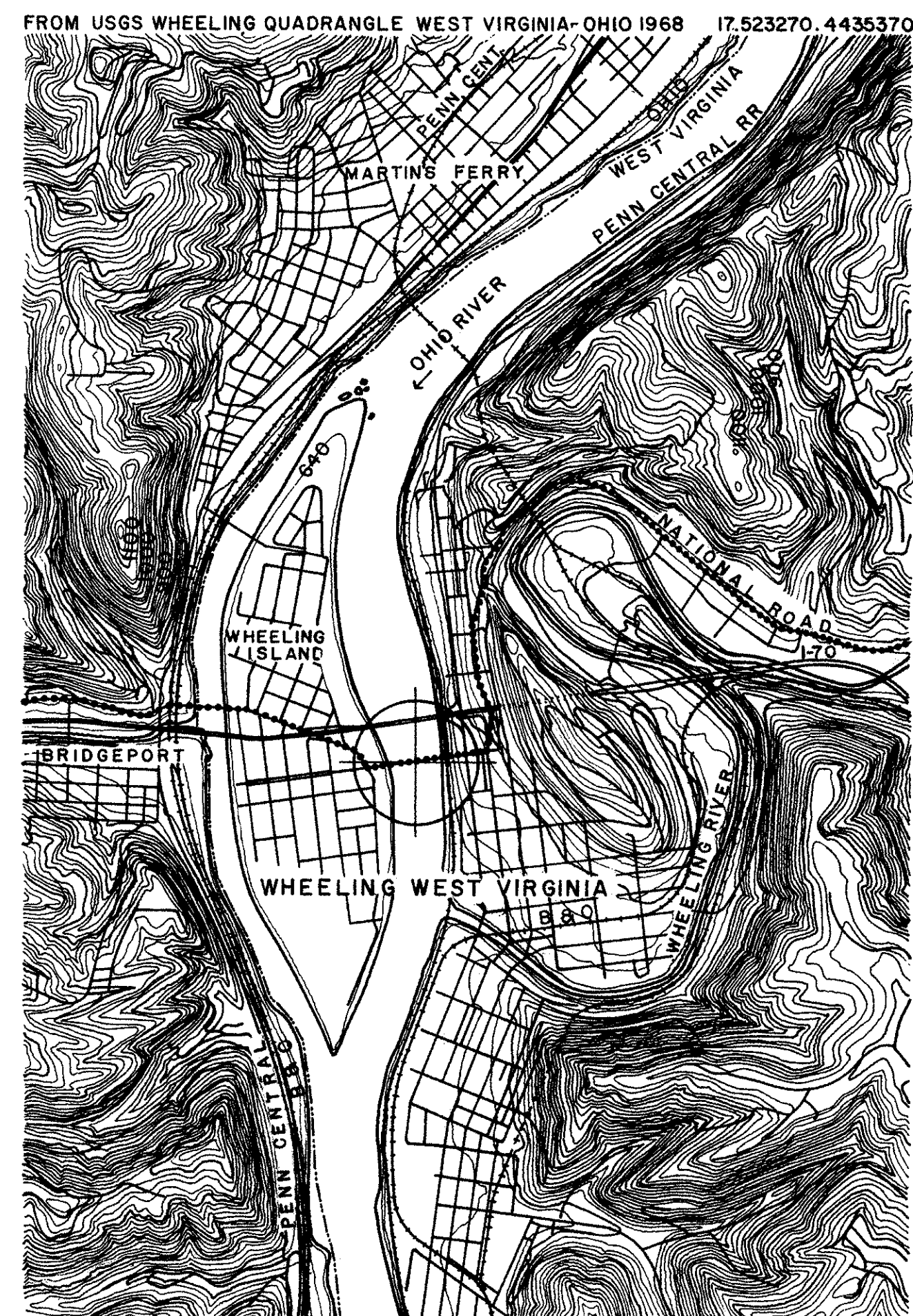
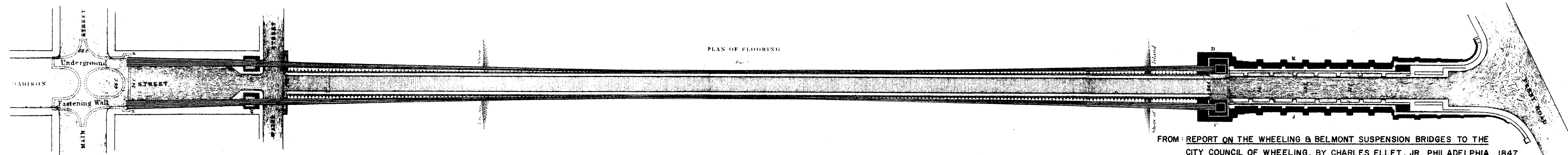
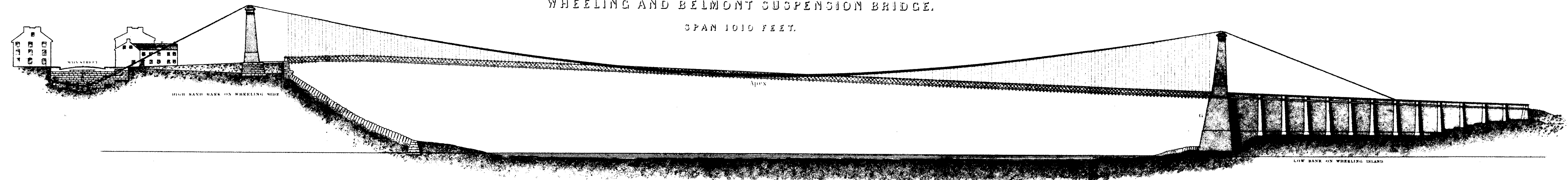


# THE WHEELING SUSPENSION BRIDGE-1849

## WHEELING, WEST VIRGINIA

PLAN OF THE  
WHEELING AND BELMONT SUSPENSION BRIDGE.  
SPAN 1010 FEET.



LOCATION MAP 1:24000

### STATEMENT OF SIGNIFICANCE

IN 1847 THE WHEELING AND BELMONT BRIDGE COMPANY COMMISSIONED CHARLES ELLET, JR., TO BUILD A CABLE SUSPENSION BRIDGE ACROSS THE MAIN CHANNEL OF THE OHIO RIVER AT WHEELING, WEST VIRGINIA (THEN VIRGINIA). THE BRIDGE WAS COMPLETED IN OCTOBER 1849. THE 1,010 FOOT MAIN SPAN OF THE BRIDGE WAS FOR MANY YEARS THE LONGEST BRIDGE IN THE WORLD; IT SURPASSED THE FRIBOURG SUSPENSION BRIDGE (1834) OVER THE SARINE RIVER IN SWITZERLAND BY 140 FEET BETWEEN TOWERS. IT IS ONE OF THE OLDEST SUSPENSION BRIDGES IN AMERICA STILL IN USE.

THE COMMISSION TO BUILD THE BRIDGE WAS GRANTED TO ELLET IN SHARP COMPETITION WITH JOHN ROEBLING, THE ONLY OTHER ENGINEER IN THE U.S. AT THE TIME WITH EXPERIENCE IN SUSPENSION BRIDGE CONSTRUCTION. BOTH ENGINEERS HAD MADE EARLIER PROPOSALS TO THE BRIDGE COMPANY, AND BOTH RESPONDED WITH DETAILED DESIGNS TO THE COMPANY'S INVITATION OF MAY 1847 FOR BRIDGE PLANS AND COST ESTIMATES.

THE DRAWING ABOVE OF THE WHEELING SUSPENSION BRIDGE IS A PHOTOCOPY OF ELLET'S SUBMITTAL. AT THE BOTTOM OF THE DRAWING ARE THESE CREDITS, "DRAWN BY C. ELLET, JR., ENGINEER. ENGRAVED BY J. I. PEASE."

THE BRIDGE WAS BUILT SUBSTANTIALLY AS PROPOSED AND IS DESCRIBED IN EXCERPTS FROM THE PROPOSAL THESIS:

THE SPAN OF THE WHEELING BRIDGE IS 1010 FEET FROM CENTRE TO CENTRE OF THE SUPPORTING TOWERS. THE HEIGHT OF THE FLOORING, AT ITS GREATEST ELEVATION, IS 97 FEET ABOVE THE LOW WATER SURFACE OF THE OHIO.

THE SUMMIT OF THE EASTERN TOWER IS 153 1/2 FEET ABOVE THE ABUTMENT BY WHICH IT IS SUPPORTED AND 23 3/4 FEET ABOVE THE SUMMIT OF THE WESTERN TOWER.

THE FLOORING IS 24 FEET WIDE, WITH TWO FOOT-WAYS,

EACH 3 1/2 FEET WIDE, AND AN INTERMEDIATE CARRIAGE-WAY 17 FEET WIDE.

THE FLOORING IS SUPPORTED BY 12 CABLES OF IRON WIRE, EACH OF WHICH WILL BE ABOUT FOUR INCHES IN DIAMETER, AND 1,380 FEET LONG.

THE CABLES REST ON IRON ROLLERS PLACED ON THE SUMMITS OF THE COLUMNS, THE MOVEMENT OF WHICH WILL EFFECTUALLY RELIEVE THE TOWERS OF THE STRAIN WHICH WOULD BE OCCASIONED BY THE CONTRACTION AND ELONGATION OF THE STAYS, CONSEQUENT ON VARIATIONS OF TEMPERATURE, OR THE TRANSITORY LOADS BROUGHT ON THE FLOORING.

THE STAYS ARE ANCHORED INTO THE MASONRY OF THE WINGWALLS, ON THE WESTERN SHORE AND INTO OTHER APPROPRIATE WALLS DEvised FOR THE PURPOSE, UNDER MAIN STREET IN THE CITY.

THE BRIDGE OPERATED PROFITABLY UNTIL 1854 WHEN A HIGH WIND SET UP OSCILLATIONS IN THE DECK, AND THE CABLES... "WERE LITERALLY TWISTED AND WRENCHED FROM THEIR FASTENINGS." THE BRIDGE COMPANY IMMEDIATELY REQUESTED RECONSTRUCTION PLANS FROM ELLET, AND UNDER THE SUPERVISION OF CAPTAIN McCOMAS, A TEMPORARY SINGLE LANE STRUCTURE WAS BACK IN SERVICE IN THREE MONTHS. IN 1860 McCOMAS COMPLETED A TWO-LANE BRIDGE USING ALL BUT FOUR OF THE ORIGINAL TWELVE CABLES SALVAGED FROM THE ORIGINAL SUSPENSION. THE SUSPENDERS AND DECK TRUSS ARE PROBABLY FROM THIS PERIOD.

IN 1872 A SYSTEM OF STAY CABLES RADIATING FROM THE TOWER TOPS WAS INSTALLED BY WASHINGTON A. ROEBLING, SON OF JOHN ROEBLING, TO STIFFEN THE STRUCTURE. FURTHER REPAIRS AND STIFFENING WERE ACCOMPLISHED IN 1922 AND IN 1930. IN 1956 THE WOODEN DECK WAS REPLACED WITH OPEN STEEL GRATING ON STEEL FLOOR BEAMS. BETWEEN 1978 AND 1983 ADDITIONAL CONSERVATION WAS GIVEN TO THE MAIN CABLES, DECK TRUSSES, AND NORTHEAST ANCHORAGE.

THE BRIDGE WAS DESIGNATED A NATIONAL HISTORIC CIVIL ENGINEERING LANDMARK BY THE AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE) IN 1969, AND A NATIONAL HISTORIC LANDMARK BY THE SECRETARY OF THE INTERIOR IN 1975. ACCORDING TO EMORY KEMP, ONE OF THE FOREMOST AUTHORITIES ON THE HISTORY OF SUSPENSION BRIDGES IN NORTH AMERICA, THE WHEELING SUSPENSION BRIDGE "...IS PERHAPS THE MOST IMPORTANT EXTANT ANTE-BELLUM CIVIL ENGINEERING STRUCTURE IN AMERICA."

### CREDITS

THIS PROJECT, CONDUCTED BY THE HISTORIC AMERICAN ENGINEERING RECORD (HAER), IS PART OF A LONG-RANGE PROGRAM TO DOCUMENT HISTORICALLY SIGNIFICANT INDUSTRIAL AND ENGINEERING SITES IN THE UNITED STATES AND INCLUDE A GROUP OF HISTORICALLY SIGNIFICANT ENGINEERING STRUCTURES IN THE STATE OF WEST VIRGINIA. THE PROJECT, SPONSORED BY THE WEST VIRGINIA DEPARTMENT OF NATURAL RESOURCES AND THE DEPARTMENT OF CIVIL ENGINEERING, WEST VIRGINIA UNIVERSITY, WAS ONE OF THREE RECORDING PROJECTS IN THE STATE—THIS ONE BEING CONDUCTED DURING THE SUMMER OF 1974. FIELD WORK, WRITTEN DATA, MEASURED DRAWINGS AND PHOTOGRAPHS WERE PREPARED UNDER THE GENERAL DIRECTION OF DOUGLAS L. GRIFFIN, CHIEF, HAER, AND DONALD E. SACKHEIM, HISTORIAN, HAER, WITH KATHLEEN HOEFT (COLUMBIA UNIVERSITY) AS PROJECT SUPERVISOR, AND EMORY KEMP (DEPARTMENT OF CIVIL ENGINEERING, WEST VIRGINIA UNIVERSITY) AS PROJECT ADVISOR. THE SURVEY TEAM CONSISTED OF DAVID VAN TASSEL, HISTORIAN (GEORGE WASHINGTON UNIVERSITY); LU ANN SIMS, STUDENT HISTORIAN (GEORGIA INSTITUTE OF TECHNOLOGY); MARTIN GREENBERG, ARCHITECT (PRATT INSTITUTE); STEPHEN HAWKS, ARCHITECT (KANSAS STATE UNIVERSITY); AND ROBERT MEDEN, ARCHITECT (KENT STATE UNIVERSITY). FORMAL PHOTOGRAPHS WERE TAKEN BY WILLIAM EDMUND BARRETT.

DELINEATED BY: LONG HOEFT ARCHITECTS, 1984  
STATE OF WEST VIRGINIA SURVEY  
OFFICE OF ARCHAEOLOGY AND HISTORIC PRESERVATION  
NATIONAL PARK SERVICE  
UNITED STATES DEPARTMENT OF THE INTERIOR

WHEELING SUSPENSION BRIDGE : 1849  
U.S. ROUTE 60, JACKSON, OHIO RIVER

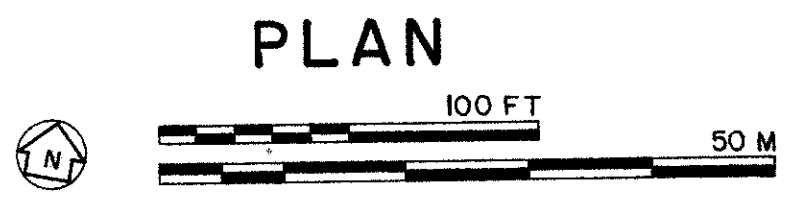
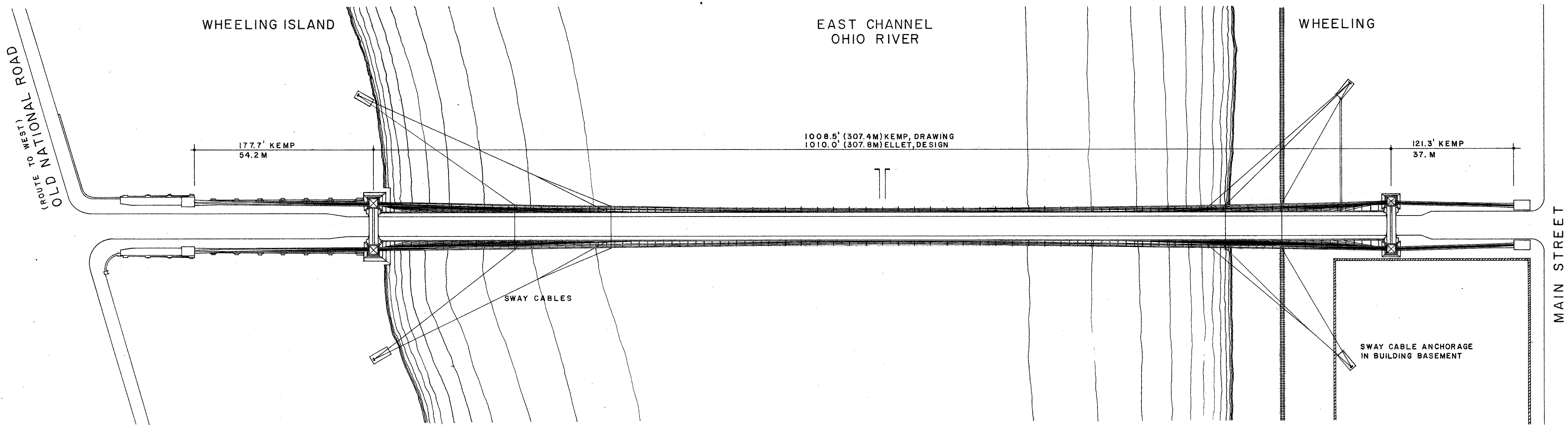
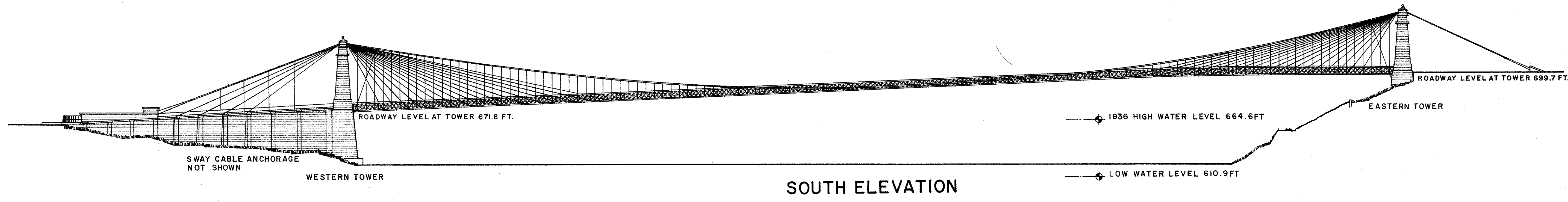
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ENGINEERING RECORD  
WV-2

SHEET  
1 of 4

WEST VIRGINIA

WHEELING

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OFFICE OF HISTORICAL AND CULTURAL PRESERVATION

NATIONAL PARK SERVICE

UNITED STATES DEPARTMENT OF THE INTERIOR

WHEELING

WHEELING SUSPENSION BRIDGE : 1849

U.S. ROUTE 40 SPANNING OHIO RIVER

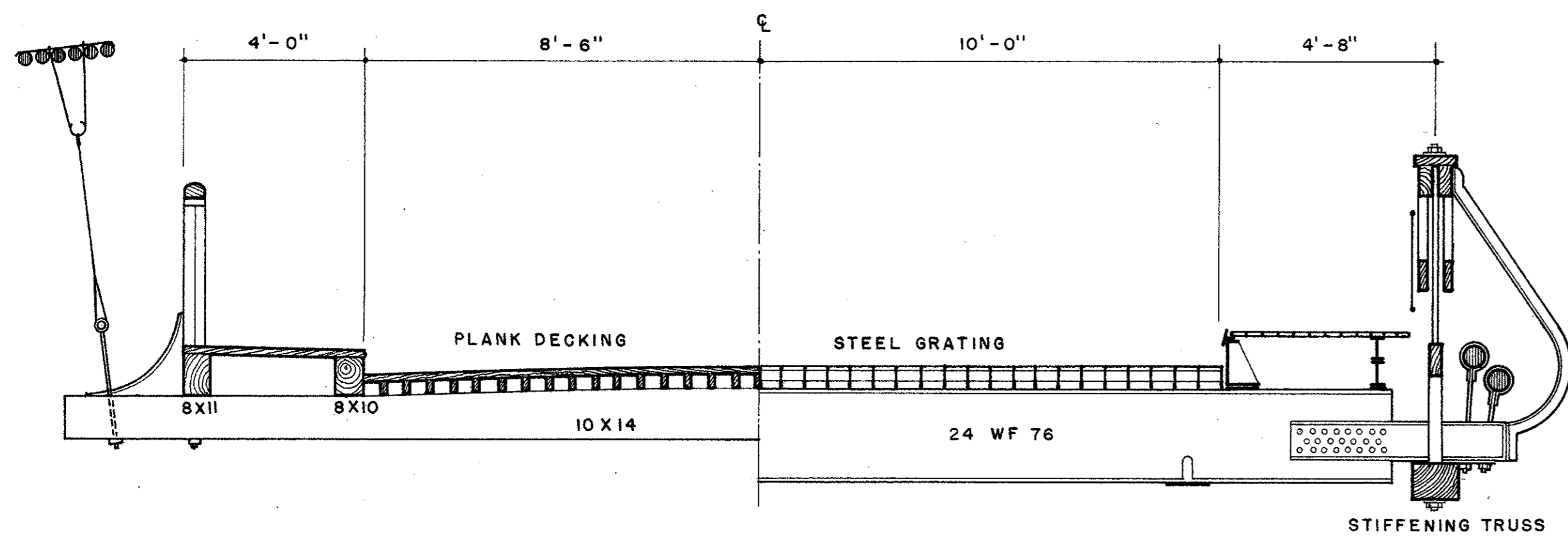
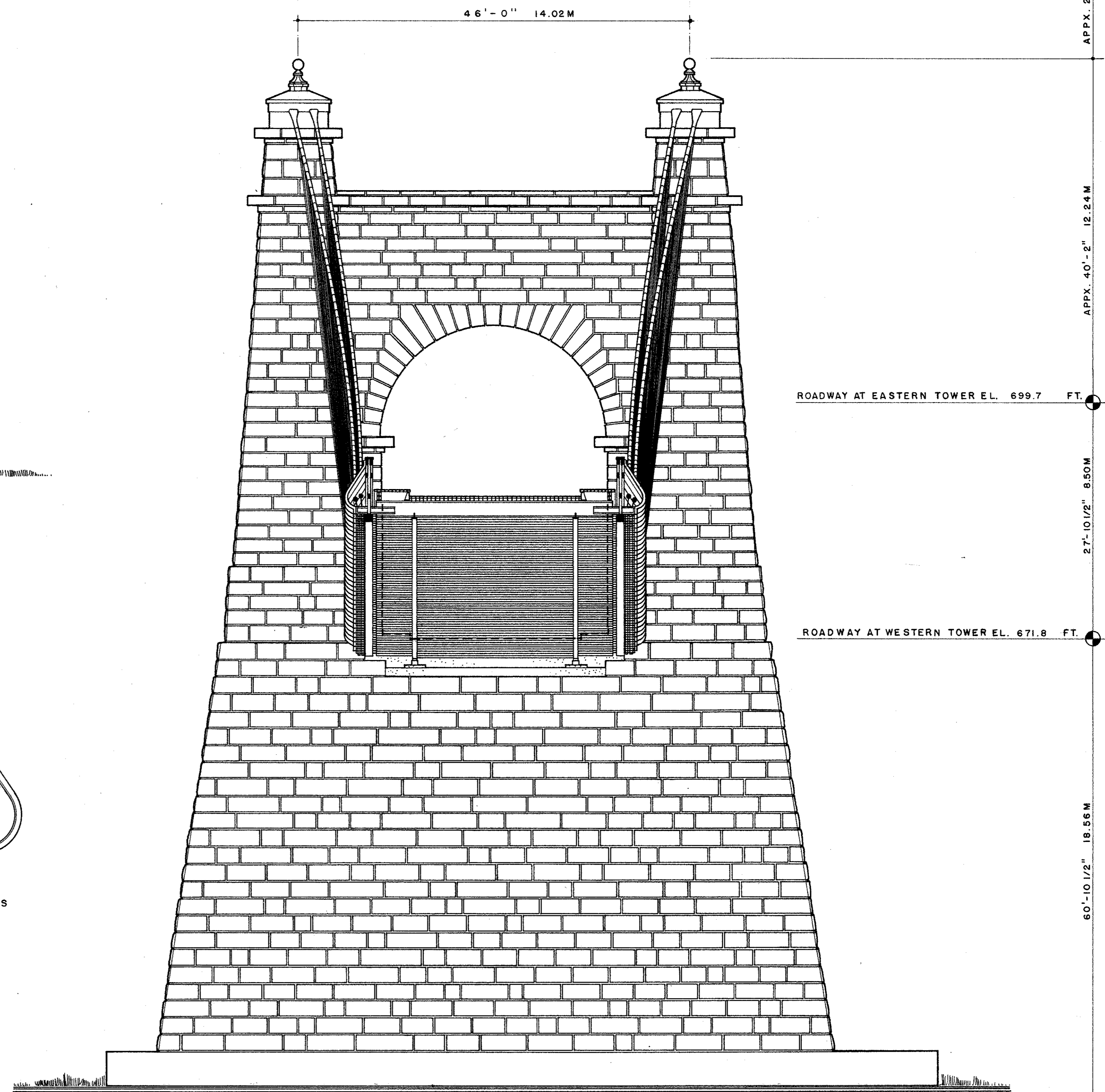
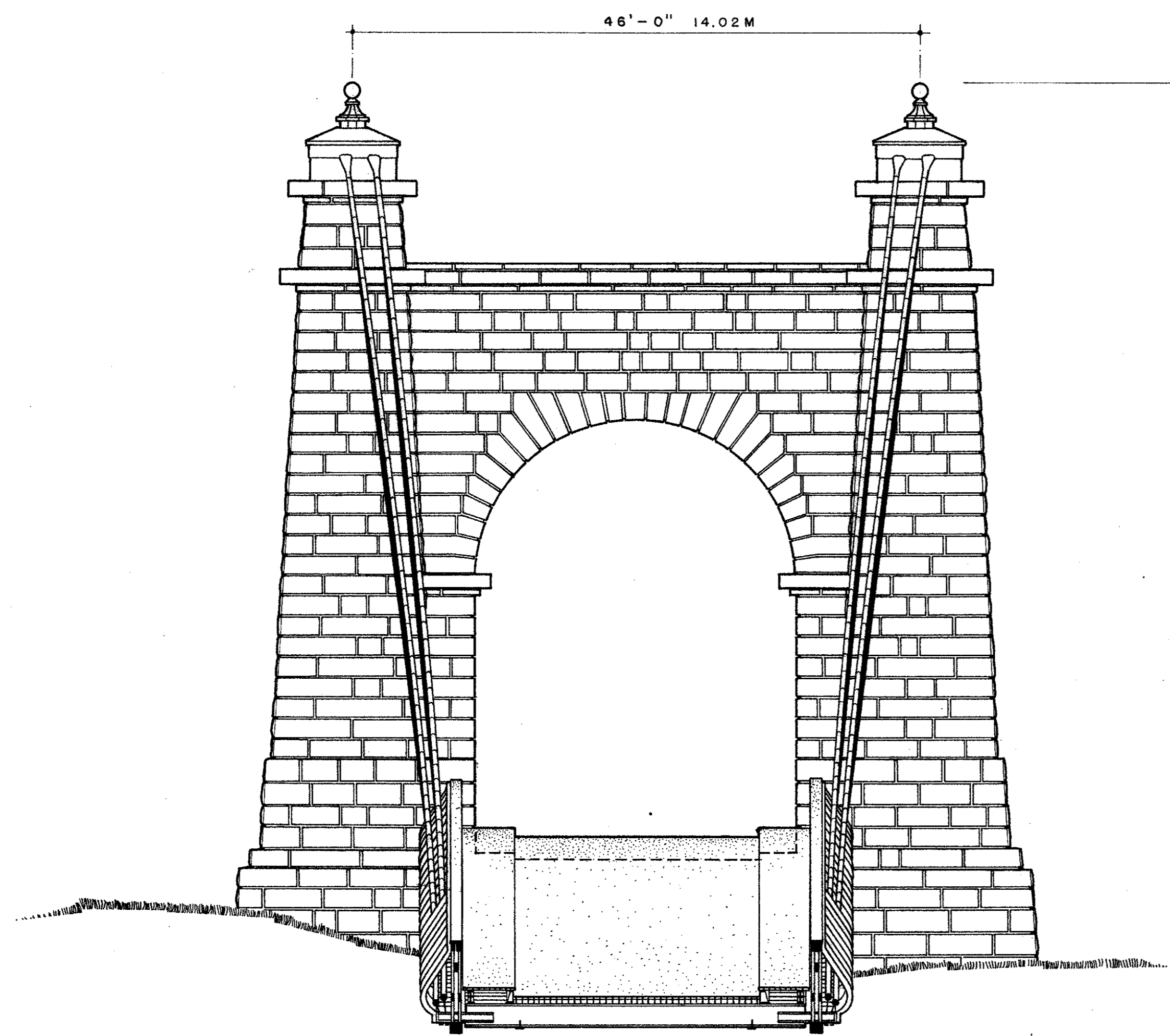
OHIO COUNTY

WEST VIRGINIA

SHEET 2 OF 4

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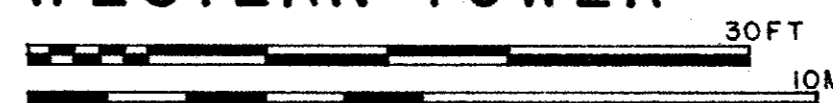
HALF-SECTION OF ORIGINAL DECK  
(FROM CULMAN, ALLGEMEINE BAUZEITUNG, 1852)

HALF-SECTION OF EXISTING DECK



EASTERN TOWER  
AND  
ROADWAY SECTIONS

WESTERN TOWER



ROADWAY AT EASTERN TOWER EL. 699.7 FT.

ROADWAY AT WESTERN TOWER EL. 671.8 FT.

LOW WATER EL. 610.9 FT. A.S.L.

60'-10 1/2" 18.56 M  
 27'-10 1/2" 8.50 M  
 APPX. 40'-2" 12.24 M  
 APPX. 23'-4" 7.11 M

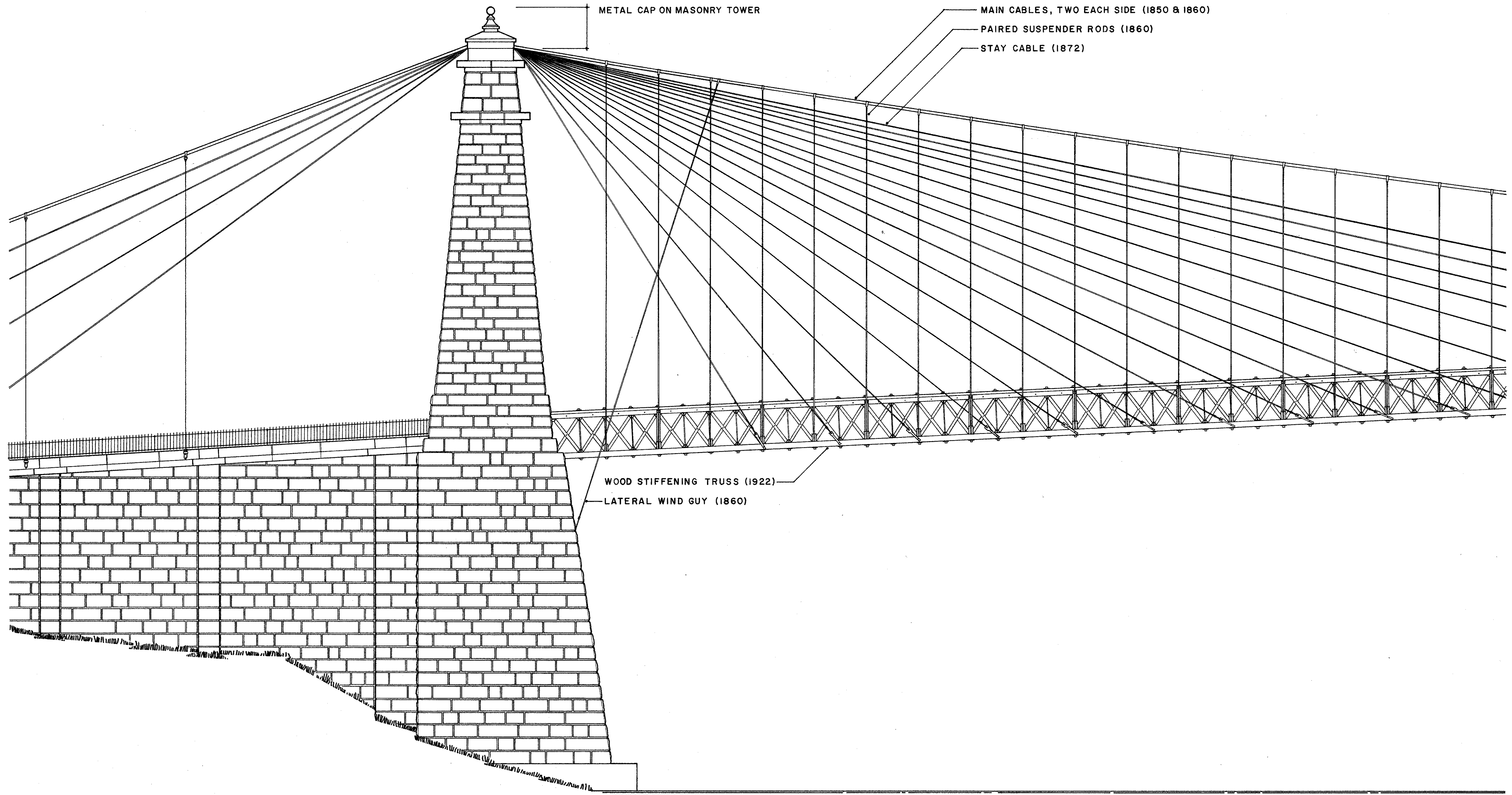
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WHEELING SUSPENSION BRIDGE : 1849  
 U.S. ROUTE 40 SPANNING OHIO RIVER  
 OHIO COUNTY

WEST VIRGINIA

SHEET 3 OF 4  
 HISTORIC AMERICAN  
 ENGINEERING RECORD  
 WY-2

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METAL CAP ON MASONRY TOWER

MAIN CABLES, TWO EACH SIDE (1850 & 1860)

PAIRED SUSPENDER RODS (1860)

STAY CABLE (1872)

WOOD STIFFENING TRUSS (1922)

LATERAL WIND GUY (1860)

WESTERN TOWER - SOUTH ELEVATION



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WHEELING  
 WHEELING SUSPENSION BRIDGE : 1849  
 U.S. ROUTE 40, SPANNING OHIO RIVER  
 OHIO COUNTY

WEST VIRGINIA

HISTORIC AMERICAN  
 ENGINEERING RECORD  
 WY-2

SHEET  
 4 OF 4

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