Spokane Register of Historic Places

OPR 90-934

Nomination Form

City/County Historic Landmarks Commission
Fourth Floor - City Hall
Spokane, Washington 99201-3333

Type all entries—complete applicable sections

1. Name

historic Monroe Street Bridge

and/or common

2. Location

street & number Monroe Street between Ide Avenue and Spokane Falls Blvd.

city, town Spokane ___ vicinity of

state Washington county Spokane

3. Classification

Category	Ownership	Status	Present Use	
___ district	_X_ public	_X_ occupied	___ agriculture	___ museum
___ building(s)	___ private	___ unoccupied	___ commercial	___ park
_X_ structure	___ both	___ work in progress	___ educational	___ private residence
___ site	**Public Acquisition**	**Accessible**	___ entertainment	___ religious
___ object	___ in process	___ yes: restricted	___ government	___ scientific
	___ being considered	_X_ yes: unrestricted	___ industrial	_X_ transportation
		___ no	___ military	___ other:

4. Owner of Property

name City of Spokane

street & number Public Works Department, City Hall, West 808 Spokane Falls Blvd.

city, town Spokane ___ vicinity of state WA

5. Location of Legal Description

courthouse, registry of deeds, etc. Spokane County Courthouse

street & number West 1116 Broadway

city, town Spokane state WA

6. Representation in Existing Surveys

title National Register of Historic Places

date 1975 ___ federal ___ state ___ county ___ local

depository for survey records Office of Archaeology and Historic Preservation, Olympia, WA

city, town and Historic Preservation Office, Spokane Regional Council, City Hall, Spokane state

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7. DESCRIPTION

Spanning the deep gorge of the Spokane River at the foot of the lower falls, the Monroe Street Bridge is one of the city's most outstanding historic structures. Its mammoth central span crosses the river in a single concrete arch, vaulting high above the rocky shoreline, emphasizing the depth and breadth of the cataract, and the masterpiece of technological innovation of the structure itself. The bridge was designed to achieve maximum aesthetic effect: its deck provides the city's finest vantage point for viewing the falls, and its supporting arches mimic the tumbling waters while framing views of the river both up and downstream. On the superstructure are some of Spokane's most distinctive artistic and architectural features, designed by the most prominent local architects of the time. Virtually unaltered since its construction, the Monroe Street Bridge stands as a monument to engineering excellence and aesthetically sensitive design.

Constructed of reinforced concrete, the bridge stands 136 feet high (to the top of the guard rail) and is 965 feet long (including approaches). It consists of a single central arch of 281 feet (pier to pier), flanked by two matching 120-foot arches, a 100-foot semi-circular span on the north side, and arch-supported approaches on both ends. The bridge's most distinctive element is the central arch, which consists of twin ribs placed 36 feet center to center. The ribs rise nearly 130 feet high, are 16 feet wide by 6 feet 9 inches thick at the crown, and flare to 19 feet 9 inches wide and 18.5 feet thick near the bottom where they join the piers. The arch alone weighs 26,920,000 pounds (including bridge deck), with a carrying capacity of 2,500,000 pounds. When completed in 1911, the arch was the third largest structure of its type in the world and the largest in the US. Only concrete arches measuring 328 feet in Rome, Italy, and 320 feet in Aukland, New Zealand, surpassed the Monroe Street Bridge. (American City, p. 420; Spokane Spokesman-Review [S-R] 12 November 1911, Part VII, p. 1).

The northeast main concrete pier stands atop a stone pier remaining from the earlier steel bridge at water's edge; two other identical stone piers stand adjacent to the southern concrete piers on the south shore. Now buried beneath fill, the south abutment is one of the most unusual features of the bridge. Lacking adequate supporting bedrock on the south bank, engineers were forced to design a 140-foot high, immensely thick concrete abutment to carry the stress of the 120-foot arch. (American City, p. 421).

Above the central arch, the bridge's superstructure is supported by five arches in each spandrel. Two arches in each spandrel in the 120-foot arches flank the central span. The eight arches on the north approach were filled from the west side in 1914 when the Union Pacific Railroad bridge was erected over the Monroe Street structure. In 1915 the city replaced the wooden approaches on the south end with five arches matching those on the north. Only four of the arches are still visible, as filling has

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obscured the other arch. A 20-foot section was left in wood to facilitate easier replacement when necessitated by periodic settling of the underlying fill. (Garrett 1975 7:2).

Although numerous alterations have changed the original appearance of the deck, it retains its most important features and dimensions. The deck consists of a 50-foot wide roadway with 9-foot cantilevered sidewalks on each side. Creosoted wood paving was removed early in the bridge's history, as were (in 1934) the tracks and utility poles of the electric streetcar line. Concrete handrails run the length of the structure along the outer edges of the sidewalks. The rails are formed to provide the appearance of a chain, with open rectangular holes centered within raised concrete ovals. Architects Cutter and Malmgren added the chain motif when other decorative elements (particularly on the pavilions) were modified after the initial bridge design had been approved. (Bridge drawings, 8 February 1910 and 17 May 1911).

Over the sidewalks above each of the four main piers stand arched concrete pavilions or lookouts, the primary decorative features of the bridge. The pavilions are functional as well as decorative in that each has a concrete seat open to the roadway but not to the river, providing the weary pedestrian relief from both weather and dizzying views of the falls and river far below. Cast concrete bison skulls are mounted under the arches facing the roadway and the river on each pavilion. Those above the roadway have recently been restored. (See Section 8 below).

Within each pavilion, mounted on the riverside wall facing the roadway, are bronze plaques commemorating the bridge builders, city officials, and historic milestones in the community's history. In December 1911 the city council contracted with the Walton Machinery Company, a local firm, for the 3 foot 4 inch by 4 foot 4 inch plaques at a cost of $530 each. (S-R 10 December 1911, Part IV, p. 6). The southwest pavilion plaque displays the date of completion and the names of J.C. Ralston, Designing Engineer; Morton Macartney, Constructing Engineer; J.F. Greene and P.F. Kennedy, Assistant Engineers; and Cutter and Malmgren, Collaborating Architects. Names of city commissioners are on the plaque across the roadway in the southeast pavilion. The plaque in the northeast pavilion provides dates and descriptions of the two bridges that stood previously at the site. Across the roadway in the northwest pavilion, salient events in the area's history are recounted, beginning with the fur trade as the first commercial venture by the North West Company in 1811.

Incandescent lamps in glass globes were originally mounted on the north and south sides of the pavilions and atop short poles on the concrete handrails. Perpetually targets of vandalism, the globes and bulbs were costing the city as much as $100 per month to maintain by 1925 when they were removed. Poles with cantilevered lamps

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matching those along North Monroe were installed in the bridge's sidewalks in 1927 (Spokane Daily Chronicle [SDC], 23 June 1971, p. 17). Brass mounts of some of the original lights are still visible atop the handrails.

Signs of aging are now appearing on the face of the Monroe Street Bridge. Cracks are visible in the supporting concrete arches under the north approach and near the southeast main pier. The deck itself is pitted and scheduled (along with underlying stringers) to be replaced in the mid 1990s. (Blegen 1990). Perhaps most noticeable is deterioration to the concrete handrailings, which are cracked and crumbling in numerous places. An investigation of the 8 December 1974 accident revealed that the rail through which the automobile crashed on the southwest side of the bridge was not adequately secured to the bridge deck. "Steel pins" holding the rail in place had rusted, allowing a forty-foot section to topple over the edge when struck by the automobile traveling at an estimated six miles per hour. Over the next several months, city crews (reportedly with some difficulty) fabricated molds to duplicate the chain-link effect of the concrete railing. (S-R 12 December 1974 and 1 December 1977; and SDC 9 and 11 December 1974 and 5 March 1975). Concrete Jersey barriers were later placed atop the curbs to deflect automobiles away from the fragile railings.

8. Significance

Period	Areas of Significance—Check and justify below				
___ prehistoric	___ archeology-prehistoric	___ community planning	___ landscape architecture	___ religion	
___ 1400–1499	___ archeology-historic	___ conservation	___ law	___ science	
___ 1500–1599	___ agriculture	___ economics	___ literature	___ sculpture	
___ 1600–1699	_x_ architecture	___ education	___ military	___ social/ humanitarian	
___ 1700–1799	___ art	_x_ engineering	___ music	___ theater	
___ 1800–1899	___ commerce	___ exploration/settlement	___ philosophy	_x_ transportation	
_x_ 1900–	___ communications	___ industry	___ politics/government	___ other (specify)	
		___ invention			

Specific dates 1911-present **Builder/Architect** City of Spokane/John C. Ralston, designer /Cutter & Malmgren, architects

Statement of Significance (in one paragraph)

Please see attached.

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8. SIGNIFICANCE

"The growth of the city is traced in the growth of its bridges," observed Spokane Chamber of Commerce President E.T. Coman at the ceremony dedicating the Monroe Street Bridge in November 1911. (S-R 24 November 1911, p. 6). It was, at that time, a simple but undeniable truth in a city founded on, owing its existence to, and divided by, a mighty river. More than any other bridge in Spokane, the Monroe Street structure symbolized the city's prosperity and development just after the turn of the century. When completed, the bridge was not only the highest and longest span over the Spokane River, it was the largest concrete arch bridge in the U.S. and the third largest in the world. Over the years few structures, such as the Davenport Hotel, have attracted more international attention to Spokane.

Two bridges preceded the present structure across the Spokane River linking the north and south halves of the city at Monroe Street. The first, made of wood, was erected in 1888, but burned shortly thereafter. In 1891 a steel bridge designed to support streetcar traffic was built. A partial collapse of the steel bridge resulted in its closure first to streetcars, and finally, on 1 January 1910, to all traffic.

By then vehicle and streetcar size, weight, and speed had increased, rendering the steel bridge obsolete. In 1905 a National Good Roads Association consultant inspected the bridge at Monroe Street and declared it unsafe. Plans for a new bridge were drawn as early as 1908, when Arvid Reuterdahl, a designer in the office of the City Engineer, submitted a plan for a bridge with two 185-foot concrete arches spanning the river, anchored on a pier in mid stream. Reuterdahl's design called for twin towers with arched connections over the deck above main piers on either bank. Eagles with wings spread were to be perched atop the towers and on obelisks at both ends of the structure.

Triumphal though it was in ornamentation, the concept lost out to a design submitted by City Engineer J.C. Ralston. Like the Reuterdahl proposed structure, Ralston's bridge had towers at either end, but differed primarily in its proposal to span the channel with a single, gigantic concrete arch. Ralston also favored using earth fill on both north and south banks as a means of shortening the overall length of the structure, something Reuterdahl had opposed for aesthetic reasons. Projected costs of the two designs also differed: Ralston estimated the city would spend $340,000, while Reuterdahl's price tag was to be $400,000. Although the figures were astronomical for the time, neither were as high as the final cost. (S-R 22 November 1908, Part 3, p. 4 and 15 December 1908, p. 9).

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On 15 December 1908, the Spokane City Council voted to adopt Ralston's plan. In a resolution passed on 13 January 1909, the Council approved the issuance of $500,000 in construction bonds for erection of new bridges at Monroe and Olive streets. The Monroe Street crossing was given priority and the lion's share of the budget, as it more than any of the other spans of the river within the city presented the greatest challenge. While streets above the falls were not much, if at all, more than ten feet above high water, Monroe Street at the foot of the falls crossed a gorge of 140 foot depth and 1500 foot width at the top. Political disputes held up the project throughout most of 1909: citizens quarrelled over the new bridge's location, some wanting it moved downstream to better serve their interests. In the meantime, noted New York City bridge engineer W.H. Burr reviewed and approved final structural plans in August 1909. (S-R 16 and 19 December 1908, pp. 1 and 7, respectively; and Barber 1984, p. 5).

Assisting Ralston in supervising construction of the new bridge were Morton MacCartney, J.F. Greene, and P.F. Kennedy, all city employees. The architectural firm of Cutter and Malmgren designed the superstructure, including the four pavilions along the pedestrian walkways. While Kirtland Cutter and Karl Malmgren designed many notable buildings in Spokane and elsewhere, the bridge engineers likewise were to become well known. Together they designed the Latah Creek Bridge, which has been listed on the National Register of Historic Places. MacCartney later designed the ill-fated Tacoma Narrows Bridge. Greene designed the five-mile-long Robert Street Bridge in New Orleans, Louisiana, one of the nation's most noteworthy structures.

After considerable vacillation regarding hiring policies, the city council finally employed sixty men by late January 1910 to begin work on piers for the new bridge. Charges of discrimination against union workers were made, and delays in ordering and shipment of steel slowed progress and reduced the work force. In late February saturated fill dirt slid away below the south approach, collapsing a one hundred-foot section of the old steel bridge. Although the incident failed to delay the already stagnant pace of construction, it did again call into question the wisdom of erecting the south approach on unstable fill. (S-R 26 January, p. 8, and 2 March, p. 15, 1910).

The Monroe Street crossing presented engineers with numerous design hurdles. High water flow of 40,000 cubic feet per second, combined with the discharge of two tailraces from the Washington Water Power generating plant on the south shore, eliminated the possibility of using falsework supported by wooden bents in the river channel. The existing steel bridge, on the other hand, provided a solution to erecting temporary construction supports: the falsework could be suspended from the deck of the steel bridge until anchored onto either shore. Workmen began lowering the wooden supports by steel cable in late June 1910; by 13 July the timber arch was completed.

On the afternoon of 21 July an unusual storm of near tornado force struck the city, casting workmen and the wooden falsework into the river. Although only two lives were lost (George Parr and Carl Bentson or Benkson), the accident resulted in costly delays. Work on the project ceased until the following February when steel arrived for a new falsework. The delay and purchase of the steel added at least $40,000 to construction costs. (S-R 12 November 1911, Part 7, p. 1; and Kennedy 1911, p. 479).

Centering of the 281-foot center span was accomplished by using steel truss supports. Anchorages and toggles on the main span piers allowed erection of steel trusses as cantilevers. The steel falsework for the bridge roadbed was cantilevered and cross beamed, and kept in place when the concrete roadbed was poured, thus adding considerable strength. Two 120-foot concrete arches to the north and south of the main arch were completed before the center span, and did not present any serious problems. The south approach, on the other hand, did. A deep gorge on that side of the river had been partially filled with debris from the fire of 1889 that destroyed the downtown area. Reaching street level from the south end of the bridge necessitated construction of a 150-foot wooden approach. (A concrete approach span had been ruled out as being too costly). The city continued to dump fill on the hillside under the wood trestle, which required frequent repairs as the fill shifted and settled. Eventually the city replaced the wooden approach with five concrete arches matching the eight on the north bank, leading one modern-day engineer to conclude that it "probably would have been wiser to have built the additional concrete span in the first place." (Barber 1984, p. 7).

Early cost estimates for the bridge ranged from $340,000 to $385,000. Actual costs for the completed structure totalled $535,000, including $48,000 worth of equipment and machinery that were used on later city projects. During the nearly two-year construction period, wages of bridgemen increased from $3.50 to $5 a day and those of common laborers from $2.75 to $3 a day, bringing labor costs to $40,000. Other expenses not budgeted for in the original estimate included "ornamental work," presumably for the pavilions and railings, which totalled $5,000. (S-R 12 November 1911, Part 7, p. 1 and 24 December 1911, p. 6).

In one of the most elaborate ceremonies in the city's history, dignitaries and over 3,000 citizens helped dedicate the newly-completed Monroe Street Bridge. On 23 November 1911, the governors of Washington and Idaho, Spokane city and county officials, and other local luminaries looked on as Miss Hazel Coates, daughter of city Commissioner of Public Works D.C. Coates, formally christened the structure. Appropriately for the occasion and the time (Washington was soon to adopt Prohibition before the nation followed suit), Miss Coates broke a bottle of Spokane River water over the arch of the bridge's northeast pavilion. Mayor W.J. Hindley infused as much

significance into the event as any politician could in his remarks:

> The completion of this bridge marks the achievement of one of the biggest tasks the world has ever seen. The honor belongs to Spokane. It is a splendid engineering triumph. It does what Lincoln did. It brings the north and south together. . . .
>
> This bridge should stand as long as some of those bridges built by the Romans, which are just as good today as the day they were built. (S-R 24 November 1911, p. 6).

Splendid though the ceremony was, it marked merely the beginning of the Monroe Street Bridge's long service to the city. Yet events subsequent to its completion seem less dramatic than those leading up to that noteworthy day in November 1911. In his remarks at the dedication, J.C Ralston noted that "dire prophesies have been made of the marring effect" the Union Pacific Railroad bridge would have when built over and across the Monroe Street structure. Despite his expressed hope that the UP would use "an appropriate concrete design," the bridge was erected in steel in 1914, barely three years later. Spokanites were not to see unobstructed views of the Monroe Street Bridge again until August 1973 when the UP trestle was finally removed. (S-R 24 November 1911, p. 6 and 25 August 1973, p. 6).

As the city prepared for the opening of Expo '74, crews applied a coating of "concrete mixture" over the pavilions and handrails in an effort to improve the appearance of the bridge's weather-worn superstructure. (S-R 2 May 1974). Seven months later, on 8 December 1974, an automobile making a U-turn on the icy roadway jumped the curb about thirty feet south of the southwest pavilion, knocked a section of concrete guard rail off the deck, and plunged 135 feet to the rocky river bank below. Gonzaga Law School student Mark S. Ratay, age 26, and his 31-year old wife Lois, were killed in the only accident resulting from a vehicle leaving the roadway of the Monroe Street Bridge. (S-R 12 December 1974; and SDC 9 and 11 December 1974).

In 1979 a ruptured water main revealed the instability of the fill underlying the bridge's south approach. Water from the severed pipe washed away loosely-packed dirt, collapsing thirty-five feet of roadway. Installation of a "grade beam" and other repairs by the Redding Construction Company, with help from a Washington Water Power crew, cost the city an unexpected $85,805. (SDC 30 July 1979, p. 3).

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BISON SKULLS

Few other cultural features in Spokane are as steeped in legend as the cast concrete bison skulls adorning the four pavilions on the Monroe Street Bridge. Two on each pavilion, four facing the roadway, four facing outward over the river (in an east/west orientation), the skulls provide a purely decorative western motif to the structure.

Origins of the skulls' artistic conception are somewhat obscure. Bridge drawings submitted by J.C. Ralston in collaboration with Cutter and Malmgren dated February 1910 show cast concrete profiles of American Indians, in feather headdresses, attached to the sides of the pavilions (that is, facing north and south). What appear to be canoes protrude from the sides of each pavilion above the top of the handrails, and bison skulls are mounted under the arches. By May 1911, Cutter and Malmgren had submitted drawings of ornamental details showing the bison skulls as they now appear, but the Indian and canoe images had been omitted. Years later Henry Bertelsen, Cutter's draftsman and long-time Spokane architect, claimed to have drawn the skulls for Cutter, but gave no clues as to the origin of the artistic inspiration. (Long 1989).

A possible explanation was provided by Mrs. John M. (Mairee Shine) Flynn. In a 1971 newspaper article, Mrs. Flynn recalled that her father, the late Patrick C. Shine, brought a large bison skull to Spokane from Alberta, Canada. For reasons not explained in the article, the skull was used as a mold or model from which the skulls on the bridge pavilions were cast. The original bison skull was reportedly "for many years . . . attached to Mr. Shines garage in full view of the street" at West 1506 Mission Avenue (SDC 29 October 1971, p. 10).

When completed, the Monroe Street Bridge was a monument to technological advancement, built to transport internal combustion-driven automobiles and electric streetcars over concrete arches virtually unequalled in size anywhere else in the world. So why would skulls of a nearly extinct species, most closely associated with Indian peoples who had recently experienced a similar fate, be prominently installed on the bridge? The intention was obviously to recall a time predating the civilization responsible for technology and, not coincidentally, for the demise of bison and Indian culture alike.

Perhaps Cutter's own words to a Spokesman-Review reporter shortly before the famed architect moved from Spokane in 1923 shed light on the bison skulls' origin. "I always built to achieve the effect of age, at least to make the building fit into its surroundings to look as if it had grown there and had not been superimposed. I have been criticized for that quality many times, but when the wind and weather complete the work I started, the owners are usually reconciled to the idea." (Quoted in

Schmeltzer 1985:57). Making an imposing concrete bridge appear to have "grown" up from the river gorge was probably beyond even Cutter's abilities. But the skulls evoke a notion of times long past, the "effect of age" Cutter sought to achieve in the buildings he designed. They also have skeletal connotations, perhaps a metaphoric allusion to exposed structural framework supporting all bridges.

In an anonymous account published in 1973, the skulls were installed by Cutter "for what were described at the time as 'personal reasons'." (SDC 22 August 1973, p. 5). Cutter scholar and Washington State University professor of architecture Henry C. Matthews speculates that the skulls appeared in the bridge design shortly after Kirtland Cutter visited Montana. While working on the lodge at Macdonald Lake in Glacier National Park, Cutter may have met Montana artist Charlie Russell and been taken with the latter's use of the bison skull as a logo on his paintings. Or perhaps, Matthews surmises, Cutter may simply have been familiar with Russell's work and his use of the bison skull in a similar fashion evoking a lost heritage. (Matthews 1989).

Once completed, the skulls became points of contention. Cutter and Malmgren filed a claim against the city for failure to compensate the architects adequately for their design work on the bridge, presumably including design of the skulls. On 22 June 1914, nearly three years after the bridge dedication, the city council passed an ordinance appropriating $1250 to settle the claim. Cutter's firm was finally paid for work dating at least four years earlier. (S-R 23 June 1914, p. 3).

Over the years the bison skulls suffered the effects of vandalism, vehicular collisions, and atmospheric weathering. In 1989, with permission of the city, sculptor Donald Rogers recast one of the skulls and covered the other three facing the roadway with a protective coating of concrete.

SUMMARY

The Monroe Street Bridge is one of the most significant structures in the city of Spokane as well as within the state of Washington. When completed it was of national and international importance, being the largest concrete arch bridge in the US and the third longest in the world. Its innovative design utilizing a single concrete arch was an adaptation to conditions presented by the site; construction techniques likewise required innovation which, despite setbacks and lengthy delays, set precedents in the field of concrete bridge engineering.

Within the context of local history, the Monroe Street Bridge is the most significant of the city's many bridges. It occupies a pivotal location at the foot of the lower falls

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where connection between the central business district on the south bank and commercial and residential zones and Spokane County offices to the north have been made for over a century. More than most other publicly-owned structures, the Monroe Street Bridge represents an achievement of the city itself: designed by a city engineer, supervised in its construction by city engineers, and built by laborers hired and directed by the city. Innovations in both design and construction techniques originated with the city engineers themselves.

Aside from its design and structural components, the bridge is significant for its decorative features, including concrete railings cast to give a chain link effect, the four pavilions, and cast concrete bison skulls, designed by the noted architectural firm of Cutter and Malmgren. Like the bridge itself, each of the features resulted from a deliberate design process through which concepts and ultimate appearances evolved into a technological triumph of remarkable aesthetic beauty.

9. Major Bibliographical References

Please see attached.

10. Geographical Data

Acreage of nominated property N/A

Verbal boundary description and justification

The structure itself between Spokane Falls Blvd. on the south and Ide Ave. on the north.

List all states and counties for properties overlapping state or county boundaries

state | county

state | county

11. Form Prepared By

name/title Craig Holstine, County Historian

organization Spokane City/County Historic Landmarks Commission | date April 1990

street & number AHS, MS 168, EWU | telephone 509-359-2239

city or town Cheney | state WA 99004

12. Signature of Owner(s)

For Office Use Only:
Date Received: 5-1-90
Date Heard: 5-16-90
Commission Decision: Approved
Council/Board Action: Approved
Date: October 22, 1990

Attest: Elizabeth Davidson
Deputy City Clerk

Approved as to form:
Asst. Corporation Counsel

We hereby certify that this property has been listed on the Spokane Register of Historic Places:

Sheri Barnard
Mayor, City of Spokane or Chair, Spokane County Commissioners

Chair, Spokane City/County Historic Landmarks Commission

Katherine W. Howlett
City/County Historic Preservation Officer

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9. Major Bibliographical References

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Blegen, Brad. City Engineer. Remarks to the Spokane City/County Historic Landmarks Commission regarding proposed alterations to the Monroe Street Bridge. 21 February 1990.

Cutter, Kirtland and Karl Malmgren. Monroe Street Bridge Details: Pilasters, Towers, Lamps, Handrail. Drawing on file, Public Works Department, City of Spokane. 17 May 1911.

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Kennedy, P.F. "Centering for the Monroe Street Bridge." Engineering Record LXIII (29 April 1911):479-80.

Long, Frederick. Retired architect, member of the Spokane City/County Historic Landmarks Commission. Personal communication regarding his recollections of Henry Bertelsen. 1990.

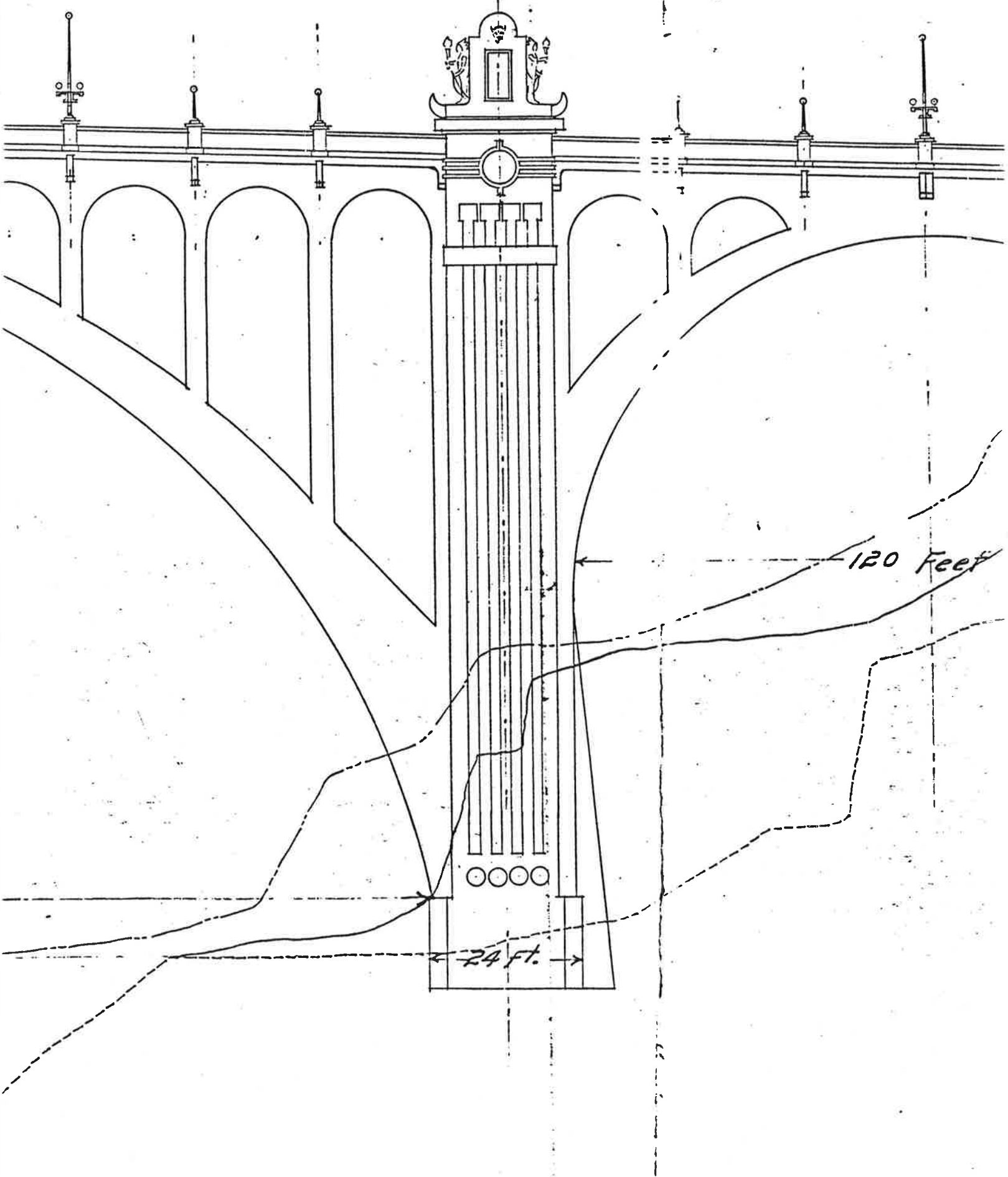
Matthews, Henry C. Professor of Architecture, Washington State University, and scholar of Kirtland Cutter. Personal communication. 1990.

Ralston, John C., in collaboration with Cutter and Malmgren. Monroe Street Bridge General Plan and Elevation. Drawing on file, Public Works Department, City of Spokane. 8 February 1910.

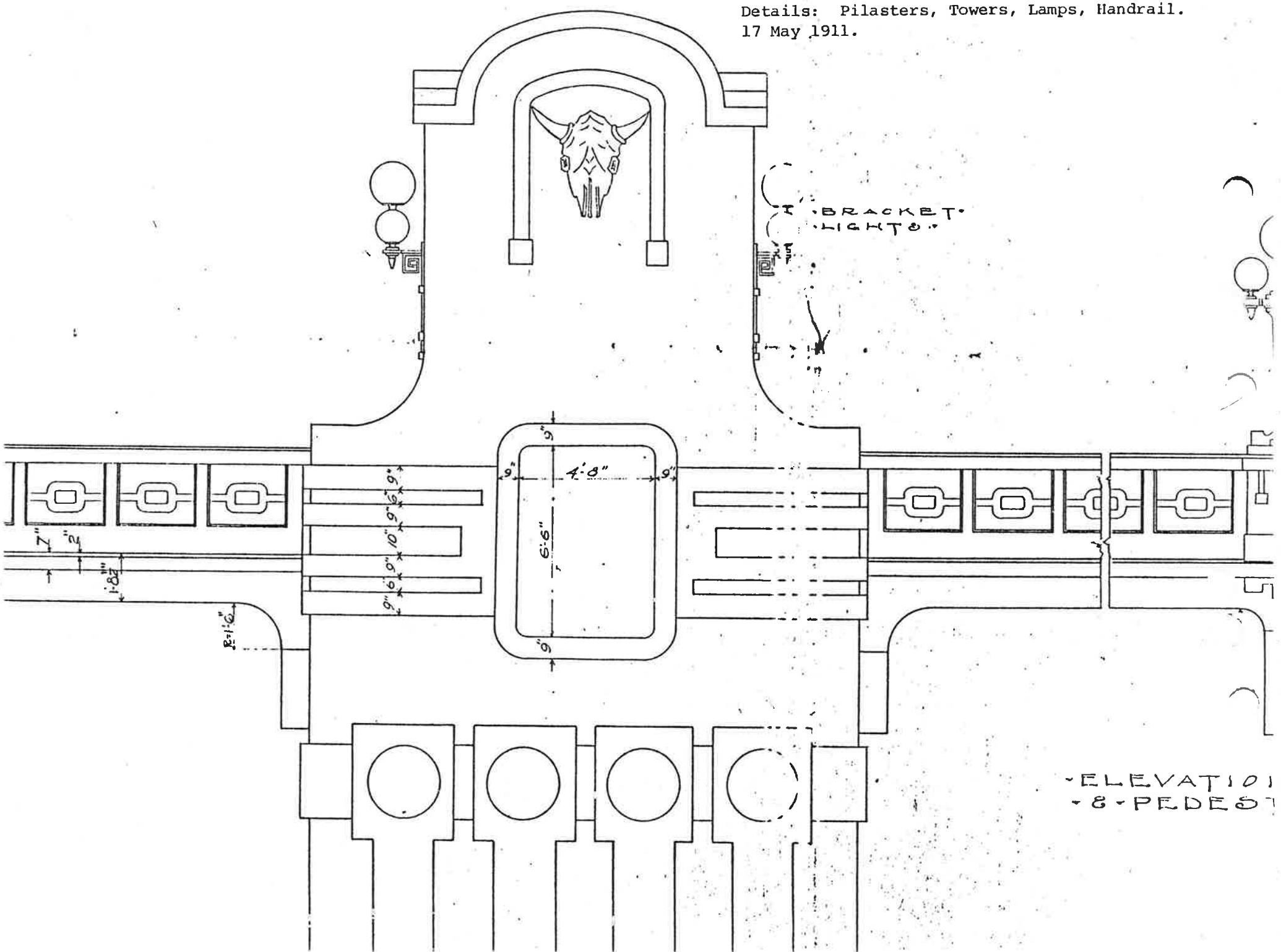
Schmeltzer, Michael. "The Cutter Mystique," Washington Magazine, Vol. 1, No. 5 (March-April 1985):49-57.

Spokane Daily Chronicle and Spokane Spokesman-Review. Various issues, including clippings in the Vertical File, Northwest Room, Spokane Public Library.

Ralston, John C. [illegible] collaboration with [illegible]utter and Malmgre-
Monroe Street Bridge General Plan and Elevation.
8 February 1910.



Cutter and Malmgren. Monroe Street Bridge
Details: Pilasters, Towers, Lamps, Handrail.
17 May 1911.



SIMILARITY IN THE SKULL OF THE BISON AND BRAHMAN

For a trained mammalogist or paleontologist, with a large reference collection and a library at hand, misidentification of bovine skulls (or partial skulls) is not a common occurrence. However, archaeologists identifying incomplete skulls and basing their identifications on the few available osteological keys, are cautioned of possible error where Brahman cattle are concerned. The Brahman (*Bos indicus*) was introduced in South Carolina in 1849 and is therefore a comparative newcomer to North America. However, enough Brahman remains lie buried throughout the southern United States to cause concern in areas where they might be mistaken for *Bison*.

The writer has observed deep brown staining of the bone in Brahman skeletons which were buried in the swampier prairies of the peninsular part of Florida during the last two decades. This dark coloration might lead to a mistaken identity and age, if only a superficial comparison of the bone were undertaken and if only those portions of the skull which are very similar to the bison were preserved. It is common practice to bulldoze a deceased cow into a gully and cover it with several feet of overburden so that a mistaken age based on the depth of the covering and the close resemblance of the Brahman to the bison might be adjudged to a comparatively recent burial. Regardless of the method or means of interment, the possibility of misidentification of Brahman material, with emphasis on partial skulls, is greater than is generally realized.

In recent years several splendid keys, to be used for the identification of Recent and Pleistocene mammals, have been published and widely distributed among archaeologists and mammalogists (Burt 1948; Glass 1951; Brown 1952; Cornwall 1957). Using only these keys, when actual comparative material is not available, is a hazardous practice where bison-Brahman material is concerned. The following statement from a section on the comparison of *Bison* and *Bos* (Hereford, Jersey, and so forth) is offered as a key characteristic for bison as compared to the domestic cow: "Frontals expanded laterally behind orbits so that zygomata are not visible from above" (Glass 1951: 45, Fig. 99). This statement generally holds true in domestic cattle, other than the Brahman, but is not a reliable criterion when the Brahman is compared with the bison as the zygomatic arch is obscured by the frontals in the Brahman as well as the bison (Fig. 1 *a*, *c*). This condition has also been observed in the case of several large Hereford bulls.

It may be well to point out an error in Glass' discussion of the *Bison-Bos* characteristics. His statement (Glass 1951: 45, par. 10), "premaxillaries not in contact with nasals — *Bos*," should read *Bison* in place of *Bos* and vice versa in the preceding paragraph. This same feature is correctly listed in a subsequent key (Brown 1952: 60-1, par. 6a, b, taken from Burt 1948: 69), but is subject to the same possibility of error as in Glass' key.

The joining of the premaxillaries with the nasals is generally a good means of distinguishing *Bos* from *Bison*, but here again there are exceptions in both genera where the nasals and premaxillaries meet at a common point with the maxillaries and if the nasals are weathered away and completely missing, this key is of little value. The skulls of bison and *Bos taurus* are not difficult to distinguish when seen from a lateral view, due to the decided angle formed at the frontal eminence in the latter. When this same area in the Brahman is compared with that of the bison and *Bos taurus*, the outline more nearly approaches that of the bison (Fig. 1 *b*, *d*). The supraorbital foramina which are located in a deep supraorbital groove in the bison and the Brahman are not as noticeably recessed in the specimens of *Bos taurus* examined.

If the entire skull is preserved identification is simplified, as the general outline of the dorsal surface of the skull in the bison more nearly approaches an equilateral triangle whereas this same area is longer and narrower in the Brahman and other members of the genus *Bos*, having the general form of an isosceles triangle (Fig. 1 *a*, *c*, *e*). The occipital region, viewed dorsally, exhibits a dished or nearly straight line between the horn cores in the Brahman as compared with an outwardly curved margin in the bison (Fig. 1 *a*, *c*). The horn cores alone in the bison and the Brahman are nearly identical in curve, shape, sculpturing, and stoutness, whereas the horn cores in other species of domestic cows tend to be lighter in build when compared with those of the bison. This similarity in bison and Brahman horn cores is particularly confusing when only that portion of the brain case exhibiting the horn cores is preserved. The orbits of the bison project laterally to a greater degree than those found in the Brahman and other domestic cows. The elongated neural spines or "hump ribs" of the thoracic vertebrae of the bison were long used to determine if the skeletons were *Bison* or *Bos* (Burt 1948: 265). These same vertebrae in the Brahman have the elongated spines in the region of the hump and are therefore of little value for distinguishing bison from Brahman.

This brief contribution is intended only as a cautionary note for field workers, but it is hoped that a more thorough study can be undertaken on the dentition and postcranial skeletons of these two similar forms.

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STANLEY J. OLSEN
Florida Geological Survey
Tallahassee, Fla.
September, 1957

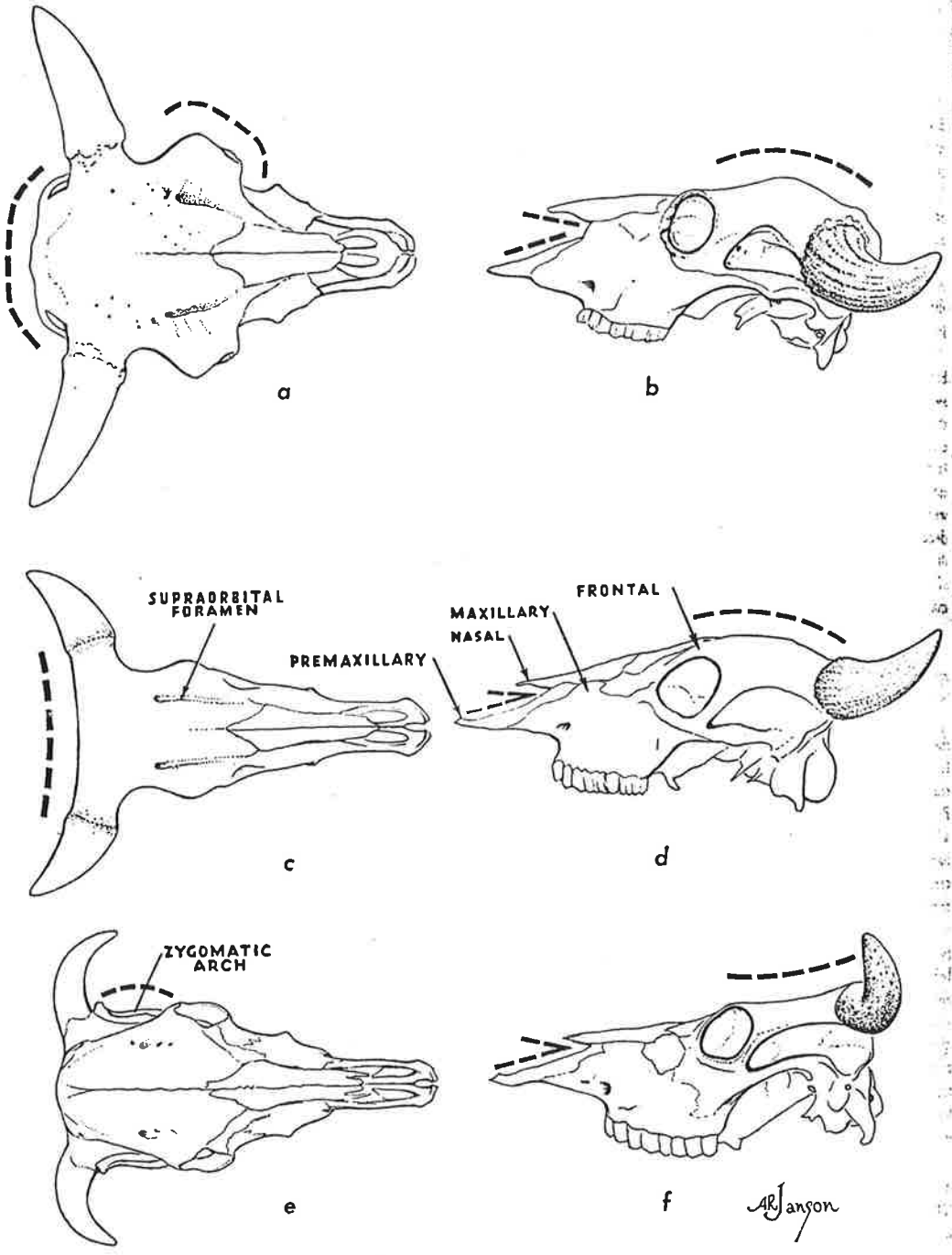

FIG. 1. [Olsen]. Comparison of the skulls of North American buffalo, Brahman, and domestic cow. *a*, dorsal view, *b*, lateral view of the skull of the North American buffalo, *Bison bison*; *c*, dorsal view, *d*, lateral view of the skull of the Brahman, *Bos indicus*; *e*, dorsal view, *f*, lateral view of the skull of the domestic cow (other than Brahman), *Bos taurus*. Dashed lines indicate differentiating characters.

Ox Skull ornament in gable of Kiosk which caps the fluted abutment-piers

Monroe Street Bridge - Spokane, Wash.

Picture 4473 neg.
SPOKANE - BRIDGES - MONROE STREET BRIDGE, THIRD

Property of
H. Hatton
2421 W. Mission Ave.
Spokane, Wash.