THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
2nd BIENNIAL MOVEABLE BRIDGE SYMPOSIUM

ST. PETERSBURG, FLORIDA

CONNECTICUT MOVEABLE RAILROAD BRIDGE REHABILITATION PROGRAM

David W. Jacobs, P.E.
Assistant Director - Structural Engineering
Manager - Connecticut Bridge Projects Office

0190D November 1987

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Metro-North Commuter Railroad Company

A few years ago, Metro-North Commuter Railroad Company, with financial assistance primarily from the Connecticut Department of Transportation (and supplemented funding from the Urban Mass Transportation Administration and the Federal Railroad Administration) embarked on the largest moveable bridge rehabilitation project ever undertaken by an operating railroad. What makes this program unique is not the type of repairs -- there's nothing particularly "state-of-the-art" or "never done before" type of work involved. What does make the project unique, however, is the scope, or extent, of work that is being performed simultaneously on four bridges, simultaneously also with other Metro-North capital and maintenance projects, and all the while maintaining:

- Better than 90% on-time performance during both peak and off-peak service on the second largest commuter railroad in the United States, and
- A minimum disruption to important commercial and recreational marine traffic on all the rivers crossed by the bridges. (Marine traffic will be affected during periods when due to electrical and mechanical work on the moveable spans, the spans will be in the down position and inoperable.)

Before I go into details of the project itself, let me give you a little background about Metro-North and how it relates to the moveable bridge project. Metro-North is the nation's second largest commuter railroad,

with over 185,000 daily riders, 665 miles of track and more than 700 passenger cars. Created in 1983, Metro-North traces its roots back to the New York and Harlem Railroad, begun in 1832 as a horse-car line in lower Manhattan. The present New Haven line traces its heritage to the New York and New Haven Railroad, which opened in the 1840's between these two cities. Today, Metro-North's three major lines - the Hudson, Harlem and New Haven, operate into and out of Grand Central Terminal, in the heart of Manhattan, and fan out over six counties in New York State and Connecticut.

The New Haven line follows the same route as the Harlem line north to the New York City line in the Bronx, where it diverges and runs northeast 60 miles to New Haven, Connecticut, skirting Long Island Sound most of the way. The line runs through Westchester County in New York State and Fairfield and New Haven Counties in Connecticut, serving a total of 64 main line and branch line stations. Unlike the Harlem and Hudson lines, the New Haven line has local branch lines - to New Canaan, Danbury and Waterbury, Connecticut. An overhead 60 Hz, 13.5 KV catenary system delivers motive power to the line and also distinguishes the New Haven main line and its New Canaan branch line from the railroad's two other principal lines.

Formed by the geologic process of deglaciation, southern Connecticut has what is known as a drowned indented coastline. This is characterized by continuous irregularities: bays, inlets, points, rivers, estuaries, etc. Commercially this was of great value to the development of the state in general and the shoreline areas in particular. It provided natural breeding grounds and habitants for an almost infinite

variety of marine species. More importantly, it provided ideal facilities for ports, terminals and other marine transportation systems.

As the industrial economy of the United States matured during the nineteenth century, railroads became of increasingly greater importance. Unfortunately, the very characteristics which made it possible for Connecticut to practically lead the young country into the industrial age, presented a formatable challenge to railroad builders. Unlike many inland and southern areas of the nation, the railroads of southern Connecticut, if they were to be built, had to continuously cross difficult waterways. This made railroad construction slow, expensive and, where the waterways were particularly wide and/or deep, technologically difficult.

Between the state borders with its two neighbors, New York on the west and Rhode Island on the east, approximately 130 miles, there are ten rivers which were wide and deep enough so that by the early nineteenth century they were already significant commercial marine highways which could not be obstructed by artificial barriers. The first rail route along the shoreline simply provided ferries to take rail cars across the rivers. This, obviously, was slow, and during winter when the waterways often became clogged with ice, unreliable. Eventually, bridge engineers constructed moveable bridges at some of the rivers. While this was an improvement at the crossings where they were built, several of the rivers were simply too deep and the currents too swift for existing construction technology to deal with.

As the area's population and industrial base expanded during the latter half of the nineteenth century, pressure of the railroad systems to modernize and expand also grew. The shoreline route, originally made up of several independent railroad companies, were consolidated into the New York, New Haven and Hartford Railroad Company. Physically, the line expanded from a single track to four tracks between New York and New Haven and two from New Haven east. And by the 1880s, the last of the ten major crossings, the Thames River between New London and Groton, was finally bridged. A continuous rail link finally existed across all of southern Connecticut.

Of the ten major waterways, five are located between the New York border and New Haven -- the line now owned by the state of Connecticut and operated by Metro-North Commuter Railroad Company. These rivers (from west to east) and their railroad bridge names are:

Mianus River	(Greenwich)	COB
Norwalk River	(Norwalk)	WALK
Saugatuck River	(Westport)	SAGA
Pequomack River	(Bridgeport)	PECK
Housatonic River	(Stratford-Milford)	DEVON

All five structures carry Metro-north's four-track electrified mainline. Further, all five were constructed within a ten year period -- 1898 to 1908. These bridges carry over 200 trains daily; Metro-North, AMTRAK and Conrail freight. Between Metro-North and AMTRAK, approximately 75,000 people per day cross these bridges. Structurally the bridges are as follows:

COB
- 2 double track rolling lift bascule spans, open deck girders
- 12 open deck girder approach spans
- 28 deck truss approach spans
- Total length of structure: 1,087 feet

WALK
- 1 four-track center pivot horizontal swing span, deck truss
- 12 open deck truss approach spans
- Total length of structure: 564 feet

SAGA
- 2 Double track rolling lift bascule spans, open deck girders
- 20 open deck girder approach spans
- Total length of structure: 458 feet

PECK
- 2 double track rolling lift bascule spans, open thru girders
- 4 Open deck girder approach spans
- 4 double track open thru girder approach spans
- Total length of structure: 366 feet

DEVON
- 2 double track rolling lift bascule spans, three trusses
- 4 open deck girder approach spans
- 8 open thru truss approach spans
- Total length of structure: 1,067 feet

What we have then is a total of 9 moveable spans and 92 fixed spans, all between 80 and 90 years old, carrying four mainline tracks, a total of 2,475 track feet, or approximately 9,000 bridge feet - almost 1.9 miles. One can now readily appreciate the magnitude of the problem of developing a rehabilitation program, encompassing all five bridges simultaneously, around an operating commuter railroad.

Because of both budget and railroad operating constraints, the rehabilitation of four bridges had to be scheduled in two distinct phases. Phase I included two items: (a) the repairs to structural, mechanical and electrical systems of the moveable spans, and (b) those items not on the moveable spans but which were deemed particularly

critical due to their exiting condition. Phase I is under construction now and Phase II, which is the rehabilitation of the remainder of the work not included under Phase I, is scheduled for 1988-1990. Phase II includes principally structural work on the approach spans, piers, fender systems and painting.

The condition of the fifth bridge, PECK (at Bridgeport), was evaluated to be no longer cost effective to rehabilitate. Therefore, a completely new structure will be built. This decision was made primarily due to a serious foundation problem with the large pit pier. Preliminary engineering is just beginning and a decision has not yet been made as to whether the new bridge will be a moveable or fixed span, or whether the alignment will be shifted or kept essentially as is.

Probably the most difficult part of this project was scheduling. In spite of the high priority given to the project by Metro-North and the Connecticut Department of Transportation (CDOT), track outages and navigation restrictions (periods when the spans cannot be opened) had to be minimized and coordinated with other capital projects involving track, catenary, signal and other bridges. Further, there was routine maintenance and non-railroad project affecting Metro-North which also required track outages. Finally, and just as importantly, both Metro-North and the CDOT were committed to maintaining a better than ninety percent on-time performance during peak and off-peak periods.

Based on all these legitimate requirements, a detailed schedule finally evolved which calls for all work under Phase I to be done within a two year period. Track outage and navigation restriction work was scheduled first at COB and DEVON. This was because these bridges were at opposite ends of the Metro-North system, and thus resulted in a minimized accumulation of possible train delays. SAGA and WALK will be done second, and simultaneously. This was done because WALK and SAGA are within the same signal block. Thus, the operating problems during track outage periods are simplified.

Another scheduling problem we had to work around was the fact that three of the four bridges, that is all except for WALK, have two identical side by side two track moveable spans. When one span is taken out-of-service, two tracks are affected. The exception to this is WALK where, because it is a horizontal swing bridge, when the span is in the open position all four tracks are affected. Therefore, track outages had to be very carefully scheduled so that when two tracks were out-of-service it was coordinated with other railroad projects which needed the same tracks to be out-of-service for their work. Before work could begin, Metro-North required the contractor to certify that all materials were on-hand and ready to be installed. Further, all equipment that was to be required had to be checked out and on the site before the track outages were granted.

The problem of track outages on Metro-North is particularly critical because of its high-level passenger platforms. When one of the tracks adjacent to a platform is taken out-of-service, ramps must be

installed to allow passengers to walk over the dead track from the platform to the cars. Sometimes during 2-track outages, these ramps must be installed over two adjacent tracks. Sufficient ramps must be provided so that train dwell times are not excessive due to delays caused by loading and/or unloading passengers using the ramps. Because the entire New Haven line has a TCS signal system on all tracks, we are able to further reduce delays during peak-hours, when two tracks are out-of-service, by using the in-service track adjacent to the high level platform even when its direction is opposite the normal direction. Obviously, this bridge rehabilitation project required extensive operational planning and coordination with other departments within the railroad. The same type of planning and coordination will be required for the Phase II work, since that too will require extensive track outages.

In Phase I, the primary work to be performed at the three bascule bridges (COB, SAGA and DEVON) consists of:

- Repairs to stringers and floor beams on the moveable span.
- Repairs to gusset plates, pins, rivets and other connection details.
- Replacement of flange angles and repairs to webs of track girders and segmental girders.
- Replacement of track girder and segmental girder tread plates.
- Replacement of all electrical operating motors, controllers and wiring (including navigation lighting).
- Repairs to heel and toe locks and associated mechanical/electrical systems.
- Rehabilitation of main span drives and associated mechanical systems.

The work at WALK is similar except that, since it is a horizontal swing rather than a rolling bascule, the circular tread plate track and bearing wheels (since there is no segmental girder) are to be replaced.

Under Phase II, the primary work on all four bridges consist of:

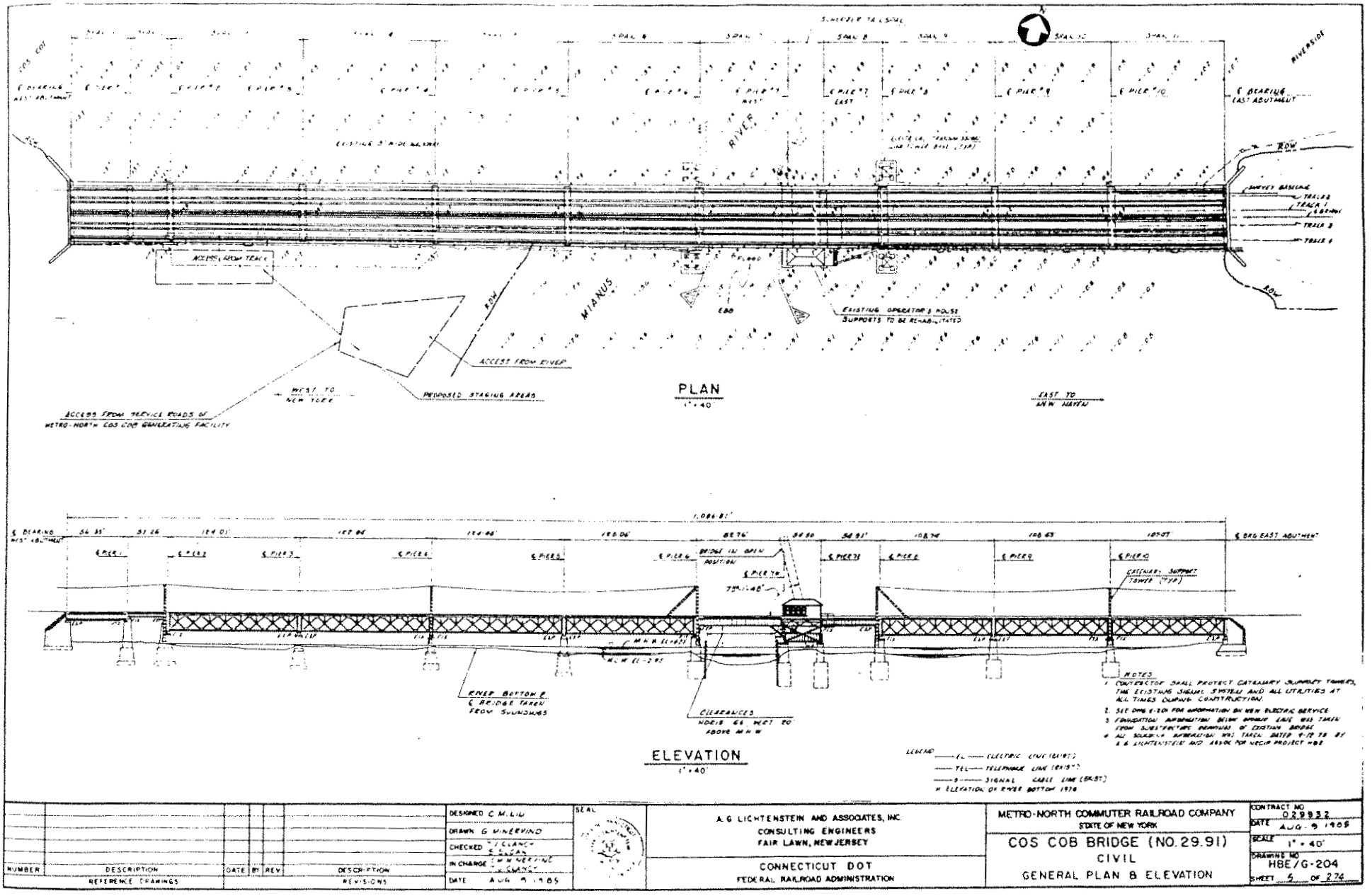
- Structural repairs to all fixed approach spans.
- Masonry repairs to all piers and abutments.
- Replacement of wooden fender systems.
- Repairs to the operator's houses.
- Installation of new inspection walkways.
- Complete sand blasting and painting.

As of this date, work on Phase I is approximately 40% complete. Work on Phase II is scheduled to begin during the summer of 1988, so that there will be some overlap between the two projects, although not at the same bridges. The total cost of Phases I and II is approximately $45 million, including design, construction, construction management and force account charges.

The final phase of the Metro-North moveable bridge rehabilitation program is, as mentioned earlier, the replacement of PECK drawbridge in Bridgeport. Based on several years of investigation, it was determined that it would not be cost effective to rehabilitate PECK and achieve a service life consistent with the other four moveable bridges after their rehabilitation. Therefore, last year the Connecticut Department of Transportation approved the consultant's recommendation regarding replacement rather than repair, and authorized Metro-North to begin feasibility studies and other preliminary engineering activities.

Frankly, it is Metro-North's desire to replace the existing drawbridge with a new fixed bridge. The savings in design, construction, operations and maintenance (in both the short and long terms) are obvious. Preliminary designs for both fixed and moveable spans are being prepared and studied, and negotiations are being held with the Coast Guard and other federal, state, local and private interests regarding proposed horizontal and vertical clearances, location of piers and possible change in right-of-way alignment. This preliminary phase of the PECK project is scheduled to be completed in April of 1988, resulting in a final selection of bridge type, geometry and alignment. Following the required regulatory reviews and approvals, we will begin final detailed design. It is hoped that construction can begin in 1991.

Figures 1 thru 9 show general layouts and framing plans of the five moveable bridges discussed in this paper.



NUMBER	DESCRIPTION	DATE	BY	REV.	DESCRIPTION
	REFERENCE DRAWINGS				REVISIONS

DESIGNED C.M.LIU
DRAWN G.VINERVINO
CHECKED T.J.CLANCY / E.S.SWAN
IN CHARGE T.J.CLANCY / E.S.SWAN
DATE AUG 9 1985

SEAL

A.G. LICHTENSTEIN AND ASSOCIATES, INC.
CONSULTING ENGINEERS
FAIR LAWN, NEW JERSEY

CONNECTICUT DOT
FEDERAL RAILROAD ADMINISTRATION

METRO-NORTH COMMUTER RAILROAD COMPANY
STATE OF NEW YORK

COS COB BRIDGE (NO. 29.91)
CIVIL
GENERAL PLAN & ELEVATION

CONTRACT NO. 029932
DATE AUG. 9 1985
SCALE 1" = 40'
DRAWING NO. H8E/G-204
SHEET 5 OF 274

FIGURE 1

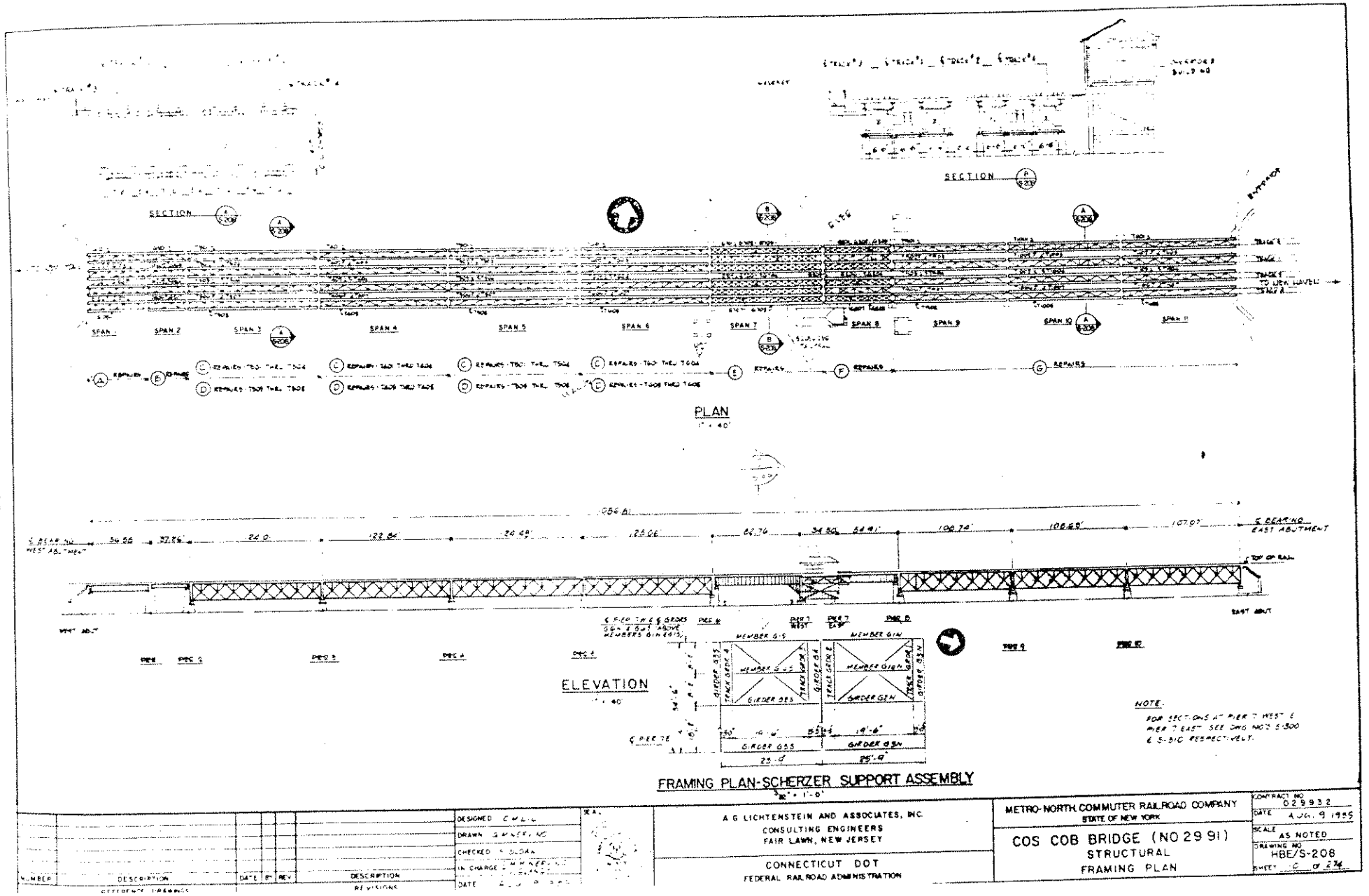
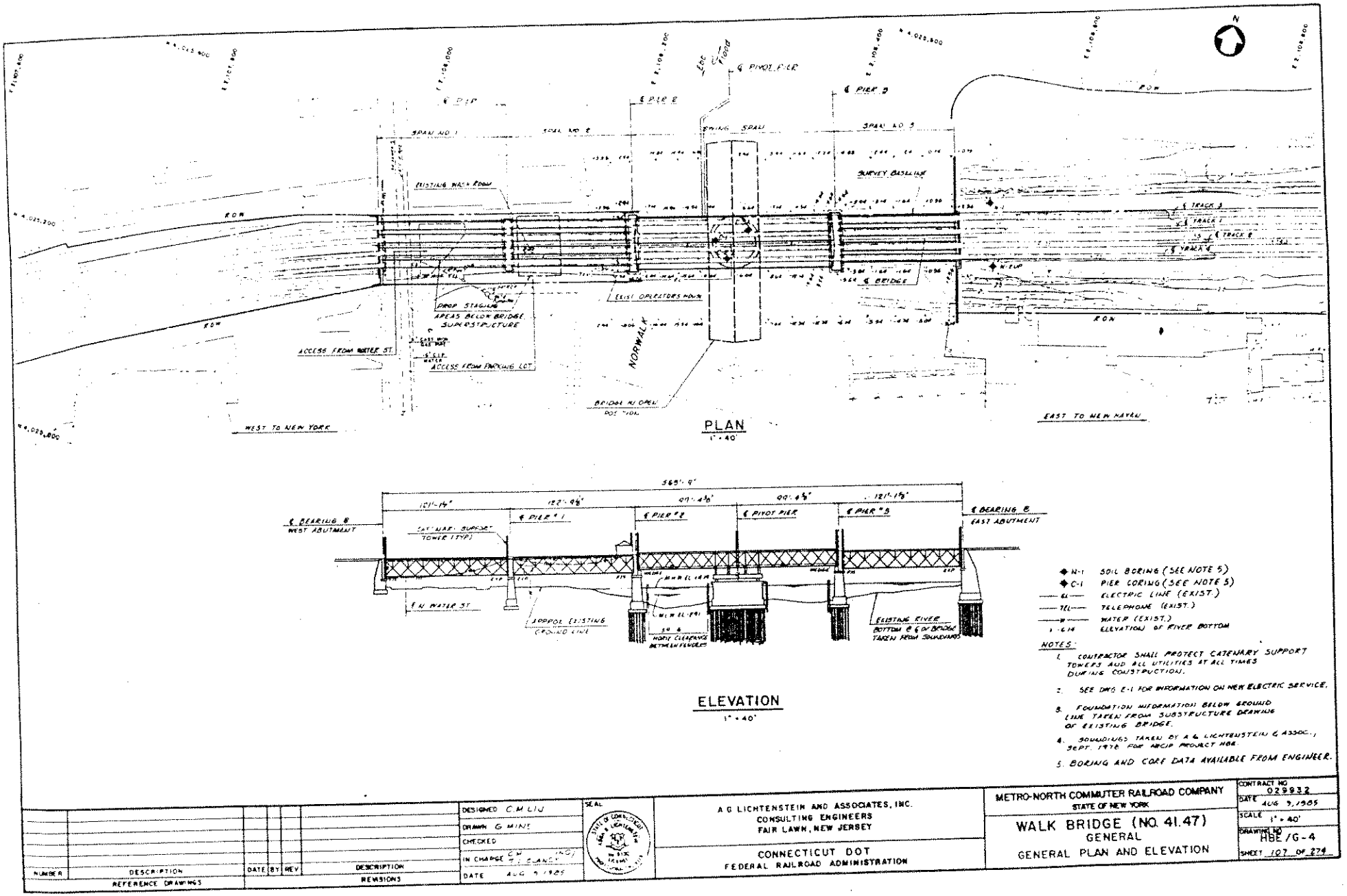

SECTION
SECTION
SPAN 1
SPAN 2
SPAN 3
SPAN 4
SPAN 5
SPAN 6
SPAN 7
SPAN 8
SPAN 9
SPAN 10
SPAN 11
PLAN
1" = 40'
ELEVATION
1" = 40'
FRAMING PLAN-SCHERZER SUPPORT ASSEMBLY
3/32" = 1'-0"
NOTE.
FOR SECTIONS AT PIER 7 WEST & PIER 7 EAST SEE DWG NO'S S-300 & S-310 RESPECTIVELY.
A G LICHTENSTEIN AND ASSOCIATES, INC.
CONSULTING ENGINEERS
FAIR LAWN, NEW JERSEY
CONNECTICUT DOT
FEDERAL RAILROAD ADMINISTRATION
METRO-NORTH COMMUTER RAILROAD COMPANY
STATE OF NEW YORK
COS COB BRIDGE (NO 29 91)
STRUCTURAL
FRAMING PLAN
CONTRACT NO 02 9932
DATE 4 JUL 9 1985
SCALE AS NOTED
DRAWING NO HBE/S-208
SHEET 6 OF 274

FIGURE 2



NUMBER	DESCRIPTION	DATE	BY	REV	DESCRIPTION
REFERENCE DRAWINGS		REVISIONS			

DESIGNED C.M. LIU
DRAWN G. MINE
CHECKED
IN CHARGE C.M. LIU
DATE AUG. 9, 1985

SEAL

A.G. LICHTENSTEIN AND ASSOCIATES, INC.
CONSULTING ENGINEERS
FAIR LAWN, NEW JERSEY

CONNECTICUT DOT
FEDERAL RAILROAD ADMINISTRATION

METRO-NORTH COMMUTER RAILROAD COMPANY
STATE OF NEW YORK

WALK BRIDGE (NO. 41.47)
GENERAL
GENERAL PLAN AND ELEVATION

CONTRACT NO. 029932
DATE AUG. 9, 1985
SCALE 1" = 40'
DRAWING NO. HBE/G-4
SHEET 107 OF 274

FIGURE 3

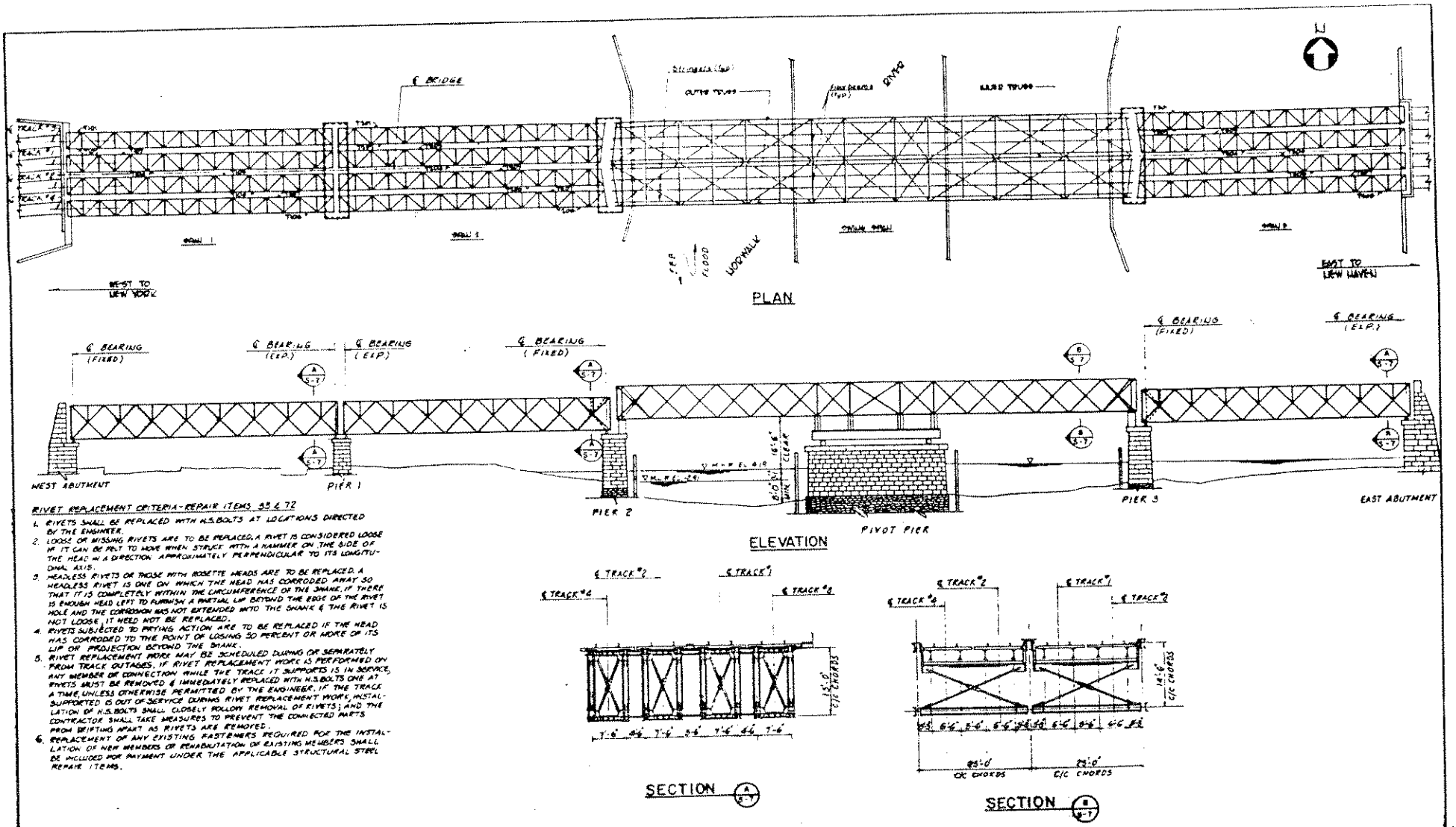
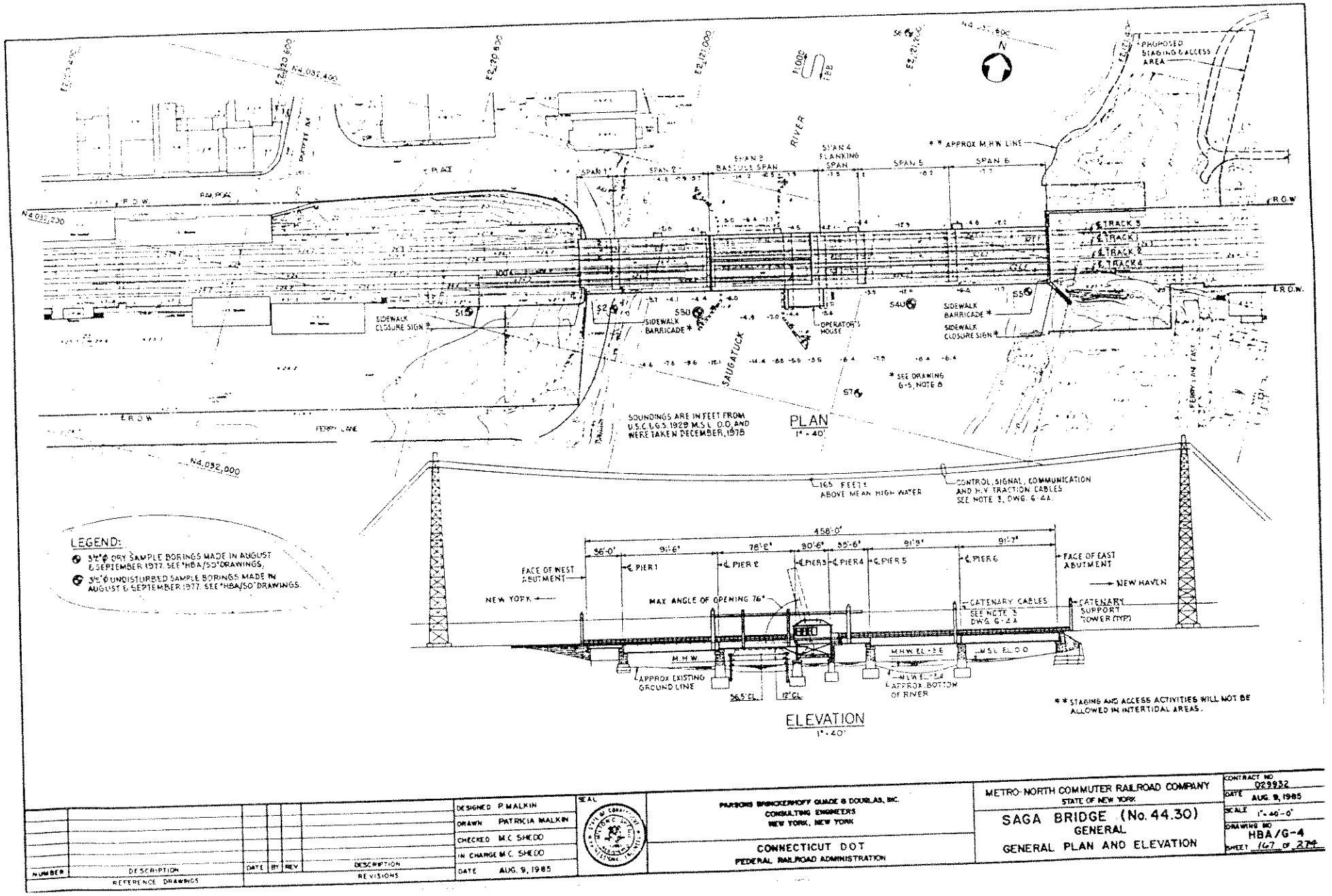

PLAN
ELEVATION
SECTION
SECTION
WEST ABUTMENT
PIER 1
PIER 2
PIVOT PIER
PIER 3
EAST ABUTMENT
RIVET REPLACEMENT CRITERIA - REPAIR ITEMS 55 & 72
1. RIVETS SHALL BE REPLACED WITH H.S.BOLTS AT LOCATIONS DIRECTED BY THE ENGINEER.
2. LOOSE OR MISSING RIVETS ARE TO BE REPLACED. A RIVET IS CONSIDERED LOOSE IF IT CAN BE MADE TO MOVE WHEN STRUCK WITH A HAMMER ON THE SIDE OF THE HEAD IN A DIRECTION APPROXIMATELY PERPENDICULAR TO ITS LONGITUDINAL AXIS.
3. HEADLESS RIVETS OR THOSE WITH ROSETTE HEADS ARE TO BE REPLACED. A HEADLESS RIVET IS ONE ON WHICH THE HEAD HAS CORRODED AWAY SO THAT IT IS COMPLETELY WITHIN THE CIRCUMFERENCE OF THE SHANK, IF THERE IS ENOUGH HEAD LEFT TO FURNISH A PARTIAL LAP BEYOND THE EDGE OF THE RIVET HOLE AND THE CORROSION HAS NOT EXTENDED INTO THE SHANK & THE RIVET IS NOT LOOSE, IT NEED NOT BE REPLACED.
4. RIVETS SUBJECTED TO PRYING ACTION ARE TO BE REPLACED IF THE HEAD HAS CORRODED TO THE POINT OF LOSING 30 PERCENT OR MORE OF ITS LAP OR PROJECTION BEYOND THE SHANK.
5. RIVET REPLACEMENT WORK MAY BE SCHEDULED DURING OR SEPARATELY FROM TRACK OUTAGES. IF RIVET REPLACEMENT WORK IS PERFORMED ON ANY MEMBER OR CONNECTION WHILE THE TRACK IT SUPPORTS IS IN SERVICE, RIVETS MUST BE REMOVED & IMMEDIATELY REPLACED WITH H.S.BOLTS ONE AT A TIME, UNLESS OTHERWISE PERMITTED BY THE ENGINEER. IF THE TRACK SUPPORTED IS OUT OF SERVICE DURING RIVET REPLACEMENT WORK, INSTALLATION OF H.S.BOLTS SHALL CLOSELY FOLLOW REMOVAL OF RIVETS; AND THE CONTRACTOR SHALL TAKE MEASURES TO PREVENT THE CONNECTED PARTS FROM SHIFTING APART AS RIVETS ARE REMOVED.
6. REPLACEMENT OF ANY EXISTING FASTENERS REQUIRED FOR THE INSTALLATION OF NEW MEMBERS OR REHABILITATION OF EXISTING MEMBERS SHALL BE INCLUDED FOR PAYMENT UNDER THE APPLICABLE STRUCTURAL STEEL REPAIR ITEMS.
DESIGNED C.M.LIU
DRAWN G.MINERVINO
CHECKED S.SLOAN
IN CHARGE C.M.MINERVINO/T.J.CLANCY
DATE AUG. 9, 1985
A.G.LICHTENSTEIN AND ASSOCIATES, INC.
CONSULTING ENGINEERS
FAIR LAWN, NEW JERSEY
CONNECTICUT DOT
FEDERAL RAILROAD ADMINISTRATION
METRO-NORTH COMMUTER RAILROAD COMPANY
STATE OF NEW YORK
WALK BRIDGE (NO. 41.47)
STRUCTURAL
FRAMING PLAN & SECTIONS
CONTRACT NO. 029932
DATE AUG. 9, 1985
SCALE N.T.S.
DRAWING NO. HBE/S-7
SHEET 113 OF 274
NUMBER DESCRIPTION DATE BY REV DESCRIPTION
REFERENCE DRAWINGS
REVISIONS

FIGURE 4



NUMBER	DESCRIPTION	DATE	BY	REV	DESCRIPTION
REFERENCE DRAWINGS		REVISIONS			

DESIGNED P. MALKIN
DRAWN PATRICIA MALKIN
CHECKED M.C. SHEDD
IN CHARGE M.C. SHEDD
DATE AUG. 9, 1985

SEAL

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.
CONSULTING ENGINEERS
NEW YORK, NEW YORK

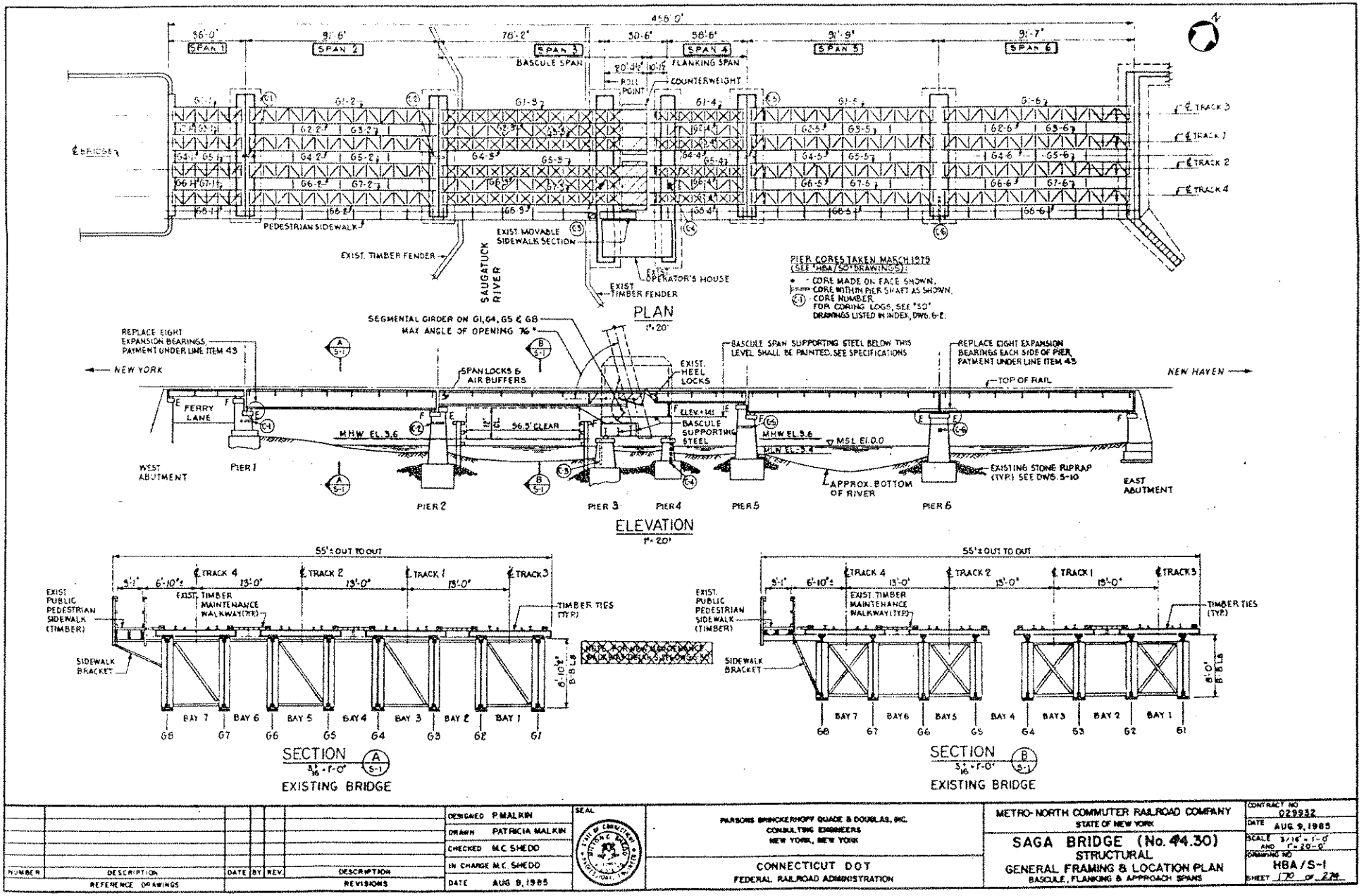
CONNECTICUT DOT
FEDERAL RAILROAD ADMINISTRATION

METRO-NORTH COMMUTER RAILROAD COMPANY
STATE OF NEW YORK

SAGA BRIDGE (No. 44.30)
GENERAL
GENERAL PLAN AND ELEVATION

CONTRACT NO. 029932
DATE AUG. 9, 1985
SCALE 1" = 40'-0"
DRAWING NO. HBA/G-4
SHEET 147 OF 274

FIGURE 5



NUMBER	DESCRIPTION	DATE	BY	REV.	DESCRIPTION
REFERENCE DRAWINGS		REVISIONS			

DESIGNED P. MALKIN
DRAWN PATRICIA MALKIN
CHECKED M.C. SHEDD
IN CHARGE M.C. SHEDD
DATE AUG 9, 1985

SEAL

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.
CONSULTING ENGINEERS
NEW YORK, NEW YORK

CONNECTICUT DOT
FEDERAL RAILROAD ADMINISTRATION

METRO-NORTH COMMUTER RAILROAD COMPANY
STATE OF NEW YORK

SAGA BRIDGE (No. 44.30)
STRUCTURAL
GENERAL FRAMING & LOCATION PLAN
BASCULE, FLANKING & APPROACH SPANS

CONTRACT NO. 029932
DATE AUG 9, 1985
SCALE 3/16" = 1'-0" AND 1"=20'-0"
DRAWING NO. HBA/S-1
SHEET 70 OF 274

FIGURE 6

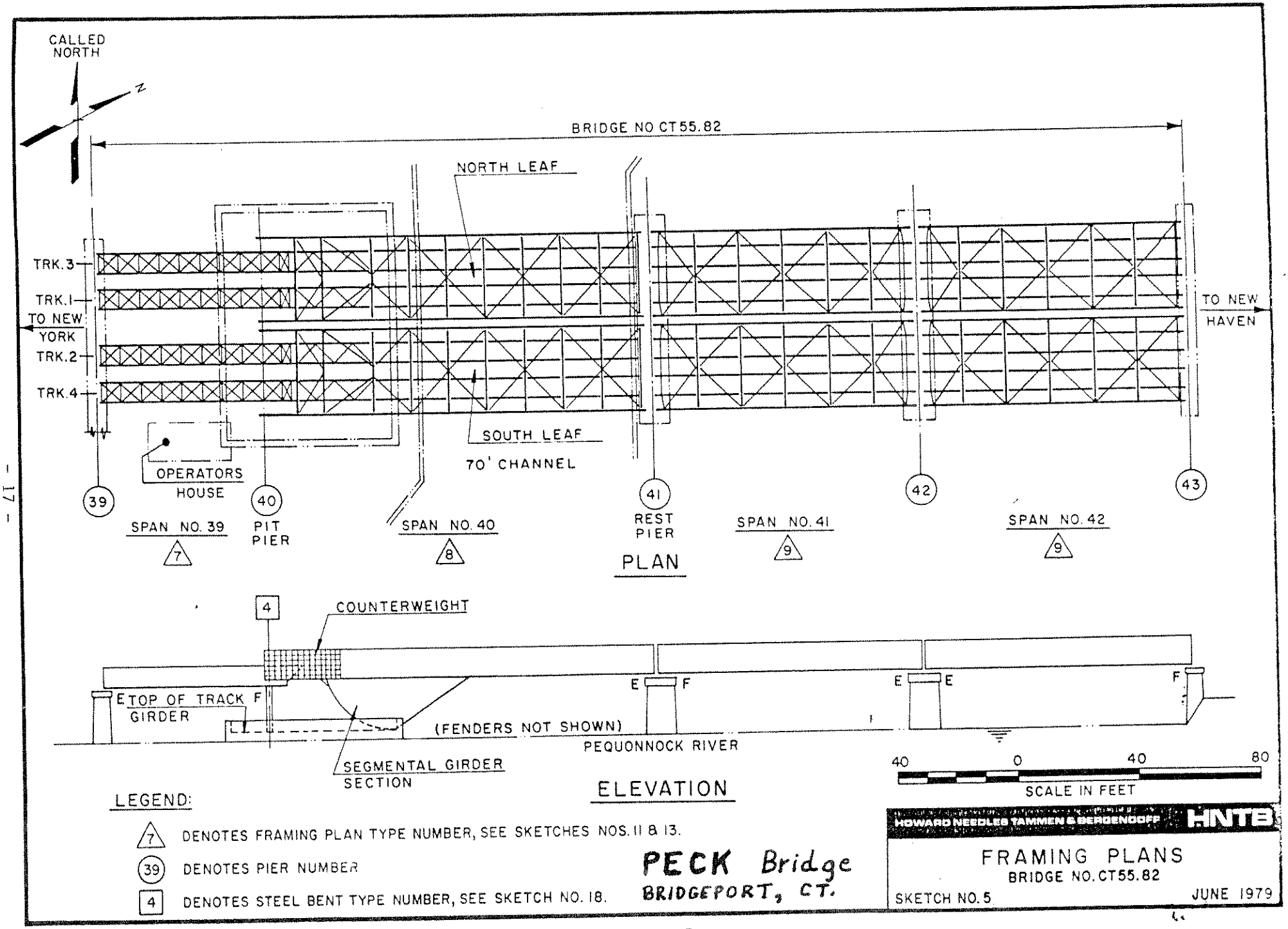

CALLED NORTH
N
BRIDGE NO CT55.82
NORTH LEAF
TRK.3
TRK.1
TO NEW YORK
TRK.2
TRK.4
TO NEW HAVEN
SOUTH LEAF
70' CHANNEL
OPERATORS HOUSE
39
40
41
42
43
SPAN NO. 39
7
PIT PIER
SPAN NO. 40
8
REST PIER
SPAN NO. 41
9
SPAN NO. 42
9
PLAN
4
COUNTERWEIGHT
E TOP OF TRACK F
GIRDER
(FENDERS NOT SHOWN)
PEQUONNOCK RIVER
SEGMENTAL GIRDER SECTION
ELEVATION
40 0 40 80
SCALE IN FEET
LEGEND:
7 DENOTES FRAMING PLAN TYPE NUMBER, SEE SKETCHES NOS. 11 & 13.
39 DENOTES PIER NUMBER
4 DENOTES STEEL BENT TYPE NUMBER, SEE SKETCH NO. 18.
PECK Bridge
BRIDGEPORT, CT.
HOWARD NEEDLES TAMMEN & BERGENDOFF
HNTB
FRAMING PLANS
BRIDGE NO. CT55.82
SKETCH NO. 5
JUNE 1979

FIGURE 7

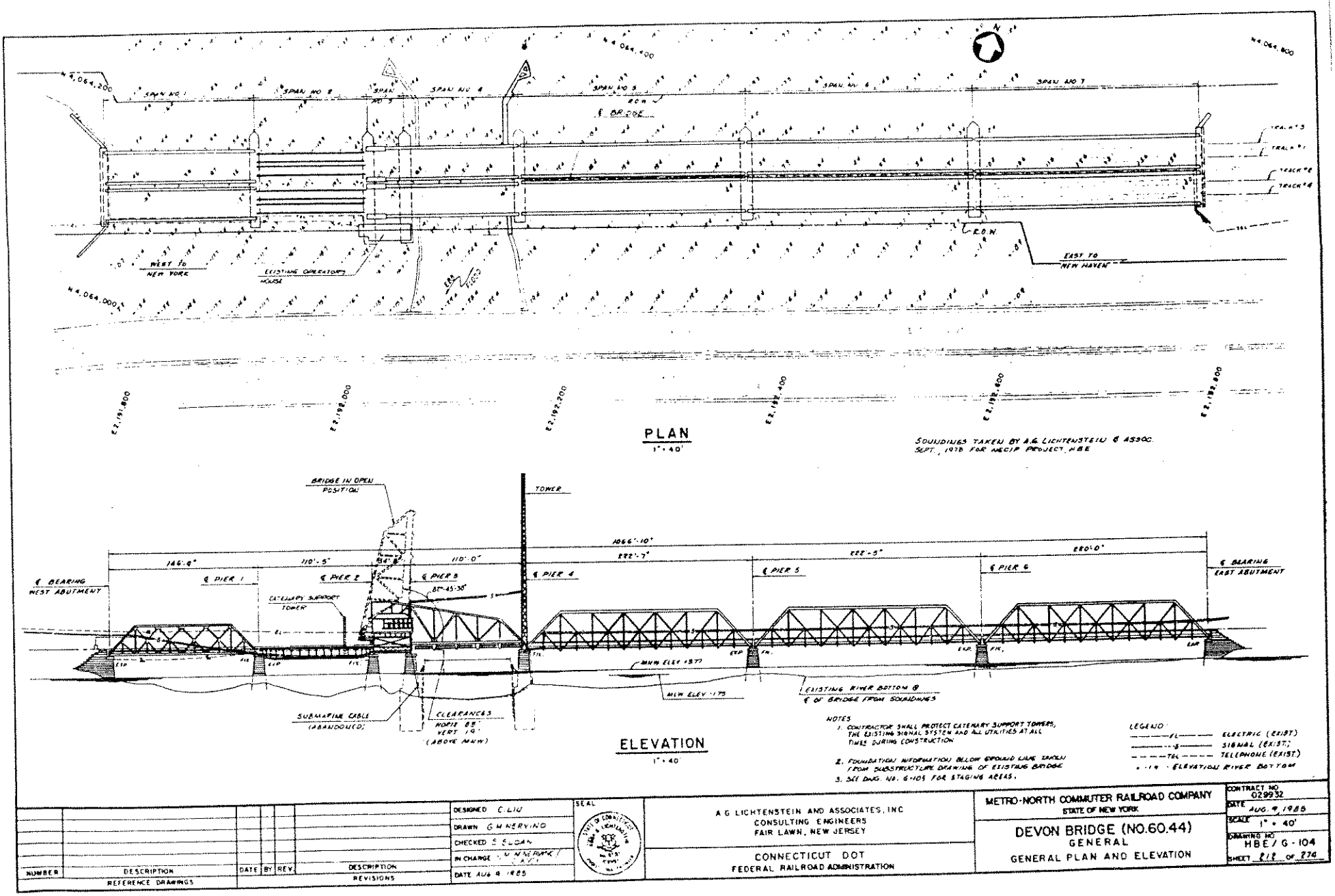
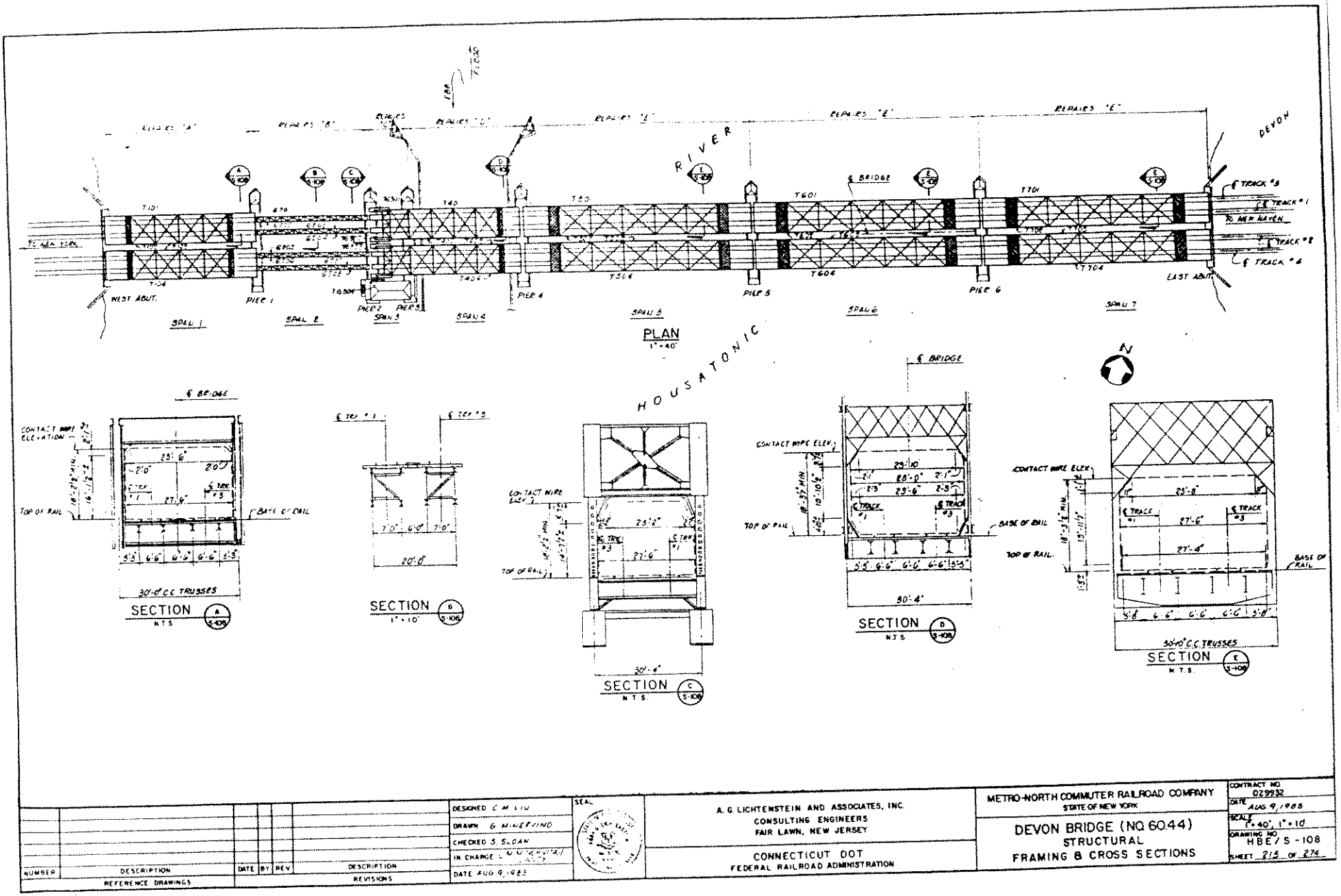

PLAN
1" = 40'
SOUNDINGS TAKEN BY A.G. LICHTENSTEIN & ASSOC. SEPT., 1978 FOR NECIP PROJECT, HBE
ELEVATION
1" = 40'
BRIDGE IN OPEN POSITION
TOWER
℄ BEARING WEST ABUTMENT
℄ BEARING EAST ABUTMENT
℄ PIER 1
℄ PIER 2
℄ PIER 3
℄ PIER 4
℄ PIER 5
℄ PIER 6
(CATENARY) SUPPORT TOWER
SUBMARINE CABLE (ABANDONED)
CLEARANCES HORIZ 85' VERT 19' (ABOVE MHW)
MHW ELEV 1.87'
MLW ELEV -1.79'
EXISTING RIVER BOTTOM @ ℄ OF BRIDGE FROM SOUNDINGS
NOTES
1. CONTRACTOR SHALL PROTECT CATENARY SUPPORT TOWERS, THE EXISTING SIGNAL SYSTEM AND ALL UTILITIES AT ALL TIMES DURING CONSTRUCTION
2. FOUNDATION INFORMATION BELOW GROUND LINE TAKEN FROM SUBSTRUCTURE DRAWING OF EXISTING BRIDGE
3. SEE DWG. NO. G-105 FOR STAGING AREAS.
LEGEND
EL ELECTRIC (EXIST)
S SIGNAL (EXIST)
TEL TELEPHONE (EXIST)
-1.9 ELEVATION RIVER BOTTOM
NUMBER DESCRIPTION DATE BY REV. DESCRIPTION
REFERENCE DRAWINGS
REVISIONS
DESIGNED C. LIU
DRAWN G.M. NERVINO
CHECKED S. SLOAN
IN CHARGE J. MACRUMP
DATE AUG 4 1985
SEAL
A.G. LICHTENSTEIN AND ASSOCIATES, INC
CONSULTING ENGINEERS
FAIR LAWN, NEW JERSEY
CONNECTICUT DOT
FEDERAL RAILROAD ADMINISTRATION
METRO-NORTH COMMUTER RAILROAD COMPANY
STATE OF NEW YORK
DEVON BRIDGE (NO.60.44)
GENERAL
GENERAL PLAN AND ELEVATION
CONTRACT NO. 029932
DATE AUG. 4 1985
SCALE 1" = 40'
DRAWING NO. HBE / G - 104
SHEET 8 OF 274

FIGURE 8



NUMBER	DESCRIPTION	DATE	BY	REV	DESCRIPTION	DESIGNED C.M. LIU	A. G. LICHTENSTEIN AND ASSOCIATES, INC. CONSULTING ENGINEERS FAIR LAWN, NEW JERSEY
REFERENCE DRAWINGS		REVISIONS				DRAWN G. MINEFFINO	
						CHECKED S. SLOAN	
						IN CHARGE [illegible]	CONNECTICUT DOT FEDERAL RAILROAD ADMINISTRATION
						DATE AUG 9, 1985	

SEAL

METRO-NORTH COMMUTER RAILROAD COMPANY
STATE OF NEW YORK

DEVON BRIDGE (NO 60.44)
STRUCTURAL
FRAMING & CROSS SECTIONS

CONTRACT NO. 029932
DATE AUG 9, 1985
SCALE 1" = 40', 1" = 10'
DRAWING NO. HBE/S-108
SHEET 215 OF 274

FIGURE 9