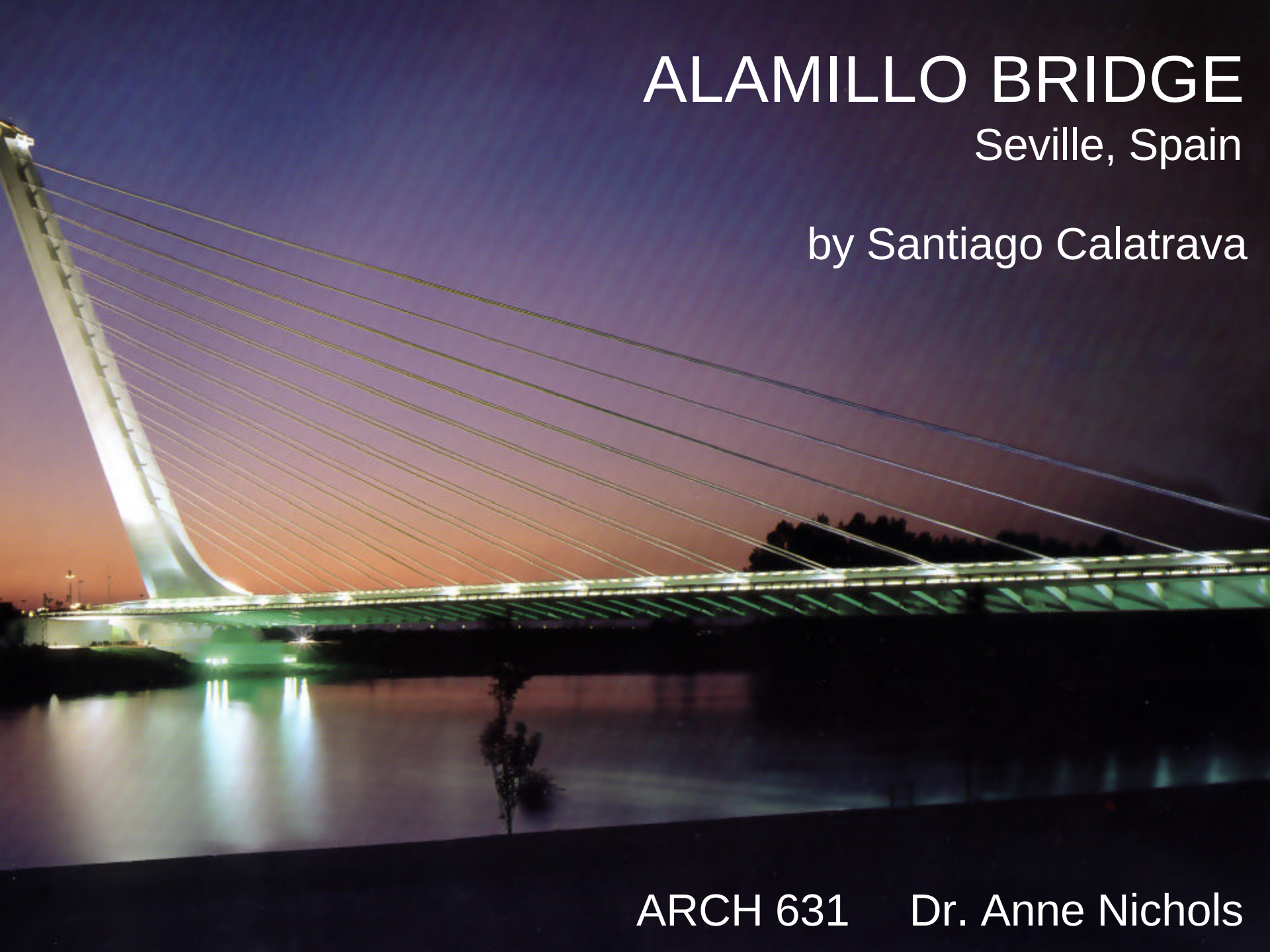


ALAMILLO BRIDGE

Seville, Spain

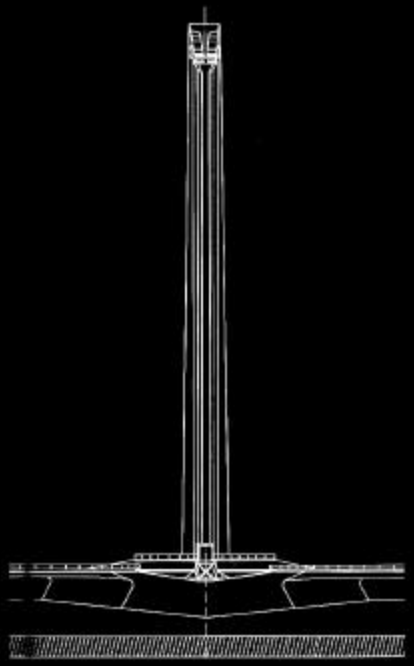
by Santiago Calatrava

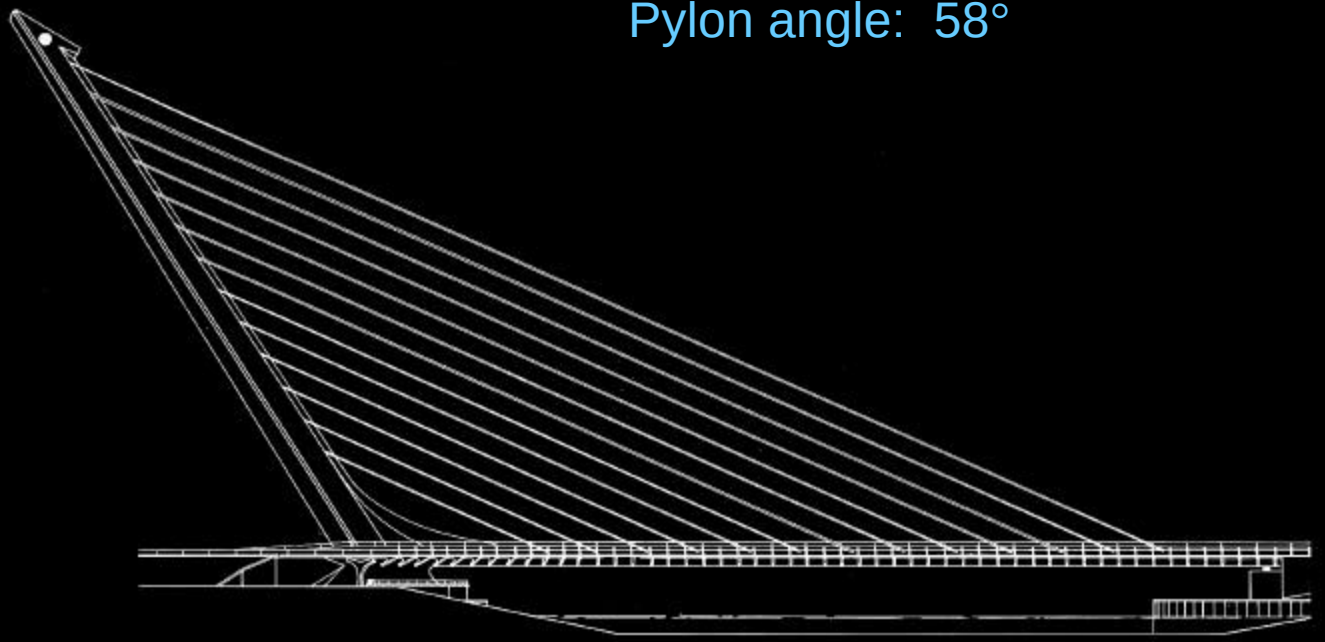
ARCH 631 Dr. Anne Nichols

SPECIFICATIONS

- Structural Type: Asymmetrical Cable-stayed Bridge
- Function: Motor and pedestrian bridge
- Location: Sevilla, Andalucia, Spain
- Crosses: Guadalquivir River
- Duration: 1987-1992

- Materials:
  - Cables: Steel
  - Pylon: Reinforced Concrete
  - Deck: Reinforced Concrete
- Dimensions & Quantities:
  - Main span: 250 m
  - Pylon height: 162 m
  - Pylon angle: 58°

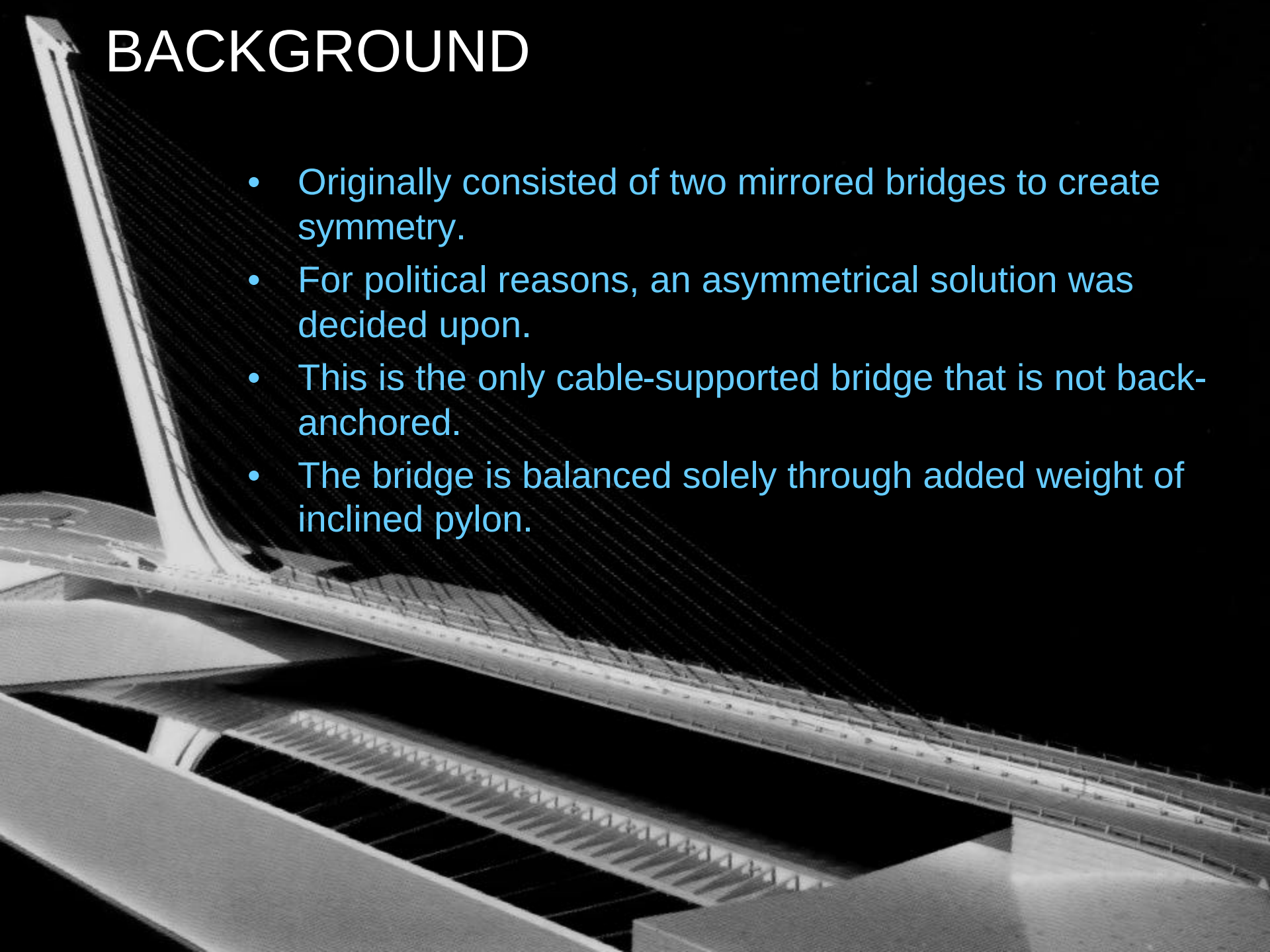




BACKGROUND

- Commissioned for the World Fair, Expo '92, to serve as its main entrance.
- This static concept can be traced back to the 1986 sculpture by Calatrava entitled 'Running Torso', in which inclined stacked marble cubes are balanced by a tensioned wire.
- The core of the tower contains a service stair to the top.

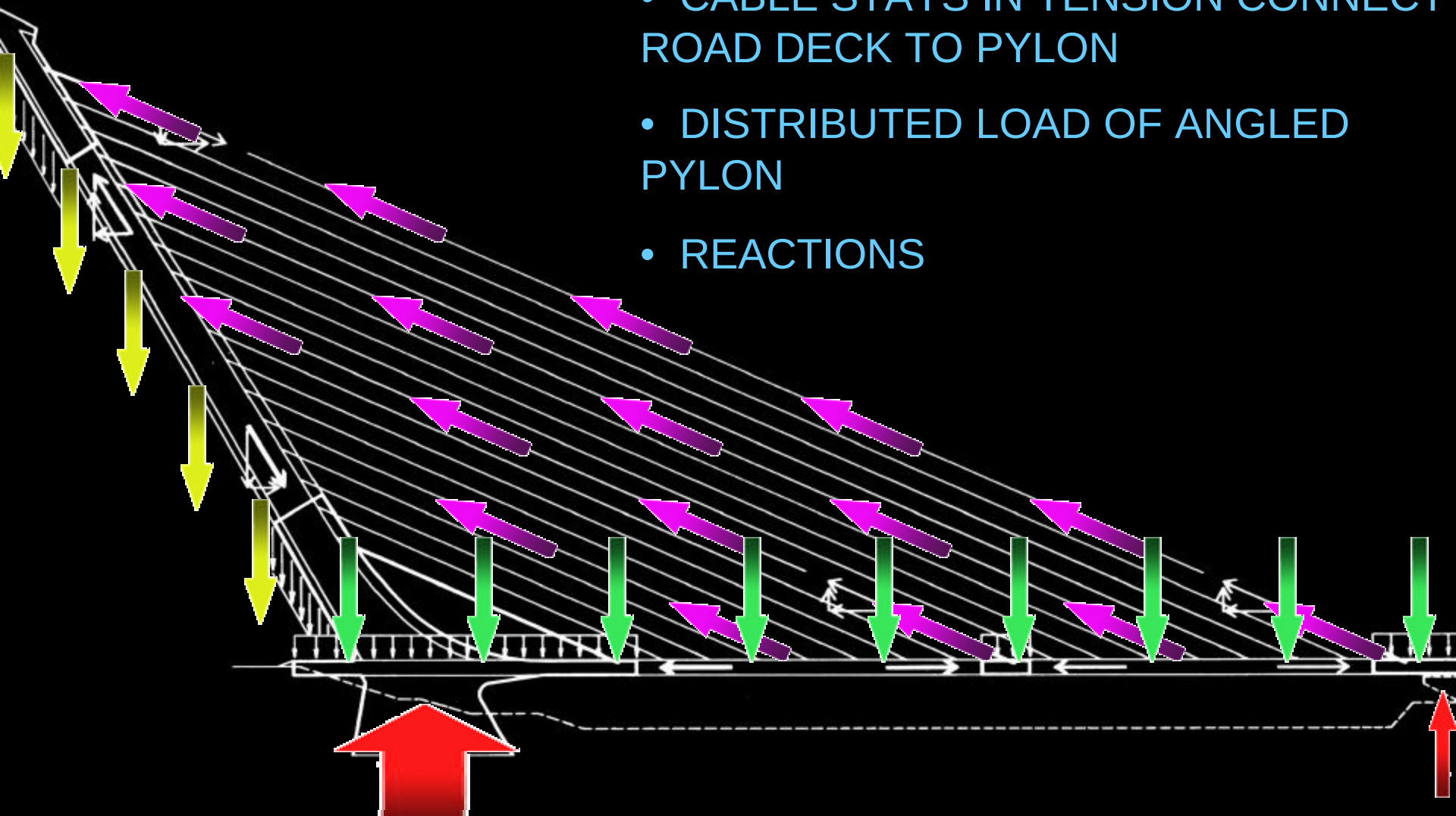
BACKGROUND



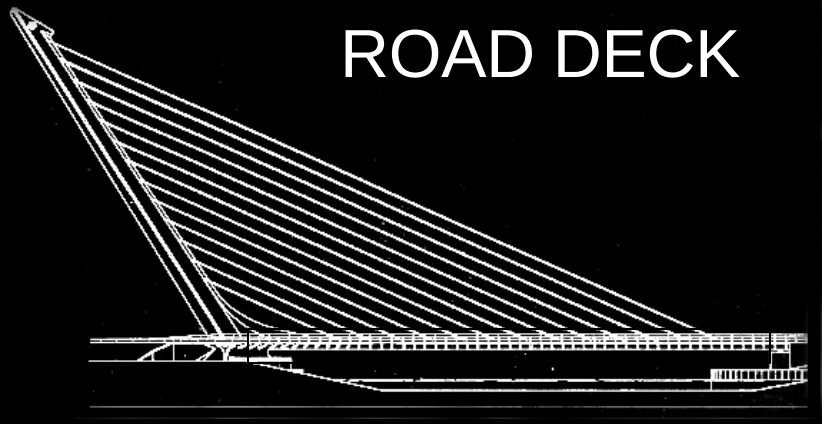
- Originally consisted of two mirrored bridges to create symmetry.
- For political reasons, an asymmetrical solution was decided upon.
- This is the only cable-supported bridge that is not back-anchored.
- The bridge is balanced solely through added weight of inclined pylon.

STRUCTURAL ANALYSIS

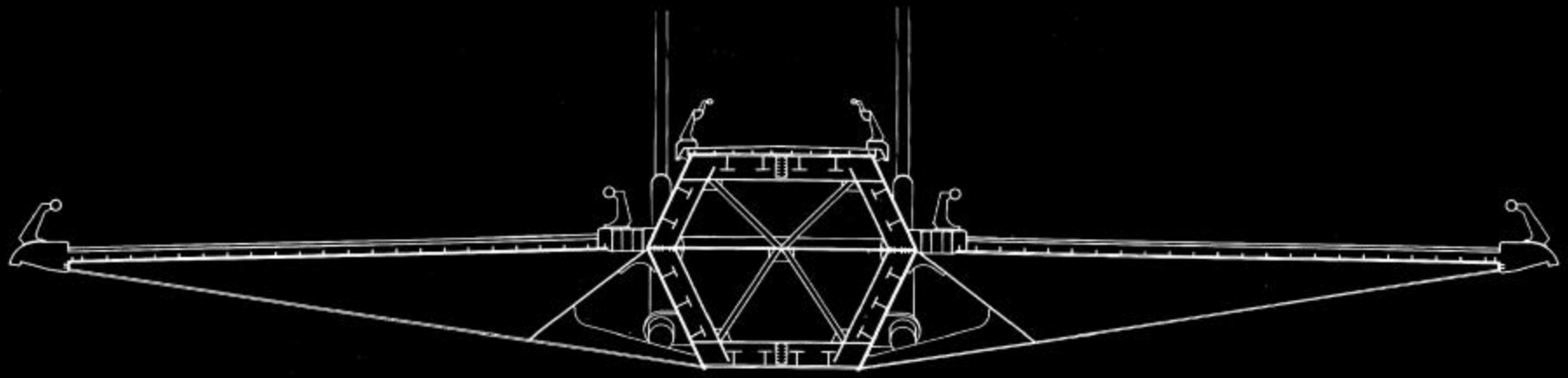
- DISTRIBUTED LOAD OF ROAD DECK
- CABLE STAYS IN TENSION CONNECT ROAD DECK TO PYLON
- DISTRIBUTED LOAD OF ANGLED PYLON
- REACTIONS



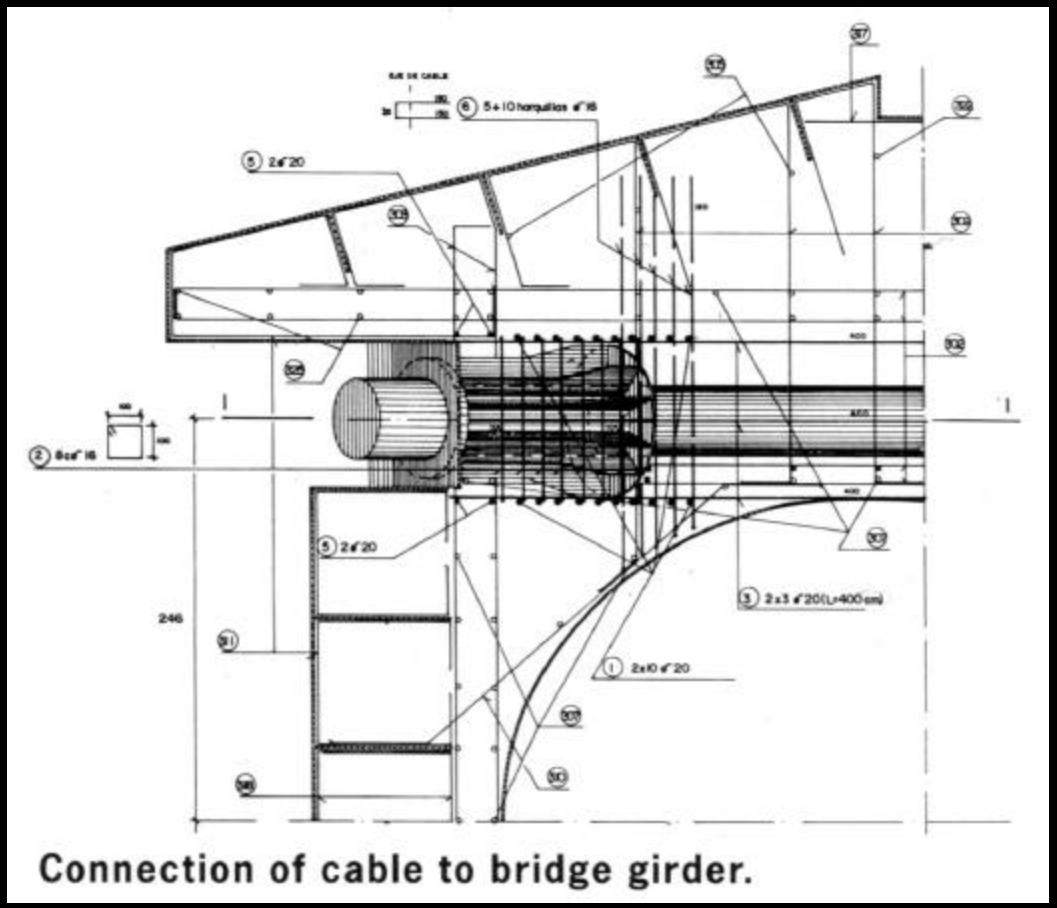
ROAD DECK



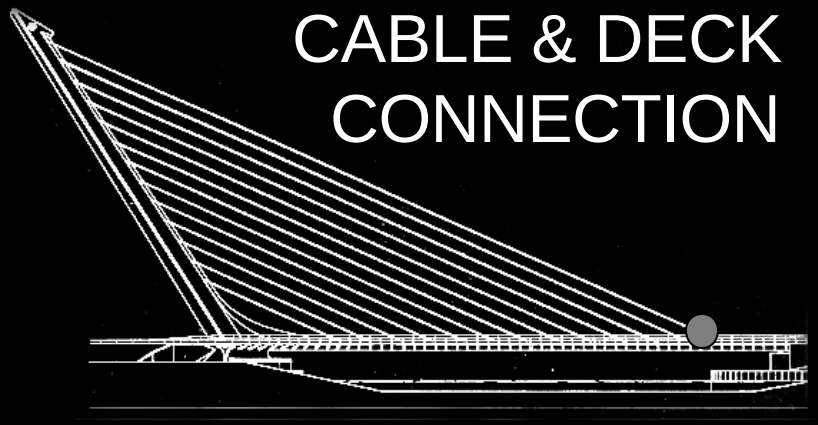
- Hexagonal box beam
- Lightweight crossbeams



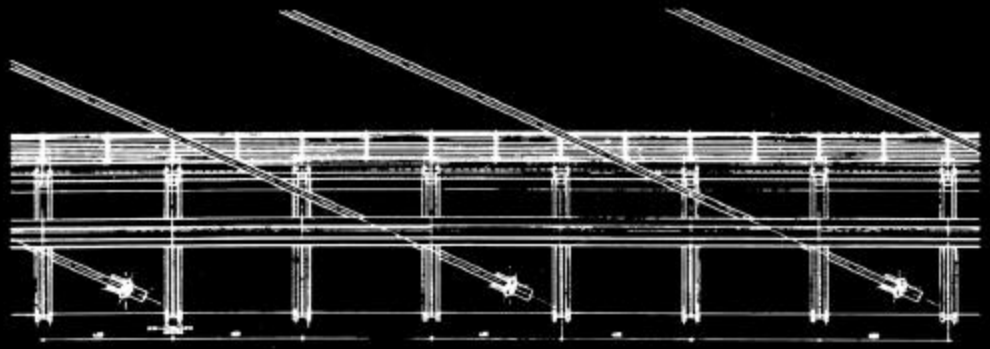
CABLE & DECK CONNECTION



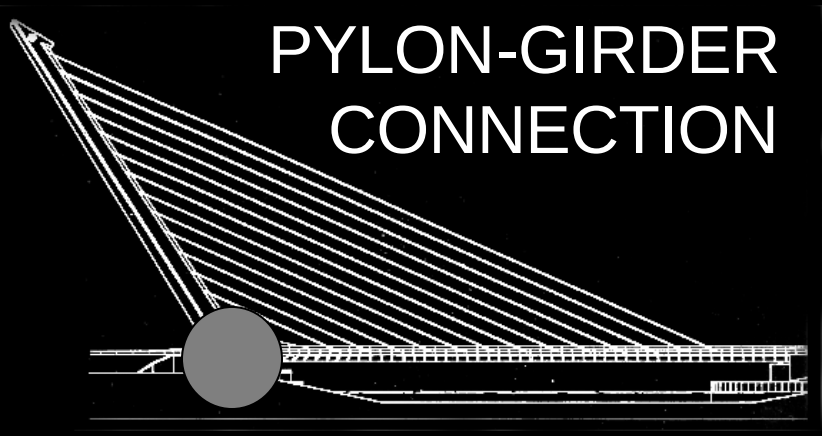
Connection of cable to bridge girder.



- Thirteen pairs of cables
- Compression wedge connections

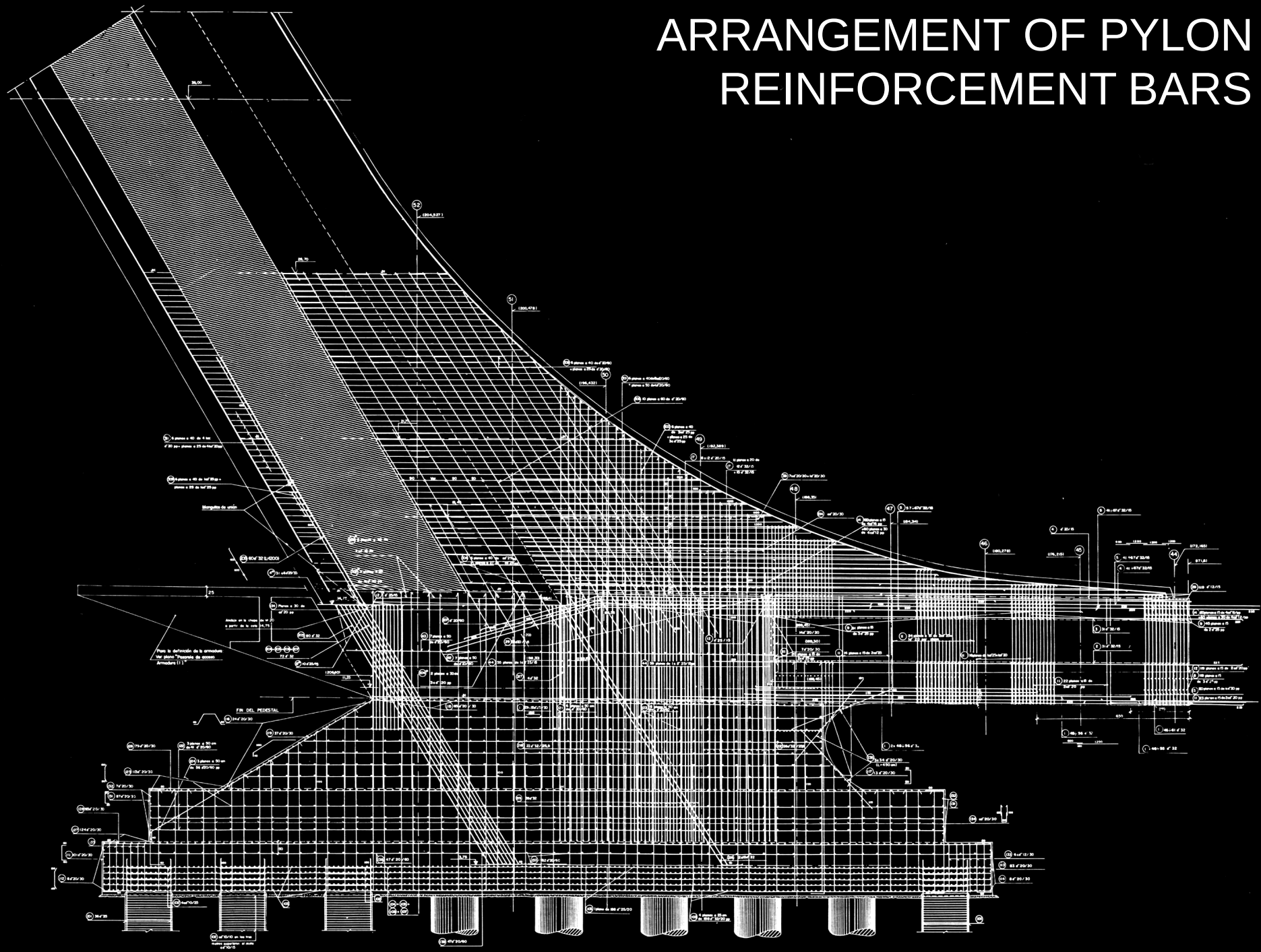


PYLON-GIRDER CONNECTION

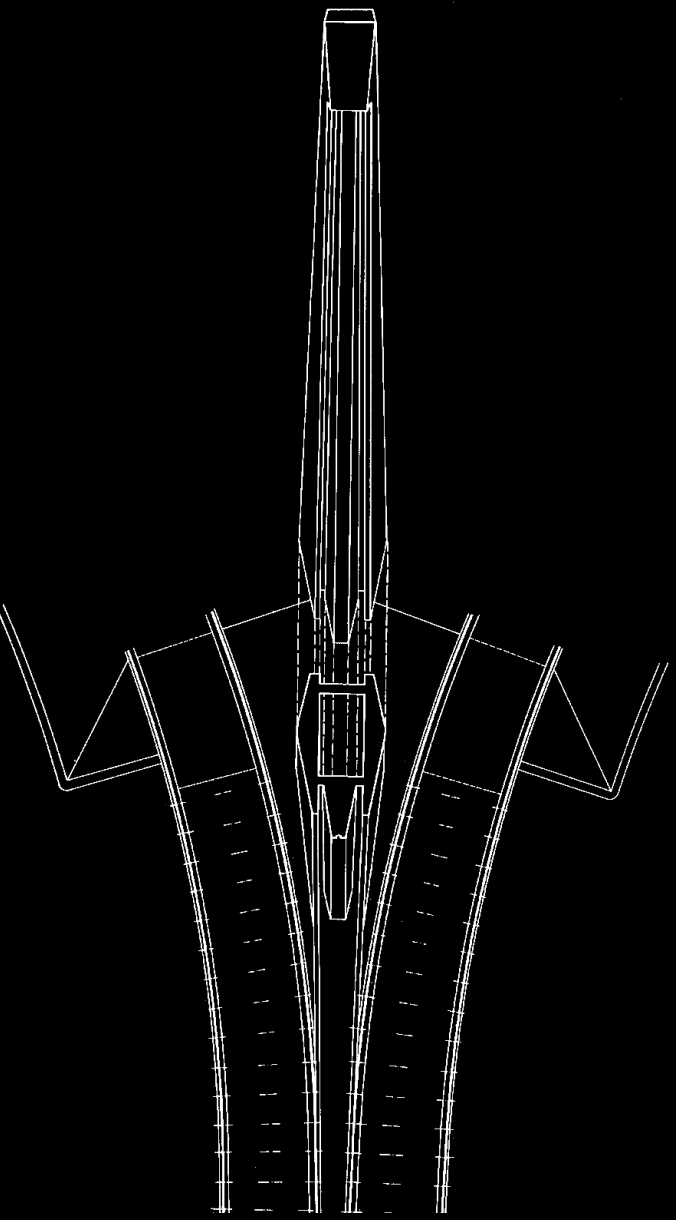


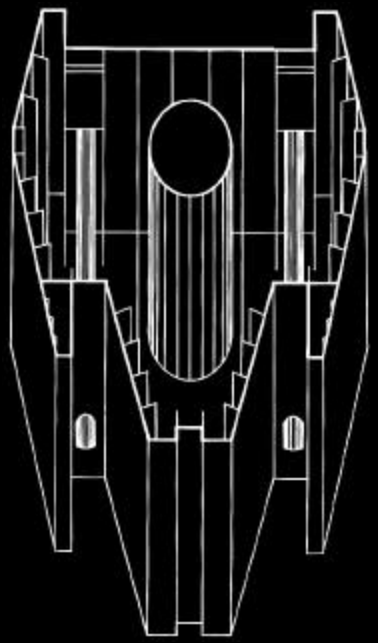
- Rigid connection
- Gusset plates
- Loads transmitted through drilled piers to soil.

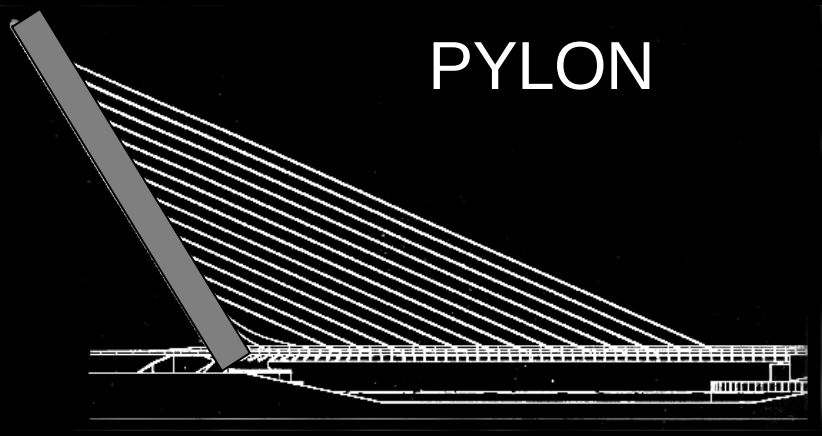
ARRANGEMENT OF PYLON REINFORCEMENT BARS



PYLON



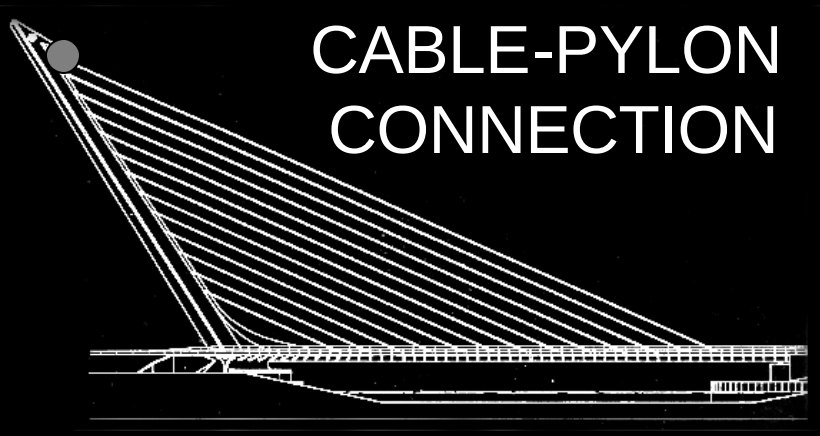


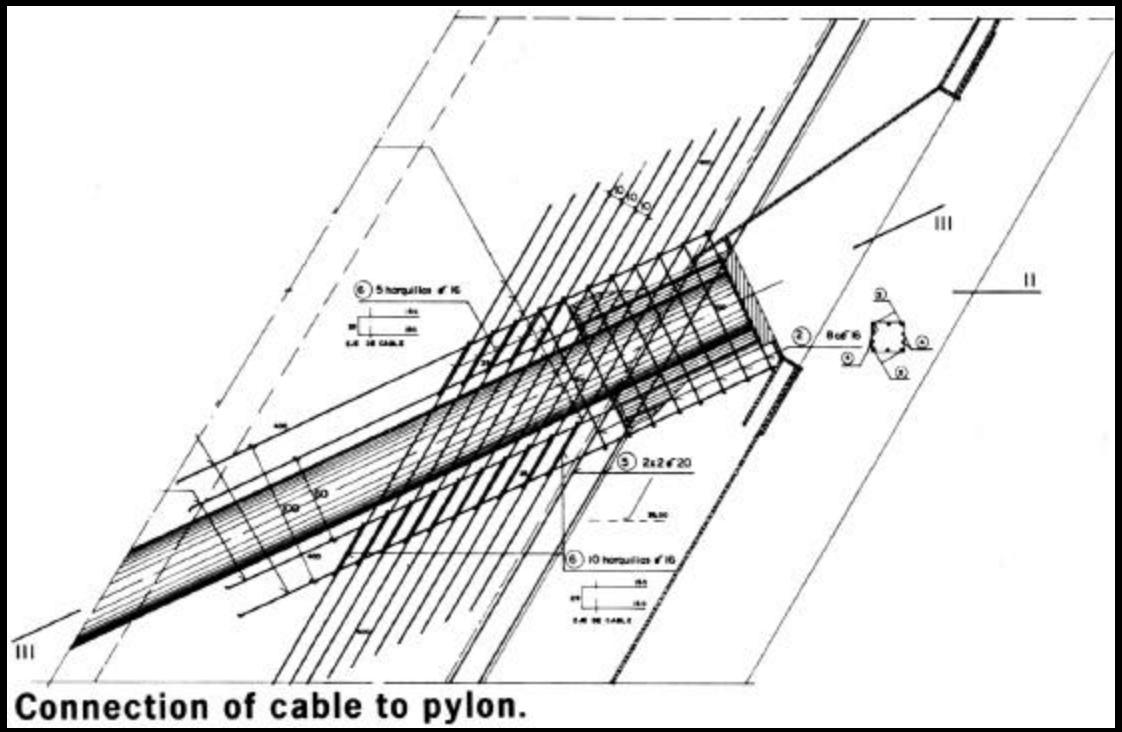


- Concrete filled steel pylon
- Central service core
- 58 degree inclination

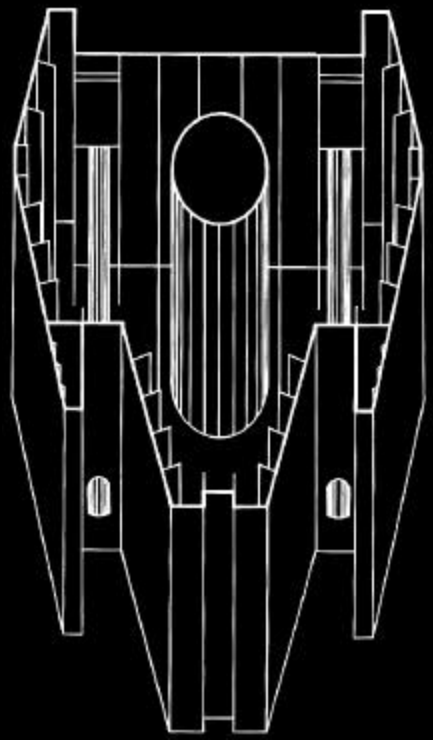
CABLE-PYLON CONNECTION

- Compression wedge connections
- Equal tension in all cables
- Installed prior to concrete fill





Connection of cable to pylon.



ADDITIONAL DESIGN CONSIDERATIONS

- TYPICAL NEED FOR BACK SUPPORTS IN ASYMMETRIC BRIDGES

- WIND LOADS AND SEISMIC LOAD CONSIDERATIONS

- UPLIFT MAY CAUSE POTENTIAL INSTABILITIES

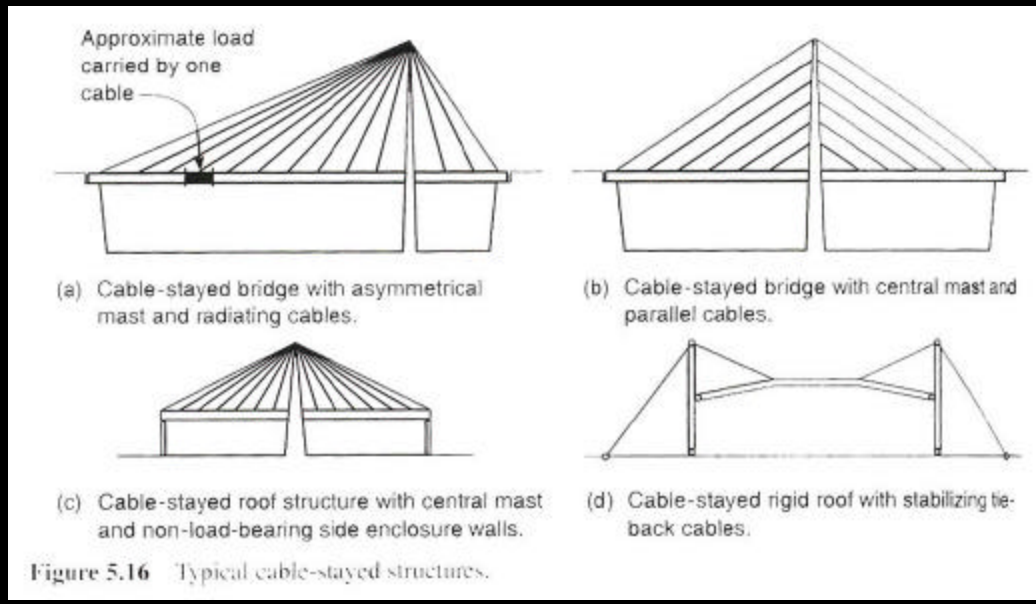


Figure 5.16 Typical cable-stayed structures.

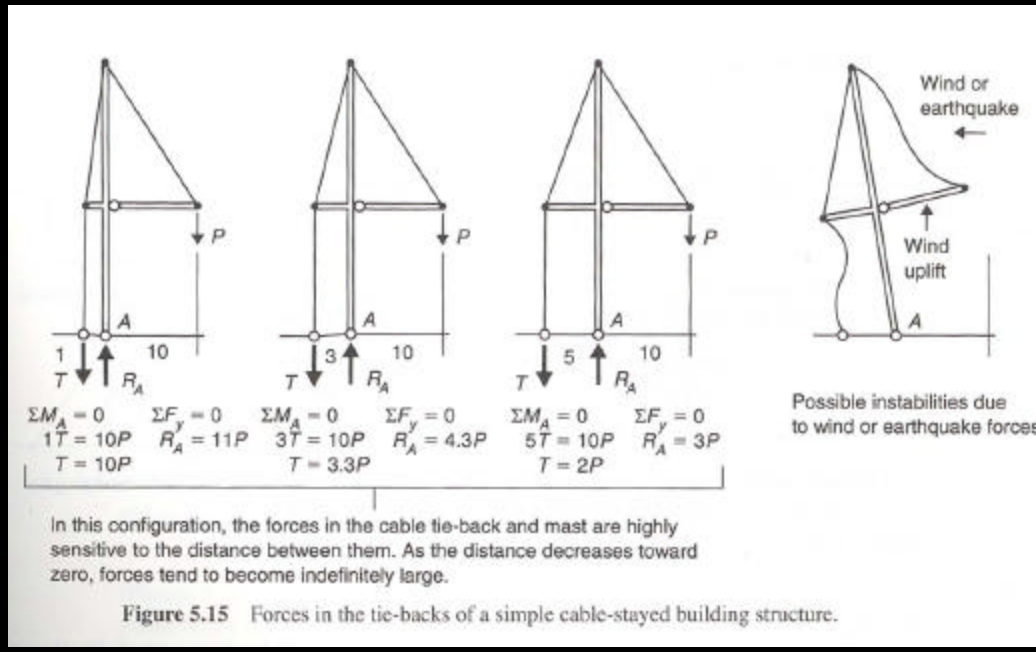
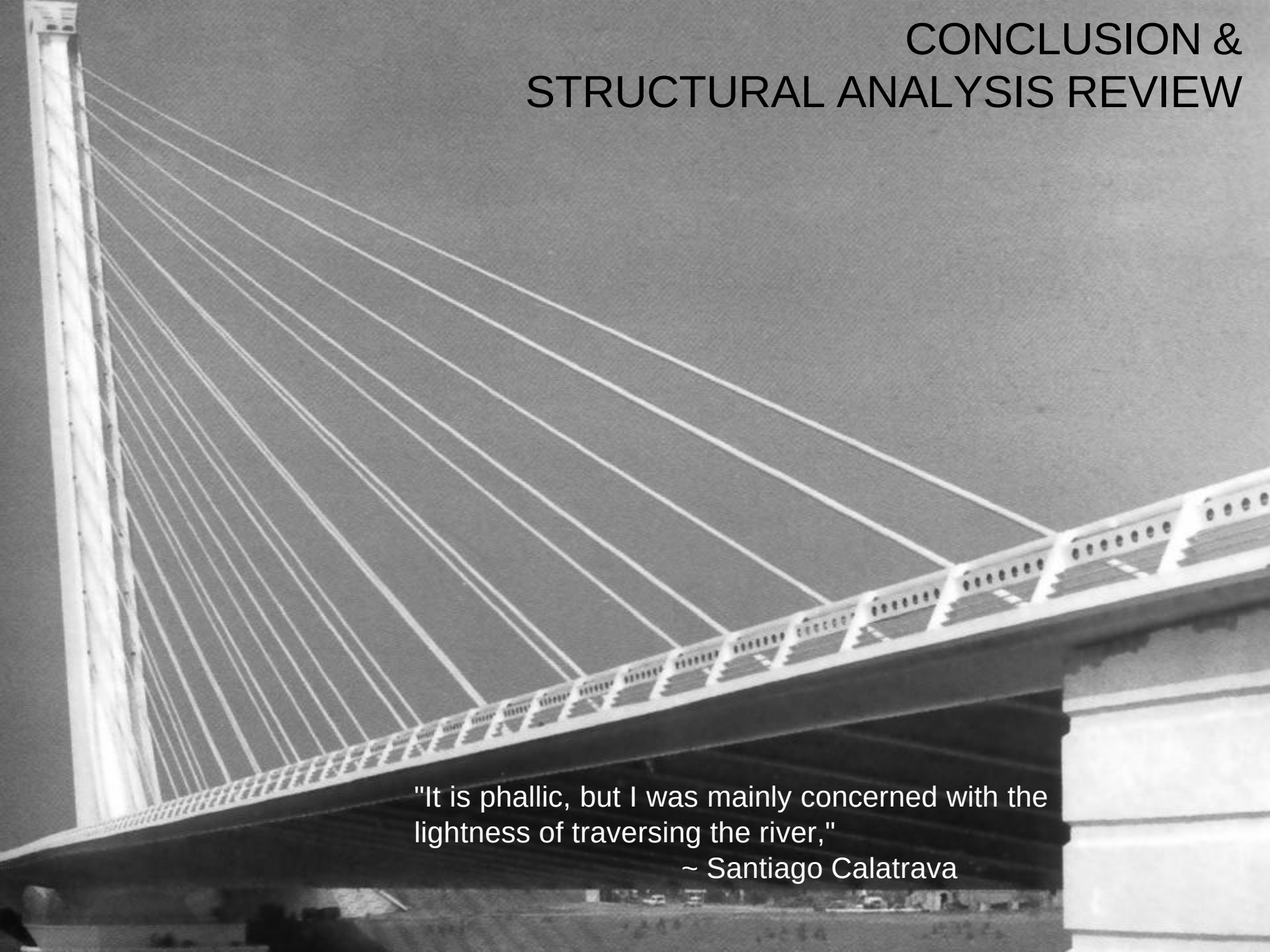


Figure 5.15 Forces in the tie-backs of a simple cable-stayed building structure.

CONCLUSION & STRUCTURAL ANALYSIS REVIEW



"It is phallic, but I was mainly concerned with the lightness of traversing the river,"

~ Santiago Calatrava

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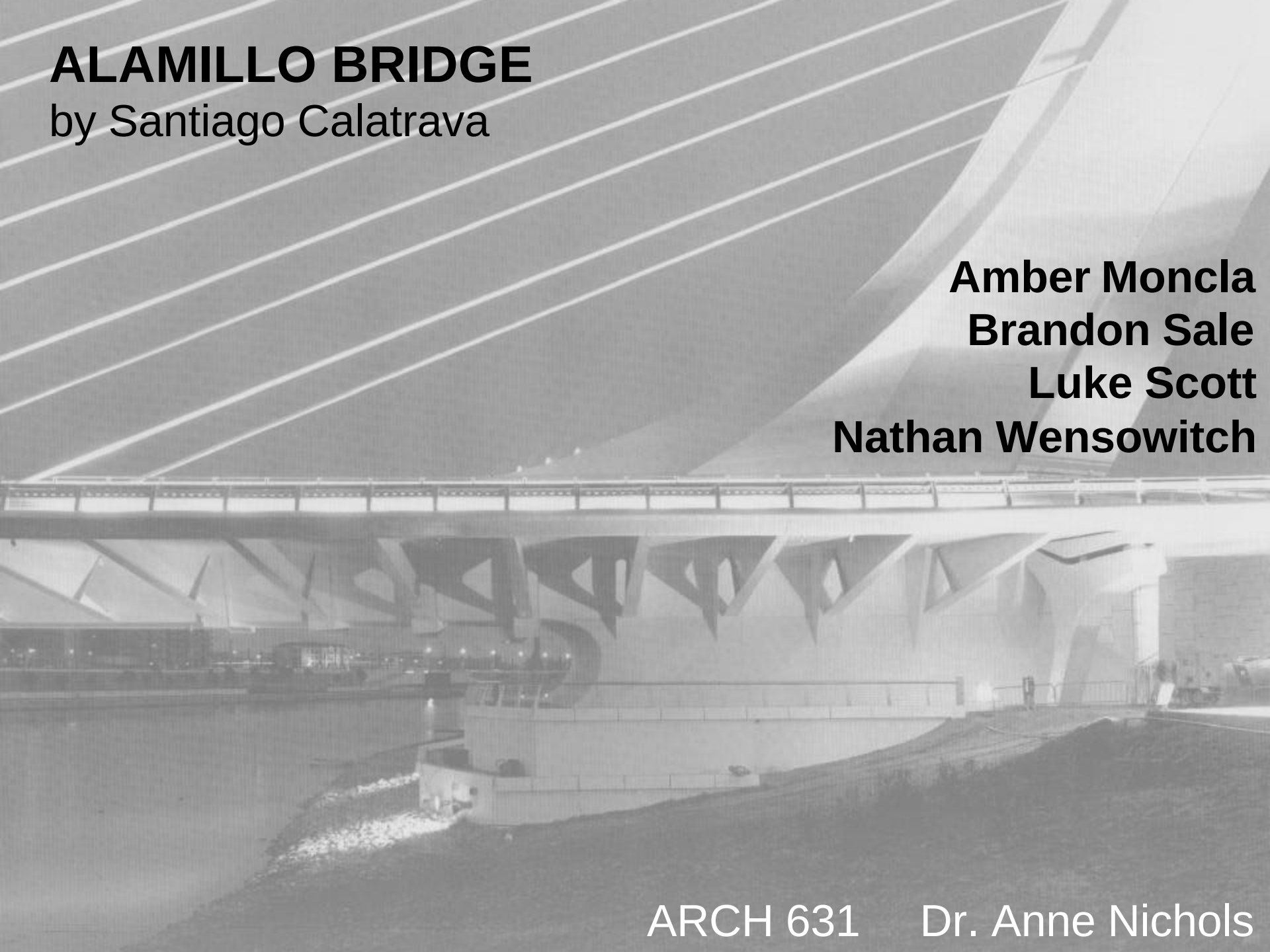

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