

Cherry Creek North Improvements and Fillmore Plaza



Landscape Performance Benefits

- Increased the District sales tax revenues by 16% (over \$1 million) in the first year after construction. This was more than double the rates of increase for both the city and the entire Denver Metro Area. » ⌵
- Decreased retail vacancy rates from 13.6% in 2009 to 7.2% in 2012. » ⌵
- Reduced crime in the District by 39%, from 180 incidents in 2009 to 110 in 2011. » ⌵
- Projected to reduce mid-day air temperatures by 6°C (11°F) as a result of increasing tree canopy on the site by 49%. » ⌵
- Reduces annual water consumption for irrigation by 3,376,000 gallons, saving \$17,600 annually, by replacing over half of the spray-irrigated turf with drip-irrigated, water-wise perennials and shrubs. » ⌵
- Reduces annual energy consumption for outdoor lighting by 223,000 kilowatts, saving \$12,700 in energy and \$1,000 in maintenance and material costs each year. » ⌵
- Removes up to 80% of solids in the stormwater runoff from Fillmore Plaza using an underground water treatment vault. » ⌵ » ⌵
- Saved \$188,000 by reusing 331 light pole footings and bases in place on the site. » ⌵

Designer

Design Workshop, Inc.

Land Use

Retrofit
Mixed-use

Project Type

Streetscape
Courtyard/Plaza
Retail

Location

Fillmore Plaza,
Denver, Colorado 80206

Size

78 acres (16 blocks)

Budget

\$18.5 million

Completion Date

2010 - Phase 1; 2011 - Phase 2

Overview

The 16-block Cherry Creek North retail district was designed to be Denver's premier outdoor shopping area. Yet deteriorating infrastructure, tired aesthetics and competition from an adjacent indoor mall had led to steady decline. Fillmore Plaza in the heart of the district was no longer a desirable public space since being closed to vehicular traffic in 1987. The new streetscape strengthens the retail environment, preserves the district's history and character, improves identity, beautifies the area, provides new lighting, improves signage, and adds 20 "Art and Garden Places" for shoppers to relax and linger. The redesigned Fillmore Plaza is now a vibrant hybrid street closed off to traffic only during planned pedestrian events. » ⌵

Sustainable Features

- Fillmore Plaza was reopened to vehicles as a hybrid two-way street. Retractable stainless steel bollards block vehicular traffic through the Plaza for special events. To accommodate both large and small events, the northern half is curbsless, has no on-street parking and provides a relatively level area for functions. The southern half, with a 4" rolled curb section and 10 on-street metered parking spaces, has been designed for larger tents and event staging. » ⌵ » ⌵
- 21,700 new plants, including 196 new trees were planted in the District. 5 mature red oaks and 2 mature locust trees were preserved and transplanted to other locations in the District.
- A computer-controlled, centralized "smart" irrigation system conserves water by eliminating leaks and water loss, preventing overspray, and more efficiently and accurately measuring of the amount of water needed for optimum plant health. » ⌵
- A linear trench drain in Fillmore Plaza captures runoff and conveys it to an underground stormwater treatment vault where it is detained and filtered before being released into

Denver's storm sewer system. The vault, located under Fillmore Street south of 2nd Avenue, can manage runoff from up to a 5-year storm. Any excess will bypass the structure internally and externally (depending on the intensity) and exit the site at other downstream inlets.» ζ

- LED lights on 360 new pedestrian light fixtures, 83 banner poles and 21 directories save energy and reduce light pollution. One-bulb, custom light poles improve the quality of the pedestrian environment at night. The mercury-free LED street lamp bulbs are safe for landfills.» ζ
- 20 new "Art and Garden Spaces," which contain signature art features, benches, tables and chairs, create distinct areas throughout the district, enrich the pedestrian experience, and encourage people to relax and linger.
- 40 single-stream recycling receptacles are paired with trash receptacles at intersections to encourage recycling and reduce impact on local landfills.» ζ
- 160 pedestrian light poles, 12 benches, 10 trash receptacles, and 2,450 cubic yards of organic materials from the existing street were donated to local communities for reuse.
- Bike racks installed throughout the District make it convenient to navigate by bicycle. Two B-cycle stations were located within the District as part of Denver's bicycle sharing program.
- More than 53 new street signs, 37 street identification banners, 46 new marketing banners, 17 new parking directory signs, and 21 new free-standing directory map structures enhance navigation and walkability in the District.

Challenge

Threatened by high on-going maintenance costs, deteriorating infrastructure, tired aesthetics and competition from an adjacent indoor mall that drained retail dollars from the stores and activity from the pedestrian realm, the design team faced the challenge of enlivening this stagnant retail district, with an emphasis on Fillmore Plaza. Not all stakeholders agreed on the design direction for Fillmore Plaza, with some wanting the space reopened to vehicular traffic and others wanting the plaza to remain solely pedestrian. If reopened, the new Fillmore Plaza would need to function both as a two-way street and as a hub capable of hosting large and small events. Another challenge was that retail needed to stay open during construction with access to the stores maintained.

Solution

It was determined that the retail in the district was suffering from lack of access and exposure to shoppers.» ζ Through extensive visioning, public outreach, and multiple iterations, the design team was able to come up with a design that appealed to all stakeholders. Fillmore Plaza» ζ was redesigned as a hybrid street, open to two-way traffic with retractable stainless steel bollards that could close the street to vehicular traffic for events. The design would increase pedestrian space» ζ, enhance amenities» ζ, and strengthen the retail environment. All retail shops remained open during construction with a 5-ft pathway accessible to each entrance. Movable signs showed changes to parking and access, and weekly meetings informed retail owners of upcoming alterations.

Cost Comparison

- Over half of the spray-irrigated turf » ζ grass area was replaced with drip-irrigated, water-wise perennials and shrubs» ζ. This reduces annual water consumption for irrigation by 3,376,000 gallons, saving \$17,600. The low-water plants are estimated to save an additional \$10,000 per year in reduced maintenance costs.

Lessons Learned

- Since this was a renovation project, there were unforeseen objects under the ground, which created obstacles that altered the final design. Some of the biggest obstacles were the existing tree roots, which required adjustments to the planting and hardscape areas, causing project delays and change orders. The initial goal was to provide hardscape access to all of the new smart meters via an 18"-wide step-out strip behind the curb. However, in some instances the tree roots were in conflict with these strips. After deliberation from different city agencies, preserving the roots took priority, and the strips were removed. This has created additional maintenance due to foot traffic in the turf areas and shrub beds near the parking meters.
- Local skateboarders grew fond of the existing planter walls once they were resurfaced. Subsequently the Business Improvement District chose to install stainless steel 'blades' cut into the walls with 3' on-center spacing. This has seemed to deter widespread damage to the walls.

Project Team

Client: Cherry Creek North Business Improvement District
 Landscape Architect: Design Workshop, Inc.
 Environmental Graphics Consultant: Stantec/CommArts

Civil Engineering Consultant: JVA, Inc.
Lighting Design Consultant: Patrick B. Quigley Associates
Electrical Engineering Consultant: SSG MEP (formerly Scanlon Szynskie Group, Inc.)
Irrigation Consultant: HydroSystems-KDI, Inc.
Traffic Consultant: Fehr and Peers
Horticultural Specialist: Bloomin' Designs
Program Manager: NV5 (formerly Nolte Associates)
General Contractor: The Weitz Company
Unit Paver and Stone Wall Contractor: Gallegos Corporation
Landscape Contractor: ValleyCrest Landscape Development
Electrical Contractor: Weifield Group
Environmental Graphics Contractor: Urban Fabrication
Surveyor: Engineering Service Company
Geotechnical Testing: Ground Engineering
Concrete Wall Renovation Specialist: Restoration Concrete, Inc.
Concrete Paving Contractor: Clem 'N' Sons Concrete
Arborist/Tree Care: Swingle Lawn Tree and Landscape Care
Demolition Contractor: OE Construction Corporation
Traffic Control: Highway Technologies
Major Product Suppliers: Endicott Clay Products, Kornegay, Landscape Forms, Miracote, Neenah Foundry, Pavestone

Role of the Landscape Architect

The landscape architect created guiding principles, designed the site, reviewed the quality of construction, and headed a diverse team of specialists in environmental graphics, transportation planning, civil engineering, lighting design, electrical engineering, structural engineering, and irrigation design. In seeking public involvement and consensus, the design team held monthly meetings with extensive stakeholder input.

Case Study Brief Prepared By:

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Research Assistant: Yue Zhang, MLA candidate, Utah State University
Research Assistant: Pamela Blackmore, BLA candidate, Utah State University
Firm Liaisons: Allyson Mendenhall, Jamie Fogle, and Todd Johnson, FASLA, Design Workshop
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References & Resources

Cherry Creek North: The New North is Here
ASLA Colorado Chapter Merit Award for Design, 2011 (Fillmore Plaza)
International Downtown Association Downtown Merit Award, 2011 (Cherry Creek North)
Engineering News Report: Redesigned Fillmore Plaza in Denver Serves Multiple Purposes (2011)
CBS4 Denver: Good News for Retailers in Cherry Creek North (2011)
CBS4 Denver: Fillmore Plaza in Cherry Creek Getting a Makeover (2011)
In Denver Times: Fight Brewing over Fillmore Plaza (2010)
Life on Capitol Hill: CCN Facelift set to start (2009)

Additional Images

















LANDSCAPE PERFORMANCE SERIES

Cherry Creek North Improvements and Fillmore Plaza Methodology for Landscape Performance Benefits

- **Increased the District sales tax revenues by 16% (over \$1 million) in the first year after construction. This was more than double the rates of increase for both the city and the entire Denver Metro Area.**

Based on 2010 year-end sales tax receipt figures, the Cherry Creek North BID received \$7,389,285 in sales tax, which is a 16% increase compared to 2009 (\$6,363,315). This rate more than doubled the surrounding areas. Compared to 2009, sales tax receipts in 2010 increased 6.5% in Colorado, 7.1% in the Denver Metro Area, and 6.5% in the City of Denver. The calculation of this performance benefit is listed below.

$$(\$7,389,285 - \$6,363,315) \div \$6,363,315 = 16\%$$
$$16\% \div 7.1\% = 2.25 \text{ (more than doubled)}$$

- **Decreased retail vacancy rates from 13.6% in 2009 to 7.2% in 2012.**

The walkable and desirable new streetscape keeps the District strong in a competitive retail environment. According to the Aggregate Historical Vacancy Report and Cherry Creek North BID Economic Indicators, the vacancy rate in 2011 was 9.8%, which has declined by 3.8% from 2009 (13.6%). The vacancy rate was further declined to 7.2% in March, 2012, the lowest value since 2008.

It is also worth mentioning that the District has 1,053,174 SF retail space. There has been no increase in retail square footage since 2008.

- **Reduced crime in the District by 39%, from 180 incidents in 2009 to 110 in 2011.**

“This is something everyone knows: A well-used city street is apt to be a safe street. A deserted city street is apt to be unsafe.” -- Jane Jacobs

The upgraded infrastructure and new lighting system created a safe environment for pedestrians. In addition, the 20 new “Art and Garden Places” create distinct areas throughout the District enriching the pedestrian experience, reinforcing the unique character of the District, and encouraging people to take a moment to relax and linger. These small open spaces increase the vitality of the District and make it safer to pass through.

This crime result is based on the dot counting from the Denver Crime Statistics & Maps. The crime statistics use National Incident Based Reporting System (NIBRS), an incident-based reporting system in which agencies collect data on each single crime occurrence. The crime number in this 16-block District is largely reduced from 180 in 2009 to 110 in 2011.

(Source: Denver City Crime Maps 2009 and 2011, Denver Police Department, <http://www.denvergov.org/PoliceDepartment/CrimeInformation/CrimeStatisticsMaps/tabid/441370/Default.aspx>)

- **Projected to reduce mid-day air temperatures by 6°C (11°F) as a result of increasing tree canopy on the site by 49%.**

Measured from the site base map, there were 528 existing trees within the project boundary. The project installed an additional 258 shade trees. The calculation here is based on the 10-year projected outcome. Canopy size of a large deciduous tree is about 250 SF, and an ornamental deciduous tree is about 175 SF. Assuming that the quantity of the street trees is split 50/50, then the average shaded area is 212.5 SF per tree. Therefore the total additional shaded area is:

$$212.5 \text{ SF per tree} \times 258 \text{ trees} = 54,825 \text{ SF}$$

Temperatures are lower under tree canopies due to shading and evapotranspiration. Maximum mid-day air temperature reductions due to trees are in the range of 0.04°C to 0.2°C per percent canopy cover increase (Nowak). This study has two assumptions: (1) 50% of the trees are large deciduous trees and the other 50% are ornamental deciduous trees, and (2) The site's mean air temperature will on average drop 0.12°C with every 1% increase in canopy cover.

- Shaded area before construction: 212.5 SF/tree × 528 trees = 112,200 SF
 - Projected 10-year outcome after construction: 112,200 SF + 54,825 SF = 167,025 SF
 - Increased percentage of shaded area: 54,825 ÷ 112,200 = 48.9%
 - Reduction of air temperature due to the increase of tree canopy: 48.9 × 0.12°C ≈ 6 °C
- **Reduces annual water consumption for irrigation by 3,376,000 gallons, saving \$17,600 annually, by replacing over half of the spray-irrigated turf with drip-irrigated, water-wise perennials and shrubs.**

All of the following calculations in this project (except for the property value calculation) used 2008 as the baseline year and 2011 as the comparison year. The project replaced over half of the spray-irrigated turf with drip-irrigated, water-wise perennials and shrubs, that reduced annual landscape water consumption from 9,582,000 gallons in 2008 to 6,206,000 gallons in 2011 (data from Hydro Systems, Inc.). Denver utility tracking spreadsheets showed that 2008 winter irrigation consumption (October 28 through May 2) was 0 gallons, and summer (May 3 through Oct 27) was 9,582,000 gallons. In 2011, after the landscape improvements, winter-water consumption totaled 378,000 gallons, and summer 5,828,000 gallons. The amount of water budget saved in this project is calculated as follows:

Irrigation water rate in Denver is \$1.20 per 1,000 gallons in the winter (October 28 through May 2), and \$4.81 per 1,000 gallons in the summer (May 3 through Oct 27).

Water savings were calculated by subtracting water costs in 2011 by 2008:

$$\$4.81 \times 9,582 - (\$1.20 \times 378 + \$ 4.81 \times 5,828) = \$46,089 - \$28,486 = \$17,603$$

- **Reduces annual energy consumption for outdoor lighting by 223,000 kilowatts, saving \$12,700 in energy and \$1,000 in maintenance and material costs each year.**

The project uses full-cutoff lights and LED lights to reduce the energy cost. The full cutoff lights are more effective than other fixtures, since light that would otherwise have escaped into the atmosphere may instead be directed towards the ground (Wikimedia Foundation). Therefore, the use of full cutoff fixtures can allow for lower wattage lamps to be used in the fixtures, producing equal or sometimes a better effect. In this project, the pedestrian light pole design has reduced the number of lamps per pole from three to one because of using full-cutoff lights. The LED lighting also contributes to the energy savings in this District. Typically the LED lights will use less than 10% electricity than the replaced incandescent bulb.

Based on the Scanlon Szynskie Group lighting consultant's power consumption spreadsheet, energy consumption decreased from 420,756 kW in 2008 to 197,806 kW in 2011. Thus the energy savings in this project is 420,756 kW – 197,806 kW = 222,950 kW.

The annual capital cost saving is calculated by subtracting the 2011 cost (\$24,901.84) from the 2008 baseline cost (\$37,635.70). The result is \$12,733.86.

The project installed LED lights on 83 banner poles and 21 directories. LED lights have a very long lifespan, usually greater than 50,000 hours, which is at least four times of conventional outdoor lighting. As a result, the District does not need to replace bulbs as often, which in turn reduces the quantity of lights and offsite storage costs. These costs total approximately \$1,000 per year.

Detailed numbers were provided by Cherry Creek North Business Improvement District (BID).

Wall	Total Length (ft)	Section Height (ft)	Section Width (ft)	Total volume (CF)	Estimated % concrete	Concrete			Actual Trap Rock Used			Additional Trap Rock needed if not using Concrete			
						Volume concrete (CF)	total lbs (110 lbs/cf)	total tons (2,000 lbs)	Volume trap rock (CF)	total lbs (185 lbs/cf)	total tons (2,000 lbs)	Volume of trap rock (CF)	total lbs (185 lbs/cf)	total tons (2,000 lbs)	
1	166	3	2	747	0%	0	0	0	747	138,195	69	0	0	0	
2	170	3	2	765	0%	0	0	0	765	141,525	71	0	0	0	
4	200	3	3	1,800	50%	900	99,000	50	900	166,500	83	900	166,500	83	
7	309	3	3	2,781	50%	1,391	152,955	76	1,391	257,243	129	1,391	257,243	129	
8	258	3	3	2,322	50%	1,161	127,710	64	1,161	214,785	107	1,161	214,785	107	
10	45	3	3	405	50%	203	22,275	11	203	37,463	19	203	37,463	19	
11	45	3	3	405	50%	203	22,275	11	203	37,463	19	203	37,463	19	
12	95	3	3	855	50%	428	47,025	24	428	79,088	40	428	79,088	40	
13	10	3	3	90	50%	45	4,950	2	45	8,325	4	45	8,325	4	
A	5	3	3	45	25%	11	1,238	1	34	6,244	3	11	2,081	1	
B	30	3	3	270	25%	68	7,425	4	203	37,463	19	68	12,488	6	
C	27	3	3	243	25%	61	6,683	3	182	33,716	17	61	11,239	6	
D	27	3	3	243	25%	61	6,683	3	182	33,716	17	61	11,239	6	
E	15	3	3	135	25%	34	3,713	2	101	18,731	9	34	6,244	3	
F	43	3	3	387	25%	97	10,643	5	290	53,696	27	97	17,899	9	
G	50	3	3	450	25%	113	12,375	6	338	62,438	31	113	20,813	10	
H	250	3	3	2,250	45%	1,013	111,375	56	1,238	228,938	114	1,013	187,313	94	
						Total Ton of Concrete		318	Total Ton of Trap Rock		778	Ton of Trap Rock		535	
						cost per ton		15	cost per ton		56.00	cost per ton		56.00	
						Total cost of Concrete		4,772	total cost of Trap Rock		43,555	Cost of Trap Rock		29,965	
						Total concrete used (ton)		318	<u>truck trips avoided</u>						
						Total cost of concrete used		4,772	Additional trap rock needed if no concrete: 535 tons						
						Additional cost of trap rock if no concrete was used		29,965	Tons per truck load:						35
									Trips avoided:						15
						Total savings by using concrete		25,193	Miles per round-trip between supplier in Canada to Troy:						736
									Total miles avoided:						11,250

- **Removes up to 80% of solids in the stormwater runoff from Fillmore Plaza using an underground water treatment vault.**

A CDS® (continuous deflective separation) stormwater treatment vault is installed in Fillmore Street south of 2nd Avenue to treat the 5-year storms and to discharge the treated runoff into Denver's stormwater drainage system. Runoff captured from the trench flows through the diversion weir which allows bypass to occur when discharge exceeds the capacity of the stormwater treatment vault. The CDS system uses induced vortex to separate and trap debris, sediment, and oil and grease. Floatable and neutrally buoyant contaminants are held within the separation chamber while negatively buoyant debris is stored in the sump.

The CDS system is effective in removing the pollutants in the stormwater. Laboratory evaluations show that the CDS units are capable of removing 70% of the free oil and grease from stormwater (Contech CDS Operations and Maintenance Guidelines for CDS Units). Typically in the United States, CDS system are designed to achieve an 80% annual solids load reduction based on lab

generated performance curves for a gradation with an average particle size of 125-microns (um) (Contech CDS Guide).

- **Saved \$188,000 by reusing 331 light pole footings and bases in place on the site.**

The unit price of a new footing was approximately \$550. The total cost of 331 new footings is:
 $\$550 \times 331 = \$182,000$

The demo cost of removing a light pole from its base is \$142, and the cost for removing a light pole and its base is \$160. Therefore the cost for removing strictly the base is $\$160 - \$142 = \$18$. This resulted in savings of $\$18 \times 331 = \$5,958$ (around \$6,000) for base removal in this project.

Therefore, the total savings in light pole footings and bases are:
 $\$182,000 + \$6,000 = \$188,000$

Methodology for Cost Comparison

- **Over half of the spray-irrigated turf grass area was replaced with drip-irrigated, water-wise perennials and shrubs. This reduces annual water consumption for irrigation by 3,376,000 gallons, saving \$17,600. The low-water plants are estimated to save an additional \$10,000 per year in reduced maintenance costs.**

See Methodology for Performance Benefit #5.

In addition, the low-water landscaping requires less maintenance than turf. Calculated by the irrigation system designer, the annual operating budget was reduced by approximately \$10,000. Therefore, the total saving annually would be: $\$17,603 - \$10,000 = \$7,603$

References

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