

# Engineering / Construction Management

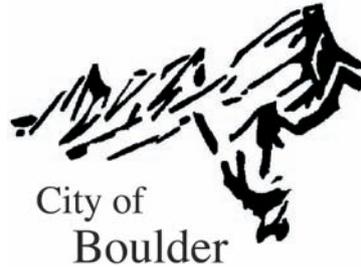
## Broadway Reconstruction – Pine To Iris

Nominating Agency: City of Boulder

**Accomplishment:** The Broadway (Pine to Iris) Reconstruction Project represented a significant public investment in the reconstruction of critical Public Works facilities along a 1.25-mile stretch of one of Boulder's primary arterial corridors. This \$14.8M Public Works project (total design and construction) represented the largest single transportation project ever constructed by City of Boulder, and also included renewal of significant aging public utility facilities. A Federal Highway Administration grant and previous contributions by Colorado Department of Transportation covered approximately two-thirds of the project construction costs.

**Innovation:** The innovations integrated into this reconstruction project were realized through creative funding, opportunistic design and collaborative construction approaches with the contractor to maximize work production while minimizing impacts to the public. Some examples are:

- Funding – State and FHWA funding received through the competitive DRCOG TIP process leveraged available local funding to maximize



the extent of the infrastructure renewal and improvements completed as a single, large urban project.

- Phasing – There were extremely tight work constraints that included

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reconstruction of 16 intersections, five which are signalized. The City and contractor accomplished this very intricate sequencing of roadway

and utility reconstruction work by collaborating and adjusting design details to expedite construction activities while minimizing disruption to utility services and maintaining safe and acceptable access for all modes of travel along this important arterial. Significant night/off-hour work was utilized in a strategic manner to maximize work opportunities and mitigate impacts while also balancing sensitivity to noise impacts.

- Permanent Water Quality Improvements – Larger in-line water quality devices were not feasible along mainline Broadway due to pre-existing utility and space limitations. The project storm sewer included installation of 20 inlets with water quality Snout®s to allow for collection of roadway sediments and eliminating the majority of sediment transport to downstream storm sewer mains and creeks.

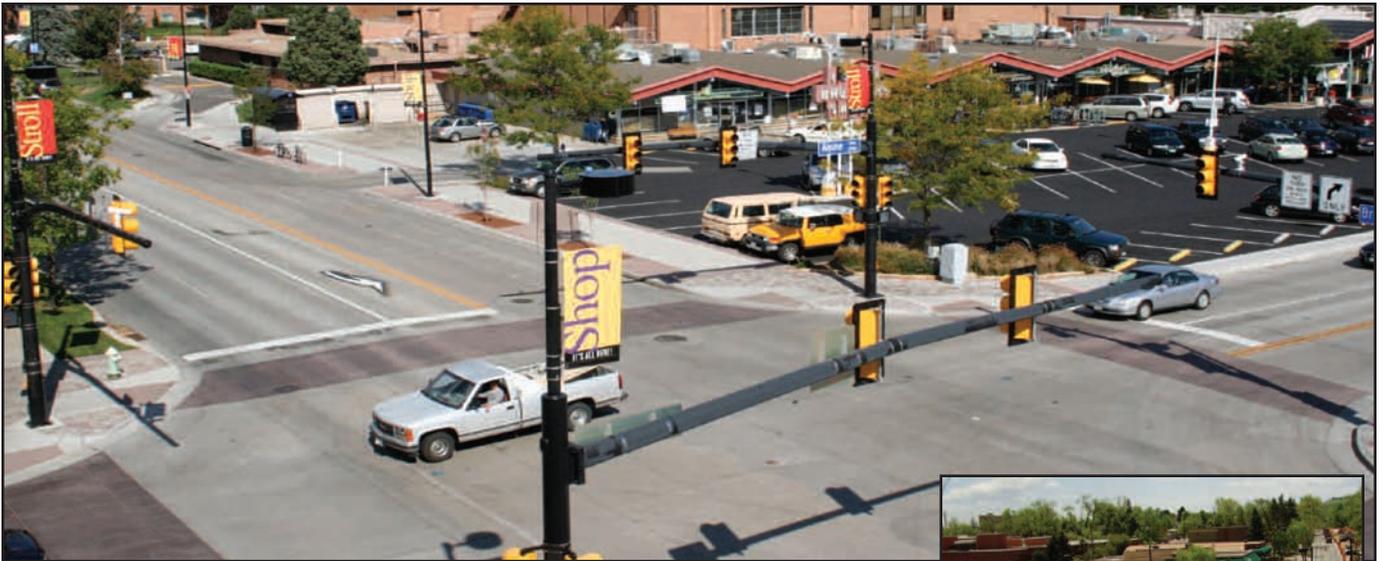


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- Permeable Pavers – Several transit stop boarding areas included permeable paver systems as a trial installation to monitor operations and maintenance aspects of these installations for possible future applications.

- Joint Utility Trench – The City led a joint utility trench installation for the entire 1.25 mile length of the project, which included City fiber-optic conduits and Xcel Energy street lighting conduits the entire length, and conduits for undergrounding overhead electric lines along a portion of the length. Significant cost and implementation efficiencies resulted from one contractor leading the installation of these combined facilities. This joint trench also provided the opportunity for improving electric system redundancy/reliability for a City recreation center and the Xcel Energy system in the corridor.

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were made through detachment, widening, and replacement of selected segments for a safer and more pleasant pedestrian environment. Use of limited available ROW and optimization of roadway/sidewalk grades in the corridor resulted in improved ADA accessibility, and maximized widths of enhanced pedestrian facilities.

**Achievement:** All of the project’s primary objectives and goals were attained and included completion of the following primary Public Works improvements:

- Roadway Reconstruction – Construction of 5.5 lane-miles of new concrete roadway, resulting in a renewed pavement designed to meet traffic needs for over 30 years.
- Pedestrian Facilities Upgrades – Replacement and upgrade of 65,000 square-feet of sidewalk facilities along the corridor. Enhancements

- Transit Stop Enhancements – Installation of improved transit stop amenities including new bus shelters, bike racks, trash receptacles and boarding areas at all 20 transit stops along this section of Broadway. Broadway is the most heavily used transit corridor in Boulder and is served by “SKIP,” RTD’s high frequency service which runs the length of the entire City.

- Public Art and Historic Preservation – A creative historically-themed public art project, Broadway in Motion, was integrated into these trans-

sit stops to honor the historic transportation modes along the corridor. These transportation-themed improvements (decorative glass panels, etched concrete) help educate transit users and create a common fabric tying the entire corridor together.

- Water and Sanitary Sewer Renewal – Replacement of 1.8 miles of aging and corroded public water lines, and replacement of 0.3 miles of aging public sanitary sewer lines. This resulted in a comprehensive renewal of critical lifelines of the City.
- Storm Sewer Installations – Installation of 1.3 miles of new public storm sewer lines. Over half of the project’s 1.25 mile length had no storm sewer systems prior to this project, adversely impacting roadway operations during even minor storm events. The project included new storm sewer systems (48-in. diameter), as a part of the City’s Stormwater Master Plan, collecting runoff from the entire developed area west of Broadway. All storm sewer completed within the project limits was designed to meet current outfall constraints while also allowing for

future extension as part of planned improvements in order to eliminate future impacts to the newly constructed concrete pavement.

- New Public Fiber-Optic Lines – Installation of 4.4 miles of new communications facilities for interconnectivity of various City facilities.
- New Private Utilities – Reconstruction of 1.1 miles of corroded gas lines, installation of 80 new street lights (and new distribution system), and undergrounding of significant overhead utilities by Xcel Energy in conjunction with this City project.
- Landscaping & Urban Streetscape Improvements – The project included selective landscape and urban design improvements in key opportunity areas to enhance the appearance and character of the street, especially in the commercial segment between North and Balsam. Significant efforts towards urban forestry preservation and an infill street tree planting program are also a part of the project.

**Transferable:** Various components of the project listed in the Achievement and Innovation sections are transferable as possible components for inclusion in other Public Works projects including, opportunistic funding approach, and comprehensive combined public/private utility and roadway renewals.

Other components that are transferable include:

- Completion Incentives/Disincentives – The City provided a generally balanced and equal incentive and disincentive for achieving significant project milestones. These milestones recognized the importance of holiday shopping seasons, school-time traffic impacts, and an efficient and aggressive completion of the project. This fair approach helped to contribute to a successful attainment of completion milestones.
- Public Art/Historic Preservation – The City exceeded the NEPA-required historic mitigation required of this project by incorporating local landmark preservation measures,

including preservation of historic stone entrances to Longs Gardens, a unique historic ditch structure head-wall, concrete fence columns/ posts at a local landmark, and creative interpretive integration of historic trolley tracks into various Broadway in Motion transit stop improvements.

- Forestry Preservation – Roadway designs were narrowed and utility installations adjusted to the maximum extent practical in many areas to balance the needs for the public works improvements while preserving a mature urban forestry canopy along the entire corridor. An in-fill street tree planting program is also in the works for Spring 2011 as a part of the project.

**Cooperation:** Public outreach from the planning/design phase and continuing through the entire construction period was crucial in capturing areas of significant public concern and integrating these aspects into the completed improvements. Highlights include:

- Team Building with impacted shopping centers, businesses, Boulder Community Hospital, Boulder Medical Center and other significant corridor interests. The City and contractor paid detailed attention to pedestrian/business/emergency access needs and scheduled coordinated utility service disruptions to proactively mitigate any concerns during project construction. The same impacted shopping centers hosted the City's project dedication event, demonstrating the great collaborative relationship that was realized in a unique public/private team effort.

- Utility Coordination – Design coordination with affected utilities started four years prior to the start of construction to identify and coordinate various work planned. Painstaking phased construction of City and private utility replacements/installations along the corridor and at the 16 reconstructed intersections required careful attention to details to minimize service disruptions and complete the work. Comprehensive private

utility work was completed in conjunction with the project.

- Historic Longs Gardens – This largest farm within the City adjoined Broadway within the project limits. Sensitive reconstruction of roadway and sidewalk improvements along this site resulted in a wider and detached sidewalk, improved landscaping, and preservation of historic stone gateway columns and walls at the entrance, leading to an enhanced view of this North Boulder icon.

- Internal Coordination and Cooperation – The City Public Works team involved many City departments (Parks, Utilities, etc.) to help refine design and maintenance details, address potential impacts and provide for an easily maintained final improvement. The project fronted a City recreation center and impacted a City park site, requiring significant team coordination efforts to maintain access/operations. The City's Parks Department allowed staging for this project on a park site, demonstrating a cohesive, multi-departmental City team.

- Funding, Reviews and Approvals – State and Federal agencies were an integral and cooperative part of the team in administering required Federal funding and NEPA-required project reviews and approvals.

**Summary:** The Broadway (Pine to Iris) Reconstruction Project represented a significant public investment in the reconstruction of critical Public Works facilities along a 1.25-mile stretch of one of Boulder's primary arterial corridors. This \$14.8M Public Works project (total design and construction) represented the largest single transportation project ever constructed by City of Boulder, and also included renewal of significant aging public utility facilities. Intricate phasing complicated project construction however the collaborative team efforts of all involved allowed the City to achieve all of its goals for the project and resulted in completion of the project on time and on budget. ●