The Montreal -
South Shore Bridge
Across
THE ST. LAWRENCE RIVER
At Montreal, Canada

Owing to the great length of this Bridge, the view shows but one-third of the total structure, which extends well over into the city of Montreal on the right and bears the burden of the automobile and street car traffic in this district.

Typical of Mr. Strauss' genius for combining artistic beauty with engineering efficiency, is the Municipal Recreation Building, the white structure on St. Helen Island at the left. This is especially designed and equipped for the enjoyment of the thousands who use this island as an open air playground, and gives access to a spacious bathing beach.

Still farther to the left, outside the range of this picture, is a long series of steel spans—24 in number, each span about 250 feet in length—ending in an earth fill.

**Dimensions:**

- Total Length: 10,300 feet
- Montreal Approach Viaduct: 2,300 feet

**Cantilever Span:**
- Anchor Arm: 420 feet
- Channel Span: 1,097 feet
- Anchor Arm: 420 feet

**Steel Work:** 32,000 tons

**Concrete Work:** 130,000 cubic yards

**Earth Fill:** 115,000 cubic yards

**Total Cost:** $12,000,000,00
Strauss Engineering Corporation -

is this year rounding out a Quarter-Century of continuous operation under the same management.

It is an Illinois corporation — one of the largest commercial organizations in the Bridge Engineering field.

Its business is the designing of Bridges — Fixed or Movable, Concrete or Steel — and the supervising of their construction.

The Corporation's association with leading financial houses enables it to arrange adequate financial aid for Toll Bridges and similar projects.

Its established clientele includes Governments, States, Counties, Cities, Municipalities and Railroads.

Over 350 Bridges in all parts of the world — all designed by the Strauss Corporation — add special weight and significance to the identifying phrase —

BRIDGES • BY • STRAUSS
Foremost in Original Design

Strauss Engineering Corporation has long been foremost in original Bridge design.

This leadership is evidenced not alone in the many Strauss patents on new types of Bridges and vital construction details, but in the eye-value of Strauss Bridge designs as well.

The phrase, “Bridges by Strauss,” spells Bridge beauty as well as Bridge economy and efficiency.

Strauss Patents

The striking originality and resourcefulness of the organization are reflected in (1) its successful combining of Bridge beauty with Bridge economy; and (2) its meeting of unusual problems with original ideas and designs, resulting in (3) the many and valuable Bridge patents issued to the Corporation by the United States and other countries.

The practical value of these patents to the Strauss clientele has been demonstrated by repeated attempts to imitate them. The Corporation’s right and title to the exclusive use of these designs have been confirmed and sustained by the Federal Courts.

Types of Bridges -

The list of Bridges by Strauss stretches over a 25-year span of service, and covers the entire field—Fixed as well as Movable Bridges. Many clients have been served over and over again.

Fixed Bridges -

In the field of Fixed Bridges, the Strauss organization is identified with a series of the world’s most notable long-span Bridges. A few of the outstanding examples are pictured and briefly described on the following pages.

Movable Bridges -

The Strauss organization has made history in the field of Movable Bridges. Its opening chapter was the replacing of the cast iron type of counterweight by the concrete type. This revolutionized the whole art, reducing Bascule and Lift Bridges from the luxury class to a sound commercial standard. For convenient reference, Strauss Movable Bridges may be divided into five main groups:

I Vertical Overhead Counterweight Type (Page 12)
II Underneath Counterweight Type (Page 14)
III Heel Trunnion Type (Page 20)
IV Simple Span Type (Page 22)
V Vertical Lift Type (Page 24)
Fixed Bridges

at Montreal
— across the St. Lawrence River

This $12,000,000.00 structure is the largest highway Bridge in the Dominion of Canada.

It is about two miles long. The main span of the cantilever portion is 1,097 feet. The Strauss organization is associated in this work with Monsarrat & Pratley of Montreal as designing and consulting engineers. Now under construction, to be completed in 1930.

A larger view of this great Bridge, in full colors, is shown in our frontispiece.

at San Francisco

The proposed Golden Gate Bridge opens the modern era of Super-Span structures. It has a 4,000-foot span—the longest ever given serious consideration by the Bridge building world.

Up to the development of this new design, the maximum length of Bridge span was represented by the Quebec Cantilever, 1,800 feet, and New York City Suspension Bridges, 1,600 feet. The increase from these lengths to a 4,000-foot span was debated in some quarters as unfeasible, but since then a 3,500-foot suspension span has been designed, (see illustration on Page 6) and is now under construction across the Hudson River at New York.

The Golden Gate Bridge measures 6,176 feet including approaches. Estimated cost, with approaches and financing, $30,000,000.00.

Illustrated in full colors on back page.
Fixed Bridges

at New York

The President of the Strauss organization is a member of the Board of Consulting Engineers for the Port of New York Authority, which has under construction two of the greatest Bridge projects of the present era—the 3,500-foot suspension span across the Hudson River at 179th Street, pictured above, and the 1,675-foot arch across the Kill van Kull between Staten Island, N. Y., and Bayonne, N. J.

Total estimated costs:
Hudson River Bridge, $75,000,000.00
Kill van Kull Bridge, $16,000,000.00

Across the Columbia

The high level highway Toll Bridge across the Columbia River, now under construction, connects Longview, Washington, with Rainier, Oregon, and is the longest Cantilever Bridge in the United States.

The main span is 1,200 feet, with anchor arms each 760 feet long. Total length, including approaches, 8,200 feet. The clear height of this new Strauss Bridge is 196 feet.

Total cost, $5,800,000.00.
**Fixed Bridges**

*at Peoria, Illinois*

Typical of the modern Municipality Bridge as designed for a city of moderate size is the Cedar Street Bridge over the Illinois River at Peoria.

The length over all is 3,800 feet, the longest span measures 296 feet, and the clearance above water level is 65 feet. The total cost is $1,250,000.00.

*at Quincy, Illinois*

Another new Bridge by Strauss is the Quincy Memorial Bridge over the Mississippi River, now under construction. This bridge will cost $1,200,000.00 and is 3,508 feet long. It contains two continuous spans, each 628 feet in length, with a water level clearance of 55 feet.

*at Independence, Mo.*

This Bridge by Strauss measures 1,657 feet, with a 507-foot center span and a 55-foot vertical clearance. Total cost, $800,000.00.
Fixed Bridges
(Concluded)

Toll Bridges
Toll Bridges are construction jobs of such a nature as often to call for special aid in financing as well as skilled and resourceful designing.

Included in the list of Bridges by Strauss are some of the world’s outstanding Toll Bridges. The ability of the Strauss organization, through the Corporation's association with leading financial institutions, to arrange financial assistance for Toll Bridges and similar projects, is an important factor in this successful record.

REGARDLESS of the size of the Bridge job – whether a project of modest size or a contract running away up in the millions – prestige is added and money is saved by first bringing the problem to headquarters —

"Bridges by Strauss"
Movable Bridges —

GROUP I -
Vertical Overhead Counterweight Type

This type of construction applies to either single or double-leaf spans.

In the single-leaf span Bridge pictured above, the trunnions or axles divide the bascule into two arms. The long arm spans the navigable stream. The short arm extends back toward the shore and serves as a support for the counterweight which balances the long arm in any position of the Bridge in opening or closing.

The entire dead load is supported at the trunnion and remains a constant vertical load upon the piers during the operation of the Bridge.

The Bridge by Strauss shown in the illustration is the Fourth Street Bridge at San Francisco.

The Vertical Overhead Counterweight type of Bridge is best adapted for locations where there is very little clearance between water level and under side of Bridge, for leaf lengths up to about 100 feet, and where economy is a prime consideration.
Movable Bridges —

GROUP II -
Underneath Counterweight Type

This type is best adapted for locations where *appearance* is a prime consideration or where there is appreciable clearance between water level and under side of Bridge.

Where the clearance is small, this type of Bridge is adaptable by providing pits in the piers for receiving the counterweights when Bridge is open.

This design applies to either double or single-leaf spans.

The Bridge by Strauss pictured on this page is the Highway Bridge at Lake Charles, Louisiana—a short span, double-leaf structure of the Underneath Counterweight type. It will be noted that when the Bridge is open the leaves act as barriers to traffic—a valuable safety feature.

Continued

Bridges by Strauss of the Underneath Counterweight type have the following points of advantage:

1. The dead load remains a fixed load on the foundation throughout the operation of the Bridge.

2. Impossible for Bridge to open under live load.

3. Advantageous location of motors and operating machinery.

4. Vital moving parts are securely housed, protected from weather and dirt.
at Chicago — The New Lake Shore Outer Drive Bridge

Only a hundred years ago, the sole connecting link between Chicago's business district on the South Side and its residence section on the North Side, was a mud scow ferry boat across the Chicago River.

The city was literally split in twain by the historic "Bridge Dispute" over a proposed small wooden structure at Dearborn Street. When at last the Bridge was built, Chicago's civic growth was accelerated by leaps and bounds.

Today Chicago is on the eve of another Bridge achievement of tremendous import. The famous Lake Shore Outer Drive is about to become the main artery of traffic between the North and South environs of the city, through the construction of the Outer Drive Bridge, of which one section is pictured above.

This great structure—which is really two bridges, since it spans both the Chicago River and the Michigan Canal—measures over one mile with approaches. The upper roadway of the approaches is 100 feet wide, with 15-foot sidewalks. The lower level carries two 30-foot roadways. The lower deck of the Bridge itself also provides rail connection between the Chicago & North Western Railway and the Chicago Harbor on the North, and the Illinois Central Railway on the South.

Each of these Bridges is a 4-truss, double deck trunnion bascule of the Strauss Through Supporting Girder type. Owing to the size, capacity and duty requirements of the Double Leaf structure across the Chicago River, it will be the heaviest Bascule Bridge in the world.

The project will be completed in 1931, at a total cost of $10,000,000.00.
Bridges by Strauss are Bridges of Beauty

Beauty as a dominant note in modern Bridge design is by no means inconsistent with the engineering problem of setting in motion a huge mass weighing thousands of tons.

Notwithstanding the tremendous utilitarian demands of the massive steel-and-concrete structures of today, Bridges by Strauss rank high among the artistic achievements of the New World. They are outstanding reminders that the immensity of the modern Bridge is no bar to structural Beauty.

The early American conception of Bridge essentials was very much like our early ideas of factory construction—strictly utilitarian. Ugliness, while not rated as an asset, was accepted as a foregone conclusion. The modern business man, however, appreciates the added cash value in a structure that is architecturally attractive.

From the world of business this new conception has spread to the civic consciousness. A Bridge which improves a city's appearance is of high advertising value. The architectural beauty of our more recent Government Bridges reflects a new note of national pride. In Bridges by Strauss, attention is given not only to economy but to appearance as well.

To the artistic standards already established by the organization, each new Bridge by Strauss offers a new challenge. It must serve every purpose of commerce by water and traffic by land with maximum efficiency—and still be a dignified and inspiring monument, giving to the commercial value of our waterways the additional asset of architectural elegance.
Movable Bridges

GROUP III -
Heel Trunnion Type

A unique feature of this design is the method (anchorage through operating strut) of supporting the live load on the bascule leaves, which act as cantilevers.

The construction is such that the anchor strut may be lengthened or shortened during the erection of the Bridge, making possible an exact adjustment between leaves and struts.

In the structure shown on the opposite page, after the erection of the Bridge was completed and the leaves were first lowered, they met at the center within three-eighths of an inch of the same elevation. By the anchor arm adjustment mentioned, the leaves were brought at once to exact position.

For leaf lengths over 100 feet, well adapted for locations where there is little clearance between water level and under side of Bridge, as it possesses advantages rendering it applicable regardless of clearance.

For the larger and heavier Bridges of the Heel Trunnion type, through-truss spans are best suited. For the lighter and shorter Bridges, semi-through spans may be used.

Applies equally well to either single or double-leaf spans.

The Bridge by Strauss pictured on this page is the double-leaf Heel Trunnion Highway Bridge over the Sacramento River at Walnut Grove, Calif.

The largest and heaviest railroad bascules in the world are of this type of Strauss design, and have been thoroughly proven by years of heavy service.
Movable Bridges

GROUP IV - Simple Span Type

This type is ideal for railroad Bridges crossing wide channels.

The Bridge by Strauss pictured above is the double-leaf simple span Railway Bridge across the U. S. Ship Canal at Sault Ste. Marie, Michigan, on the Canadian Pacific Railway.

This is the world’s longest Bascule Bridge. The distance from center to center of channel piers is 336 feet.

From a navigation standpoint, this is doubtless the most important Bascule Bridge in service. A greater yearly tonnage passes through the canal at this point than through either the Panama or the Suez Canal.

The leaves are interlocked with a compression lock at the top and a tension lock at the bottom, converting the two leaves into one simple-span truss—an idea developed to make practicable the use of a double-leaf Bridge for railway traffic.

The success of this pioneering in design is evidenced by the fact that although no such device ever had been used before, this Bridge by Strauss is now in its 16th year of continuous heavy-duty service.

This type may also be used with underneath counterweights where appearance is an important consideration.
Movable Bridges

GROUP V -
Vertical Lift Type -
With Rack-and-Pinion Drive

This type of Bridge by Strauss is so designed that the moving span in opening and closing travels vertically, the floor of the Bridge remaining horizontal at all times.

The movement, in other words, resembles that of a modern elevator—save for the fact that the operating cables are eliminated. The advantage is obvious, since the use of operating cables involves not only constant attention but frequent renewals—during which time a cable-operated Bridge is necessarily out of commission.

Where appearance is a prime consideration, this type of Bridge can be made very attractive, as the illustration indicates. Here the towers are featured by enclosing the steel work in ornamental concrete bases.

(Concluded)

Strauss Bridges of this type are best adapted for wide channels where the required vertical lift is small.

Also for locations where the Bridge is built at considerable height above water level, thus reducing materially the vertical travel of the span.

An economical design for long spans with short lift.
Makers of Bridge History

Bridges by Strauss have made history in the Movable Bridge field.

The opening chapter was written years ago, when Mr. Strauss replaced cast-iron counterweights with modern concrete.

This forward step revolutionized the art. It converted Bascule and Lift Bridges into economic structures. Other history-making chapters in the development of Bridges by Strauss include the following notable improvements:

- Parallel-Link System of Counter-balancing.
- Underneath Counterweight type.
- Heel Trunnion type.
- Solid type of Self-Supporting Overhead Counterweight.
- Wing type of Overhead Counterweight.
- Vertical-Post Trunnion Support with Pin-Connected Counterweight.
- Through-Girder Trunnion Support. This type has been used exclusively by the City of Chicago under license of the Strauss Engineering Corporation.
- Anchor-Strut for Double-Leaf Cantilever Bascules.
- Simple Span type, with Tension and Compression Locks for Double-Leaf Bascules.
- Double-Deck Bascules. (Kamini-stiquia type).

Operating Strut and Guide for Heel Trunnion Bridges—the Standard Bascule operating mechanism.

Modern type of Trunnion Sleeve and Bearing.

Forced and Automatic Lubrication—the forerunner of the Alemite System.

Automatic End-Lock.

New Center-Lock—the modern Jaw-Lock for Double-Leaf Bridges.

Push-Button Control.

* * *

Typical of the improvements contributed to the art by the Strauss organization, is the new Center-Lock pictured above. This modern Jaw-Lock for Double-Leaf Bridges promptly rendered obsolete the old latch-bar or plunger type of lock.

It not only aids the operator in closing the Bridge to bring the two leaves to the same level, but also eliminates vertical play between the ends of the leaves under heavy traffic.
Prize Winning Designs

International Competitions -

Bridges by Strauss have won first prizes in the following International Competitions for Movable Bridges:

At Copenhagen, Denmark—Knippels Bridge Competition in 1911.

At Petrograd, Russia—Palace Bridge Competition in 1911 (Known today as the Republican Bridge).

At Tientsin, China—Pei Ho Bridge Competition in 1920 (Highway Bridge at Viceroy’s Yamen).

National Competitions -

First prizes were awarded to Bridges by Strauss in the following National Competitions for Movable Bridges:

At Peoria, Illinois—Peoria & Pekin Union Railway Bridge Competition in 1911.

At Deering, Illinois — Chicago & North Western Railway Bridge, in 1914.

At Chicago—Railroad Bridge over South Branch of Chicago River at Sixteenth Street for Illinois Central, Michigan Central, Chicago & North Western and Chicago, Burlington & Quincy Railroads, in 1916—the longest single-leaf Bascule ever built.

At Buffalo, N. Y.—U. S. Government Bridge Competition, in 1911.

At Louisville, Ky.—U. S. Government Bridge Competition, in 1913.


At Washington, D. C.—The magnificent Arlington Memorial Bridge across the Potomac River, a Double-Leaf Underneath Counterweight Bridge, 90-ft. wide, for U. S. Government, in 1926. (See illustration on Pages 18 and 19.)

* * *

A quarter-century of steady progress in scientific design has kept Bridges by Strauss in the front ranks of efficiency, safety, wide adaptability, artistic effect, and economy of construction.
IN Strauss Bridges we have sought, and in the main have realized, the accomplishment of that ideal combination of First Quality and Economy, which the world has the right to expect from the modern Engineer — and which in large degree is the measure of its progress.

Strauss Engineering Corporation

[Signature]
President and Chief Engineer

CHARLES A. ELLIS        CLIFFORD E. PAINE
Vice-President & Contracting Manager  Vice-President & Managing Engineer

307 North Michigan Avenue
CHICAGO

Send for Complete Catalog
"You see that Bridge, that huge red naked thing of steel? Magnificent, eh? And there—no, there, right at the top, a little dot that sways and crawls along, fearful lest it lose its dizzy head and dash into oblivion? Pitiful, isn't it—that pygmy being with its two small hands and smaller brain, beside the Bridge that rears its massive frame against the sky? You see him? Well—he made it!"
The Golden Gate Bridge

Across
THE GOLDEN GATE
At San Francisco, California

THE Golden Gate Bridge, for which the preliminary plans prepared by Mr. Strauss have been approved by the War Department, connects the city of San Francisco with the famous Muir Woods residence section to the north—till now practically isolated from the city by a mile-and-a-quarter stretch of ocean. This great structure (as described on Page 5) has a 4,000-foot center span—dimensions without precedent in the history of Bridge Building.