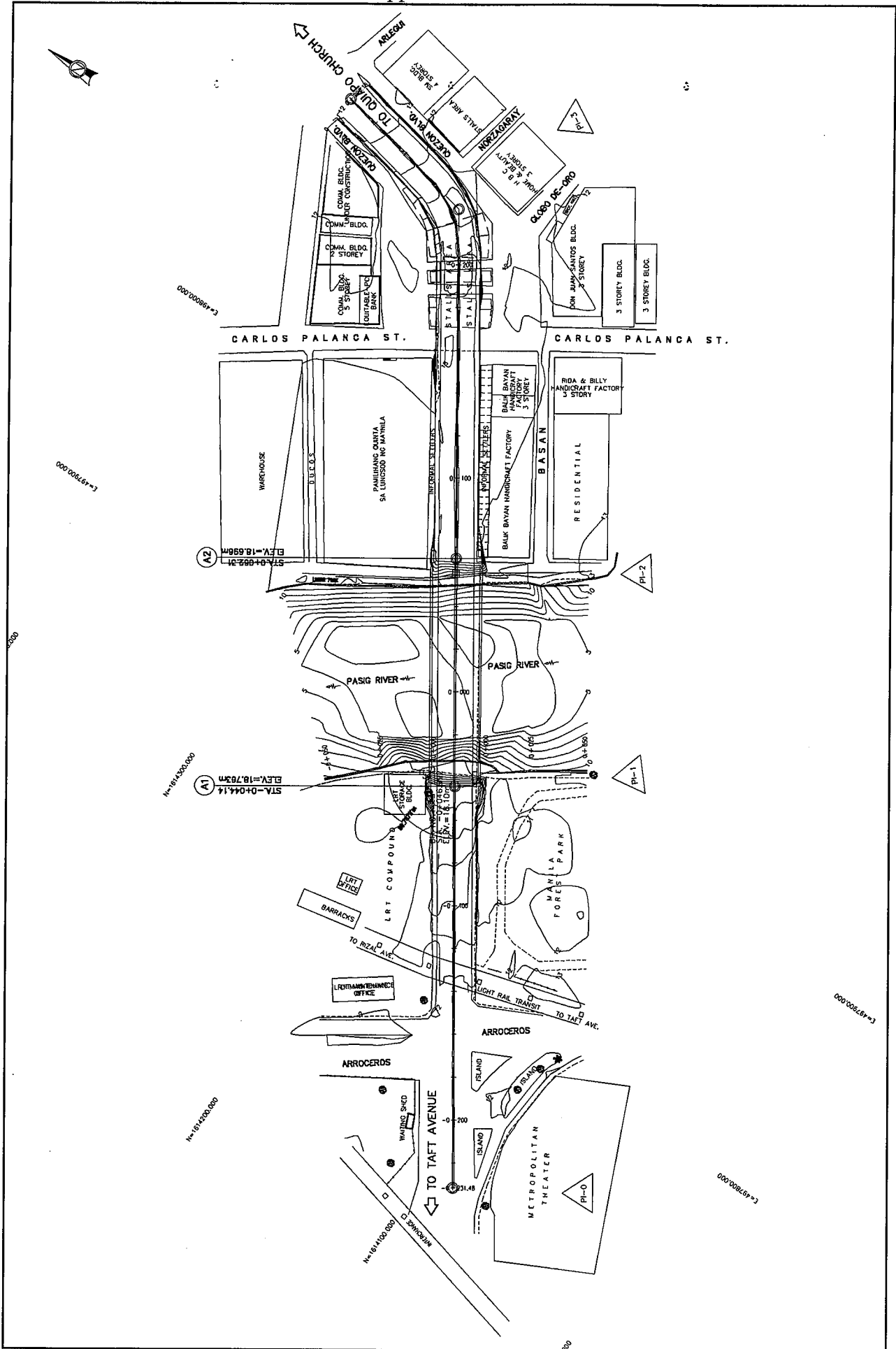


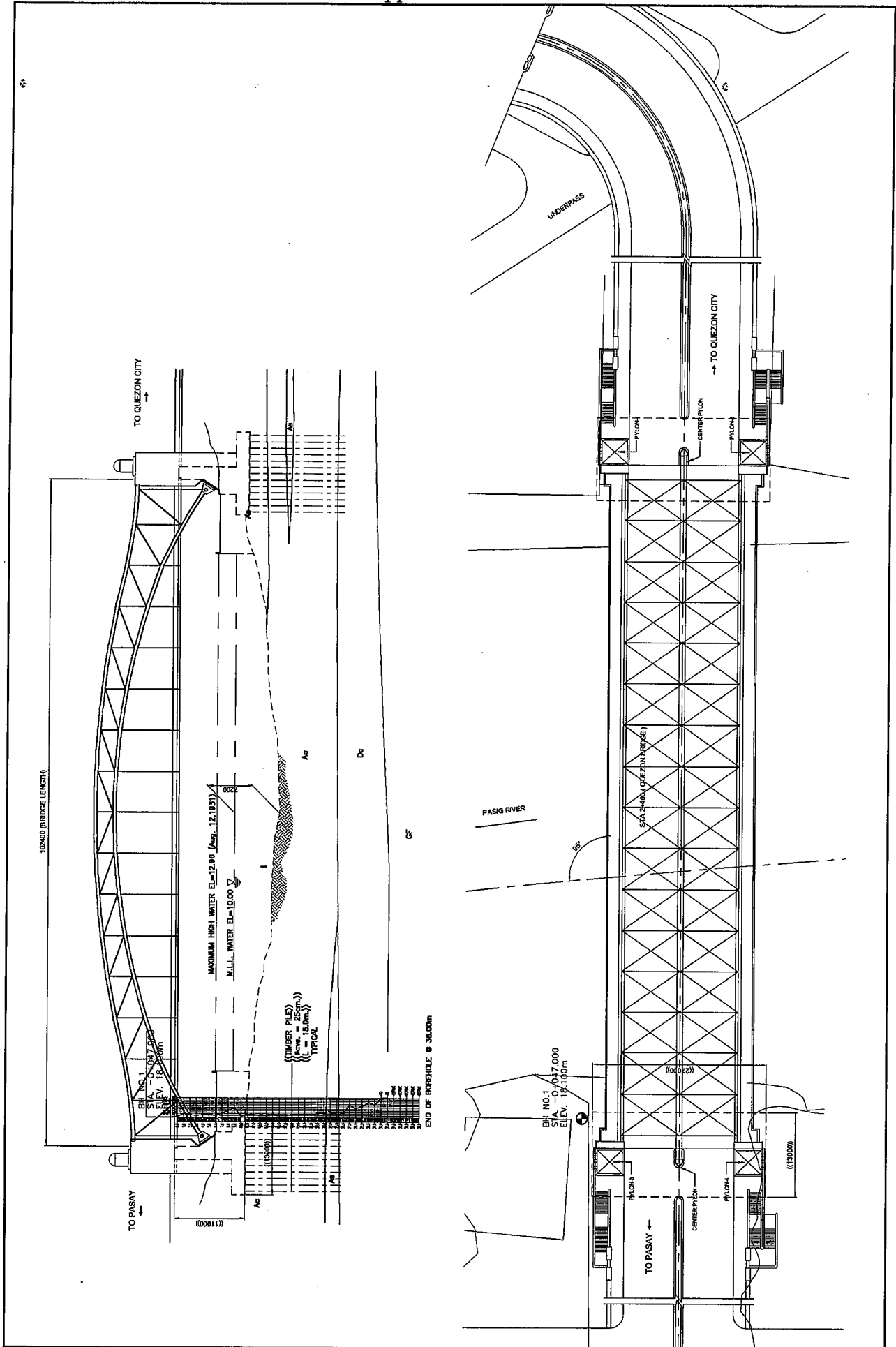
CHAPTER 21

FEASIBILITY STUDY OF QUEZON BRIDGE REHABILITATION PLAN

Appendix 21.1.2-1

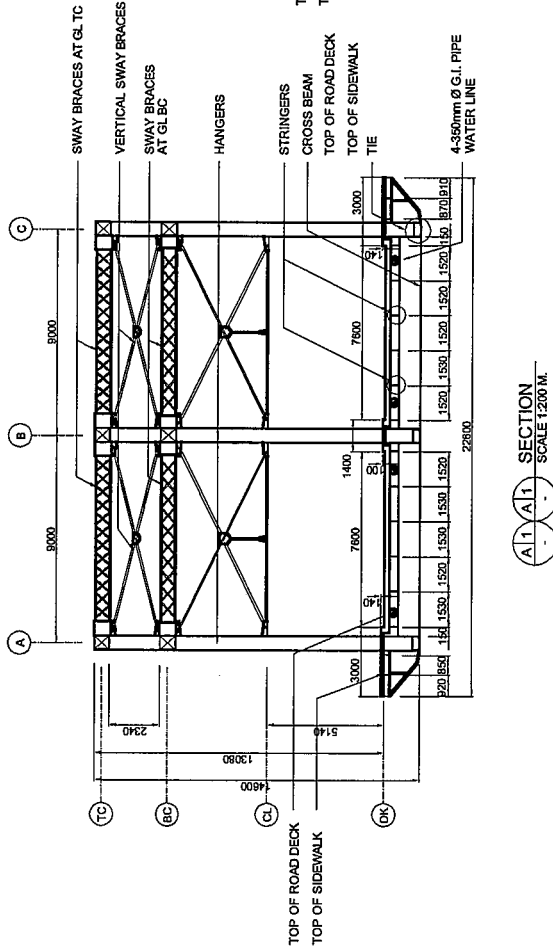
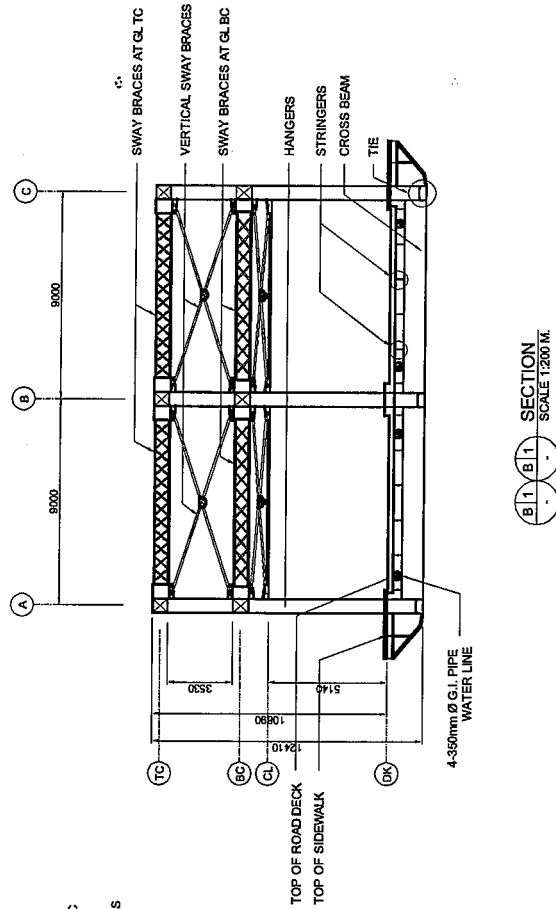


TOPOGRAPHIC SURVEY OF QUEZON BRIDGE



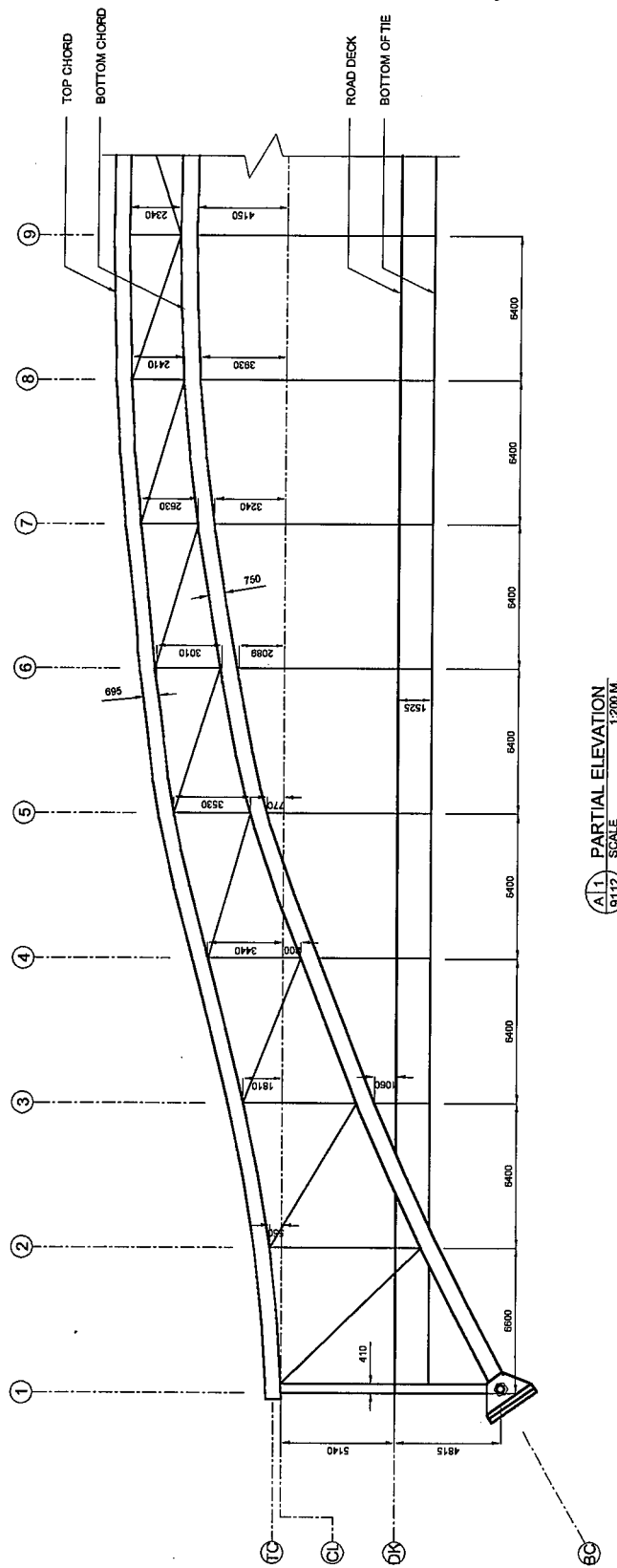
GEOTECHNICAL SURVEY OF QUEZON BRIDGE

Appendix 21.1.3-2



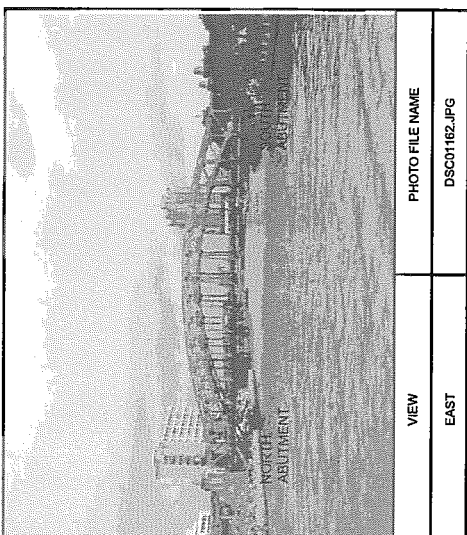
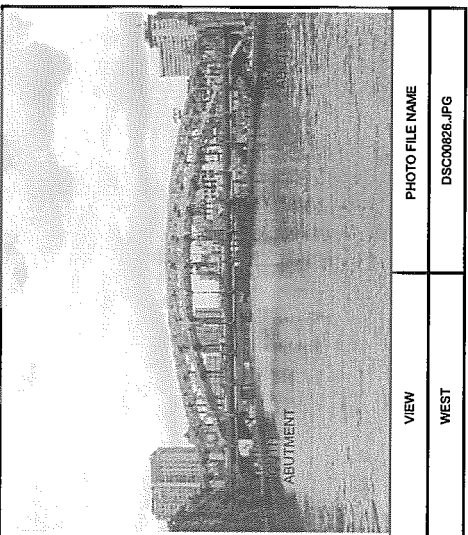
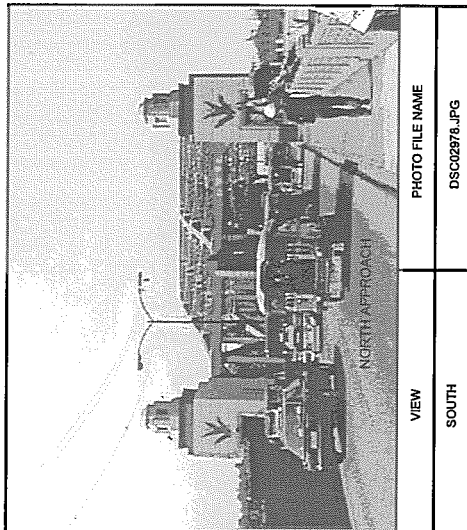
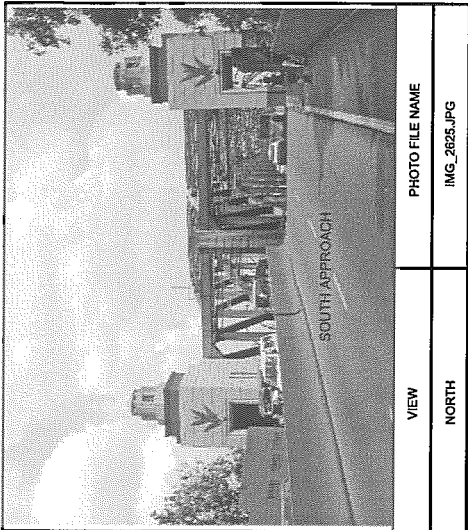
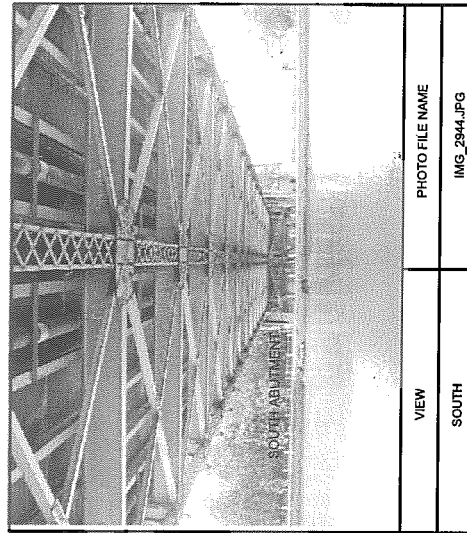
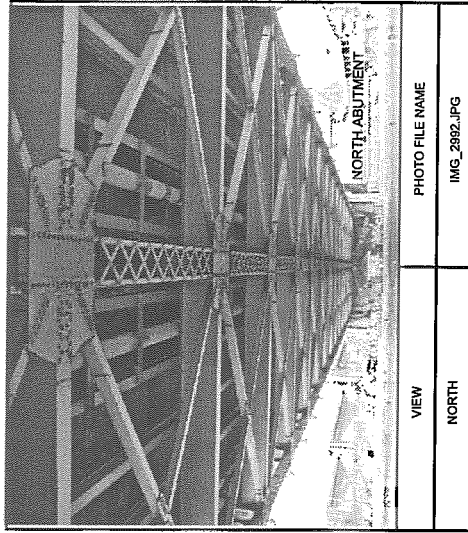
SECTION AT GRID LINE 9 AND GRID LINE 13

Appendix 21.1.3-3



PARTIAL ELEVATION FROM GRID LINE 1 TO GRID LINE 9

Appendix 21.1.3-4

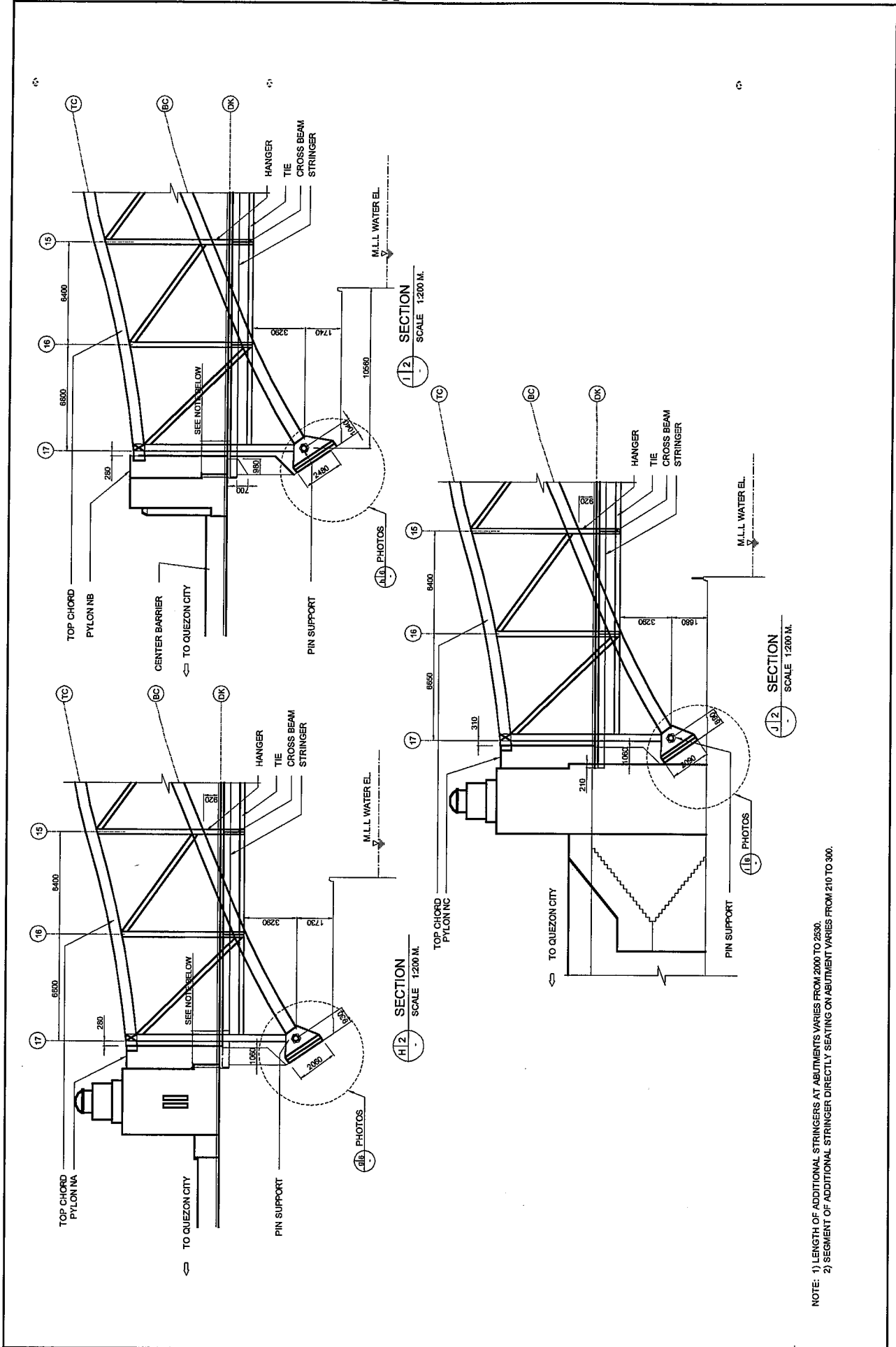


PHOTOS

PHOTOS

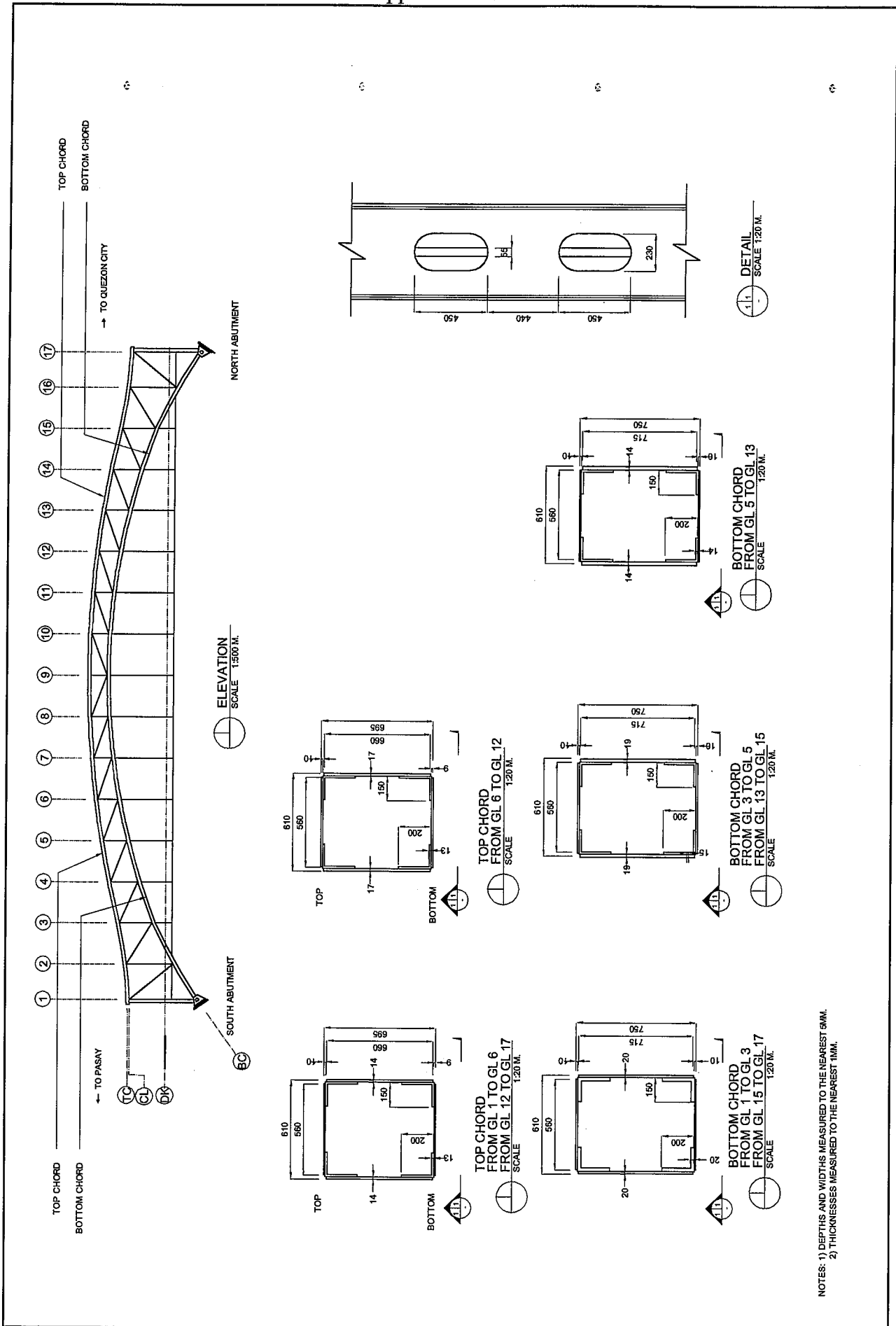
PHOTOS

PHOTOS OF SPAN, APPROACHES AND DECK FRAME

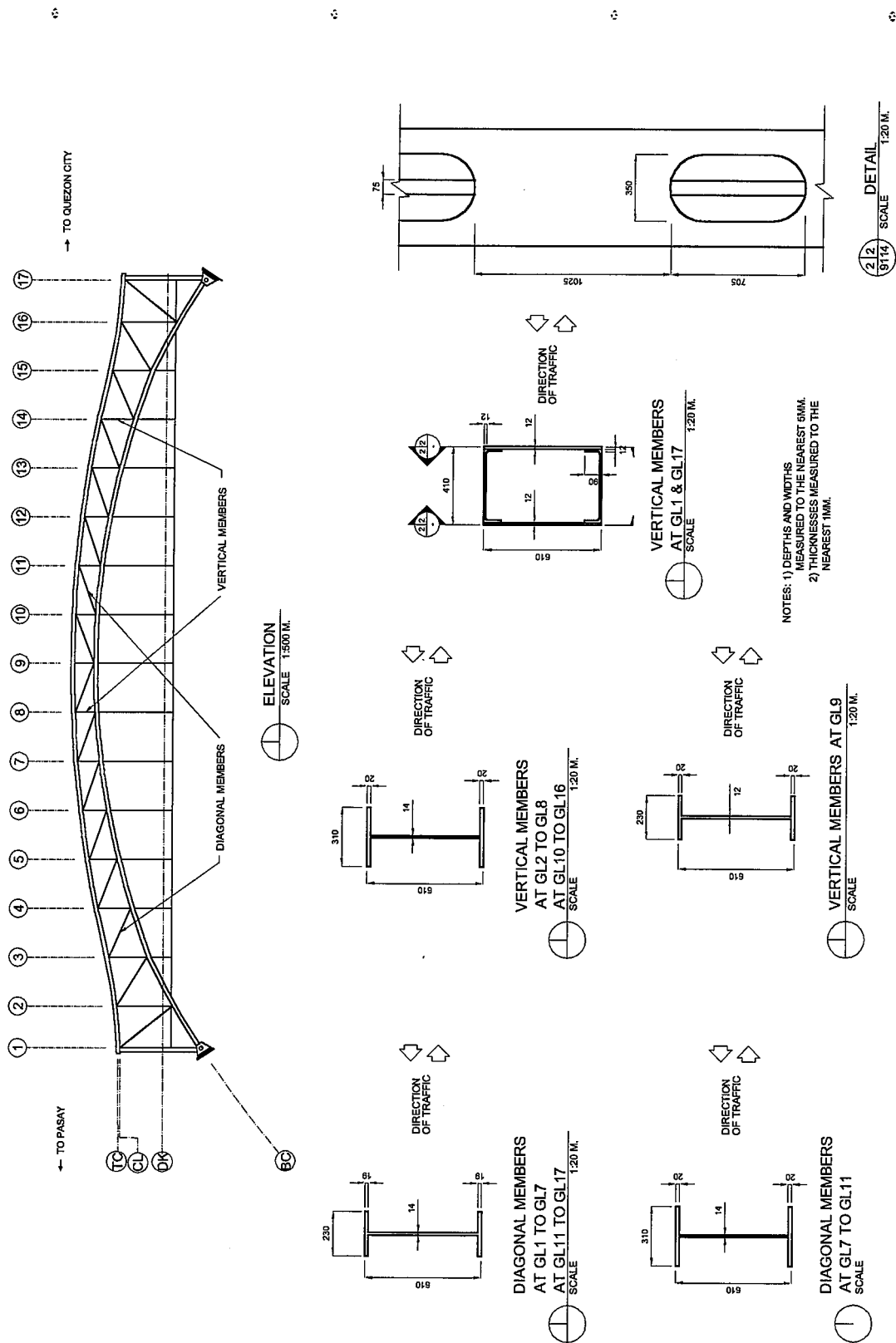


SECTION AT NORTH ABUTMENT AND PYLONS

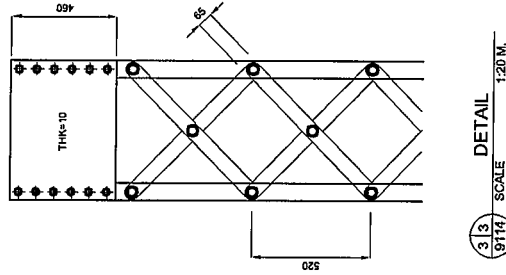
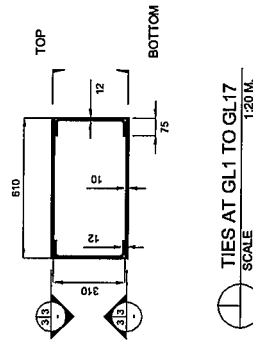
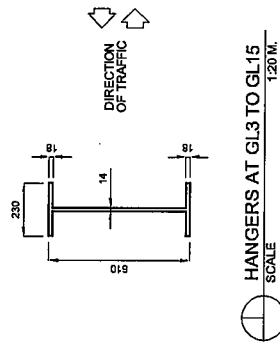
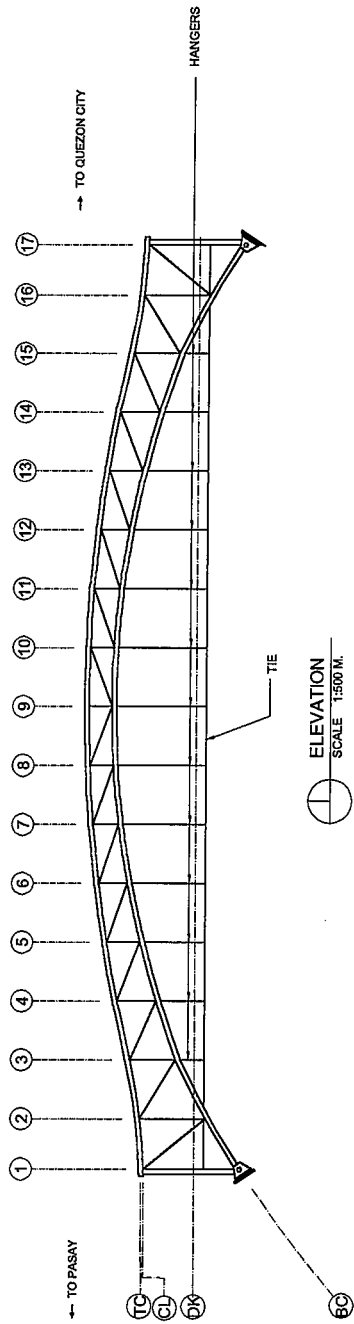
NOTE: 1) LENGTH OF ADDITIONAL STRINGERS AT ABUTMENTS VARIES FROM 2000 TO 2530.
 2) SEGMENT OF ADDITIONAL STRINGER DIRECTLY SEATING ON ABUTMENT VARIES FROM 210 TO 300.



DETAIL OF TRUSS A AND TRUSS C
TOP CHORD AND BOTTOM CHORD MEMBERS

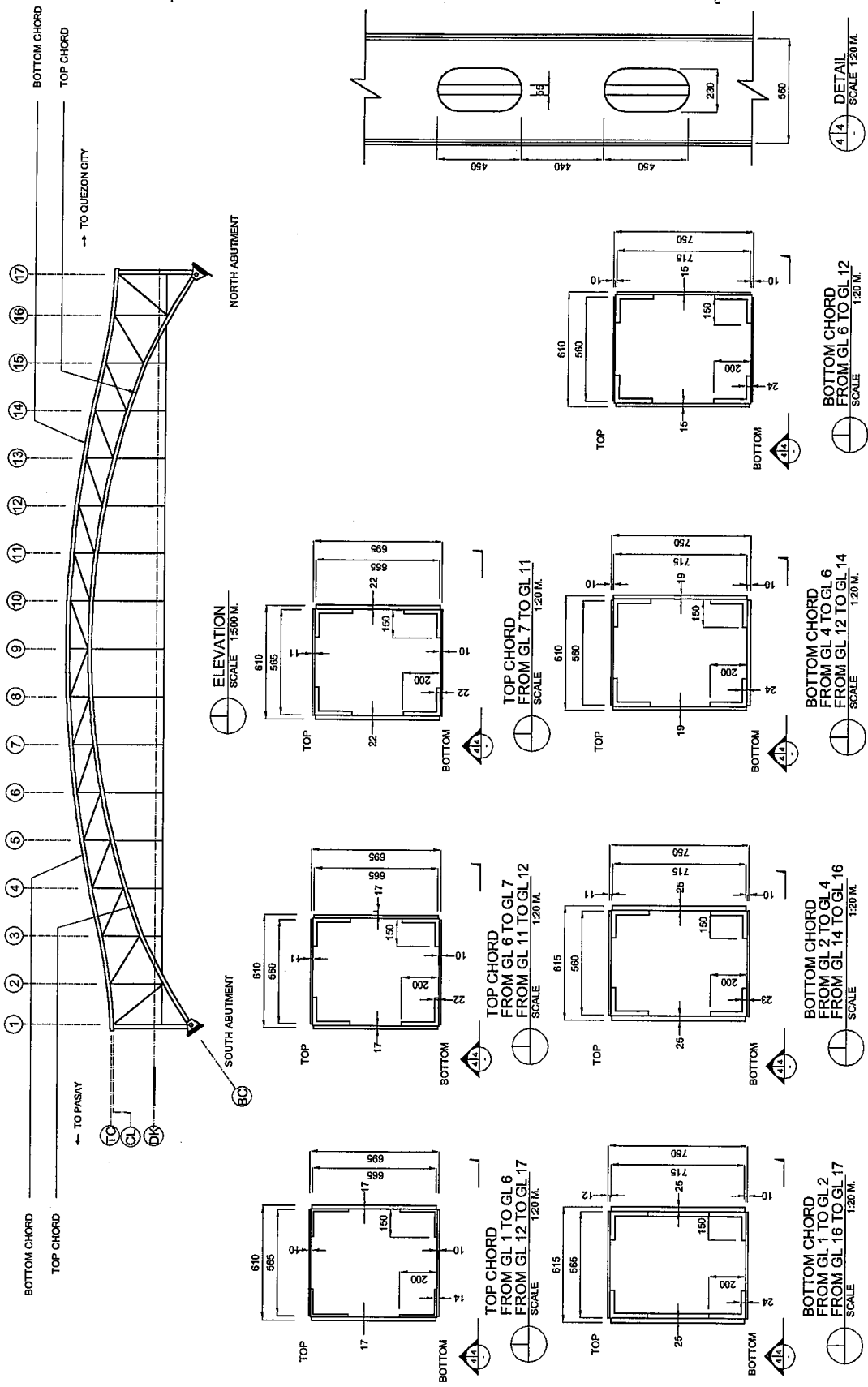


DETAILS OF TRUSS A AND TRUSS C - DIAGONAL AND VERTICAL MEMBERS



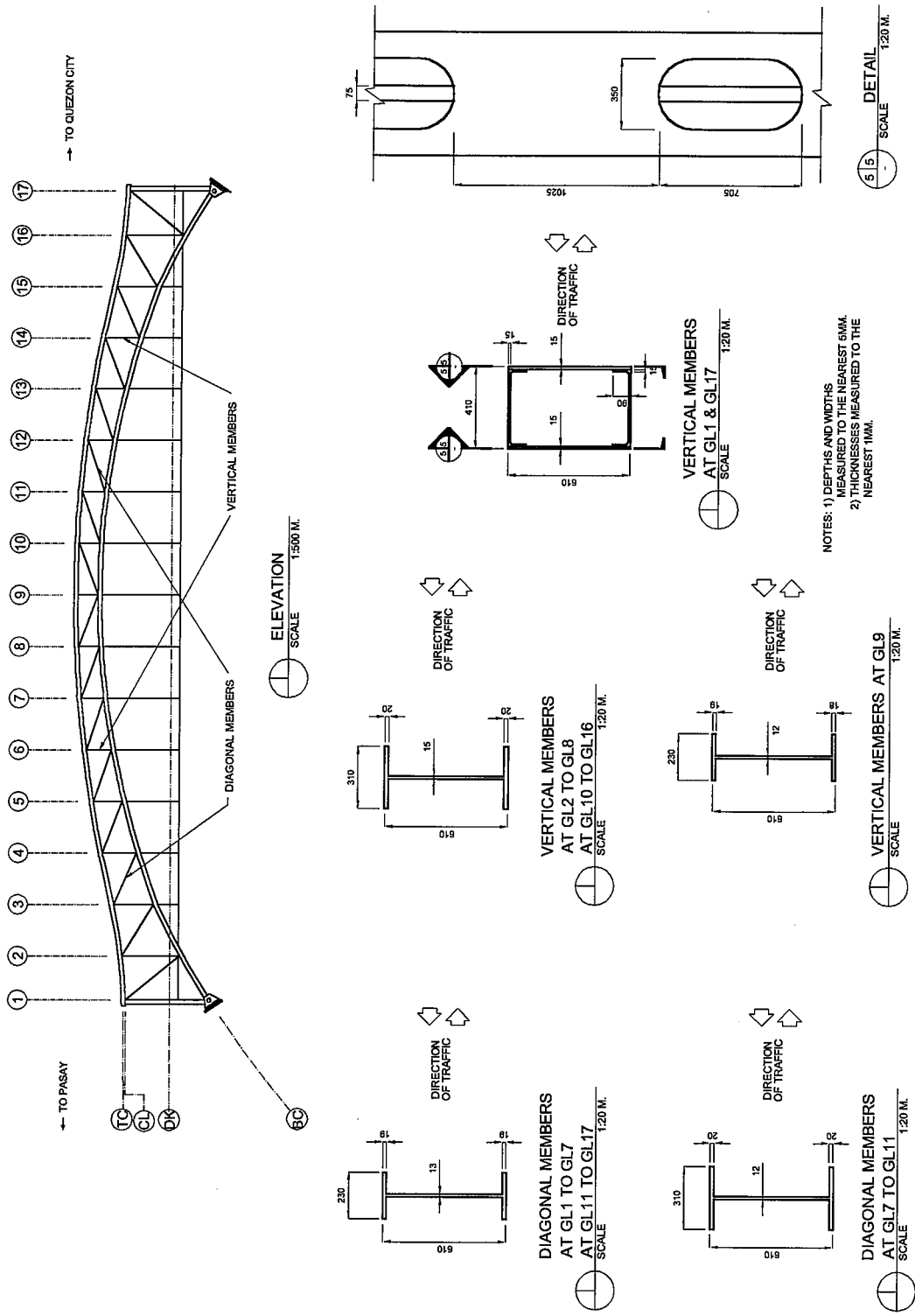
NOTES: 1) DEPTHS AND WIDTHS MEASURED TO THE NEAREST 5MM.
2) THICKNESSES MEASURED TO THE NEAREST 1MM.

DETAILS OF TRUSS A AND TRUSS C - HANGERS AND TIES

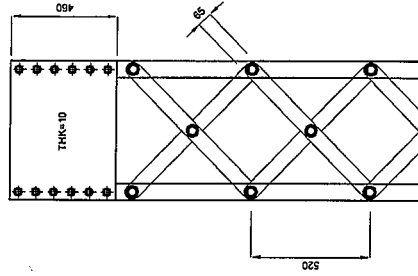
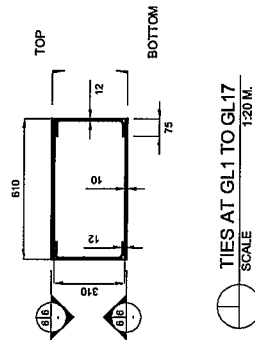
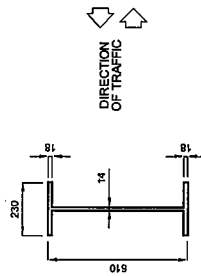
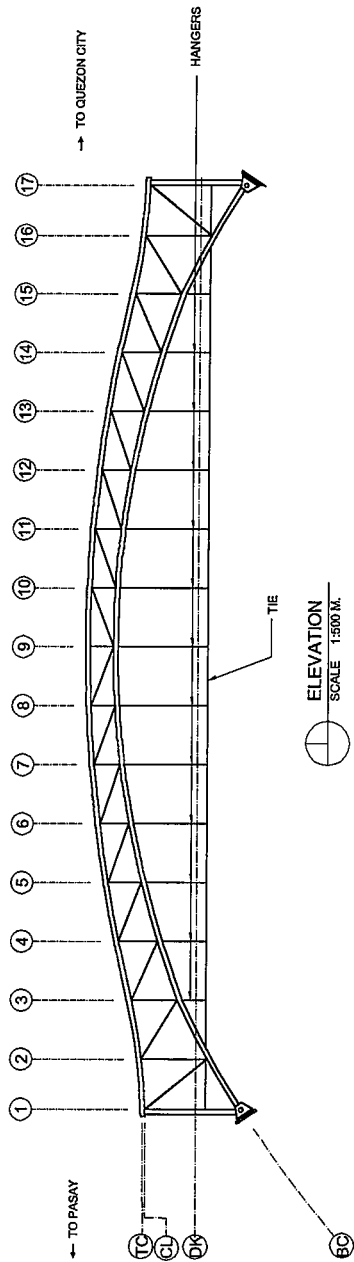


NOTES: 1) DEPTHS AND WIDTHS MEASURED TO THE NEAREST 5MM.
 2) THICKNESSES MEASURED TO THE NEAREST 1MM.

DETAIL OF TRUSS B - TOP CHORD AND BOTTOM CHORD MEMBERS

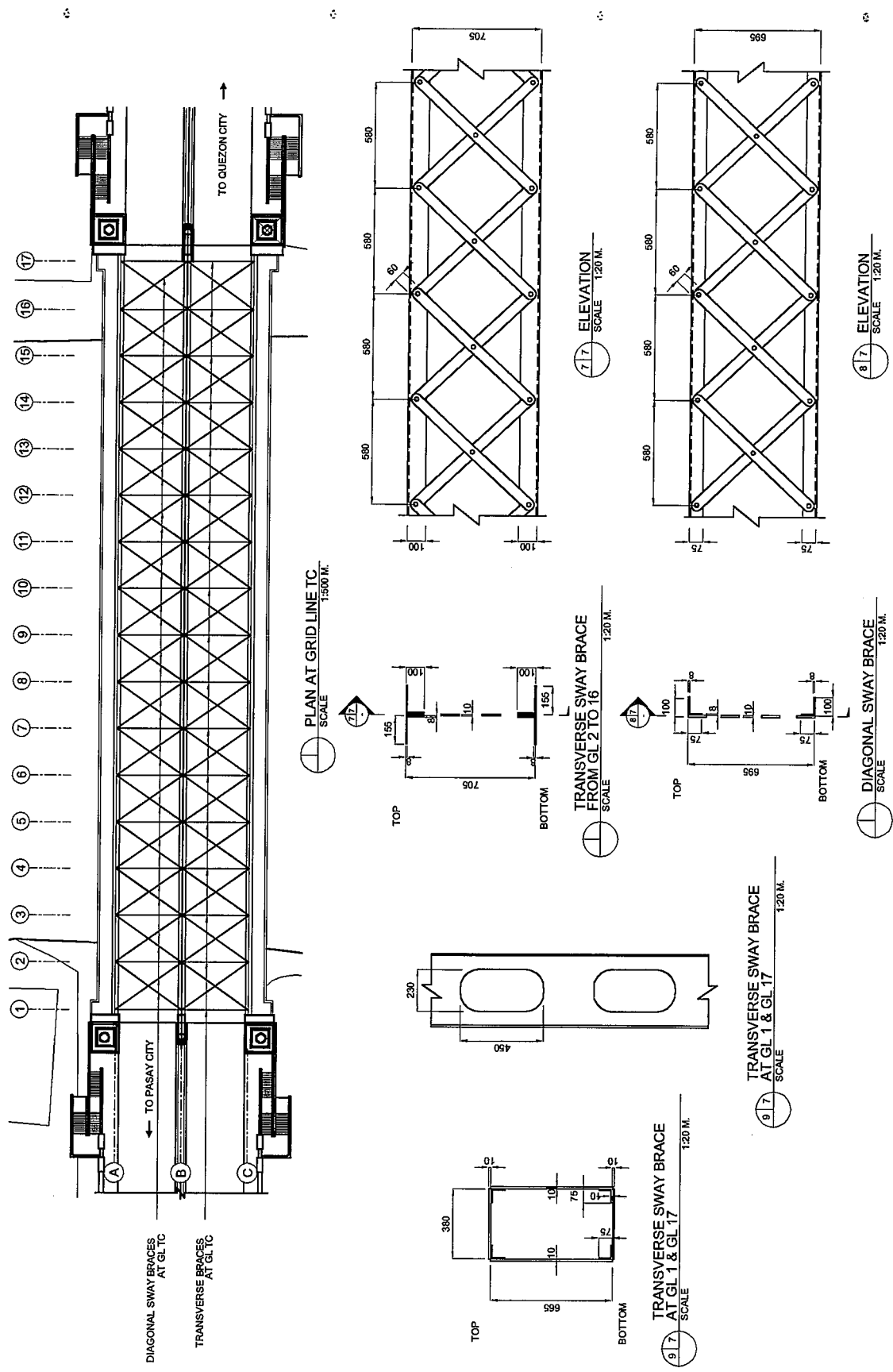


DETAIL OF TRUSS B - DIAGONAL MEMBERS AND VERTICAL MEMBERS

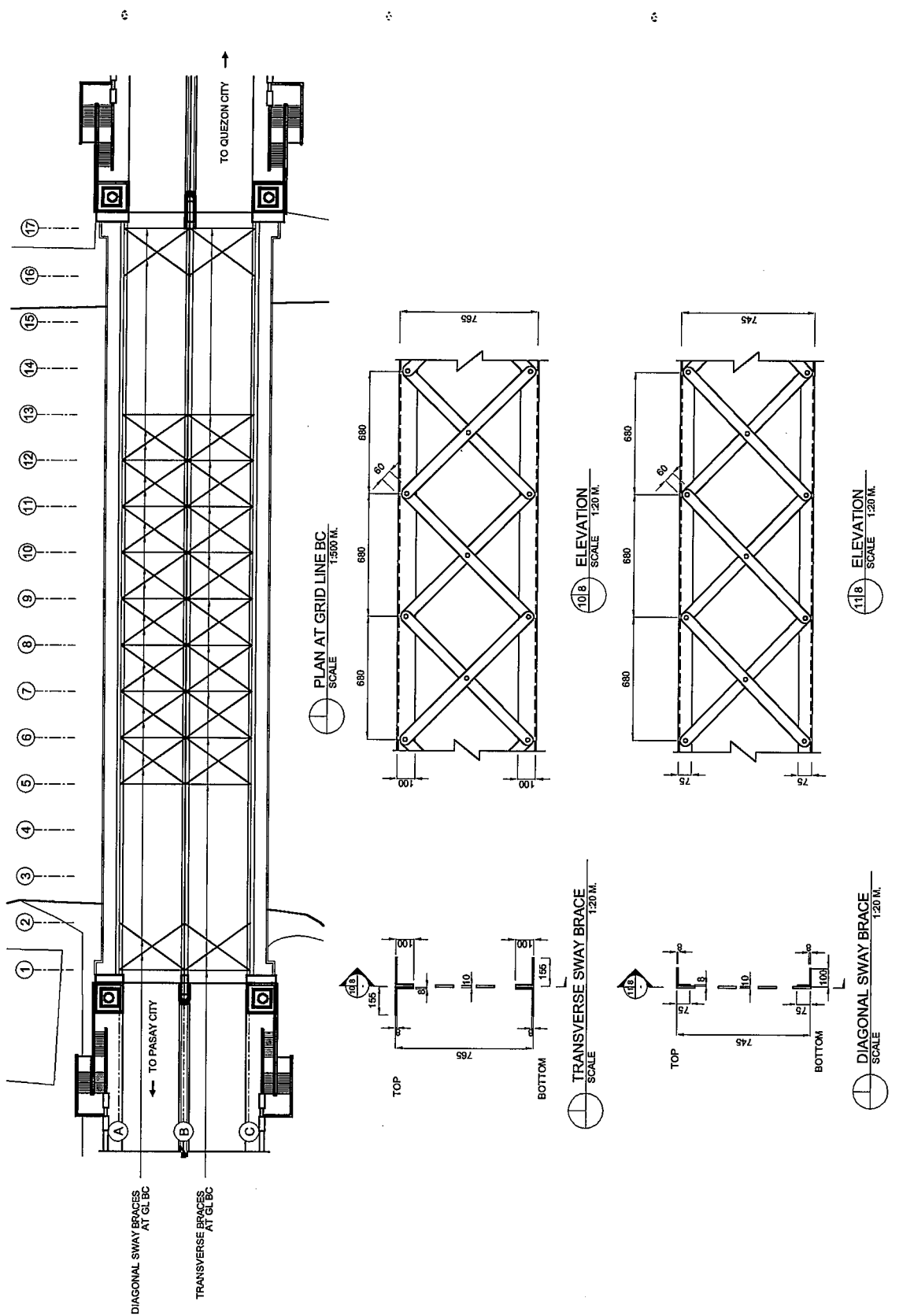


NOTES: 1) DEPTHS AND WIDTHS MEASURED TO THE NEAREST 5MM.
2) THICKNESSES MEASURED TO THE NEAREST 1MM.

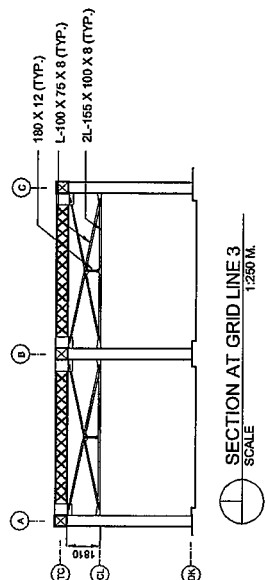
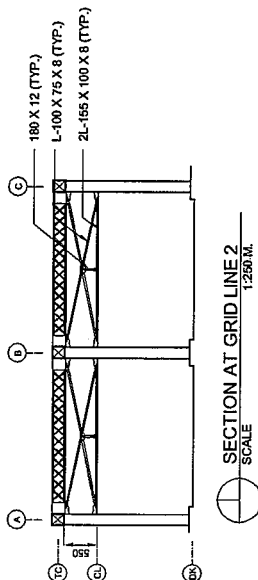
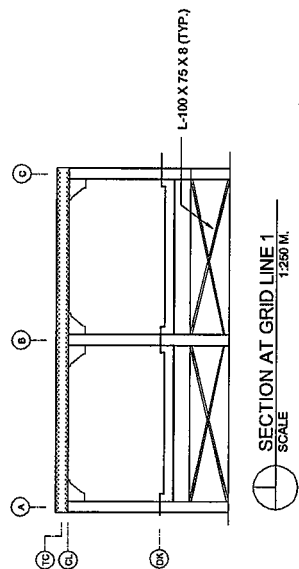
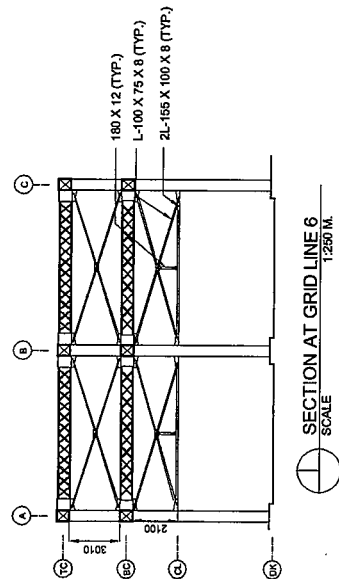
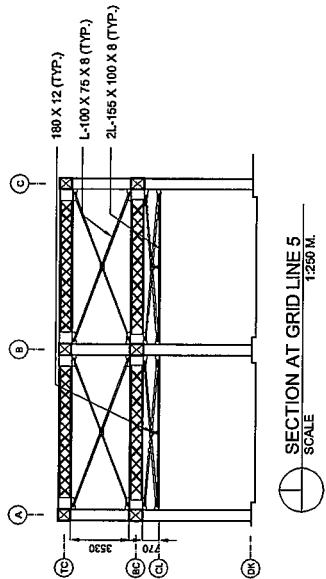
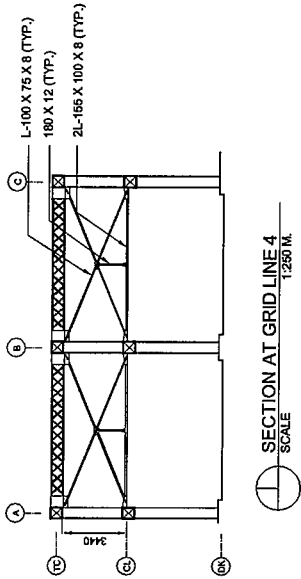
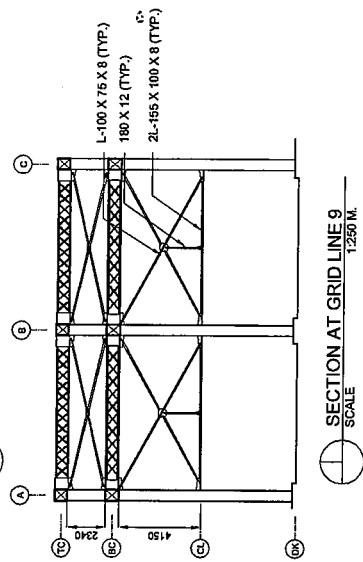
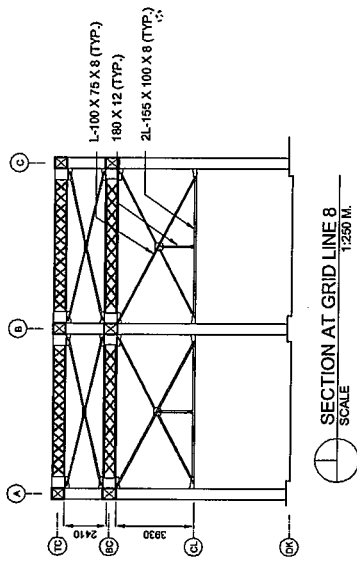
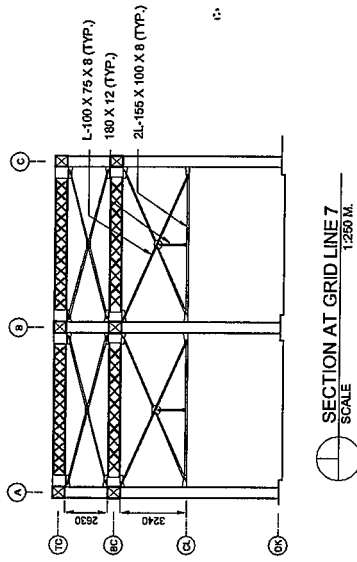
DETAILS OF TRUSS B - HANGERS AND TIES



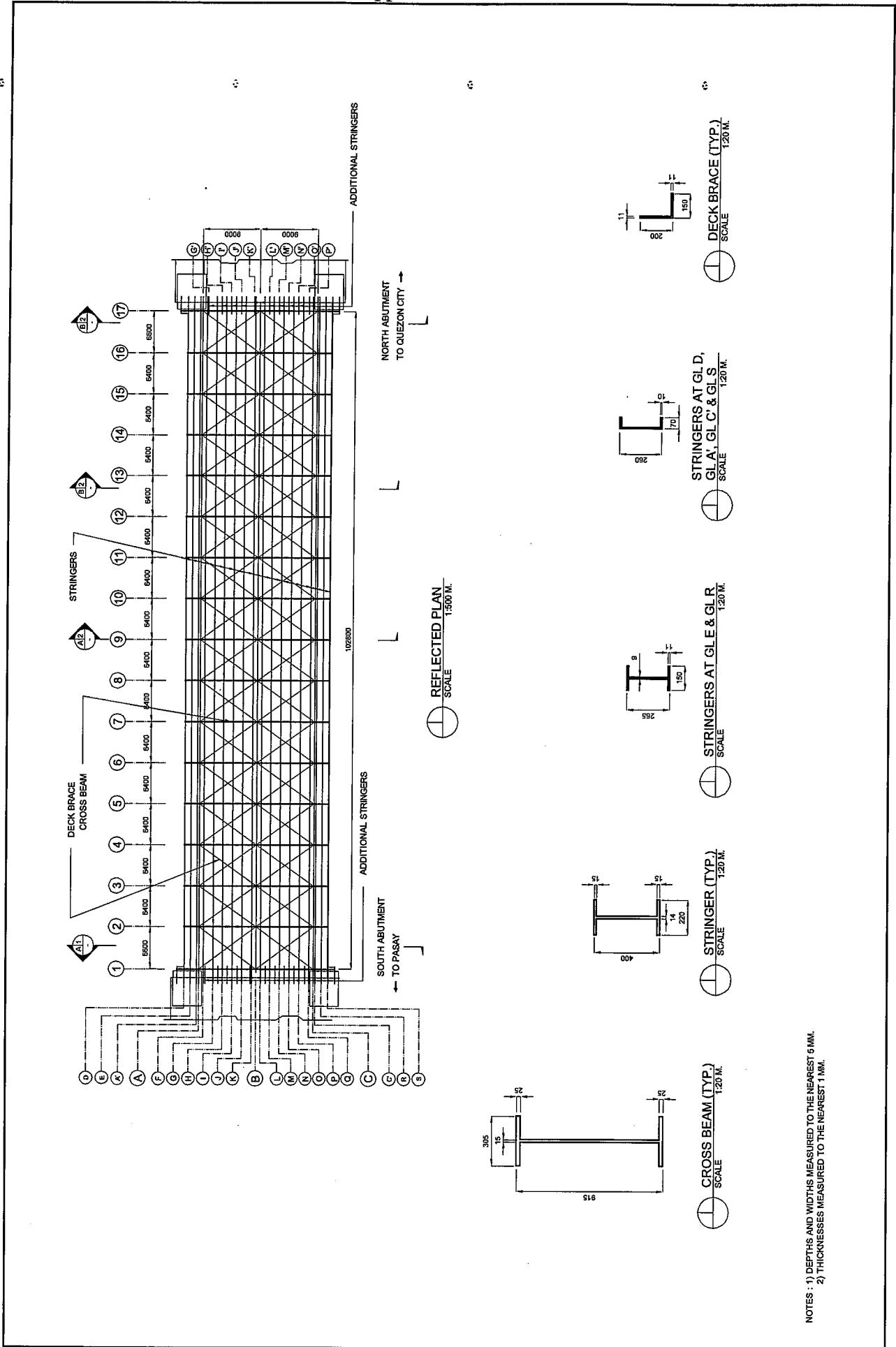
DETAILS OF SWAY BRACES AT GRID LINE TC



DETAILS OF SWAY BRACES AT GRID LINE BC

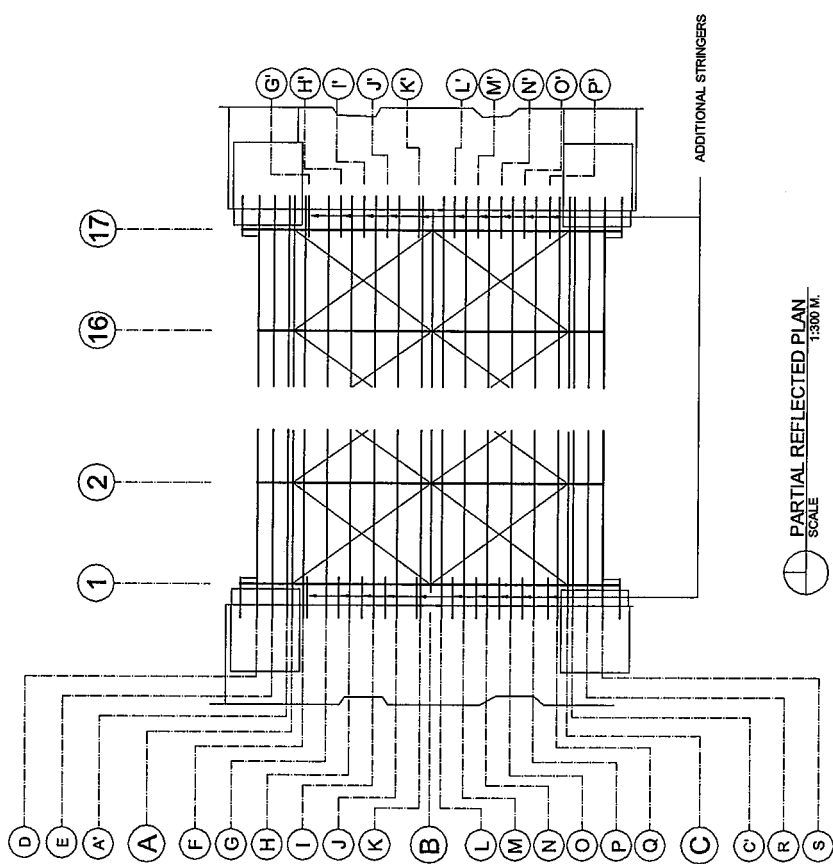
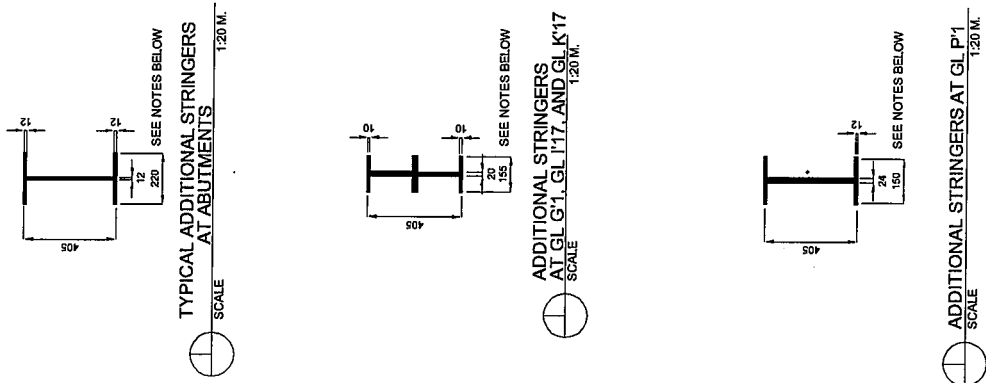


DETAILS OF VERTICAL SWAY BRACES



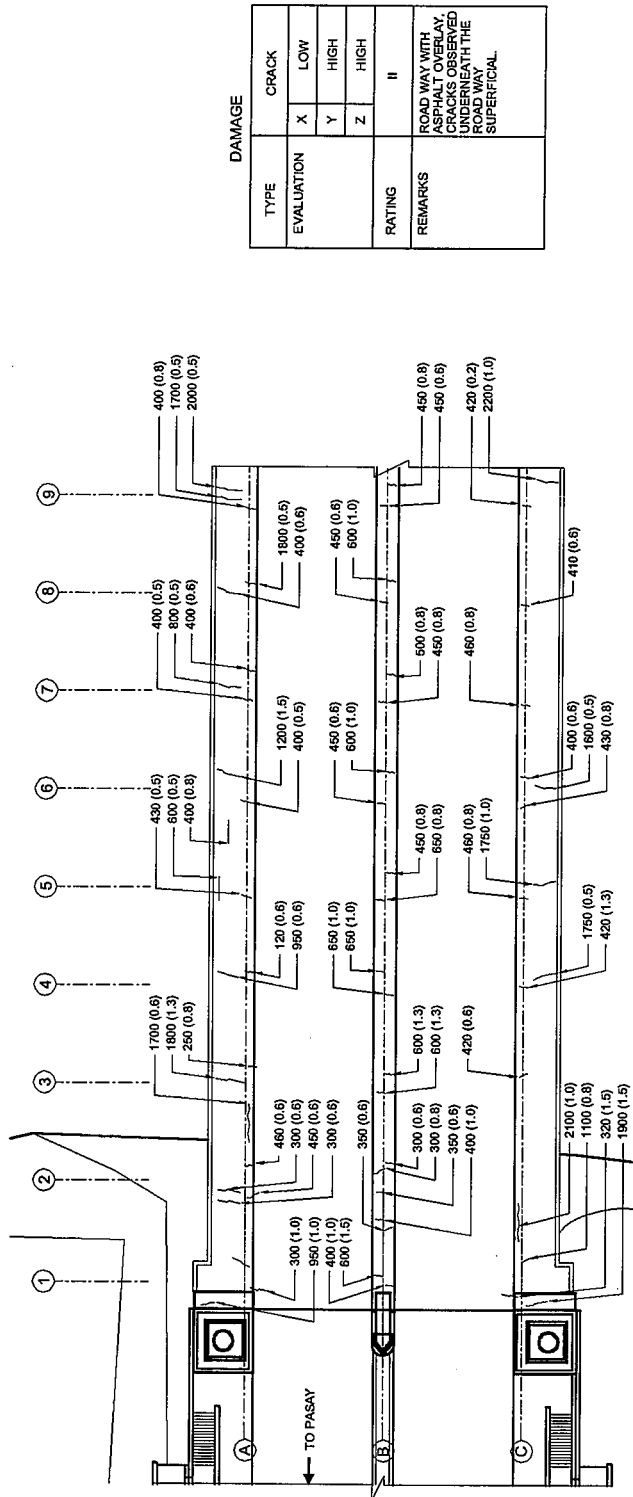
NOTES : 1) DEPTHS AND WIDTHS MEASURED TO THE NEAREST 5 MM.
 2) THICKNESSES MEASURED TO THE NEAREST 1 MM.

DETAILS OF DECK FRAME MEMBERS



- NOTES :
- 1) DEPTHS AND WIDTHS MEASURED TO THE NEAREST 5 MM.
 - 2) THICKNESSES MEASURED TO THE NEAREST 1 MM.
 - 3) LENGTHS OF ADDITIONAL STRINGERS AT ABUTMENTS VARY FROM 2000 TO 2530.
 - 4) SEGMENT OF ADDITIONAL STRINGERS DIRECTLY SEATING ON ABUTMENT VARIES FROM 210 TO 300.

DETAILS OF DECK FRAME MEMBERS - ADDITIONAL STRINGERS

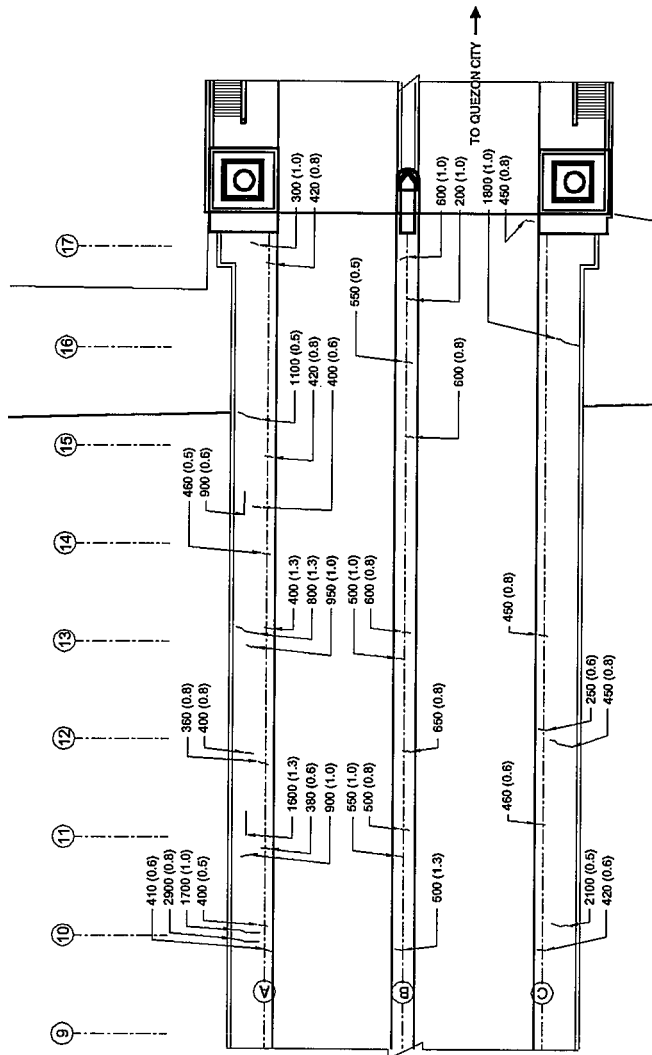


PLAN FROM GRID LINE 1 TO GRID LINE 9
SCALE 1:400 M.

LEGEND:
2100 (1.0) - APPROXIMATE LENGTH OF CRACK
1100 (0.3) - WIDTH OF CRACK MEASURED USING CRACK COMPARATOR
320 (1.5)
1800 (1.5)

| DAMAGE | | CRACK |
|---------|--|-------|
| TYPE | EVALUATION | |
| | X | LOW |
| | Y | HIGH |
| | Z | HIGH |
| RATING | II | |
| REMARKS | ROAD WAY WITH ASPHALT OVERLAY. CRACKS OBSERVED UNDERNEATH THE ROAD WAY WITH SUPERFICIAL. | |

CRACKS ON SIDEWALK AND MEDIAN FROM GRID LINE 1 TO GRID LINE 9

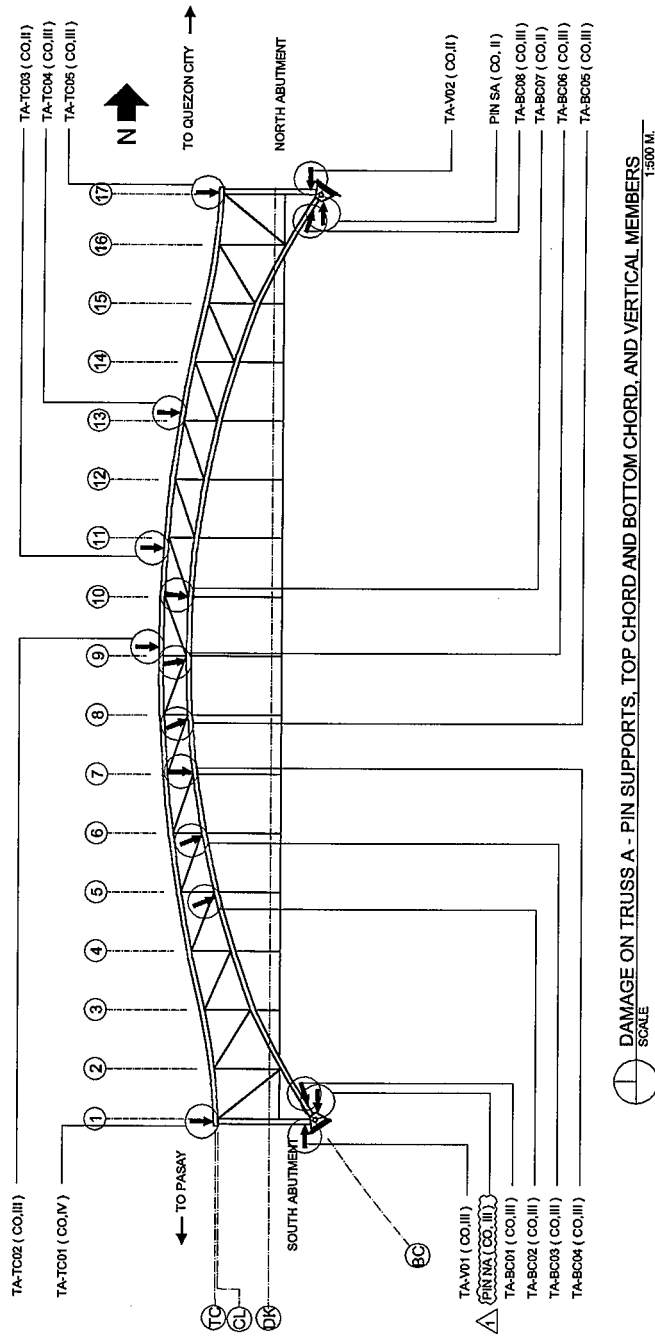


PLAN FROM GRIDLINE 9 TO GRIDLINE 17
SCALE 1:400 M.

LEGEND:
 2100 (0.5) - APPROXIMATE LENGTH OF CRACK
 (0.6) - WIDTH OF CRACK MEASURED USING CRACK COMPASOR

| DAMAGE | | CRACK |
|---------|--|-------|
| TYPE | EVALUATION | LOW |
| | | HIGH |
| | | HIGH |
| RATING | | II |
| REMARKS | ROAD WAY WITH ASPHALT OVERLAY CRACKS OBSERVED UNDERNEATH THE ROAD WAY SUPERFICIAL. | |

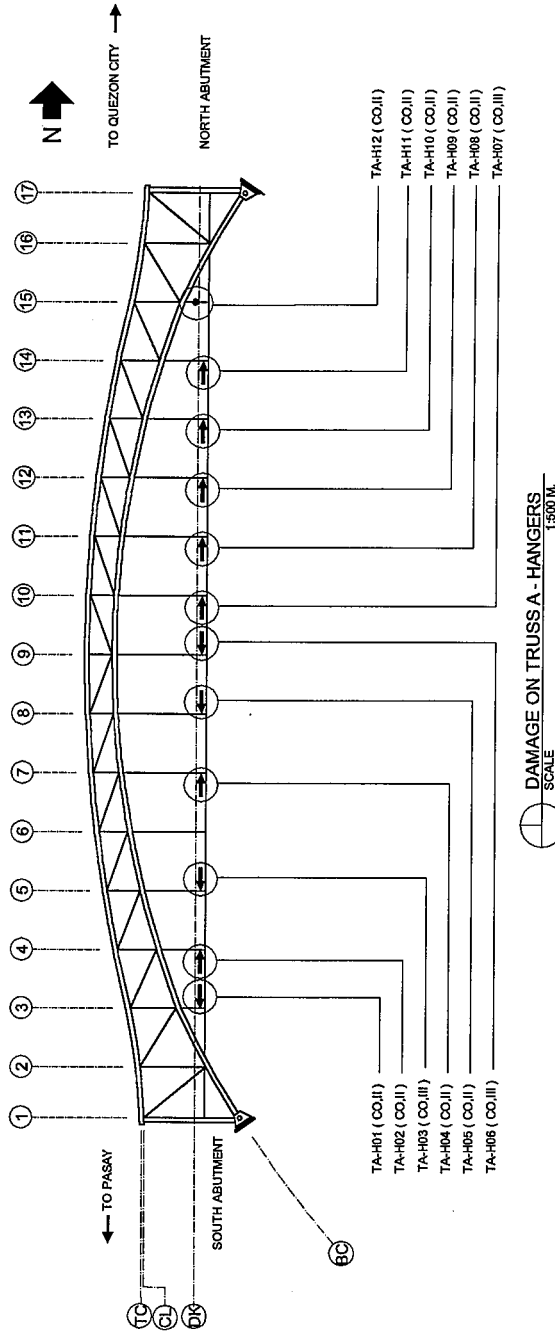
CRACKS ON SIDEWALK AND MEDIAN FROM GRID LINE 9 TO GRID LINE 17



DAMAGE ON TRUSS A - PIN SUPPORTS, TOP CHORD AND BOTTOM CHORD, AND VERTICAL MEMBERS
SCALE 1:500 M.

LEGEND:
 TA-BC01 (CO.II) - DAMAGE SHEET WHERE PHOTOS OF DAMAGE CAN BE FOUND.
 CO - CORROSION
 III - DAMAGE RATING
 ↑ - VIEW WHEN PHOTO WAS TAKEN.
 △ - REVISED 12/11/08

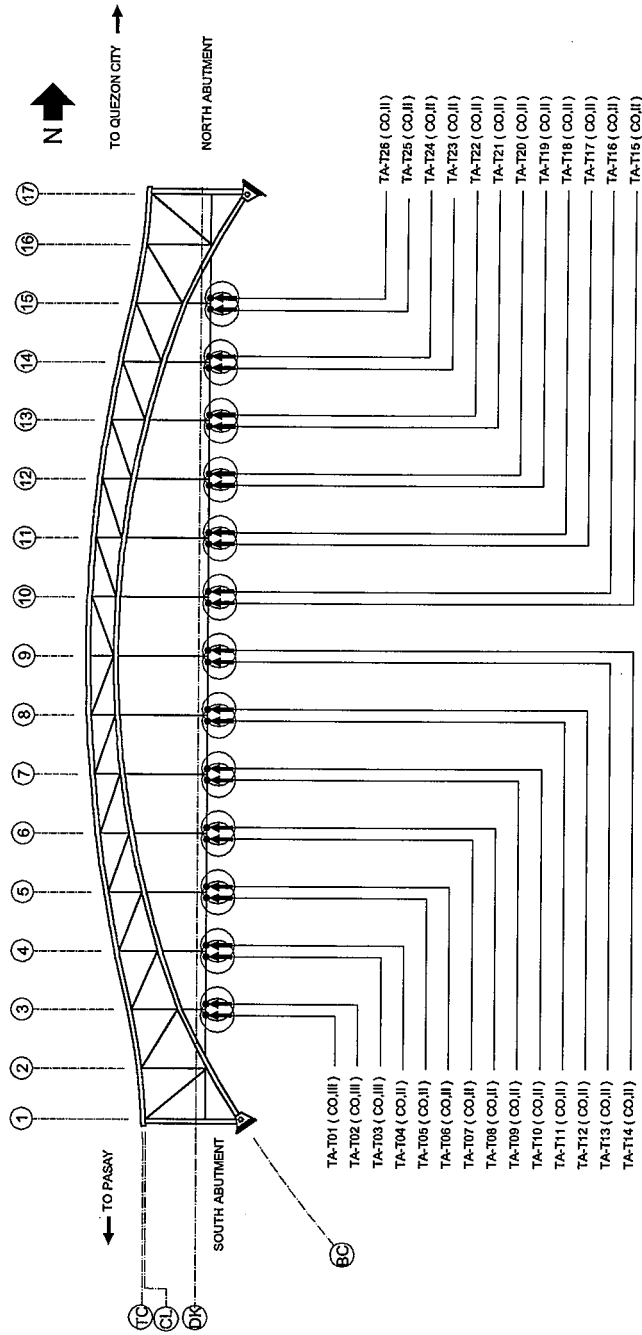
DAMAGE ON TRUSS A - PIN SUPPORTS, TOP & BOTTOM CHORDS AND VERTICAL MEMBERS



DAMAGE ON TRUSS A - HANGERS
SCALE 1:500 M.

- LEGEND:
- TA-H01 (CO.III) - DAMAGE SHEET WHERE PHOTOS OF DAMAGE CAN BE FOUND.
 - CO - CORROSION
 - III - DAMAGE RATING
 - ↑ - VIEW WHEN PHOTO WAS TAKEN.

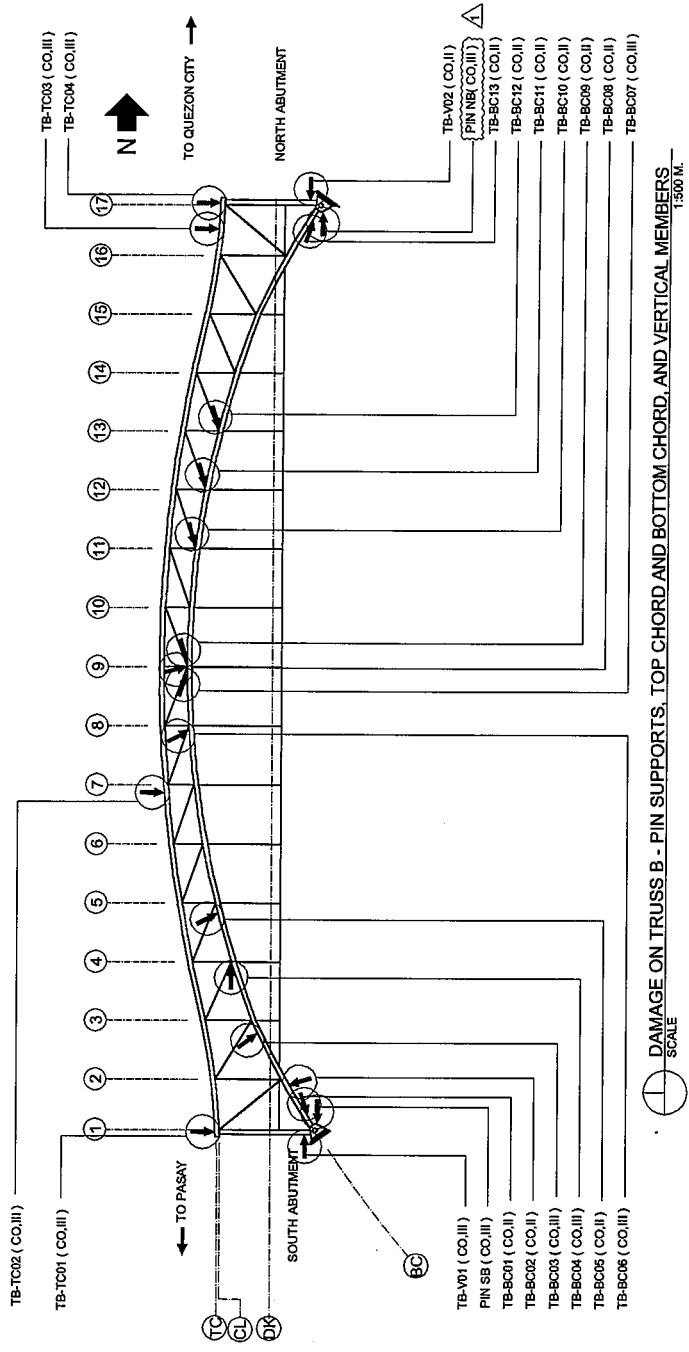
DAMAGE ON TRUSS A - HANGERS



DAMAGE ON TRUSS A-TIES
SCALE 1:500

LEGEND:
 TA-T01 (CO,II) - DAMAGE SHEET WHERE PHOTOS OF DAMAGE CAN BE FOUND.
 CO - CORROSION
 II - DAMAGE RATING
 ↑ - VIEW WHEN PHOTO WAS TAKEN.

DAMAGE ON TRUSS A -TIES



LEGEND:

TB-BC01 (CO.II)

TB-BC01 - DAMAGE SHEET WHERE PHOTOS OF DAMAGE CAN BE FOUND.

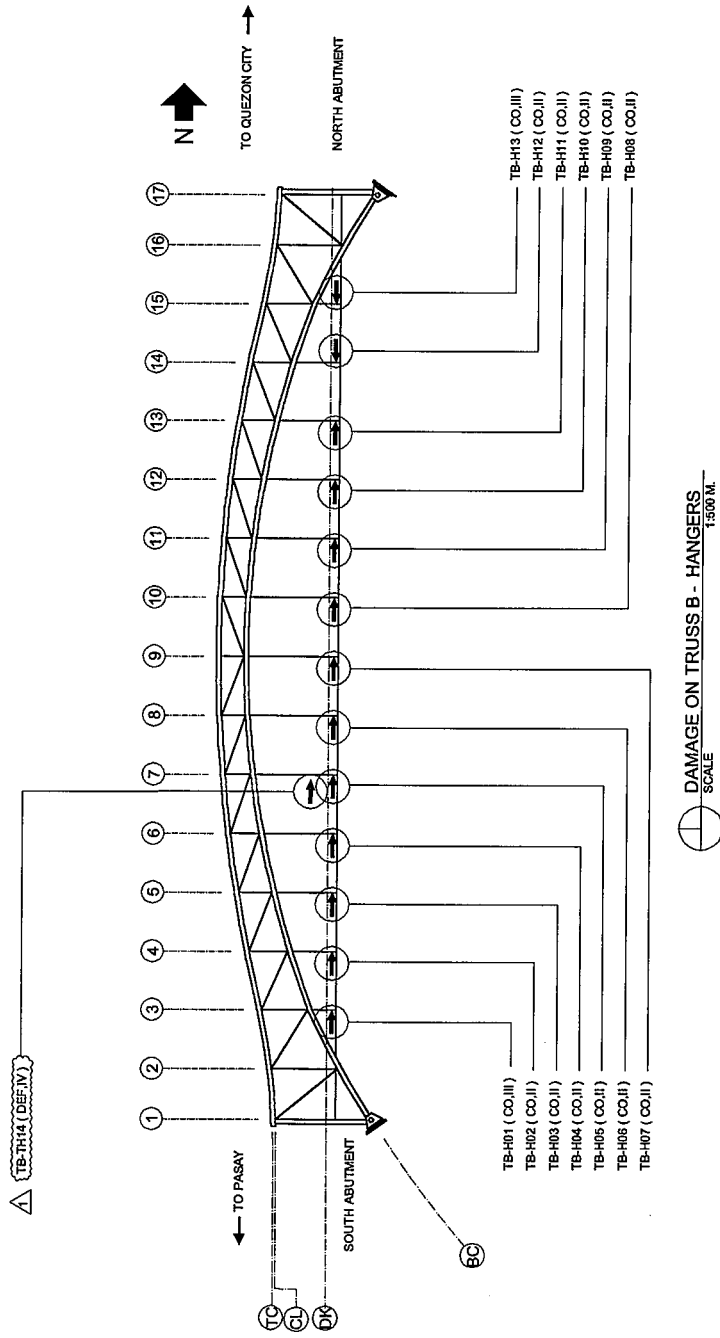
CO - CORROSION

II - DAMAGE RATING

↑ - VIEW WHEN PHOTO WAS TAKEN.

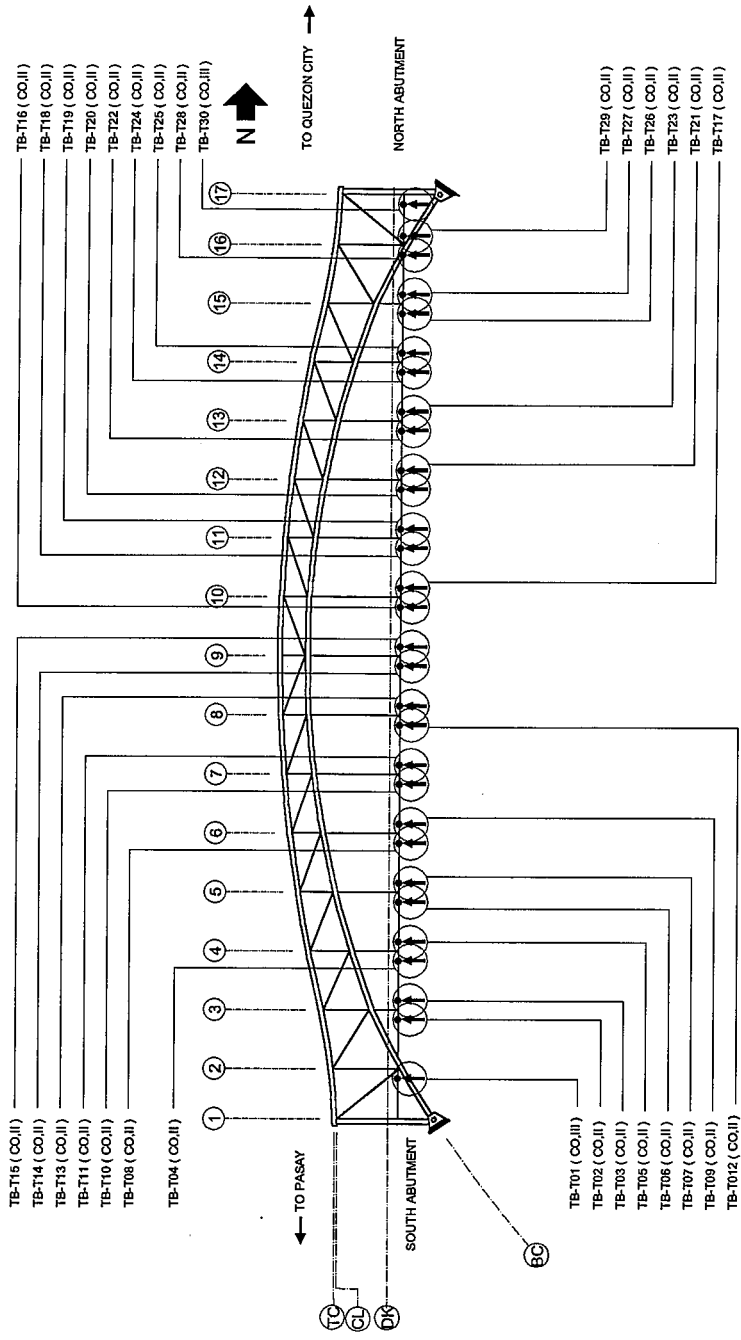
△ - REVISED 12 / 1 / 03

DAMAGE ON TRUSS B - PIN SUPPORTS, TOP & BOTTOM CHORDS AND VERTICAL MEMBERS



- LEGEND:**
- TB-H01 (CO.III)
 - TB-T01 - DAMAGE SHEET WHERE PHOTOS OF DAMAGE CAN BE FOUND.
 - CO - CORROSION
 - III - DAMAGE RATING
 - ← - VIEW WHEN PHOTO WAS TAKEN.
 - △ - REVISED 12 / 1 / 03

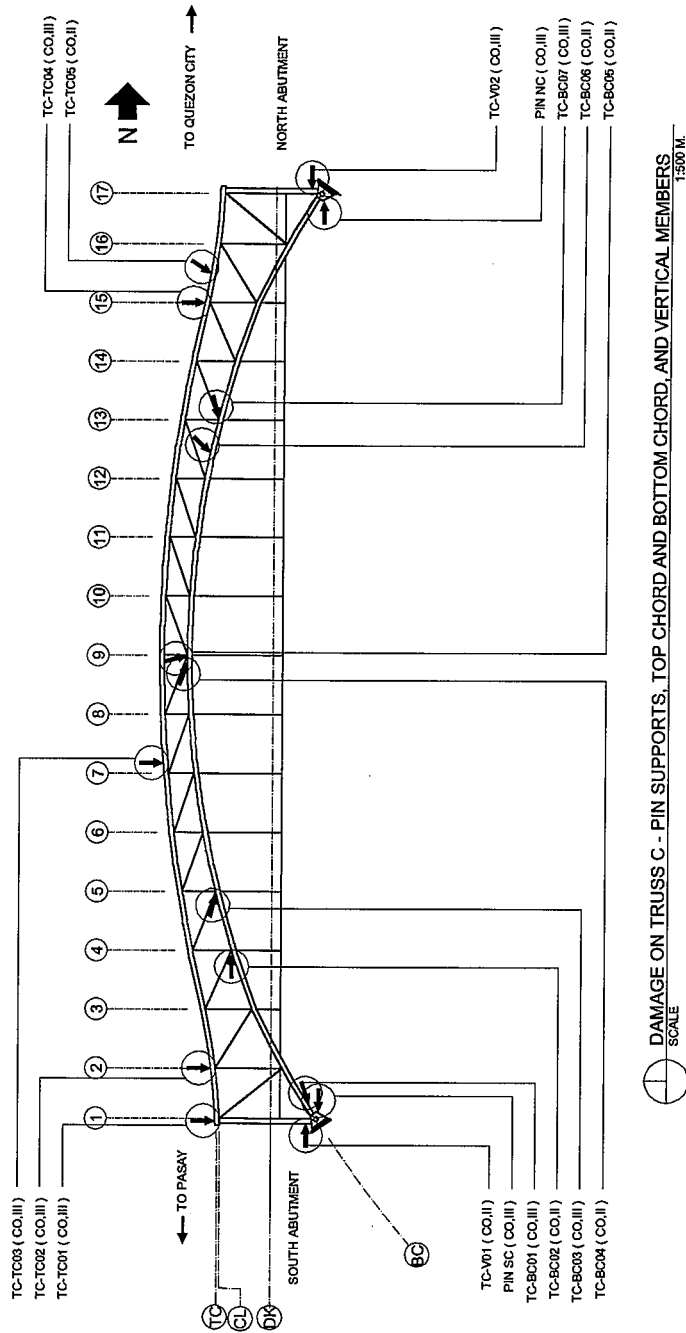
DAMAGE ON TRUSS B - HANGERS



DAMAGE ON TRUSS B - TIES
SCALE 1:500 M.

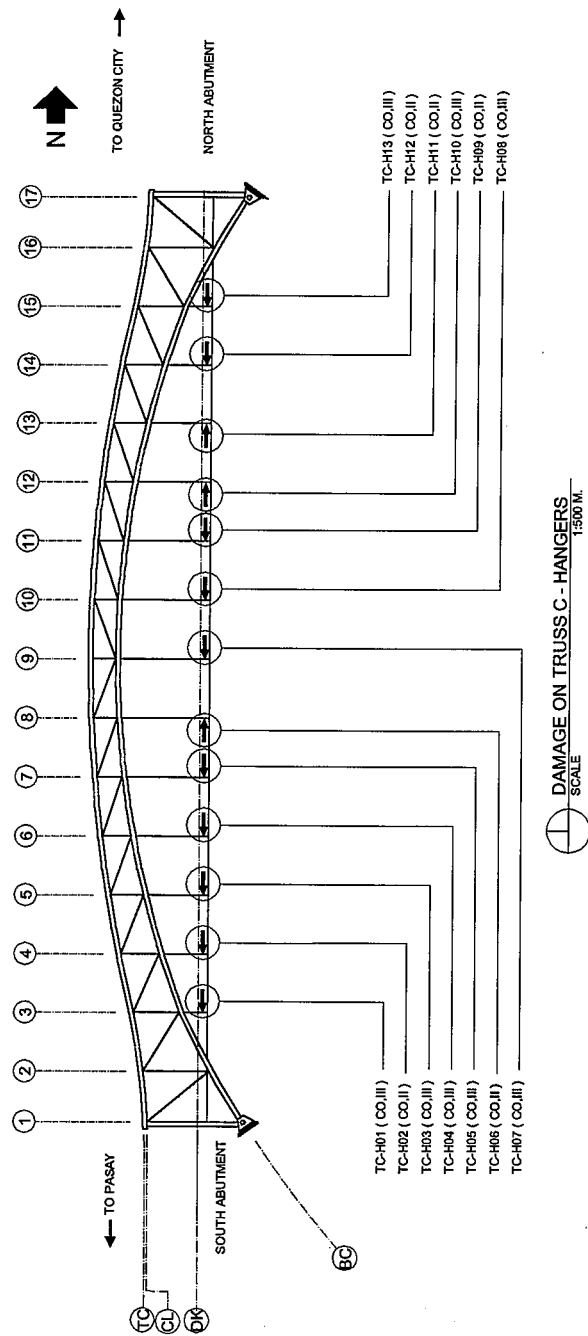
- LEGEND:**
- TB-T01 (CO.III) - DAMAGE SHEET WHERE PHOTOS OF DAMAGE CAN BE FOUND.
 - CO - CORROSION
 - III - DAMAGE RATING
 - ↑ - VIEW WHEN PHOTO WAS TAKEN.

DAMAGE ON TRUSS B - TIES



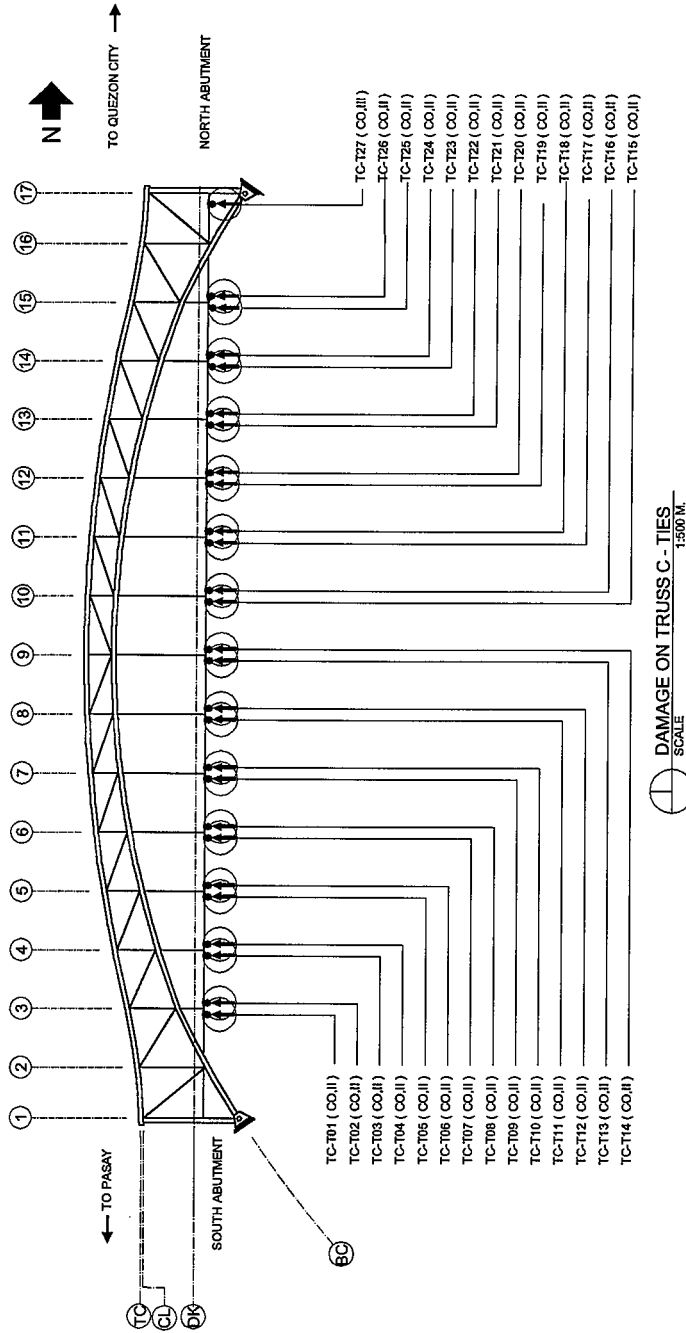
DAMAGE ON TRUSS C - PIN SUPPORTS,
TOP & BOTTOM CHORDS AND VERTICAL MEMBERS

LEGEND:
 TC-BC01 (CO.III) - DAMAGE SHEET WHERE PHOTOS
 OF DAMAGE CAN BE FOUND.
 CO - CORROSION
 III - DAMAGE RATING
 ↑ - VIEW WHEN PHOTO WAS TAKEN.



LEGEND:
 TC-H01 (CO,III)
 TC-H01 - DAMAGE SHEET WHERE PHOTOS OF DAMAGE CAN BE FOUND.
 CO - CORROSION
 III - DAMAGE RATING
 ↑ - VIEW WHEN PHOTO WAS TAKEN.

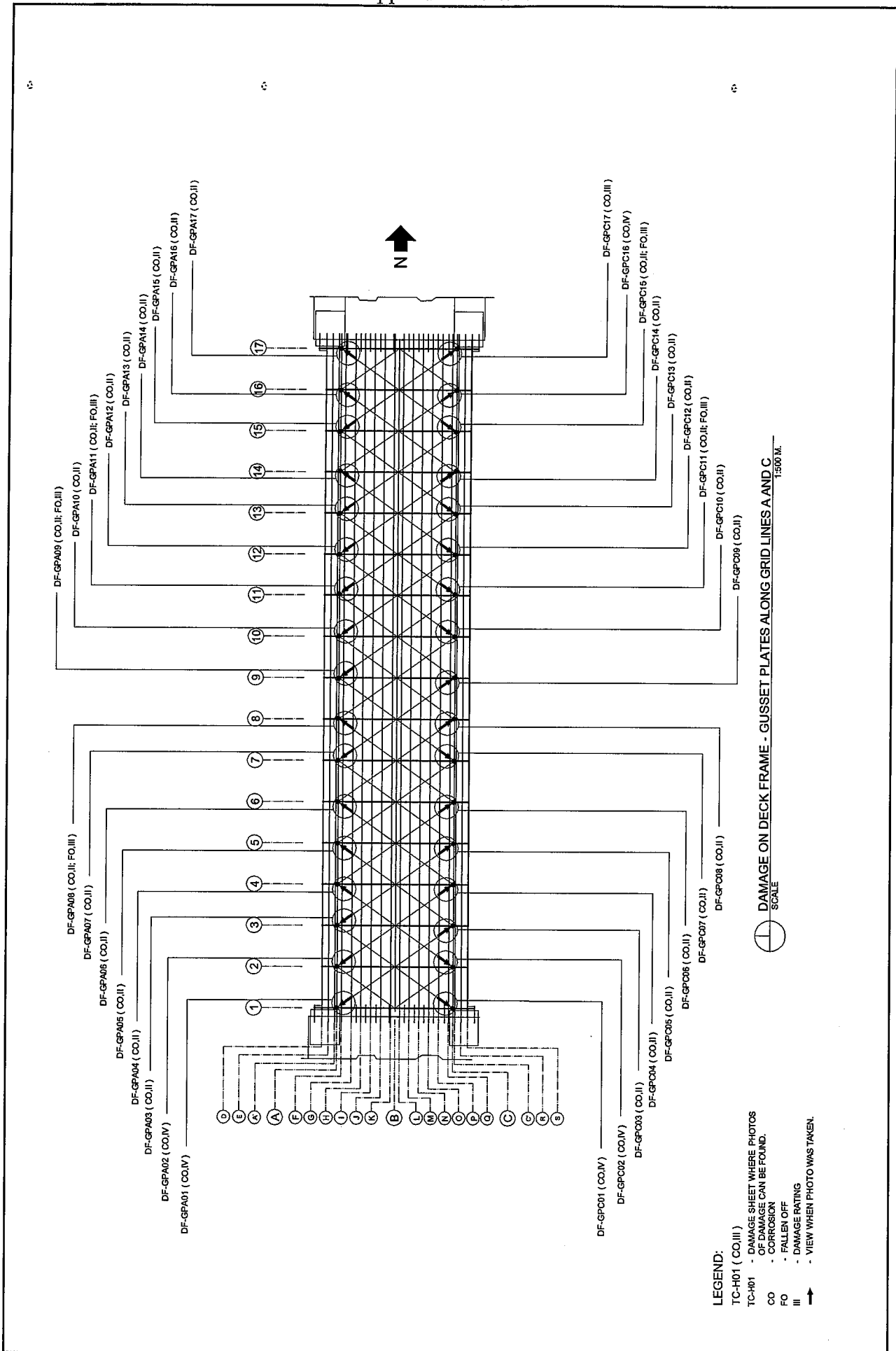
DAMAGE ON TRUSS C - HANGERS



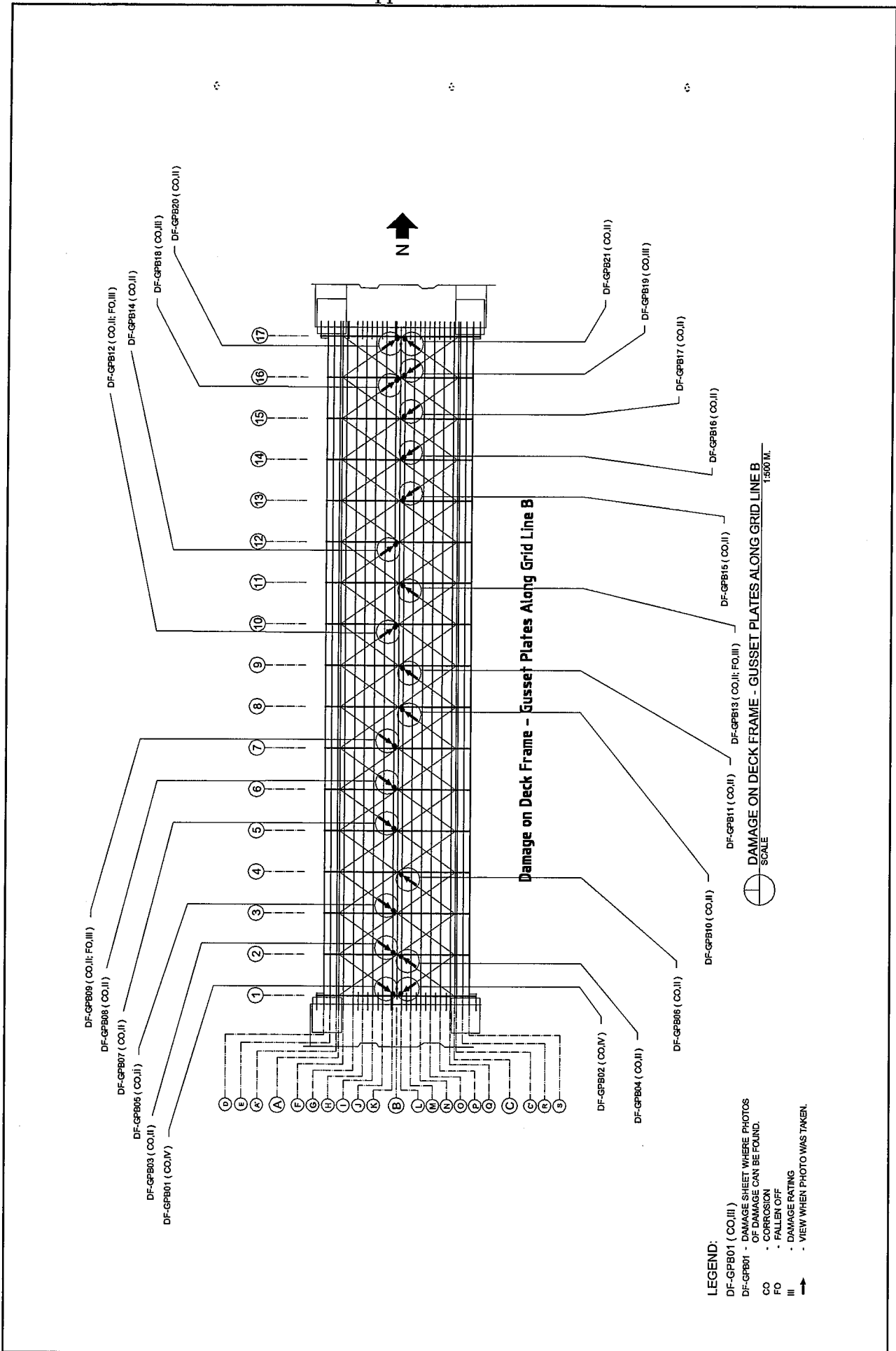
LEGEND:
 TC-T01 (CO.II) - DAMAGE SHEET WHERE PHOTOS OF DAMAGE CAN BE FOUND.
 CO - CORROSION
 II - DAMAGE RATING
 ↑ - VIEW WHEN PHOTO WAS TAKEN.

DAMAGE ON TRUSS C - TIES
 SCALE 1:300 M

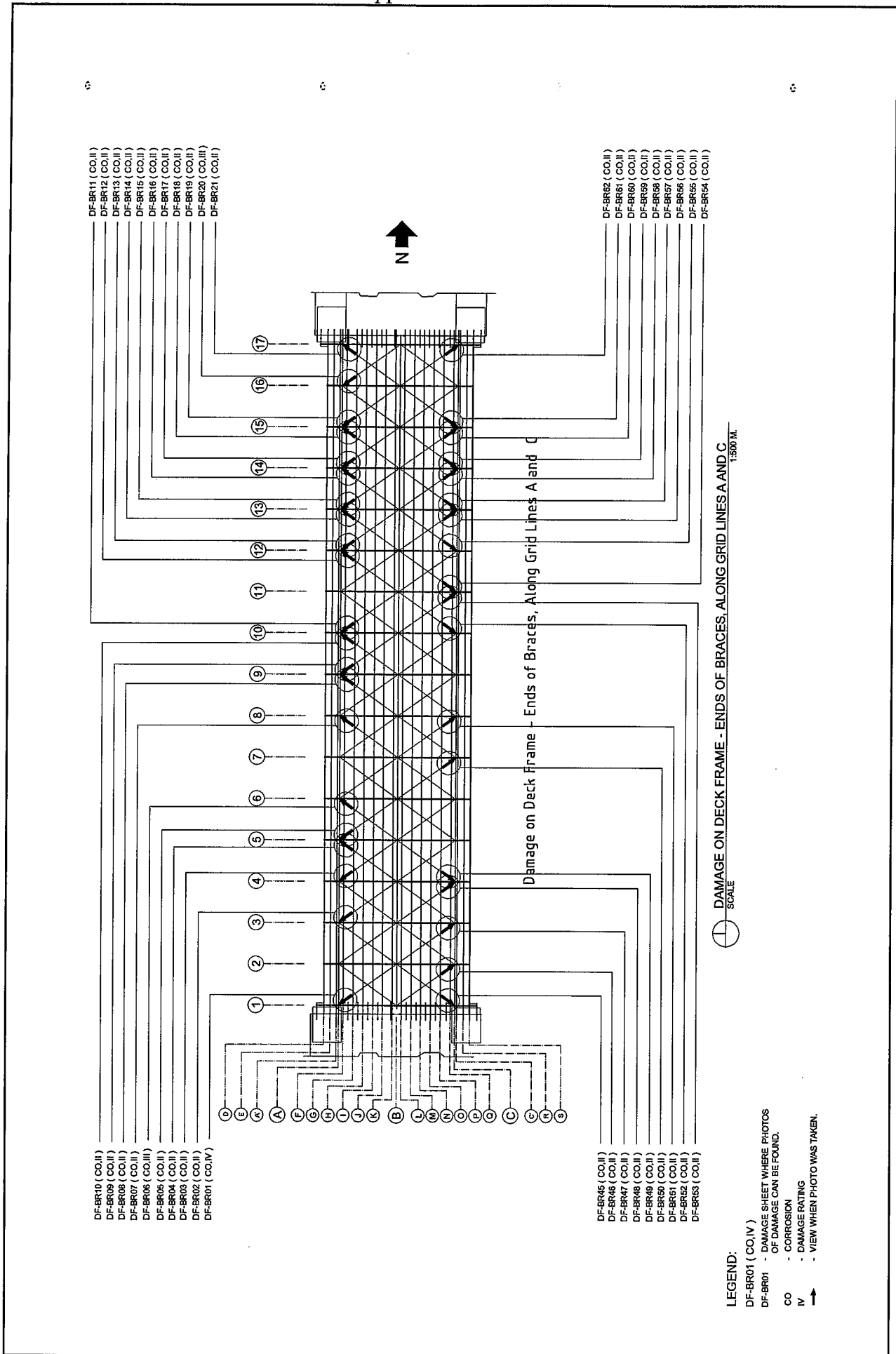
DAMAGE ON TRUSS C - TIES



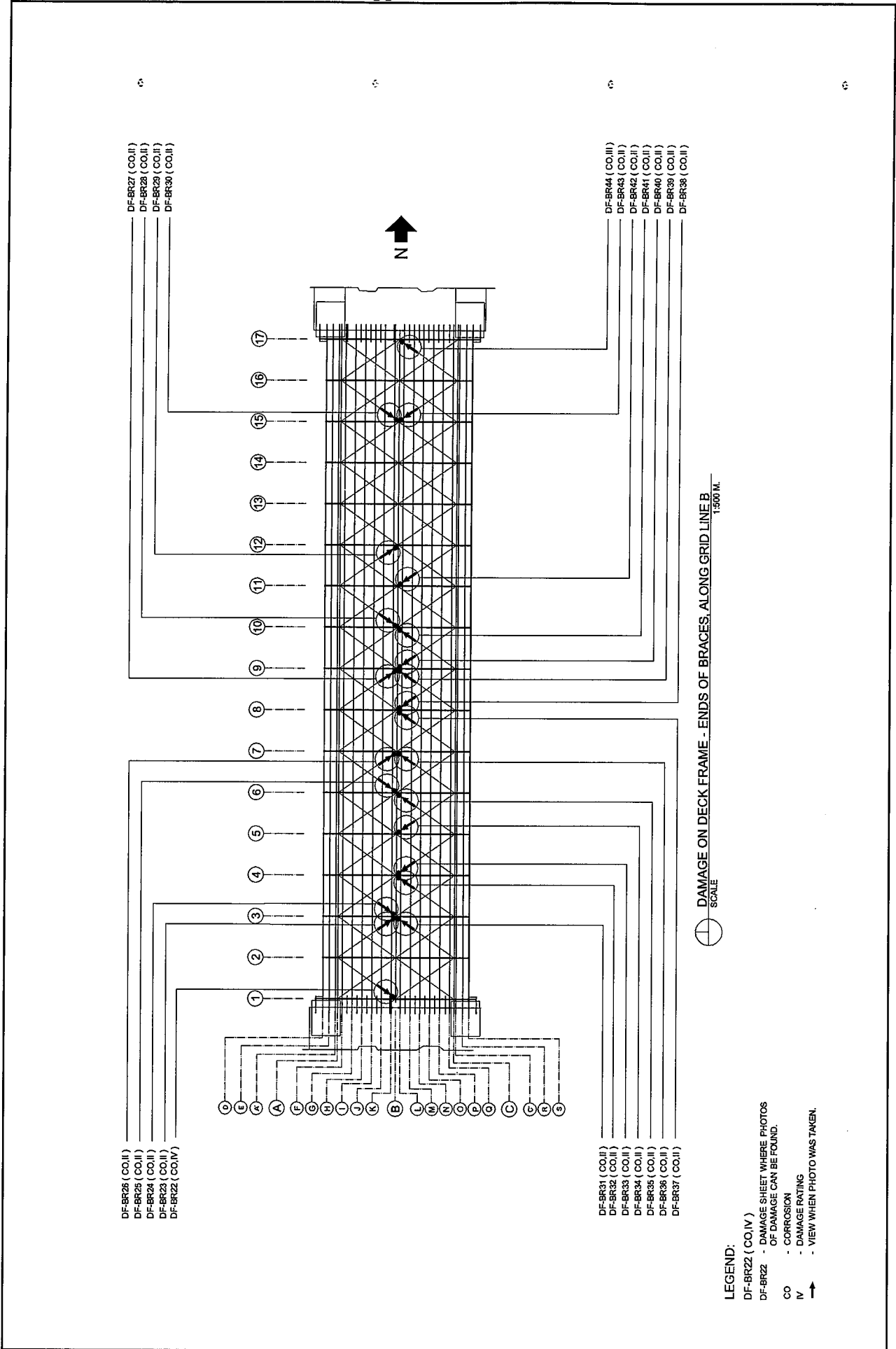
DAMAGE ON DECK FRAME - GUSSET PLATES ALONG GRID LINES A AND C



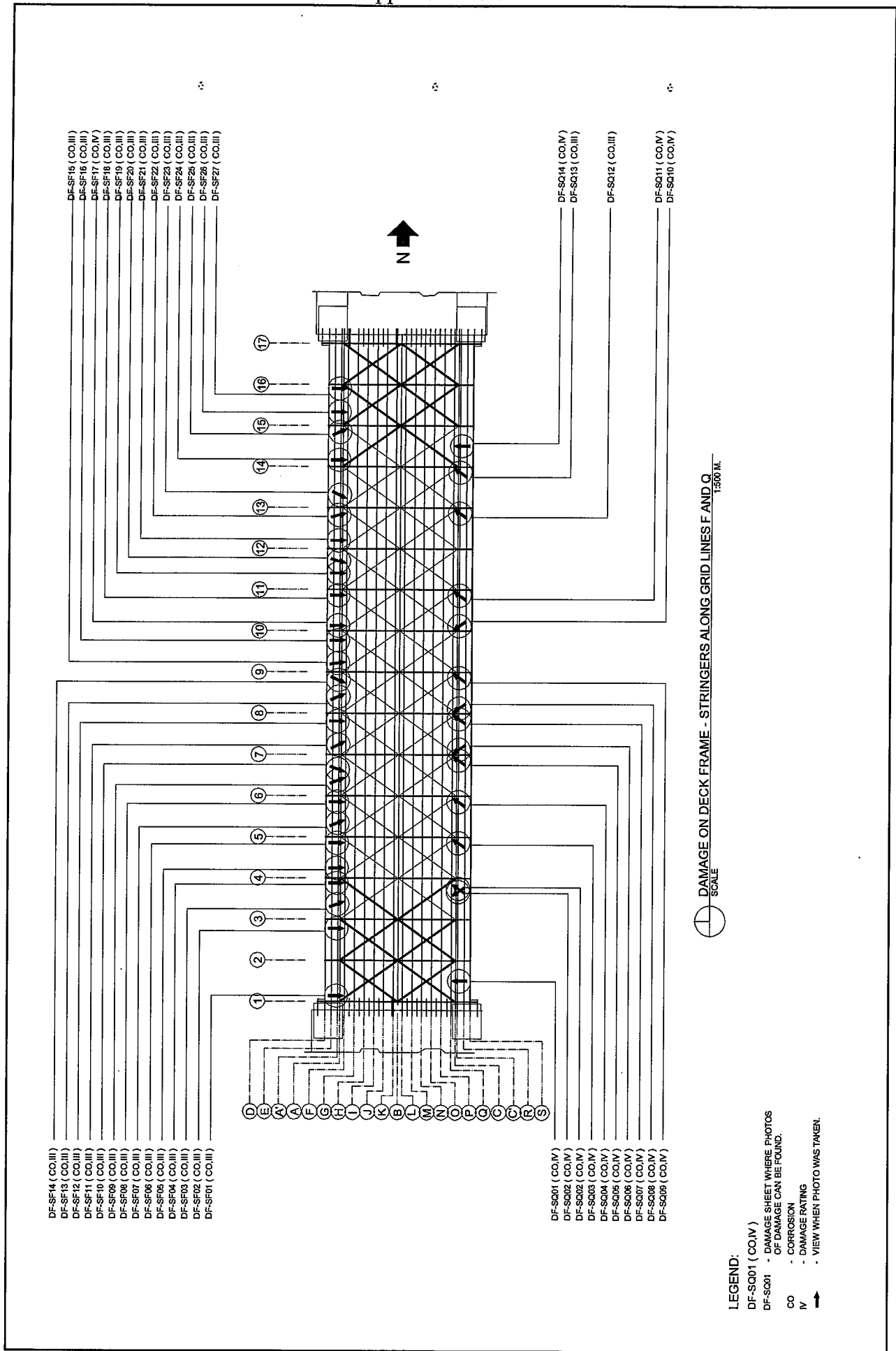
DAMAGE ON DECK FRAME - GUSSET PLATES ALONG GRID LINE B



DAMAGE ON DECK FRAME - ENDS OF BRACES, ALONG GRID LINES A AND C



DAMAGE ON DECK FRAME - ENDS OF BRACES, ALONG GRID LINE B



DF-SF16 (CO,III)
 DF-SF16 (CO,III)
 DF-SF17 (CO,IV)
 DF-SF18 (CO,III)
 DF-SF19 (CO,III)
 DF-SF20 (CO,III)
 DF-SF21 (CO,III)
 DF-SF22 (CO,III)
 DF-SF23 (CO,III)
 DF-SF24 (CO,III)
 DF-SF25 (CO,III)
 DF-SF26 (CO,III)
 DF-SF27 (CO,III)

DF-SF14 (CO,III)
 DF-SF13 (CO,III)
 DF-SF12 (CO,III)
 DF-SF11 (CO,III)
 DF-SF10 (CO,III)
 DF-SF09 (CO,III)
 DF-SF08 (CO,III)
 DF-SF07 (CO,III)
 DF-SF06 (CO,III)
 DF-SF05 (CO,III)
 DF-SF04 (CO,III)
 DF-SF03 (CO,III)
 DF-SF02 (CO,III)
 DF-SF01 (CO,III)

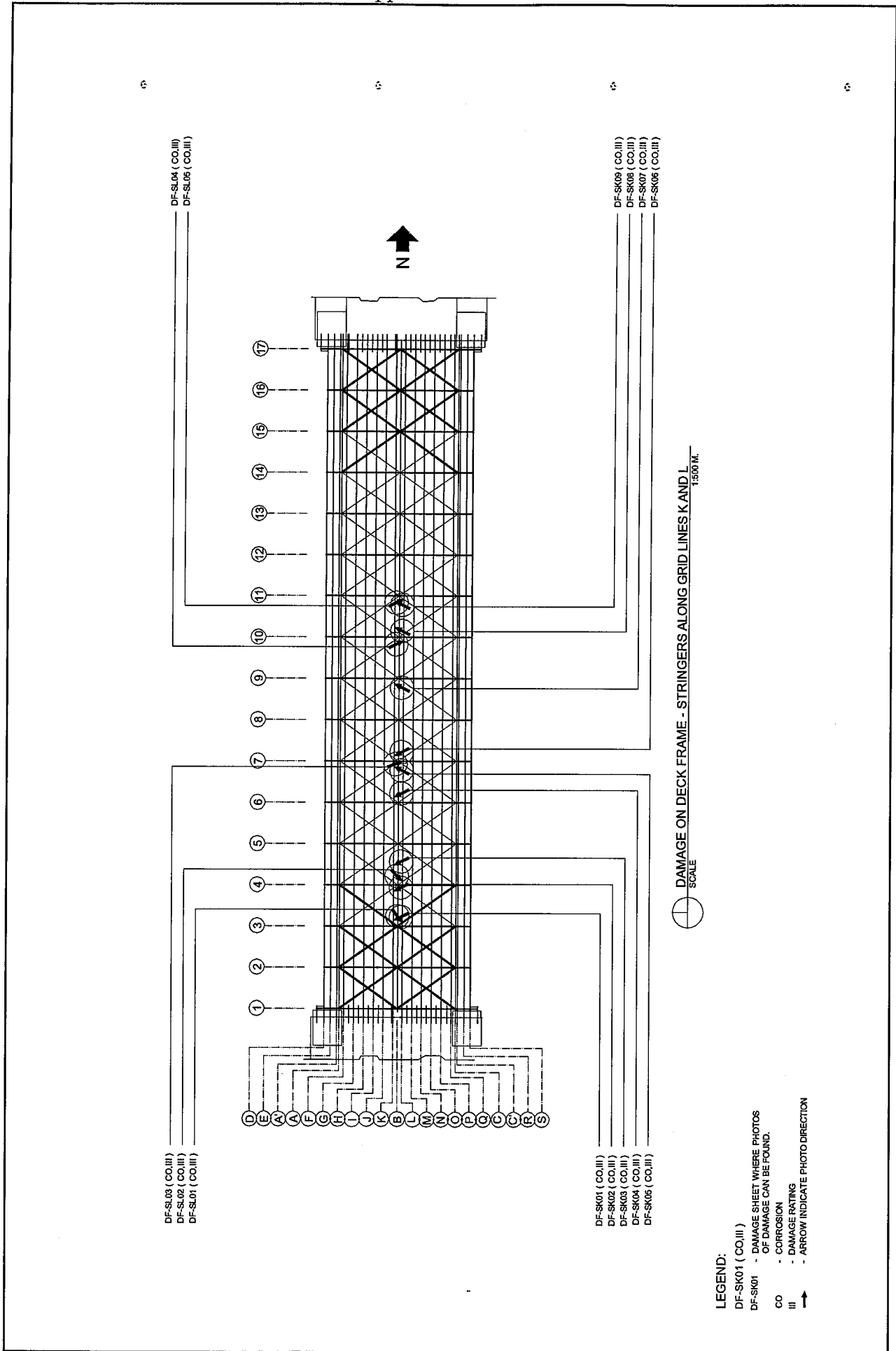
DF-SQ14 (CO,IV)
 DF-SQ13 (CO,III)
 DF-SQ12 (CO,III)
 DF-SQ11 (CO,IV)
 DF-SQ10 (CO,IV)

DF-SQ01 (CO,IV)
 DF-SQ02 (CO,IV)
 DF-SQ02 (CO,IV)
 DF-SQ03 (CO,IV)
 DF-SQ04 (CO,IV)
 DF-SQ05 (CO,IV)
 DF-SQ06 (CO,IV)
 DF-SQ07 (CO,IV)
 DF-SQ08 (CO,IV)
 DF-SQ09 (CO,IV)

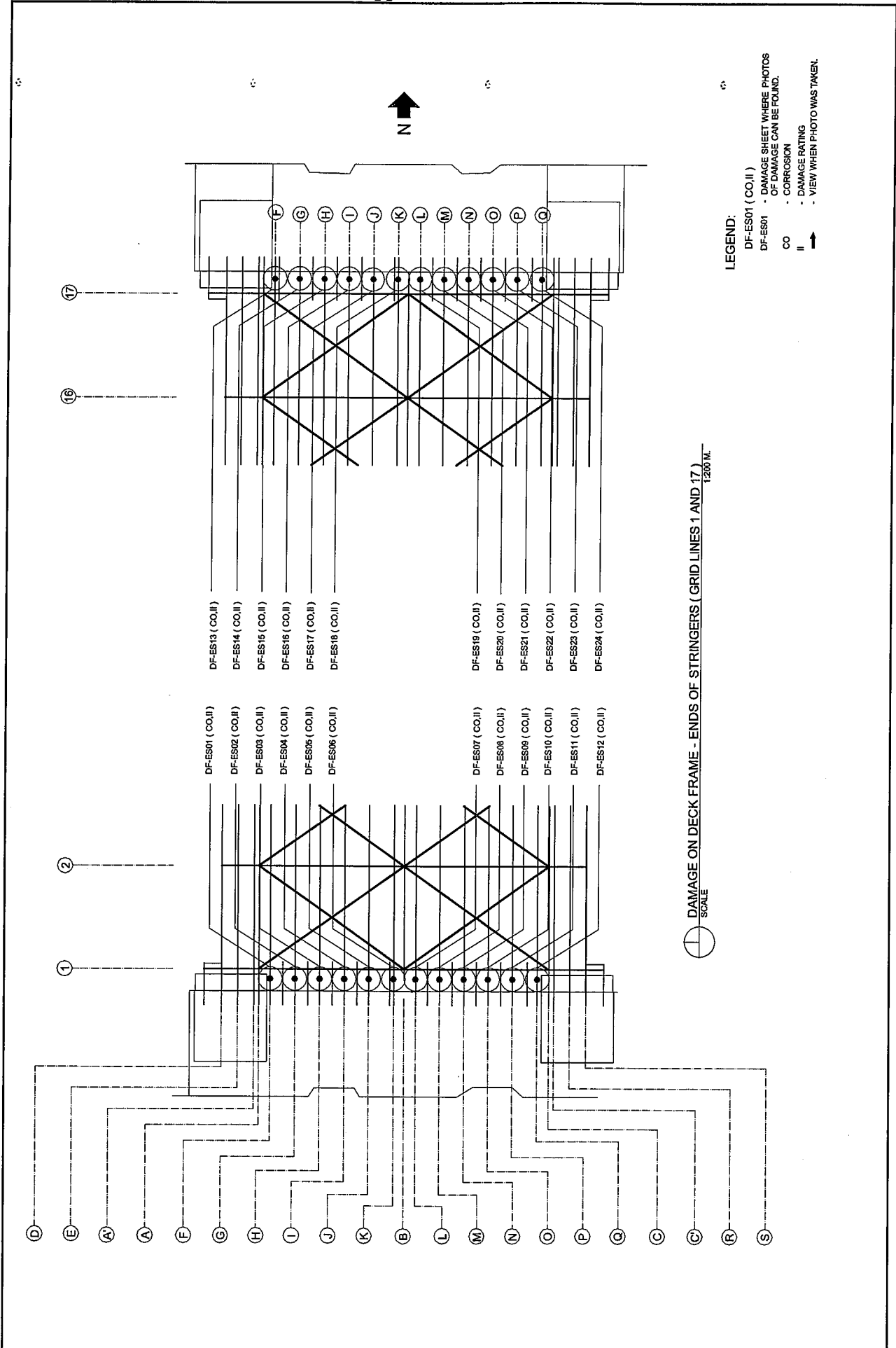
DAMAGE ON DECK FRAME - STRINGERS ALONG GRID LINES F AND Q
 SCALE 1:500 M.

LEGEND:
 DF-SQ01 (CO,IV)
 DF-SQ01 - DAMAGE SHEET WHERE PHOTOS OF DAMAGE CAN BE FOUND.
 CO - CORROSION
 IV - DAMAGE RATING
 - VIEW WHEN PHOTO WAS TAKEN.

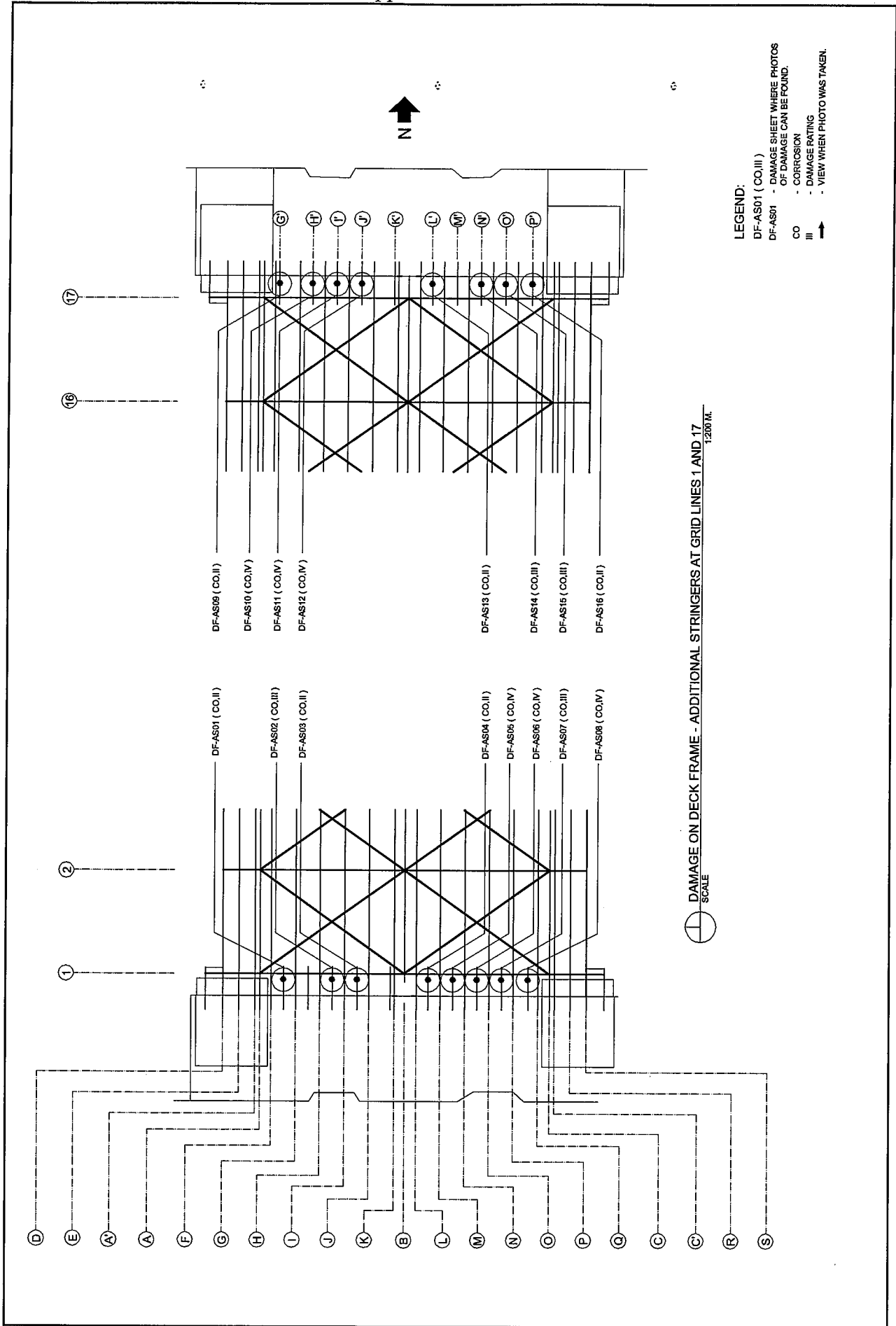
DAMAGE ON DECK FRAME - STRINGERS ALONG GRID LINES F AND Q



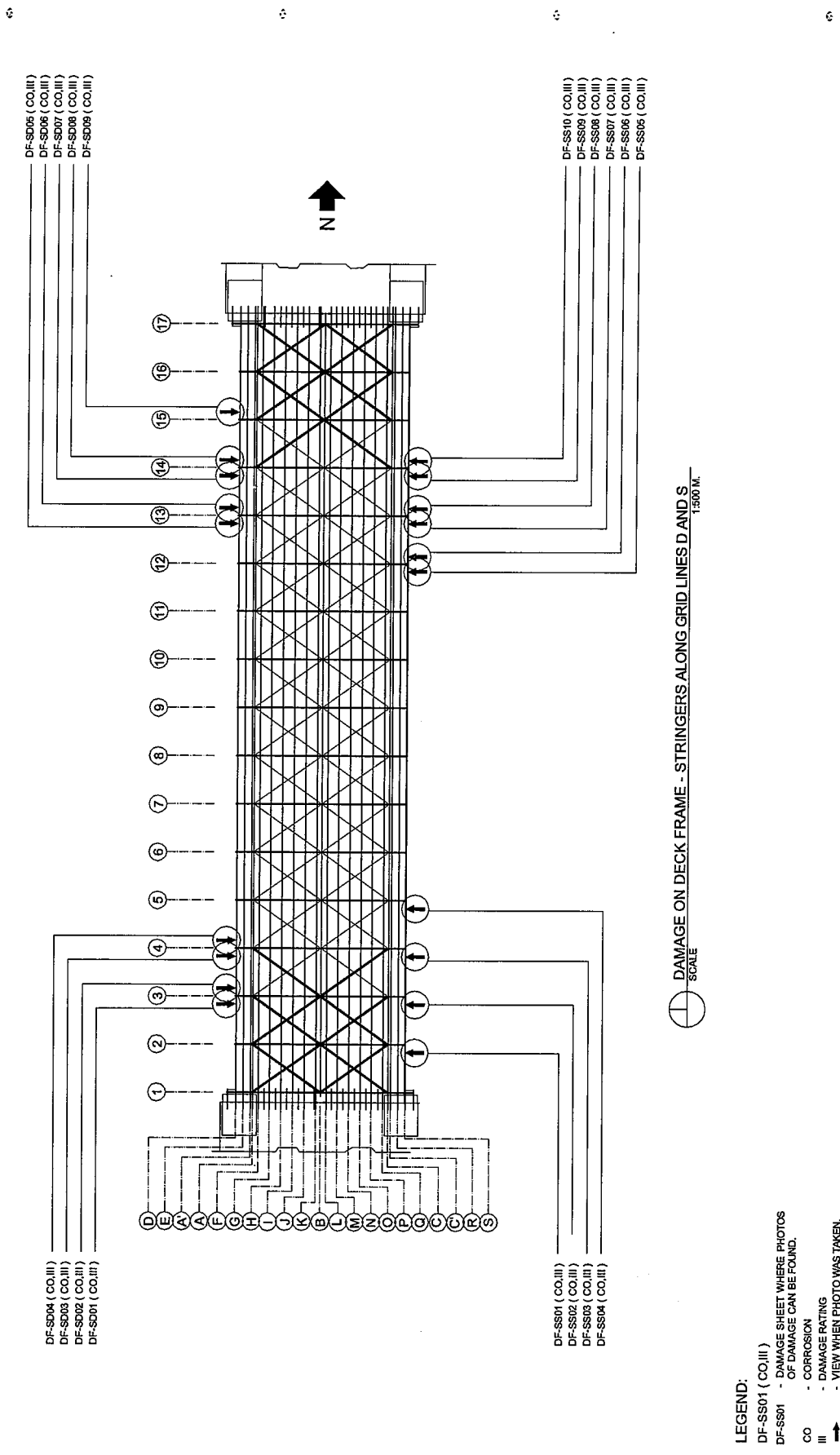
DAMAGE ON DECK FRAME - STRINGERS ALONG GRID LINES K AND L



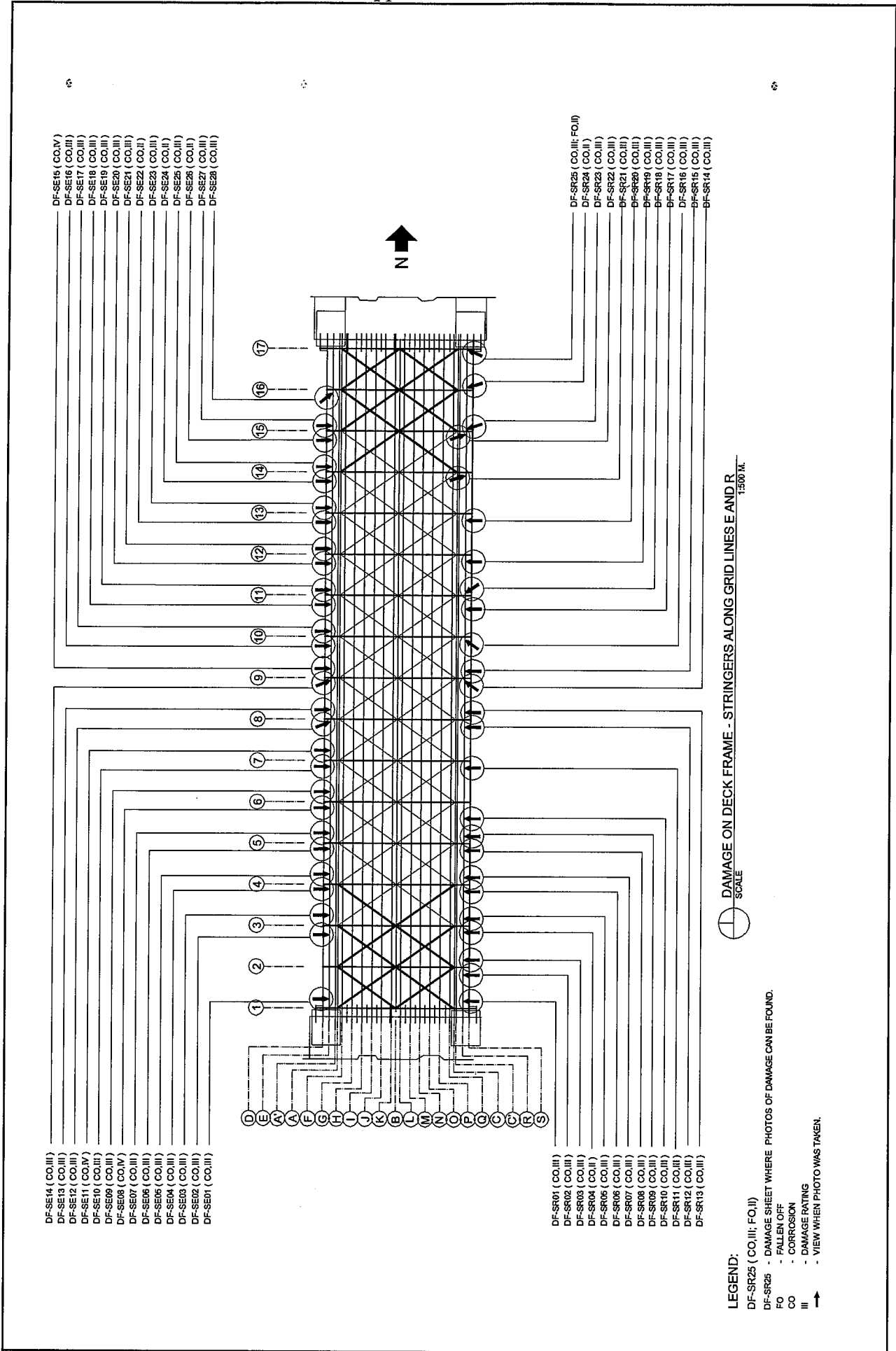
DAMAGE ON DECK FRAME - ENDS OF STRINGERS (GRID LINES 1 AND 7)



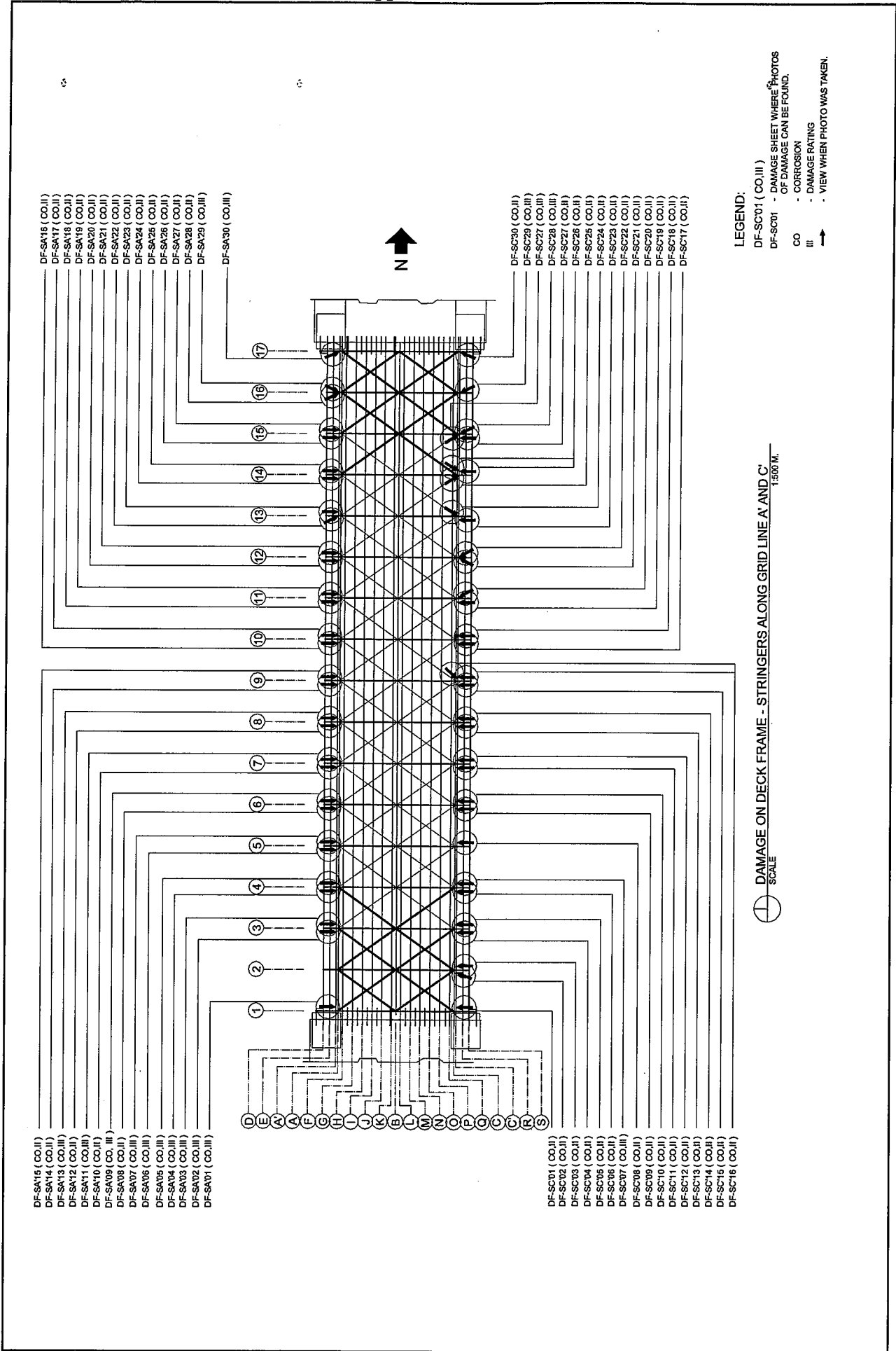
DAMAGE ON DECK FRAME - ADDITIONAL STRINGERS AT GRIDLINES 1 AND 17



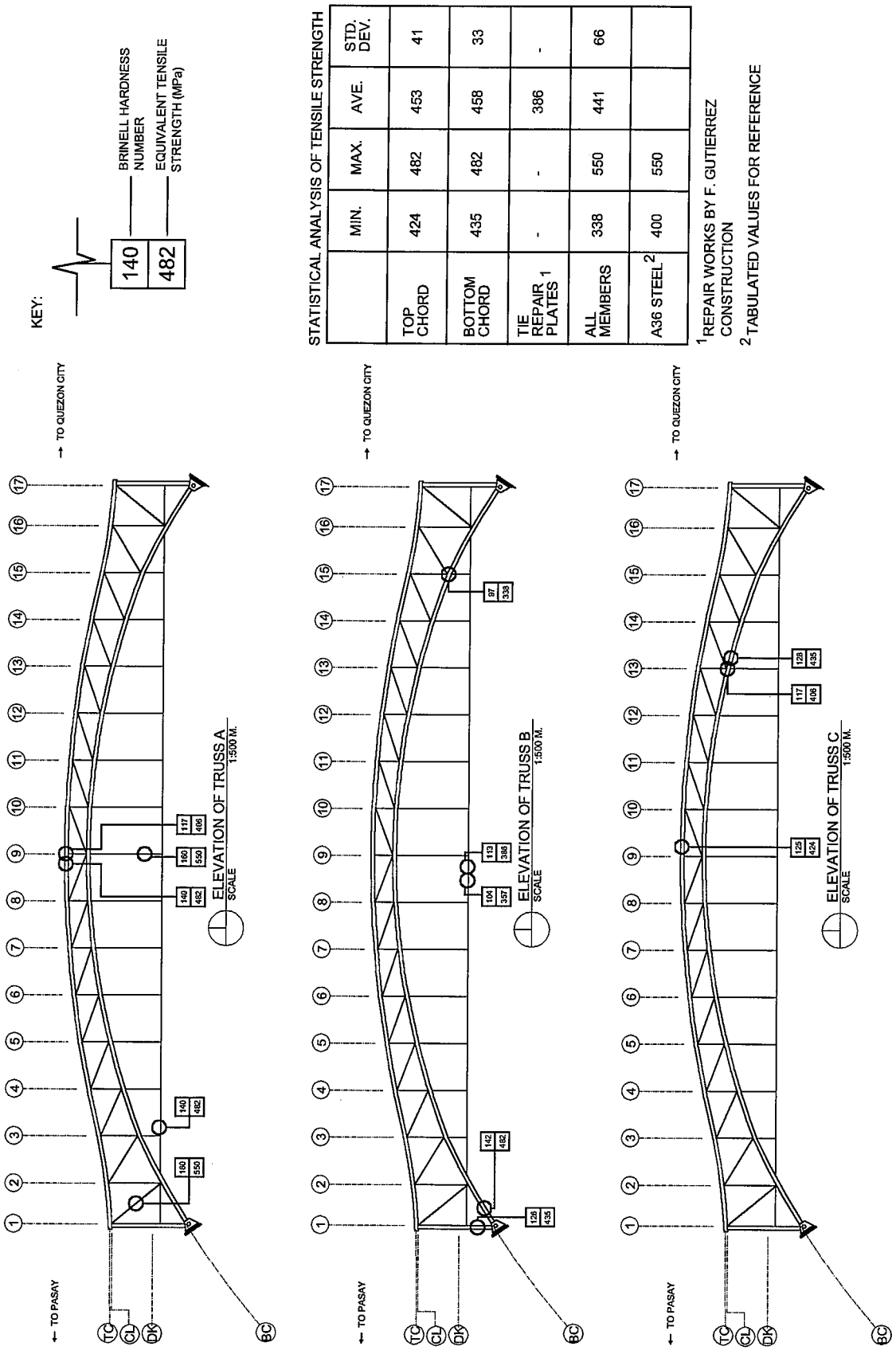
DAMAGE ON DECK FRAME - STRINGERS ALONG GRID LINES D AND S



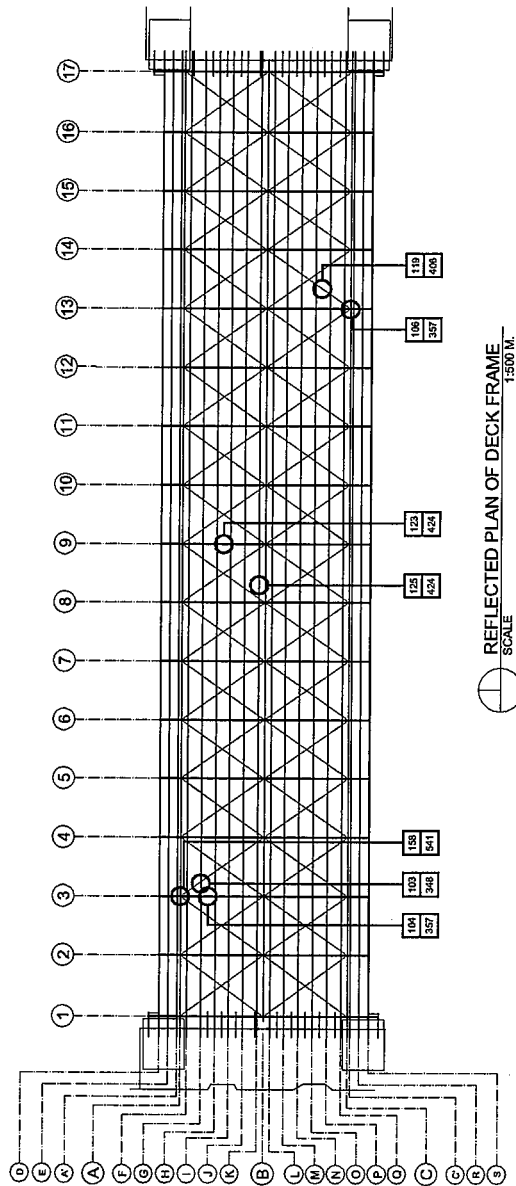
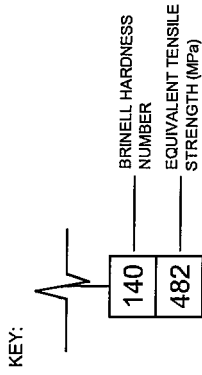
DAMAGE ON DECK FRAME - STRINGERS ALONG GRID LINES E AND R



DAMAGE ON DECK FRAME - STRINGERS ALONG GRID LINE A' AND C'



SUMMARY OF TEST RESULTS FOR HARDNESS OF TRUSS A, B & C



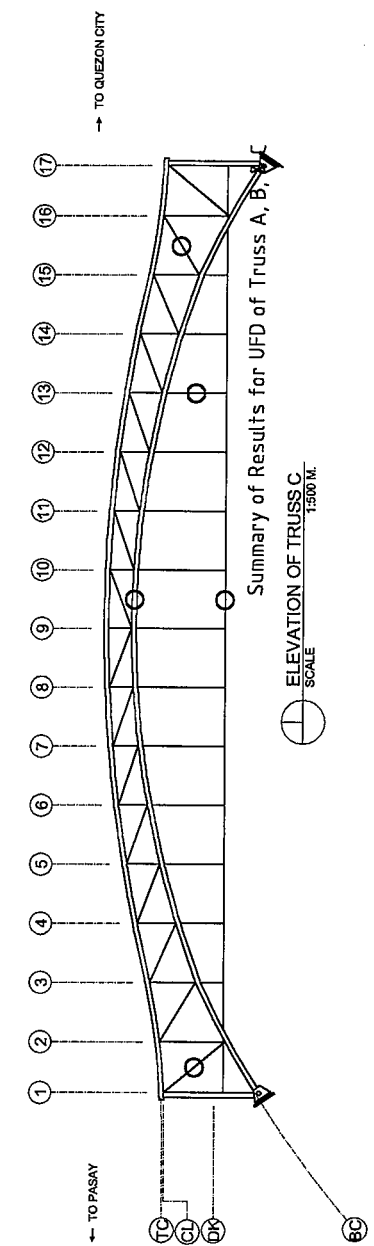
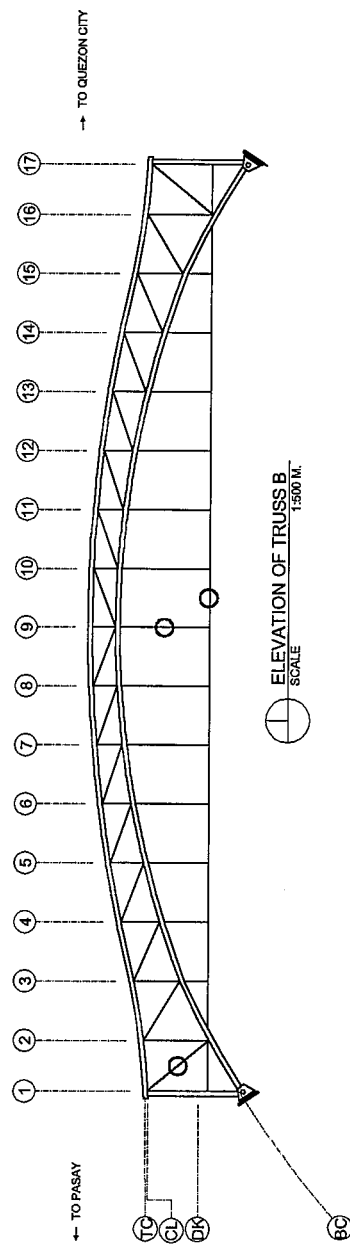
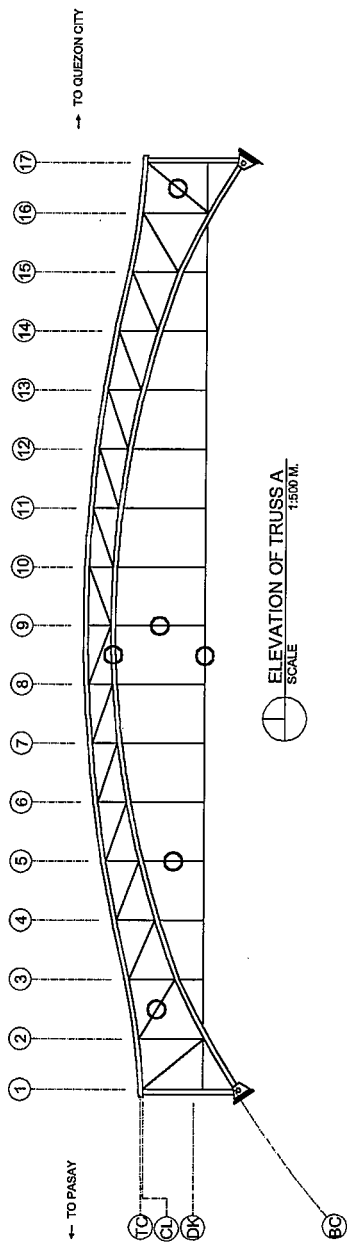
STATISTICAL ANALYSIS OF TENSILE STRENGTH

| | MIN. | MAX. | AVE. | STD. DEV. |
|------------------------------------|------|------|------|-----------|
| STRINGER/ CROSS BEAM | 348 | 424 | 389 | 41 |
| NEW (REPAIR) GUSSET 1 PLATES | 357 | 541 | 449 | 92 |
| ALL MEMBERS | 348 | 541 | 408 | 67 |
| A36 STEEL ² | 400 | 550 | | |

¹ REPAIR WORKS BY F. GUTIERREZ
CONSTRUCTION

² TABULATED VALUES FOR REFERENCE

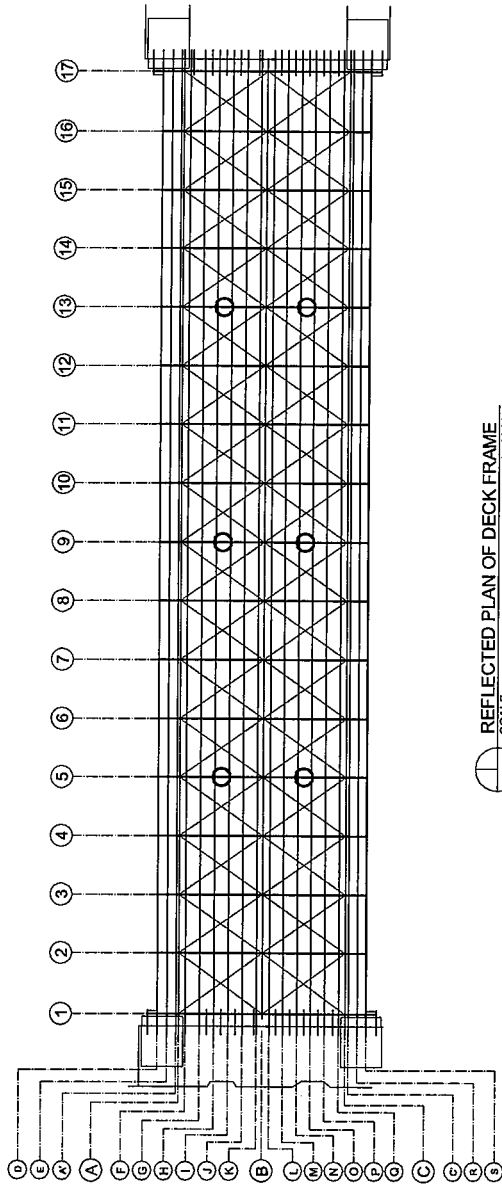
SUMMARY OF TEST RESULTS FOR HARDNESS OF TRUSS A, B & C



NOTE:

1. NO SIGNIFICANT DEFECTS (INTERNAL DEFECTS OR DISCONTINUITIES) WERE FOUND ON ALL TESTS LOCATIONS.
2. TEST LOCATIONS (APPROX. 0.3 M X 0.3 M.) WERE WITHIN THE 2.0 M MIDSPAN SEGMENTS OF THE MEMBERS.
3. PORTIONS TESTED WERE AS FOLLOWS:
 - A. SIDE PLATE OF BOTTOM CHORD & TIE
 - B. FLANGE OF DIAGONAL & HANGER

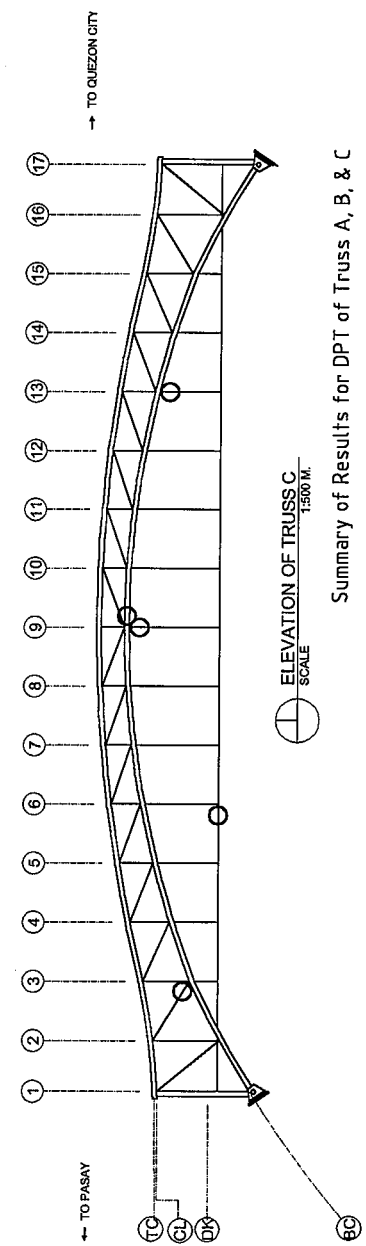
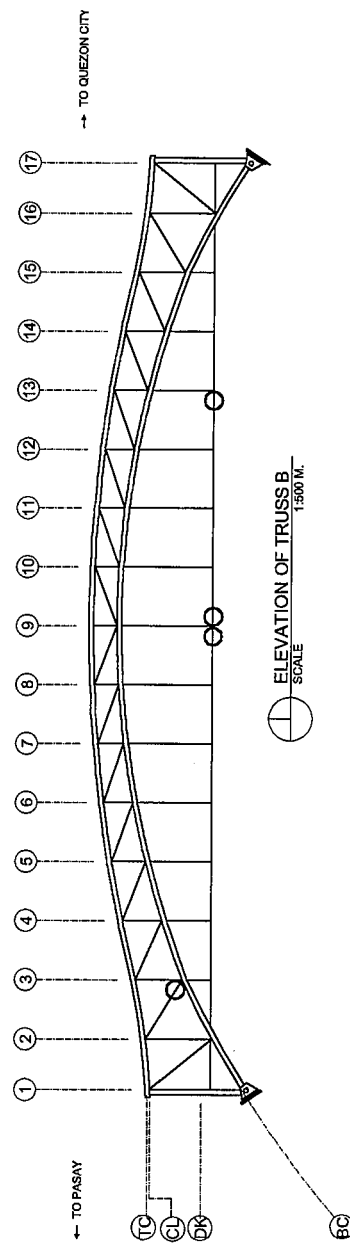
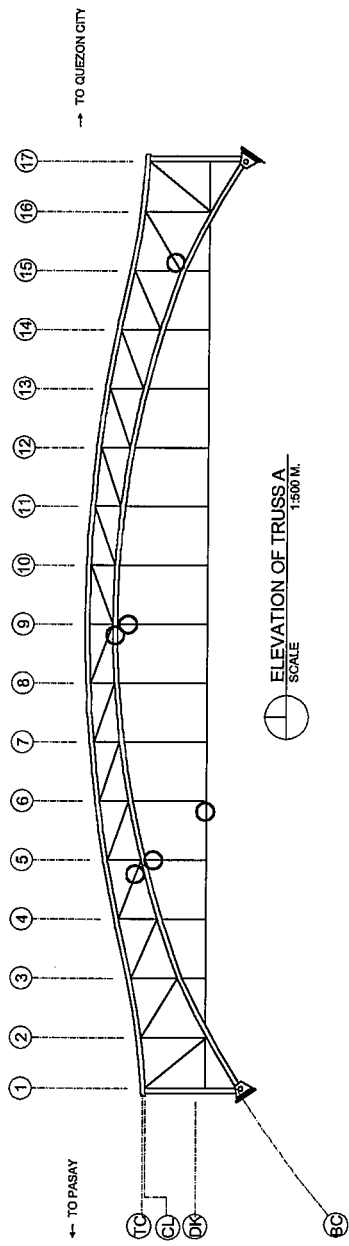
SUMMARY OF TEST RESULTS FOR UFD OF TRUSS A, B & C



NOTE:

1. NO SIGNIFICANT DEFECTS (INTERNAL DEFECTS OR DISCONTINUITIES) WERE FOUND ON ALL CROSS BEAMS TESTED.
2. TEST LOCATIONS (APPROX. 0.3 M X 0.3 M.) WERE WITHIN THE 2.0 M MIDSPAN SEGMENTS OF THE CROSS BEAMS.
3. PORTIONS TESTED WERE BOTTOM FLANGES.

SUMMARY OF TEST RESULTS FOR UFD OF TRUSS A, B & C

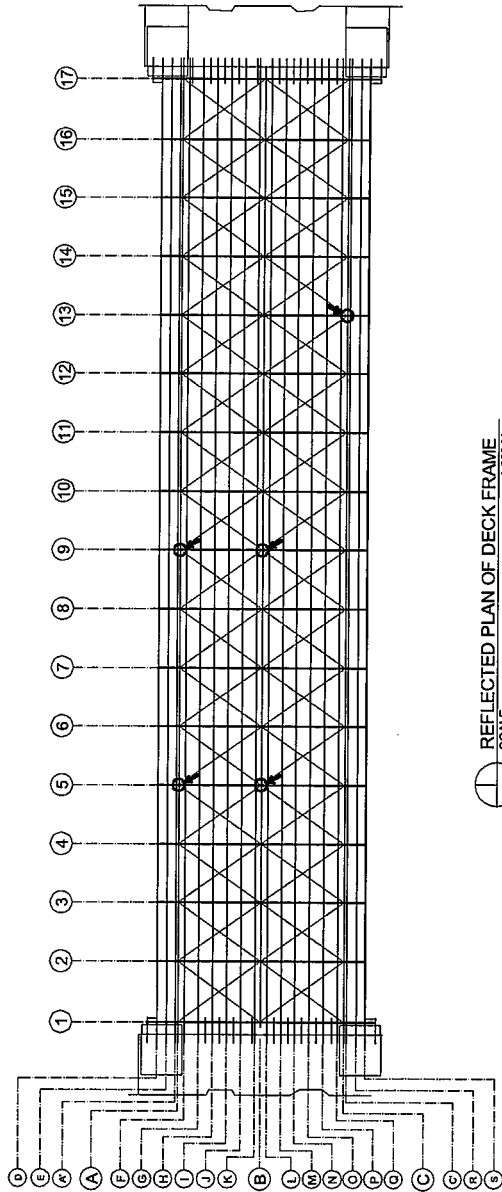


NOTE:

1. NO SIGNIFICANT DEFECTS (INTERNAL DEFECTS OR CRACKS) WERE FOUND ON ALL TESTS LOCATIONS.
2. TEST LOCATIONS (APPROX. 0.3 M IN LENGTH) WERE THE FOLLOWING:
 - A. NEAR GUSSET PLATES, AT CONNECTED FLANGE, WEB OR PLATE, AND
 - B. WELDS.

Summary of Results for DPT of Truss A, B, & C

SUMMARY OF TEST RESULTS FOR DPT OF TRUSS A, B & C



NOTE:

1. NO SIGNIFICANT DEFECTS (INTERNAL DEFECTS OR CRACKS) WERE FOUND ON ALL TESTS LOCATIONS.
2. EACH TEST (APPROX. 0.9 M IN LENGTH) WAS PERFORMED ON CROSS BEAM WEB NEAR CONNECTION TO HANGER AS INDICATED BY AN ARROW.

REFLECTED PLAN OF DECK FRAME
SCALE 1:500 M

SUMMARY OF TEST RESULTS FOR DPT OF TRUSS A, B & C

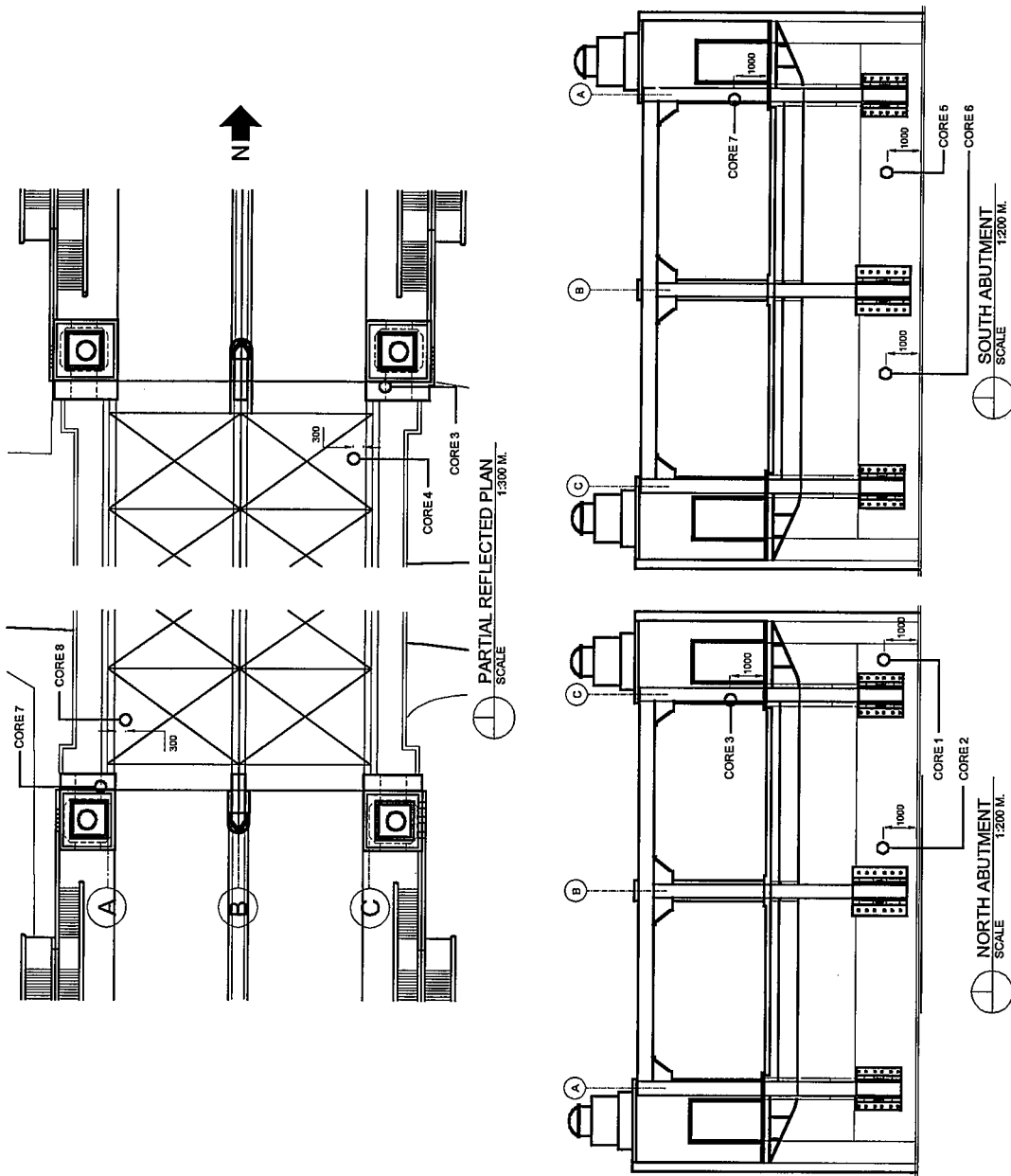
TEST RESULTS OF CONCRETE ON ROAD DECK & PYLONS

| | Road Deck | | Pylons | |
|--------------------------|-----------|--------|--------|--------|
| | Core 4 | Core 8 | Core 3 | Core 7 |
| CORE LENGTH (mm) | 210 | - | 214 | 215 |
| ORIENTATION ¹ | V | V | H | H |
| COMP. STRENGTH (MPa) | 21 | - | 21 | 28 |
| CARBONATION DEPTH (mm) | - | 0 | 0 | 0 |

TEST RESULTS OF CONCRETE ON ABUTMENTS

| | North Abutment | | South Abutment | |
|--------------------------|----------------|--------|----------------|--------|
| | Core 1 | Core 2 | Core 5 | Core 6 |
| CORE LENGTH (mm) | 400 | 400 | 380 | 315 |
| ORIENTATION ¹ | D | D | D | D |
| COMP. STRENGTH (MPa) | 17 | 26 | 24 | 29 |
| CARBONATION DEPTH (mm) | 0 | 0 | 0 | 12 |

¹H - Horizontal, V - Vertical, D - Diagonal



SUMMARY OF RESULTS FOR CONCRETE TESTING