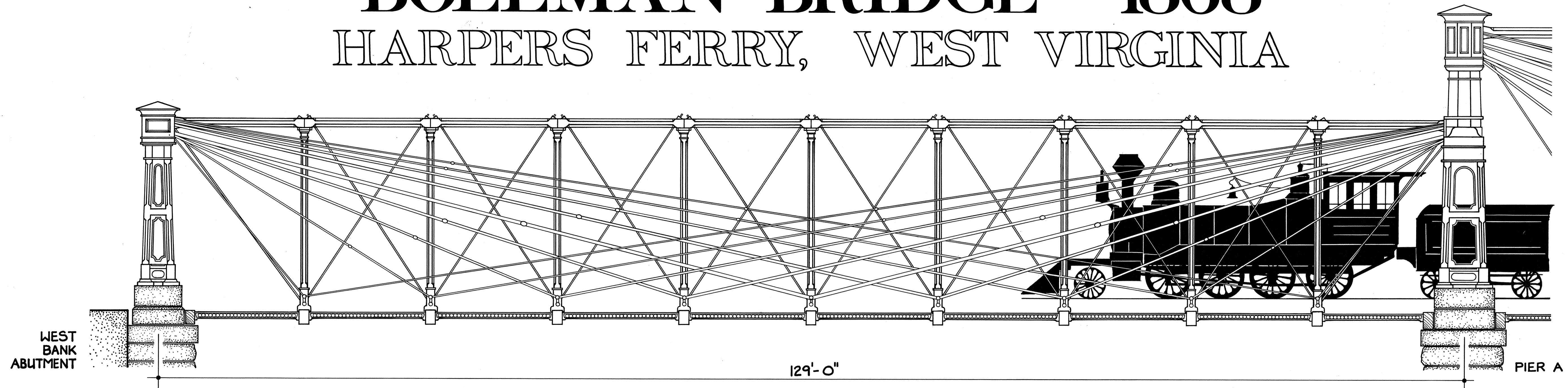


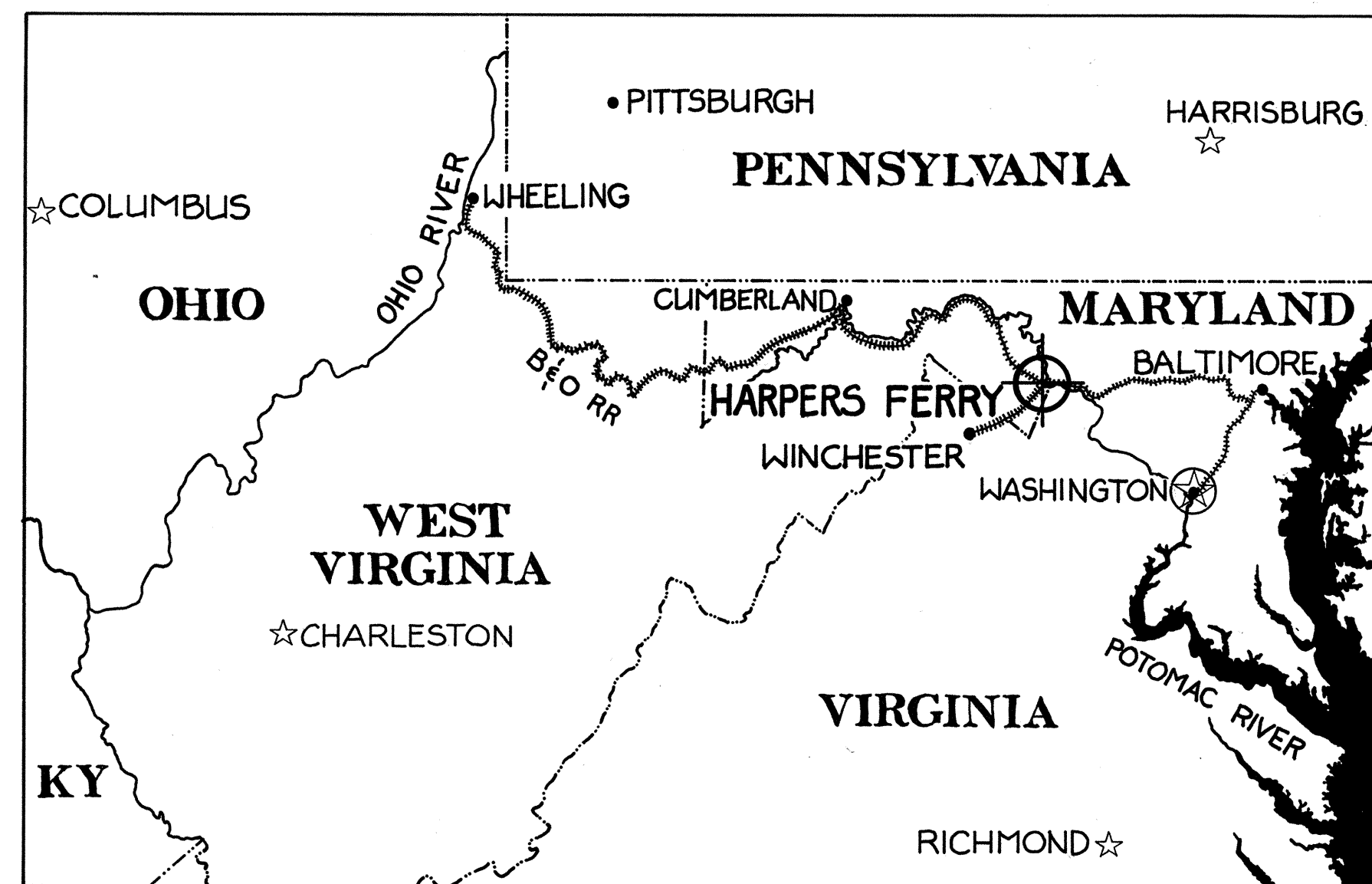
BALTIMORE & OHIO RAILROAD: BOLLMAN BRIDGE 1868

HARPERS FERRY, WEST VIRGINIA

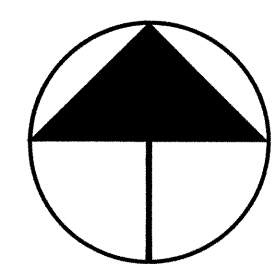


WINCHESTER SPAN: SOUTH ELEVATION

SCALE
3/16" = 1'-0"



LOCATION MAP



SCALE
1" = 40 MILES



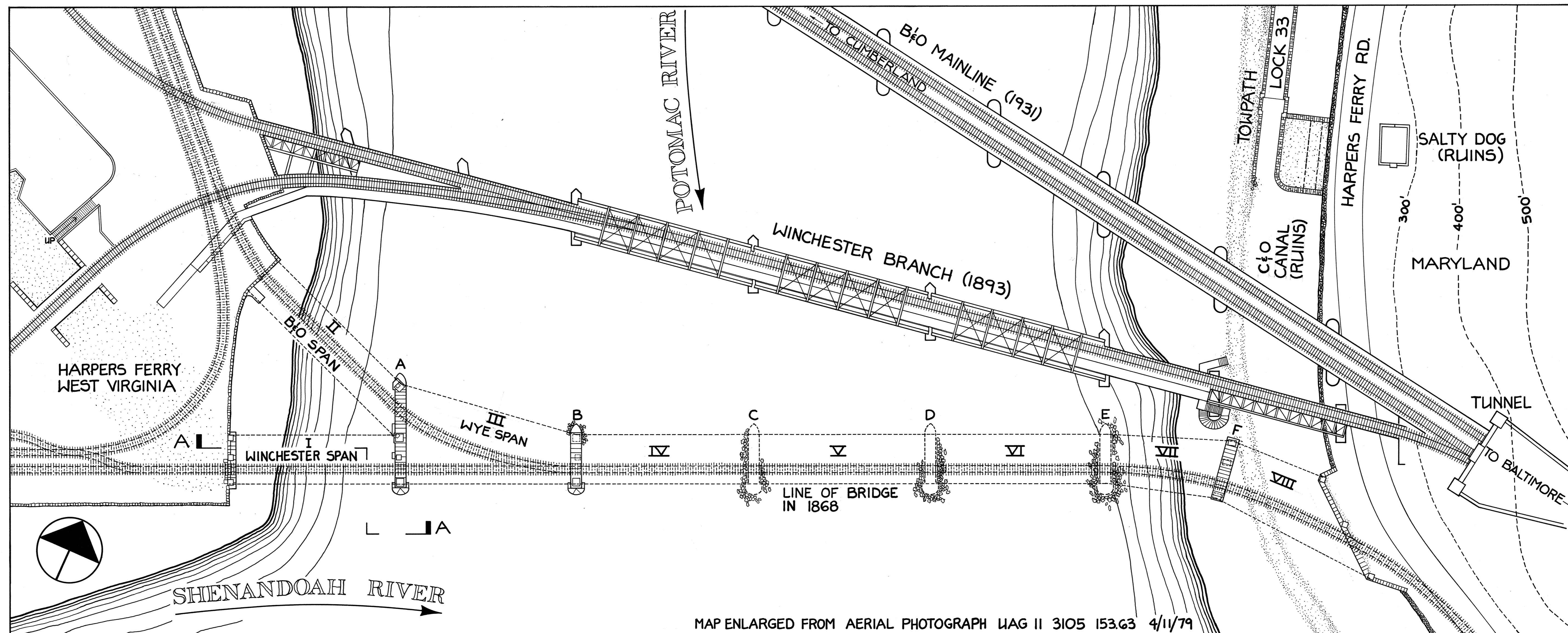
MAP SOURCE: ATLAS OF NORTH AMERICA, NATIONAL GEOGRAPHIC SOCIETY, 1985, PAGE 55.

WENDEL BOLLMAN'S "SUSPENSION TRUSS" PATENTED IN 1852, WAS THE FIRST IRON BRIDGE WIDELY UTILIZED BY A RAILROAD. EMPLOYING CAST IRON COMPRESSION AND WROUGHT IRON TENSION MEMBERS, IT WAS CONSTRUCTED OVER VIRTUALLY EVERY BALTIMORE AND OHIO RAILROAD RIVER CROSSING REQUIRING PIER TO PIER SPANS OF LESS THAN TWO HUNDRED FEET. BECAUSE IT APPEARED IN SUCH NUMBERS AT AN IMPORTANT JUNCTURE IN CIVIL ENGINEERING HISTORY, AS INTUITIVE GAVE WAY TO EXACT ENGINEERING AND IRON WAS WIDELY BEING CONSIDERED AS A CONSTRUCTION SUBSTITUTE FOR WOOD, BOLLMAN'S DESIGN RECEIVED MUCH ATTENTION. ITS SUCCESS HELPED USHER IN THE ERA OF IRON BRIDGES AND THE MODERN PERIOD OF STRUCTURAL ENGINEERING. BUT SUCCESS WAS SHORT-LIVED. COMPETING DESIGNS REQUIRED LESS IRON. UNEQUAL WEIGHT DISTRIBUTION AMONG DIAGONAL SUSPENSION MEMBERS CAUSED EXCESSIVE STRESS THAT REQUIRED FREQUENT ADJUSTMENT. BOLLMAN'S TRUSS WAS OBSOLETE BY 1875.

ONLY ONE BOLLMAN BRIDGE REMAINS, LOCATED IN SAVAGE, MARYLAND, CROSSING THE LITTLE PATUXENT RIVER (CA. 1869, SEE HAER MD-1), BUT STRUCTURAL MEMBERS OF AT LEAST TWO SEPARATE SPANS OF THE B&O BRIDGE AT HARPERS FERRY, WEST VIRGINIA WERE RECENTLY RECOVERED FROM THE POTOMAC RIVER. ALTHOUGH ELEVEN SPANS WERE BUILT AT HARPERS FERRY BETWEEN 1852 AND 1868, THE RECOVERED

PIECES ARE PROBABLY COMPONENTS OF THE SECOND WINCHESTER SPAN, WHICH ABUTTED THE WINCHESTER AND POTOMAC BRANCH OF THE B&O ON THE HARPERS FERRY SIDE OF THE RIVER, AND AN ADJOINING SPAN WHICH WERE BUILT IN 1868. WASHED INTO THE RIVER BY THE FLOOD OF 1936, THEY ARE THE ONLY KNOWN PIECES DOCUMENTING DESIGN MODIFICATIONS OCCURRING AFTER 1852.

THE BOLLMAN BRIDGE/VIRGINIUS ISLAND RECORDING PROJECT WAS UNDERTAKEN BY THE HISTORIC AMERICAN ENGINEERING RECORD (HAER), AN AGENCY OF THE NATIONAL PARK SERVICE, U.S. DEPARTMENT OF THE INTERIOR, DURING THE SUMMER OF 1987. THE PROJECT WAS COSPONSORED BY THE HARPERS FERRY NATIONAL HISTORICAL PARK, HARPERS FERRY, WEST VIRGINIA, DONALD W. CAMPBELL, SUPERINTENDENT, AND THE HISTORIC AMERICAN BUILDINGS SURVEY/HISTORIC AMERICAN ENGINEERING RECORD (HABS/HAER), DR. ROBERT J. KAPSCH, CHIEF. THE FIELD TEAM, UNDER THE DIRECTION OF ERIC DELONY, CHIEF AND PRINCIPAL ARCHITECT, HAER, AND ASSISTED BY DENNIS FRYE, HISTORIAN, HARPERS FERRY NHP, CONSISTED OF BRIAN D. BARTHOLOMEW, ARCHITECTURAL SUPERVISOR (GENSLER AND ASSOCIATES/DENVER), ARCHITECTURAL TECHNICIANS JOANNA DOWNS (US/ICOMOS AND UNIVERSITY COLLEGE, LONDON, ENGLAND) AND SAMUEL GAINÉ (US/ICOMOS AND UNIVERSITY COLLEGE, DUBLIN, IRELAND), AND JACK BERGSTRESSER, HISTORIAN (AUBURN UNIVERSITY).



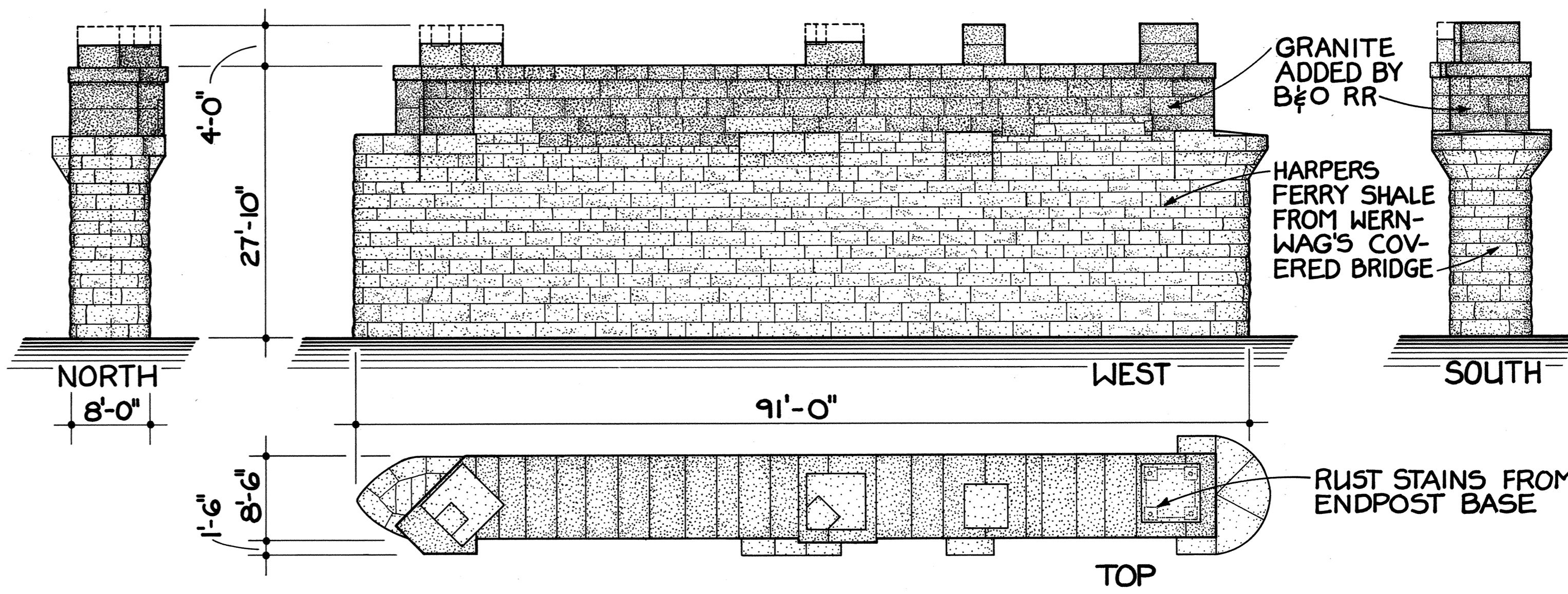
MAP ENLARGED FROM AERIAL PHOTOGRAPH UAG II 3105 153.63 4/11/79

SITE PLAN

SCALE
1" = 40'



- 1836-37 — TIMBER BRIDGE DESIGNED BY BENJAMIN H. LATROBE AND ERECTED BY LEWIS WERNWAG ACROSS POTOMAC RIVER AT HARPERS FERRY.
- 1851 — TIMBER WINCHESTER SPAN (I) REPLACED BY IRON BOLLMAN SUSPENDED TRUSS WITH GRANITE ENDPOSTS AND THREE PARALLEL LINES OF TRUSSING FOR A RAILROAD TRACK AND COMMON ROAD.
- JUNE 1861 — LATROBE'S TIMBER BRIDGE ALONG WITH WINCHESTER SPAN DESTROYED BY CONFEDERATE FORCES.
- AUG. 1862 — BOLLMAN TRUSSES COMPLETED OVER SPANS V AND VI. REST OF BRIDGE REMAINS TEMPORARY TRESTLEWORK.
- SEPT. 1862 — CONFEDERATE FORCES BLOW UP SPANS V AND VI.
- NOV. 1862 — BOLLMAN TRUSS REBUILT OVER SPAN VI.
- APRIL 1863 — BOLLMAN TRUSS COMPLETED OVER SPANS IV, V AND VII.
- 1863 — WOODEN FLOORS OF BOLLMAN SPANS BURNED BY UNION FORCES.
- 1868 — REMAINING TRESTLEWORK REPLACED BY BOLLMAN TRUSSES.
- 1893 — TUNNEL THROUGH MARYLAND HEIGHTS AND SECOND RAILROAD BRIDGE ACROSS POTOMAC RIVER CONSTRUCTED. SPAN II, ONE LINE OF TRUSSING AND RAILROAD TRACK REMOVED FROM BOLLMAN BRIDGE.
- 1924 — SPANS VII AND VIII WASHED OUT BY FLOOD AND REPLACED.
- 1931 — THIRD RAILROAD BRIDGE CONSTRUCTED ACROSS POTOMAC RIVER.
- 1936 — ENTIRE BOLLMAN BRIDGE SUPERSTRUCTURE WASHED OUT BY FLOOD.
- 1985 — PIER E DESTROYED BY FLOOD.
- SEPT. 1987 — EAST AND WEST ABUTMENTS, PIERS A, B AND F STILL EXTANT.



PIER A

SCALE
1" = 10'



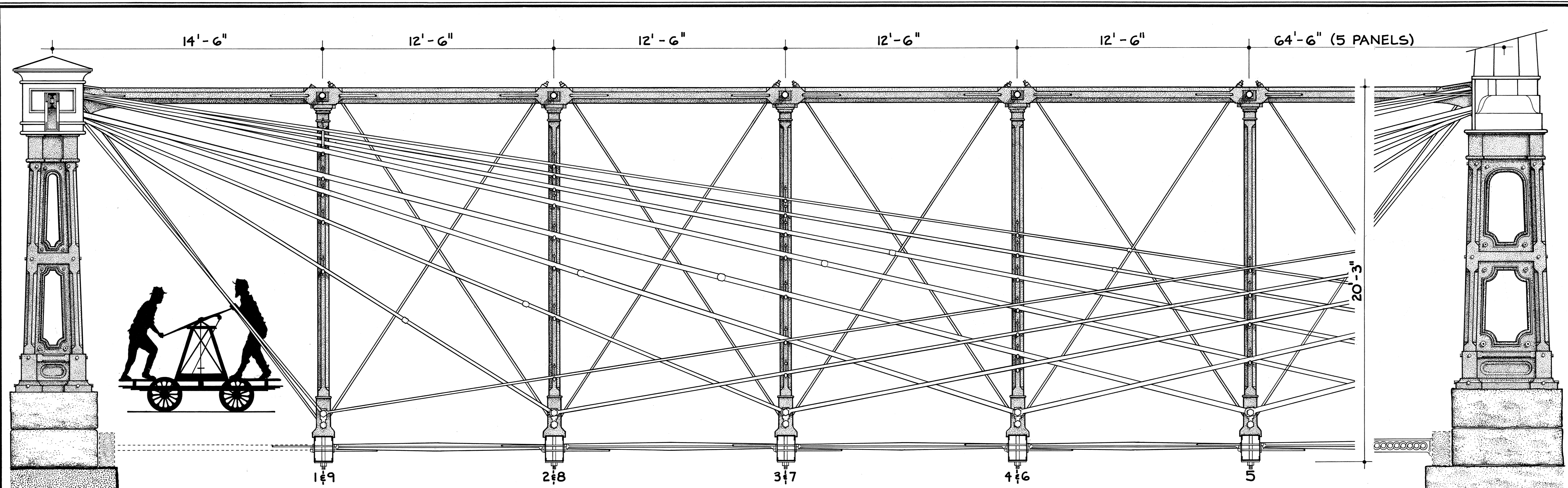
DELINEATED BY: BRIAN D. BARTHOLOMEW, JOANNA DOWNS, SAMUEL GAINES, 1987.

BOLLMAN BRIDGE/VIRGINIA ISLAND RECORDING PROJECT
HISTORIC AMERICAN ENGINEERING RECORD
UNITED STATES DEPARTMENT OF THE INTERIOR

BALTIMORE AND OHIO RAILROAD; BOLLMAN BRIDGE 1868
BALTIMORE AND OHIO RAILROAD; POTOMAC CROSSING
JEFFERSON COUNTY WEST VIRGINIA

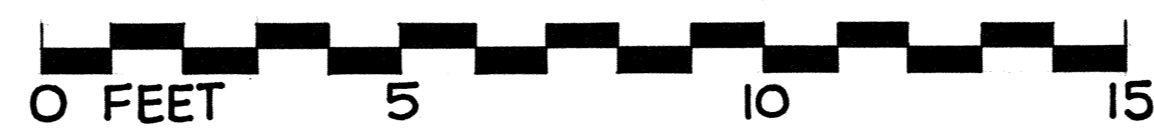
HISTORIC AMERICAN ENGINEERING RECORD
SHEET 2 of 6
WV - 36

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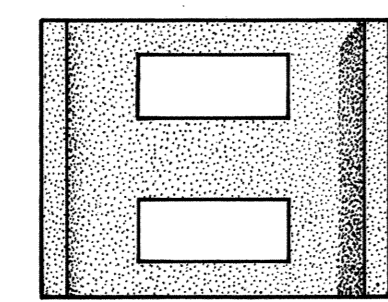
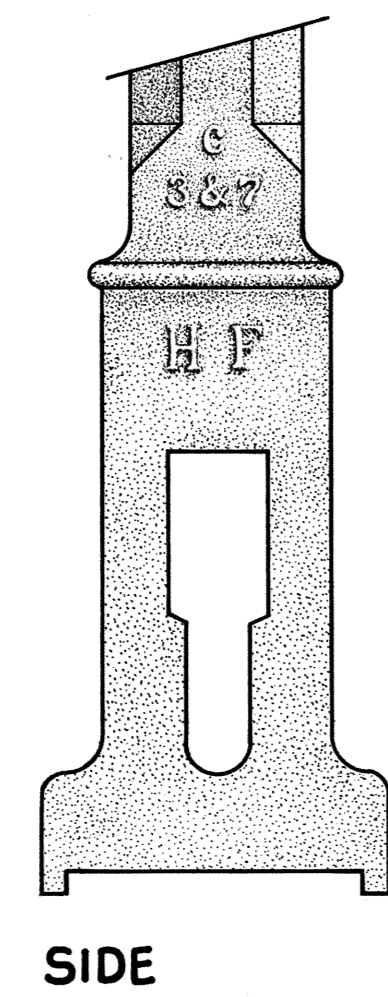
SECTION A-A

SCALE 3/8" = 1'-0"



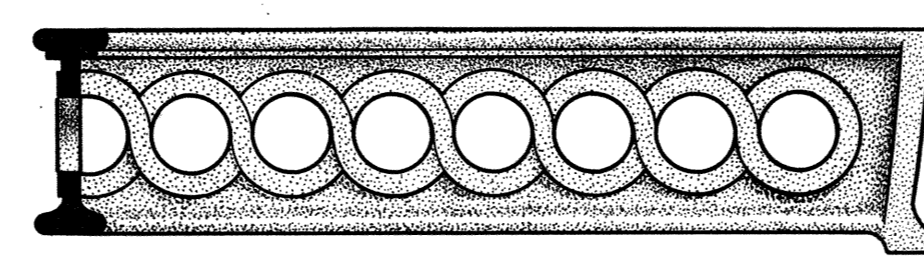
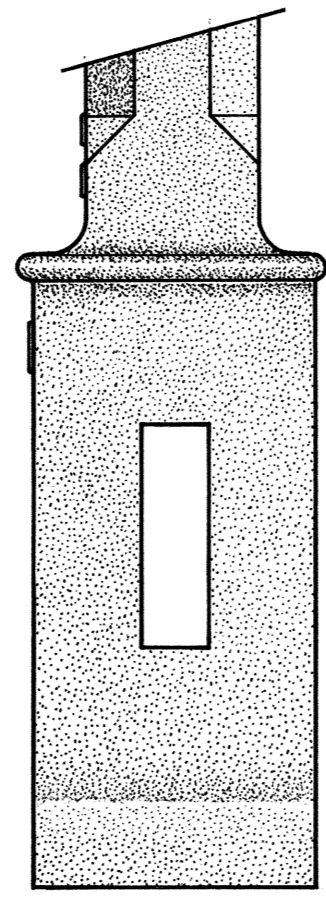
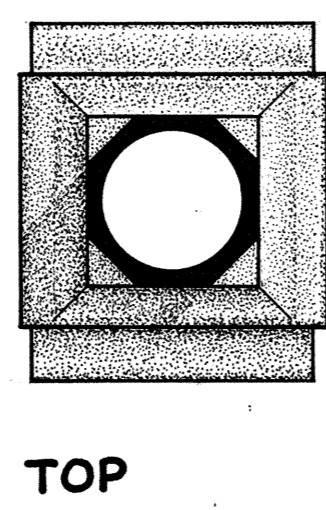
WEST BANK ABUTMENT

PIER A

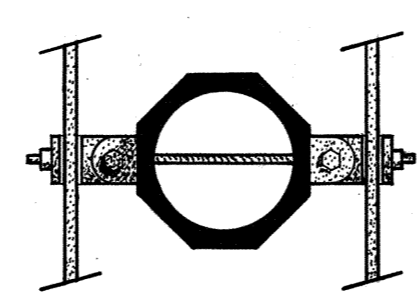
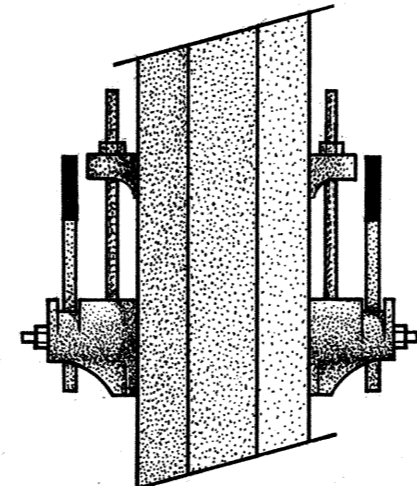


POST BASE

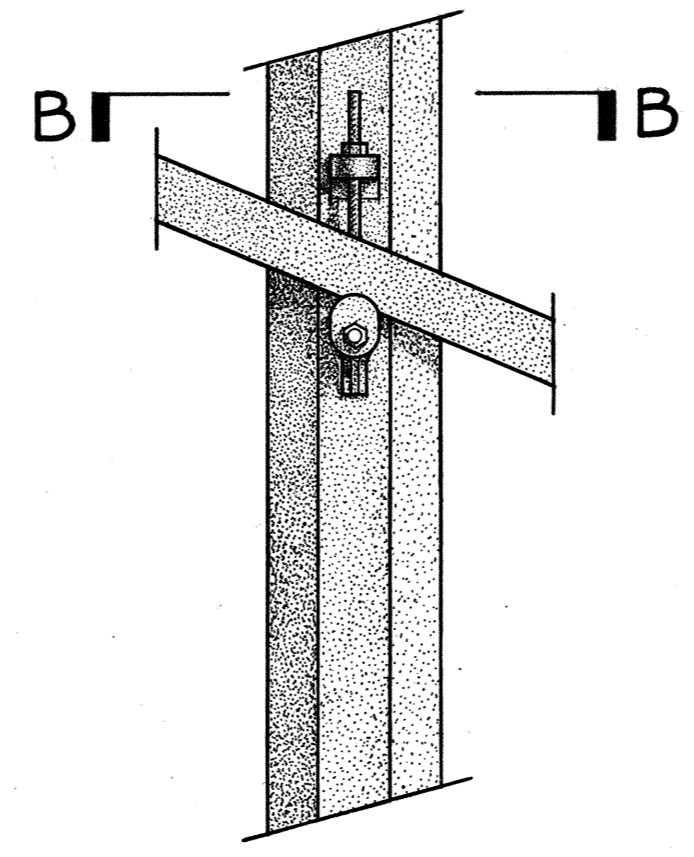
SCALE 1 1/2" = 1'-0"



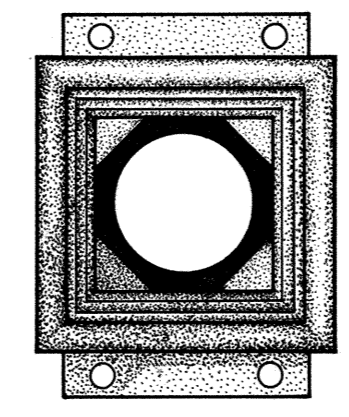
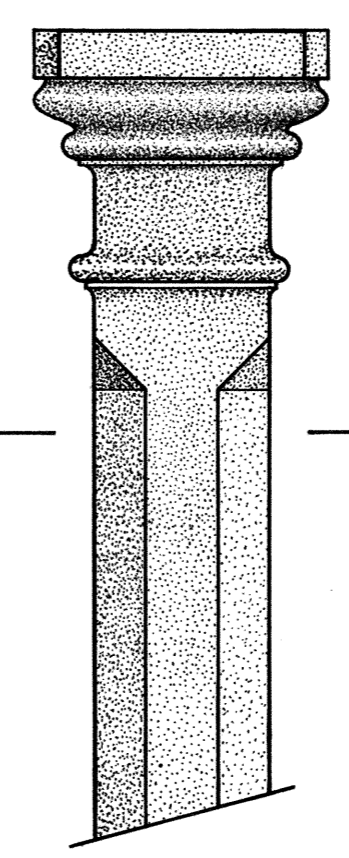
PANEL SPACER



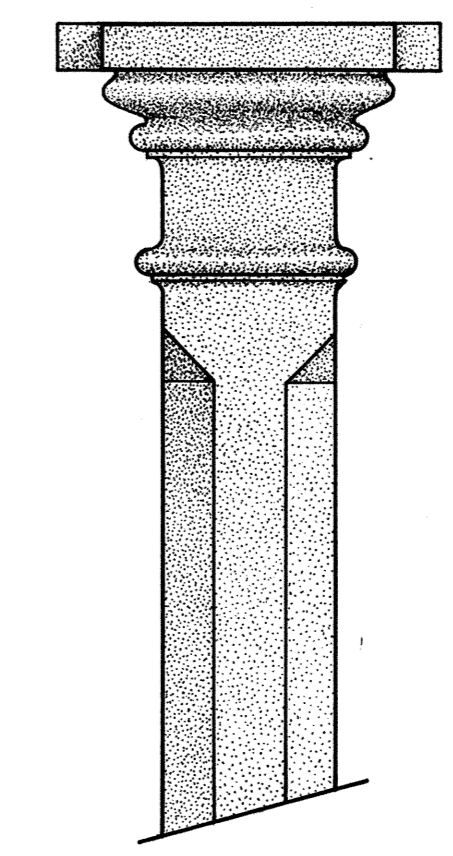
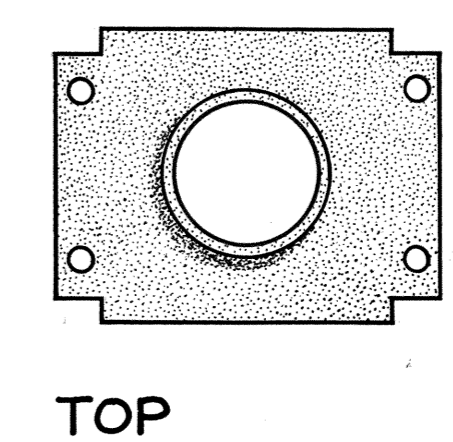
SECTION B-B



DIAGONAL RETAINER



POST HEAD

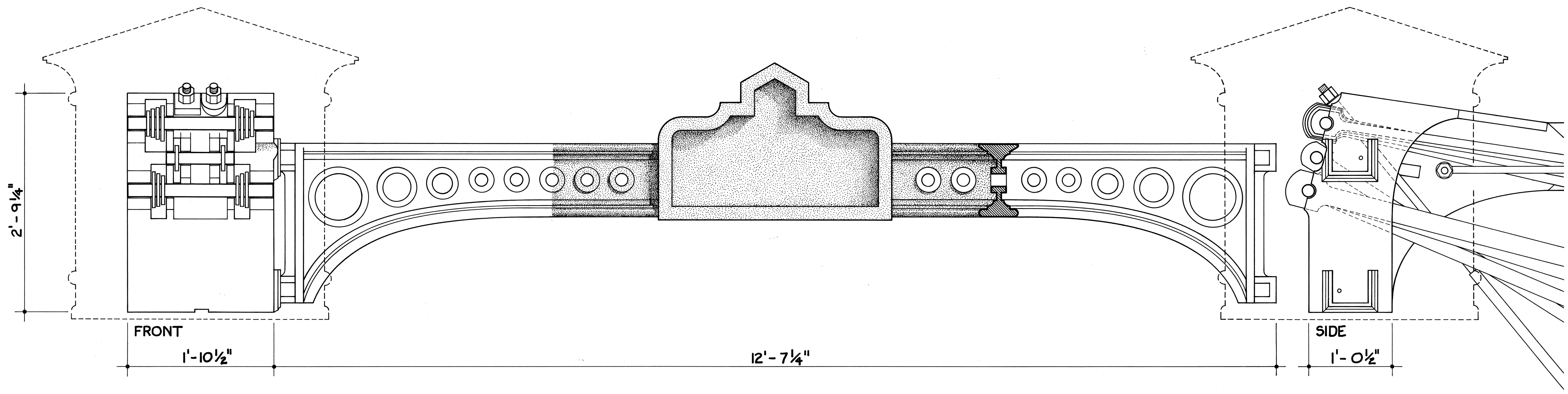


DELINEATED BY: SAMUEL GAINE, BRIAN D. BARTHOLOMEW, JOANNA DOWNS, 1987.
 BOLLMAN BRIDGE/VIRGINUS ISLAND RECORDING PROJECT
 HISTORIC AMERICAN ENGINEERING RECORD
 UNITED STATES DEPARTMENT OF THE INTERIOR

HARRERS FERRY
 WEST VIRGINIA
 BALTIMORE AND OHIO RAILROAD,
 BALTIMORE AND OHIO RAILROAD,
 POTOMAC CROSSING
 JEFFERSON COUNTY

SHEET 3 of 6
 HISTORIC AMERICAN
 ENGINEERING RECORD
 WV-36

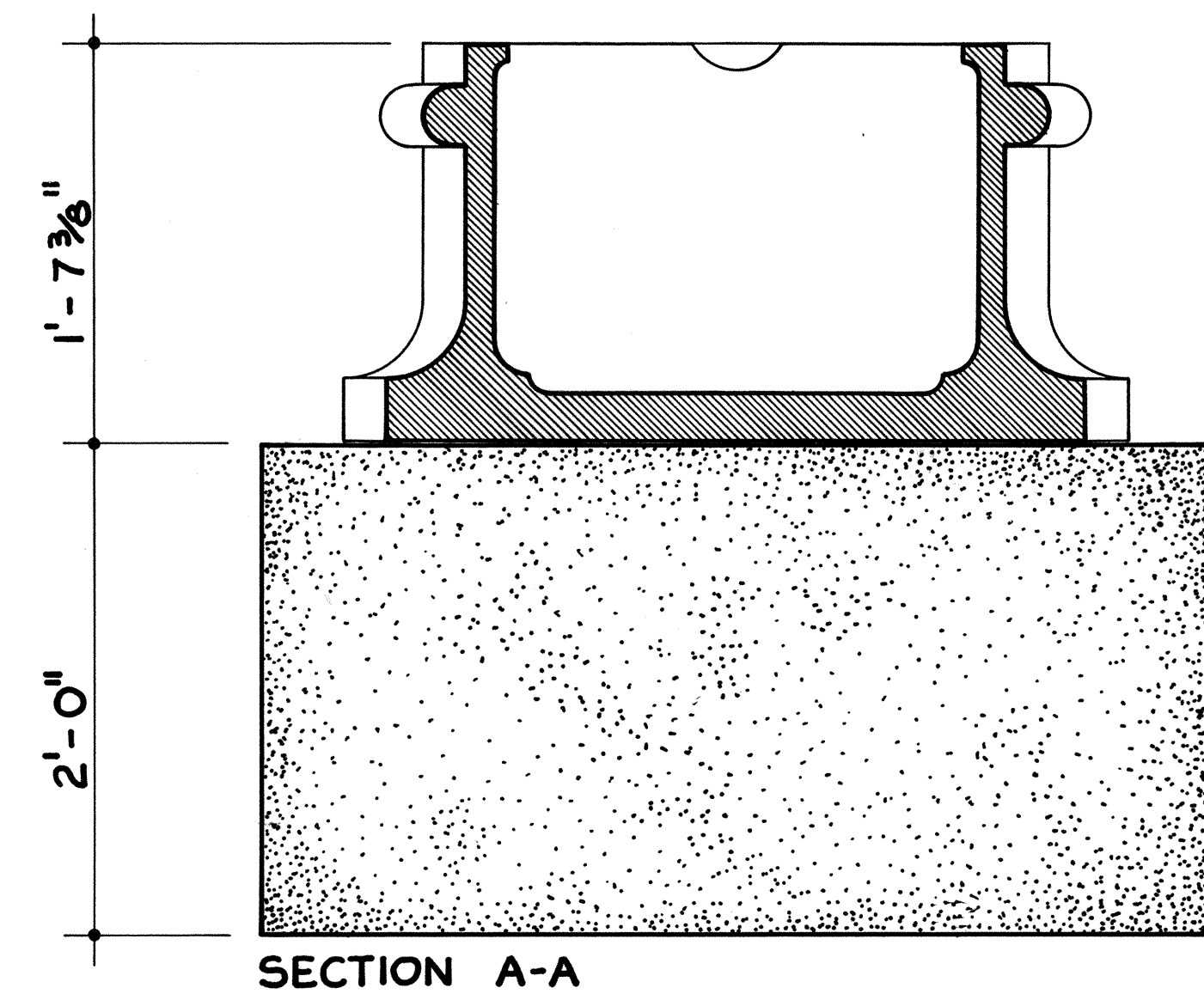
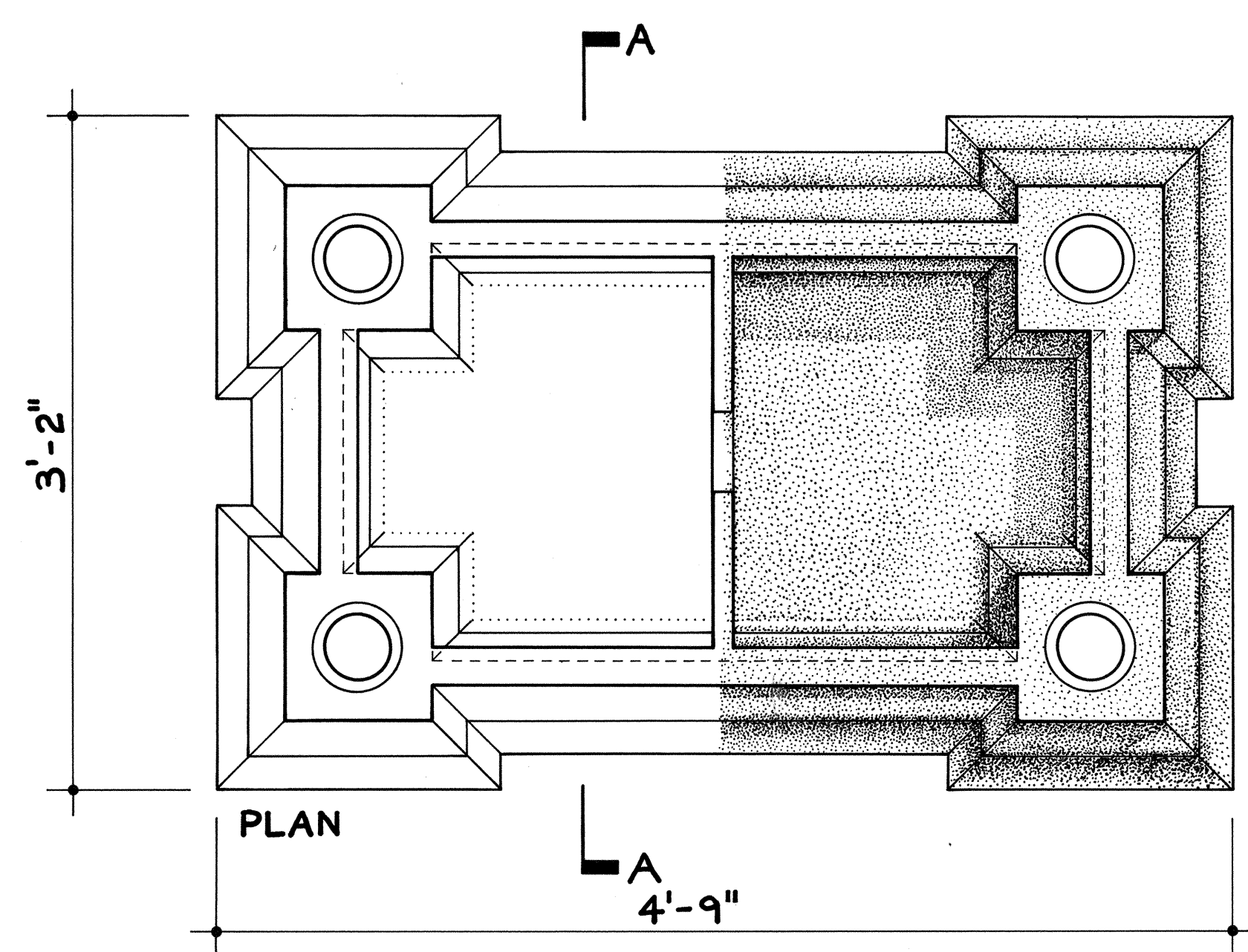
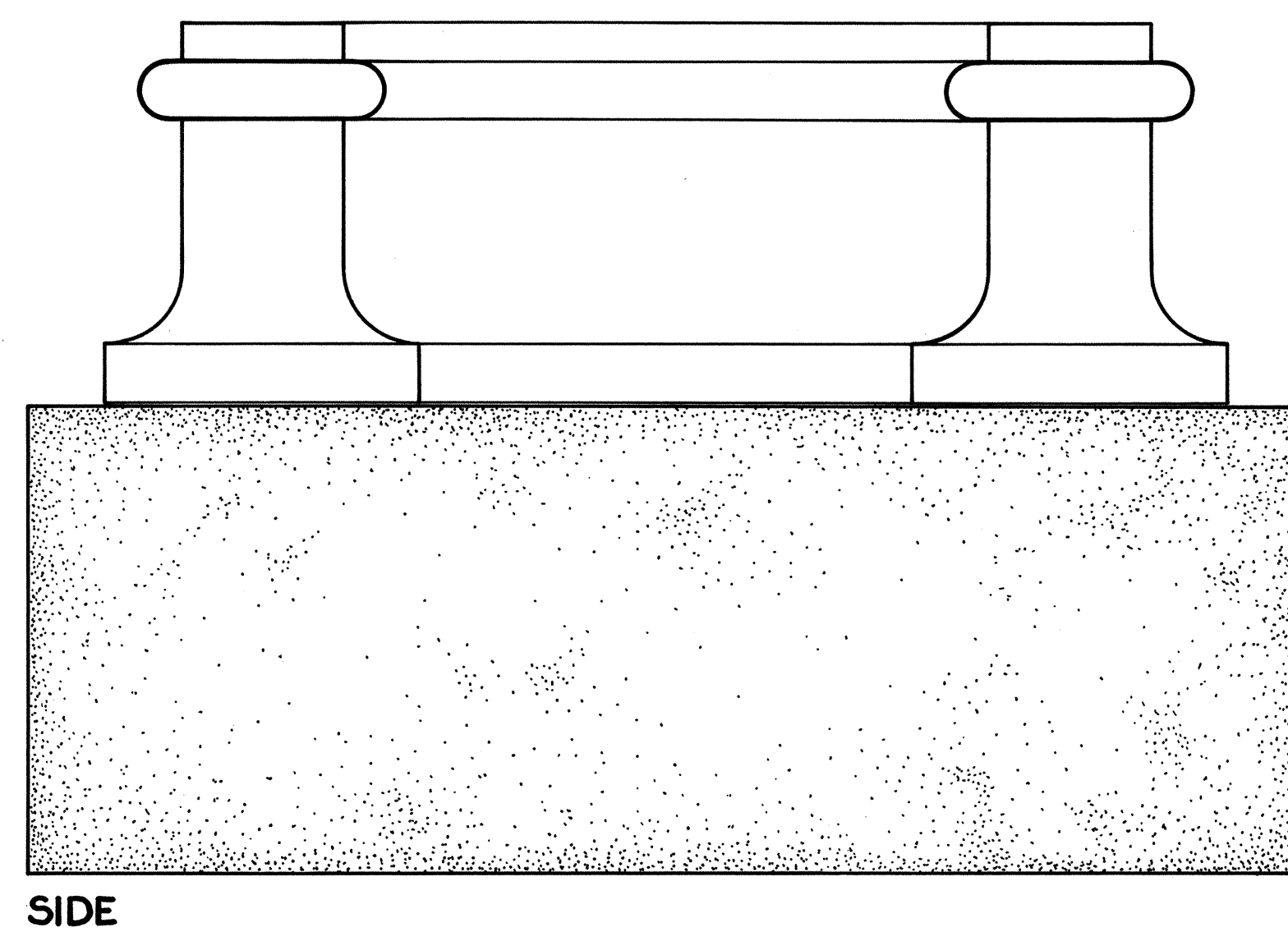
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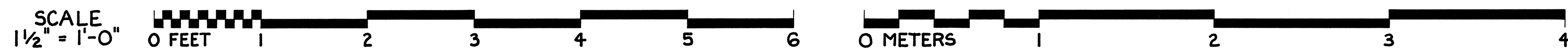
ANCHOR CASTING AND PORTAL STRUT AT WEST BANK ABUTMENT

DASHED PROFILE LINE ABOVE DEPICTS WOOD COVER OVER ANCHOR CASTING RECONSTRUCTED FROM PHOTOGRAPHS HF771 AND HF835, HARPERS FERRY NATIONAL HISTORICAL PARK LIBRARY.

THE PORTAL DEPICTED ABOVE IS FROM THE WINCHESTER SPAN (SEE PHOTOGRAPHIC REFERENCES AT LEFT) WITH AN ANCHOR CASTING BELIEVED TO BE ASSOCIATED WITH IT. BELOW IS AN ENDPOST BASE FOUND AMONG THE RUINS OF PIER C, EAST SIDE, BUT SIMILAR IN MASS AND DETAIL TO THAT WHICH WOULD HAVE STOOD AT THE WINCHESTER SPAN.



ENDPOST BASE AND GRANITE PLINTH



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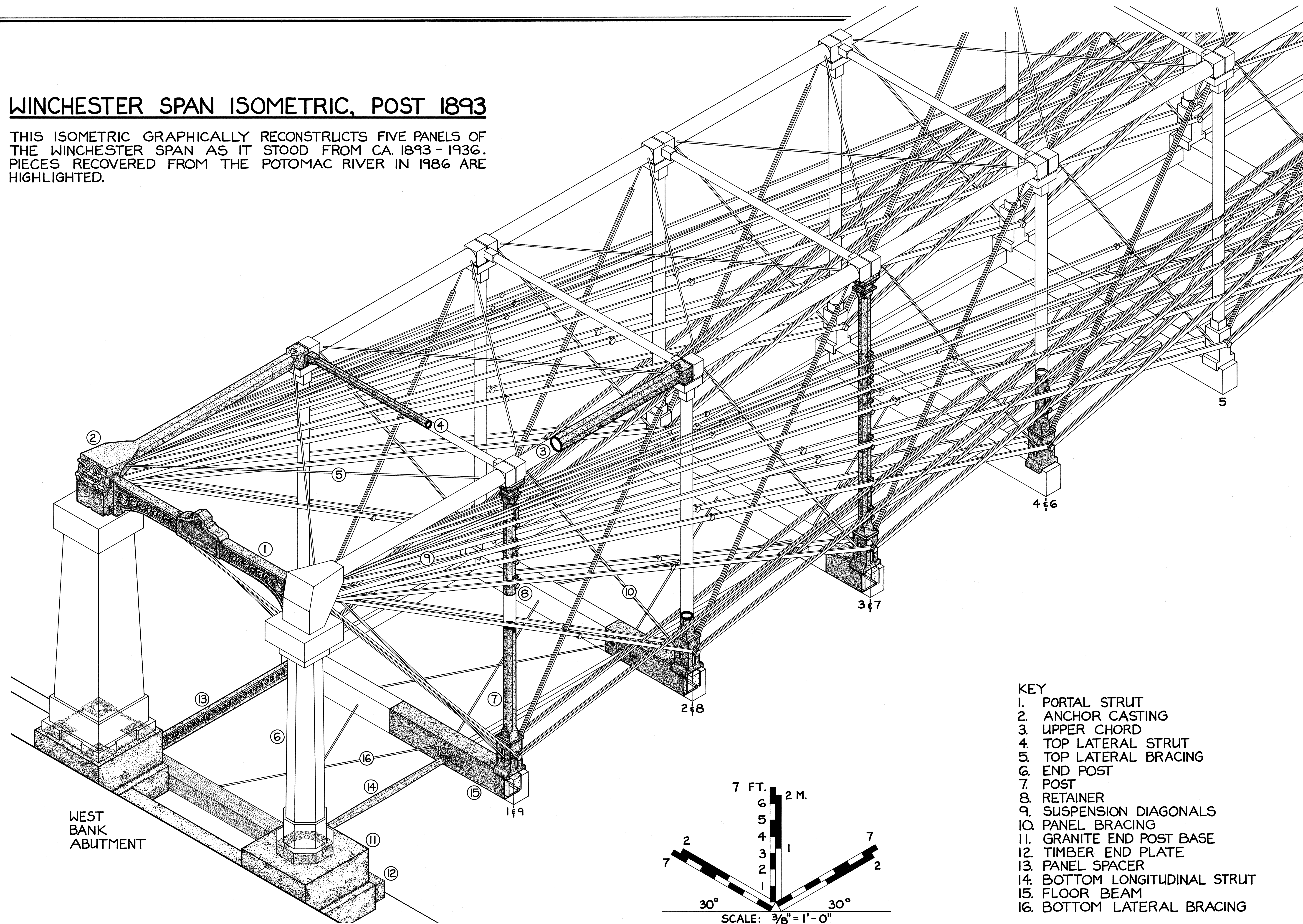
BALTIMORE AND OHIO RAILROAD: BOLLMAN BRIDGE 1868
BALTIMORE AND OHIO RAILROAD, POTOMAC CROSSING
HARPERS FERRY JEFFERSON COUNTY WEST VIRGINIA

SHEET 4 of 6
HISTORIC AMERICAN ENGINEERING RECORD
WV - 36

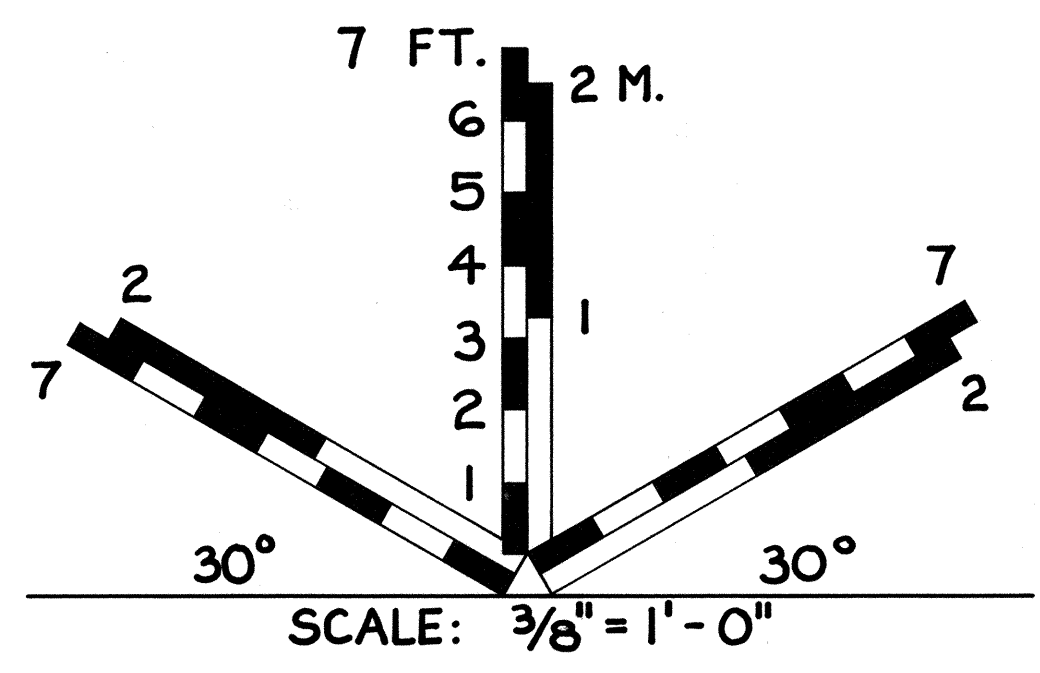
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WINCHESTER SPAN ISOMETRIC, POST 1893

THIS ISOMETRIC GRAPHICALLY RECONSTRUCTS FIVE PANELS OF THE WINCHESTER SPAN AS IT STOOD FROM CA. 1893 - 1936. PIECES RECOVERED FROM THE POTOMAC RIVER IN 1986 ARE HIGHLIGHTED.



- KEY**
- 1. PORTAL STRUT
 - 2. ANCHOR CASTING
 - 3. UPPER CHORD
 - 4. TOP LATERAL STRUT
 - 5. TOP LATERAL BRACING
 - 6. END POST
 - 7. POST
 - 8. RETAINER
 - 9. SUSPENSION DIAGONALS
 - 10. PANEL BRACING
 - 11. GRANITE END POST BASE
 - 12. TIMBER END PLATE
 - 13. PANEL SPACER
 - 14. BOTTOM LONGITUDINAL STRUT
 - 15. FLOOR BEAM
 - 16. BOTTOM LATERAL BRACING



WEST BANK ABUTMENT

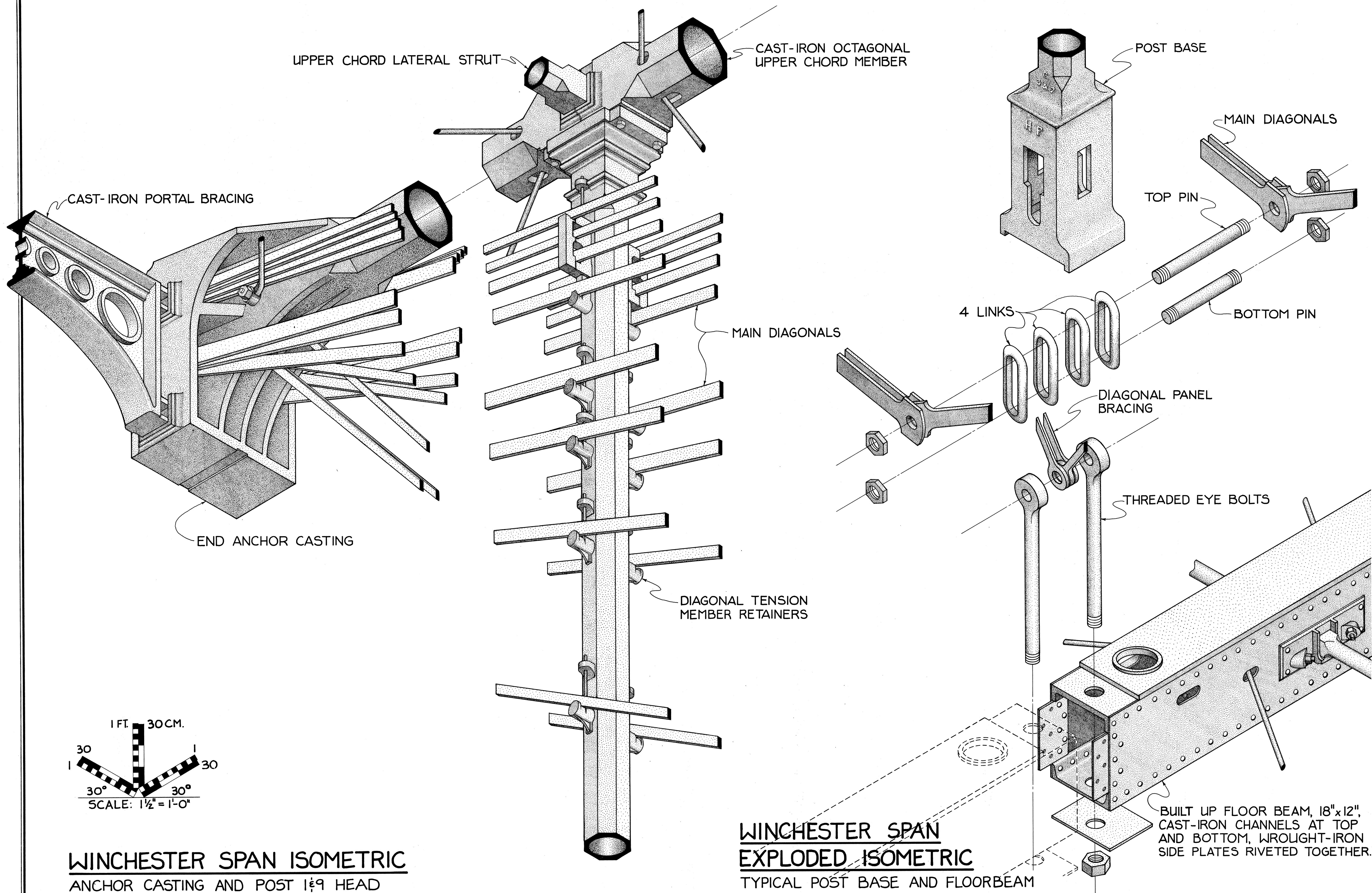
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BOLLMAN BRIDGE/VIRGINUS ISLAND RECORDING PROJECT
HISTORIC AMERICAN ENGINEERING RECORD
UNITED STATES DEPARTMENT OF THE INTERIOR

BALTIMORE AND OHIO RAILROAD: BOLLMAN BRIDGE 1868
BALTIMORE AND OHIO RAILROAD, POTOMAC CROSSING
JEFFERSON COUNTY WEST VIRGINIA

HISTORIC AMERICAN ENGINEERING RECORD
SHEET 5 of 6
WV - 36

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WINCHESTER SPAN ISOMETRIC
ANCHOR CASTING AND POST 1/4 HEAD

WINCHESTER SPAN
EXPLODED ISOMETRIC
TYPICAL POST BASE AND FLOORBEAM

DELINEATED BY: SAMUEL GAINE, BRIAN D. BARTHOLOMEW, JOANNA DOWNS, 1987/ ISABEL YANG, 1988
 BOLLMAN BRIDGE/VIRGINIUS ISLAND RECORDING PROJECT
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HISTORIC AMERICAN ENGINEERING RECORD
 SHEET 6 OF 6
 WV - 36

BOLLMAN BRIDGE 1868
 BALTIMORE AND OHIO RAILROAD, POTOMAC CROSSING
 BALTIMORE AND OHIO RAILROAD, POTOMAC CROSSING
 JEFFERSON COUNTY WEST VIRGINIA
 HARPERS FERRY

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