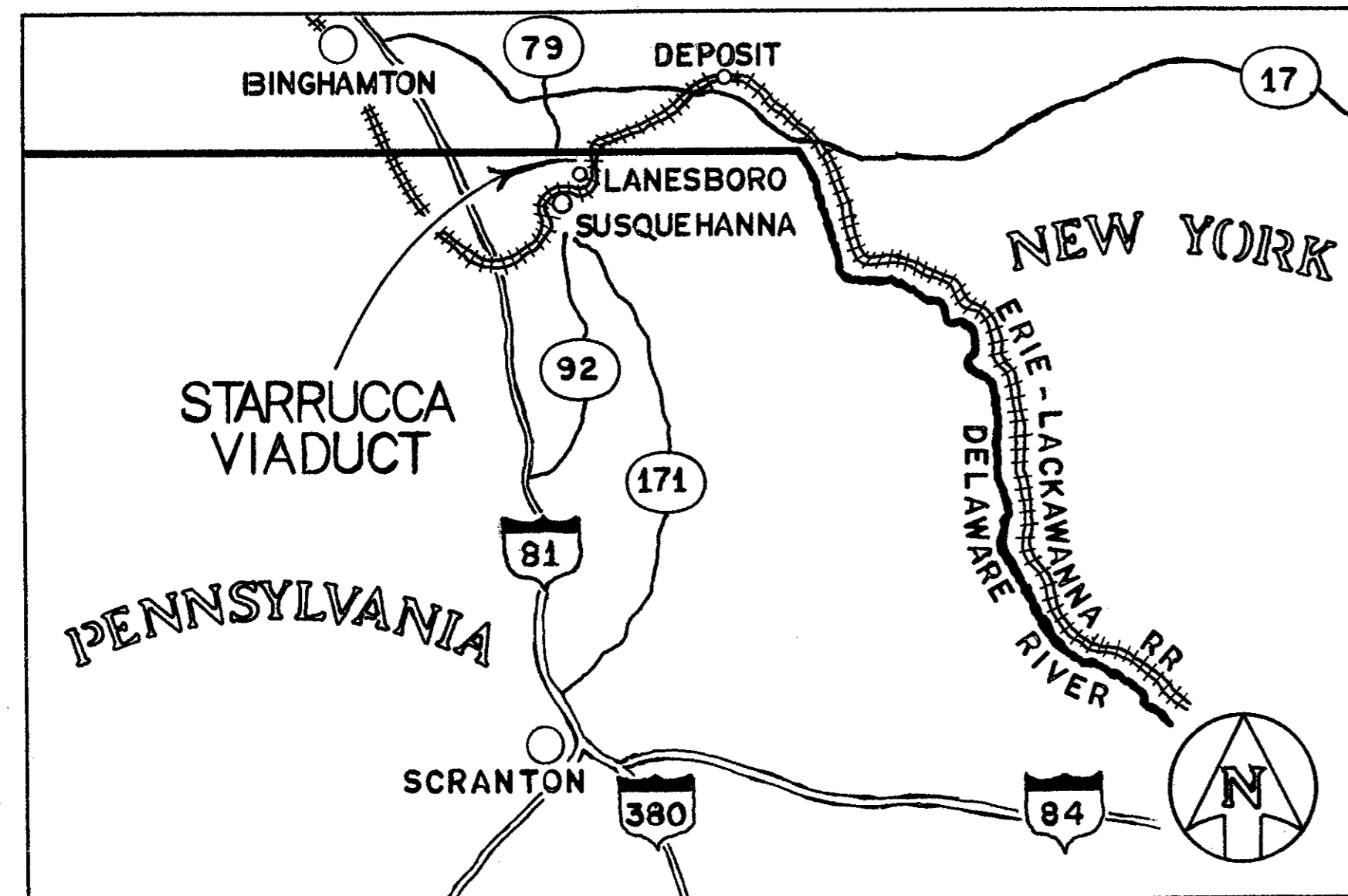


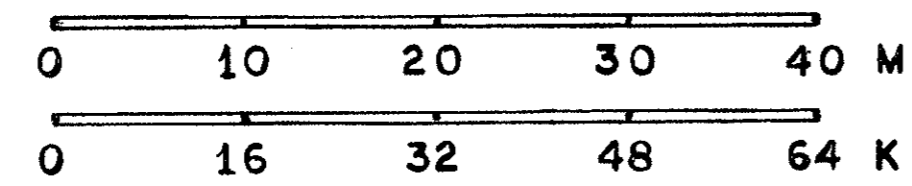
# ERIE RAILWAY STARRUCCA VIADUCT • 1848

## LANESBORO VICINITY, PENNSYLVANIA



LOCATION MAP

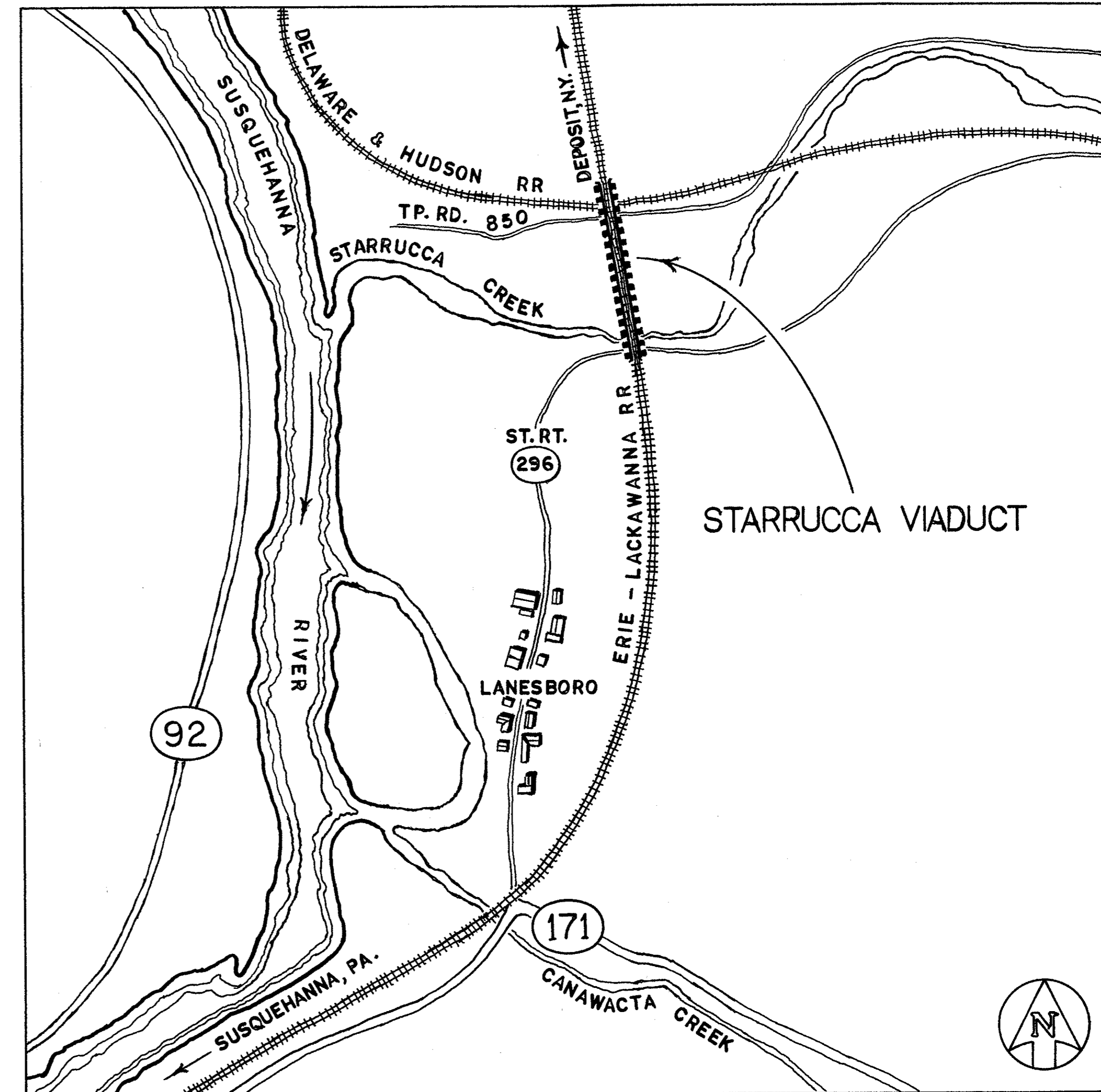
SCALE: 1 INCH = 10 MILES  
16 KM.



THE STARRUCCA VIADUCT WAS BUILT BY THE ERIE RAILWAY IN 1848, UNDER THE SUPERVISION OF THE ENGINEERS J. P. KIRKWOOD AND J. W. ADAMS, AND HAS BEEN RECOGNIZED, FROM THE TIME OF ITS CONSTRUCTION, AS ONE OF THE MOST DARING FEATS OF STONE VAULT ENGINEERING EVER ATTEMPTED IN THIS COUNTRY. WITHIN A GENERATION OF ITS COMPLETION, THIS TYPE OF CIVIL ENGINEERING WAS RENDERED OBSOLETE BY THE INTRODUCTION OF THE BESSEMER CONVERTER INTO THE IRONMAKING INDUSTRY. THEREAFTER DESIGNERS BEGAN TO CONSIDER THE USE OF STEEL CABLES AND I BEAMS FOR LARGE SCALE BRIDGE ERECTION. THE STARRUCCA VIADUCT WAS AMONG THE LAST OF THE CLASSIC STONE ARCH BRIDGES TO BE BUILT, AND IS FOUND TODAY - STANDING AS ORIGINALLY CONCEIVED - AT THE SITE.

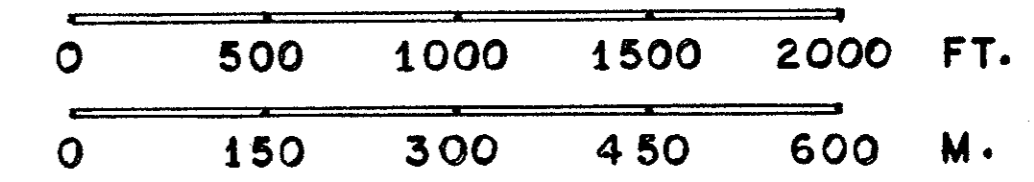
STONE VAULT DESIGNING HAD BEEN MARKED, SINCE THE AGE OF THE ROMANS, BY A TWOFOLD INTENTION: TO REDUCE WEIGHT AND TO MAINTAIN STRENGTH. SEVERAL METHODS WERE FINALLY EVOLVED, BUT THEY WERE EFFECTED ONLY WITH GREAT CAUTION. PIER DIMENSIONS WERE GRADUALLY REDUCED FROM THE FORTRESS-LIKE AQUEDUCTS OF THE PRE-CHRISTIAN ERA TO THE LIGHTER BRIDGETOWERS FOUND IN THE FIRST CENTURY A.D.. IN THE EARLY CHRISTIAN PERIOD, EXPERIMENTS WERE MADE TO LESSEN THE DEADWEIGHT OF THE TRIANGULAR SPANDRELS BETWEEN THE CURVES OF THE ARCHES. SPANDRELS WERE BUILT WITH INTERIOR CORES AND WITH HOLLOW NICHES SET INSIDE THE VAULT WALLS. BY THE TIME OF THE LATE ROMAN EMPIRE, PROGRESSION WAS MADE TOWARD GREATER ARCH SPANS, AND TOWARD THINNER COLUMNS - BUT WITHOUT THE SACRIFICE OF STRUCTURAL STRENGTH.

STARRUCCA VIADUCT STANDS IN A DIRECT HISTORIC LINE WITH THAT PROGRESSION. ONE HUNDRED FEET HIGH AND A FIFTH MILE LONG, ITS LIGHTNESS OF STYLE AND GRACEFUL BAYS GIVE NO INDICATION OF ITS INHERENT STRENGTH. THE BRIDGE, TODAY, IS ABLE TO ACCEPT RAIL TONNAGES FOUR TIMES GREATER THAN ANY LOCOMOTIVE WEIGHTS KNOWN IN 1848. SITED IN A WOODED VALLEY OF NATURAL BEAUTY, THE STARRUCCA VIADUCT IS ALSO ABLE TO CREATE A LASTING AESTHETIC IMPRESSION.



SITE PLAN

SCALE: 1 INCH = 500 FEET  
150 M.



BASED ON USGS MAP, 7.5 MINUTE SERIES 1978 SUSQUEHANNA QUADRANGLE UTM REFERENCE NO. 18,451610 .4645740

THIS RECORDING PROJECT IS PART OF THE HISTORIC AMERICAN ENGINEERING RECORD (HAER), A LONG-RANGE PROGRAM TO DOCUMENT HISTORICALLY SIGNIFICANT ENGINEERING AND INDUSTRIAL SITES IN THE UNITED STATES. THE HAER IS ADMINISTERED BY THE NATIONAL PARK SERVICE, U.S. DEPARTMENT OF THE INTERIOR. THE ERIE RAILWAY SURVEY, CONDUCTED IN 1971, WAS ONE OF THE HAER'S FIRST RECORDING PROJECTS. DRAWINGS OF THE STARRUCCA VIADUCT WERE MADE IN 1984 BY PAUL BERRY OF COLUMBUS, OHIO, FOR HAER. THEY WILL BE ADDED TO OTHER ERIE RAILWAY MATERIALS IN THE HAER COLLECTION AT THE LIBRARY OF CONGRESS.

DELINEATED BY: PAUL BERRY 1984  
ERIE RAILWAY SURVEY  
HISTORIC AMERICAN ENGINEERING RECORD  
UNITED STATES DEPARTMENT OF THE INTERIOR

LANESBORO  
ERIE RAILWAY: STARRUCCA VIADUCT - 1848  
SPANNING THE VALLEY OF STARRUCCA CREEK  
SUSQUEHANNA COUNTY

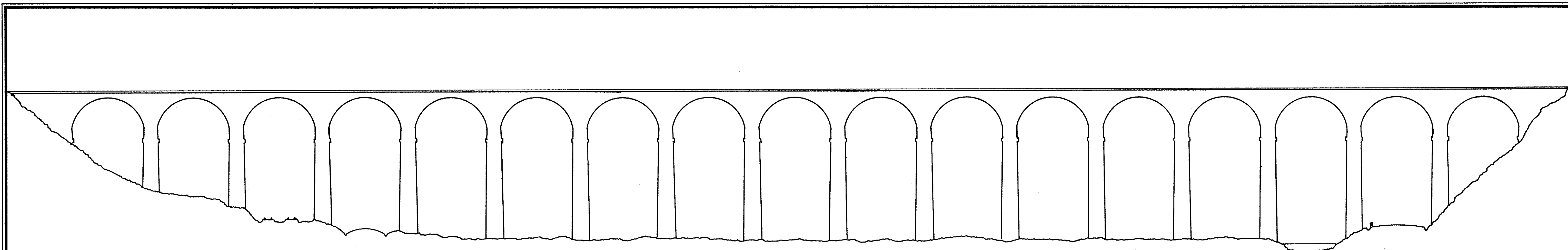
PENNSYLVANIA

SHEET 1 OF 3

HISTORIC AMERICAN ENGINEERING RECORD

PA - 6

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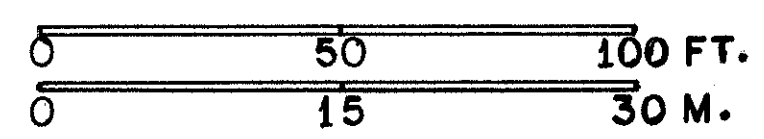
NORTH ABUTMENT

DELAWARE & HUDSON TRACKS

PENN. TP. RD. 850

WEST ELEVATION

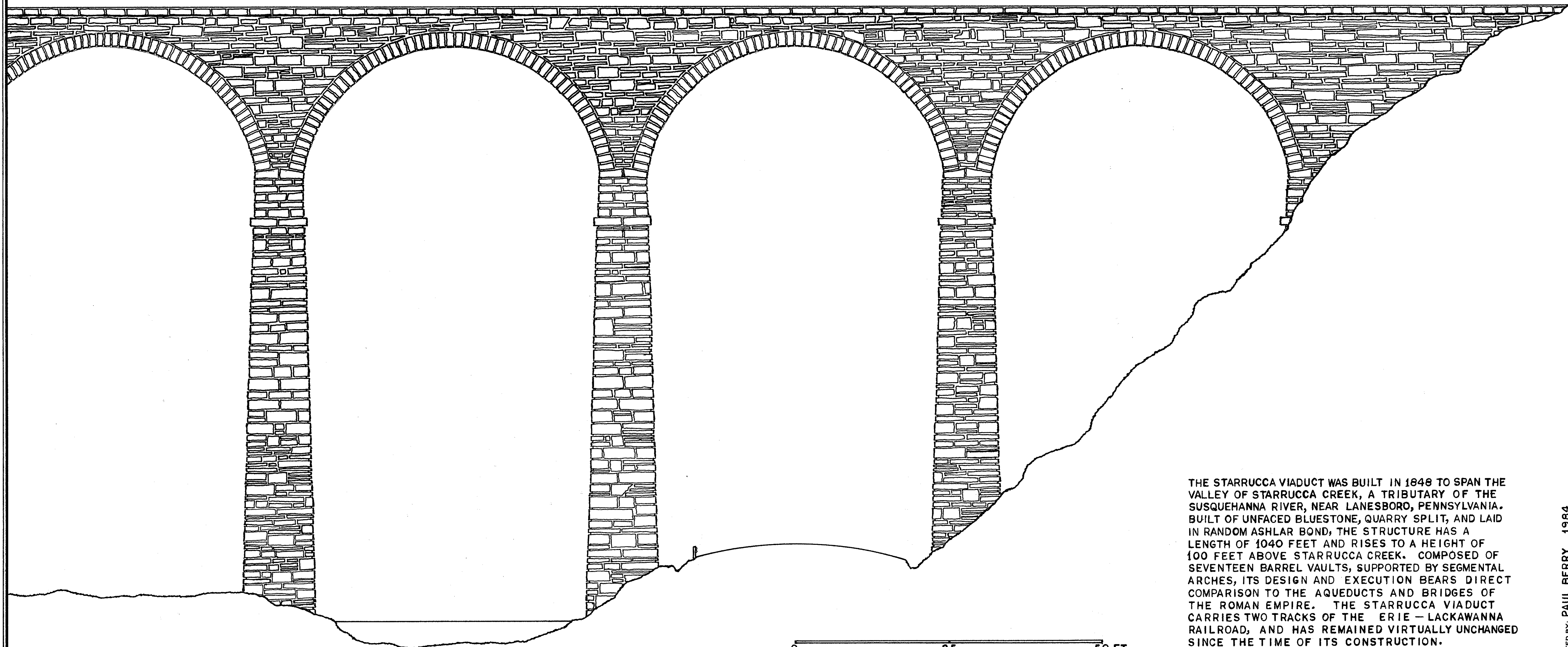
SCALE 1/32 IN. = 1 FT.



STARRUCCA CREEK

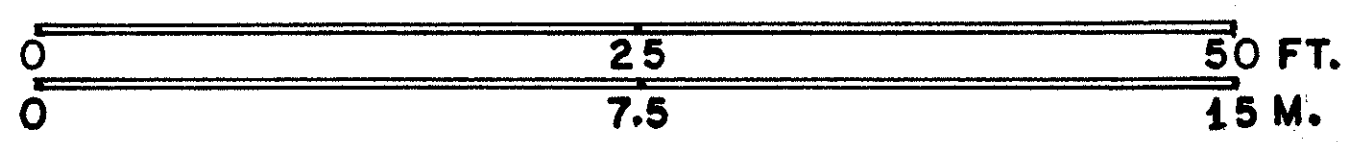
PENN. ST. RT. 296

SOUTH ABUTMENT



DETAIL AT STARRUCCA CREEK

SCALE 1/8 IN. = 1 FT.



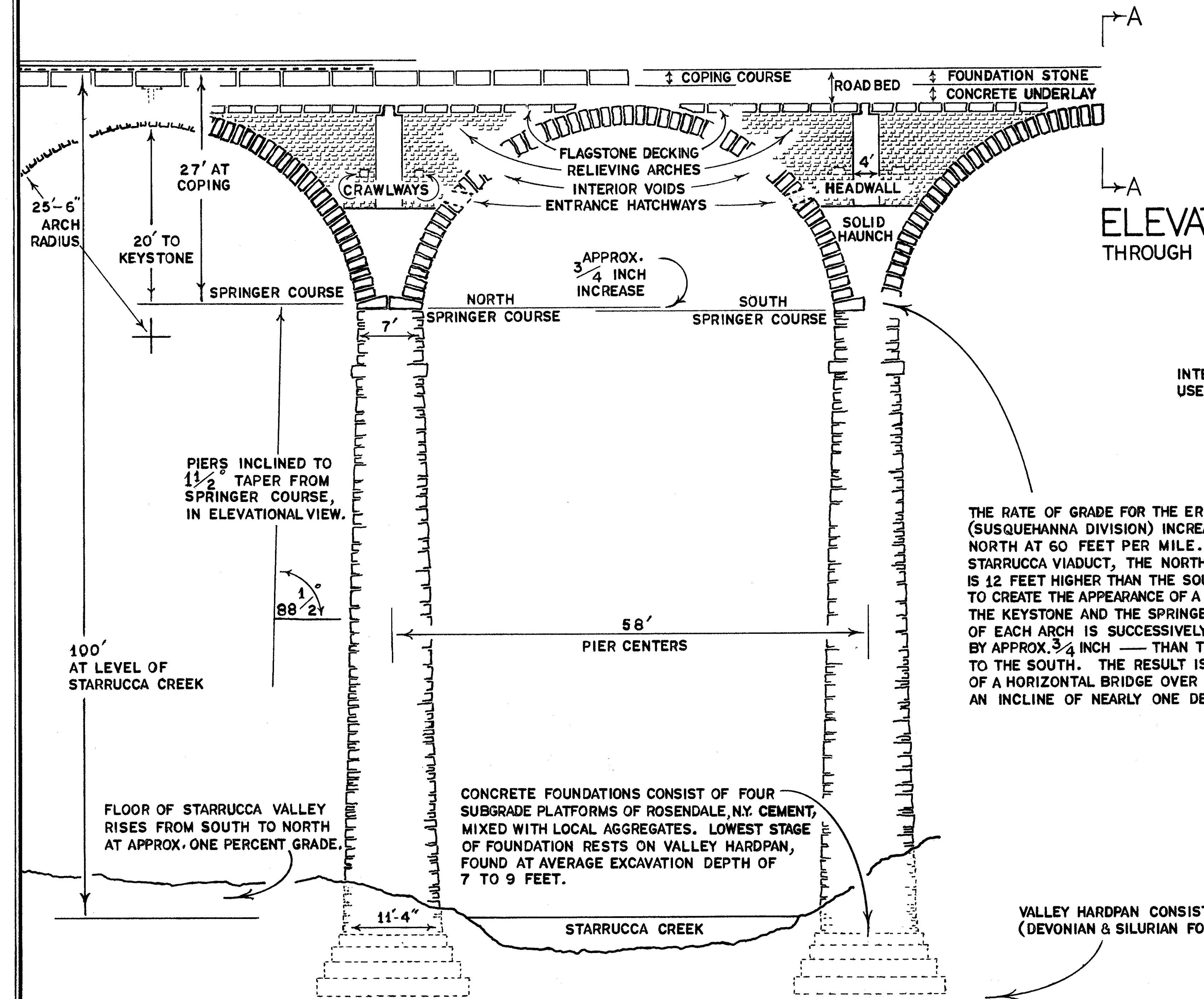
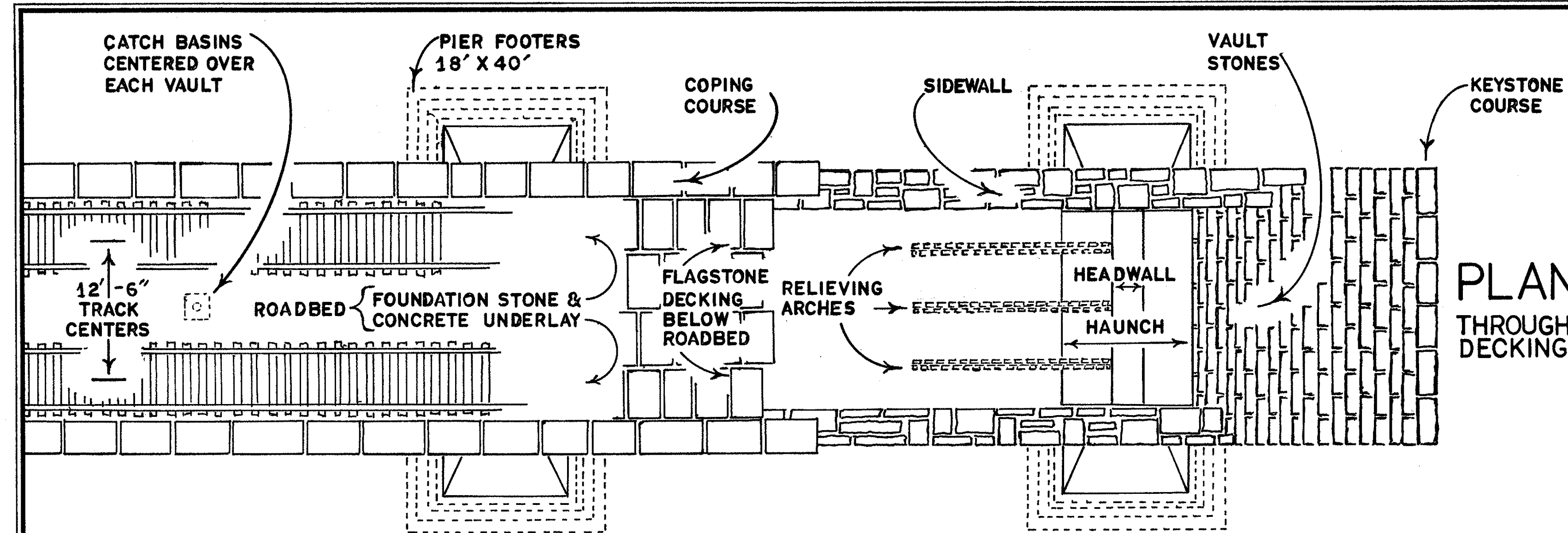
THE STARRUCCA VIADUCT WAS BUILT IN 1848 TO SPAN THE VALLEY OF STARRUCCA CREEK, A TRIBUTARY OF THE SUSQUEHANNA RIVER, NEAR LANESBORO, PENNSYLVANIA. BUILT OF UNFACED BLUESTONE, QUARRY SPLIT, AND LAID IN RANDOM ASHLAR BOND, THE STRUCTURE HAS A LENGTH OF 1040 FEET AND RISES TO A HEIGHT OF 100 FEET ABOVE STARRUCCA CREEK. COMPOSED OF SEVENTEEN BARREL VAULTS, SUPPORTED BY SEGMENTAL ARCHES, ITS DESIGN AND EXECUTION BEARS DIRECT COMPARISON TO THE AQUEDUCTS AND BRIDGES OF THE ROMAN EMPIRE. THE STARRUCCA VIADUCT CARRIES TWO TRACKS OF THE ERIE - LACKAWANNA RAILROAD, AND HAS REMAINED VIRTUALLY UNCHANGED SINCE THE TIME OF ITS CONSTRUCTION.

DELINEATED BY: PAUL BERRY 1984  
ERIE RAILWAY SURVEY  
HISTORIC AMERICAN BUILDINGS SURVEY  
HISTORIC AMERICAN ENGINEERING RECORD  
UNITED STATES DEPARTMENT OF THE INTERIOR

LANESBORO  
ERIE RAILWAY: STARRUCCA VIADUCT - 1848  
THE VALLEY OF STARRUCCA CREEK  
SUSQUEHANNA COUNTY  
PENNSYLVANIA

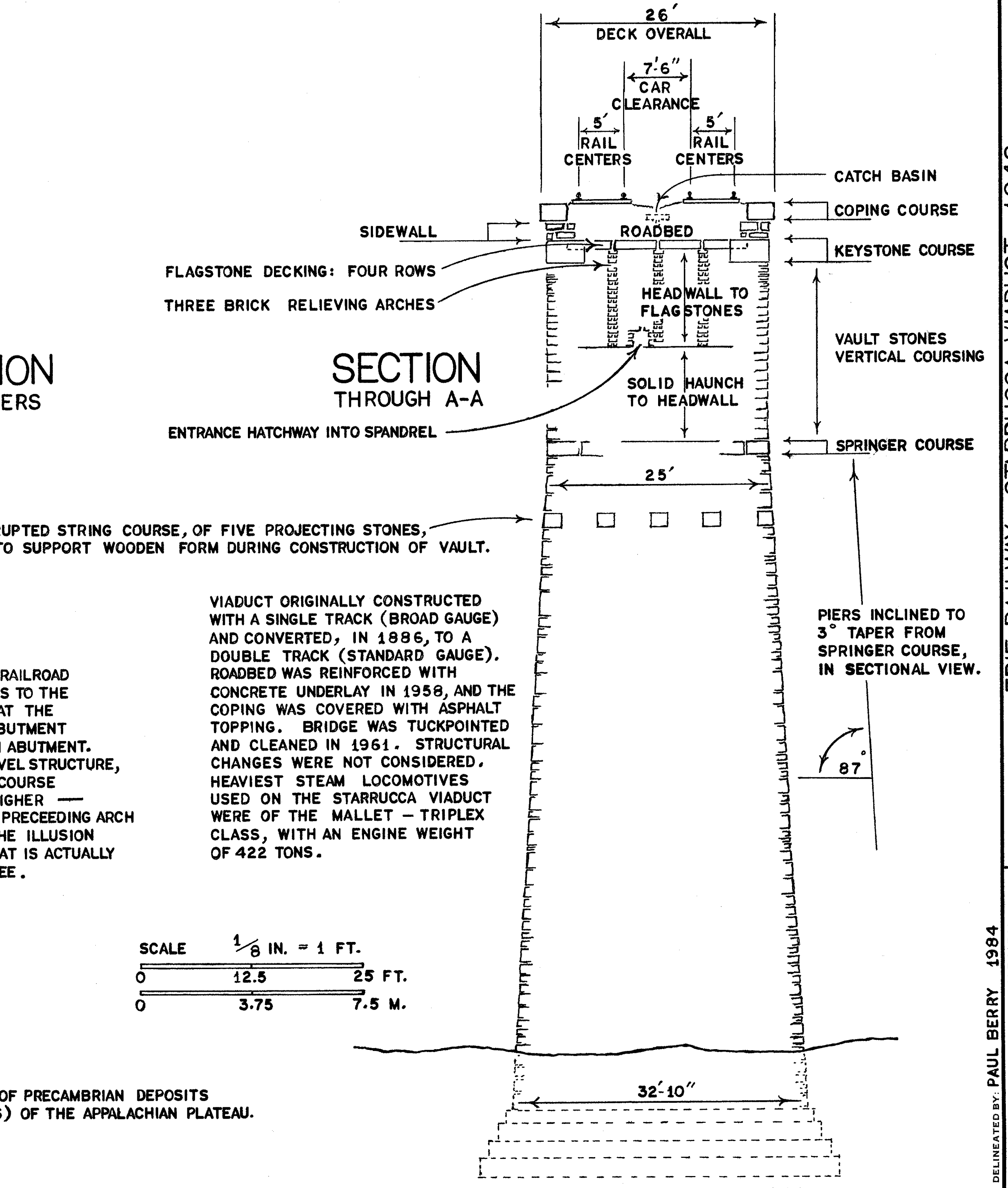
SHEET 2 of 3  
HISTORIC AMERICAN ENGINEERING RECORD  
PA - 6

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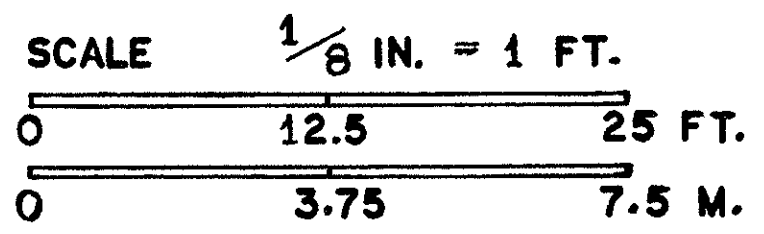
THE ERIE RAILWAY'S STARRUCCA VIADUCT WAS ERECTED IN TWO BUILDING SEASONS, 1847-48, UNDER THE DIRECTION OF THE ENGINEERS JAMES PUGH KIRKWOOD (BORN 1807, EDINBURGH, SCOTLAND; DIED 1877, NEW YORK) AND JULIUS WALKER ADAMS (BORN 1812, BOSTON; DIED 1899, NEW YORK). THEIR CONCEPT INVOLVED A 17 VAULT STONE-ARCH BRIDGE, CROSSING 1040 FEET OF CREEK VALLEY, 100 FEET ABOVE THE WATER. SEVERAL FEATURES DISTINGUISH THE STRUCTURE, ASIDE FROM ITS ECONOMY OF MATERIAL AND ITS SPEED OF CONSTRUCTION. THE USE OF PLAIN CONCRETE IN THE PIER FOUNDATIONS, RATHER THAN DRESSED STONE, WAS EXPERIMENTAL FOR THE TIME. INSTEAD OF SOLID SPANDELS BETWEEN THE 51 FOOT ARCHES, INTERIOR VOIDS WERE PROVIDED TO LIGHTEN THE LOAD ON THE VAULTS. THE TOP OF EACH PIER CARRIED A SOLID HAUNCH FROM WHICH A VERTICAL HEADWALL ROSE TO MEET THE FLAGSTONE DECK OF THE VIADUCT. SPRINGING FROM THE SIDE OF THE HEADWALL, THREE BRICK HALF ARCHES RAN LENGTHWAYS TO THE UPPER SHOULDER OF THE VAULT NEAR THE CROWN. THESE SPANDREL ARCHES SUPPORTED THE FLAGSTONES OF THE DECK, AND THE VOIDS BETWEEN THEM LESSENE THE DEAD WEIGHT. THE INTENTION WAS TO TRANSFER THE TRAIN LOADINGS LENGTHWAYS FROM THE CROWN OF THE VAULT — ITS STRONGEST POINT — OVER TO THE VERTICAL PIERS, WHERE THEY COULD BE TRANSMITTED DIRECTLY TO THE GROUND.

THE STARRUCCA VIADUCT, THE MOST EXPENSIVE BRIDGE IN THE WORLD AT THE TIME (\$320,000), WAS AMONG THE LAST OF THE STONE VIADUCTS TO BE BUILT. WITHIN 30 YEARS, BRIDGES WERE BEING CONSTRUCTED OF THE NEW MATERIALS MASS PRODUCED IN THE ROLLING MILLS OF THE IRON INDUSTRY: BEAMS, PLATES, GIRDERS, PILINGS AND CABLES. BECAUSE OF ITS DISTINCTION, THE STARRUCCA VIADUCT WAS DESIGNATED A NATIONAL HISTORIC CIVIL ENGINEERING LANDMARK BY THE AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE) IN 1973.



THE RATE OF GRADE FOR THE ERIE RAILROAD (SUSQUEHANNA DIVISION) INCREASES TO THE NORTH AT 60 FEET PER MILE. AT THE STARRUCCA VIADUCT, THE NORTH ABUTMENT IS 12 FEET HIGHER THAN THE SOUTH ABUTMENT. TO CREATE THE APPEARANCE OF A LEVEL STRUCTURE, THE KEYSTONE AND THE SPRINGER COURSE OF EACH ARCH IS SUCCESSIVELY HIGHER — BY APPROX. 3/4 INCH — THAN THE PRECEEDING ARCH TO THE SOUTH. THE RESULT IS THE ILLUSION OF A HORIZONTAL BRIDGE OVER WHAT IS ACTUALLY AN INCLINE OF NEARLY ONE DEGREE.

VIADUCT ORIGINALLY CONSTRUCTED WITH A SINGLE TRACK (BROAD GAUGE) AND CONVERTED, IN 1886, TO A DOUBLE TRACK (STANDARD GAUGE). ROADBED WAS REINFORCED WITH CONCRETE UNDERLAY IN 1958, AND THE COPING WAS COVERED WITH ASPHALT TOPPING. BRIDGE WAS TUCKPOINTED AND CLEANED IN 1961. STRUCTURAL CHANGES WERE NOT CONSIDERED. HEAVIEST STEAM LOCOMOTIVES USED ON THE STARRUCCA VIADUCT WERE OF THE MALLETT - TRIPLEX CLASS, WITH AN ENGINE WEIGHT OF 422 TONS.



VALLEY HARDPAN CONSISTS OF PRECAMBRIAN DEPOSITS (DEVONIAN & SILURIAN FOLDS) OF THE APPALACHIAN PLATEAU.