered. Whenever off-street trails are constructed or extended, they should be designed to be completely separated from traffic. Trails that cross automobile traffic at intersections, driveways, alleys, and other curb cuts are hazardous because they introduce the potential for conflicts with auto traffic.

Some trails are insufficiently wide and have competing uses, like bicycling, walking, and in-line skating. Widening these paths to meet demand may encourage faster bicycling speeds, resulting in less safe conditions. Where trail uses conflict and there is adequate space, a five- to six-foot wide sidepath of crusher fines can provide a separate area for slower-moving traffic.

Recommendations

- Pursue cost-effective opportunities to develop new trails and to fill in the gaps in the existing off-street trail system.

- Construct trails based on consistent design standards throughout the City. The Recommended Design Standards in the Appendix should be used as guidelines for trail planning and design, subject to neighborhood review and specific physical limitations. Improve the coordination of maintenance and construction through common guidelines and standards.

  Design new and reconstructed trails to be safe and non-circuitous, especially trails used for commuter bicycling. Consider the aesthetic and natural aspects of the trail experience in the design of all projects. Protect existing vegetation. Plan and design all trails with aesthetic amenities and appropriate vegetation.

On-Street/Off-Street Bikeway Maintenance

Issue

The City has set a goal of attracting more people to bicycling and reducing car trips. Adequate street and facility maintenance are an important facet of this goal. The physical condition of riding surfaces is a key safety factor and a determinant in the decision to ride a bicycle for commuting and recreation.

Since the bicycle is by definition a two wheel vehicle with a very small road contact area, surface conditions are especially important. This fact has maintenance-related implications for both on- and off-street bikeways. On city streets, bicycles are more sensitive to surface slickness and irregularities than are cars. On off-street paths, commuter cyclists are sometimes unable to ride safely because of debris or ice.

Analysis

In spite of the sensitivity of bicycles to surface conditions, insufficient attention is given to bicycle facility maintenance. Motor vehicle travel lanes are regularly swept and patched, while the sides of streets, where bicycles tend to ride, are often bumpy and covered with sand, debris, ice, or snow. A street that is poorly maintained along its shoulders and curb lines is effectively that much narrower than its measured width, placing more demand on the remaining road.

The Parks and Recreation Department gives high priority to maintenence of off-street paths, but surface conditions are a problem in places because of staff and equipment limitations, design problems (i.e., trails located where ice tends to build up), design and maintenance conflicts, and run-off problems.

Recommendation

Improve facility design and maintenance practices to create a better cycling experience and meet the goal of shifting travel from motor vehicles to bicycles. To achieve this, a comprehensive on-street and off-street maintenance plan is needed. This should be based on five major policies.

- —Clear responsiblity is assigned for each bicycle facility prior to its construction or official designation.
- —Any public or private improvements adjacent to or effecting existing and planned bicycle facilities are designed and constructed so they do not compromise the use of those facilities.
- —Facilities accommodating bicycles are designed where possible to minimize maintenance needs and reduce hazards associated with maintenance limitations.
- —City agencies give roughly equal priority for bicycle and motor vehicle facility maintenance.
- —Over the next few years maintenence capabilities are expanded to obtain a higher general level of street conditions, especially on street surfaces used by bicycles.

This Bicycle Master Plan includes strategies for achieving adequate maintenance of bicycle facilities. Refer to the Appendix for specific on- and off-street bicycle facilities recommendations.

Bicycle Parking

Issue

Many potential bicyclists are hesitant to ride for utilitarian trips because they fear their bicycles will get stolen. There is a widespread perception that any bicycle rack or hardware is useless in deterring theft. The real and perceived fear of bicycle theft is a major impediment to greater bicycle ridership and nationally.

Analysis

Bicycle theft is a problem, but most of the bicycles that are stolen are improperly locked or not locked at all. For many people, the fear of leaving a bicycle unattended is based on a deficiency of sturdy parking fixtures and a lack of awareness of the most secure method of locking their bicycles. Theft is preventable if bicycles are locked properly. Bicycle racks should allow riders to easily and conveniently secure their bicycles. Bicyclists should be educated in the proper types and use of locks.

Recommendation

- Place an adequate number of bicycle parking racks and/or lockers as needed at the appropriate destinations, such as schools and universities, public gathering places, transit stations, bus stops, and shopping centers. The recommended style of bicycle rack is the inverted "U" Bike Rib bicycle rack or the equivalent.

- Encourage employers and property owners to either provide secure parking near building entrances and protected from rain, or allow secure storage inside buildings.

- Encourage merchants to provide secure, practical bicycle parking for customers.

Bicycle parking near restaurants and shopping

New Routes and Signage Improvements

Issue

While the combination of existing on-street and off-street routes in Denver currently serves most areas of the City, the system is incomplete in several places. The off-street trail system is well-used and easily understood, but many Denverites are unaware of the existence of an on-street bicycle system.

Among the problems with the current bicycle signage it that the signage is insufficient, and the relationship among routes is unclear. Among the problems with the current bicycle route signage is that signs are not frequent enough, they blend in with surroundings, they don't indicate nearby destinations, and the placement of signs is not consistent. In some places, the signed route ends, giving no clear indication where to find the nearest connecting route.

Analysis

A major goal of the Denver Bicycle Master Plan is to provide a comprehensive bicycling network with access to all parts of the City. Completion of the one-mile grid system of bicycle routes will result in the addition of over 100 miles of new routes. A one-mile grid makes it possible for a person anywhere in the City to be no more than one-half mile from a designated route. The designation of on-street bicycle routes can provide a focus for the implementation of improvements to make the City's streets safer for bicycling. The design standards mentioned earlier should serve as the guidelines for improvements to the bicycle routes.

A policy to improve bicycle route signage and directional signage will show the connections between the routes. Comprehensive and frequent bicycle signage can also promote bicycling by making the extensive bicycle route system more easily discernible and generally known.

Bicyclists prefer to ride on streets with few stop signs and signals in an effort to maintain momentum. The placement of stop signs on bicycle routes should be evaluated to maintain a balance between encouraging bicycle traffic while not encouraging more automobile traffic on these streets.

Existing bicycle lanes on 16th Avenue.

Recommendations

- Upgrade and replace bicycle signage citywide to provide a comprehensive, understandable system. (See pages 59-61.)

Northwest Area

- *Tennyson Street:* Designate and sign from W. 52nd Avenue under I-70 to W. 46th Avenue. Provide directional signage on Tennyson Street to the new bicycle path at Willis Case Golf Course. (See Project #2.)

- *Zuni Street:* Designate and sign Zuni Street from W. 52nd Avenue under I-70 to W. 46th Avenue.

- *W. 43rd, 44th, and 45th Avenues:* After the railroad bridge is modified, complete the signed connection along W. 43rd Avenue from Navajo Street to Fox Street, along Fox Street to 44th Avenue, across I-25 to 45th Avenue to the Platte River Greenway. (See Projects #3 and 4.)

- *W. 35th Avenue:* Consolidate the former one-way routes on 33rd and 35th Avenues into a single two-way route on 35th Avenue from Perry Street to Navajo Street. Remove bicycle route designation and signs on 33rd Avenue. Add new designation and signage on W. 35th Avenue between Sheridan Boulevard and Perry Street. Evaluate the placement of stop signs between Quivas Street and Lipan Street so that bicyclists do not have to stop at every cross street.

- *W. 36th Avenue:* Designate and sign as a bicycle route from Navajo Street to the Inca Street underpass at I-25. Install directional signage to the Platte River Greenway from Navajo Street, through the I-25 underpass, and across Rockmont Park. Ensure proper maintenance of underpass lighting.

- *Pecos Street:* Designate from 35th Avenue to 32nd Avenue. Show connection to routes on W. 35th Avenue and Navajo Street. Post signs on the off-street connection through the new neighborhood park to the 20th Street viaduct.

- *Tejon Street:* Designate and sign between 35th Avenue and 16th Street as an on-street route.

- *Vallejo Street:* Remove existing bicycle route designation between 35th Avenue and 30th Avenue.

- *30th Avenue:* Remove existing bicycle route designation between Vallejo Street and 16th Street.

- *Navajo Street:* Remove existing bicycle route designation between 35th Avenue and 32nd Avenue.

- *W. 26th Avenue:* Designate from Sheridan Boulevard to Perry Street.

- *Yates Street:* Designate from W. 26th Avenue to Byron Place.

- *W. Byron Place:* Designate and sign from Yates Street to W. 23rd Avenue at Stuart Street as an on-street alternative around the north side of Sloan Lake. Modify Byron Place to accommodate two-way traffic.

- *Wolff Street:* Designate as a bicycle route and install signage to connect Sloan Lake with the Lakewood Gulch trail.

- *North High School Connection:* Designate and sign Clay Street and Dunkeld Place from W. 32nd Avenue to the bicycle path connection on the east side of North High School. Designate the wide sidewalk on the north side of W. 29th Avenue between Eliot and Bryant Streets as a bicycle sidepath. Post warning signs for motorists and bicyclists at Speer Boulevard crossing. Provide on-street bicycle lanes on W. 29th Avenue between Bryant Street and 15th Street

- *W. 26th Avenue — Stoneman's Row Connection:* Designate W. 26th Avenue between Eliot Street and Zuni Street as an on-street route, then Zuni Street from 26th Avenue across Speer Boulevard at the signal. Continue directional signs along a new route on West 27th Avenue to Vallejo Street to W. 28th Avenue (past the "Stoneman's Row" houses) to Umatilla Street to Central Street. Connect to 15th Street via Central Street for access to Confluence Park. This project provides an alternative to the Speer/I-25 interchange, which has no sidewalk. Post signs at both ends of Speer Boulevard directing bicyclists to safe bicycle routes.

- *Central Street:* Designate and sign from the Umatilla Street to the 20th Street Viaduct.

- *Boulder Street:* Designate and sign between 29th Avenue/15th Street and 16th Street.

- *Eliot Street:* Designate and sign between 23rd Avenue and 17th Avenue. Provide a signed, striped route through Mile High Stadium parking lots to 17th Avenue.

- *W. 17th Avenue:* Install signage, bicycle lanes, and pavement markings as needed to define and enhance this corridor from the southwest corner of Sloan Lake Park to the Platte River Greenway.

- *Decatur Street:* Designate from W. 13th Avenue to Weir Gulch.

- *Weir Gulch:* Place bicycle signage on Weir Gulch between Decatur Street and the Platte River Greenway.

- *W. 10th Avenue:* Designate as a bicycle route from Sheridan Boulevard to Decatur Street. Via Decatur Street, tie into Platte River Greenway at W. 13th Avenue and at Weir Gulch with directional signs.

- *Perry Street:* Provide additional signage along Perry Street from Lakewood Gulch to Bayaud Avenue, and at intersecting routes such as W. 1st Avenue.

Northeast Area

- *Lincoln Street:* Post bicycle route signs on Lincoln Street from 47th Avenue, under I-70, to 45th Avenue, providing a link from north Globeville to the rest of the system.

- *46th Avenue:* If the State and City provide improvements on 46th Avenue, designate 46th Avenue as a bicycle route from the west side of the Platte River bridge to Humboldt Street. The sidepath through the 46th Avenue underpass should be signed as a bicycle dismount zone. Designation and signage should continue from 46th Avenue, on Humboldt Street, to 47th Avenue to Race Street.

- *Northeast Connection to Platte River Greenway:* Designate Race Court and Race Street as a signed bicycle route from the Platte River Greenway to E. 47th Avenue. Continue bicycle route designation on 47th Avenue to Clayton Street, on Clayton Street from 47th Avenue to 44th Avenue, and on 44th Avenue from Clayton Street to Steele Street.

- *E. 35th Avenue:* Designate and sign from Downing Street to Quebec Street. Provide directional signage to St. Charles Recreation Center along Lafayette Street. (See Project #12 for a future connection on 35th Street to Platte River Greenway.)

- *Marion Street:* Designate as bicycle route from 35th Avenue to 33rd Avenue.

- *Franklin Street:* Designate and sign Franklin Street from 40th Avenue to 29th Avenue.

- *Lafayette Street:* Continue designation and signage along Lafayette Street from 25th Avenue to 16th Avenue at Park Avenue. Tie into the Franklin Street connection to Cheeseman Park.

- *High Street:* Designate and sign from 29th Avenue to 16th Avenue.

- *Race Street:* Designate and sign from 16th Avenue to Cheeseman Park at 12th Avenue.

- *Steele Street:* Designate and sign from 44th Avenue to 29th Avenue.

- *Jackson Street:* Designate and sign from Smith Road to 35th Avenue.

- *City Park and 21st Avenue Connecting Route Improvements:* Improve signage and add pavement marking through City Park to connecting routes. Remove route designation on 22nd Avenue from High Street to York Street, and the continuation into City Park to Duck Lake. Designate and sign bicycle route on 21st Avenue from High Street to York Street. Route bicycle traffic through west gate of City Park at 21st Avenue. (Also see Project #27.)

- *Montview Boulevard:* From Colorado Boulevard to Quebec Street, revise existing bicycle lane stripes to meet established engineering standards.

- *Dahlia Street:* Designate from 52nd Avenue to Montview Boulevard. (Also see Project #16.)

- *Cherry Street:* Designate and sign from Montview Boulevard to 12th Avenue.

- *Clermont Street:* Designate and sign from 12th Avenue to Bayaud Avenue. Dahlia, Cherry, and Clermont Streets form a north-south corridor parallel to Colorado Boulevard.

Central Area

- *21st Street:* Designate 21st Street from the new baseball stadium at Blake Street to 20th Avenue. At the northwest end, provide a connection to Wazee Street and the 20th Street viaduct via Blake Street. Restripe to provide a 15-foot outside lane for bicycles and cars. At the southeast end, connect to Sherman Street with a one-block long sidepath on the north side of 20th Avenue, to be used until 20th Avenue is converted to two-way traffic.

- *Curtis Street:* Establish a signed route on Curtis Street from 21st Street to Downing Street/33rd Avenue. (See Project #13) Show connections to 35th Street and E. 35th Avenue via designated routes on 33rd Avenue and Marion Street. Since Curtis Street is one-way southwest of Broadway, designate an on-street route from Curtis Street to 24th Street to Champa Street to the bicycle route on 21st Street.

- *20th Street Viaduct:* Post signage on the two-way sidepath from W. 32nd Avenue and Pecos Street to Blake Street. Provide additional warning signs for motorists and bicyclists at intersections.

- *15th Street:* Designate and sign from 29th Avenue to Wazee Street.

- *Wazee Street:* Designate a two-way on-street bicycle route with 14- to 15-foot outside lanes for cars and bicycles on Wazee Street from the new access ramp at Cherry Creek (See Project #20) to 20th Street viaduct and new baseball stadium.

- *Market Street Ramp from Cherry Creek Path:* Provide signage to direct bicyclists between the Market Street ramp and the Wazee Street bicycle route.

- *Southside access to Auraria:* Designate and sign an on-street route on Umatilla Street from W. 13th Avenue to "Old Colfax" Avenue, to Curtis Street, under the Colfax viaduct into the Auraria campus. This connection continues through the campus via an existing path on the Curtis Street alignment.

- *W. 13th Avenue:* Designate and sign from the Platte River Greenway to Mariposa Street.

- *Bannock Street/Cherokee Street:* Designate bicycle routes on Bannock (one-way south) and Cherokee Street (one-way north) from Colfax Avenue to Speer Boulevard. Remove existing route on Acoma Street from 14th Avenue to Speer Boulevard.

- *7th Avenue:* Designate and sign from the Cherry Creek Path to the existing 7th Avenue bicycle route at Williams Street.

- *Galapago Street:* Provide comprehensive bicycle route signage on this existing route between 11th Avenue and 1st Avenue.

- *E. 1st Avenue:* Designate as a bicycle route from Galapago Street to Ogden Street.

Southwest Area

- *Platte River Greenway/Alameda Avenue/Cherokee Street Connection:* Remove existing route designation along Kalamath Street (from Alameda to Bayaud), Bayaud Avenue (from Kalamath to Cherokee), and Galapago Street (from Bayaud to 1st Avenue). Replace with a safer, smoother route on the bicycle sidepath along the north side of Alameda Avenue, through the railroad underpass, to the on-street route on Cherokee Street from Alameda Avenue to 1st Avenue. Upgrade the crossings at the southbound I-25 off-ramp, Santa Fe, and Kalamath. Install stop signs, and bicycle, pedestrian, and automobile warning signs near the stop signs at I-25 exit ramp onto westbound Alameda.

- *Cherokee Street:* Provide a signed bicycle route connection from Cherokee Street and Alameda Avenue to the RTD/MAC light rail station. Install new signal at Alameda and Cherokee. (Also see Project #37.)

- *Perry Street/Stuart Street/Raleigh Street:* Complete north-south corridor with directional signage on Perry Street from 1st Avenue to Bayaud Avenue, W. Bayaud Avenue from Perry Street to Stuart Street, then on Stuart Street from Bayaud Avenue, across Morrison Road to Raleigh Street. Post bicycle route signs on Raleigh Street to Louisiana Avenue, and identify intersecting routes on Louisiana Avenue and Tennyson Street to the south.

- *W. 1st Avenue:* Provide additional signage and pavement markings from Sheridan Boulevard to Federal Boulevard. (Also see Project #30.)

- *W. Maple Avenue:* Relocate existing route from Bayaud Avenue to W. Maple Avenue between Tejon Street and Navajo Street, then south on Navajo Street to Cedar Avenue to Platte River Greenway. This would require paving Maple Avenue from Pecos Street to Navajo Street, and a new access ramp at the Greenway. (See Minor Improvement #33.)

- *Virginia Avenue:* Designate as a bicycle route from Irving Street to Platte River Greenway.

- *Kentucky Avenue:* Designate and sign from Sheridan Boulevard to Zuni Street, and connect through the Huston Lake park trail to Zuni Street and Virginia Avenue.

- *W. Florida Avenue:* Reconfigure the striping of W. Florida Avenue from Sheridan Boulevard to Xavier Street to include bicycle lanes, as a continuation of bicycle lanes in Lakewood and as part of the connection to Sanderson Gulch. (Also see Project #40 in "Related Projects" — Lakewood, page 52.)

- *Xavier Street:* Designate and sign from Louisiana Avenue to Sanderson Gulch.

- *Sanderson Gulch/Ruby Hill Park/Platte River Greenway Connection:* Install signs from Sanderson Gulch bicycle path along the off-street connection on Florida Avenue to Ruby Hill Park and the Greenway. Include bicycle crossing signs at intersections. Continue signage along new bicycle path around the north end of Overland Golf Course to Iowa Avenue underpass at Santa Fe Drive, and on Iowa Avenue bicycle route.

- *Delaware Street:* Designate and sign between Iliff Avenue and Yale Avenue.

- *Bear Creek to Pierce Street Connection:* Install directional signs from Bear Creek bikeway across new bridge, along the connection to Pierce Street. (See Projects #46 and 48.) Work with Lakewood to establish a signed on-street route on Pierce Street to Quincy Avenue.

- *W. Yale Avenue:* Continue signed route on W. Yale Avenue from Lamar Street to Sheridan Boulevard, with a connection into Lakewood.

- *S. Webster Street:* Designate as an on-street bicycle route from W. Yale Avenue to the connection with the Bear Creek Trail.

- *W. Dartmouth Avenue:* Remove "Bikes must use bikepath" signs along Dartmouth Avenue from Webster Street to Sheridan Boulevard. Designate and sign Dartmouth Avenue as a bicycle route from the Bear Creek Trail near Fenton Street to Lowell Boulevard.

- *Irving Street:* Designate as a bicycle route to connect Knox Court/Lowell Boulevard to Loretto Heights College.

- *W. Union Avenue:* Designate from Utica Street to Federal Boulevard. Coordinate with Englewood to extend access to Greenway.

- *S. Utica Street:* Designate as an on-street bikeway from Quincy Avenue to Union Avenue.

- *Lowell Boulevard:* Designate from Hampden Avenue to the south city limit through Fort Logan Mental Health Center, which requires minor improvements at Quincy Avenue (see Project #48) and permission from the Mental Health Center. If the connection through the Health Center is not permitted, designate an on-street bicycle route on Oxford Avenue from Lowell Boulevard to Irving Street, on Irving Street from Oxford Avenue to Quincy Avenue, and on Quincy from Irving Street to Lowell Boulevard.

- *W. Stanford Avenue:* Designate from Kipling Street to the bicycle path connection at Dudley Street. Post directional signs along the bicycle path to Quincy Avenue, and along Quincy to Wadsworth Boulevard. Tie into sidepath on Quincy. (See Project #48.)

- *Lakes Lake Area:* Designate and develop bicycle routes and paths to serve this area, including the reserved north-south right-of-way east of Dudley Street, a bicycle route on Union Avenue, and a route from Quincy Avenue to Union Avenue.

Southeast Area

- *Ogden Street:* Designate from 1st Avenue to Cedar Avenue.

- *Ellsworth Avenue:* Designate from Ogden Street to Downing Street.

- *Bayaud Avenue:* Remove bicycle route designation on Bayaud Avenue from Ogden Street to Downing Street/ Marion Street Parkway.

- *Cedar Avenue:* Designate Cedar Avenue from Ogden Street to Marion Street Parkway for access to Washington Park.

- *York Street:* Designate and sign as an on-street route from the bicycle sidepath on Alameda Avenue (from University Boulevard) to Exposition Avenue. Include complete directional signage to direct bicyclists to use this route to Washington Park, instead of using 1st Avenue or continuing south on University Boulevard.

- *Bayaud Avenue:* Designate and sign a bicycle route along Bayaud Avenue from Steele Street to Kearney Street This route requires use of an alley from Leetsdale Drive to Albion Street along the Bayaud alignment. Designate and sign Cedar Avenue from Kearney Street to Monaco Parkway. (Also see Project #51.)

- *Dahlia Street:* Designate from Bayaud Avenue to Leetsdale Drive. Coordinate with Glendale to establish north-south connection on Cherry Street to the Cherry Creek Path.

- *Ohio Avenue:* Designate and sign from RTD/MAC light rail station to new access under I-25 across Broadway to Pearl Street.

- *Virginia Avenue:* Designate from RTD/MAC light rail station near Cherokee Street to Marion Street Parkway. Install directional signs. Coordinate bicycle access through Broadway Marketplace with the development team.

- *Iowa Avenue:* Designate from Santa Fe Drive to Franklin Street. Use the existing connection on Buchtel Parkway. Install directional signage showing access to Ruby Hill Park and Washington Park.

- *Louisiana Avenue:* Remove route designation on Louisiana Avenue from Ogden Street to Franklin Street.

- *Logan Street:* As a continuation of the Pearl Street bicycle route, designate a route from Pearl Street to Logan Street on Tennessee Avenue. Continue Logan Street designation to Iowa Avenue, to connect to Sherman Street route.

- *Sherman Street:* Designate as a bicycle route from Iowa Avenue to Yale Avenue. Connect with the existing Englewood route.

- *Mississippi Avenue:* Designate and sign as an on-street route from Steele Street to Dahlia Street. Urge Glendale to designate and sign the small portion of this route in its boundaries.

- *Cherry Street:* Designate and sign as an on-street route between the Cherry Creek Path and Mississippi Avenue. Coordinate with the City of Glendale to provide an extension along Dexter Street.

- *Jersey Street:* See Minor Improvement #55: Leetsdale at George Washington High School

- *Virginia Avenue:* Designate from Jersey Street to Quebec Street.

- *Exposition Avenue:* Designate from the Cherry Creek Path access at Four Mile Historic Park to Kearney Street.

- *Iliff Avenue:* Designate and sign between the proposed new bridge over the railroad tracks and Santa Fe Drive (see Project #44) to Franklin Street.

- *Dahlia Street:* Designate and sign as bicycle route from Mississippi Avenue to Warren Avenue.

- *Warren Avenue:* Designate and sign as bicycle route from Dahlia Street to Grape Street to the High Line Canal access.

- *Iliff Avenue at Holly Street:* Improve directional signage at this intersection to show connections to High Line Canal, Warren Avenue, and Dahlia Street routes.

- *Quebec Street:* Designate and sign from Alameda Avenue to Mississippi Avenue, with a future extension through Lowry redevelopment. Install signage, bicycle lanes, and wide curb lanes as needed to improve bicycle access.

- *Dayton Street:* Designate and sign an on-street bicycle route from Alameda Avenue to the High Line Canal.

- *Mississippi Avenue:* Designate and sign from Oneida Street to Quebec Street.

- *Oneida Street:* Designate and sign from Mississippi Avenue to Florida Avenue and the Cherry Creek Path.

- *Florida Avenue:* Designate and sign a bicycle route from Florida Avenue at Monaco Parkway, across Cook Park and the bridge at Oneida Street. At Place Middle School, provide signage to show the connection to the Florida Avenue path north of Place Middle School to the High Line Canal. (See Project #57.)

- *Clarkson Street:* Designate and sign between Harvard Avenue and Yale Avenue.

- *Harvard Avenue:* Designate and sign from Sherman Street to Clarkson Street.

- *St. Paul Street:* Relocate existing bicycle route from Milwaukee Street to St. Paul Street between Warren Avenue and Vassar Avenue to create a more direct alignment.

- *Harvard Gulch Path:* Remove bicycle designation on this fragmented path between Downing Street and University Boulevard. This corridor could be improved for local pedestrian use if many of its curb ramps were reconstructed and through-access across University were terminated. The path in this area between York Street and University Boulevard should be replaced with a park facility without through-access to University. Pedestrians wanting to travel east-west through the area should be directed away from the existing path at Gaylord Street to an east-west street with a signalized crossing of University Avenue.

- *Oneida Street:* Designate and sign from Iliff Avenue to Yale Avenue as an on-street alternative to the High Line Canal in this area.

- *Quebec Street:* Designate and sign as an on-street route with striped bicycle lanes from High Line Canal to Yale Avenue.

- *Newport Street:* Designate and sign a bicycle route from the High Line Canal access at the intersection of Newport Street and Bucknell Place to Girard Avenue, then connect via Girard Avenue to Oneida Street.

- *Oneida Street:* Continue bicycle route on Oneida Way from Girard Avenue to Poplar Street. From Poplar Street connect to Oneida Street, to Princeton Avenue (both east and west), then to Eastmoor Drive to Quebec Street.

- *Quincy Avenue:* Continue bicycle route designation from Olive Street to Eastmoor Drive.

On-street route in a Denver neighborhood

- *Quebec Street/S. Ulster Parkway:* Designate and sign bicycle route on Quebec Street from Quincy Avenue, under I-225, then on S. Ulster Parkway into the Denver Tech Center to Belleview Avenue.

- *Union Avenue:* Install a signed bicycle route connection from S. Ulster Parkway to Yosemite Street.

- *Tamarac Street at Hampden Avenue:* Improve signage and bicycle lane striping on Tamarac Street through this intersection. Create a signed bypass route of the Tamarac/Hampden intersection using the Poplar Street signalized intersection at Hampden Avenue. Route cyclists along Spruce Street and Rosemary Way/Quince Street to Kenyon Avenue from the south, and along Dartmouth Avenue, Cornell Avenue, Pontiac Street, Girard Avenue, and Hamilton Place from the north to provide an on-street connection from Rosamond Park to Bible Park. Provide for bicyclists actuation of the Tamarac/Hampden and Poplar/Hampden traffic signals. Ensure adaquate traffic signal timing for bicycles and pedestrians across Hampden Avenue. Opportunities for grade-separated bicycle crossings of Hampden Avenue should be pursued in the future.

- *Dayton Street:* If Greenwood Village constructs bicycle path connection to Cherry Creek Reservoir, post an on-street route from Eastman Avenue across Hampden Avenue. (See Project #74.) Ensure adaquate traffic signal timing across Hampden.

- *Yale Avenue:* Designate and sign as an on-street route between the proposed "Cherry Creek/Yale Avenue Connection" and Havana Street to facilitate the use of Yale Avenue as a route to and from Aurora.

Stapleton, Lowry, Montbello and Eastern areas

- *Syracuse Street:* Designate, sign, and stripe between the Stapleton and Lowry redevelopments. Provide route signage, bike lanes, and pavement markings.

- *Yosemite Street:* Designate as a bicycle route from Montview Boulevard to 11th Avenue between the Stapleton and Lowry redevelopments. Install bike route signage and pavement markings as needed. As traffic increases on Yosemite Street, maintain adequate width and priority for bicyclists. Coordinate with Aurora on the possibility of additional access to Stapleton via 19th Avenue and the Westerly Gulch/Chester Street park.

- *Smith Road:* Designate and sign from Jackson Street, under Colorado Boulevard to Quebec Street. This route will be extended to the new Sand Creek Bikeway under Stapleton runways to Havana Street. (See Project #70.)

- *56th Avenue:* Designate and sign as a bicycle route from Quebec Street to Peoria Street, as part of the construction and reconstruction of 56th Avenue.

- *47th Avenue:* Enhance Montbello access from Havana Street to Albrook Drive with signage and pavement markings along 47th Avenue. (See Project #72.)

- *Montbello Routes:* Establish a network of on-street routes along Albrook Drive, Andrews Drive, 49th Avenue, Crown Boulevard, Uvalda Street, Nome Street, Bolling Drive, Maxwell Place, and Tulsa Court. When 51st Avenue is extended, provide a bicycle route to connect with 48th Avenue at Chambers Road. Identify a connection through Montbello High School grounds to directly link 50th Avenue to Bolling Drive.

PROPOSED CAPITAL IMPROVEMENTS: PROJECT NUMBERS

SPECIAL THANKS TO U.S. WEST DIRECT
FOR PROVIDING THE BASE MAP FOR THIS PROJECT.

DENVER PUBLIC WORKS DEPARTMENT
WELLINGTON E. WEBB, MAYOR
JAMES MACKAY, P.E., PROJECT MANAGER

City and County of
Denver, Colorado

DENVER BICYCLE MASTER PLAN

NORTH

SCALE MILES

KEY TO SYMBOLS FEET

PROPOSED IMPROVEMENTS

- SPOT IMPROVEMENT (Bridge, Intersection, etc.)
- NEW PRIMARY OFF-STREET BIKEWAYS
- NEW SECONDARY OFF-STREET BIKEWAYS (Sidewalk & Connector Paths)
- NEW OR RECONFIGURED SIGNED ON-STREET BICYCLE ROUTES
- ALTERNATE/FUTURE ROUTE
- OBSOLETE ROUTES (to be removed)
- MAC LIGHT RAIL STATION
- TRAIL RECONSTRUCTION

CONSULTANT: DESIGN VENTURES, INC.

WITH STATISTICAL CONSULTING SERVICES
PHILLIP E. FLORES ASSOCIATES INC.
WATT COMMUNICATIONS
BASE MAP PRODUCED BY MDS CARTOGRAPHY JANUARY 1993.

Capital Improvement Projects

Issue

Denver's comprehensive system of on- and off-street bicycle facilities provides good access to most areas of Denver. In certain locations, a lack of facilities makes getting from one place to another difficult. These gaps in the system leave bicyclists without a convenient way to get across a highway, railroad tracks, or other barriers. Minor problems include poor connections between bicycle routes, intersections where bicycle access is difficult, and the substandard condition of some facilities, like the absence of curb cuts or lack of adequate road width for bicycles.

The opportunities for new off-street bicycle paths are limited in Denver because of the scarcity of undeveloped land. The off-street bicycle system in Denver is heavily used for both recreational and utilitarian bicycling. Some of the trails were created several years ago when the demands on them were less than they are today. Some of these trails are narrow and of poor quality paving materials.

Analysis

A safe network of routes and paths suitable for novice and family riders is a goal of the Master Plan. Some people are not comfortable riding on streets with automobile traffic. Designated bicycle routes can introduce novice riders to riding on streets where traffic moves at slower speeds at lower volumes. Bicycle routes should encourage more bicycling by providing a safe network for new and inexperienced bicyclists, allowing access to all parts of the City by bicycle. As cyclists gain experience, they may feel more secure venturing from the designated routes.

All improvement projects are subject to review prior to implementation. This includes public review to ensure that the project is consistent with neighborhood goals. As projects near construction, adjustments may be made as necessary.

For pedestrian and bicyclist safety reasons, this Plan does not recommend the use of sidewalks for adult bicycle riding. Opportunities to cost-effectively replace sidepaths and sidewalk bikeways should be pursued. Some existing bicycle facilities, however, use sidewalks as two-way bicycle sidepaths. Previously designed improvements such as the 20th Street Viaduct also will have these provisions. Some of these sidepath designs are retained as Master Plan bicycle facilities as a necessity for practical, physical, and cost reasons. The Master Plan also proposes some sidepaths in unique situations where they will improve rather than decrease safety. However this class of design is not preferred for future projects.

Recommendations

Major Capital Improvements
These projects are capital improvements that require investments of more than $100,000.

- *Clear Creek Trail to Northwest Neighborhood Connection: (#2)* Install a 10-foot wide concrete bicycle path from Sheridan Boulevard to Tennyson Street along the south side of Willis Case Golf Course. Include comprehensive directional signage. (See also Minor Capital Improvement Project #1.)

- *Railroad Overpass Modifications at W. 43rd Avenue — Inca Street to Fox Street: (#3)* Work with the railroad companies to modify the existing pedestrian overpass for bicycle and handicapped access between the northwest neighborhoods and the Platte River Greenway. Construct ramps at both ends. Install signage on 43rd, 44th, and 45th Avenues.

- *Platte River Greenway Reconstruction — 50th Avenue to Franklin Street: (#5)* A plan to close this portion of Platte River Drive to motor vehicle traffic is

now being negotiated. When the street is closed, convert the on-street route to an off-street concrete path consistent with the rest of the corridor. As a low-cost alternative, instead of constructing a new concrete path, sawcut the existing asphalt street to the proper width and alignment.

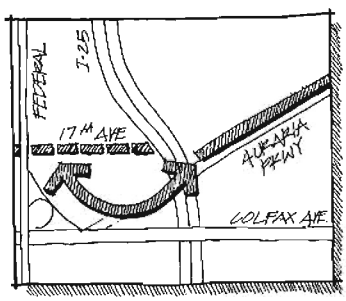
- *35th Street Connection to Northeast Neighborhoods: (#12)* Create a connection from the Platte River Greenway to the northeast neighborhoods via a new bicycle and pedestrian bridge over the railroad tracks at approximately 35th Street. Add new signage from the Greenway to 35th Street. Install an access ramp to the Greenway from 35th Street.

As an alternative to the 35th Street bridge, 38th Street could be designated as a bicycle route if major safety improvements were made to it. Improvements must include bicycle-safe reconstruction or redesign of the Downing Street/38th Street intersection, the railroad underpass, and curb cuts to properties northwest of the underpass.

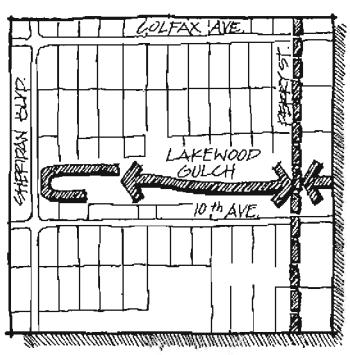
- *Cherry Creek Path Reconstruction — Confluence Park to Market Street: (#19)* Widen the existing bicycle path to 10- or 12-foot wide concrete and repair drainage problems. Consider installation of a five- to six-foot parallel soft-surface pedestrian path to reduce bicycle and pedestrian conflicts.

- *Wynkoop Street Ramp to Cherry Creek Path: (#20)* Construct access ramp on the south side of Cherry Creek to tie into the historical Wynkoop Street railroad bridge after its recommission for bicycle and pedestrian use.

- *Auraria Parkway Viaduct Connections to W. 17th Avenue: (#22)* To improve connections to the W. 17th Avenue and Eliot Street routes, construct a separated bikeway with barriers from the alley behind Federal Boulevard along the east side of the northbound Federal exit ramp to the sidepath on the Colfax viaduct. Widen the exit ramp to the west if necessary. Coordinate bus parking needs on the ramp with RTD. Use signage to direct bicyclists to the Auraria Parkway viaduct sidepath for access to Auraria instead of the Colfax viaduct, which has three dangerous intersections.



To provide an alternative to the Auraria viaduct route, install comprehensive signage and pavement markings along W. 17th Avenue, across the Platte River at the Bronco bridge, and over the mainline railroad tracks into Auraria and the new Elitch's site. Install a striped bicycle climbing lane for cyclists ascending the hill westbound on the north side of W. 17th Avenue between Federal Boulevard and Bryant Street. Repair and replace the path between W. 17th Avenue and the Platte River bridge.



- *Completion of Lakewood/Dry Gulch Reconstruction: (#23)* Replace the Lakewood Gulch asphalt trail from Knox Court to Federal Boulevard and from 10th Avenue through Martinez Park with a 10-foot wide, non-circuitous concrete path. Improve drainage and engineering. Provide connections to neighborhoods. Work with Lakewood on a Dry Gulch trail extension across Sheridan Boulevard to tie into Lakewood's routes. Install bicycle and pedestrian traffic signals and actuation buttons at the intersection of Sheridan Boulevard and the Dry Gulch .

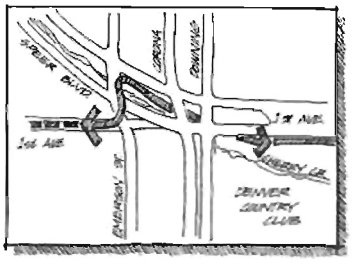
Designate an on-street route from the east end of Lakewood Gulch through Rude Park to 13th Avenue and the Platte River Greenway as an alternative to the underpass at Decatur Street, which has security and drainage problems.

- *Weir Gulch Reconstruction: (#29)* Replace the asphalt with 10-foot wide concrete. Bicycle path designation should end west of Barnum Park unless the path is extended to include a separated crossing of 6th Avenue and an extension through north Weir Gulch to the Platte River Greenway.

- *Platte River Greenway Reconstruction: (#31)* Widen the existing eight-foot wide Platte River Greenway [Colorado Greenway Trail] to 10-foot wide concrete, with an adjacent five- to six-foot wide soft-surface trail.

- *Platte River Greenway Bridge Replacement: (#32)* Replace the six wood span bridges over the Platte River along the Platte River Greenway that are reaching their structural life expectancy. Improve bridge alignment simultaneously. Coordinate cost-sharing with Urban Drainage and Flood Control, and The Platte River Valley Greenway Foundation.

- *1st Avenue/Speer Boulevard/Downing Street Improvements: (#36)* Reconfigure this intersection, including curb cuts and sidewalks, to better accommodate bicycle turning movements and create easier access to the Cherry Creek Path. Provide directional signage to intersecting routes.



Phase I: To bypass the intersections on Downing Street at Speer Boulevard and Bayaud Avenue, construct a wide sidepath along the east side of Emerson/Clarkson Street from the Cherry Creek access ramps at Speer Boulevard to 1st Avenue. This sidepath permits safe and direct two-way bicycle access between the Cherry Creek Path and the 1st Avenue bicycle route on the one-way Clarkson/Emerson Street. This allows east-west traffic to bypass the narrow sidewalk on the south side of Speer Boulevard between Downing Street and Lafayette Street. Post signs on both ends of the narrow sidewalk encouraging bicyclists to dismount. Install directional signs on Ogden Street from 1st Avenue to Cedar Avenue, then to Marion Street, for access to Washington Park. Also show access on Ellsworth Avenue from Ogden Street to Downing Street as an alternative route to Marion Street Parkway and Washington Park.

Phase II: To eliminate turning conflicts and bypass Speer Boulevard, construct a low-water crossing and ramp from the Cherry Creek path to the east side of Downing Street, south of 1st Avenue. Connect to a two-way sidepath on the east side of Downing Street to Marion Street Parkway. Retain existing bicycle lanes on Downing Street as an on-street option.

- *Sanderson Gulch Improvements: (#41)* As a long-term goal, replace the asphalt with 10-foot wide concrete, simultaneously improving trail alignment. Add curb cuts, and improve neighborhood connections where needed.

- *Platte River Greenway Reconstruction — Florida Avenue to Evans Avenue: (#43)* Replace the only remaining asphalt section of the Platte River Greenway with 10-foot wide concrete from Florida Avenue to Pasquinal's Landing Park, along the west side of Overland Golf Course. Construct a fence to screen bicyclists from golf balls.

- *Iliff Avenue/Platte River Greenway Connection: (#44)* Construct a bicycle and pedestrian bridge over the railroad tracks and Santa Fe Drive along the

Neighborhoods should be consulted to establish priorities where trail greenways are narrow and widening of the paths could significantly reduce the landscape.

Iliff Avenue alignment to bypass heavy automobile traffic on Evans Avenue and Dartmouth Avenue. A short bicycle path through the park would complete the connection to the Greenway.

- *West Harvard Gulch/Platte Greenway Connection: (#45)* (Programmed and funded) Extend the existing West Harvard Gulch bike path to the Platte River Greenway. To complement these improvements, Englewood intends to upgrade West Harvard Gulch to Zuni Street.

- *Bear Creek Trail/Pierce Street Connection to Southwest Neighborhoods: (#46)* (Programmed and funded) Construct a bicycle path along the sewer easement on the south side of Bear Creek to tie into a new bicycle and pedestrian bridge from Bear Creek Park. Connect to Pierce Street for on-street access to the southwest neighborhoods. Provide directional signage to and from the bridge along the new path and Pierce Street.

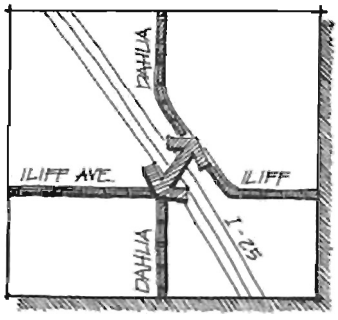
- *Bear Creek Trail: (#47)* Convert the Bear Creek Trail to a 12-foot wide concrete path, or a combination of 10-foot wide concrete and adjacent five- to six-foot wide soft-surface path. Improve trail alignment as needed.

- *Quincy Avenue Access to Southwest Neighborhoods: (#48)* Work with Lakewood to construct a two-way concrete bicycle sidepath along the north side of Quincy Avenue from Wadsworth Boulevard to Sheridan Boulevard. Improve bicycle access on Quincy Avenue from Sheridan Boulevard to Lowell Boulevard. (See "Other Projects" – Lakewood, page 53.)

Phase I: Construct a separate two-way concrete bicycle sidepath along the north side of Quincy Avenue from Wadsworth Boulevard to Pierce Street. NOTE: This is a City of Lakewood project.

Phase II: Construct a separate two-way concrete bicycle sidepath along the north side of Quincy Avenue from Pierce Street to Sheridan Boulevard. Construct a link along the west side of Wadsworth Boulevard for several hundred feet north and south of Belleview Avenue to complete off-street access to Southwest Plaza. This project will require coordination with Lakewood and the Colorado Department of Transportation.

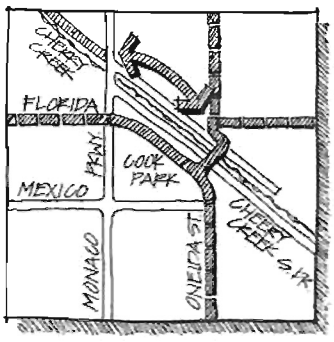
Phase III: Widen Quincy Avenue from Sheridan Boulevard to Utica Street, and install bicycle lanes or wide curb lanes. Pave the off-street gravel connection along the south side of Fort Logan Health Center between Utica Street and Lowell Boulevard as a two-way bicycle sidepath.



- *Buchtel Corridor Bikeway: (#53)* Install a bikeway along Buchtel Boulevard from Iowa Avenue to Colorado Boulevard as part of new park development. Consider an extension to Dahlia Street across the existing railroad overpass at I-25. Work with RTD since this is a planned rapid transit corridor.

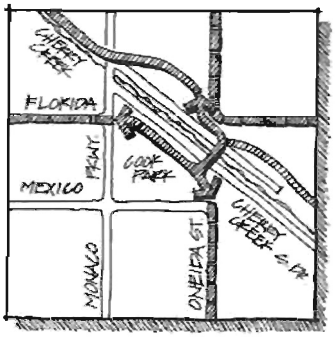
- *Dahlia Street/Iliff Avenue Overpass at I-25: (#54)* Construct an overpass across I-25 to fill a north-south gap on Dahlia Street and an east-west gap on Iliff Avenue, and to bypass the Evans Avenue bridge at I-25. As an alternative, modify the existing railroad overpass north of Evans Avenue for use as a bicycle crossing. Access to the bridge is hazardous due to I-25 exit ramps, and would require State approval of traffic signals on the ramps to be viable.

· *Cherry Creek Path Reconstruction — Holly Street to Oneida Street: (#56)* Phase I: Reconstruct the existing bicycle path from Monaco Parkway to the pedestrian bridge at Place Middle School. Install a 10-foot wide concrete path and landscaping consistent with the rest of the corridor. Modify signalization, curb cuts, and the crosswalk across Monaco Parkway at N. Cherry Creek Drive for safer, more convenient bicycle crossings.



Phase II: As curb and gutter placement continues along the Cherry Creek corridor, provide a 10-foot wide concrete path, plus a five- to six-foot soft-surface pedestrian path from Holly Street to Monaco Parkway at Garland Park.

Long-term option: When the Monaco Parkway bridge over Cherry Creek is reconstructed, investigate the possibility of creating a bicycle path underpass, including analysis of physical feasibility, cost, and security considerations. Currently, the bridge clearance is very low and placement of a bicycle path under the bridge would require expensive engineering. If the Monaco underpass is constructed, place an underpass at Holly Street and construct a continuous recreational path separated from traffic.



· *Cook Park Intersecting Routes at Florida Avenue, Oneida Street, and Cherry Creek: (#57)* Upgrade directional signage at this hub where several routes converge. Widen and replace the bike path through Cook Park from Florida Avenue at Monaco Parkway to the Cherry Creek bridge at Oneida Street with a more direct, easy-to-follow 10-foot wide concrete path. Construct a 10-foot wide concrete trail to create a strong north-south connection on the Oneida Street corridor from Florida Avenue, across the Cherry Creek bridge, through Cook Park to Mexico Avenue. Improve the Mexico Avenue/Oneida Street intersection to facilitate bicycle and pedestrian crossing. (See page 48.)

· *High Line Canal Path Upgrade: (#59)* Parallel to the existing path, develop a five- to six-foot wide soft-surface path with crusher fines, or other soft material, to more safely and comfortably accommodate slower-speed foot traffic. If analysis shows it is the most cost-effective solution, incrementally replace the existing seven- to eight-foot wide asphalt path with a 10-foot wide concrete path as funds permit. To avoid scattering gravel from the soft path onto the concrete path, the two paths should be separated where possible. Tint the concrete dark gray or earth tone to make the path less intrusive.

Because of the diversity of trail users, and because this proposal may be perceived as a substantial change to the existing facility, neighborhood consensus should be sought before construction.

· *Cherry Creek Path/Yale Avenue Connection: (#64)* Develop a bicycle path connection from Cherry Creek through Babi Yar Park to Yale Avenue to provide a good connection to Aurora.

· *Cherry Creek Path Reconstruction: (#66)* Repair and replace the Cherry Creek Path from the High Line Canal to I-225. Install a 10-foot wide concrete path, improve grades, and reconstruct the underpass at I-225.

· *Near-term Montbello Access through Stapleton Airport Redevelopment: (#68)* Create direct access through Stapleton Airport to connect Montbello routes with the Denver bicycle grid. Develop the Sand Creek corridor and adjacent trails as part of the "Emerald Strands" recreation plan. Develop connections with the Green Valley Ranch neighborhood. Install signage throughout Montbello as specified in the list of "New Routes."

Early action: Until a new street system traversing Stapleton is available, improve access to Montbello with the following projects:

—(#69) When 56th Avenue is reconstructed between Quebec Street and Peoria Street, designate and sign as an on-street route, and provide 15-foot wide curb lanes in each direction.

—(#70) Construct wide curb lanes or a separated bicycle path along Smith Road from Quebec Street to Sand Creek.

—(#71) Create an off-street trail along the Sand Creek corridor from Smith Road, under the runways, to Havana Street.

—(#72) Install wide curb lanes or a separated bicycle path along the west side of Havana Street from 47th Avenue to Smith Road.

—(#73) Construct four- to six-foot wide shoulders along Havana Way from Smith Road to the city limits at Moline Street.

· *Peoria Street: (#76)* Replace the existing sidepath, which is narrow and circuitous, with a 10-foot wide concrete sidepath from 56th Street to Albrook Drive. Straighten the path alignment, relocate utility boxes, and fix curb ramps.

· *Green Valley Ranch: (#79)* Pave a 10-foot wide path along the High Line Canal between 40th Avenue and Malaya Street in the developed area of Green Valley Ranch.

· *Westwood Trail: (#80)* Presently, a Master Plan is being developed to construct a trail and open space corridor from Perry Street eastward to Zuni Street along an existing Public Service Company (PSCo) easement. This portion of the corridor is funded for trail and open space landscape improvements to be constructed in 1994. Agreements with PSCo, the Southwest community Center, and Kepner Middle School will be needed.

Future improvements should include providing on-street linkages to Weir Gulch Trail, Huston Lake Park, Sanderson Gulch Trail, Platte River Greenway, the Southwest Community Center, and Kepner Middle School. Care should be exercised in providing street crossings at Kentucky, Lowell, Irving, and West Mississippi. To uphold user safety, coordination will be needed to provide signalized street crossings at Morrison Road and Federal Boulevard.

· *Traffic Signal Actuation:* Initiate a citywide bicycle traffic signal actuation plan targeting problem intersections. Adopt a policy for new construction to include appropriate signal actuation features at intersections where bicyclists may be unduly delayed.

· *Storm Sewer Grates:* Complete the citywide program to replace unsafe street drainage with bicycle-safe drainage grates on bicycle routes. Use vaned grates where possible.

· *Handrails:* Provide specific annual funding for railing installations along off-street trails. The needs are numerous.

Minor Capital Improvements
These projects are capital improvements that require investments of less than $100,000.

- *Trail Fixtures:* Provide annual funding for installation of trail-related amenities along Greenway corridors. This includes portable toilet enclosures, phones, drinking water, etc.

- *Trees:* A citywide tree planting program should be considered to help reinforce the visibility and enjoyment of bicycle corridors.

- *Inspiration Point Park Connection: (#1)* Construct a wide sidewalk on the east side of Sheridan Boulevard from W. 49th Avenue and Inspiration Point Park to the proposed bicycle path on the south side of Willis Case Golf Course. If feasible, add an on-demand traffic signal at W. 49th Avenue and Sheridan Boulevard. If this is not feasible, exclude this sidewalk and signal project and replace with a redesigned bicycle and pedestrian crossing of Sheridan at the existing westbound I-70 to northbound Sheridan ramp intersection. This should include a refuge island, crosswalk, adequate signal time, and a stop or yield sign for ramp traffic.

- *W. 44th Avenue bridge: (#4)* Widen and replace the shoulder approaches to W. 44th Avenue bridge over I-25.

- *E. 46th Avenue Improvements: (#6)* If CDOT constructs a 10-foot sidepath along the north side of 46th Avenue and a new ramp to the Platte River Greenway, provide additional improvements to permit the safe designation of 46th Avenue as a bicycle route. These improvements include widening the sidewalks on the bridge over the Platte River for safe bicycle passage (possibly by decreasing the traffic lanes across from three to two), narrowing the channelization of National Western Drive at 46th Avenue for safe bicycle and pedestrian crossing, and signing the sidepath along the 46th Avenue railroad underpass as a bicycle dismount zone.

- *47th Avenue and York Street Railroad Crossing Improvement: (#7)* Install a two-way concrete bicycle sidepath on the south side of 47th Avenue from Gaylord Street to York Street. The sidepath will include a southward extension of the existing railroad crossing to provide a more direct, safer route for bicycles across York Street and the railroad tracks along 47th Avenue. Provide a 90-degree bicycle crossing of the railroad tracks. Determine if an on-demand signalized crossing of York Street at 47th Avenue is warranted. Include a comprehensive signage system.

- *Curtis Street/Downing Street/33rd Avenue: (#13)* Modify the intersection to facilitate safe bicycle access between Curtis Street and 33rd Avenue and to avoid the heavy traffic on Downing Street. Modifications include a wide sidewalk on the west side of Downing Street between Curtis Street and 33rd Avenue, curb cuts, crosswalks, and directional signage.

- *31st Street/Downing Street/29th Avenue Connection at RTD-MAC Light Rail Station: (#14)* Designate 31st Street as a bicycle route from Curtis Park to Downing Street. Construct a one-block bicycle path connection through Curtis Park to complete the connection from Curtis Street to 29th Avenue. Adjust the traffic signal for safe bicycle crossing from 31st Street across Downing Street to 29th Avenue. Consult with RTD about accommodation of bicycle facilities, including bicycle parking. Construct an off-street bicycle

path to provide a direct connection along the south side of the new RTD-MAC light rail station.

- *E. 35th Avenue Improvements: (#15)* Modify street intersection gutters and their approaches to eliminate sharp pavement dips. Improve bicycle route signage from York Street to Quebec Street. Determine if a bicycle and pedestrian activated signal is warranted at 35th Avenue and York Street, where currently there is no signal.

- *Dahlia Street Connection: (#16)* Construct a bicycle path connection on the Dahlia Street alignment between 39th and 38th Avenues to eliminate the on-street diversion to Eudora Street.

- *Sloan Lake Loop and Intersecting Routes: (#17)* Upgrade the park loop trail to 10- or 12-foot wide asphalt, especially on the north side. Clearly define the path with signs and pavement markings. Install directional signs at intersecting routes. Rebuild or widen the existing path to connect the 20th Avenue bicycle route in Edgewater, across Sheridan, along the southwest edge of the lake, to W. 17th Avenue. Redesign the connector path that ties 23rd Avenue into the main park loop and improve the directional signage, since the current path does not make a strong connection. Install signage at the intersections of the park loop with Perry Street on the north and south sides of the lake.

- *Cleveland Place Connection: (#25)* Establish a connection along Cleveland Place from Colfax, Bannock, and 14th Streets to 16th Avenue. A wide sidewalk connection should connect Cleveland Place with Bannock Street and 14th Street at Colfax. Minimize bicycle and pedestrian conflicts with pavement markings and signage, possibly including dismount zones.

- *W. 11th Avenue Connection: (#26)* Provide direct through-access in the 11th Avenue right-of-way through the Greenlee School parking lot between Lipan and Kalamath Streets. Construct a curb cut on Lipan Street. Upgrade directional signage on this corridor which links the Platte River Greenway to the Cherry Creek Path .

- *City Park Connecting Route Improvements: (#27)* Add a discrete counter-flow bicycle lane on one-way 21st Avenue at the west side of the park, with signage and pavement markings. Modify or replace traffic control gates in the park to ensure better passage for bicycles. (Also see "Route Designations," page 31.)

- *12th Avenue and Colorado Boulevard Intersection Improvements: (#28)* Rework the off-set intersection to provide improved bicycle crossing to permit safe, legal crossing of Colorado Boulevard. Widen sidewalks, install curb cuts, and create a sidewalk refuge for cyclists waiting for signal change. This improvement may require minor right-of-way acquisition to improve path geometry on the west side of Colorado Boulevard to 12th Avenue.

- *Weir Gulch Signal at Alameda Avenue: (#29)* Evaluate the feasibility of a bicycle and pedestrian activated signal. Install if it can be shown to meet state and local warrants.

- *1st Avenue and Federal Boulevard: (#30)* To facilitate crossing Federal Boulevard at the signal at W. 1st Avenue, and to improve the connection to the bicycle route on Irvington Place, widen the curb cuts and the sidewalk on the east side of Federal Boulevard from 1st Avenue to Irvington Place. Provide additional directional signage.

- *W. Maple Avenue: (#33)* Pave the existing gravel street from Pecos Street to Navajo Street as part of the bicycle route realignment from Bayaud Avenue. Since this is also a street improvement, the cost should be split between the bicycle program and the street improvements program budget. Install a short access ramp to the Platte River Greenway at Cedar Avenue.

- *7th Avenue Access to Cherry Creek: (#34)* To provide safe two-way bicycle access along one-way Lincoln Street, replace the existing narrow sidewalk at Zeckendorf Park along the west side of Lincoln Street from 7th Avenue to Speer Boulevard with a new 10-foot wide concrete bicycle and pedestrian sidepath. Install wide perpendicular curb ramps on both ends of this path. Install bike warning signs for left-turning vehicles from Lincoln Street to northbound Speer Boulevard. Also post signs to warn bicyclists of turning conflicts. Shift and widen the curb ramp five feet to the west on the southwest corner of the northbound Speer Boulevard/Lincoln Street intersection, and align with a new crosswalk to the sidepath in Zeckendorf Park. Remove the end wall at the top of the existing Cherry Creek Path access ramp between Lincoln Street and Broadway, and extend the ramp to the corner of Speer and Lincoln, thus widening the sidewalk. During the 6th/Lincoln/Speer Reconstruction, minimize construction impact to Cherry Creek Path, and provide good surface connections to the path.

- *Sanderson Gulch Spur: (#42)* Pave a small connection on the Navajo Street alignment between Louisiana Avenue and the north spur of Sanderson Gulch. Post directional signage indicating this route to the Platte River Greenway via Louisiana Avenue.

- *Bayaud Avenue to Cherry Creek Connection: (#51)* Remove the route designation of the Alameda Avenue sidepath from Colorado Boulevard to Monaco Parkway because of dangerous curb cuts, and lack of continuity across Colorado Boulevard. As an replacement route, designate and sign Bayaud Avenue from Steele Street to Kearney Street. At the northwest corner of Steele Street and Bayaud Avenue, relocate the signal box out of the travel path of cyclists and pedestrians. Improve bicycle accommodations to the Colorado Boulevard/Bayaud Avenue signalized intersection including signage, pavement markings, reconstruction of the center island, and curb cuts. Designate and sign the one-way alley from Leetsdale Drive to Albion Street for two-way bicycle traffic. Widen the alley to the south if necessary. At Kearney Street, designate a bicycle route on Cedar Avenue to the traffic signal at Monaco Parkway. Widen the east sidewalk on Monaco Parkway from Cedar Avenue to Alameda Avenue as a safe connection to the Alameda sidepath east of Monaco Parkway .

- *Steele Street: (#52)* Widen the street or eliminate parking where needed, especially between Louisiana and Florida Avenues, to accommodate bicyclists with wide curb lanes from Mississippi Avenue to the I-25 bridge.

Citywide Minor Improvements
NOTE: A policy to routinely include these improvements in all new projects and retrofitting projects should be adopted.

- *Vale Drive Connection: (#56)* Pave the existing path from the Cherry Creek Path south of Four Mile Historic Park to Vale Drive. Develop a signed route connection to the Park Welcome Center. Provide bike racks.

- *Leetsdale Drive at George Washington High School: (#55)* Determine if a demand-activated signal for automobiles and bicycles can be installed at the Jersey Street crossing of Leetsdale Drive, based on MUTCD warrant criteria #4 or #10. If so, install a signal and signage, and designate an on-street bicycle route on Virginia Avenue to Jersey Street to Exposition Avenue to bypass (and abandon) the current off-street path behind the George Washington High School. If a signal is not warranted, retain the existing path alignment, and add a refuge island in the median of Leetsdale Drive in line with the path.

- *Mexico Avenue and Oneida Street Intersection Improvement: (#57)* (Programmed and funded) Improve the bicycle and pedestrian crossing between Cook Park and Oneida Street across Mexico Avenue. Add a crosswalk across Mexico in line with the west sidewalk of Oneida Street. Construct a new 10-foot sidewalk on the north side of Mexico Avenue between the existing park path and the new crosswalk. Add warning signage.

- *High Line Canal Ramp at Oneida Street: (#58)* Enhance north-south bicycle access along the Oneida Street-High Line Canal-Tamarac Street corridor with a 10-foot concrete ramp with appropriate grades from Oneida Street to the High Line Canal one block north of the existing ramp at Iliff Avenue which is narrow and steep. This may require right-of-way acquisition.

- *High Line Canal Bridges: (#60)* Replace existing four-foot wide High Line Canal span bridges south of Iliff Avenue with 10-foot span bridges for better bicycle and maintenance vehicle access.

- *Yosemite Street Connection to High Line Canal: (#62)* (Programmed and funded) Construct a separated off-street path from High Line Canal along Yosemite Street to the existing bicycle path south of Hampden Avenue. If the City extends the Yosemite Street path across Cherry Creek, include bicycle facilities and a grade-separated crossing of the Cherry Creek Path.

- *High Line Canal Path Bridge at Cherry Creek: (#63)* (Programmed and funded.) Replace the existing four-foot wide bridge on Cherry Creek south of the High Line Canal with a 10-foot wide span bridge for better bicycle and maintenance vehicle access.

- *Tamarac Street/DTC Boulevard Connection to the Denver Tech Center: (#67)* Install bicycle route enhancements, including bicycle lanes, pavement markings, and signage, to connect the Tamarac Street bicycle lanes from Quincy Avenue under I-225 to DTC Boulevard. Widen and upgrade the off-street path, including hazard warning at the crossing along the east sidewalk of Tamarac Street from Quincy Avenue, under I-225, to DTC Boulevard, to the George Wallace Park bicycle path at Goldsmith Gulch. Reconstruct curb cuts, especially at Tufts Avenue, to improve the flow of bicycles. Provide a signal activator.

Development and Redevelopment Projects

Issue

Currently, several major projects in the City of Denver offer opportunities to upgrade and extend the bicycle system. Some of these projects are currently in the construction phase, and the need to modify for bicycle facilities is immediate. Other projects are in the initial phases of development so that bicycle access and facilities can be adequately planned for and designed. The closure of Lowry Air Force Base and Stapleton International Airport provide opportunities for new bicycle access where it was previously not specifically accommodated.

Analysis

Working with the planners and developers while these projects are in their initial stages can facilitate the creation of strategic links in the bicycle system.

Recommendations

- *I-70 Viaduct Reconstruction at 46th Avenue:(#6)* As part of this project, the Colorado Department of Transportation should construct a 10-foot minimum width two-way bicycle sidepath on the north side of 46th Avenue from the railroad underpass to Humboldt Street. If the State provides the 10-foot wide sidepath along with a new ramp to the Platte River Greenway, the City should provide the minor improvements listed in Project #6.

- *Rockmont Park Development:(#8)* Include bicycle access to the new park, which connects the northwest neighborhoods to the Platte River Greenway, through the existing I-25 underpass at 36th Avenue, and across new 20th Street viaduct. (Also see Project #9.)

- *20th Street Viaduct Replacement Project:(#9)* The 20th Street viaduct project will provide new access to the Platte River Greenway. A 10- to 12-foot wide sidewalk on the southwest side is programmed to accommodate bicyclists and pedestrians. The bicycle route at the northwest end of the 20th Street viaduct will traverse a small park and connect to the Pecos Street route at 32nd Avenue. The southeast end will provide access to the new baseball stadium, and connect to the Wazee Street bicycle route, provided Wazee Street is converted to two-way traffic. Along 20th Street, 15- to 20-foot wide sidewalks (15 feet wide between Wazee and Blake) should continue to Market Street with extra-wide perpendicular curb cuts. Special care should be given to keep lighting standards and other street furniture outside the travel path.

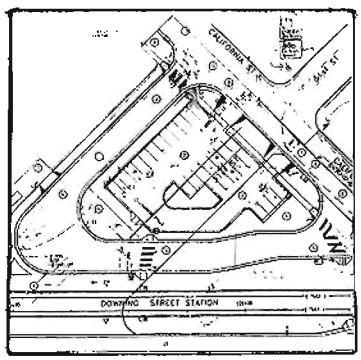
- *23rd Street Viaduct Replacement Project:(#10)* The new 23rd Street viaduct will have a bicycle and pedestrian sidewalk. This project will provide new access to the Platte River Greenway. At the northwest end of the 22nd/23rd Street viaduct, a short bicycle path connection and a new bicycle and pedestrian bridge over the Platte River will provide access to the Greenway. Cyclists should be warned of heavy traffic in the intersections with I-25, Fox Street, and the 38th Avenue underpass. At the southeast end, provide a bicycle connection on Blake Street to the baseball stadium, and a new route on 21st Street.

- *New Baseball Stadium:(#11)* Provide high-quality low-volume access on Wazee Street from a new ramp at Cherry Creek (see Project #20) to the new stadium, and along 21st Street, connecting with the Sherman Street and Curtis Street routes. An extra-wide sidewalk on the new 20th Street viaduct connects the Platte River Greenway to the baseball stadium. Provide secure bicycle parking to accommodate up to 500 bicycles.

- *Elitch's:(#18)* The Elitch's project will provide a multi-use trail along the east bank of the Platte River from 17th Avenue to Cherry Creek. The Bronco bridge may need to be widened. Work with site planners for new Elitch's to provide direct access from the Platte River Greenway, the Cherry Creek Path, and the Auraria campus. Provide secure bicycle parking to accommodate up to 300 bicycles.

- *16th Street Mall Extension:(#21)* Along the 16th Street Mall extension, provide adequate width for a bicycle route in each direction from the Wazee Street bicycle route to Elitch's over the Little Raven bridge, and Cherry Creek. Also integrate bicycle access into plans for historic 16th Street bridge over the Platte River and I-25 at new park.

- *RTD-MAC Light Rail Line:(#24)* Develop safe bicycle access to, and parking at light rail stations. Explore the possibility of accommodating bicycles on trains. Provide lockers and racks for long-term parking at intercept stations. At the transit stations, provide directional information, including bicycle route information, to major civic attractions. In the Downtown area, reduce bicycle hazards at non-perpendicular bicycle crossings of light rail tracks through use of track flangeway fillers and warning signs.



Explore the possibility of locating bicycle trails adjacent to the railroad tracks. With the current MAC alignment, RTD does not have the right-of-way to provide space for a bicycle trail. Future extensions of the MAC may provide the opportunity for bicycle trail development. How to safely cross the tracks will need to be addressed.

- *MAC Station: 31st Street and Downing Street (#14)* Provide a wide sidewalk connection directly from the signal at 29th Avenue and Downing Street along the south side of new RTD light rail station. High-quality bicycle parking should be provided at the station.

- *MAC Station: Alameda Avenue (#37)* Provide improved bicycle access to the station via Cherokee Street and Virginia Avenue. Provide a traffic signal at the Cherokee Street/Alameda Avenue intersection to make bicycle and automobile access safer to the station area.

- *MAC Station: Burkhardt Steel (#39)* Incorporate bicycle access with a direct bicycle connection on Ohio Avenue to the station. If feasible, provide a bicycle path adjacent to and along the east side of the railroad tracks running from the top of the Mississippi Avenue underpass to the MAC station.

- *6th/Lincoln/Speer Reconstruction:(#35)* Provide surface connections to the existing Cherry Creek Path, and add a low water crossing over Cherry Creek. Minimize construction impact to the bicycle path. (See also #34.)

- *Broadway Marketplace:(#38)* Coordinate with the development team to ensure bicycle access at this major new shopping center, including striped bicycle lanes, and secure bicycle parking. Provide bicycle access to the MAC station, Bannock Street, Virginia Avenue, and the bicycle and pedestrian underpass along Alameda Avenue.

- *Montbello Access/Stapleton Airport Redevelopment Connections:(#68)* Create direct access through the Stapleton Airport redevelopment to connect routes in Montbello to the Denver bicycle grid. Included is a path along Westerly Creek (Montview to Sand Creek) extending north along the railroad ROW to 47th & 56th Avenues. Develop the Sand Creek corridor and adjacent trails as part of the "Emerald Strands" recreation plan. Develop connections with the Green Valley Ranch neighborhood.

- *Lowry Redevelopment Connections:(#75)* Develop and sign a new east-west bicycle route across Lowry Air Force Base into Aurora. Connect with bicycle routes on existing streets where possible. Designate a new north-south corridor to link the Stapleton redevelopment (from Westerly Creek) through Lowry to the Alameda Avenue and High Line Canal path.

- *Private Development Project — Montbello:(#77)* As land is developed along the 40th Avenue corridor east of Peoria Street, private interests should provide a bicycle path along 40th Avenue.

- *New Denver Airport/Gateway Redevelopment Connections:(#78)* The major east-west access across Peña Boulevard and into the Gateway Development will be from 48th and 56th Avenues. As part of these projects, to be paid for by the City of Denver, provide bicycle facilities on both streets. Construction of 56th and 48th Avenues across Peña Boulevard should accommodate bicycles with wide on-street curb lanes, as well as separated off-street facilities. 48th Avenue will connect to Green Valley, which has been isolated. A strong connection to Aurora needs to be developed along Chambers Road to 38th Avenue, to Sable Boulevard. Ensure the E-470 project includes a safe grade-separated crossing for this bicycle access. (See "Related Projects" – page 50.)

The traditional urban street grid for Gateway should complement a network of on-street neighborhood bicycle routes. A north-south collector street on each side of Tower Road should provide on-street bicycle accommodations. A recreation-oriented bicycle path is planned along the west side of Peña Boulevard, crossing under Peña Boulevard at Second Creek, and connecting to the 70th Avenue corridor into the new airport. To avoid conflicts, the Plan recommends that the Air Train be located in the median of Peña Boulevard, instead of north and west of it. First Creek and Second Creek run diagonally through the Gateway per the "Emerald Strands" Plan recreational corridors.

Many visitors and tourists who are recreational cyclists arrive and depart at the airport and will need special accommodations to access the regional highway and bikeway network. Despite the remoteness of the airport, commuter bicycling should be considered a viable option for employees who live in Montbello or Gateway, and work at the airport or at airport-related facilities along Cargo Road.

To Be Implemented by Entities Other than The City of Denver

Related Projects

Issue

The City of Denver is the center of a large metropolitan area. Connections between bicycle routes in Denver and adjacent areas are lacking in some places.

Analysis

The creation of a metropolitan bicycle network requires cooperation between the municipalities that share boundaries. Related projects in adjacent cities should be developed with cooperation between the two municipalities involved.

Recommendations

Region and State

- *Denver/Boulder Connection:* Support and participate in planning the Denver-to-Boulder bicycle connection to be facilitated by DRCOG and possibly CDOT.

- *E-470 Project:* Include a safe, grade-separated crossing for bicycle access to the Denver International Airport.

Adams County

- *Tennyson Street:* Work with Adams County to establish a connection to the Clear Creek Path and Arvada. Use Tennyson Street as an alternative to the Sheridan/I-70 interchange.

Arapahoe County

- *Cherry Creek corridor:* Work with Arapahoe County to determine the best use for the last remaining gap along Cherry Creek from the current end at Wabash Street to the High Line Canal. Suggested uses include a paved trail or a soft-surface route for mountain bikes. Improvements should include directional signage.

- *E. Florida Avenue:* Encourage Arapahoe County to designate E. Florida Avenue as a bicycle route between the Denver and Aurora city limit.

Aurora

- *Montbello Access/Stapleton Airport Redevelopment Connections:(#68)* Create direct access through the Stapleton Airport redevelopment to connect Montbello routes with the Denver bicycle grid. Coordinate with the City of Aurora to develop the portions of the Sand Creek corridor and adjacent trails that lie within its jurisdiction as part of the "Emerald Strands" recreation plan. A strong connection to Aurora needs to be developed along Chambers Road to 38th Avenue, to Sable Boulevard. These improvements will connect with Denver's improvements on these corridors to provide a complete system.

- *Westerly Gulch:* Coordinate with Aurora on the possibility of additional access to Stapleton via 19th Avenue and the Westerly Gulch/Chester Street park.

- *Lowry Redevelopment connections:(#75)* Develop and sign a new east-west route into Aurora.

- *Cook Park intersecting routes at Florida Avenue, Oneida Street, and the Cherry Creek Path:(#57)* Create a strong east-west Florida Avenue connection from the path behind Place Middle School into Aurora. Encourage Aurora to designate E. Florida Avenue as a bicycle route.

- *Cherry Creek corridor:(#64)* Encourage Aurora to designate E. Yale Avenue as an on-street bicycle route to improve access to the Cherry Creek Path and the High Line Canal through Babi Yar Park.

Commerce City

- *56th Avenue — Dahlia Street:* Urge Commerce City to designate and sign 56th Avenue between Dahlia Street and Quebec Street as an on-street route. Also encourage designation of Dahlia Street from 56th Avenue to 52nd Avenue. (Also see Project #69.)

Englewood

- *W. Dartmouth Avenue Connection to the Platte River Greenway:(#50)* Work with Englewood and Urban Drainage and Flood Control to provide a bicycle path through the new Little Dry Creek greenway located along the south side of Dartmouth between Huron Street and the Platte River Greenway. Urge Englewood to designate Elati Street and Eastman Avenue as on-street bicycle routes for access between Dartmouth Avenue and the new path. Urge Englewood to remove the bicycle route designation on Dartmouth Avenue between Zuni Street and the Platte River Greenway because of heavy traffic.

- *W. Union Avenue:* Work with Englewood to extend a new bicycle route on W. Union Avenue from Federal Boulevard to the Platte Greenway.

- *W. Girard Avenue:* Urge Englewood to designate and sign W. Girard Avenue between Knox Court and Irving Street as an on-street route for access between Lowell Boulevard and Loretto Heights College.

Glendale

- *Mississippi Avenue:* Urge Glendale to designate and sign Mississippi Avenue within its city limits as an on-street bicycle route.

- *Cherry Street:* Urge Glendale to designate and sign Cherry Street from Leetsdale Drive to Mississippi Avenue as an on-street bicycle route. The connection from Cherry Street to Dahlia Street can be made using the sidewalk along the north side of Leetsdale Drive.

Greenwood Village

- *Southeast Neighborhood Connection to Cherry Creek Reservoir:(#65)* If Greenwood Village decides to construct an off-street path adjacent to the west edge of Kennedy Golf Course over I-225 to Cherry Creek Reservoir, the City of Denver should designate a bicycle route on Dayton Street.

Lakewood

- *Dry Gulch Improvements:(#23)* Work with Lakewood on a trail extension across Sheridan Boulevard to tie into Lakewood's routes. Install bicycle and pedestrian button to permit activation of existing traffic signal at Sheridan Boulevard.

- *Sanderson Gulch Connection to Lakewood: (#40)* Work with Lakewood to improve the connection between W. Florida Avenue and Sanderson Gulch, a link in the "Greenway Loop" which follows the Platte River, Bear Creek and Kipling Street bikeways, along with Florida Avenue and Sanderson Gulch. W. Florida Avenue has good bicycle facilities in Lakewood, but is a four-lane arterial in Denver with a busy intersection at Sheridan Boulevard.

- *Pierce Street Connection to the Southwest Neighborhoods:(#46)* Urge Lakewood to designate Pierce Street as an on-street route that connects with the new bikepath connection along the south side of Bear Creek. This route should include directional signage.

- *Quincy Avenue Access to Southwest Neighborhoods:(#48)* Urge the City of Lakewood to construct a separate two-way concrete bicycle sidepath along the north side of Quincy Avenue from Wadsworth Boulevard to Pierce Street to tie into the new on-street route on Pierce Street to the Bear Creek Path connection. The new path will connect to an existing bicycle path south of Quincy Avenue and west of Wadsworth Boulevard.

  Coordinate with Lakewood to provide bicycle facilities along Quincy Avenue and Wadsworth Boulevard to tie into proposed improvements within the City of Denver. Urge Lakewood to provide a safe bikeway connection between Wadsworth Boulevard and Carr Street in the vicinity of Belleview Avenue.

Loretto Heights College (Private Institution)

- *Connection between Knox Court and Dartmouth Avenue:* Work with the College to permit an on-street connection through the southeast part of the campus loop road to allow bicyclists to ride between Knox Court and Irving Street southwest of the campus to the east entrance of the College at Dartmouth Avenue.

Denver Country Club (Private Institution)

- *1st Avenue:* Work with the management and Board of Directors of the Denver Country Club for an arrangement to shift the sidepath along the north side of their property on 1st Avenue slightly southward to allow the City to add a landscaped buffer between automobile traffic and the multi-use path.

Auraria Higher Education Center

- *Bicycle Parking Racks on the Auraria Campus:* Encourage the AHEC to replace the bicycle parking fixtures currently in place on campus. Recommend the installation of inverted "U" style racks (like the Bike Rib Bike Rack or equivalent). This style of rack allows bicyclists to lock their bicycles more quickly and securely than with the existing fixtures. Ω

Enforcement

Rules of the Road

Issue

Bicyclists have a reputation for not obeying traffic laws. They are frequently seen running red lights and stop signs, going the wrong way down the street, and switching unpredicatably from the sidewalk to the street. This behavior puts the bicyclists at risk and increases conflicts with pedestrians and motorists. While most bicyclists are conscientious, the behavior of those who are not leaves the biggest impression on motorists. This behavior contributes to the antagonism between bicyclists (even those who do obey the law) and motorists.

Conversely, motorists often drive in a manner that is dangerous to bicyclists. Cyclists report that cars sometimes seem to go out of their way to intimidate them by driving too close, blowing their horns, and generally harassing them.

Analysis

According to State law, bicycles are vehicles and are expected to operate according to the rules of the road. In the survey conducted among bicyclists and non-bicyclists, enforcement of rules of the road was one of the highest priorities. This was true of enforcing rules for bicyclists as well as motorists. The survey indicated that increasing enforcement efforts and associated training would improve the bicycling experience. There was no significant difference among responses of those who frequently ride, occasionally ride, or never ride.

The Denver Police indicated that their priorities for enforcement focus on the more serious crimes against persons and properties, but indicated a willingness to work with the Bicycle Committee to improve enforcement of bicycle laws. Enforcing rules for motorists is easier than for bicyclists. The bicyclists can escape from the police officers who are generally in cars. However, enforcing all laws is part of their job and an effort should be made to focus more on violations that could lead to serious accidents.

Recommendations

- Work with the Chief of Police to increase enforcement on the following offenses:
  - running stop lights and stop signs
  - riding the wrong way down the street
  - riding at night without lights

  Enforcement should be concentrated on streets that carry higher volumes of traffic where accidents are most likely to occur. The Chief could instruct all Districts to increase enforcement after a review of the rules of the road as they apply to bicyclists, motorists near bicyclists, and the interaction between them.

- Increase police patrols of the off-street trail system, preferably with police on bicycles.

- Work with the Police Department to explore the use of Bicycle Volunteers to supplement Police efforts. Their duties could include providing "eyes on the road" to discourage illegal or dangerous behavior both on-street and on off-street paths, informing police of troublesome situations, and summoning police when necessary. They could also disperse information, give directions, and report on dangerous conditions or maintenance problems. Bicycle Volunteers should be seen as "ambassadors" for bicycling rather than monitors.

- Strengthen the volunteer bicycle registration program by increasing efforts to get bicycles registered. This could be done through bicycle shops, a media campaign, special registration weeks, and other promotional techniques. When a bicycle is registered, the owner should receive a packet of materials that covers safety and security issues, bicycle parking, secure locking techniques, and a map of the bicycle routes in Denver. This effort may need to be subsidized by a grant or other type of sponsorship.

Bicycle Messengers

Issue

Bicycle messengers provide a valuable service to Downtown businesses. They are couriers for parcels, plans, and original documents necessary for the smooth day-to-day operation of many offices. Messengers also replace the need for using vehicles for this service thus reducing air pollution and congestion.

Downtowners are heard to complain about some bicycle messengers riding on the sidewalk, frightening or actually hitting pedestrians, and disregarding rules. Although many messengers ride safely, a few are seen as dangerous to both pedestrians and motorists.

Analysis

Evaluation of the current situation for bicycle messenger services shows the following:

- There are many fewer bicycle messengers today than five years ago because of local business changes and the increased use of fax machines.
- Relations between messengers, police, and the public have improved over the last two years.
- Complaints received at the Downtown Denver Partnership have decreased over the past three years, although they still receive 7 or 8 per year.
- There is a wide range of management styles among the messenger companies ranging from no program to some regulation of employees. Most companies do not have regulations to ensure public and personal safety.
- There is only one program, in Vancouver, that regulates bicycle messengers with a licensing program. The effect of this program on bicycle messenger behavior is deemed to be negligible. However, it is a good public relations device because it gives a clear avenue for directing citizen's concerns.
- The current situation does not warrant the effort necessary to license messengers. The number of bicycle messengers has decreased, the number of complaints has decreased, and some messengers are making efforts to regulate themselves. However, there is room for improvement by reinforcing a self-regulating program. If the situation deteriorates, a license program could be initiated.

Recommendations

· Create a set of City Guidelines for bicycle messengers. Contact companies using bicycle messengers (including those who employ messengers only to deliver the company's product or service) to explain that there are new Guidelines and that they should use them in their messenger operations. Outline the reasons for complying with the guidelines as follows:

- improve bicycle safety among messengers;
- decrease dangerous (or frightening) incidents between messengers , motor traffic, and pedestrians
- decrease antagonism between messengers and police;
- possibly decrease company insurance costs;
- clarify the rules effecting bicycles in Downtown;
- establish clear operating procedures for messenger services; and
- create a positive image for messengers in Downtown.

The intent is to encourage messenger services to regulate themselves, reduce illegal bicycling activity, minimize confrontations with pedestrians and motor traffic, and increase safety.

The Guidelines should include the following:

- classes or discussions on "rules of the road" including safety, courtesy, and other standard operating procedures for Downtown messenger services. These classes should be required for all messengers;
- written and road test for all potential employees;
- recommended helmet-usage and provision of helmet if necessary;
- company identification system for all messengers;
- reprimand or employment release procedure for messengers with repeated violations or a demonstrated lack of compliance, based on employer review.

· An assessment of the current situation should be explicitly written that evaluates safety, pedestrian comfort, tickets issued, and complaints called into the messenger service businesses, the police department, and the Denver Partnership Mall Management office. This information should be supplemented by annual interviews with the police, the Partnership staff, the messenger service businesses, or other groups as determined when the program is set into place.

The resultant assessment will serve as a basis for evaluating the effectiveness of self-regulating messenger services. Should the guidelines and self-regulating techniques be ineffective as judged by the groups described above, a licensing program similar to the one in Vancouver could be instituted. This may need to be further evaluated if additional regulation is desired. This could include:

- city licensing of all messengers upon successful completion of a written and road test;
- issuance of license plates and messenger license for a fee to cover costs;
- company identification displayed on the bicycle including an individual number;
- an equitable system for revoking licenses and possibly adding points to the driver's auto license; and
- a hot line for complaints that results in letters of reprimand and, if many complaints are filed, revocation of the license. Ω

Education and Training

Training

Issue

Most bicycle experts agree that bicycle training reduces accidents, encourages greater ridership, and makes bicycling safer for bicyclists, pedestrians, and motorists. People who frequently bicycle often have differing opinions about the proper way to ride, merge with traffic, make left turns at intersections, and other aspects of bicycling. In addition, they do not consistently obey traffic laws, and thus put themselves and others in danger.

A person who knows how to ride a bicycle does not necessarily know how to ride in traffic. There is no general perception of the need for training, especially among those who ride frequently or those who do not plan to ride in traffic.

Analysis

Currently, the League of American Wheelman (LAW) has a 30-hour training course for adults called "Effective Cycling" with classroom and on-road training. The American Automobile Association (AAA) has a bicycle-training booklet that shows how to conduct a bicycle rodeo to test skills, but has little practical application. Other courses taught through bicycle clubs and schools seem to be sporadic and not comprehensive. To compound the problem, some of the information about safe riding is contradictory.

The computerized survey indicated that Denver citizens did not think that bicycle training would make commuting by bicycle easier. At the workshop, local bicycle experts indicated that they did not think formal training would attract many people, nor were they likely to take a training course if offered. Therefore, the most likely way to reach a wide audience is through an informal program that offers "bite-sized and enjoyable" bits of bicycling information.

Recommendations

- Develop consistent, comprehensive materials for three types of groups:
  —those who have an interest and would take a three- to five-hour course from institutions such as the YMCA or health clubs;
  —bicycle clubs or other groups that want to train adults with a serious interest in bicycling (10- to 20-hour course);
  —parents who could use a booklet to help them train their children. This would have the added benefit of giving correct information to adults who probably would not otherwise review training material.

- Using the materials described above, develop a program for institutions and health clubs to teach people how to make bicycling an easy commuting choice. Create and supply the necessary materials and train volunteers to

conduct these programs. Explore the financial feasibility of this and perhaps get a sponsor or charge a small fee.

- Develop a promotional program of "Riding Tips" that can be placed as signs on buses, or publicly disseminated through television factoids and newspapers. Focus on safe, efficient, and effective bicycle habits.

- Establish a "Street Wise" program similar to "Bicycle Buddies" programs in other cities to educate potential bicycle commuters. Utilize the skills and knowledge of regular bicycle commuters to train and encourage their neighbors to commute by bicycle.

Schools

Issue

Beyond their normal academic curriculum, schools provide an avenue for teaching basic life skills. Teachers regularly present information on health issues, substance abuse, and personal safety. Sometimes, bicycle safety is discussed and occasionally a training session is held if there is an interested teacher. However, a basic bicycling skills course is not a standard component of the education process.

Analysis

The schools are a natural place to teach children bicycling skills and safety. Many students ride bicycles and even those who don't could later become safer motorists because they know what to expect from bicyclists. Schools are an ideal place to implement general bicycle safety and skills courses because a large segment of the population has regular contact with the public school system.

The Denver Public Schools are keenly interested in including a bicycle program as part of their overall curriculum. They would like to include a program at each grade level that is appropriate to the students' age and study areas. For example, teachers could teach bicycle safety along with the existing pedestrian safety lesson offered in the fourth grade, bicycle written tests could be part of

Bicycling to school

computer classes offered in Middle School, and lessons on the public good achieved by using bicycles instead of cars could be included in a science section on the effects of pollution. Physical education courses can be particularly beneficial by providing an avenue for practical bicycling experience. In this way, bicycle programs are integrated into the existing curriculum thus making its introduction quite easy to accomplish.

Road training is also of interest to the Denver Public Schools. Students could go to a special training course and be given simulated on-road experience. Liability issues could be handled through parental permission slips, as it is for other school field trips.

The School District was interested in accommodating a comprehensive bicycle program, training teachers, and having specialists come to the schools to conduct classes. While funding for additional programs is currently difficult to obtain, a bicycle program could be created to fit within the existing school curriculum and budget. One impediment to introducing bicycle education in the schools is the lack of materials for bicycle courses that deliver a consistent message about safe bicycling habits.

Recommendations

- Working with curriculum specialists, teachers, and administrators from the Denver Public Schools, develop a bicycle program appropriate for each grade. Explore resources within the school and community to support this program.

- Develop materials and messages that are consistent for all twelve grades. Explore options for on-road training and a training course as part of the overall program. Look for existing materials that comply to the best standards of bicycling, such as films, computer programs, and booklets. Materials and course work should cover secure parking, locks, preparedness, and simple bicycle repair.

- Analyze the potential for funding a training course or "Safety Town" to include streets, an intersection, stop signs and lights, buildings, bicycles, and perhaps even pedal cars. When assembled, the course should simulate typical situations found when riding a bicycle on the street. If funding is available, pursue design and use of the course in accordance with the grade levels that would find it most useful.

Training at an early age

- Identify sources for volunteer bicycle specialists to work with teachers and the schools, and set up a program for including them in the curriculum. These sources could include bicycle clubs, teacher training programs, and Bicycle Advisory Committee members.

- Develop a training program and materials for teachers and volunteer specialists. The Bicycle Planner for the City of Denver should establish the elements to be taught and determine the content for bicycle courses consistent with City enforcement policy.

- Work with the schools to provide adequate and secure bicycle parking for students who ride to school. Ω

PROMOTION, ENCOURAGEMENT, AND INFORMATION

Signs and Maps

Issue

Denver's existing system of bicycle route signage consists primarily of green bicycle route signs that indicate several of the best streets for bicycling. These streets were selected as bicycle routes because of lower traffic volumes and adequate width. These bicycle route signs indicate only that a particular street has been designated as a bicycle route but do not point out important nearby destinations or provide other useful information.

The City does not have a comprehensive street sign or directory system to guide bicyclists around the City. Directional signs and street routes are generally oriented toward motorists. Because little signage is geared to bicyclists, finding the nearest or best bicycle route to a destination can be difficult.

Bicyclists, particularly novice bicyclists, are often discouraged from riding in areas that are unfamiliar. The layout of the bicycle system is not clear except on maps. The problem is further complicated by the number of times bicycle routes change streets, making bicycle navigation difficult.

Most maps are designed for motorists. The bicycle route maps that are available tend to be oriented to recreational bicycling. Many people complain that they are unfamiliar with bicycle routes and do not know where to get good bicycle system maps. Survey analysis said people in Denver are generally unaware of the existing route system and that an easy-to-read, easy-to-obtain, widely ditributed map of Denver's bicycle routes would be very helpful.

The Denver Bicycle Touring Club produces and sells a comprehensive map for the Metro-Denver region. This map has been produced since the early 1980s and updated several times. It has been popular and helpful to bicyclists throughout the Metro region. Even though the DBTC map includes Denver's routes, it is difficult to read the details necessary to successfully navigate in the dense urban parts of the City.

Analysis

A grid of north-south and east-west streets suitable for bicycling traverse the City. The Bicycle Master Plan uses this system of streets to create a network of convenient bikeways. This bikeway grid could easily be molded into a wayfinding system that provides a basis for bicycle navigation. A clearly distinguishable grid of bicycle routes would have the additional advantage of making drivers aware of the bicycle routes and the likelihood of sharing the road with bicyclists, and might encourage some motorists to ride their bikes.

Currently, none of the maps of Denver's bicycle system are easy-to-read, of a manageable size, and readily available. Distribution of a map specifically of the bicycle routes in Denver would be helpful in the goal of encouraging higher levels of commuting and utilitarian bicycling.

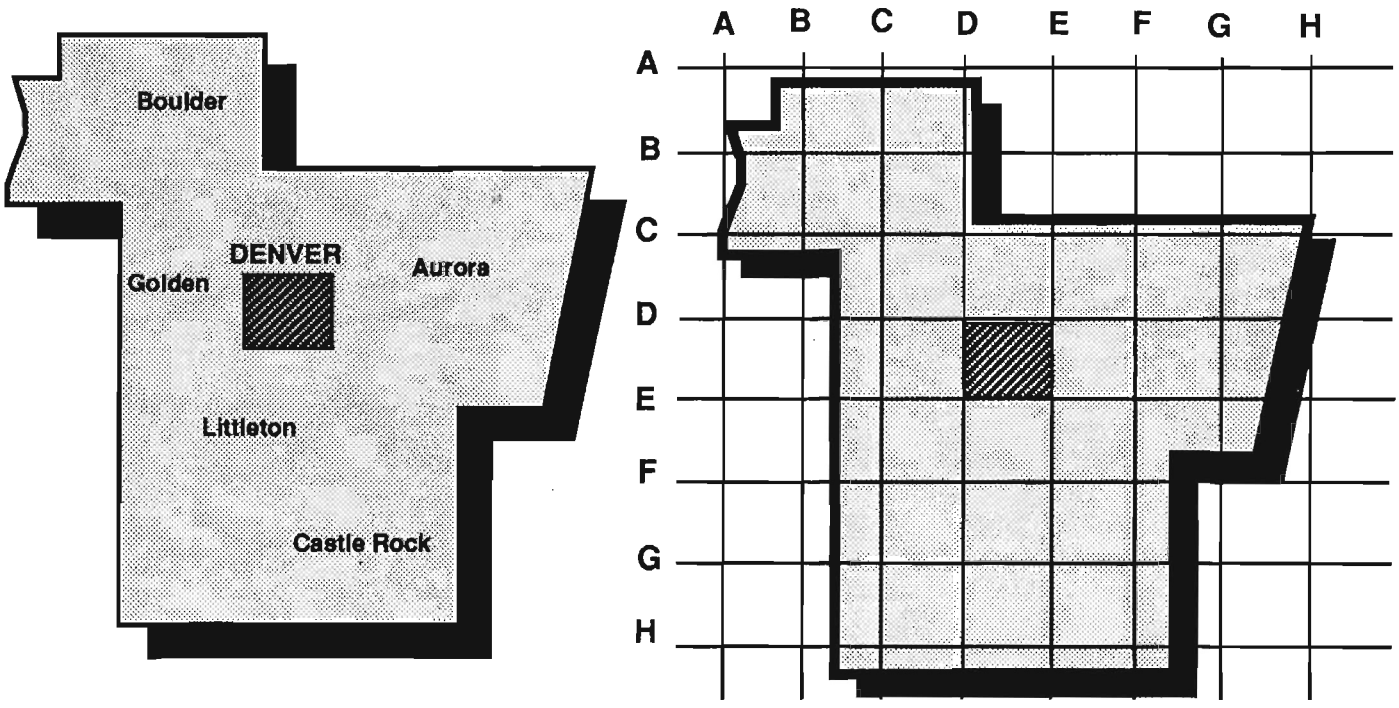
Recommendations

- Implement a comprehensive citywide signage system to clearly indicate bicycle routes and trails. Create a signage "kit of parts." Include safety precaution signs and directional signs to bicycle parking. Place directional signs at intersections indicating popular destinations. Supplement the system with outdoor directories of the City bicycle routes. This master signage project should be developed as comprehensive system based on the routes in the Master Plan. Plan the installation in phases if necessary for funding reasons.

- Implement a "bike-wayfinding" system to designate routes and assign numbers or letters to specific routes. The Plan includes a suggested numbering and route system. The bike-wayfinding system utilizes the one-mile grid of bicycle routes proposed in this document to facilitate bicycle access to all parts of the City.

The purpose of the system is to distill the complex system of City routes and simplify them into a basic system of north-south and east-west routes. To make this system easy to expand into surrounding municipalities, the numbering system is designed to be applied to routes throughout the region. If during the course of the master signage project, a better system is discovered,

Bike-wayfinding system designation for Denver and surrounding areas.



Denver Regional Transportation Planning Area

City of Denver, Section "D-D'

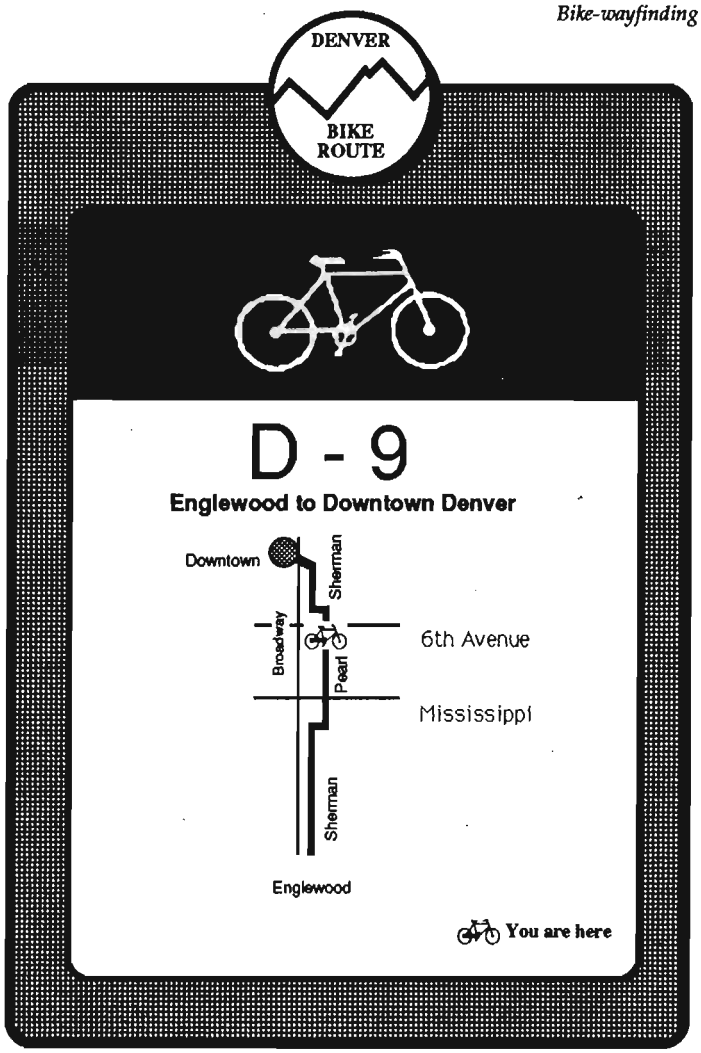
or this system needs modification to comply with Federal, State, or City requirements, those changes should be made while preserving the following characteristics:

—ability to expand into the surrounding areas
—clarity of the system as distinct from the street numbering system
—uniformity of the network reaching all parts of the City

- Place pressure-sensitive bike-wayfinding route designation stickers on street-name signs to indicate bicycle routes.

- Provide Denver residents and visitors with the "Existing Conditions" map developed for this Master Plan as a clear, easily read guide to the City's bicycle system. Periodically update the map as necessary. Ensure wide distribution of the maps at little or no cost to Denver bicyclists. (Distibution outlets for could include grocery stores, drugstores, RTD stations, City offices, bicycle shops, sporting goods stores, civic organizations, State offices, and Denver convention bureaus, among others.) Coordinate the format of this map with the Denver Bicycle Touring Club's Metro-area map so that use of both is maximized. Provide maps for promotional packages places.

Bike-wayfinding system sign



Promotional Elements

Issue

Many Denver residents use their bicycles frequently for recreation purposes, using familiar multi-use trails. But when it comes to short-distance commuting and errand trips, most Denverites choose to drive their cars without considering the option of riding a bicycle.

Many Denverites are unaware of the quality of the existing bicycle system. Potential bicycle commuters are sometimes discouraged from bicycling because of a lack of facilities near their place of work. Adequate and safe parking, lockers, and shower facilities are not commonly available, and this deters those who might otherwise commute.

Motorists and bicyclists often do not know how to share the road. Most conflicts among bicyclists and motor vehicles occur at intersections when turning vehicles cross the path of oncoming traffic. Mid-blocks conflicts occur less frequently.

Analysis

Educating employers and potential bicyclists easy commuting methods could increase the percentage of bicycle commuters. Replacing trips usually made by car with bicycle trips for commuting, errands, and other trips has both personal and civic advantages:

- —reduced air pollution and fuel consumption
- —reduced roadway congestion
- —exercise
- —cost savings

Nationally, 54% of the population lives within five miles of their work-place. Five miles is considered a comfortable distance for bicycling and yet, many people think of five miles as "too far" to ride. A five-mile bicycle commute, taken leisurely, does not have to be an athletic event requiring showers and locker-room facilities. Helping people who actually need these facilities to find them is also an important part of effective bicycle encouragement.

Bicyclists need adequate and secure parking. Some people prefer to store their bicycles indoors, protected from the weather and out of sight of potential vandals. Many buildings have basements or other unused areas suitable, with minimal retro-fitting, for bicycle parking. These spaces could provide parking, and remove parking concerns as an impediment to bicycle commuting. Publicizing to prospective bicyclists that their vehicles are less likely to be stolen if they are locked properly to a secured fixture is a simple way to increase bicycling.

Bicycle and motor vehicle conflict could be reduced through a promotional and informational campaign. Since no licensure is required for bicyclists, and safe bicycling is seldom taught in any organized way, opinions about how to mix the two modes vary. Information dissemination, education, and other methods to create a common understanding about bicycle and motor vehicle interaction could reduce conflicts and accidents.

Recommendations

- Develop a comprehensive promotional and media campaign to focus attention on bicycling as an alternative form of transportation. Work with print and broadcast media to develop a campaign that will encourage bicycling, such as television and radio bicycle traffic reports (the condition of bicycle paths and trails), and factoids (bits of information presented in a question & answer format around commercial breaks). Include information for safe bicycling.

- Promote the use of bicycling and public transit in tandem as a way of getting to and from various destinations. Transit can extend the effective range of bicycle trips, and bicycles can be effective distributors at either end of a transit trip. Encourage RTD to allow bicycles on transit vehicles to increase the range of bicycle commuting. Implement a bicycle/transit system to provide options for bicycle commuters during inclement weather.

- Increase the supply and availability of bicycle parking by encouraging employers to provide parking for employees, and business and store owners to provide parking for their customers and employees. Provide information to bicyclists about how to properly lock and secure a bicycle to the parking fixture to reduce the chance of theft. Create a signage or information system to direct bicyclists to bicycle parking.

- Enlist corporate sponsors to encourage commuter bicycling. Encouragement could consist of sponsoring bicycling programs such as Bike-to-Work Day, or providing bicycle parking and clothes lockers for employees who bicycle commute. Develop a bicycling information booklet for employers. A designated employee could serve as a transportation coordinator to facilitate the company's efforts. Companies could encourage employees to use a "company bicycle" for running errands close to the workplace. Employers could offer bonuses to employees who bicycle regularly. Examples include 15 minutes vacation time for each day the employee bicycles to work, or awards for cumulative days of bicycle commuting.

- Generate a short tag line, logo, or slogan to identify the bicycling efforts in Denver. Examples that could be used include:
  - Bike Denver – It's Wheely Fun
  - Join the Bicycle Revolution
  - Bike to Work – Personal Power
  - Bike Denver – No Sweat

- Create information specifically geared for bicyclists and other road users to encourage a common understanding of how to "Share the Road" and reduce conflicts between motor vehicles and bicycles. This can be strengthened by including this type of information in the motor vehicle licensing program and at motor vehicle registration facilities. Coordinate with education and training efforts.

Advocacy

Issue

Well-organized promotional and public relations efforts have greatly benefitted groups concerned with environmental issues, recycling, and accommodations for people with disabilities. Their methods of disseminating information and encouragement is carefully conceived to reach a wide audience, from school children to special interest groups to employers and businesses. The messages are carried by many media forms: television, newspapers, signs, brochures, and informational enclosures.

To date, efforts to promote bicycling as a legitimate form of transportation have not been able to achieve similar levels of awareness. Promotion and information on bicycling requires a plan and implementation strategy to highlight it as an important public issue. Programs to encourage people to bicycle are only effective if they respond directly to the concerns people have about bicycling and their disposition to try it.

Analysis

There is no organized entity that serves as the voice of the bicycle community in Denver. A group that works to advance bicycling in the political arena, that monitors legistation that effects bicycling, and that lobbies for improved bicycling conditions is non-existent.

The Denver Bicycle Advisory Committee has begun to fulfill this role. While the DBAC is the coordinating body, much of the actual advocacy work is done by the public who have experience on the roads and trails in the City and know the conditions.

Recommendation

- Strengthen the role of the Denver Bicycle Advisory Committee. With the Denver Bicycle Planner as a leader, the DBAC can review bicycle-related projects undertaken by the City. The DBAC should encourage more public inclusion in their process, holding quarterly or semiannual public meetings to receive public comments and direction. A DBAC newsletter could be useful to let the citizens of Denver know about issues of bicycling interest and their relation to Denver City programs and projects. Ω

Institutional Policy

Documents and Standards

Issue

Many physical improvement projects are completed each year in Denver. New buildings, parks, bus shelters, roadways, schools, and recreational facilities are designed and constructed by a variety of private companies, as well as governmental departments, agencies, and districts having jurisdiction within the City boundaries. Responsibility for public projects is assumed by the City of Denver, the Denver Public School District, the Regional Transportation District, the Denver Water Board, the State of Colorado, the Federal Government, and their various agencies.

Each set of construction documents is held to specific standards. Some of these standards are unique to the particular authority involved. Other standards, handicapped access for example, are applied to all projects by Federal regulation. Added to the inherent complication of design documents, consideration of bicycle provisions as a routine part of the procedure for producing plans and construction documents is difficult to ensure. A result is that existing bicycle facilities do not comply consistently with established standards.

Analysis

In most planning and construction efforts, bicyclists needs are not adequately considered. Bicycle facilities, parks, and roadways are often built without the simple considerations that would allow bicycle access and parking, causing bicycles to be either excluded or hindered. To accommodate bicycles after construction often requires costly retro-fitting, sometimes resulting in a clumsy design solution.

Lack of review of bicycle facilities as they are planned can result in building paths and other facilities that are inadequate, difficult to maintain, or do not age well. Designing the facilities in coordination with those who maintain them can avoid expensive maintenance or lack of maintenance problems.

Reasons for a lack of "bicycle thinking" in the planning and construction process are mostly due to the following:

- —no single set of design standards and a general lack of knowledge about bicyclists needs
- —no "check-off for bikes" as part of the list of design considerations
- —a lack of coordination among the authorities involved
- —no single source to review plans prior to construction
- —no monitoring system during construction

Generally, accommodating bicycles does not significantly add to the cost of a project. Optimizing designs to be "bicycle friendly" is easier in the early stages of planning and design, and results in a more cohesive bicycle system.

Recommendations

- Institute design standards compatible with recognized standards for bicycle facilities. Establish typical street cross-sections, including lane width.

- Integrate bicycle considerations into all new street and highway projects. Require a "check-off for bikes" as a step in the processing of all construction projects within the City limits, whether initiated by the public or private sector, to verify that projects comply with the Design Guidelines contained in the Technical Supplement. With private projects, work with the developer to accommodate bicycles in the ways suggested throughout the Master Plan. Curb cuts, parking, and access are all part of these considerations. Provide for early design review, and improve coordination among government agencies. Establish a standard of access within the public easements and encourage other amenities such as bicycle parking. Through the City Bicycle Planner, coordinate the efforts of departments that construct, maintain, or otherwise provide on- or off-street bicycle facilities. Encourage a review of all plans by the City Bicycle Planner, and members of the appropriate departments from the City staff.

- Include a maintenance review of bicycle facilities as part of the process. Coordinate with departments that maintain bicycle paths and routes in Public Works, Parks and Recreation, or any other City Department with maintenance responsibilities.

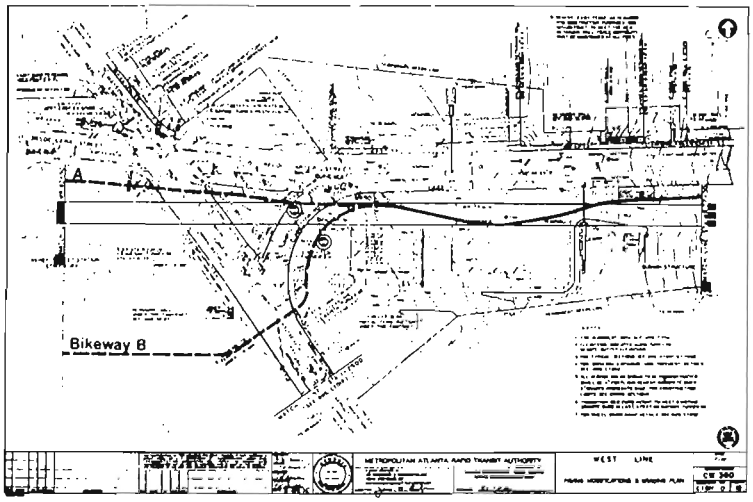
- Assign responsibility for ongoing maintenance prior to the construction of new bicycle facilities.

- Rather than maintaining a separate section on bicycle facilities, integrate bicycle standards for on-street routes into street engineering standards.

Planning

Issue

Creating and maintaining a City-wide bicycle system that is effective, safe, and convenient requires constant monitoring. In past and recent City and private projects, there has been no clear policy for including bicycle accommodations



or deciding what standards should apply. In some cases, decisions have been made with the best of intentions to enhance bicycling. However, often the actual facility has been marginal or detrimental to bicycling.

Correcting these mistakes is almost always more costly and less satisfactory than building them properly from the start. Therefore, planning for bicycle facilities, an integral element to funding and construction opportunities, is vital to the implementation of the Bicycle Master Plan. Without proper planning and predictable funding, many opportunities to use routine construction projects to cost-effectively improve the bicycle system will be lost.

Without a policy to create a budgeting process and staff to carry out the Plan, the bicycle system and its promotional, educational, and informational efforts will always be an afterthought.

Analysis

A single recognized, designated source for decision-making is necessary to avoid this recurring problem and to answer questions which we cannot now anticipate. While to some this may seem like a luxury, it is necessary to have a consistent and coordinated effort. Good bicycle facilities require a thorough knowledge of the unique requirements for bicycling. The requirements of a motor vehicle or pedestrian system are quite different from and often in conflict with the needs of a bicycling system. All three systems — motor vehicle, pedestrian, and bicycle — can work together, but will not automatically do so. If a bicycling perspective is not provided in the overall planning and engineering work of the City, well-intentioned efforts to improve bicycle facilities often lead to inadequate or dangerous solutions.

Recommendations

- Designate a permanent, full-time Bicycle Planner staff position in the Denver Public Works Department. The Planner should be given responsibility for implementing the Master Plan, including the promotional, educational, and informational portions. Other duties would include:
  - —evaluating existing and new facilities and programs;
  - —reviewing new plans, redevelopments, and other construction efforts;
  - —coordinating all bicycle projects; and
  - —securing funding from State, Federal, and private sources for bicycle facilities and promotion.

- Set a policy to ensure that the Bicycle Planner is included in all public construction and reconstruction review processes.

- When the Bicycle Master Plan is approved as an amendment to the City Comprehensive Plan, adopt a City goal of increasing bicycle commuting from its current 1% to 2% by 1996 and 3% by 2000.

- Implement an evaluation system to test the effect of specific improvements to the bicycle network on ridership levels.

- Maintain the City's Bicycle Hot-Line (640-BIKE) for bicyclists to call for route information and to report conditions of the bicycle trails and on-street paths.

BICYCLE COMMUTING

Denver Bicycle Commuters*

Workforce:	230,000
Bicycle Commuters:	2,000
Percentage:	<1%

Goals for Denver

1996:	2.0%
2000:	3.0%

*Source: 1990 U.S. Census

Funding

Although funds for infrastructure improvements are limited at this time, significant upgrades to Denver's bicycle program are possible. The emphasis of the Bicycle Advisory Committee and the Bicycle Planner should be on working with public and private interests to ensure all projects consider bicycle needs. In this way, bicycle projects can be implemented in the course of regular development and redevelopment and funds can be used more effectively. This can be accomplished by including bicycle needs in Public Works standards and through a development-review process.

The City of Denver has adopted goals in support of alternative transportation and specifically the bicycle mode. Therefore, predictable bicycle funding should be included as a regular component of the General and Capital Funds. This should include provisions for programmed physical and program improvements. The operating budget, drawn from federal, state, and local sources, should include funding for:

- —proper maintenance of existing facilities;
- —repair where unexpected damage has occurred or in areas that are deteriorated;
- —promotion, education, enforcement, and information distribution;
- —constructing new facilities to complete the system as outlined in the Master Plan;
- —the staff position of a full-time Bicycle Planner; and
- —facility maintenance and planning functions.

The new federal Intermodal Surface Transportation Efficiency Act (ISTEA) provides a major opportunity for Denver to fund strategic parts of its proposed bicycle system. Many physical improvements adopted by the City in the Bicycle Master Plan, as an amendment to the Denver Comprehensive Plan, can be submitted for ISTEA funding through the Denver Regional Council of Governments.

Significant improvements to the bicycle system in Denver are possible through a combination of policies designed to tap both public and private development opportunities. A range of traditional funding sources can be utilized to make improvements to the pedestrian and bicycle systems. They include:

Potential Funding Sources for Bicycle Projects

Federal Sources:	ISTEA funds through DRCOG and CDOT (TIP)
	Joint development with highway and transit projects
State Sources:	State Department of Transportation — Highway Department funds
	Bicycle and pedestrian improvements in conjunction with road projects
RTD:	Joint development to provide access to stations and Park & Ride facilities

Lottery Funds:	Bicycle facilities within recreation corridors and associated amentities
City Sources:	General revenues Special district funds as appropriate General transportation funds Line item Capital Improvement Projects budget requests for bikeways – Public Works and Parks & Recreation Dept. Developer contributions Annual street and highway improvements Parks and Recreation Dept. annual budget Designated bond funds
Denver Public Schools:	Administration of safety and training programs in the general curriculum
Regional Level:	Federal Transit Administration funds Transit agency development funds
Private Funds:	Corporate and individual grants Volunteer contributions Developer contributions Bicycle facilities integrated in development projects

For a further discussion of funding, please see the section titled "Use of the Plan," pages 6-7. Ω

IMPLEMENTATION STRATEGY

Priorities

The Bicycle Master Plan was designed to be implemented. All of the recommendations are achievable, both fiscally and politically, within the next 10-15 years.

The projects identified below are selected for immediate action. They are the most cost-effective projects, and will result in the greatest benefit immediately. They are the primary objectives to achieve the goals of the Master Plan set forth in the introduction to this document.

The responsibility for implementation of this Plan belongs to all the people of Denver. The Bicycle Planner will guide the implementation. The public sector will be accountable for portions of the Plan, as will private entities, bicycle groups, and interested citizens.

Facilities

- Designate the bicycle routes listed in the "New Route Designation" section. Install the correct "Bike Route" signage.
- Use existing staff and equipment to institute policies and standards for improved bicycle facility maintenance. Explore options to increase staff levels and upgrade equipment to maintain streets and trails to the level commensurate with the goals of this Plan.
- Implement the "Immediate Action" capital improvement projects listed below.
- Fine-tune the bicycle stencil street painting system by testing its performance on selected bicycle routes. Paint stencils throughout the City according to the standards in this document.

Enforcement

The priority of this category is partially addressed by education and training, specifically encouraging riding according to the rules of the road.

- Work with the Denver Police Department to enforce rules that can prevent serious accidents for both bicyclists and motorists.

Education and Training

- Work with the Bicycle Advisory Committee, the Auraria colleges of Education, Denver Public Schools, and other youth programs to establish a program of bicycle education. This could include development of a proposal for "Safety Town."

Promotion, Encouragement, and Information

- Print and distribute a full color, easily read Denver bicycle route map. Provide bicycling information applicable to all levels of bicycling ability. Determine distribution methods, sites, and cost, to ensure availability.

- Develop a promotional campaign to encourage bicycle commuting. Work with corporations on sponsorship and encouragement. Put together information packages which include Denver bicycle route maps. Implement a "Street Wise" commuting program, pairing experienced bicyclists with new commuters.
- Create a signage "kit of parts" to replace existing signage standards, which otherwise will be used on new route designations. Determine locations for signs, budget, and installation schedule.
- Create a "bike-wayfinder" system to provide clearer navigation of the City by bicycle. Install directories and signage with route maps. Provide bike-wayfinder information on the Denver bicycle route map.

Institutional Policy

- Retain the services of a full-time Bicycle Planner as a staff position in the Department of Public Works.
- Develop a task force made up of staff of City Departments that deal with bicycle issues. Work toward a system of greater cooperation and information sharing among Departments.
- Develop an evaluation system to establish baseline ridership data and then test the effect of improvements as the Plan is implemented. Ω

Priority list of Capital Improvement Projects

Major Capital Improvements

Funded/Programmed
- West Harvard Gulch/Platte Greenway Connection (#45)
- Bear Creek Trail/Pierce Street Connection to Southwest Neighborhoods (#46)
- Westwood Trail (#80)

Immediate Action
- 1st Avenue/Speer Boulevard/Downing Street Improvements — Phase I (#36)
- Auraria Parkway Viaduct Connections to W. 17th Avenue (#22)
- Completion of the Lakewood/Dry Gulch Reconstruction (#23)
- Dahlia Street/Iliff Avenue Overpass at I-25 (#54)
- Cook Park Intersecting Routes at Florida Avenue, Oneida Street, and Cherry Creek (#57)
- Cherry Creek Path Improvements — Phase I (Monaco to Oneida) (#56)
- Wynkoop Street Ramp to Cherry Creek (#20)

Incremental Trail Reconstruction
- Bear Creek Trail (#47)
- High Line Canal Path (#59)

Minor Capital Improvements

Funded/Programmed
- City Park Connecting Routes (#27)
- Improvements to E. 35th Avenue (#15)
- Mexico Avenue and Oneida Street Intersection Improvement (#57)

Immediate Action
- 1st Avenue at Federal Boulevard (#30)
- W. 11th Avenue Connection (#26)
- Cleveland Place Connection (#25)
- Curtis Street/Downing Street/33rd Avenue (#13)
- 31st Street to 29th Avenue Connection at RTD Light Rail Station (#14)
- 47th Avenue and York Street Railroad Crossing Improvement (#7)
- E. 46th Avenue Improvements (#6)
- 7th Avenue Access to Cherry Creek (#34)
- Bayaud Avenue to Cherry Creek Connection (#51)
- High Line Canal Ramp at Oneida Street (#58)

Other Major Capital Improvements (in order of priority)

- Clear Creek Trail to Northwest Neighborhood Connection (#2)
- Platte River Greenway Bridge Replacement (#32)
- Near-Term Montbello Access through Stapleton Airport Redevelopment (#68)
- Quincy Avenue Access to Southwest Neighborhoods (#48)
- Iliff Avenue/Platte River Greenway Connection (#44)
- 35th Street Connection to Northeast Neighborhoods (#12)
- Railroad Overpass Modifications at W. 43rd Avenue – Inca Street to Fox Street (#3)
- Platte River Greenway Reconstruction – Florida Avenue to Evans Avenue (#43)
- 1st Avenue/Speer Boulevard/Downing Street Improvements – Phase II (#36)
- Cherry Creek Path – Phase II (Holly to Monaco) (#56)
- Cherry Creek Path/Yale Avenue Connection (#64)
- Cherry Creek Path Reconstruction – Confluence Park to Market Street (#19)
- Cherry Creek Path Reconstruction (#66)
- Buchtel Corridor Bikeway (#53)
- Green Valley Ranch (#79)
- Platte River Greenway Reconstruction – 50th Avenue to Franklin Street (#5)
- Peoria Street (#76)
- Weir Gulch (#29)
- Sanderson Gulch Improvements (#41)
- Platte River Greenway Widening/Reconstruction (#31)

Other Minor Capital Improvements (in order of priority)

- 12th Avenue and Colorado Boulevard Intersection Improvements (#28)
- Sloan Lake Loop and Intersection Routes (#17)
- Weir Gulch at Alameda Avenue (#29)
- W. 44th Avenue Bridge (#4)
- Steele Street Improvements (#52)
- W. Maple Avenue Paving (#33)
- High Line Canal Path Bridge at Cherry Creek (#63)
- Leetsdale Drive at George Washington High School (#55)
- Inspiration Point Park Connection (#1)
- High Line Canal Bridges (#60)
- Yosemite Street Connection to High Line Canal (#62)
- Tamarac Street/DTC Boulevard Connection to the Denver Tech Center (#67)
- Dahlia Street Connection (#16)
- Sanderson Gulch Spur (#42)

PRELIMINARY COST ESTIMATES

MAJOR &MINOR CAPITAL IMPROVEMENTS

DENVER BICYCLE MASTER PLAN
March 1993

City and County of Denver
Public Works Department

Project Number: 1
Project Limits: Inspiration Point Park
Project Description: Path (10') on E side Sheridan Blvd. with actuated signal at or near 49th Ave.

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete Path	750	sy	$20	$15,000
Excavation	150	cy	$9	$1,350
Landscaping	1,200	sf	$3	$3,600
Remove curb	20	lf	$9	$180
Concrete curb	20	lf	$12	$240
Ped/bike signal	1	ls	$12,000	$12,000

Subtotal	$32,370.00
Contingencies (15%)	$4,855.50
Engineering/Mgt (20%)	$6,474.00
Total Project Cost	**$43,699.50**

Project Number: 1—Alternative
Project Limits: Inspiration Point Park
Project Description: Path (10') on N side 48th Ave to Ames St. (plus park connection at Ames)

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete Path	450	sy	$20	$9,000
Excavation	100	cy	$9	$900
Landscaping	500	sf	$3	$1,500
Remove curb	120	lf	$9	$1,080
Concrete curb	120	lf	$12	$1,440
R/W acquisition	30	sf	$25	$750
Remove conc. walk	200	sy	$12	$2,400

Subtotal	$17,070.00
Contingencies (15%)	$2,560.50
Engineeering/Mgt (20%)	$3,414.00
Total Project Cost	**$23,044.50**

Project Number: 2 (Clear Creek to Northwest Neighborhood)
Project Limits: Willis Case Golf Course, Tennyson to Sheridan
Project Description: Construct 10-foot-wide bike path

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete path	3,000	sy	$20	$60,000
Excavation	1,000	cy	$9	$9,000
Signs	10	ea	$100	$1,000
Lanscaping	5,400	sf	$3	$16,200
				$0
				$0
				$0

Subtotal	$86,200.00
Contingencies (15%)	$12,930.00
Engineering/Mgt (20%)	$17,240.00
Total Project Cost	**$116,370.00**

PRELIMINARY ESTIMATES

Project Number: 3—Alternative
Project Limits: 43rd Avenue, Inca St. to Fox St.
Project Description: Ins Install ramp structures

Item	Quantity	Unit	Unit Cost	Item Cost
Bike/ped ramp structure	600	lf	$600	$360,000

Subtotal	$360,000.00
Contingencies (15%)	$54,000.00
Engineering/Mgt (20%)	$72,000.00
Total Project Cost	**$486,000.00**

Project Number: 4
Project Limits: 44th Avenue Bridge over I-25
Project Description: Bike lane construction on approaches

Item	Quantity	Unit	Unit Cost	Item Cost
Asphalt pavement	800	sy	$13	$10,400
Excavation	300	cy	$9	$2,700
				$0
				$0

Subtotal	$13,100.00
Contingencies (15%)	$1,965.00
Engineering/Mgt (20%)	$2,620.00
Total Project Cost	**$17,685.00**

Project Number: 5
Project Limits: Platte Greenway, 50th Ave. to Franklin St.
Project Description: Path construction by sawcutting street to 12' path

Item	Quantity	Unit	Unit Cost	Item Cost
Sawcut	4,000	lf	$1	$4,000
Rem. asph. pavemt.	2,500	sy	$7	$17,500
Lanscaping	25,000	sf	$3	$75,000

Subtotal	$96,500.00
Contingencies (15%)	$14,475.00
Engineering/Mgt (20%)	$19,300.00
Total Project Cost	**$130,275.00**

PRELIMINARY ESTIMATES

Project Number: 6
Project Limits: 46th Ave.—Natl. Western Dr. to Platte Greenway
Project Description: Intersection channelization and bridge sidewalk widening (connection to Greenway by others)

Item	Quantity	Unit	Unit Cost	Item Cost
Asphalt pavement	50	sy	$13	$650
Concrete curb	150	lf	$20	$3,000
Excavation	50	cy	$9	$450
Remove striping	150	sf	$2	$300
New striping	600	lf	$1	$600
Traffic control	1	ls	$4,000	$4,000
Bridge sidewalk widening	60	sy	$50	$3,000
Concrete path	100	sy	$20	$2,000
Signs	6	ea	$75	$450

Subtotal	$14,450.00
Contingencies (15%)	$2,167.50
Engineering/Mgt (20%)	$2,890.00
Total Project Cost	**$19,507.50**

Project Number: 7
Project Limits: 47th Ave., Gaylord St. to York St.
Project Description: Construct sidepath with improved RR crossing

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete path	660	sy	$20	$13,200
Extend grade crossing	3	ea	$5,000	$15,000
Traffic signal modification	1	ls	$2,000	$2,000
Traffic control	1	ls	$2,500	$2,500
Excavation	200	cy	$12	$2,400
Signs	10	ea	$75	$750

Note: Gate protection of sidepath is not currently provided and is not included in estimate.

Subtotal	$35,850.00
Contingencies (15%)	$5,377.50
Engineering/Mgt (20%)	$7,170.00
Total Project Cost	**$48,397.50**

Project Number: 8
Project Description: Rockmont Park Redevelopment

Redevelopment Project—see Master Plan.
Programmed and funded.

PRELIMINARY ESTIMATES

Project Number: 9
Project Description: 20th St. Viaduct Replacement

Redevelopment Project—see Master Plan

Project Number:10
Project Description: 23rd St. Viaduct Peplacement

Redevelopment Project—see Master Plan

Project Number: 11
Project Description: New Baseball Stadium

Redevelopment Project—see Master Plan

PRELIMINARY ESTIMATES

Project Number: 12
Project Limits: 35th St., Blake St. to Brighton Blvd.
Project Description: Bike/ped bridge, plus ramp to Greenway

Item	Quantity	Unit	Unit Cost	Item Cost
Bike/ped overpass & ramps	900	lf	$600	$540,000
Concrete path	100	sy	$20	$2,000
Excavation	40	cy	$9	$360
				$0
				$0

Subtotal	$542,360.00
Contingencies (15%)	$81,354.00
Engineering/Mgt (20%)	$108,472.00
Total Project Cost	**$732,186.00**

Project Number: 13
Project Limits: Curtis St./Downing St./33rd Ave.
Project Description: Connector bike path 10' width

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete pavement	120	sy	$20	$2,400
Remove exist. conc. walk	60	sy	$9	$540
Remove exist. asph. pvmt.	60	sy	$7	$420
Remove curb	40	lf	$9	$360
Concrete curb	40	lf	$12	$480
Traffic control	1	ls	$1,500	$1,500
Signs	4	ea	$100	$400

Subtotal	$6,100.00
Contingencies (15%)	$915.00
Engineering/Mgt (20%)	$1,220.00
Total Project Cost	**$8,235.00**

Project Number: 14A
Project Limits: 31st St./Downing St./29th Ave. Connection
Project Description: Intersection modifications

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete pavement	100	sy	$20	$2,000
Excavation	20	cy	$9	$180
Remove exist. conc.walk	50	sy	$9	$450
Remove curb	40	lf	$9	$360
Concrete curb	40	lf	$12	$480
Traffic control	1	ls	$2,000	$2,000
Pavement markings	160	sf	$2	$320
Signs	4	ea	$120	$480

Subtotal	$6,270.00
Contingencies (15%)	$940.50
Engineering/Mgt (20%)	$1,254.00
Total Project Cost	**$8,464.50**

PRELIMINARY ESTIMATES

Project Number: 14B
Project Limits: 31st St./Downing St./29th Ave. Connection
Project Description: Curtis Park path construction

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete pavement	400	sy	$20	$8,000
Excavation	40	cy	$9	$360
Remove exist. asphalt walk	180	sy	$7	$1,260
Remove curb	40	lf	$9	$360
Concrete curb	40	lf	$12	$480
Traffic control	1	ls	$2,000	$2,000

Subtotal	$12,460.00
Contingencies (15%)	$1,869.00
Engineering/Mgt (20%)	$2,492.00
Total Project Cost	**$16,821.00**

Project Number: 15
Project Limits: 35th Avenue, Downing St. to Syracuse St.
Project Description: O Install ramp structures

Item	Quantity	Unit	Unit Cost	Item Cost
Milling/resurf @ crosspan	10	ea	$1,200	$12,000
Signs	60	ea	$100	$6,000
Manhole adjustment	5	ea	$1,500	$7,500
Inlet adjustment	3	ea	$3,000	$9,000

Subtotal	$34,500.00
Contingencies (15%)	$5,175.00
Engineering/Mgt (20%)	$6,900.00
Total Project Cost	**$46,575.00**

Project Number: 16
Project Limits: Dahlia Street connection, 38th to 39th Avenue
Project Description: Construct bike path

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete path	880	sy	$20	$17,600
Excavation	300	cy	$9	$2,700
Landscaping	3,200	sf	$3	$9,600
				$0
				$0
				$0
				$0

Subtotal	$29,900.00
Contingencies (15%)	$4,485.00
Engineering/Mgt (20%)	$5,980.00
Total Project Cost	**$40,365.00**

PRELIMINARY ESTIMATES

Project Number: 17A
Project Limits: Sloan Lake, North Side
Project Description: Replacement of path on north side, plus signing and pavement markings for adjacent bikeway sections

Item	Quantity	Unit	Unit Cost	Item Cost
Remove existing asphalt	1,200	sy	$7	$8,400
Excavation	250	cy	$9	$2,250
Landscaping	2,400	sf	$3	$7,200
New asphalt path	1,800	sy	$13	$23,400
Signs	10	ea	$120	$1,200
Pavement markings	500	sf	$2	$1,000
				$0

Subtotal	$43,450.00
Contingencies (15%)	$6,517.50
Engineering/Mgt (20%)	$8,690.00
Total Project Cost	**$58,657.50**

Project Number: 17B
Project Limits: Sloan Lake, Northeast Side
Project Description: Reconstruction of connector path to 23rd Avenue

Item	Quantity	Unit	Unit Cost	Item Cost
Remove existing concrete	200	sy	$7	$1,400
Excavation	80	cy	$9	$720
Landscaping	400	sf	$3	$1,200
Concrete path	350	sy	$20	$7,000
Signs	4	ea	$120	$480
				$0
				$0

Subtotal	$10,800.00
Contingencies (15%)	$1,620.00
Engineering/Mgt (20%)	$2,160.00
Total Project Cost	**$14,580.00**

Project Number: 17C
Project Limits: Sloan Lake, Southwest Side
Project Description: Improvements to 17th Avenue-20th Avenue connector path

Item	Quantity	Unit	Unit Cost	Item Cost
Remove existing concrete	300	sy	$7	$2,100
Excavation	120	cy	$9	$1,080
Landscaping	600	sf	$3	$1,800
Concrete path	500	sy	$20	$10,000
Signs	4	ea	$120	$480
				$0
				$0

Subtotal	$15,460.00
Contingencies (15%)	$2,319.00
Engineering/Mgt (20%)	$3,092.00
Total Project Cost	**$20,871.00**

PRELIMINARY ESTIMATES

Project Number: 18
Project Description: Elitch's Development

Redevelopment Project—see Master Plan

Project Number: 19
Project Limits: Cherry Creek—Confluence Park to Market St.
Project Description: Path replacement—10+4 feet

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete path	3,100	sy	$20	$62,000
Remove existing path	2,500	sy	$12	$30,000
Crusher fines	1,250	sy	$9	$11,250
				$0
				$0
				$0
				$0

Subtotal	$103,250.00
Contingencies (15%)	$15,487.50
Engineering/Mgt (20%)	$20,650.00
Total Project Cost	**$139,387.50**

Project Number: 20
Project Limits: Cherry Creek at Wynkoop Street
Project Description: Construction of connector ramp

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete path	160	sy	$20	$3,200
Retaining wall	240	lf	$200	$48,000
Handrail wall-mounted	120	lf	$25	$3,000
Excavation	400	cy	$9	$3,600
Removal of existing wall	1	ls	$4,000	$4,000
Fence rail	120	lf	$50	$6,000
				$0

Subtotal	$67,800.00
Contingencies (15%)	$10,170.00
Engineering/Mgt (20%)	$13,560.00
Total Project Cost	**$91,530.00**

PRELIMINARY ESTIMATES

Project Number: 21
Project Description: 16th Street Mall Extension

Redevelopment Project—see Master Plan

Project Number: 22
Project Limits: Auraria Parkway/17th Avenue
Project Description: Colfax/Federal ramp modificaions

Item	Quantity	Unit	Unit Cost	Item Cost
Asphalt pavement	350	sy	$13	$4,550
Jersey barrier or similar	500	lf	$40	$20,000
Excavation	150	cy	$9	$1,350
Remove striping	250	sf	$2	$500
New striping	1,000	lf	$1	$1,000
Traffic control	1	ls	$4,000	$4,000
Drainage modification	1	ls	$5,000	$5,000
Reloc. wood street lights	4	ea	$500	$2,000

Subtotal	$38,400.00
Contingencies (15%)	$5,760.00
Engineering/Mgt (20%)	$7,680.00
Total Project Cost	**$51,840.00**

Project Number: 23A
Project Limits: Lakewood Gulch, Federal to Knox
Project Description: Trail Repaving and Realignment

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete Path	2,200	sy	$20	$44,000
Excavation	1,000	cy	$9	$9,000
Landscaping	12,000	sf	$3	$36,000
Remove exist path	2,200	sy	$7	$15,400

Subtotal	$104,400.00
Contingencies (15%)	$15,660.00
Engineering/Mgt (20%)	$20,880.00
Total Project Cost	**$140,940.00**

PRELIMINARY ESTIMATES

Project Number: 23B
Project Limits: Dry Gulch at Sheridan Blvd.
Project Description: Signal Modification

Item	Quantity	Unit	Unit Cost	Item Cost
Signal Mod.	1	ls	$6,000.00	$6,000.00
Signage	1	ls	$500.00	$500.00

Subtotal	$6,500.00
Contingencies (15%)	$975.00
Engineering/Mgt (20%)	$1,300.00
Total Project Cost	**$8,775.00**

Project Number: 24
Project Description: RTD-MAC Light Rail Line

Redevelopment Project—see Master Plan

Project Number: 25
Project Description: Cleveland Place Connection

Programmed and Funded

PRELIMINARY ESTIMATES

Project Number: 26
Project Limits: 11th Avenue - Kalamath to Lipan
Project Description: Curb ramps to accommodate westbound bicycle traffic on north sidewalk

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete path	50	sy	$20	$1,000
Remove existing walk	25	sy	$12	$300
Remove existing curb	40	lf	$9	$360
Signs, ground mounted	4	ea	$120	$480
Landscaping	60	sf	$3	$180
Excavation	10	cy	$9	$90
Concrete curb @ ramps	48	lf	$12	$576
			Subtotal	$2,986.00
			Contingencies (15%)	$447.90
			Engineering/Mgt (20%)	$597.20
			Total Project Cost	**$4,031.10**

Project Number: 27
Project Description: City Park Connecting Route Improvements

Programmed and unded

Project Number: 28
Project Limits: 12th Avenue at Colorado Blvd.
Project Description: Bike path construction (10' or12' attached)

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete path	105	sy	$20	$2,100
Remove existing walk	50	sy	$12	$600
Remove existing curb	30	lf	$8	$240
Property acquisition	450	sf	$20	$9,000
Traffic control	1	ls	$3,000	$3,000
Excavation	10	cy	$9	$90
Concrete curb @ ramps	30	lf	$12	$360
			Subtotal	$15,390.00
			Contingencies (15%)	$2,308.50
			Engineering/Mgt (20%)	$3,078.00
			Total Project Cost	**$20,776.50**

Project Number: 29A
Project Limits: Weir Gulch—limits of existing path
Project Description: Replace asphalt with 10' path

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete path	5,000	sy	$20	$100,000
Remove asphalt path	4,000	sy	$7	$28,000
Excavation	350	cy	$9	$3,150
Landscaping	9,000	sf	$3	$27,000
				$0
				$0
				$0

Subtotal	$158,150.00
Contingencies (15%)	$23,722.50
Engineering/Mgt (20%)	$31,630.00
Total Project Cost	**$213,502.50**

Project Number: 29B
Project Limits: Weir Gulch at Alameda Ave
Project Description: Installation of Actuated Signal

Item	Quantity	Unit	Unit Cost	Item Cost
Traffic signal	1	ls	$15,000	$15,000

Subtotal	$15,000.00
Contingencies (15%)	$2,250.00
Engineering/Mgt (20%)	$3,000.00
Total Project Cost	**$20,250.00**

Project Number: 30
Project Limits: 1st Ave. @ Federal Blvd.
Project Description: Construct 8' path on east side and ramps
(8' is greatest practical width)

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete path	70	sy	$20	$1,400
Remove existing sidewalk	42	sy	$15	$630
Remove existing curb	80	lf	$10	$800
Traffic control	1	ls	$2,500	$2,500
Excavation	10	cy	$12	$120
Concrete curb	24	lf	$13	$312
				$0

Subtotal	$5,762.00
Contingencies (15%)	$864.30
Engineering/Mgt (20%)	$1,152.40
Total Project Cost	**$7,778.70**

PRELIMINARY ESTIMATES

Project Number: 31 (Platte River Greenway Reconstruction)
Project Limits: All segments not widened under other projects
Project Description: Reconstruction 10+6 feet wide
(Approximate length 5 miles)

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete path	30,000	sy	$20	$600,000
Remove concrete paveme	24,000	sy	$7	$168,000
Crusher fines path	15,000	sy	$9	$135,000
Lanscaping	50,000	sf	$3	$150,000
Excavation	2,000	cy	$9	$18,000

Subtotal	$1,071,000.00
Contingencies (15%)	$160,650.00
Engineering/Mgt (20%)	$214,200.00
Total Project Cost	**$1,445,850.00**

Project Number: 32
Project Limits: Platte Greenway (entire)
Project Description: Wood span bridge replacement
with wider steel structures

Item	Quantity	Unit	Unit Cost	Item Cost
Bike/ped bridge (typ.)	6	each	$120,000	$720,000
Remove old bridge	6	each	$5,000	$30,000
Abutments all locations	12	each	$12,000	$144,000

Subtotal	$894,000.00
Contingencies (15%)	$134,100.00
Engineering/Mgt (20%)	$178,800.00
Total Project Cost	**$1,206,900.00**

Project Number: 33A
Project Limits: Maple Avenue, Navajo to Pecos
Project Description: Bike path construction, 12' (throretical)

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete pavement	400	sy	$20	$8,000
Excavation	150	cy	$9	$1,350
Landscaping	1,200	sf	$3	$3,600
Traffic control	1	ls	$1,000	$1,000
				$0
				$0
				$0

Subtotal	$13,950.00
Contingencies (15%)	$2,092.50
Engineering/Mgt (20%)	$2,790.00
Total Project Cost	**$18,832.50**

PRELIMINARY ESTIMATES

Project Number: 33B
Project Limits: Maple Avenue, Navajo to Pecos
Project Description: Street construction, 36' curb section

Item	Quantity	Unit	Unit Cost	Item Cost
Asphalt pavement	1,067	sy	$13	$13,871
Excavation	600	cy	$9	$5,400
Landscaping	1,200	sf	$3	$3,600
Traffic control	1	ls	$3,000	$3,000
Concrete curb & gutter	650	lf	$9	$5,850
Drainage improvements	1	ls	$10,000	$10,000
Crushed stone subgrade	300	cy	$5	$1,500
			Subtotal	$43,221.00
			Contingencies (15%)	$6,483.15
			Engineering/Mgt (20%)	$8,644.20
			Total Project Cost	**$58,348.35**

Project Number: 34 (7th Avenue-Cherry Creek Connection)
Project Limits: Zeckendorf Park
Project Description: Bike path construction (10')

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete path	200	sy	$20	$4,000
Remove existing walk	100	sy	$12	$1,200
Remove existing curb	40	lf	$8	$320
Signs, ground mounted	4	ea	$120	$480
Landscaping	950	sf	$3	$2,850
Excavation	35	cy	$9	$315
Concrete curb @ ramps	40	lf	$12	$480
			Subtotal	$9,645.00
			Contingencies (15%)	$1,446.75
			Engineering/Mgt (20%)	$1,929.00
			Total Project Cost	**$13,020.75**

Project Number: 35
Project Description: 6th/Lincoln/Speer Reconstruction

Redevelopment Project—see Master Plan

PRELIMINARY ESTIMATES

PRELIMINARY ESTIMATES

Project Number: 36A
Project Limits: First/Speer/Downing Improvements Phase 1
Project Description: Path on Emerson-Clarkson from First Avenue to Speer Blvd.

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete path	500	sy	$20	$10,000
Excavation	170	cy	$9	$1,530
Landscaping	900	lf	$3	$2,700
Bridge sidewalk widening	60	sy	$100	$6,000
Curb removal	60	lf	$9	$540
Concrete curb	60	lf	$12	$720
Traffic control	1	ls	$3,000	$3,000
Striping removal	80	sf	$1	$80
Striping replacement	250	lf	$2	$500

Subtotal	$25,070.00
Contingencies (15%)	$3,760.50
Engineering/Mgt (20%)	$5,014.00
Total Project Cost	**$33,844.50**

Project Number: 36B
Project Limits: First/Speer/Downing Improvements Phase 2
Project Description: Direct connection from Downing St. bike lanes to Cherry Creek bikeway

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete path	400	sy	$20	$8,000
Excavation	1,100	cy	$9	$9,900
Retaining Wall	300	lf	$200	$60,000
Low-water crossing	1	ls	$5,000	$5,000
Landscaping	800	sf	$3	$2,400
Structure to carry Downing St. easternmost lane over bike path	1	ls	$100,000	$100,000

Subtotal	$185,300.00
Contingencies (15%)	$27,795.00
Engineering/Mgt (20%)	$37,060.00
Total Project Cost	**$250,155.00**

Project Number: 37
Project Description: MAC Station at Alameda Avenue

Redevelopment Project—see Master Plan

Project Number: 38
Project Description: Broadway Marketplace

Redevelopment Project—see Master Plan

Project Number: 39
Project Description: MAC Station at Burkhart Steel

Redevelopment Project—see Master Plan

Project Number: 40
Project Description: Sanderson Gulch Connection to Lakewood

Adjacent city project (Lakewood) — see Master Plan

PRELIMINARY ESTIMATES

PRELIMINARY ESTIMATES

Project Number: 41
Project Limits: Sanderson Gulch—All (Florida to Colorado Ave.)
Project Description: Replace asphalt path with 10' concrete

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete path	13,000	sy	$20	$260,000
Remove asphalt path	10,500	sy	$7	$73,500
Landscaping	24,000	sf	$3	$72,000
				$0
				$0
				$0
				$0

Subtotal	$405,500.00
Contingencies (15%)	$60,825.00
Engineering/Mgt (20%)	$81,100.00
Total Project Cost	**$547,425.00**

Project Number: 42 (Sanderson Gulch Spur)
Project Limits: Navajo Ave., Louisiana to existing trail
Project Description: path construction

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete pavement	150	sy	$20	$3,000
Excavation	50	cy	$9	$450
Signs	3	ea	$75	$225
Remove curb	20	lf	$9	$180
Concrete curb	20	lf	$12	$240
Traffic control	1	ls	$1,000	$1,000

Subtotal	$5,095.00
Contingencies (15%)	$764.25
Engineering/Mgt (20%)	$1,019.00
Total Project Cost	**$6,878.25**

Project Number: 43
Project Limits: Platte Greenway, Florida Ave. to Evans Ave.
Project Description: Replacement of asphalt with concrete

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete path	3,300	sy	$20	$66,000
Remove concrete paveme	3,300	sy	$7	$23,100
Crusher fines path	1,300	sy	$9	$11,700
Lanscaping	6,000	sf	$3	$18,000

Subtotal	$118,800.00
Contingencies (15%)	$17,820.00
Engineering/Mgt (20%)	$23,760.00
Total Project Cost	**$160,380.00**

Project Number: 44
Project Limits: Iliff Avenue-Platte River Greenway Connection
Project Description: Bike/ped bridge over Santa Fe Dr. & Railroad with approaches

Item	Quantity	Unit	Unit Cost	Item Cost
Bike/ped ramp structure	900	lf	$600	$540,000
				$0
				$0
				$0
				$0
				$0

Note> Some repairs to Iliff Avenue west of Delaware Street would also be needed.

Subtotal	$540,000.00
Contingencies (15%)	$81,000.00
Engineeering/Mgt (20%)	$108,000.00
Total Project Cost	**$729,000.00**

Project Number:45
Project Description: West Harvard Gulch/Platte Greenway Connection

Programmed and Funded

Project Number: 46
Project Description: Bear Creek/Pierce Street Connection to Southwest Neighborhoods

Programmed and Funded

PRELIMINARY ESTIMATES

Project Number: 47A
Project Limits: Bear Creek—Sheridan to Wadsworth
Project Description: Replace asphalt path with 10+4

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete path	10,000	sy	$20	$200,000
Remove asphalt path	8,000	sy	$7	$56,000
Crusher fines	4,000	sy	$9	$36,000
Landscaping	18,000	sf	$3	$54,000
Excavation	1,350	cy	$9	$12,150
				$0
				$0
			Subtotal	$358,150.00
			Contingencies (15%)	$53,722.50
			Engineering/Mgt (20%)	$71,630.00
			Total Project Cost	**$483,502.50**

Project Number: 47B
Project Limits: Bear Creek—Lowell to Sheridan
Project Description: Replace asphalt path with 10+4

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete path	5,500	sy	$20	$110,000
Remove asphalt path	4,400	sy	$7	$30,800
Crusher fines	2,200	sy	$9	$19,800
Landscaping	10,000	sf	$3	$30,000
Excavation	750	cy	$9	$6,750
				$0
				$0
			Subtotal	$197,350.00
			Contingencies (15%)	$29,602.50
			Engineering/Mgt (20%)	$39,470.00
			Total Project Cost	**$266,422.50**

Project Number: 48A
Project Limits: Quincy Avenue, Wadsworth to Pierce
Project Description: Concrete path construction

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete path	1,350	sy	$20	$27,000
Excavation	450	cy	$9	$4,050
Landscaping	4,800	sf	$3	$14,400
Signs	4	ea	$75	$300
Note: Phase 1 is in the City of Lakewood and would not be funded by Denver.			Subtotal	$45,750.00
			Contingencies (15%)	$6,862.50
			Engineering/Mgt (20%)	$9,150.00
			Total Project Cost	**$61,762.50**

PRELIMINARY ESTIMATES

Project Number: 48B
Project Limits: Quincy Avenue, Pierce to Sheridan
Project Description: Concrete path construction

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete pavement	8,000	sy	$20	$160,000
Excavation	2,600	cy	$9	$23,400
Landscaping	28,000	sf	$3	$84,000
Signs	8	ea	$75	$600

Subtotal	$268,000.00
Contingencies (15%)	$40,200.00
Engineering/Mgt (20%)	$53,600.00
Total Project Cost	**$361,800.00**

Project Number: 48C
Project Limits: Quincy Avenue Phase 3—Utica to Lowell
Project Description: Concrete path construction

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete pavement	4,400	sy	$20	$88,000
Excavation	1,500	cy	$9	$13,500
Landscaping	16,000	sf	$3	$48,000
Signs	8	ea	$75	$600

Subtotal	$150,100.00
Contingencies (15%)	$22,515.00
Engineering/Mgt (20%)	$30,020.00
Total Project Cost	**$202,635.00**

Project Number: 49
Project Description: Knox Court to Dartmouth Avenue Connection through Loretto Heights College

See Related Projects in the Master Plan

PRELIMINARY ESTIMATES

Project Number: 50
Project Description: Dartmouth Conection to Fill East-West Gap to the Platte River Greenway

Adjacent city project (Englewood) — see Master Plan

Project Number: 51A (Bayaud-Cherry Creek Connection)
Project Limits: Bayaud Ave. at Steele St.
Project Description: Relocation of signal controller

Item	Quantity	Unit	Unit Cost	Item Cost
Relocate control cabinet	1	ls	$2,500	$2,500
Property acquisition	20	sf	$50	$1,000
Landscaping	20	sf	$10	$200
Concrete path	5	sy	$20	$100
				$0
				$0
				$0

Subtotal	$3,800.00
Contingencies (15%)	$570.00
Engineering/Mgt (20%)	$760.00
Total Project Cost	**$5,130.00**

Project Number: 51B (Bayaud-Cherry Creek Connection)
Project Limits: Bayaud/Colorado/Leetsdale
Project Description: Intersection modifications

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete pavement	50	sy	$20	$1,000
Excavation	20	cy	$9	$180
Remove existing asphalt	50	sy	$7	$350
Remove curb	60	lf	$9	$540
Concrete curb	60	lf	$12	$720
Relocate traffic pole	1	ea	$2,000	$2,000
				$0

Subtotal	$4,790.00
Contingencies (15%)	$718.50
Engineering/Mgt (20%)	$958.00
Total Project Cost	**$6,466.50**

PRELIMINARY ESTIMATES

Project Number: 51C (Bayaud-Cherry Creek Connection)
Project Limits: Monaco Pkwy., Cedar to Alameda
Project Description: Construct 10' path on east side

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete path	670	sy	$20	$13,400
Remove existing sidewalk	400	sy	$12	$4,800
Remove existing curb	24	lf	$8	$192
Signs, ground mounted	4	ea	$120	$480
Landscaping	1,200	sf	$3	$3,600
Concrete curb	24	lf	$9	$216
Excavation	90	cy	$9	$810

Subtotal	$23,498.00
Contingencies (15%)	$3,524.70
Engineering/Mgt (20%)	$4,699.60
Total Project Cost	**$31,722.30**

Project Number: 52
Project Limits: Steele Street, Louisiana to Florida
Project Description: Widening Street 8 feet

Item	Quantity	Unit	Unit Cost	Item Cost
Asphalt pavement	1,155	sy	$13	$15,015
Excavation	600	cy	$9	$5,400
Landscaping	2,600	sf	$3	$7,800
Traffic control	1	ls	$3,000	$3,000
Concrete curb & gutter	1,300	lf	$9	$11,700
Drainage improvements	1	ls	$8,000	$8,000
Crushed stone subgrade	200	cy	$5	$1,000
Remove concrete walk	900	sy	$7	$6,300
New Concrete walk	900	sy	$12	$10,800

Subtotal	$69,015.00
Contingencies (15%)	$10,352.25
Engineering/Mgt (20%)	$13,803.00
Total Project Cost	**$93,170.25**

Project Number: 53
Project Limits: Buchtel Blvd., Iowa Ave. to Colorado Blvd.
Project Description: Construct 10-foot-wide bike path

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete path	9,000	sy	$20	$180,000
Excavation	3,000	cy	$9	$27,000
Signs	10	ea	$100	$1,000
Lanscaping	16,000	sf	$3	$48,000
				$0
				$0
				$0

Note: This estimate includes only the direct costs of the bike path. The Buchtel corridor includes other improvements, not shown here.

Subtotal	$256,000.00
Contingencies (15%)	$38,400.00
Engineering/Mgt (20%)	$51,200.00
Total Project Cost	**$345,600.00**

PRELIMINARY ESTIMATES

Project Number: 54
Project Limits: Dahlia St/Iliff Ave over I-25
Project Description: Bike/ped bridge with approaches

Item	Quantity	Unit	Unit Cost	Item Cost
Bike/ped ramp structure	650	lf	$700	$455,000
Maintenance of traffic	1	ls	$10,000	$10,000
Concrete path	200	sy	$20	$4,000
				$0

Subtotal	$469,000.00
Contingencies (15%)	$70,350.00
Engineering/Mgt (20%)	$93,800.00
Total Project Cost	**$633,150.00**

Project Number: 55
Project Limits: Leetsdale Drive at Jersey Street/Geo. Wash. HS
Project Description: Installation of Actuated Signal

Item	Quantity	Unit	Unit Cost	Item Cost
Traffic signal	1	ls	$12,000	$12,000

Subtotal	$12,000.00
Contingencies (15%)	$1,800.00
Engineering/Mgt (20%)	$2,400.00
Total Project Cost	**$16,200.00**

Project Number: 56A
Project Limits: Cherry Creek—Holly St. to Oneida St.
Project Description: Path const.—12' wide Monaco to Oneida

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete path	2,700	sy	$20	$54,000
Excavation	900	cy	$9	$8,100
Landscaping	8,000	sf	$3	$24,000
				$0
				$0
				$0
				$0

Subtotal	$86,100.00
Contingencies (15%)	$12,915.00
Engineering/Mgt (20%)	$17,220.00
Total Project Cost	**$116,235.00**

PRELIMINARY ESTIMATES

Project Number: 56B
Project Limits: Cherry Creek East of Four Mile Historic Park
Project Description: Connector path to Vale Drive—8' wide

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete path	160	sy	$20	$3,200
Excavation	60	cy	$9	$540
Landscaping	360	sf	$3	$1,080
Drainage improvement	1	ls	$1,000	$1,000
				$0
NOTE: Drainage improvement is minimum to accommodate connection				$0
between path and the dead end of Vale Drive.				$0

Note: Drainage improvement estimated is minimum to accommodate the connection between path and the end of Vale Drive. More drainage work would be desirable.

Subtotal	$5,820.00
Contingencies (15%)	$873.00
Engineering/Mgt (20%)	$1,164.00
Total Project Cost	**$7,857.00**

Project Number: 57A
Project Limits: Cook Park
Project Description: Path on North side of Parking Lot

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete Path	680	sy	$20	$13,600
Excavation	250	cy	$9	$2,250
Landscaping	4,800	sf	$3	$14,400
				$0
				$0

Subtotal	$30,250.00
Contingencies (15%)	$4,537.50
Engineering/Mgt (20%)	$6,050.00
Total Project Cost	**$40,837.50**

Project Number: 57B
Project Limits: Cook Park
Project Description: Path from Cherry Ck Dr. North to intersection of Oneida Street and the Florida Avenue path

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete Path	360	sy	$20	$7,200
Excavation	150	cy	$9	$1,350
Landscaping	1,400	sf	$3	$4,200

Subtotal	$12,750.00
Contingencies (15%)	$1,912.50
Engineering/Mgt (20%)	$2,550.00
Total Project Cost	**$17,212.50**

PRELIMINARY ESTIMATES

PRELIMINARY ESTIMATES

Project Number: 57C
Project Description: Mexico Avenue/Oneida Street Intersection Improvement

Programmed and Funded

Project Number: 58
Project Limits: Highline Canal at Oneida St.
Project Description: Connector path construction (10')

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete path	170	sy	$20	$3,400
Concrete curb @ ramp	22	lf	$12	$264
Remove existing curb	22	lf	$8	$176
Landscaping	600	lf	$3	$1,800
Excavation	100	cy	$9	$900
Low retaining wall	75	lf	$50	$3,750

Subtotal	$10,290.00
Contingencies (15%)	$1,543.50
Engineering/Mgt (20%)	$2,058.00
Total Project Cost	**$13,891.50**

Project Number: 59
Project Limits: Highline Canal
Project Description: Path reconstruction (per mile)

Item	Quantity	Unit	Unit Cost	Item Cost
Remove asphalt path	4,200	sy	$7	$29,400
Concrete path (10-foot)	5,870	sy	$20	$117,400
Excavation	560	cy	$9	$5,040
				$0
				$0

Subtotal	$151,840.00
Contingencies (15%)	$22,776.00
Engineering/Mgt (20%)	$30,368.00
Total Project Cost	**$204,984.00**

Project Number: 60 (Highline Canal Bridges)
Project Limits: S of Iliff Ave. and at Cherry Creek
Project Description: Bridge replacement (4' to 10')

Item	Quantity	Unit	Unit Cost	Item Cost
New bridge @ Iliff	1	ls	$15,000	$15,000
New bridge @ Cherry Ck	1	ls	$90,000	$90,000
Remove existing bridge	2	ea	$4,000	$8,000
Abutment modification	4	ea	$4,000	$16,000

Subtotal	$129,000.00
Contingencies (15%)	$19,350.00
Engineering/Mgt (20%)	$25,800.00
Total Project Cost	**$174,150.00**

Project Number: 61
Project Description: Cherry Creek Corridor in Arapahoe County

Adjacent county project (Arapaho) — see Master Plan

Project Number: 62
Project Description: Yosemite Street Connection to Highline Canal

Programmed and funded

PRELIMINARY ESTIMATES

Project Number: 63
Project Limits: Cherry Creek S of Highline Canal
Project Description: Bridge replacement (4' to 10')

Item	Quantity	Unit	Unit Cost	Item Cost
New bridge	1	ls	$50,000	$50,000
Remove existing bridge	1	ls	$3,000	$3,000
Abutment modification	2	ea	$2,000	$4,000

Subtotal	$57,000.00
Contingencies (15%)	$8,550.00
Engineering/Mgt (20%)	$11,400.00
Total Project Cost	**$76,950.00**

Project Number: 64
Project Limits: Cherry Creek—Yale Avenue connector
Project Description: Path construction - 10' wide
(Babi Yar Park)

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete path	2,000	sy	$20	$40,000
Lanscaping	3,600	sf	$3	$10,800
Excavation	700	cy	$9	$6,300
				$0
				$0

Subtotal	$57,100.00
Contingencies (15%)	$8,565.00
Engineering/Mgt (20%)	$11,420.00
Total Project Cost	**$77,085.00**

Project Number: 65
Project Description: Southeast Neighborhood Connection
to Cherry Creek Reservoir

Adjacent city project (Greenwood Village) — see Master Plan

PRELIMINARY ESTIMATES

Project Number: 66 (Cherry Creek Path Reconstruction)
Project Limits: Highline Canal to I-225
Project Description: Reconst. 10 feet wide with improved grades

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete path	7,500	sy	$20	$150,000
Remove concrete paveme	6,000	sy	$7	$42,000
Excavation	5,000	sy	$9	$45,000
Lanscaping	12,000	sf	$3	$36,000
Drainage improvements	1	ls	$20,000	$20,000

Subtotal	$293,000.00
Contingencies (15%)	$43,950.00
Engineering/Mgt (20%)	$58,600.00
Total Project Cost	**$395,550.00**

Project Number: 67
Project Limits: Tamarac/DTC, Quincy to Tufts
Project Description: Construct 10' path on east side

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete path	1,900	sy	$20	$38,000
Remove existing sidewalk	1,150	sy	$12	$13,800
Remove existing curb	40	lf	$8	$320
Signs, ground mounted	4	ea	$120	$480
Landscaping	1,200	sf	$3	$3,600
Concrete curb	40	lf	$9	$360
Excavation	240	cy	$9	$2,160

Subtotal	$58,720.00
Contingencies (15%)	$8,808.00
Engineering/Mgt (20%)	$11,744.00
Total Project Cost	**$79,272.00**

Project Number: 68
Project Descrioption: Near-term Montbello Access through Stapleton Airport Redevelopment Area

Adjacent city project (Aurora) — see Master Plan

PRELIMINARY ESTIMATES

Project Number: 69
Project Limits: 56th Avenue, Quebec St. to Peoria St.
Project Description: Additional cost to provide 30' width (as opposed to minimum 24' width)

Item	Quantity	Unit	Unit Cost	Item Cost
Asphalt pavement	10,000	sy	$13	$130,000
Excavation	3,500	cy	$9	$31,500
Landscaping (minimal)	1,000	sf	$3	$3,000
Traffic control	1	ls	$5,000	$5,000
Crushed stone subgrade	2,000	cy	$5	$10,000
Drainage improvements	1	ls	$10,000	$10,000

Note: Segment from Yosemite to Havana is total reconstruction: remainder is widening shoulders of existing 2-lane road.

Subtotal	$189,500.00
Contingencies (15%)	$28,425.00
Engineering/Mgt (20%)	$37,900.00
Total Project Cost	**$255,825.00**

Project Number: 70
Project Limits: Smith Road, Quebec St. to Sand Creek
Project Description: Bike lane/bike path construction

Item	Quantity	Unit	Unit Cost	Item Cost
Asphalt pavement	5,600	sy	$13	$72,800
Excavation	1,900	cy	$9	$17,100
				$0
				$0

Subtotal	$89,900.00
Contingencies (15%)	$13,485.00
Engineering/Mgt (20%)	$17,980.00
Total Project Cost	**$121,365.00**

Project Number: 71
Project Limits: Sand Creek—Smith Road to Havana Street
Project Description: Bike path construction

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete pavement	7,200	sy	$20	$144,000
Excavation	2,400	cy	$9	$21,600
Landscaping (minimal)	14,400	lf	$3	$43,200
Lighting under runways	1	ls	$5,000	$5,000
Crushed stone subgrade	1,200	cy	$5	$6,000
				$0
				$0

Subtotal	$219,800.00
Contingencies (15%)	$32,970.00
Engineering/Mgt (20%)	$43,960.00
Total Project Cost	**$296,730.00**

PRELIMINARY ESTIMATES

Project Number: 72
Project Limits: Havana St. from Havana Way to 50th Avenue
Project Description: Bike path construction

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete pavement	8,800	sy	$20	$176,000
Excavation	6,000	cy	$9	$54,000
				$0
				$0

Subtotal	$230,000.00
Contingencies (15%)	$34,500.00
Engineeering/Mgt (20%)	$46,000.00
Total Project Cost	**$310,500.00**

Project Number: 73
Project Limits: Havana Way, Smith Road to Moline Street
Project Description: Bike lane construction

Item	Quantity	Unit	Unit Cost	Item Cost
Asphalt pavement	5,400	sy	$13	$70,200
Excavation	1,800	cy	$9	$16,200
				$0
				$0
				$0
				$0
				$0

Subtotal	$86,400.00
Contingencies (15%)	$12,960.00
Engineeering/Mgt (20%)	$17,280.00
Total Project Cost	**$116,640.00**

Project Number: 74
Project Descrtiption: 19th Avenue/Westerly Gulch/
Chester St park in Aurora

Adjacent city project (Aurora) — see Master Plan

PRELIMINARY ESTIMATES

Project Number: 75
Project Description: Lowry Redevelopment Connections

Redevelopment and adajcent city projects (Aurora) — see Master Plan

Project Number: 76
Project Limits: Peoria St. from Albrook Drive to 56th Avenue
Project Description: Bike path reconstruction

Item	Quantity	Unit	Unit Cost	Item Cost
Concrete pavement	8,300	sy	$20	$166,000
Excavation	1,000	cy	$9	$9,000
Remove existing path	5,000	sy	$7	$35,000
Remove curb	400	lf	$9	$3,600
Concrete curb	400	lf	$12	$4,800
Relocate utility box	6	ea	$1,000	$6,000
				$0

Subtotal	$224,400.00
Contingencies (15%)	$33,660.00
Engineering/Mgt (20%)	$44,880.00
Total Project Cost	**$302,940.00**

Project Number: 77
Project Description: Private Development — Montbello

Redevelopment Project—see Master Plan

PRELIMINARY ESTIMATES

Project Number: 78
Project Description: New Denver Airport/
Gateway Redevelopment Connections

Redevelopment Project—see Master Plan

Project Number: 79 (Green Valley Ranch Connection)
Project Limits: Highline Canal, 40th Ave. to Malaya St.
Project Description: Path construction

Item	Quantity	Unit	Unit Cost	Item Cost
Landscaping	22,000	sf	$3	$66,000
Concrete path (10-foot)	12,000	sy	$20	$240,000
Excavation	4,000	cy	$9	$36,000
				$0
				$0

Subtotal	$342,000.00
Contingencies (15%)	$51,300.00
Engineering/Mgt (20%)	$68,400.00
Total Project Cost	**$461,700.00**

Project Number: 80 (Westwood Trail)

Project Description: Trail Construction

	Quantity	Unit	Unit Cost	Item Cost
				$0.00
			Cost to be determined,	$0.00
			based on further study.	$0.00
Rough Cost Estimate supplied by Denver Parks and Recreation				**$450,000.00**

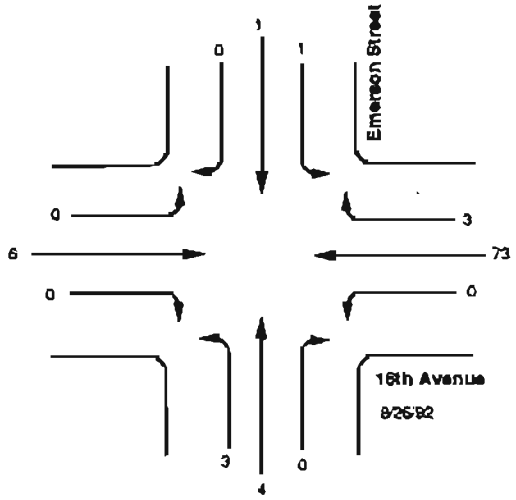
APPENDIX

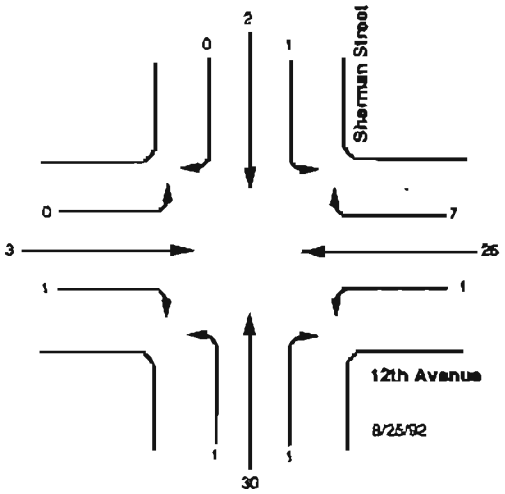
DENVER BICYCLE MASTER PLAN
March 1993

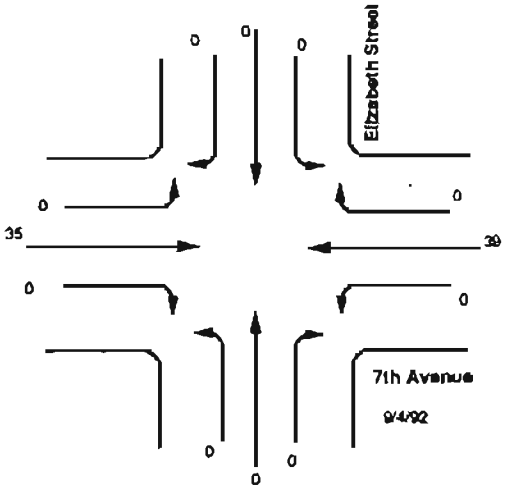
City and County of Denver
Public Works Department

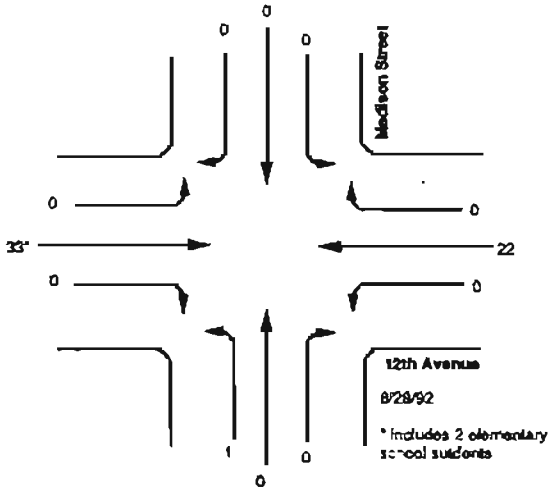
DENVER BICYCLE MASTER PLAN
1992 Baseline Bicycle Counts

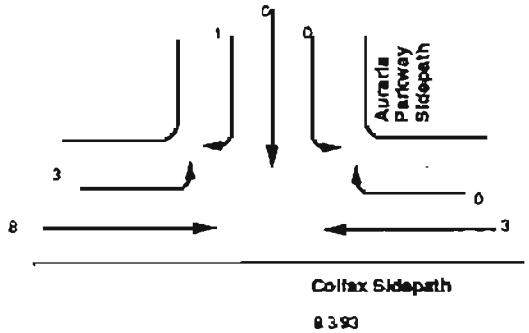
Late Summer and Fall
Morning Commute Period
3 hour count, 6:00 to 9:00 A.M.

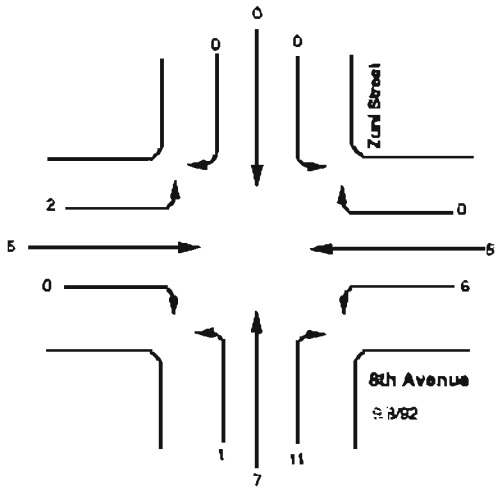












1992 Baseline Bicycle Counts
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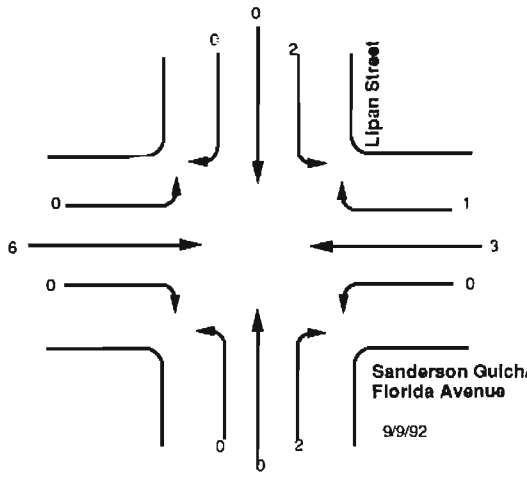

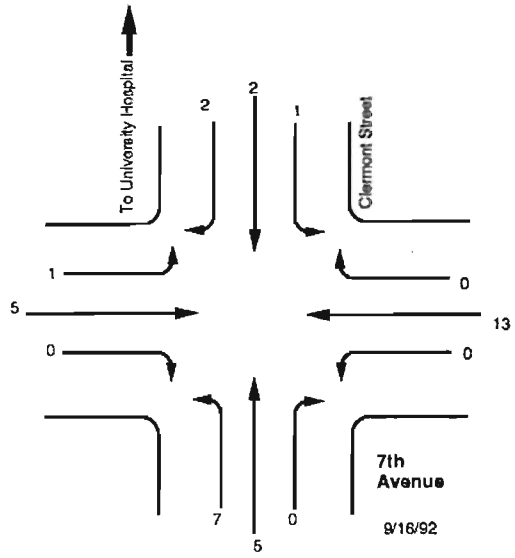

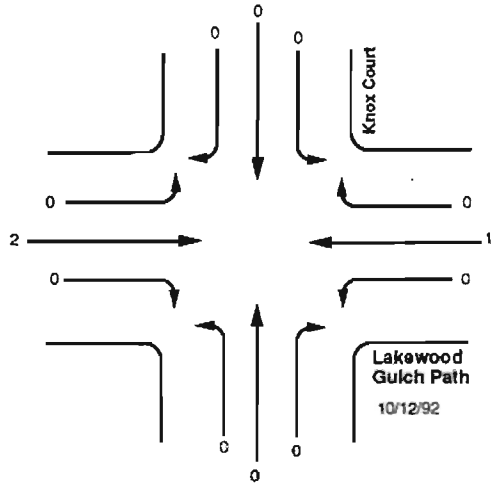

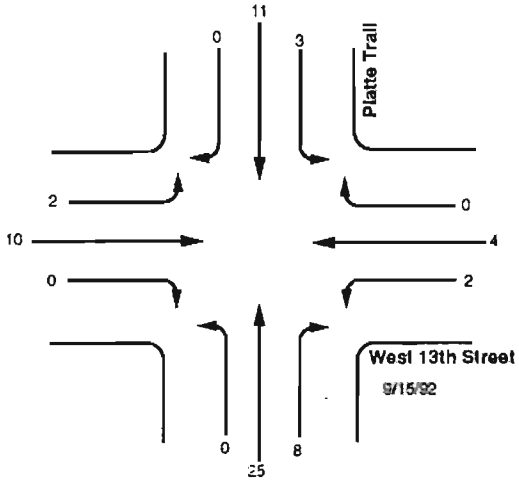

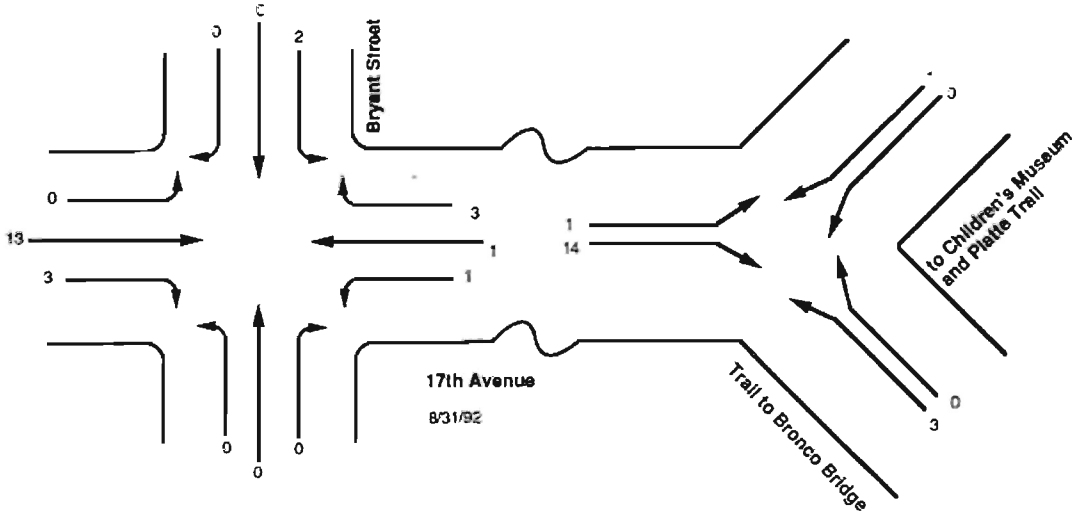

1992 Baseline Bicycle Counts
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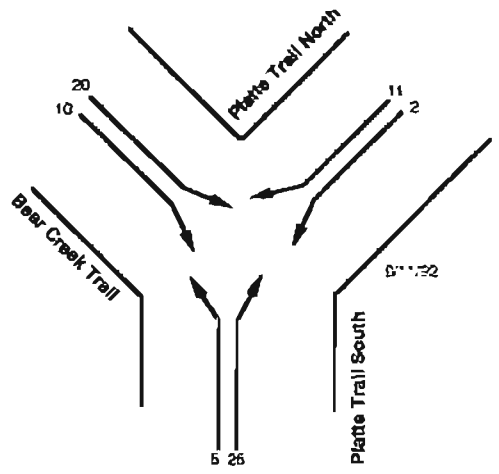

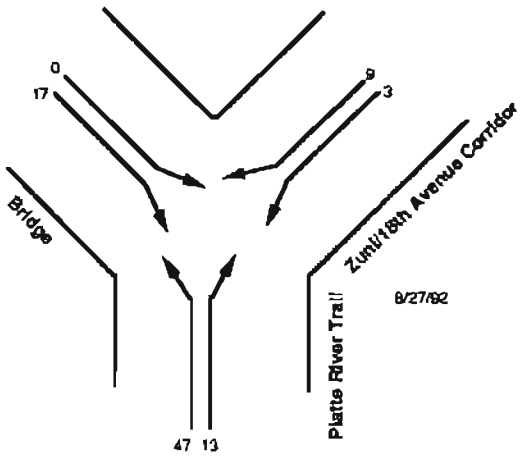

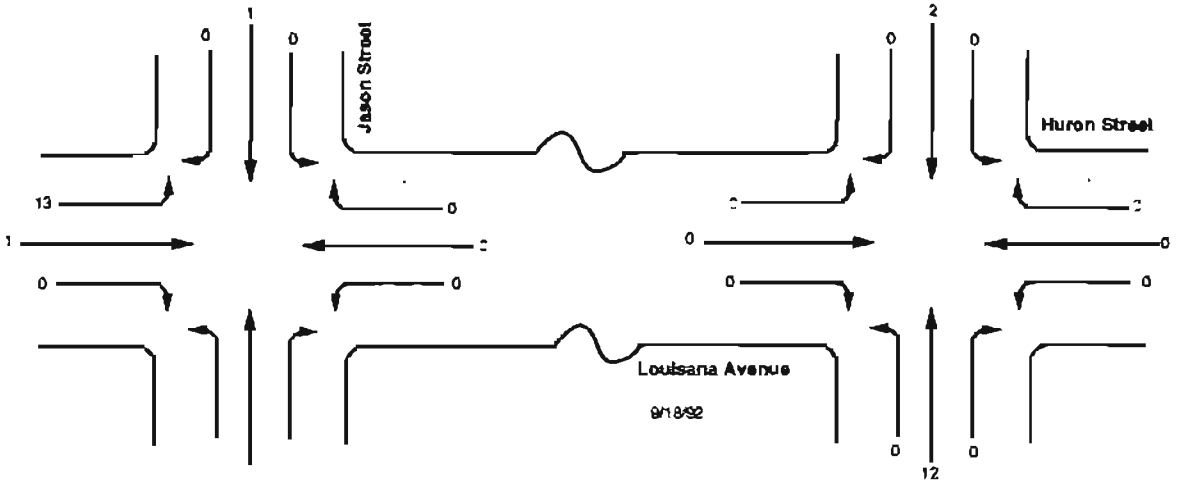

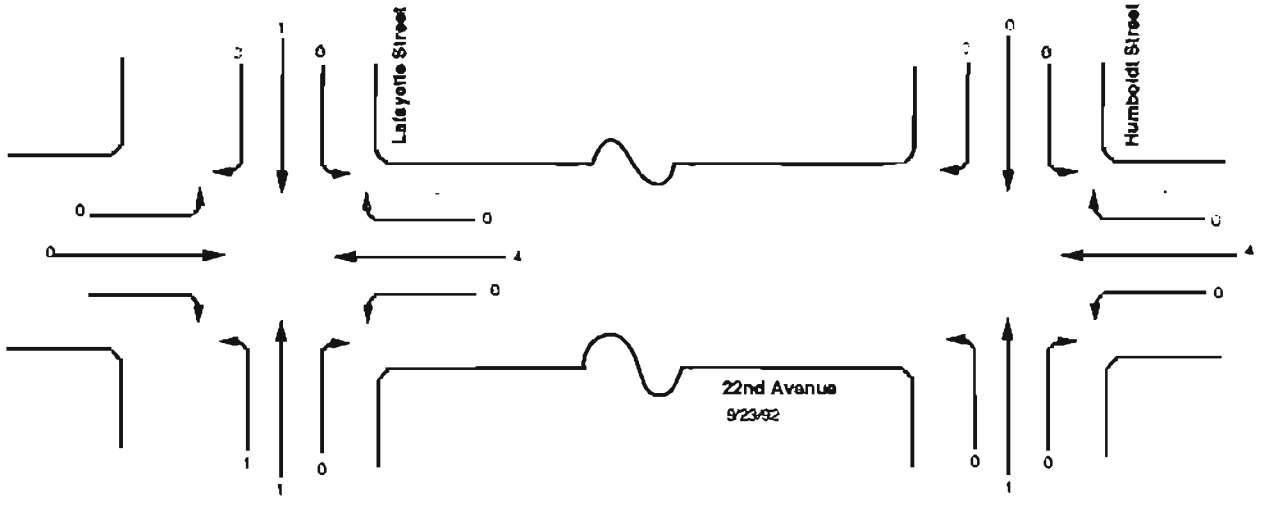

1992 Baseline Bicycle Counts
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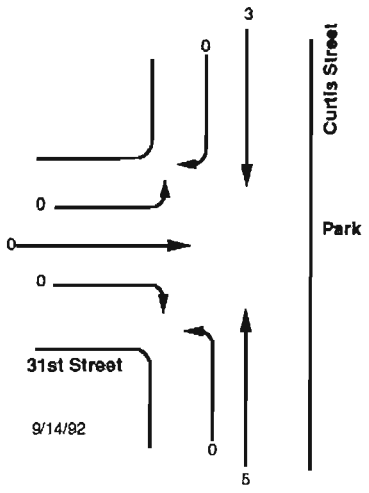
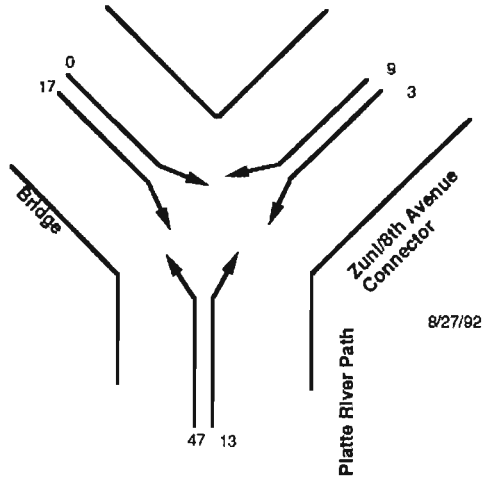
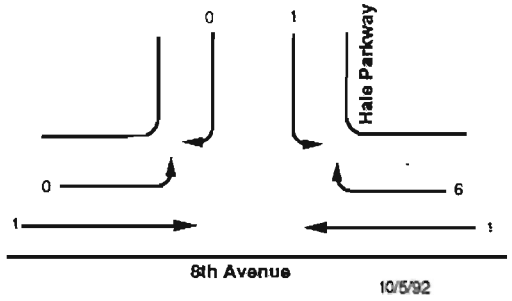
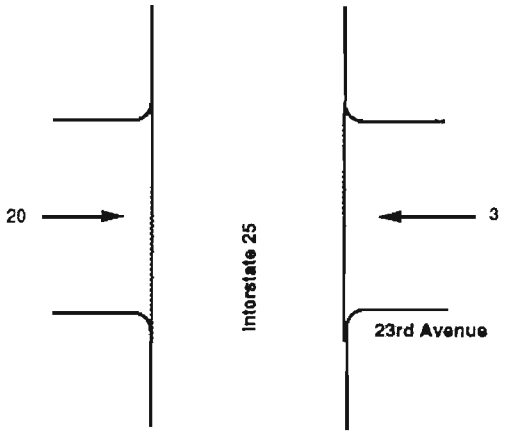
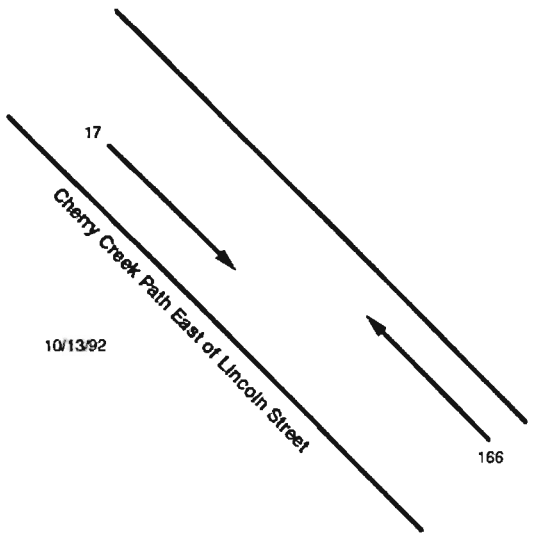
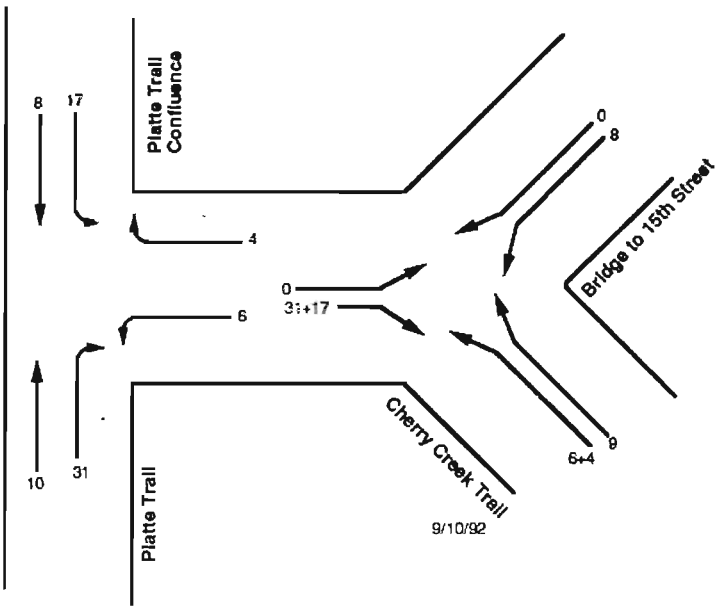












Recommended On-Street Bicycle Route Maintenance Standards

Proper maintenance of on-street riding surfaces is a key factor in bicycle safety and an important consideration in people's decision to ride a bicycle. Designing bikeways to reduce maintenance, giving priority to the sweeping and plowing of the sides of streets where bicyclists ride, and ensuring that riding surfaces are relatively smooth- are all requisites in attracting more of the general public to bicycling. To improve the condition of Denver's bicycle routes, it is recommended that the City adopt the following standards for facilities within the public rights-of-way used by bicyclists:

- Maintenence responsibility
  Responsiblity for on-going maintenance for each bicycle facility must be assigned and assumed prior to its construction or official designation. Responsibility for on-street maintenance rests primarily with the Denver Public Works Department or the CDOT. Responsibility for the removal of debris or snow deposited onto a bicycle path or route by any public agency or private concern will be assumed by that agency or concern.

- Location of on-street maintenance activities
  Maintenence will be provided regularly on areas where bicycles are legally operated on: streets, officially-designated "bicycle sidepaths" and along viaducts. Special emphasis will be placed on the maintenance of designated routes.

- Street sweeping
  Whenever any street is swept, ensure that the area cleaned also includes the sides of roads where bicycles are ridden. Sweep all the way to gutters on "no parking" streets and adjacent to cars on streets where parking is permitted. Ensure that surface debris, dirt, broken glass and sand is removed quickly from bicycle travel areas. Special attention should be given to a thorough cleaning in April to remove sand deposited during the winter.

- Snow plowing
  Designated bicycle route streets should be given priority as "snow routes". Plowing standards should ensure snow is removed from bicycle travel zones. This includes plowing all the way to gutters on "no parking" streets and adjacent to cars on streets where parking is permitted. Snow is not to be stored on plowed into bicycle travel zones.

- Surface repair
  A constant repair program should be in place to maintain a uniform, smooth surface on bicycle route streets for bicycle riding. Ensure that any repair of a street surface, including pothole filling, includes repair of the pavement in bicycle travel zones.

- Scheduling
  Inspections, maintenance and repair will be regularly scheduled. Inspection of all on-street facilities, including signage and street surface markings, will be done at least annually. Scheduling of repairs for any deficiencies will be included in this inspection.

· Bicycle route priority
Work with City agencies to give roughly equal priority for bicycle and motor vehicle facility maintenance.

· Maintenence-on-call
Based on the existing "Bicycle Hotline" telephone system (640-BIKE), develop a system to receive, verify, organize and respond to citizen reports about unsafe road surface conditions on bicycle routes. If this system is well-managed it can become an inexpensive way to improve reporting of problems and be a way to mitigate "constructive notice" issues.

· Future Maintenence
Over the next few years expand maintenence capabilities to obtain a higher general level of street conditions, especially on street surfaces used by bicycles. This should include additional staff for more frequent street sweeping and plowing, special equipment to maintain non-standard areas used for bikeways (such as sidepaths on viaducts), and special training and supervision for improved bicycle route maintenence.

Multi-Use Trails
Recommended Design Standards

Trail Design and Construction

New and reconstructed trails should be designed to be safe and non-circuitous, especially trails used for commuter bicycling. The aesthetic and natural aspects of the trail experience should be given important consideration in the design of all projects. Attention should always be given to the protection of existing vegetation. Aesthetic amenities and appropriate vegetation should be included in all trail planning and design.

Trail Configurations and Features:

- Design multi-use trails to encourage safe riding and walking by maintaining good sight distance. Design to prompt riders to be aware of other users at intersecting points. Avoid designs that encourage careless merging movements
- Avoid trail designs that include any unsignalized mid-block crossings of roadways, particularly arterial roads.
- Include curb cuts at all new trail and roadway intersections.
- Provide highly visible pavement markings to warn users of upcoming intersections, traffic crossings, and stop signs.
- Mark center lane stripes on all two-way trails in high congestion areas and restricted visibility zones.
- Provide and maintain vandal-proof lighting under all new bridges and underpasses over 20 feet wide that cross trails. Retrofit existing underpasses and bridges with adequate lighting.
- Avoid placing bollards and other small fixed hazards in the path of riders and walkers. Bollards should not be installed unless trail operational histories indicate they are truly needed.
- Maintain a three-foot minimum, clear recovery zone adjacent to all trails for bicycle use, when possible.
- Avoid trail alignments that go up and down hills needlessly.
- Include protective railings meeting AASHTO recommendations on new trails, ramps, and landings adjacent to abrupt grade changes. The ongoing program to retrofit existing trails, ramps, and landings with protective railings should be continued with adequate funding.

Trail Width:

- Add a smooth, consistent soft-surface path parallel to the existing hard-surface trail where possible to more safely and comfortably accommodate slower speed foot traffic when upgrading an overused or overcrowded pathway, instead of widening the existing paved trail. Where practical, consider the use of a planted strip to separate these trails to reduce surface materials being carried between trails.
- Establish normal width for new two-way paved trails of 10 feet; soft-surface trails should be five to six feet wide. If available right-of-way does not permit a parallel soft path, a 12-foot width may be considered.

Trail Elevation and Slope:

- Construct all new trails to be at least above the two-year flood plain, except where not possible due to clearance deficiencies.
- Design trails so that the maximum longitudinal slope does not exceed A.D.A. Standards slope of 1: 12.

Trail Materials:

- When asphalt trails need to be completely reconstructed due to deterioration, replace them with a concrete surface, if funds are available.
- If complete funding is not available, choose between systematic conversion of existing asphalt trails to concrete, or application of interim asphalt overlay, depending on which is most cost-effective.

Trail Drainage and Maintenance Considerations:

- Construct trail surface with a one-inch vertical offset (1° above adjacent ground).
- Design trails to have adequate cross-drainage.
- Ensure all adjacent public works projects include provisions to minimize sheet flow cross-drainage, and to prevent concentrated drainage or run-off from areas adjacent to the trail.
- Design bridge deck drains to prevent drainage from running onto trail surfaces.
- Maintain a three-foot clear zone with swales along the uphill side of all trails to help reduce debris deposited on the trail by run-off flows.
- Design trails to facilitate easy snow removal, sweeping, and other maintenance.
- To accommodate maintenance vehicles, design heavily-used trails so that the minimum turning radius, measured at the inside curve, is 20 feet (15 feet on lower use trails).
- Design all bridges over trails so that snow being plowed does not fall over the edge on to trails.
- Ensure regular plowing of all trails used by bicyclists in winter.
- Provide adequate and regular control of thorns on trails through environmentally safe methods.
- Design structures adjacent to trails (bridges, walls, etc.) to be vandal-proof and graffiti-resistant.
- Prior to new facility implementation, ensure that the appropriate agency or agencies agree upon responsibility for ongoing maintenance and snow removal. This should include scheduled maintenance, and maintenance in response to calls from citizens.
- Refer to "Recommended Trail Maintenance Considerations" for a more-detailed maintenance discussion.

Trail-Heads

- Design trail-heads sensibly, and provide access to maintenance vehicles.
- Provide parking at new trail-heads. Consider the addition of parking at existing trail-heads where possible.
- Locate trail-heads where they will not cause negative impacts on surrounding neighborhoods.

Automatic Water Sprinkling Systems

Sprinkling Schedule:

- Develop schedule for sprinkler operation to ensure that cross-trail irrigation does not occur during peak commute hours.
- Implement a system to monitor and report complaints of cross-trail irrigation, and respond to those complaints expediently.

Sprinkler System Design:

- Design new systems to avoid cross-trail irrig. ion.
- Evaluate the cost-effectiveness of retrofitting existing cross-trail irrigatio.. systems in high trail-use areas.

Fixtures

Toilets:

- Provide toilets at all trail heads and at all major parks along trails.
- Locate toilets approximately every three miles along trails.
- Design toilets so that are easily maintained.

Drinking Water:

- Utilize wall or post spigots (or handpumps) for durability and simplicity.
- Provide drinking water approximately every one-and-a-half miles, and at a" major parks along trails.
- Cluster toilet and drinking facilities where possible.

Benches:

- Provide benches approxim....ly every two miles along trails, or where people may want to stop. More benches may be necessary along trails with higher use. Consider local user needs to determine number of benches needed.

Signage

- Provide comprehensive signage as an integral component of all new bicycle projects.
- Retrofit existing facilities with signage as necessary.
- Install signage to address the following issues:

Safety Signage

- Advisory to "share the road"
- Speed regulations that are realistic with enforcement capabilities
- Advisory to "Travel on the right side, pass on the left"
- Recommendation to announce intention to pass with bell, horn or voice
- Advice of restricted access areas
- Recommendation of bicycle helmet use
- Regulatory signage prohibiting motor vehicles

Informational Signage

- General informational signage, such as mile markers, points of historical or natural interest
- Signs at major entrances to trails, including trail maps
- Directional indicators at connections to activity centers and areas of interest
- Route information
- Directional signage, including local street names

Bridges

Existing Bridges:

- Access-restriction bollards are not necessary on bridges less than eight feet wide.

New Bridges:

- Minimum bridge width, from inside railing to inside railing, should be 10 feet. Additional width is especially appropriate on principal routes.
- All low-water bridges must be of a clear-span open-waterway design, and should never utilize a small-diameter culvert design. Preferred elevation is above the two-year flood level.

Law Enforcement

- Focus law enforcement efforts on increasing safety for all trail users. Stress safe bicycle riding, especially as it relates to other modes.
- Curtail threats to personal safety related to gang and indigent activities.
- Encourage established Police Department bicycle patrols to routinely ride the trails.
- Consider Bicycle Volunteers to monitor City trails.

Intra-Agency and Inter-Agency Coordination

- Review all trail improvement projects and adjacent public works projects during design development by Parks and Recreation Planning Division, Parks maintenance managers, and the City Bicycle and Pedestrian Planner.
- Review construction and improvement project work orders in the vicinity of recreational trails by Parks maintenance and Parks and Recreation Planning Division prior to execution.
- Share overall responsibility and authority for planning and inter-agency coordination of bicycle projects and activities between the City Bicycle and Pedestrian Planner, Parks and Recreation Planning Division, and Trails Coordinator.
- Ensure adequate trail detours during trail construction or impacts from adjoining projects.

Recommended Trail Maintenance Considerations
Denver Bicycle Master Plan: 1993

Maintenance to be performed on a continuous, scheduled basis:

1. Trail-user safety

Safety is central to all maintenance operations, and is the single most important trail maintenance concern. Items for consideration include scheduling and documentation of inspections, the condition of railings, bridges, and trail surfaces, proper and adequate signage, removal of debris, and coordination with other agencies associated with trail maintenance

2. Trails inspection

Trails inspections are integral to all trail maintenance operations. Inspections will occur on a regularly scheduled basis, the frequency of which will depend on the amount of trail use, location, age, and the type of construction. All trail inspections are to be documented.

3. Trail sweeping

Trail sweeping is one of the most important aspects of trail maintenance, and helps ensure the safety of trail users. The type of sweeping to be performed depends on trail design and location. Trails that require sweeping of the whole system will be swept by machine. Trails that require only spot sweeping of bad areas will be swept by hand or with blowers. Some trails require a combination of methods. Trail sweeping will be performed on a regularly scheduled basis.

4. Trash removal

Trash removal from trail corridors is important from both a safety and an aesthetic viewpoint. Trash removal includes removing ground debris and emptying trash containers along the trails. Trash removal will take place on a regularly scheduled basis, the frequency of which will depend on trail use and location.

5. Tree and shrub pruning

Tree and shrub pruning will be performed for the safety of trail users. Pruning will be performed to established specifications on a scheduled and as needed basis, the frequency of which will be fairly low.

6. Mowing of vegetation

The trails maintenance personnel will mow the vegetation along trail corridors on a scheduled basis only where mowing is not performed by other agencies or park districts.

7. Scheduling Maintenance Tasks

Inspections, maintenance, and repair of trail related concerns will be regularly scheduled. Inspection and repair priorities should be established, dictated by trail use, location, and design. Scheduling maintenance tasks is a key item towards the goal of a consistently clean and safe trail system.

Maintenance to be performed on an irregular or as needed basis:

1. Trail Repair

Repair of asphalt or concrete trails will be closely tied to the inspection schedule. Prioritization of repairs is part of the process. The time between observation and repair of a trail will depend on whether the needed repair is deemed a hazard, to what degree the needed repair will affect the safety of the trail user, and whether the needed repair can be performed by the trails maintenance crew or if it so extensive that it needs to be repaired by outside entities.

2. Trail Replacement

The decision to replace a trail and the type of replacement depends on many factors. These factors include the

age of the trail, and the money available for replacement. Replacement involves either completely overlaying an asphalt trail with a new asphalt surface, or replacement of an asphalt trail with a concrete trail. In general, replacing asphalt trails with concrete is desirable. (A discussion of the different philosophies concerning the replacement of an asphalt trail with a concrete surface can be found elsewhere in the Bicycle Master Plan.) Parks Planning will coordinate all trail replacement, and the Trail Coordinator will recommend trails for replacement.

3. Snow and ice removal

The trails maintenance crew, with the help of the various districts, will remove snow from all city trails as soon as possible after a snowfall. The trails crew will provide help as needed to any district. Ice control and removal of ice build-up on trails is a continual factor because of the freeze-thaw cycle, . Ice control is most important on grade changes and curves. Ice can be removed or gravel/ice melt applied. After the ice is gone, leftover gravel should be swept as soon as possible.

4. Weed control

Weed control along trails will be limited to areas in which certain weeds are creating a hazard to users. An example is the "goathead" thorns deposited on trails in some areas. Environmentally safe weed removal methods should be used, especially along waterways.

5. Trail Edging

Trail edging maintains trail width, and increases trail drainage. In the past, sweeping operations and failure to sweep to the edge have created berms on both sides of some trail sections. In addition, uphill slopes adjacent to the trails have eroded onto some trail sections. Removal of this material will facilitate proper draining of the trail surface, allow the flowing action of the water to clean the trail, and limit standing water on trail surfaces. Proper drainage of trail surfaces will also limit ice build-up during winter months.

6. Trail drainage control

In places where low spots on the trail catch water, trail surfaces should be raised or drains built to carry away water. Some trail drainage control can be achieved through the above-mentioned edging of trails. Wherever trail drainage is corrected near steep slopes, the possibility of erosion must be considered.

7. Trail signage

Trail signage falls into two categories: safety and information. Overall, trail users should be informed via signage of where they are, where they are going, and how to use trails safely. Signs related to safety are most important and should be considered first. Information signage can enhance the trail users experience. A citywide system of trail information signage should be a goal.

8. Revegetation

Areas adjacent to trails that have been disturbed for any reason should be revegetated to minimize erosion.

9. Habitat enhancement and control

Habitat enhancement is achieved by planting vegetation along trails, mainly trees and shrubs. Enhancement can improve the aesthetics of the trail, help prevent erosion, and provide for wildlife habitat. Habitat control involves mitigation of damage caused by wildlife. An example is the protection of trees along waterways from damage caused by beavers.

10. Public awareness

Creating an understanding among trail users of the purpose of trails and their proper use is a goal of public awareness. Basic concepts of trail use include resolution of user conflicts, and speed limitations. The philosophy of trail use is not a direct concern of the maintenance program, but is certainly of interest. Also, trail representatives should be easily accessible to field questions and concerns.

11. Trail program budget development

A detailed budget should be created for the trails program, and revised on an annual basis.

12. Volunteer coordination

The use of volunteers can help to increase public awareness of trails, and provide a good source of labor for the program. Possible sources of volunteers include Boy Scout troops, school groups, church groups, trail users, or court workers. Acknowledgement of volunteers' concerns are important, as are possible incentives or recognition of work performed. Implementation of an "Adopt-a-Trail" program should be considered.

13. Records

Good record-keeping techniques are essential to an organized program. Accurate logs should be kept on items such as daily activities, hazards found and action taken, maintenance needed and performed, etc. Records can also include surveys of the types and frequency of use of certain trail sections. This information can be used to prioritize the needs of trail management.

14. Graffiti control

The key to graffiti control is prompt observation and removal. During scheduled trail inspections, occurrences of graffiti should be noted, and the graffiti removal crew promptly notified.

15. Mapping

Many detailed maps are privately marketed and available for the trail user. From a maintenance standpoint, a more detailed map of the Denver trail system than is presently available is needed for internal park use.

16. Coordination with other agencies

Maintenance of trails located within more than one jurisdiction, like the Platte River Trail and the High Line Canal Trail, is provided by the government agencies in addition to the Denver Parks and Recreation Department. A clear understanding of the delegation of maintenance responsibilities needs to be established to avoid duplicating efforts or missing maintenance on sections of the trails.

17. Education and interpretation

Many segments of the Denver trail system contain a wealth of opportunities for education and interpretation. A successful example operated through the Denver Public Schools is the Greenway Experience, which has been in place for many years. The greatest opportunities exist on trails located along waterways where concepts about urban wildlife and ecology can be easily viewed and learned. Educational opportunities range from interpretive signage to educational tours.

18. Law enforcement

A greater law-enforcement effort might be made toward the goal of a safer trail system. Law enforcement agencies should be aware about the location of trails, and the types and levels of use they receive. Sections of trail corridors being used by transients is an ongoing problem that is not easily solved. Increased law enforcement awareness will be addressed on an as needed basis.

19. Proper training of employees

Properly training maintenance employees is essential to the efficient operation of the trails maintenance program. All employees should be thoroughly trained to understand and be aware of all of the above-mentioned aspects of trail maintenance. Safety, a good work ethic, and proper care of equipment and tools will always be the backbone of a good training program. Employees must also be aware of the need for positive public contact. Proper positive attitude towards public questions and concerns is important, as is the conveyance of this information to trail supervisors.

Priority Intersections - Bicycle Detection Loops

Lowell Blvd & W. 46th Avenue*1
Federal Blvd & W. 46th Avenue*
Federal Blvd & 35th Avenue
Tennyson Street & Evans Avenue
Raleigh Street & Yale Avenue
York Street & 21st Avenue*1
Esplanade & 17th Avenue*
Steele Street & 17th Avenue 2
Colorado Blvd & Montview Blvd*2
Colorado Blvd & 12th Avenue
Holly Street & Cherry Creek Drive
Santa Fe Drive & Iowa Avenue*2
Logan Street & Iowa Avenue*
Franklin Street & Louisiana Avenue*
Franklin Street & Evans Avenue
University Blvd & Florida Avenue
University Blvd & Iliff Avenue
Colorado Blvd & Iliff Avenue 2
Holly Street & Hampden Avenue 2

Underlining indicates that only that particular street needs bicycle sensitive loops at the intersections since the green would normally be given to the intersecting street until cross traffic is detected.

* indicates signals on routes which will be receiving bicycle improvements with other projects.

NOTE: Funding was approved by City Council in the January 1, 1993 Budget.
Further study by staff indicated that some locations can be addressed through other appropriate measures to be determined relative to the following:

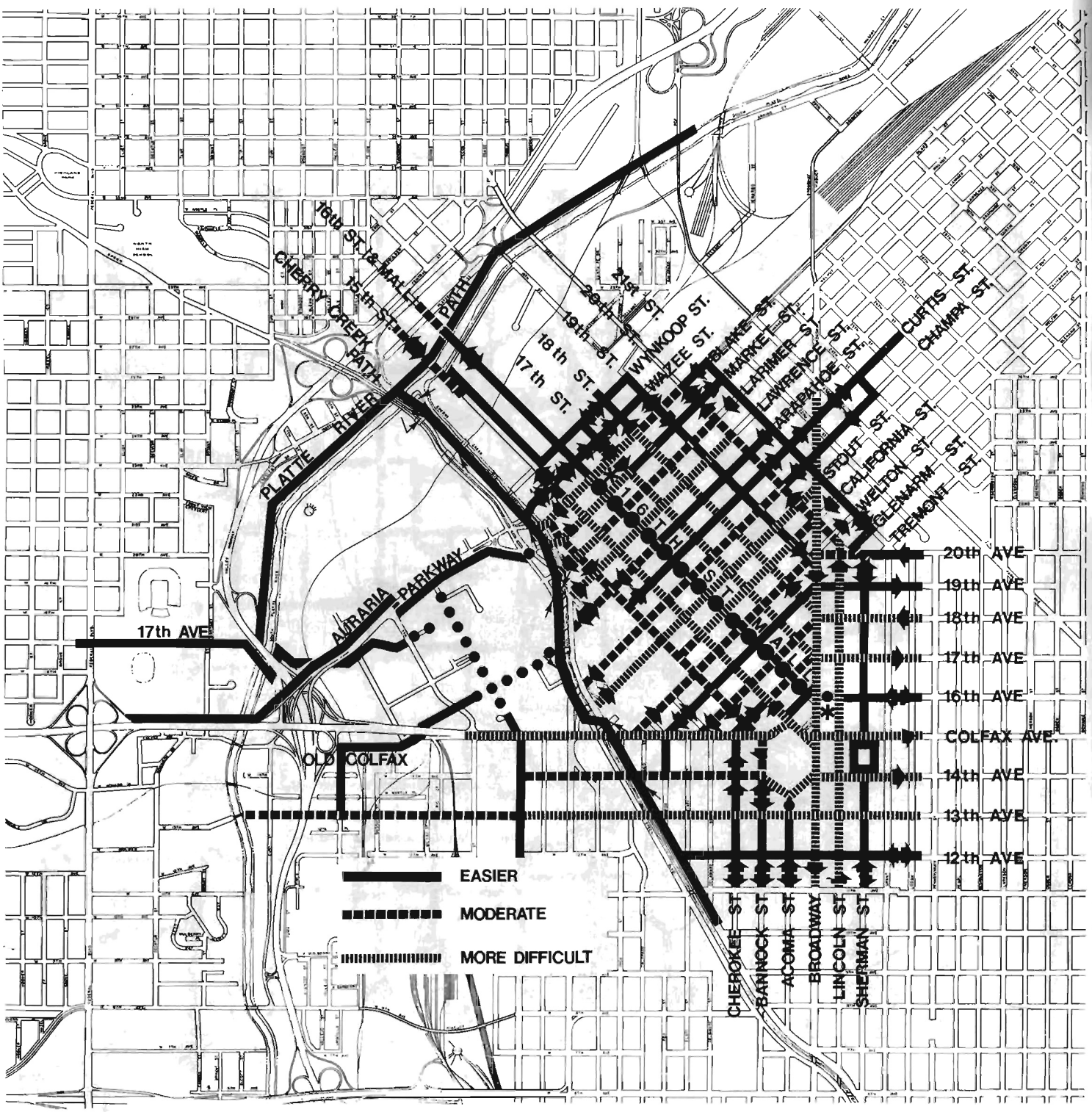
1. Signal currently operates on fixed-time cycle.
2. Additional study may be necessary to determine best solution.

COVER ART

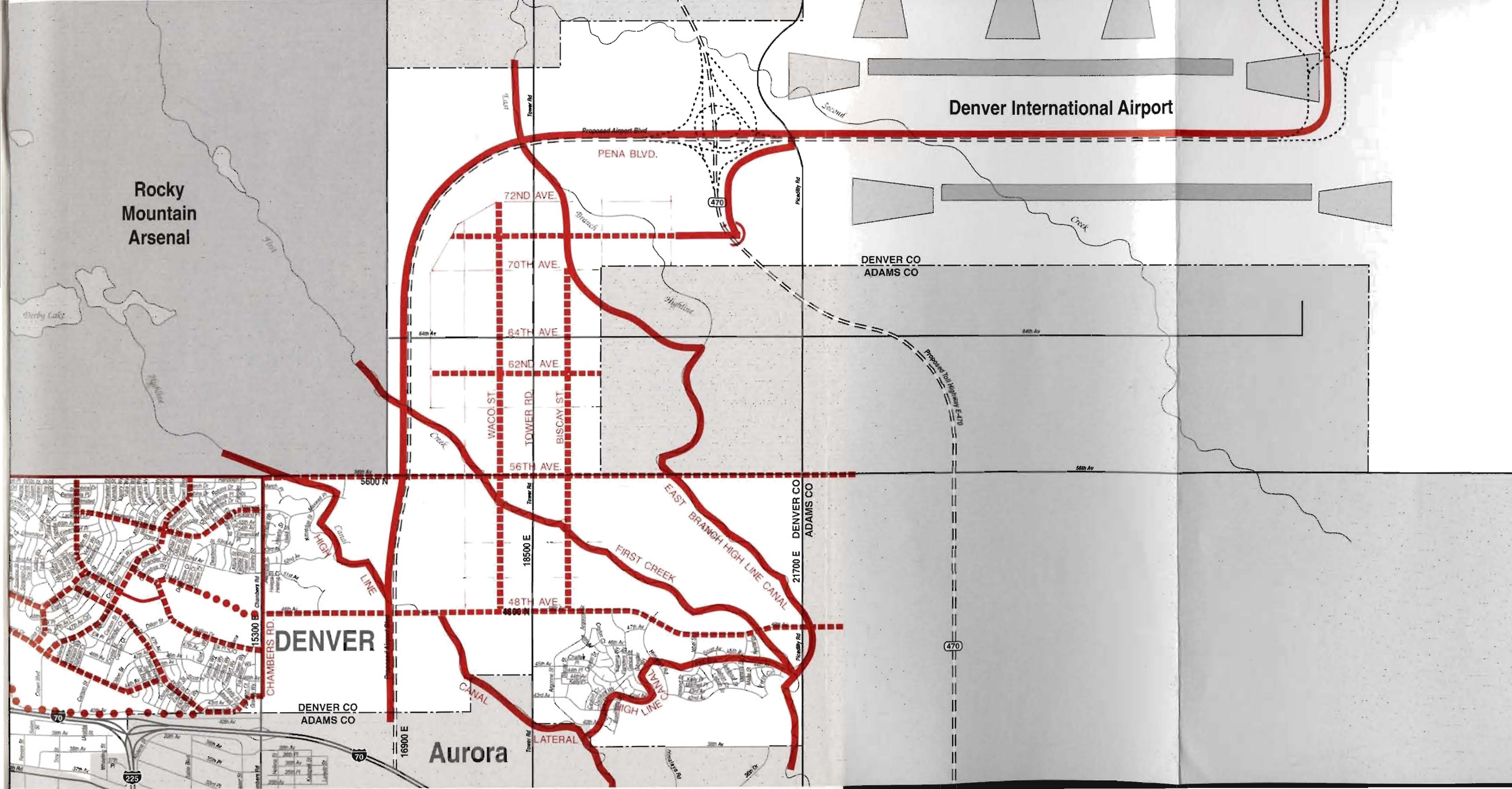
We are very grateful to
local artist
Andrew Carson
for allowing us to use
his artwork on
the cover of this plan.

Andrew Carson Design
2948 Eagle Way
Boulder, Co 80303
1-800-892-9985

WAYFINDER SIGNAGE SYSTEM MAP



STREET SUITABILITY MAP: DOWNTOWN DENVER


Rocky Mountain Arsenal
Denver International Airport
PENA BLVD.
72ND AVE.
70TH AVE.
64TH AVE.
62ND AVE.
56TH AVE.
48TH AVE.
WACO ST.
TOWER RD.
BISCAY ST.
CHAMBERS RD.
DENVER
DENVER CO
ADAMS CO
Aurora
HIGH LINE CANAL
EAST BRANCH HIGH LINE CANAL
FIRST CREEK
LATERAL
Proposed Toll Highway E-470
470
5600 N
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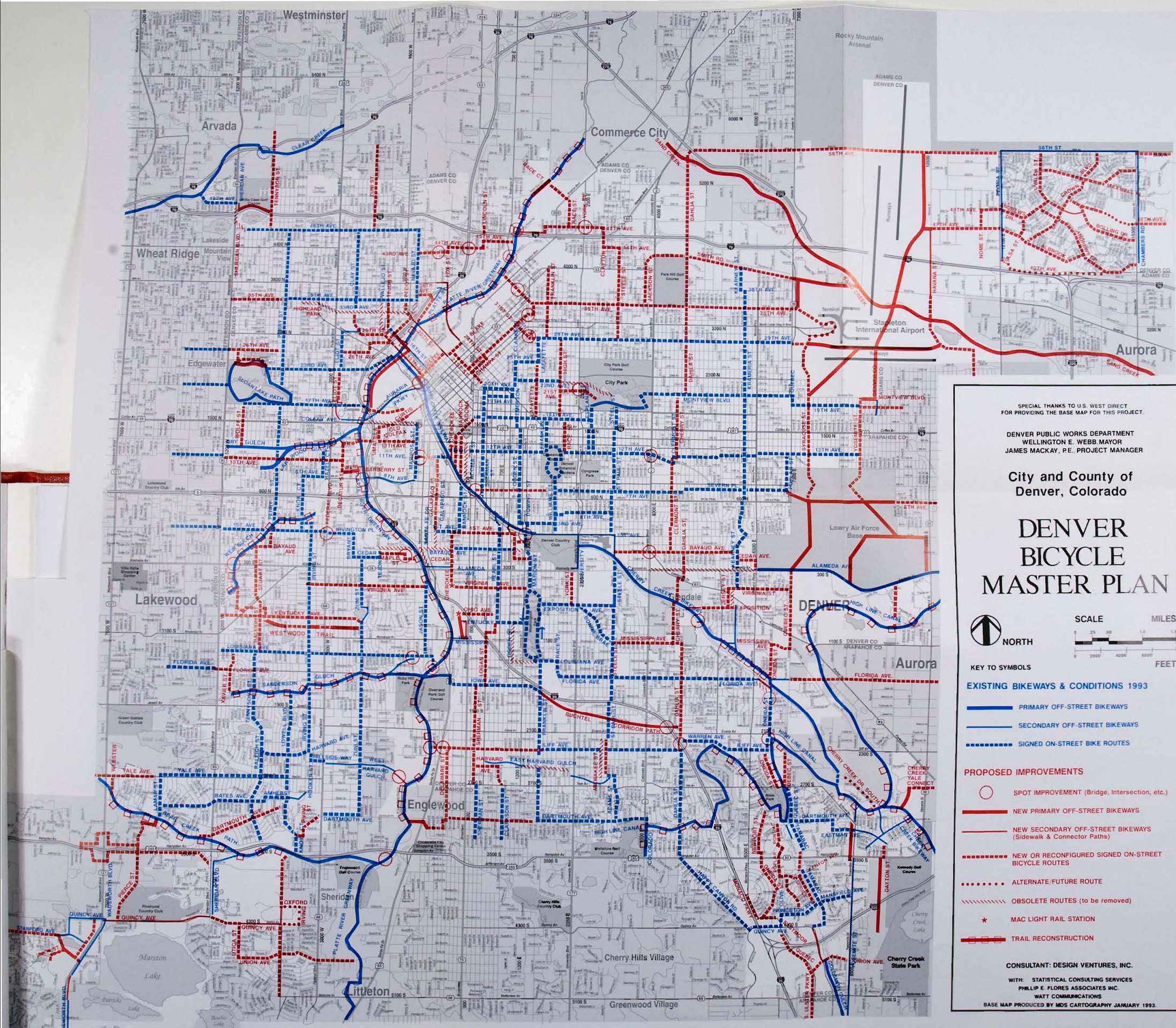
15300 E
16900 E
18500 E
21700 E



SPECIAL THANKS TO U.S. WEST DIRECT FOR PROVIDING THE BASE MAP FOR THIS PROJECT.

DENVER PUBLIC WORKS DEPARTMENT
WELLINGTON E. WEBB MAYOR
JAMES MACKAY, P.E., PROJECT MANAGER

City and County of Denver, Colorado

DENVER BICYCLE MASTER PLAN

NORTH

SCALE MILES

0 .25 .50 1.0 1.5

0 2000 4000 6000 FEET

KEY TO SYMBOLS

EXISTING BIKEWAYS & CONDITIONS 1993

- PRIMARY OFF-STREET BIKEWAYS
- SECONDARY OFF-STREET BIKEWAYS
- SIGNED ON-STREET BIKE ROUTES

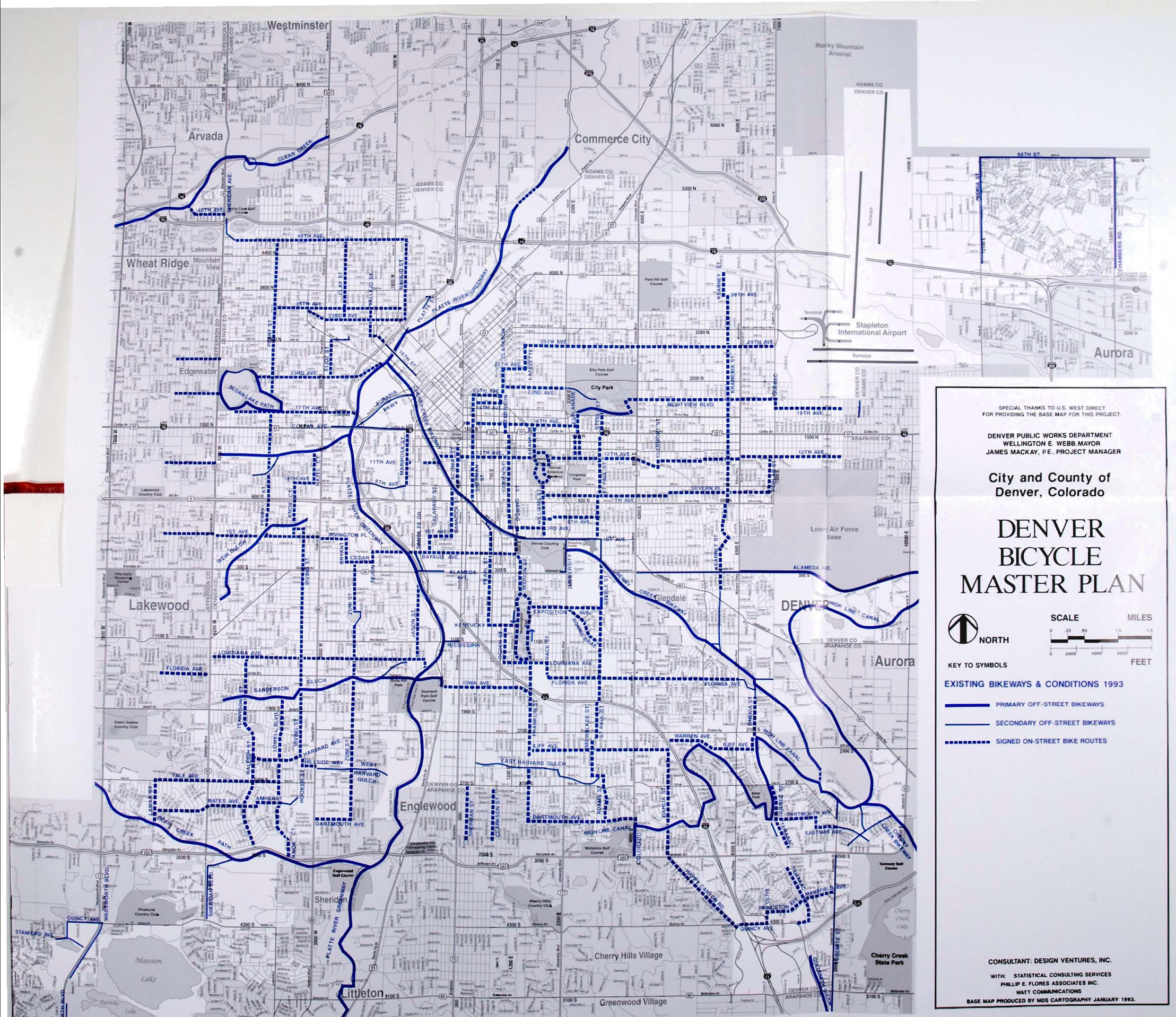
PROPOSED IMPROVEMENTS

- SPOT IMPROVEMENT (Bridge, Intersection, etc.)
- NEW PRIMARY OFF-STREET BIKEWAYS
- NEW SECONDARY OFF-STREET BIKEWAYS (Sidewalk & Connector Paths)
- NEW OR RECONFIGURED SIGNED ON-STREET BICYCLE ROUTES
- ALTERNATE/FUTURE ROUTE
- OBSOLETE ROUTES (to be removed)
- MAC LIGHT RAIL STATION
- TRAIL RECONSTRUCTION

CONSULTANT: DESIGN VENTURES, INC.

WITH: STATISTICAL CONSULTING SERVICES
PHILLIP E. FLORES ASSOCIATES INC.
WATT COMMUNICATIONS

BASE MAP PRODUCED BY MDS CARTOGRAPHY JANUARY 1993.



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NORTH

SCALE MILES
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FEET

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