THE COLORADO STREET BRIDGE

RESTORATION PROJECT
PHOTOGRAPHS

1991-1993

The Colorado Street Bridge Restoration Project

1991-1993

Tavo Olmos ~ Photographer

Kiewit Pacific Company
De Leuw, Cather & Company
City of Pasadena, Public Works Department

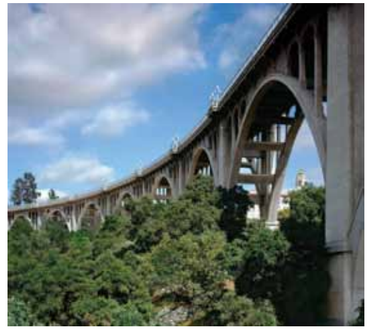
Chronology

1886	*Pasadena City Incorporation*
1912-1913	*Original Construction of Colorado Street Bridge*
1913	*Dedicated December 13, 1913*
1975	*Designated Civil Engineering Landmark*
1979	*Designated Cultural Heritage Landmark*
1981	*Placed on National Register of Historic Places*
1991-1993	*Colorado Street Bridge Rehabilitation Project*
1993	*Rededicated December 13, 1993*

Forward
The Colorado Street Bridge

by Claire Bogaard

In a city famous for its great architecture, the Colorado Street Bridge is one of Pasadena's most loved and recognized landmarks. The bridge's location high above the Arroyo Seco, with the San Gabriel Mountains in the distance to the north, provides a perfect setting for the bridge with its gracious curves and grand arches.



Completed in 1913, it was intended to connect two Pasadena neighborhoods and to assure safe access during any flooding in the Arroyo Seco below.

During its history, the bridge has been threatened more than once. In the 1950s, demolition was suggested when the 134 Freeway was first proposed. Local residents launched a letter campaign calling for protection of the bridge, and the bridge was saved. During the 1970s, state engineers asserted that the bridge needed extensive repairs and was no longer needed because the nearby Route 134 could carry local traffic.

Pasadena Heritage, the historic preservation organization founded in 1977, sprang into action. To call attention to the threat to the bridge and to marshal community support, the organization hosted a party on the bridge. The event captured widespread interest and support, and there followed years of meetings about how to reinforce the structure seismically and restore design elements lost over the years. As support strengthened, federal funding was obtained and in 1991 the bridge closed for rehabilitation.

Two years later, the bridge re-opened, and Pasadena Heritage once again hosted the "Colorado Street Bridge Party," a biennial event of great popularity.

Today, the status of the bridge seems secure and artists and photographers alike are seen pursuing the bridge from its innumerable angles. Thanks to Tavo Olmos' imaginative scenes, the superb photographs of this book will enhance our appreciation of the bridge as readers study its detail, beauty and grandeur.

Introduction

A Bridge as a Work of Art

by Ann Scheid

Many said that "it couldn't be done," and more said that it was too expensive, said Pasadena Mayor Richard Lee Metcalf, speaking at the opening ceremony in 1913. He extolled the bridge not only for its strength and durability, but also for its beauty, which he maintained would bring pleasure to many people. The story of the building of the Colorado Street Bridge is one of meeting the challenges to create a handsome bridge spanning a recognized natural wonder, the Arroyo Seco, and to provide a grand entrance to Pasadena without destroying either the beauty of the Arroyo or the views from its banks. Surmounting difficult engineering problems and investing over $240,000, Pasadena, Los Angeles County, and the bridge designers achieved a bridge that won the admiration of engi neers and citizens alike. Almost immediately it became a destination for countless tourists; its curved concrete span of enormous arches prompted a writer in Scientific American to proclaim it as "one of the few bridges that can properly be classified as a work of art."[1]

As Mayor Metcalf had prophesied, the bridge proved so attractive that it became the subject of countless paintings and photographs. It also attracted the depressed and deranged, earning the notorious label, "suicide bridge," and forcing the erection in the 1930s of barriers atop its graceful balustrade. In the 1980s, when deterioration of its reinforced concrete and fears of earthquake vulnerability threatened the venerated structure, the City of Pasadena, the State of California and the federal government all joined with concerned citizens to come up with almost $30 million to restore the bridge, an act of faith in its enduring symbolic value to Pasadena.

Ceremonies to open the Colorado Street Bridge were held at Carmelita Park at the corner of Orange Grove and Colorado Street on December 13, 1913. After the speeches, a procession of cars decorated with banners and pennants and accompanied by a 16-piece marching band from Pasadena High School wound through the city from Carmelita to Marengo Avenue and then west on Colorado Street and across the bridge. Crossing the 1,467-foot long span, the celebrants enjoyed beautiful views of the Arroyo and the mountains.

Completion of the bridge marked the beginning of Pasadena's civic beautification efforts that eventually culminated in the Bennett Plan and the realization of the Civic Center in the 1920s. Already one of the wealthiest cities per capita in the nation and a desirable winter resort in a salubrious climate, Pasadena boasted of more cars per capita than any other city in the world. Built in a time when motoring for pleasure was a growing pastime, the

1. "Pasadena's Beautiful Bridge," *Scientific American,* December 6, 1913, Vol. 109, No. 23, p. 1.

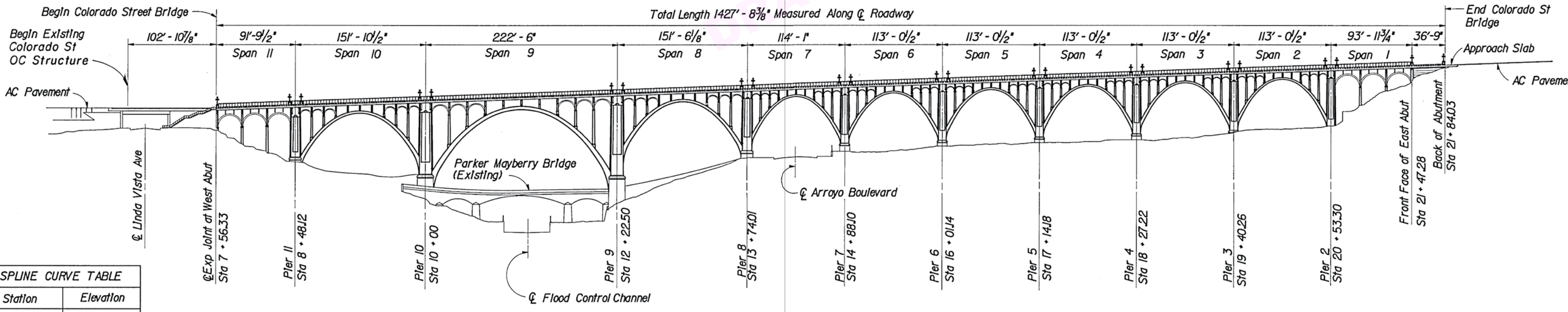
bridge tied into a regional highway network linking the San Gabriel Valley to the Pacific Ocean and opened up the Arroyo's west bank to new residential development, promoting the growth of the city.

Dr. John Low Alexander Waddell of the Kansas City engineering firm Waddell & Harrington was selected to design Pasadena's new bridge. Waddell was internationally known, having built major bridges throughout the United States as well as in Europe and Japan. More importantly, Waddell had studied the aesthetics of bridge design; he advocated harmonizing the bridge with its environment, merging its general outlines with those of the landscape, and considering the various angles from which the bridge would be viewed. Waddell's reputation satisfied skeptical property owners along the Arroyo that the bridge would not spoil their views or reduce their property values. Waddell was also eager to exploit the aesthetic possibilities offered by reinforced concrete; his choice of the material for the Colorado Street Bridge was path-breaking because it would be the longest such span built up to that time.

For the engineers, construction of the bridge presented problems: the difficulty of reaching secure footings in the Arroyo, the fact that the east bank was significantly higher than the west bank, and the question of whether to build from rim to rim or to build a lower bridge across the ravine. Waddell's symmetrical design of a series of nine arches featured a classical balustrade marked by ornamental lights at each of the piers. The bridge would run straight across the ravine, requiring deep footings and also requiring digging out the approach on the east bank. His firm projected a cost of over $240,000, way over the $200,000 budgeted for the project. A proposal from a Los Angeles contractor to pour sections of the bridge and then lift them into place was studied but rejected as too costly.

In the end, the City chose the low bid of $187,500 from local contractor and former City councilman John Drake Mercereau. To save money Mercereau altered Waddell's design, curving the span at the eastern end to shorten the piers and to avoid the expense of digging out the east bank. Construction began in July 1912, with completion set for May 1913.

Skilled carpenters, working at the bottom of the gorge, began to build the hundreds of forms needed for the many arches, girders, spandrels and decorative details. Metal workers fabricated special forms for the capitals on the spandrel columns and other decorative elements.



SPLINE CURVE TABLE	
Station	Elevation

Horse-powered pulleys hoisted the heavy formwork from the streambed to the workmen above. On the east bank a gasoline engine mixed the concrete, which was poured into dump cars running along a rail track. The cars moved by gravity out across the gorge on a trestle supported by the wood framework and later by the partially constructed bridge itself. The liquid concrete was dumped into a hopper and then into steel spouts that emptied into the forms where workmen spaded and compacted it. Steel reinforcing bars were fastened securely in the forms to hold firm during concrete pouring.

The steel bars came from the steel mills of the industrial East; the sand, gravel, and crushed rock for the concrete were hauled in trucks from one mile north in the Arroyo; the timber came from the forests of Northern California; and the cement came from the Riverside Portland Cement Company in Riverside.

That winter high winds swept through the Arroyo, impeding the work, and time was lost when deeper excavations were necessary to reach solid footings. By the end of March 1913, three of the nine arches were finished and work had begun on the fourth. The opening was pushed back to August. By mid-July, with the giant central arch still incomplete, work was speeded up to meet the deadline. Then on August 1, a disastrous accident occurred. An entire section of the form for arch #8 near the west bank fell to the bottom of the Arroyo, taking with it three workmen and tons of liquid concrete, steel and wood.

One man was killed instantly and two others succumbed later to their injuries.

The accident came at quitting time, just as the last load of concrete was dumped into the forms. Eight workmen were in the danger zone, but two saved themselves by jumping to safety onto the solid part of the bridge and three grabbed onto strips of steel rebar protruding from the partially finished structure. The men were rescued by their comrades, who extended ladders out to help them crawl to safety over the void. Faulty falsework construction was blamed for the accident, although none of the officials could explain why the accident had happened, and at the inquest no one could answer the question from a jury member as to whether any life-saving devices such as ropes were available at the work site.

The accident set back the opening by several months, to Thanksgiving. A further delay ensued when it was discovered that the ornamental lighting planned for the bridge had not been included in the budget.

When opening day finally arrived, the celebration on December 13 was a big success with over 2,000 people gathered at the grandstand in Carmelita Park. More than 1,000 automobiles passed over the new bridge before the start of the ceremony

Soon after the opening of the bridge, Pasadena architect Myron Hunt was hired to design another bridge across the

stream beneath the new bridge. Known as the Parker-Mayberry Bridge and commissioned by William Smith Mason, the "baby sister" bridge repeated the classical details of the original and gave access to Mason's Alta San Rafael Tract on the west bank of the stream.

In the 1930s, state engineering experts determined that the economies realized in the original construction had reduced the bridge's capacity to carry heavy loads; the famous curve at the east end that had saved so much money by shortening the height of the piers had relocated them from the optimum locations designated in the original Waddell design. Proposals to widen the bridge and build a pedestrian walkway in its center proved unfeasible and stricter load restrictions had to be placed on the bridge.

Following World War II, when Los Angeles began its great age of freeway building, a freeway bridge across the Arroyo was proposed to replace the outdated old bridge. Opened in 1953, Pioneer Bridge borrowed design features, notably the arches, from the old bridge. As for the old bridge, it was allowed to stand, after Pasadenans organized a letter-writing campaign to save it. Both approaches to the Colorado Street Bridge were altered to accommodate the new structure. On the west three arch spans were removed, and a new structure was built to swing to the south and connect with the new Colorado Boulevard frontage road. On the east, a new ramp was constructed to the old bridge.

From the 1950s through the 1980s, the old bridge remained, until finally it was clear that it needed a complete makeover. Closed to traffic in 1989, the bridge was re-opened on December 13, 1993, 80 years to the day after the original opening. The reconstruction brought the bridge up to current seismic standards, replaced deteriorating concrete and steel, improved roadway safety, and preserved the bridge for future generations. As in 1913, many said it couldn't be done and more said it was too expensive. This book tells the story, in the words of City officials, engineers and preservationists, and in the striking photos that document the restoration of the bridge.

Now every other year, on a balmy July evening, Pasadenans gather on the Colorado Street Bridge for their biannual Bridge Party. This event, a fund-raiser sponsored by Pasadena Heritage, has become a tradition, celebrating the bridge and Pasadena's preservation movement, which has done so much to raise the community's awareness about Pasadena's special character. Filled with hundreds of strolling people, musicians, and tables offering food from local restaurants, the bridge comes alive as the dusk deepens and Pasadenans enjoy their very own public work of art.

Ann Scheid, historian

EXCAVATOR W/ BREAKER IS REMOVING UPPER PORTION OF CONCRETE BRIDGE ABOVE TIE ARCHES. TRANSVERSE STEEL BEAMS FOLLOW BEHIND PROVIDING SUPPORT FOR THE CONCRETE RECONSTRUCTION.

LABORER IS CHIPPING CONCRETE FROM THE LOWER END OF THE BRIDGE ARCH IN PREPARATION FOR STRENGTHENING OF THE ARCH.

CUTTING ACCESS THROUGH THE CONCRETE PIER BASES TO INTERCEPT THE VERTICAL HIGH STRENGTH WIRE.

STRENGTHENING OF THE MAIN BRIDGE PIER BASES WITH HIGH STRENGTH STEEL RODS AND RECONSTRUCTION THE CONCRETE STRUT.

ERECTING NEW PRE-CAST CONCRETE COLUMNS WHICH SUPPORT THE UPPER BRIDGE STRUCTURE.

SETTING COLUMN ON NEW CONCRETE BASE.

SCAFFOLDING AROUND BRIDGE PIERS TO PROVIDE ACCESS FOR REFINISHING THE CONCRETE SURFACES OF THE PIERS AND ARCHES.

UPPER PORTIONS OF BRIDGE ARE BEING FORMED AND POURED BACK. LOWER PORTIONS OF PIERS, ARCHES, AND STRUTS HAVE BEEN COMPLETED

CONCRETE DECK AND SPANDRAIL BEAMS IN UPPER STRUCTURE ARE BEING CONSTRUCTED AS WELL AS OVERHANG SUPPORTS

SCAFFOLDING AROUND UPPER PORTIONS OF ARCHES AND STRUTS PROVIDE ACCESS FOR THEIR RESTORATION.

BRIDGE SPAN OVER THE ARROYO SECO. LOOKING UP AT WORK DECK FOR SUPPORT OF UPPER STRUCTURE RECONSTRUCTION WITH TOWER CRANE IN BACKGROUND.

VIEW LOOKING UP UNDER BRIDGE AT RECONSTRUCTED STRUTS AND ARCHES.


WORK DECK BEING REMOVED
AFTER COMPLETION OF UPPER
DECK RECONSTRUCTION.

REMOVING WORK DECK

VIEW OF FINISHED BRIDGE DECK AND SUPPORT BEAMS FROM UNDERNEATH PRIOR T. REMOVING WORK DECK.

DECK SUPPORTS COMPLETED

FORMING OVERHEAD SUPPORTS.

Preserving a Masterpiece

by Art Krieger

During 35 years in the field of civil engineering, I cannot recall any improvement project quite like the restoration of the Colorado Street Bridge. As a national historical landmark, the bridge received emotional community support to avoid permanent closing and possible demolition. The difficulty in financing the huge restoration costs, and the challenge of coming up with an engineering design that would maintain the beautiful appearance of the original structure and still meet the latest seismic and truck loading capability required, were just some of the obstacles overcome.

Around the time I became Pasadena's City Engineer/ Director of Public Works & Transportation, the Colorado Street Bridge was getting closer attention. The maximum speed and the posted weight limit of the bridge had continued to be reduced every two years by state engineers and there were increasing reports of large concrete pieces breaking off the bridge structure and falling into the Arroyo Seco below.

Fortunately, in 1978 the Federal Highway Bridge Replacement and Rehabilitation Fund coverage was expanded to also include non-federal aid highways and now could include the bridge; however, no engineering studies had yet been made to show that this aged reinforced concrete arch bridge *could* be repaired. Pasadena Heritage, which was also very concerned about the future of the bridge, offered to provide funds toward such a study. Mel Green, a structural engineering consultant, was retained and he confirmed that the bridge could be restored. Future engineering testing and design efforts would determine just how extensive the repairs to the bridge would be to restore it to current standards.

With an eye on the federal funding, Mel Green and I went to Sacramento to meet with the Caltrans bridge engineers to get their approval for the project. The state engineers agreed to support the city's application for consideration of the federal funds. State approval was very important because each state administered federal funded bridge projects within their state.

The next step was to find out what the Federal Highway Administration (FHWA) would require to meet current bridge standards. To that end, I flew to Washington D.C. to meet with the Deputy Administrator, Les Lamm. Mr. Lamm advised that to obtain approval of our application for federal funds, the project would have to include the following improvements: (1) meet current seismic requirements for bridges in California, (2) provide a slightly wider roadway which would support heavy truck loading, and (3) install a metal guard rail at the edge of the roadway to prevent out of control vehicles from going onto the

sidewalk and crashing through the side of the bridge into the Arroyo below. This last requirement was a tough one, especially as it impacted the original appearance of the roadway and sidewalk of the bridge. I explained later to Pasadena Heritage and others in the community that this requirement was not negotiable; Congress was insistent that these safety measures be followed if federal bridge funds were to be used. With City Council approval, an application for federal and state funding toward the restoration of the Colorado Street Bridge was filed.

Meanwhile, I happened to learn that Mr. Lamm was scheduled to speak soon at an engineering conference in Los Angeles. I contacted him and suggested that it might be a good idea for him to take a look at the Colorado Street Bridge while he was in the area. He agreed and I was able to show him the historically significant reinforced concrete arch bridge and its unusual surrounding area. I believe that viewing the bridge first hand contributed to his support of using federal bridge funds for this expensive local restoration project.

The project was subsequently approved to commence and the engineering firm of De Leuw Cather and Company was selected to prepare the plans, specifications and estimates to repair the bridge. Following approval of the plans by state and federal engineers, a construction contract could then be advertised for bids, a contract awarded and construction could begin.

I retired from my position with the City while the construction plans for the restoration of the bridge were still being completed. During the next four years the excellent engineering staff of the department continued to oversee the project and pursue supplemental funding. Pasadena City Council members also contacted our representatives in Congress for their support of the bridge improvements. There were many individuals who contributed to the success of this project: Pasadena city staff, Pasadena Heritage, and countless federal, state, county and consultant engineers. The restoration of the bridge was successfully completed and the bridge re-opened to traffic in December 1993.

In closing, I recall a conversation I had at a reception at Caltech with the Monsignor of a Pasadena church. He commented to me that perhaps the millions of dollars being spent to repair the deteriorating Colorado Street Bridge might be better used to feed and house the poor. I replied to him, "Father, have you ever visited Paris?" He told me he had. I said, "The care of the Colorado Street Bridge is as important to the people of Pasadena as the care of the Notre Dame Cathedral is to the people of Paris!" We then moved on to another subject.

Art Krieger, Pasadena City Engineer/Director of Public Works & Transportation (Retired)

REFLECTIONS OF PUBLIC WORKS

by Cynthia Kurtz

I never look at the Colorado Street Bridge without thinking about how close Pasadena came to losing it. With all the other funding needs and the ever accelerating cost, it seemed an impossible task to find the money.

To replace the bridge with a straight, sound structure that would carry everyone safely across the Arroyo was about one third of the cost of restoring the bridge. The old bridge was too narrow, the railing was too low, and there had been too many suicides — lots of very good reasons to replace the bridge with a modern functional structure.

However, there was something about the grace and beauty of the Bridge that made it impossible to think about taking it down. The Public Works Department staff talked about how practical it would be to replace the Bridge but just kept working to make sure that didn't happen.

When we finally were able to cobble together the funding from city, state and federal sources, the plan quickly unraveled when the representative from the regional Federal Highway Administration (FHA) office rejected the city's final funding request.

Our hero was Congressman Carlos Moorhead who stepped into the fight and convinced FHA in Washington to overrule the regional decision, something that we had been solemnly told would never happen. It was but one of the many "close calls" for the Colorado Street Bridge.

Construction began with a great project team led by City Engineer Bill Sato and Project Manager and Principal Engineer, Alan Charmatz. First was the "de-construction." The light posts were removed for restoration, the outside of the arches were chipped away, and the centers of the massive piers were removed. Day by day, piece by piece, the bridge became smaller and smaller as everything that needed to be repaired and replace was removed. It began to look like a pencil drawing set against the Arroyo.

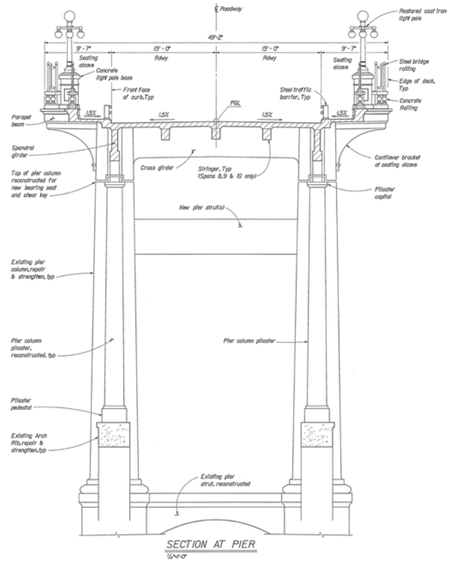
The project went well albeit there were nervous days. The structural integrity of the Bridge had to be reduced before it could be rebuilt. We held our collective breath. If an earthquake would have struck, the structure likely would have collapsed in a heap onto the floor of the Arroyo.

Happily, there were no earthquakes — not even a tremor — and the rebuilding began. Plates were dropped into the bottom of the piers, tension poles were screwed into the plates, the arches were rebuilt, then the roadbed, and finally the beautifully restored lights posts were replaced. The pencil drawing had once again become the Colorado Street Bridge we all recognize and love.

It was then that Vice Mayor Katie Nack realized that the project was going to be completed very close to the 80th anniversary of the original Bridge's dedication. What an opportunity to recognize both the Pasadenans who had known that no simple structure could adequately connect the eastside and the westside of the Arroyo communities and the engineers and officials who had worked tirelessly to make sure the Bridge would stand for generations. So on December 13, 1993 we rededicated the Colorado Street Bridge.

Actually, I think the Bridge has angels who watch over it. There is no other way to explain why a structure that came so close to being demolished still graces the Arroyo. Each time I drive across it or watch it standing proudly against the San Gabriel Mountains, I thank those angels for protecting it.

Cynthia J. Kurtz, Former Director of Public Works



COMPLETED DECK AND OVERHANG SUPPORTS

The Restoration Project

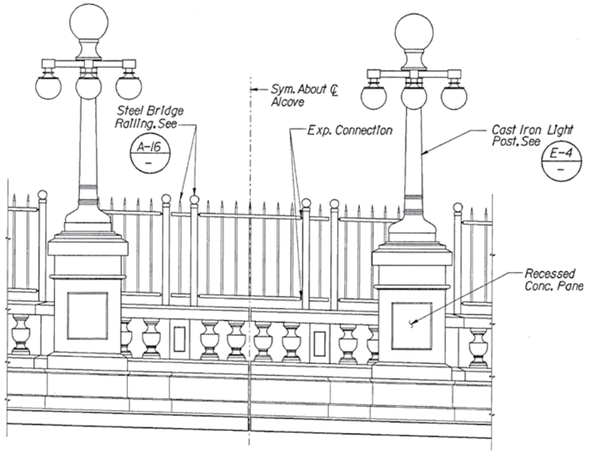
by Melvyn Green

When Pasadena Heritage members asked me to help to save the bridge it seemed an overwhelming project. Early arch bridges were typically bypassed with a new structure and used as a foot or bike path — or they were demolished. It seemed impossible. But with citizen support, financial and vocal, I was able to develop a plan of engineering evaluation to determine the condition of the bridge and how it could be upgraded and saved.

From my point of view, the major turning point for the project was when Art Krieger arranged for a meeting with the Administrator of the Federal Highways Administration (FHwA). We met with him in Washington, D.C. The intent of the meeting was to obtain support from the top. We discussed the project and the bridge's "deficiencies" and the goals of the community.

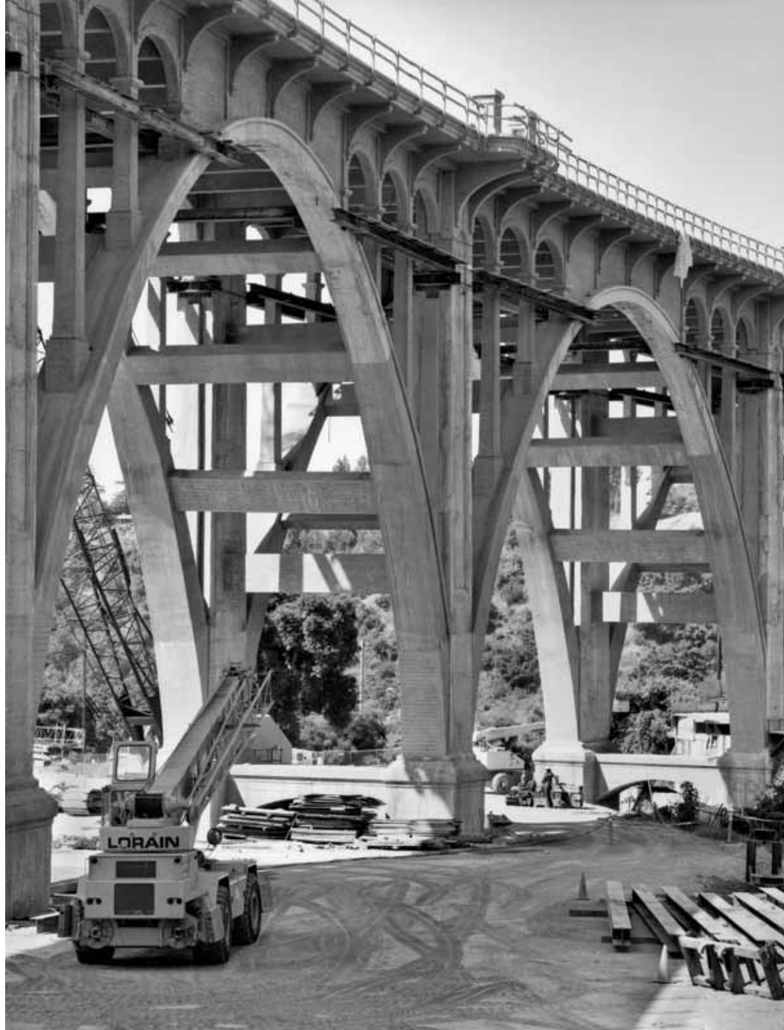
Based on Art's presentation of issues and the community's interest, a directive was prepared for FHwA staff listing the acceptable criteria for the rehabilitation of the bridge. Once this direction was given from Washington, the attitude of the agencies, at all levels, became a "can do" approach. The level of effort and the sudden ability to overcome roadblocks resulted in the project moving forward with good speed and success.

Melvyn Green, Structural Engineer



RESTORED BRIDGE PIER @ BASE.

RESTORING CONCRETE COLUMNS WITH CRANE AND 134 FRWY. IN BACKGROUND.



NEW PIER, ARCH,
+ STRUT CONNECTIONS.

SETTING PRE-CAST CONCRETE PIERS FOR BARRIER RAIL

POURING CONCRETE BRIDGEDECK

POURING CONCRETE DECK.

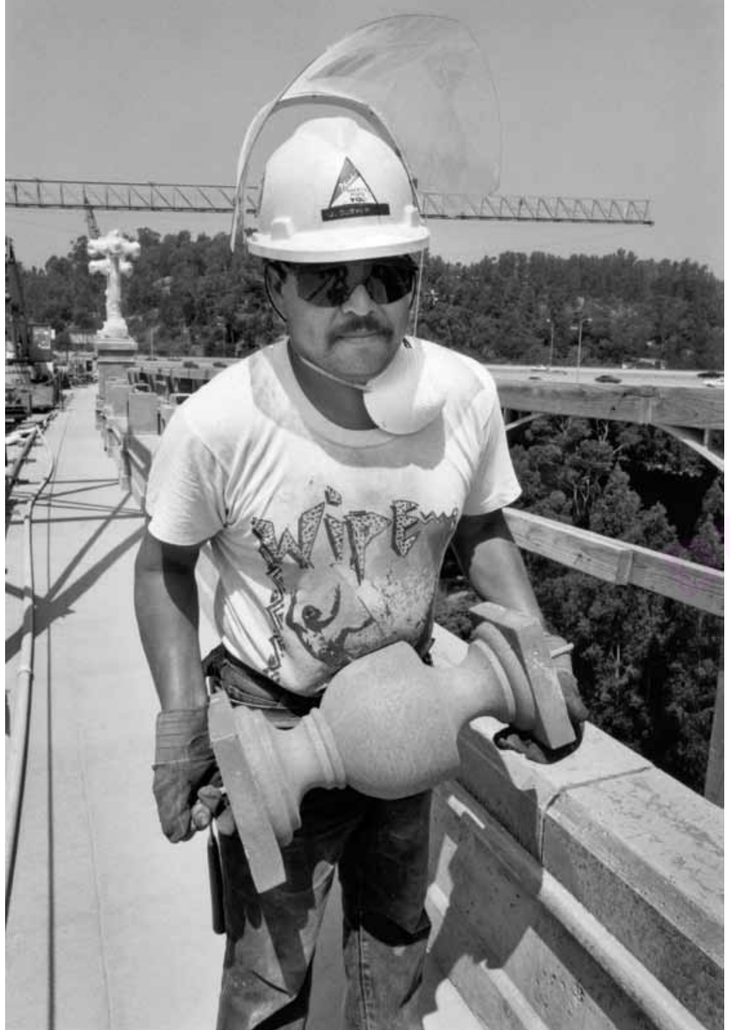
CONCRETE SUPERINTENDENT WATCHING OVER DECK POUR.


Pouring Concrete Barrier Rail

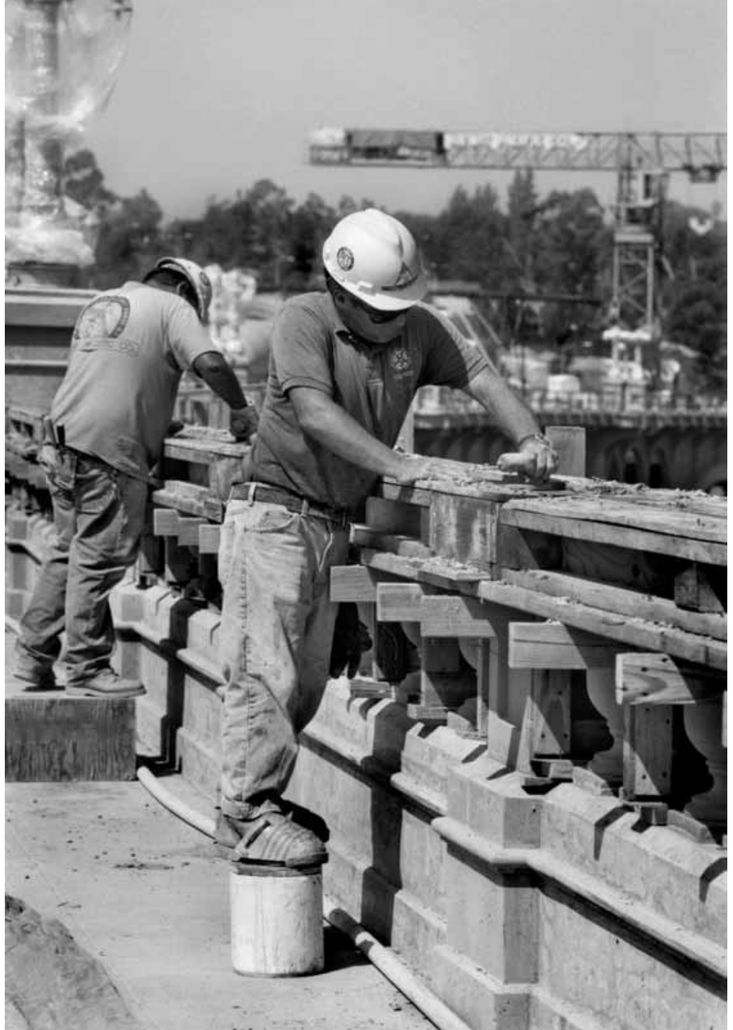
FORMING BASE COLUMNS

SIDEWALK, BARRIER RAIL, AND LIGHT BASE COLUMNS AFTER STRIPPING FORMS.

Pre-Cast Rail Ballestrade

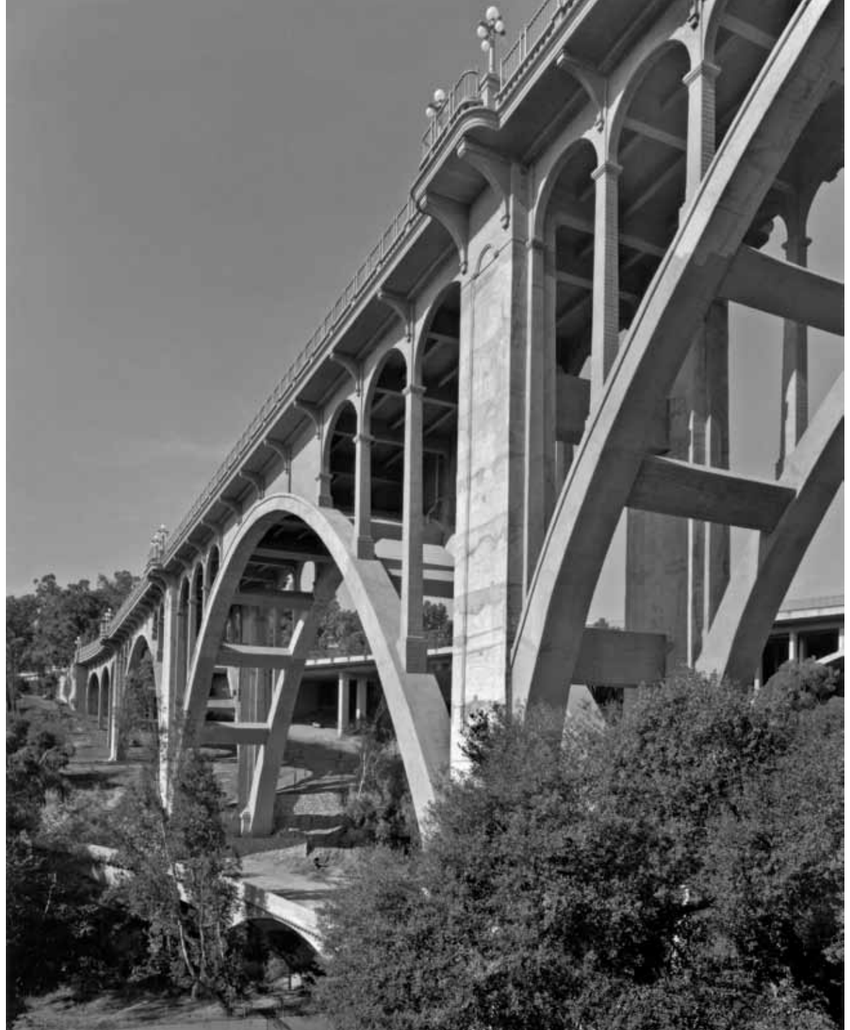


Bridge Lights Set
Rail Ballestrades Set



Pouring Top Rail of Barrier Rail

Dry finishing Concrete Barrier Rail.



Scott Buchholz, Ron Hoffman, Bill Sato, Cynthia Kurtz and Alan Charmatz

Acknowledgements

This book would not have been possible without the vision and the support of the City of Pasadena. Special thanks to the Department of Public Works, and former Director Cynthia Kurtz, who was responsible for hiring me to photograph this once-in-a-lifetime project.

I would like to personally thank Art Krieger, Bill Bogaard, Claire Bogaard, Cynthia Kurtz, Ann Scheid, Mel Green, Bill Ellinger, Jack Clapp and Dan Rix for their contributions to this book.

Of the many who contributed to the success of the Bridge project few were more influential than the following:

From the City of Pasadena: former Directors of Public Works, Art Krieger and Cynthia Kurtz. Former City Engineers, Bill Sato and Alan Charmatz. Former Mayors Rick Cole and Katie Nack, and former City Manager, Phil Hawkey.

From Pasadena Heritage: Claire Bogaard and Sue Mossman.

From the County of Los Angeles, Department of Public Works: Ron Hoffman and Scott Buchholz.

From the State Office of Historic Preservation: Knox Mellon, Stephen Mikesell and Hans Kreutsberg.

Constructed by Kiewit Pacific Company and designed by DeLeuw Cather Company.

Tavo Olmos
Photographer
2012

Book Design:
Jared Millar

The mystique of the **Colorado Street Bridge** is undeniable. For a century the grand landmark has stood as a beacon to all who come to Pasadena. The effort to restore the structure has become a symbol of achievement in preservation, engineering and civic pride — an object of art and inspiration.

Pasadena photographer **Tavo Olmos** was contracted by the City to document the restoration project. The images were edited, printed and forgotten — until now. On the occasion of the bridge centennial this book features select views of the project and embellished with the personal reflections of the principals responsible for bringing the project to life.

Mayor **Bill Bogaard** welcomes the reader with an inspiring message. **Pasadena Heritage** founder and former Director **Claire Bogaard** shares her thoughts in the Forward and local author and historian **Ann Scheid** sets the stage in the Introduction. Former Directors of Public Works, **Art Krieger** and **Cynthia Kurtz** write about their experience in guiding this extraordinary project.

Ultimately, this book is an homage to the people who built and preserved a beloved local landmark; the architects, the engineers, the civic leaders and the community organizers who worked tirelessly to make it possible. And in doing so, bringing about an awareness and appreciation of a unique spirit in an uncommon place — **Pasadena**.