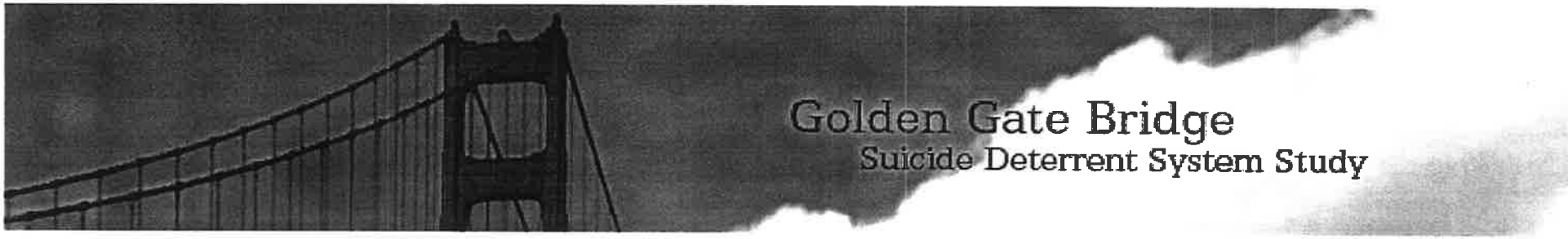
5/24/07
No 1 PPt

PHASE 1 - Wind Tunnel Testing of Generic Concepts

COMPLETED



www.ggbsuicidebarrier.org

Golden Gate Bridge
Suicide Deterrent System Study

Home
Study Overview
Engineering & Environmental
Get Involved / Comment
Library

GOLDEN GATE BRIDGE
Visit the Website

Welcome

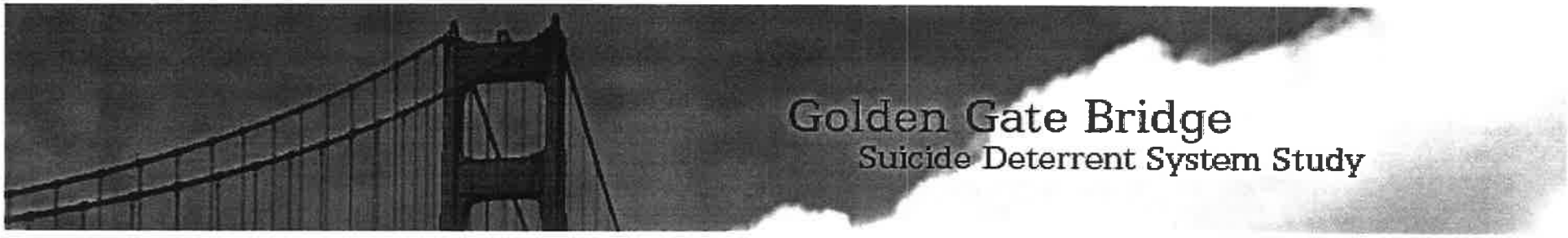
The Golden Gate Bridge, Highway and Transportation District (District), San Francisco, CA, initiated the Golden Gate Bridge Suicide Deterrent System Study (Study) in fall 2006. This special website has been created so that the public can easily access information as the Study progresses.

Stay Informed
To track the Study progress, we encourage you to take a moment and sign-up to receive email updates. We respect your privacy and will only use this information to send you information about this Study.

A user friendly comment form is available to provide input to the Study as it progresses.

What's New

The Phase 1 Wind Study Report is scheduled to be released on May 24, 2007 and will be posted on this website by noon. During Phase 1, several generic concepts for a potential suicide barrier underwent wind tunnel testing to determine the impact on the wind stability of the Bridge.



Board Process – 2 Phases

Phase 1 – It's All About Wind. A pass/fail test.

GOLDEN GATE BRIDGE SUICIDE DETERRENT SYSTEM STUDY
Key Milestones

2006 | 2007 | 2008

FALL | WINTER | SPRING | SUMMER | FALL | WINTER | SPRING

PHASE 1: Wind Tunnel Testing of Generic Concepts

Initiate Phase 1

Release Wind Study Report (May 24, 2007)

PHASE 2: Preliminary Engineering & Environmental Studies

Initiate Preliminary Environmental Studies

Formally Initiate Environmental Process

Public/Agency Input (30 days)

Release Draft EIR/EA

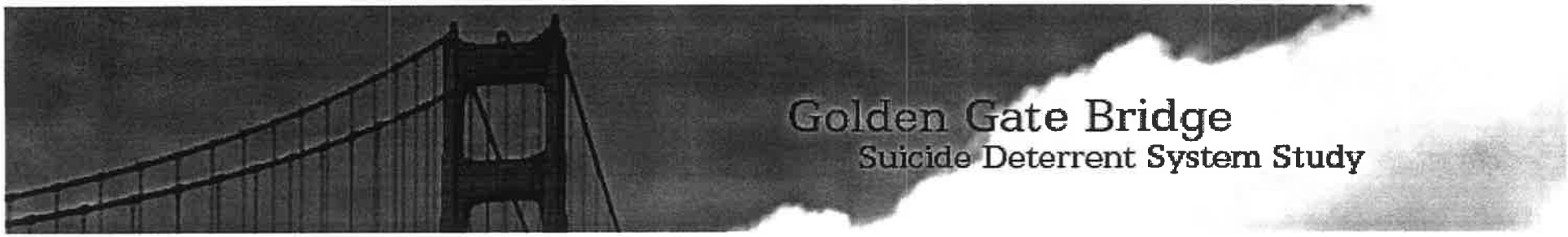
Public/Agency Review (45 days)

Release Final EIR/EA

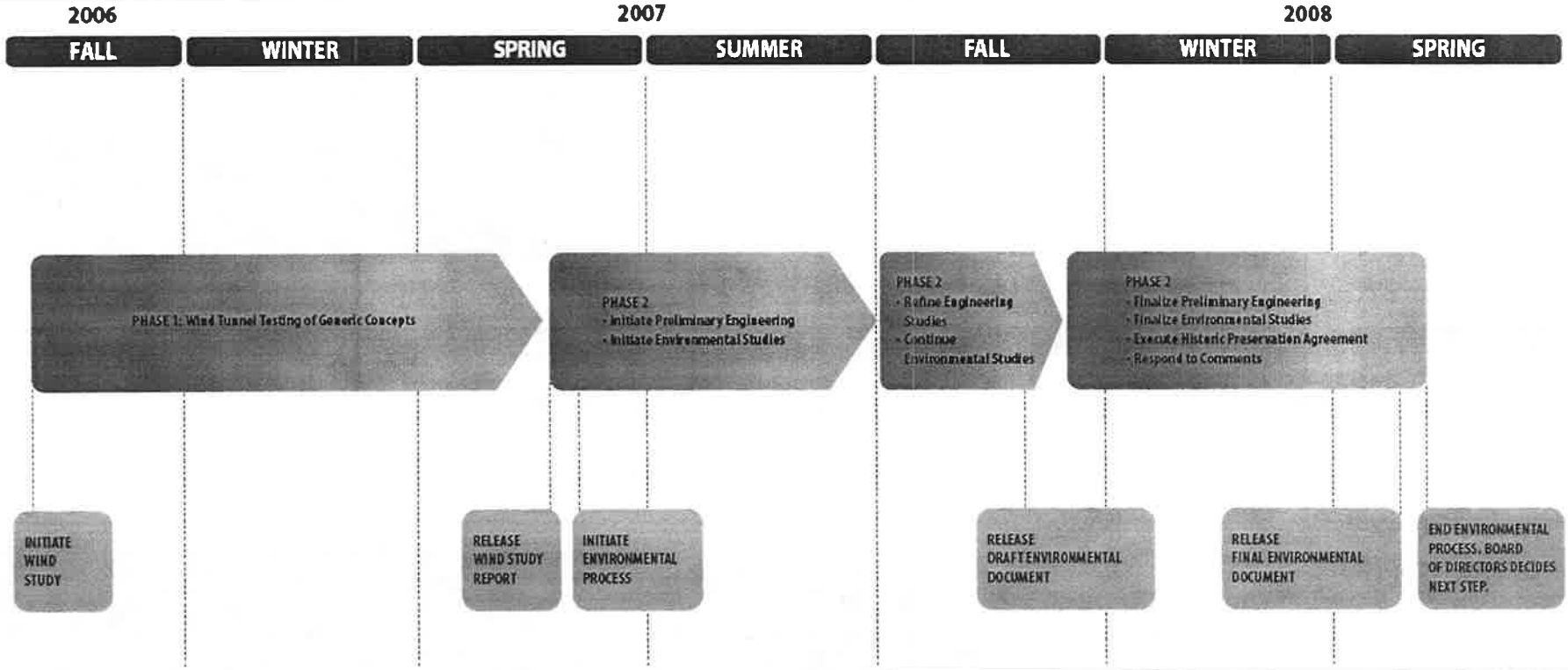
Public/Agency Review (30 days)

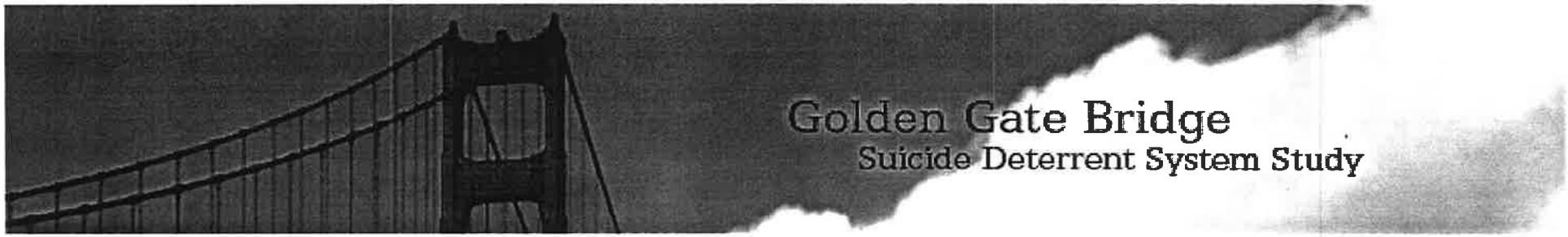
End Environmental Process

Board of Directors Decides Next Step

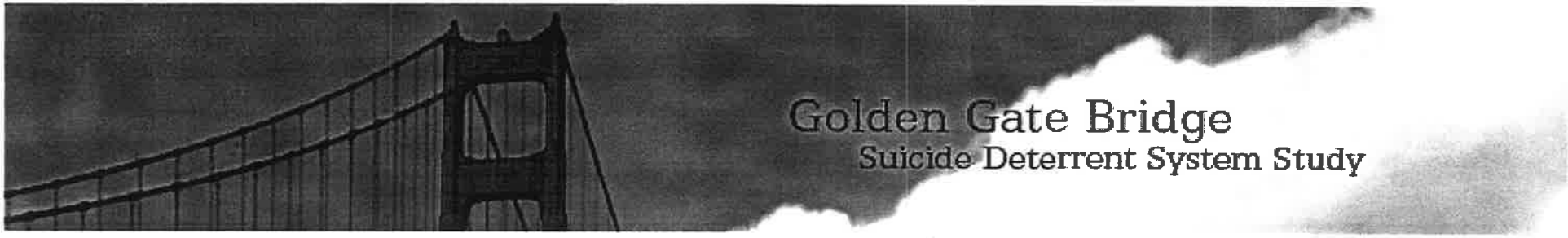


GOLDEN GATE BRIDGE SUICIDE DETERRENT SYSTEM STUDY
Concept Testing, Alternative Evaluation & Screening Process



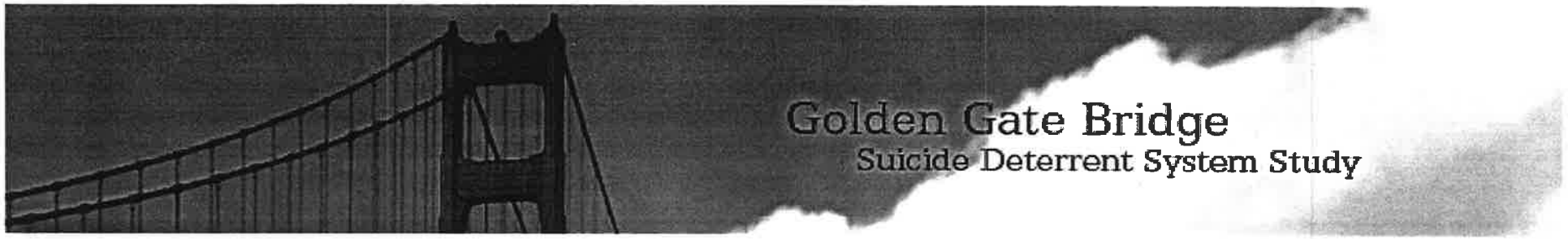


Phase 2 – Take what passes the wind test and overlay all other values



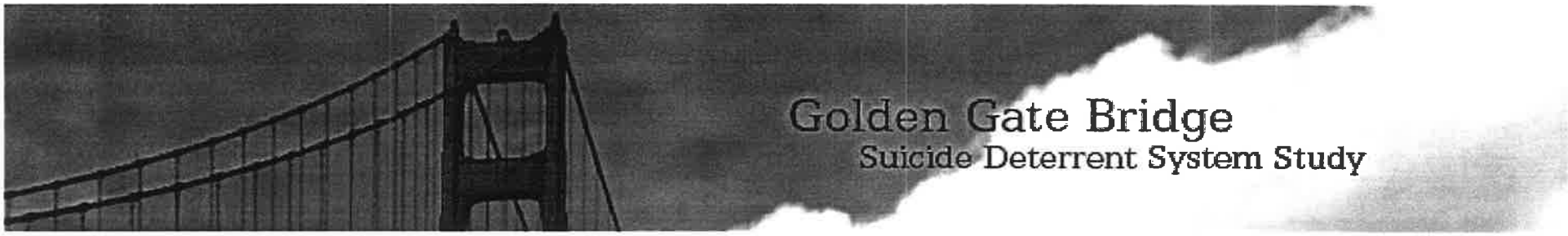
"Build" alternatives will be developed utilizing the results from the wind tunnel testing.

Consider & evaluate a "no-build" alternative as well as several "build" alternatives.

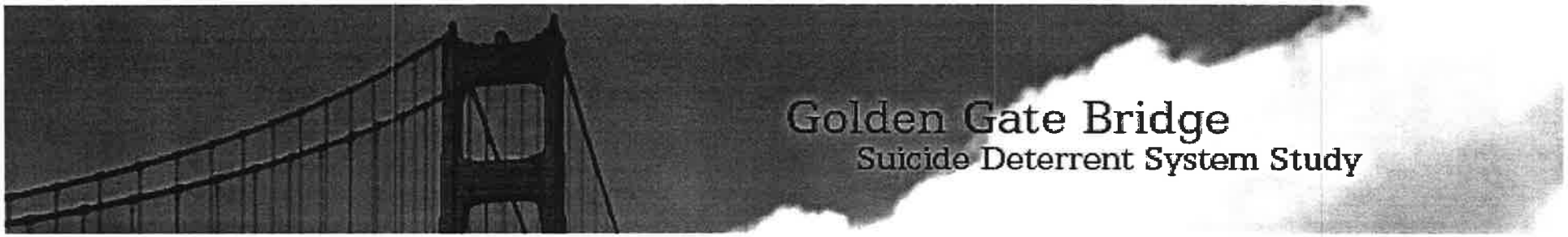


Each alternative will be evaluated against the adopted Board Criteria.

Each alternative will be evaluated for anticipated environmental impacts.



- Architectural Renderings
- Visual Impact Analysis
- Historic Preservation Considerations
- Maintenance & Operations Concerns
- Cost



GOLDEN GATE BRIDGE SUICIDE DETERRENT SYSTEM STUDY
Environmental Process Chart

- Notice of Preparation
- Scoping & Screening
- Environmental Technical Studies
  - Historic
  - Parklands
  - Visual
- Prepare Environmental Document
- Circulate Draft Environmental Document and Receive Public & Agency Input
- Identify Preferred Alternative
- Approvals and Release of Final Environmental Document
- Board Action on Environmental Document

GOLDEN GATE BRIDGE SUICIDE DETERRENT SYSTEM STUDY
Key Milestones

2006 | 2007 | 2008

FALL | WINTER | SPRING | SUMMER | FALL | WINTER | SPRING

PHASE 1: Wind Tunnel Testing of Generic Concepts

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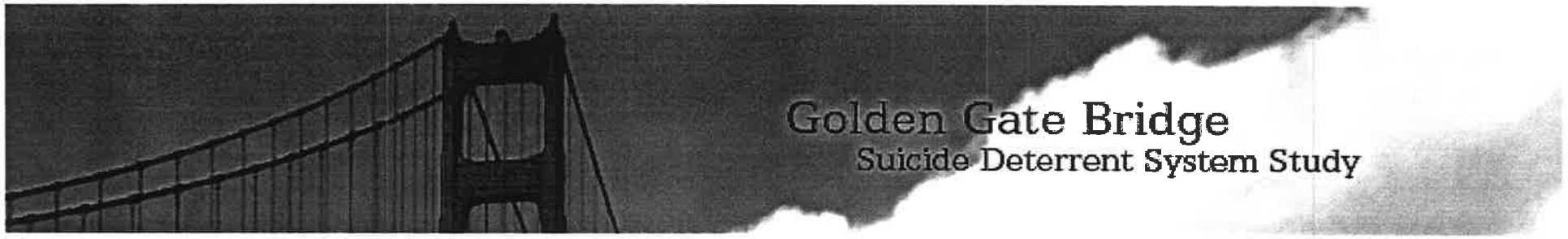
End Environmenal Process

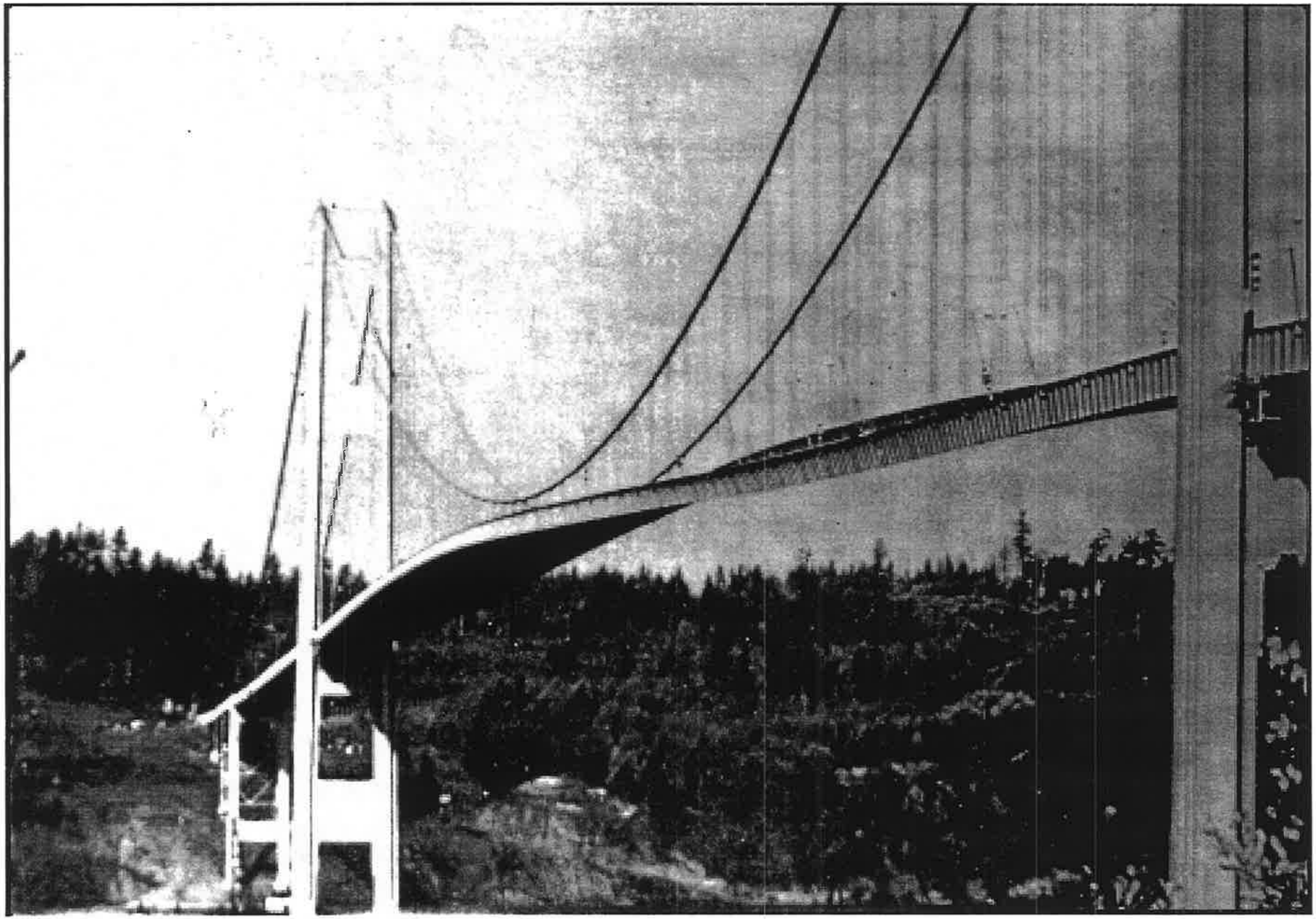
Board of Directors Decides Next Step

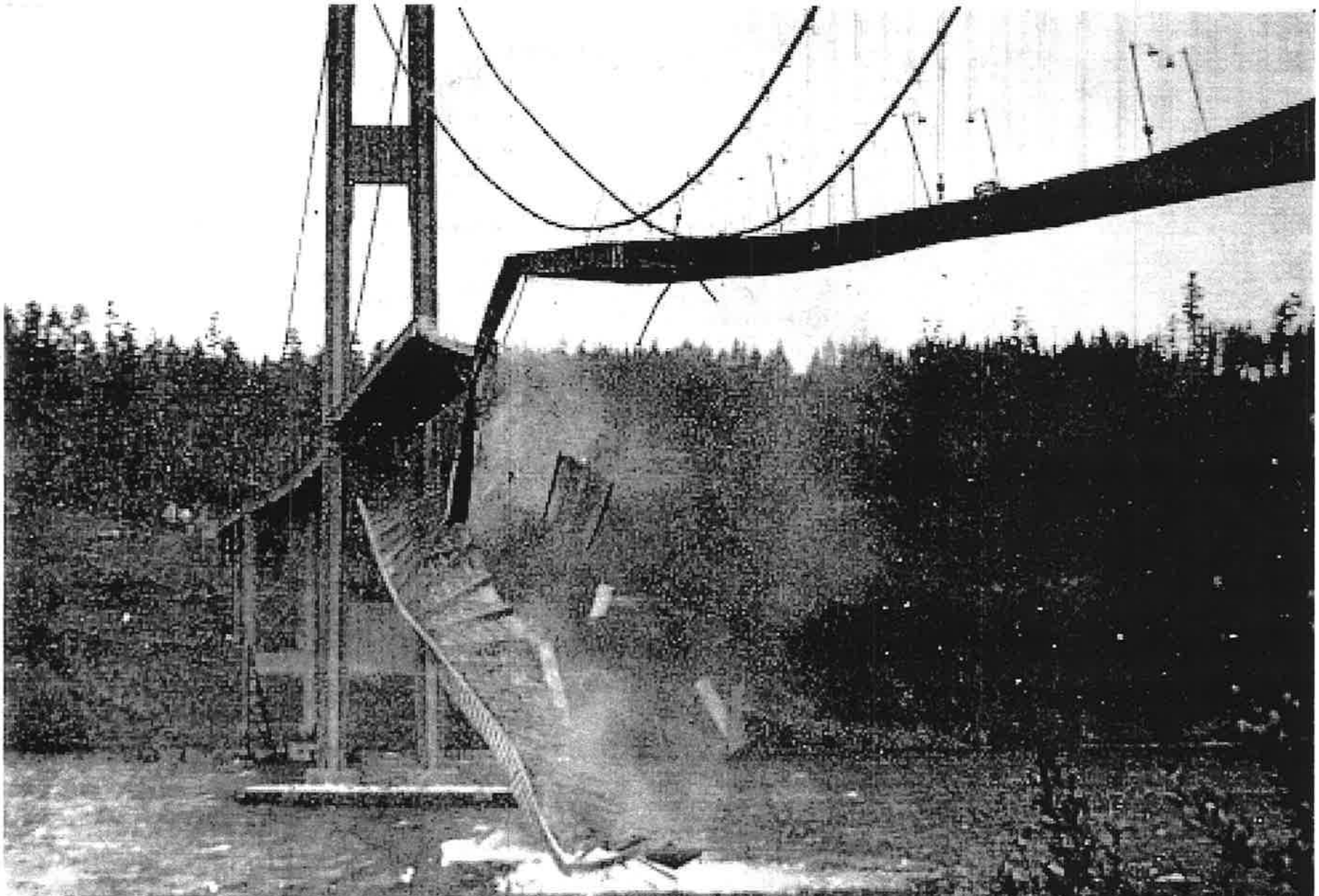


PHASE 1

RESULTS

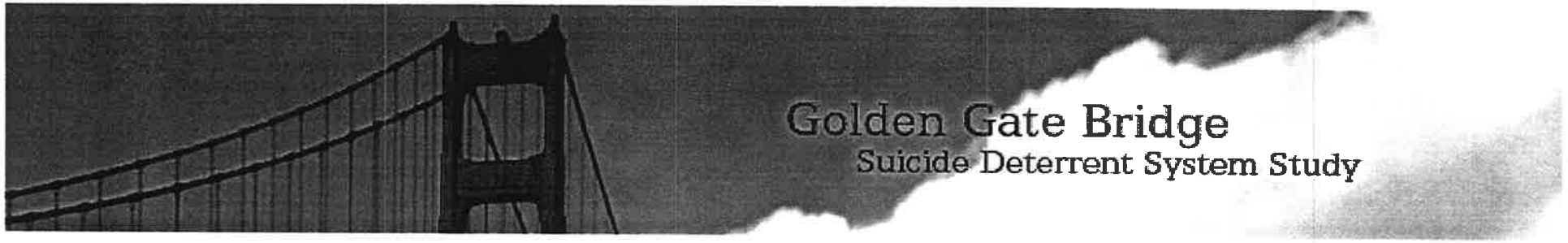
Why Wind is Important





THREE GENERIC CONCEPTS:

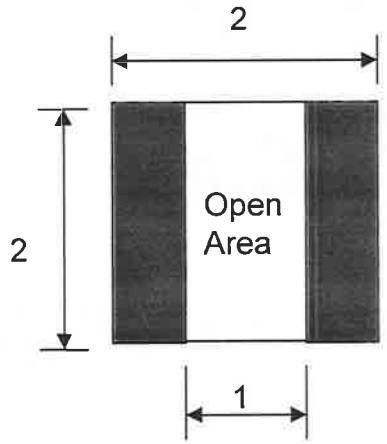
1. Add on to the existing railing
2. Replace the existing railing
3. Nets that extend out horizontally



Different variables for each concept:

1. Height
2. "Solid Ratio"
3. "Wind Devices"

SOLID RATIO

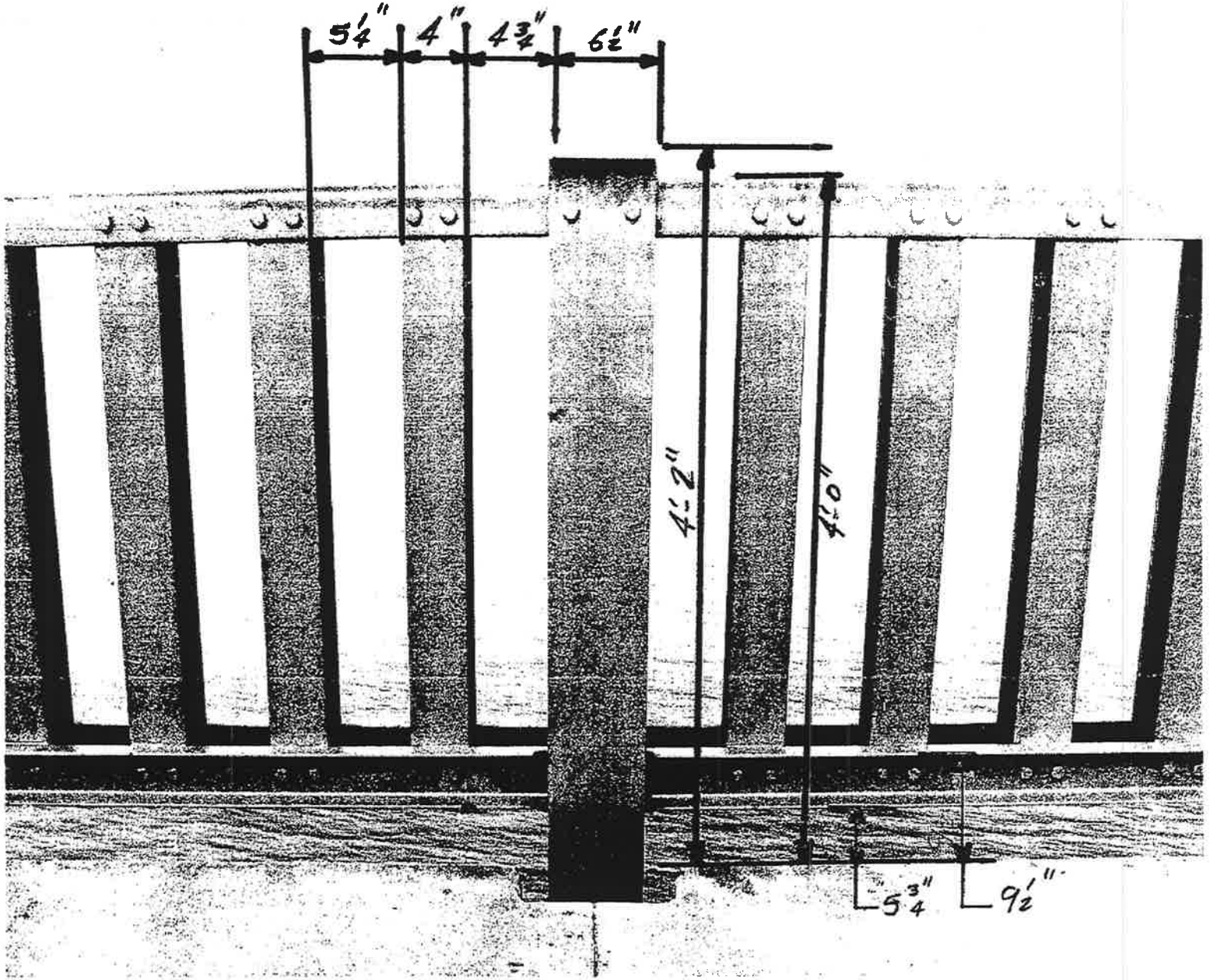


Solid Ratio % = (Solid Area) / (Total Area) x 100

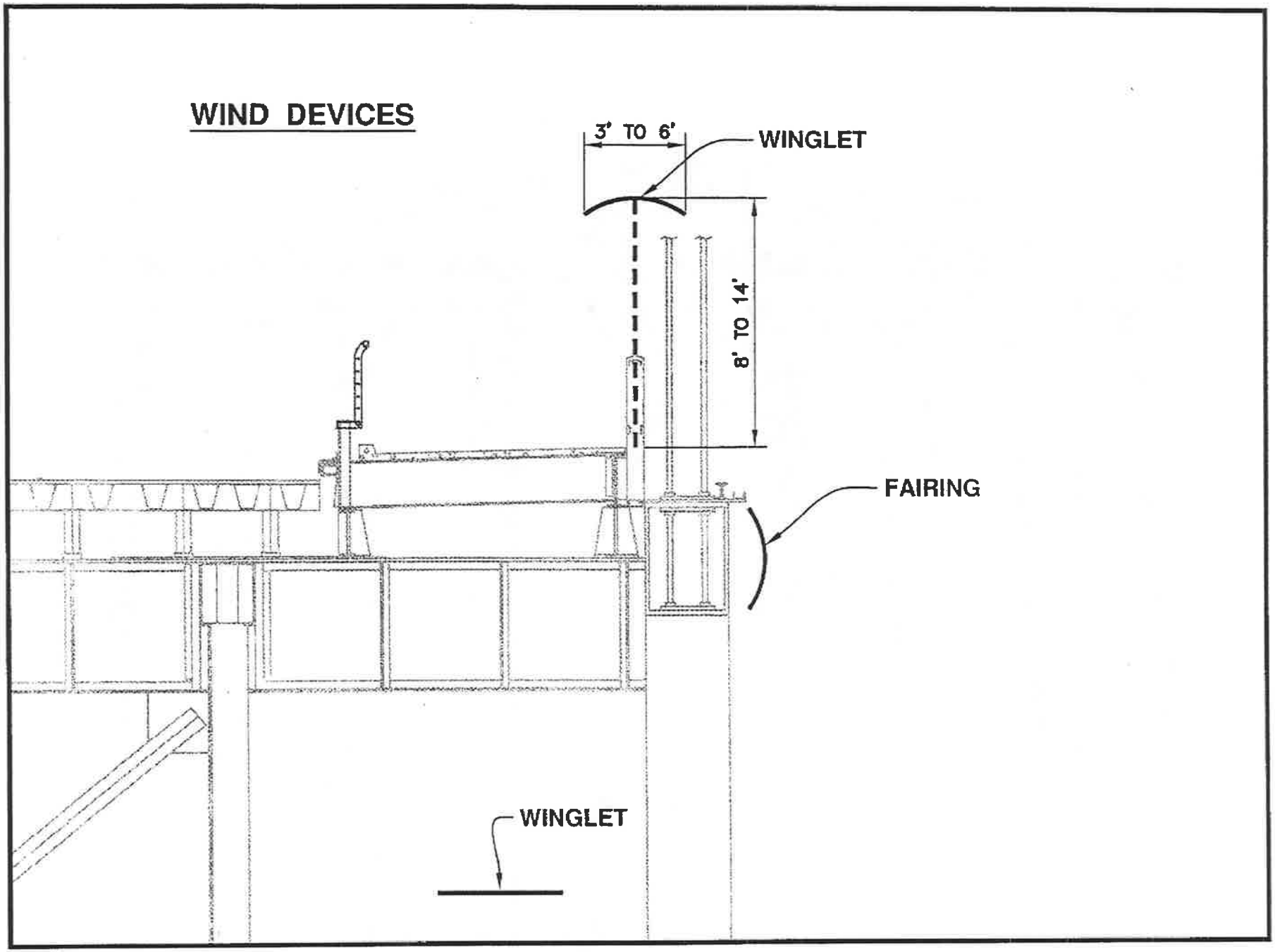
Solid Area = 2 x 1 = 2

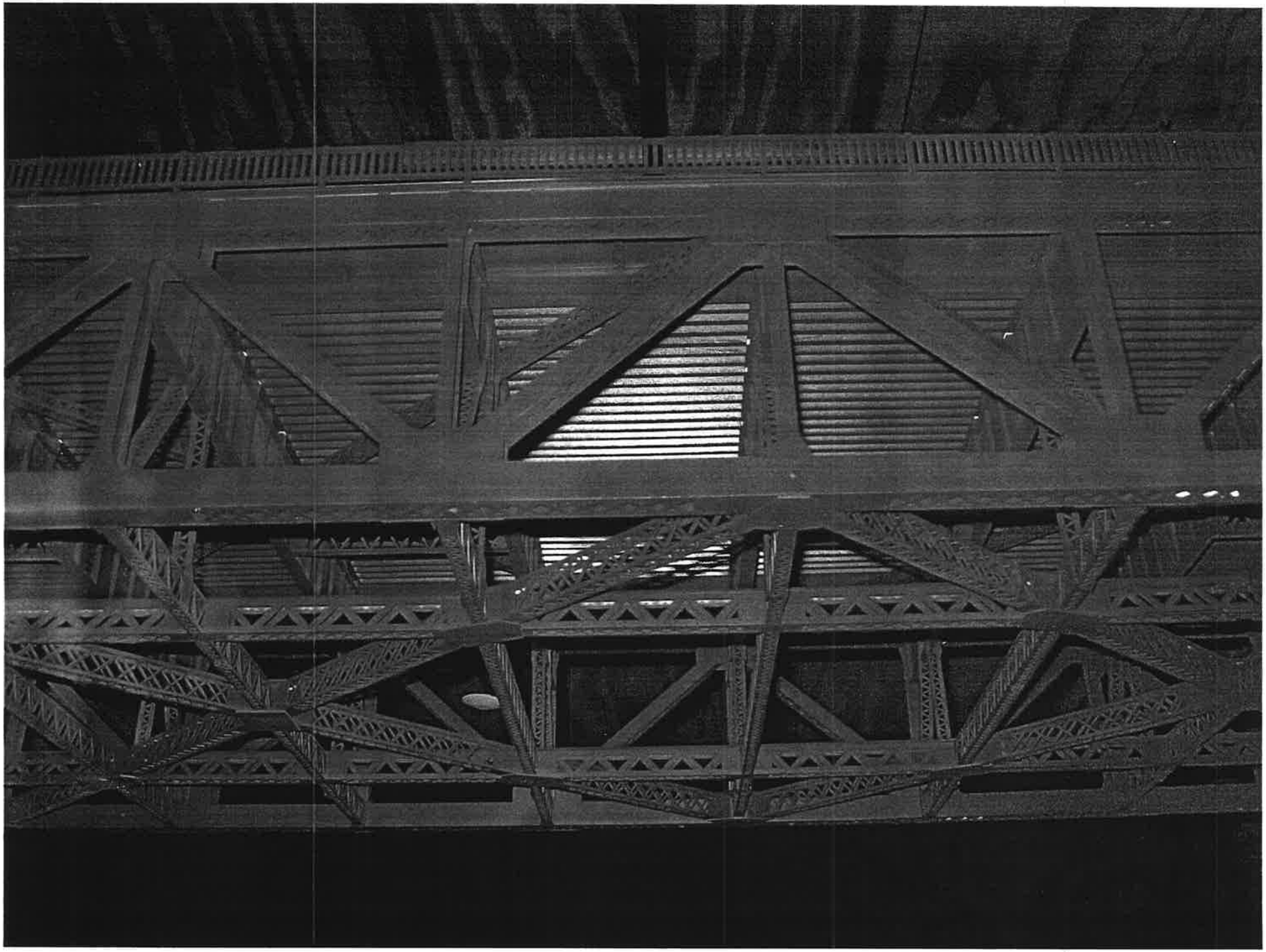
Total Area = 2 x 2 = 4

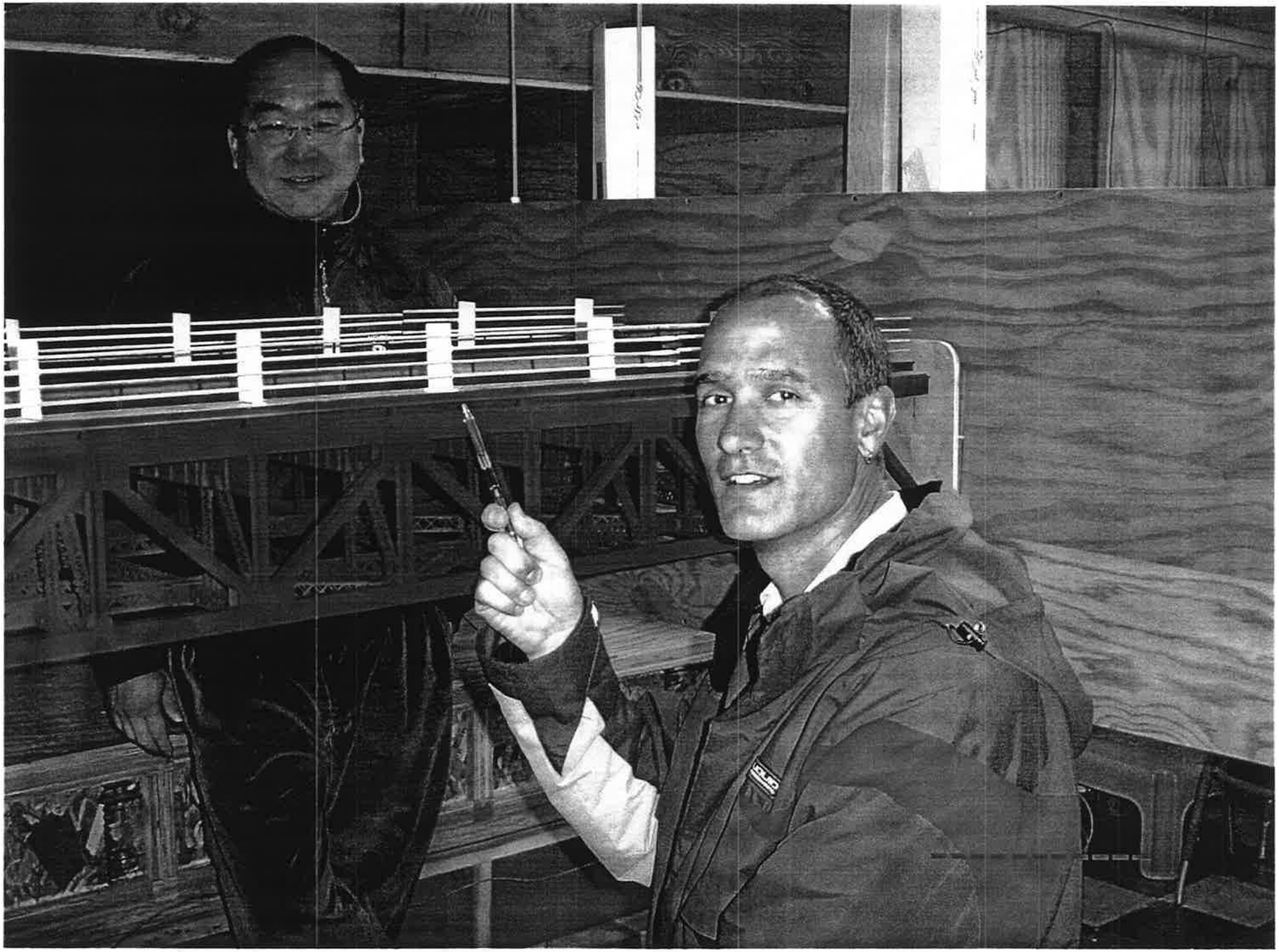
Solid Ratio = 2/4 x 100 = **50%**

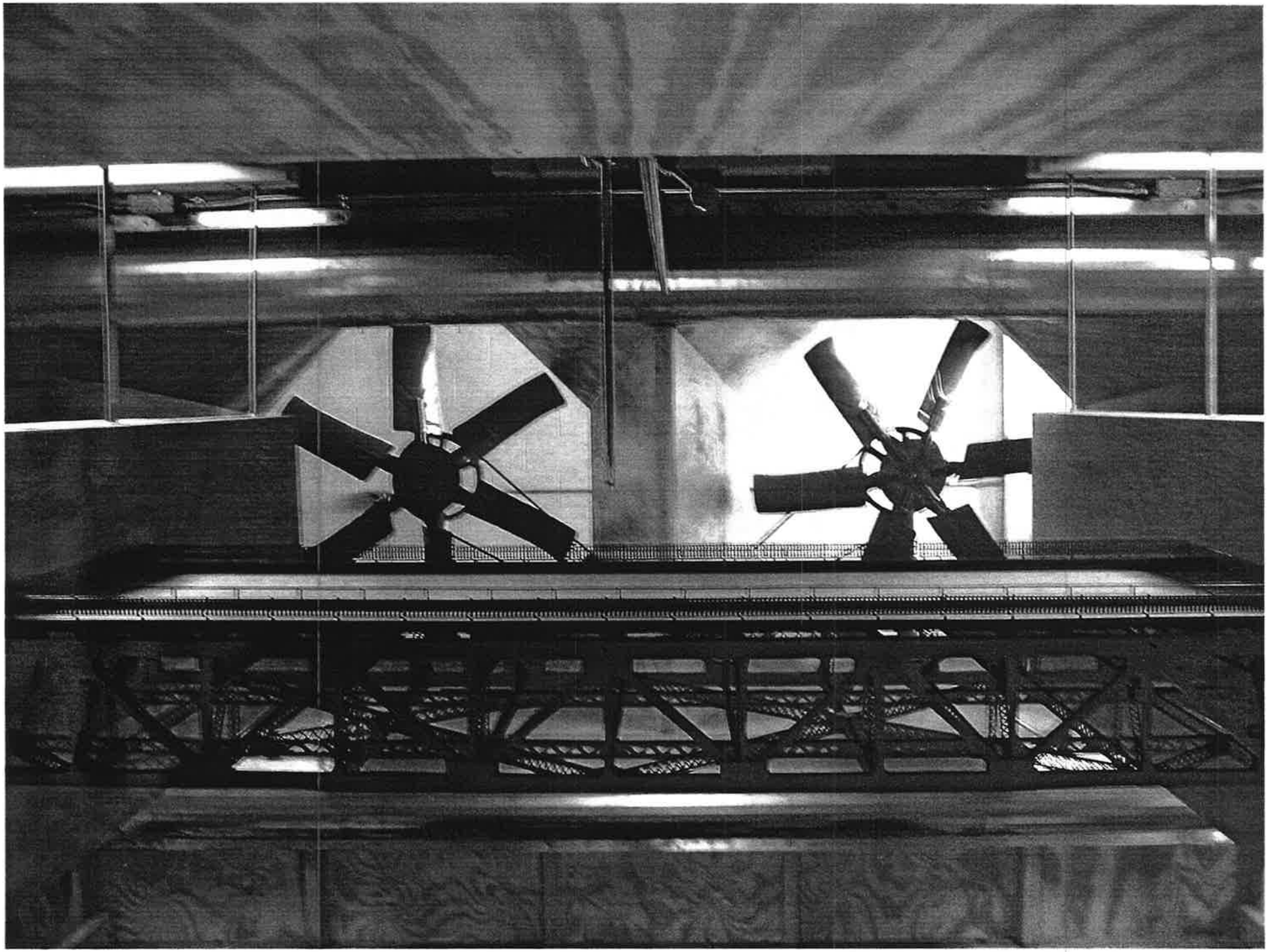

5¼"
4"
4¾"
6½"
4'-2"
4'-0"
5¾"
9½"

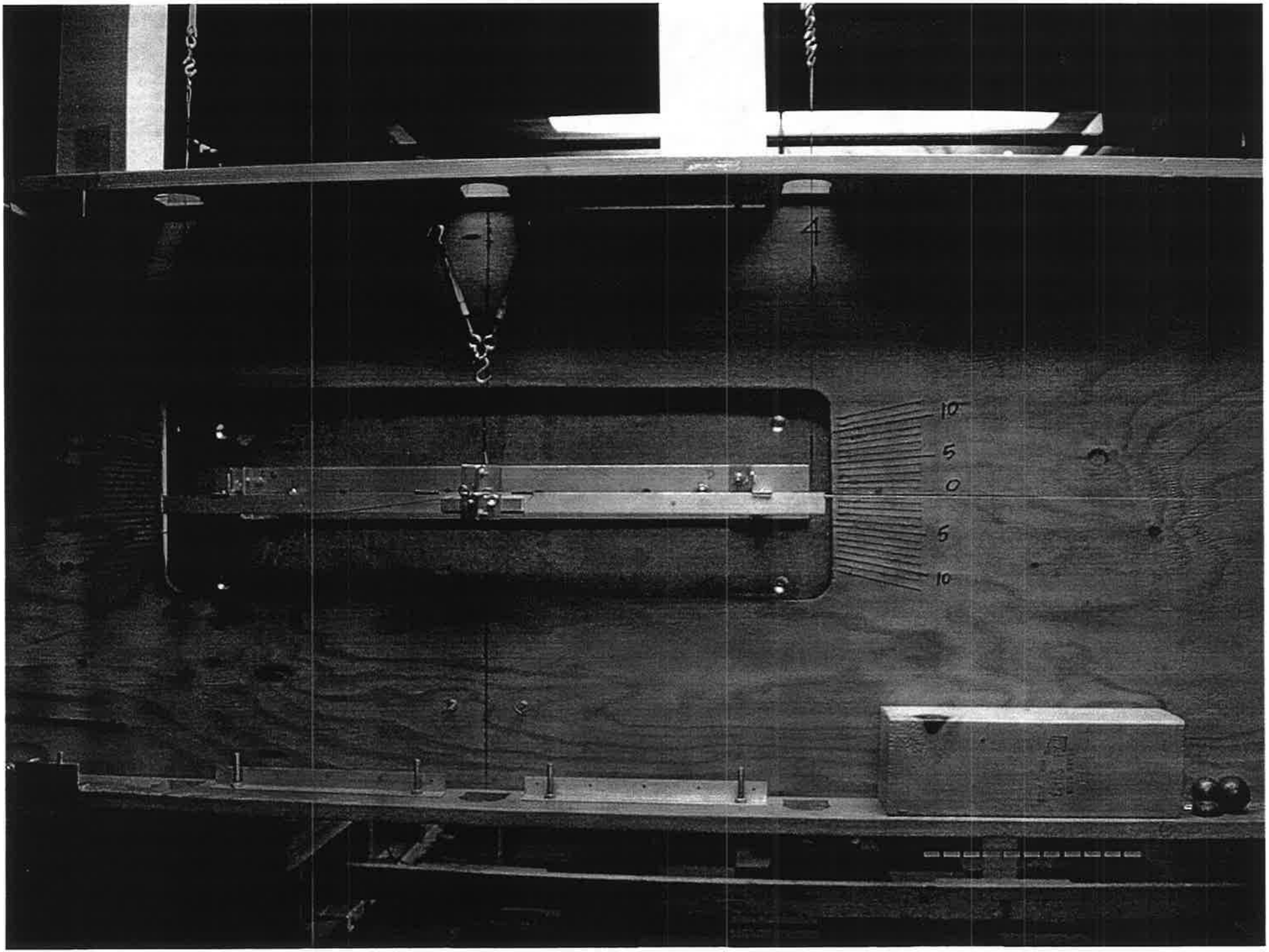
WIND DEVICES

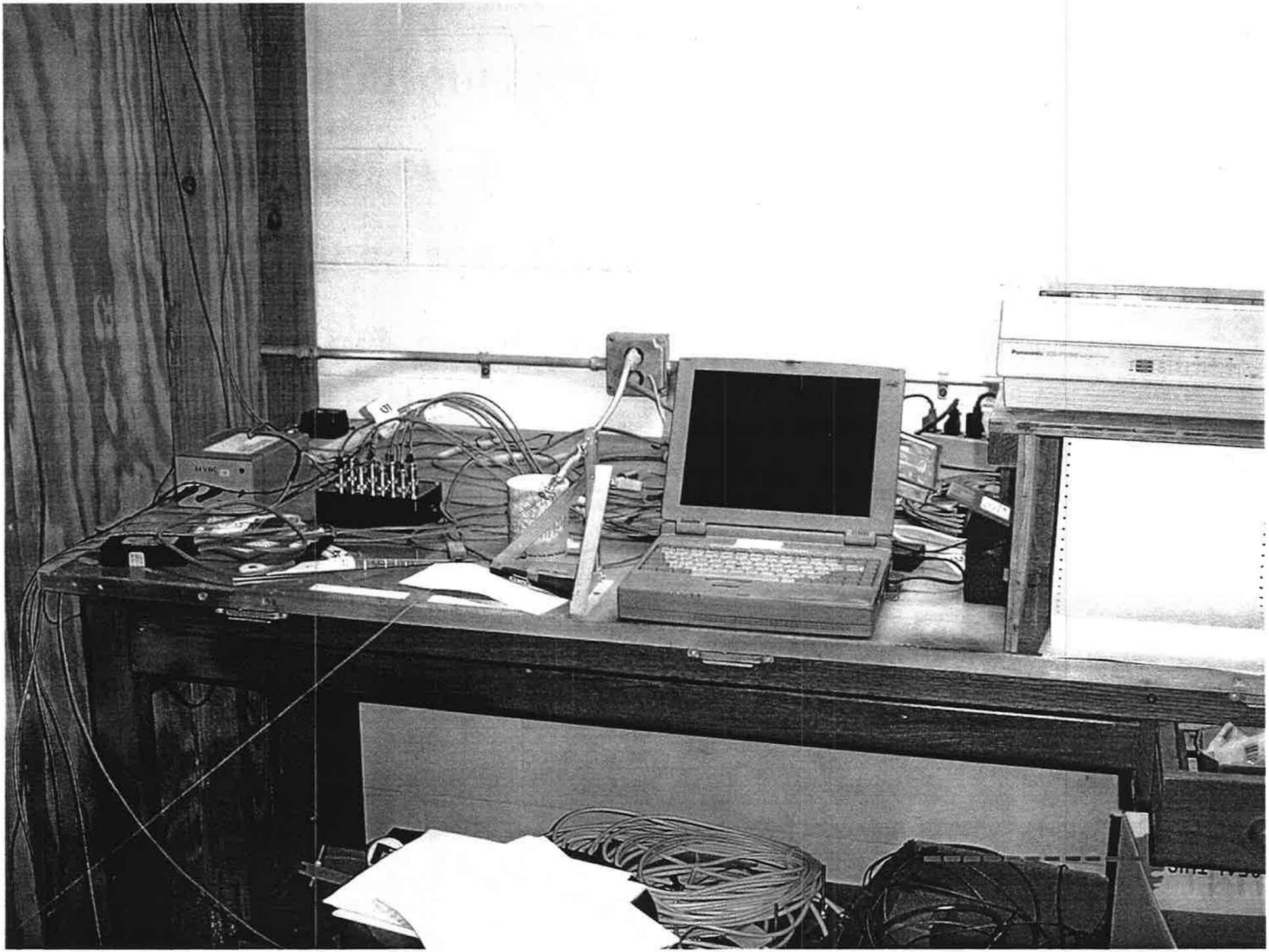









10
5
0
5
10

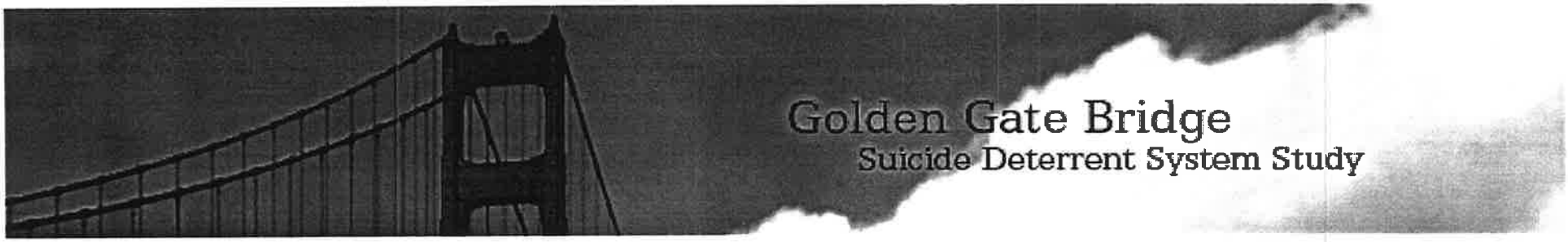


Findings from Wind Tunnel Testing

- Various railing heights are acceptable
  (8'-14' tall)
- Can't be very solid (12%-24% solid)
- Wind Devices are necessary

  Visible; or

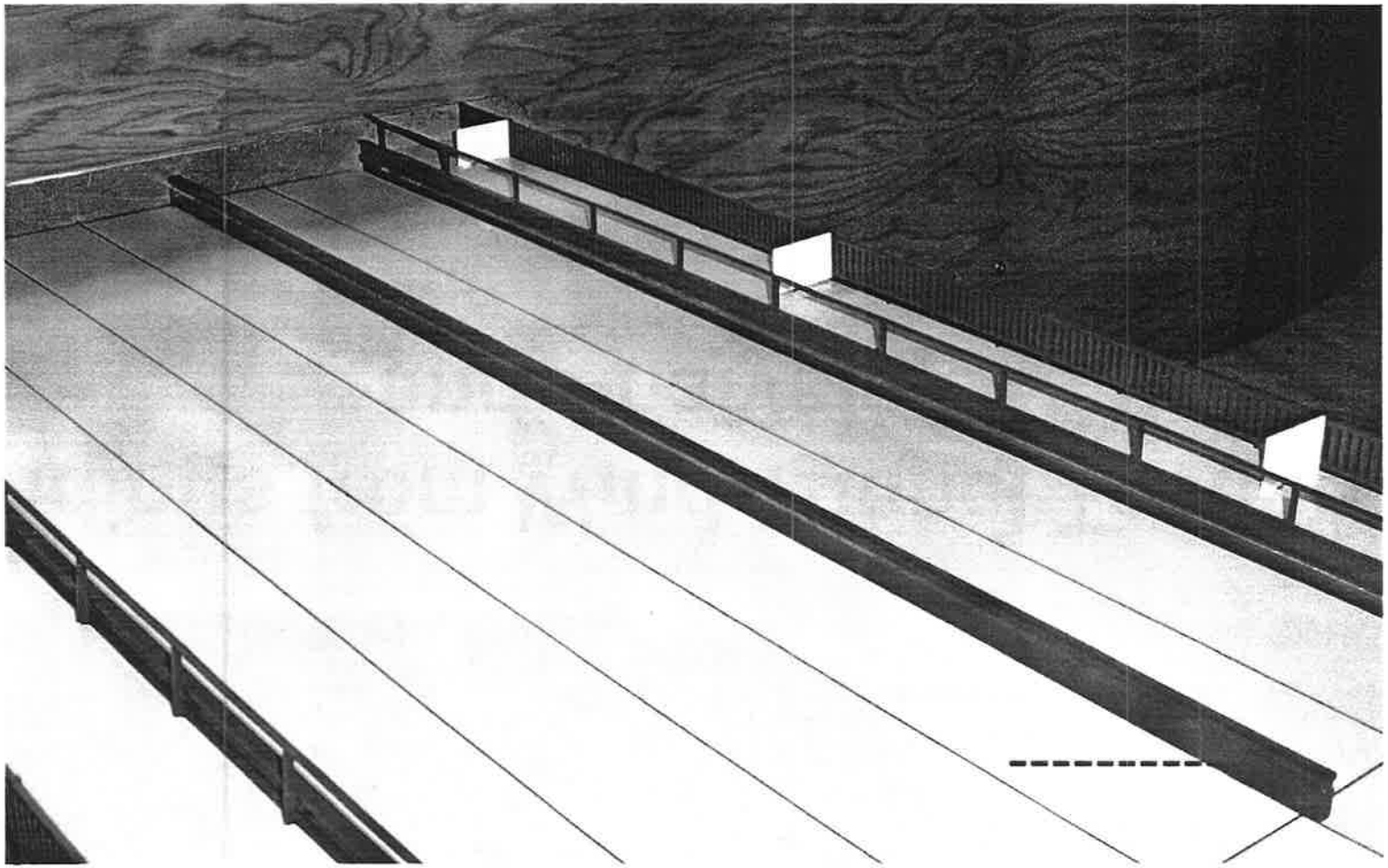
  Hidden from view

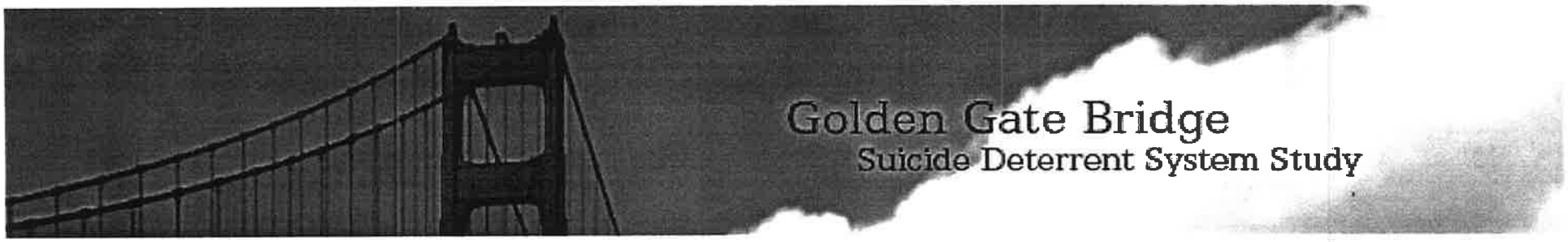


Findings from Wind Tunnel Testing and Analysis

- Workable net option requires replicated existing railing.
- Only option for keeping existing railing requires a winglet on top of railing attachment. Hidden wind devices don't work.

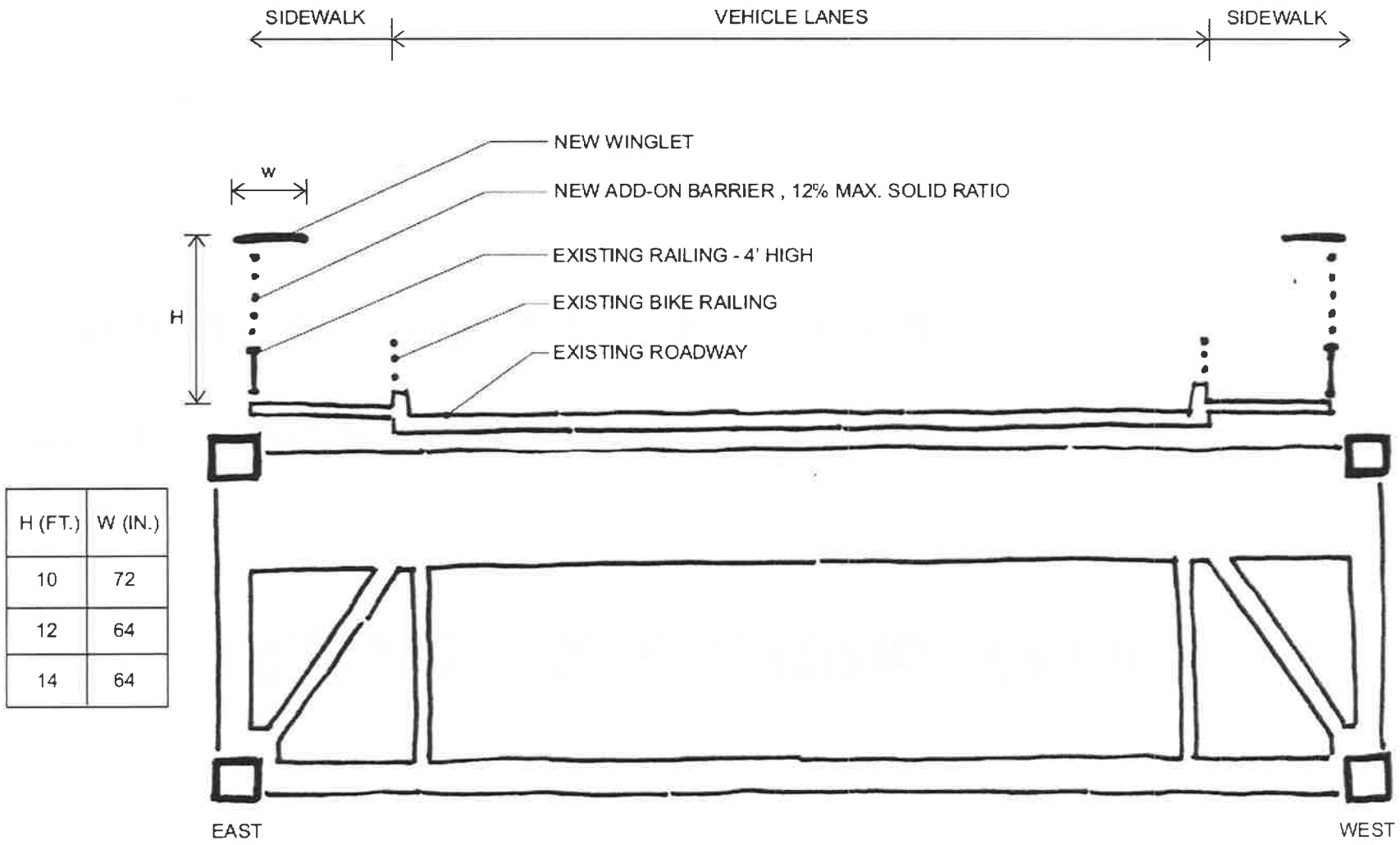
Moveable Median Barrier does not create wind instability.





Add-on to Existing Railing

- Requires a visible wind device.
- Hidden wind devices don't work.



H (FT.)	W (IN.)
10	72
12	64
14	64

FIGURE 1.1 - CONCEPT 1 : ADDING TO THE EXISTING RAILING
SCALE : NOT TO SCALE

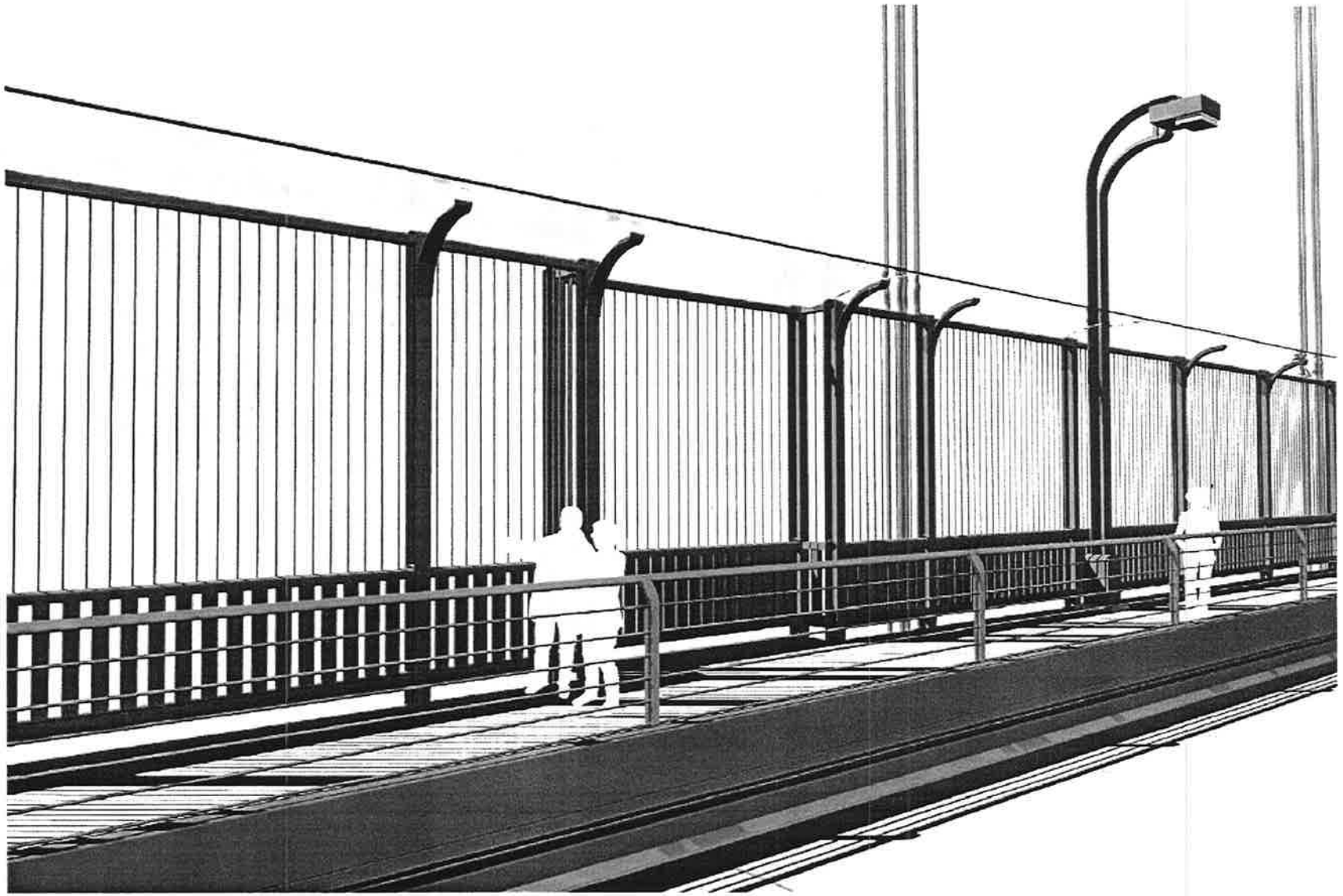


FIGURE 1.2a - EXAMPLE OF CONCEPT 1 (EXAMPLE SHOWN WITH HEIGHT OF 14'-0" TRANSPARENT WINGLET OF 64", VERTICAL MEMBERS SPACED AT 6", SOLID RATIO OF 12%) *VIEW FROM ROADWAY*

FIGURE 1.2b - EXAMPLE OF CONCEPT 1 (EXAMPLE SHOWN WITH HEIGHT OF 14'-0" TRANSPARENT WINGLET OF 64", VERTICAL MEMBERS SPACED AT 6", SOLID RATIO OF 12%) *VIEW FROM SIDEWALK*

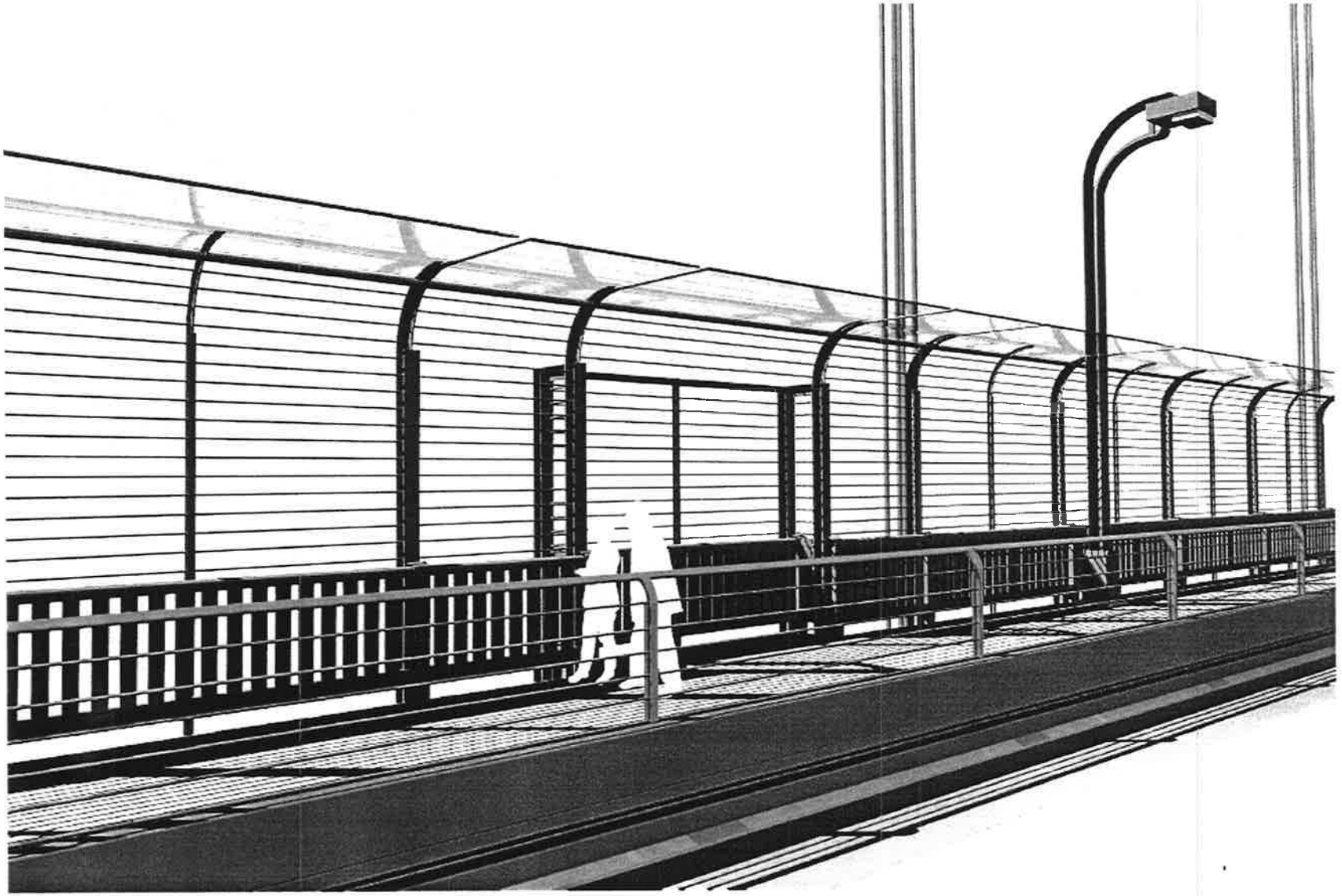


FIGURE 1.3a - EXAMPLE OF CONCEPT 1 (EXAMPLE SHOWN WITH HEIGHT OF 12'-0" TRANSPARENT WINGLET OF 64", HORIZONTAL MEMBERS SPACED AT 6", SOLID RATIO OF 9%) *VIEW FROM ROADWAY*

FIGURE 1.3b - EXAMPLE OF CONCEPT 1 (EXAMPLE SHOWN WITH HEIGHT OF 12'-0" TRANSPARENT WINGLET OF 64", HORIZONTAL MEMBERS SPACED AT 6", SOLID RATIO OF 9%) *VIEW FROM SIDEWALK*

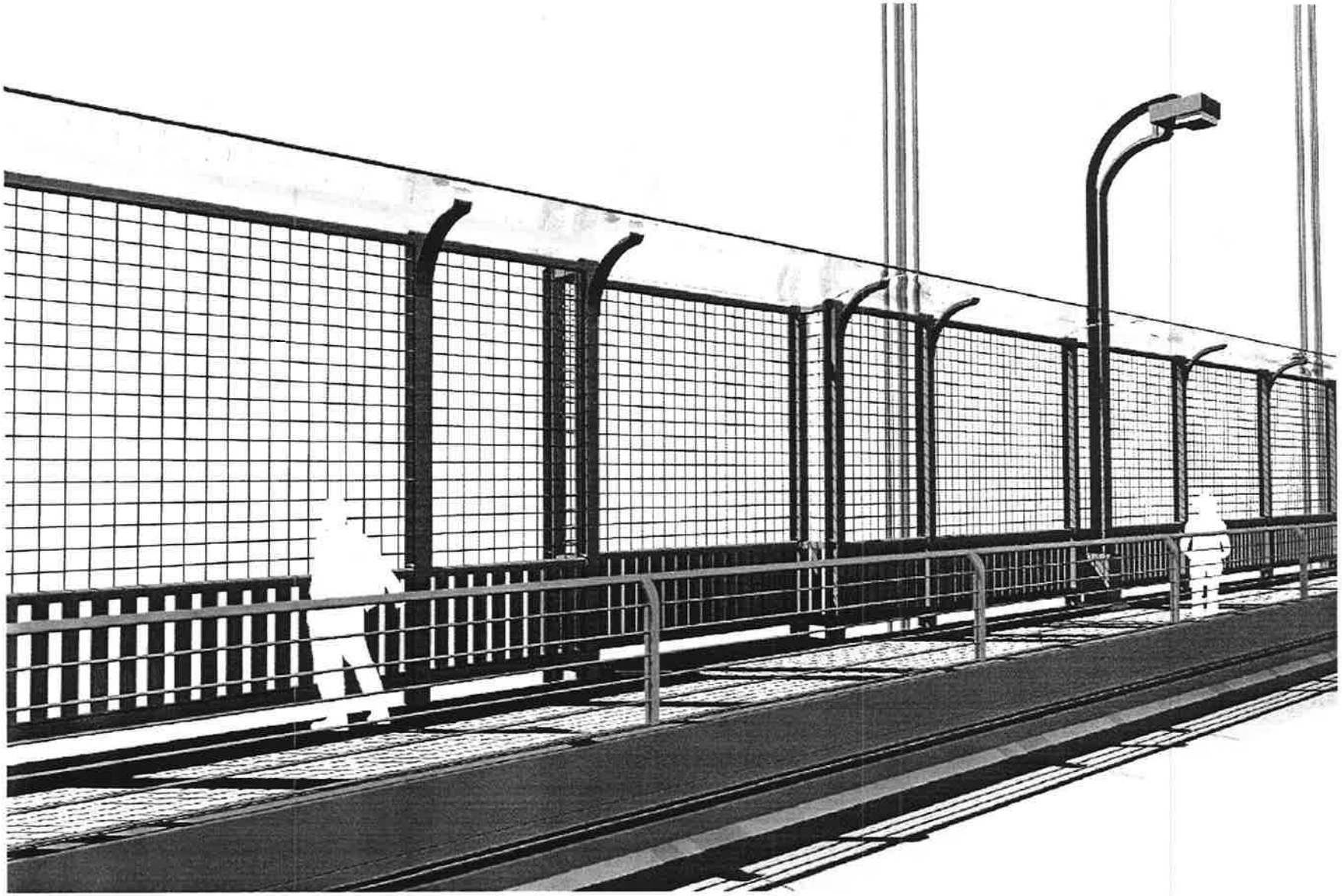


FIGURE 1.4a - EXAMPLE OF CONCEPT 1 (EXAMPLE SHOWN WITH HEIGHT OF 14'-0" TRANSPARENT WINGLET OF 64", VERTICAL AND HORIZONTAL WIRE MESH OF 6", SOILD RATIO OF 11%) *VIEW FROM ROADWAY*

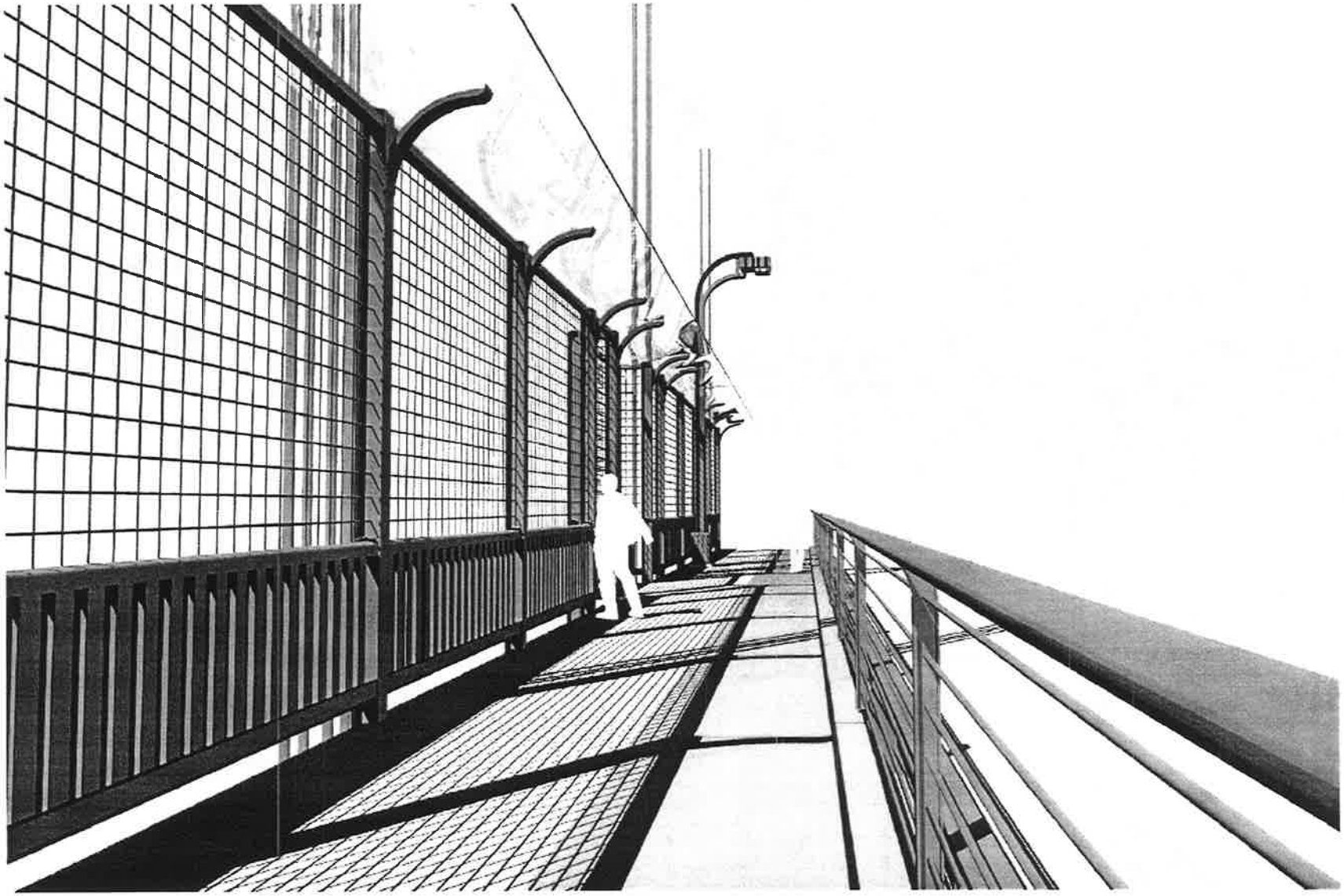
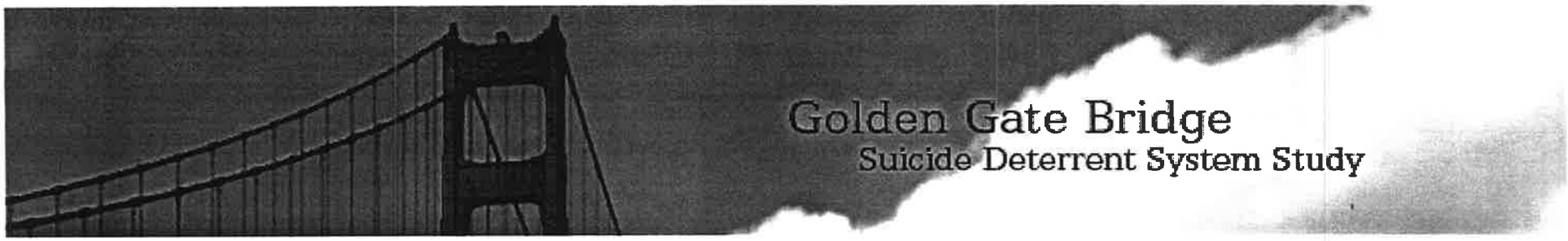


FIGURE 1.4b - EXAMPLE OF CONCEPT 1 (EXAMPLE SHOWN WITH HEIGHT OF 14'-0" TRANSPARENT WINGLET OF 64", VERTICAL AND HORIZONTAL WIRE MESH OF 6", SOILD RATIO OF 11%) *VIEW FROM SIDEWALK*



Replace the Existing Railing

- Not encumbered with relatively solid existing railing
- Lots more design flexibility
- Hidden or visible wind devices work
- Barrier can be inclined 20 degrees inboard or outboard

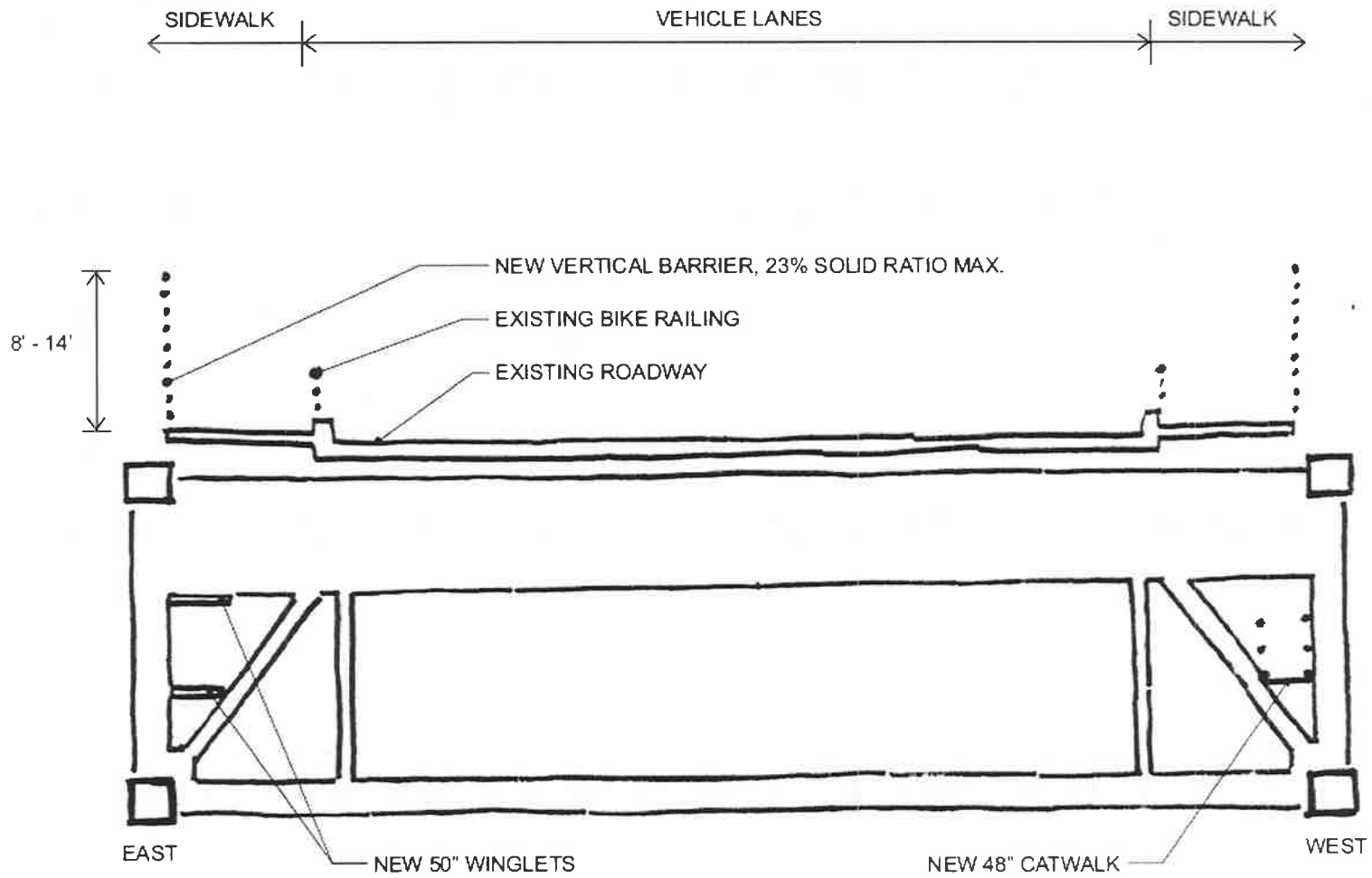
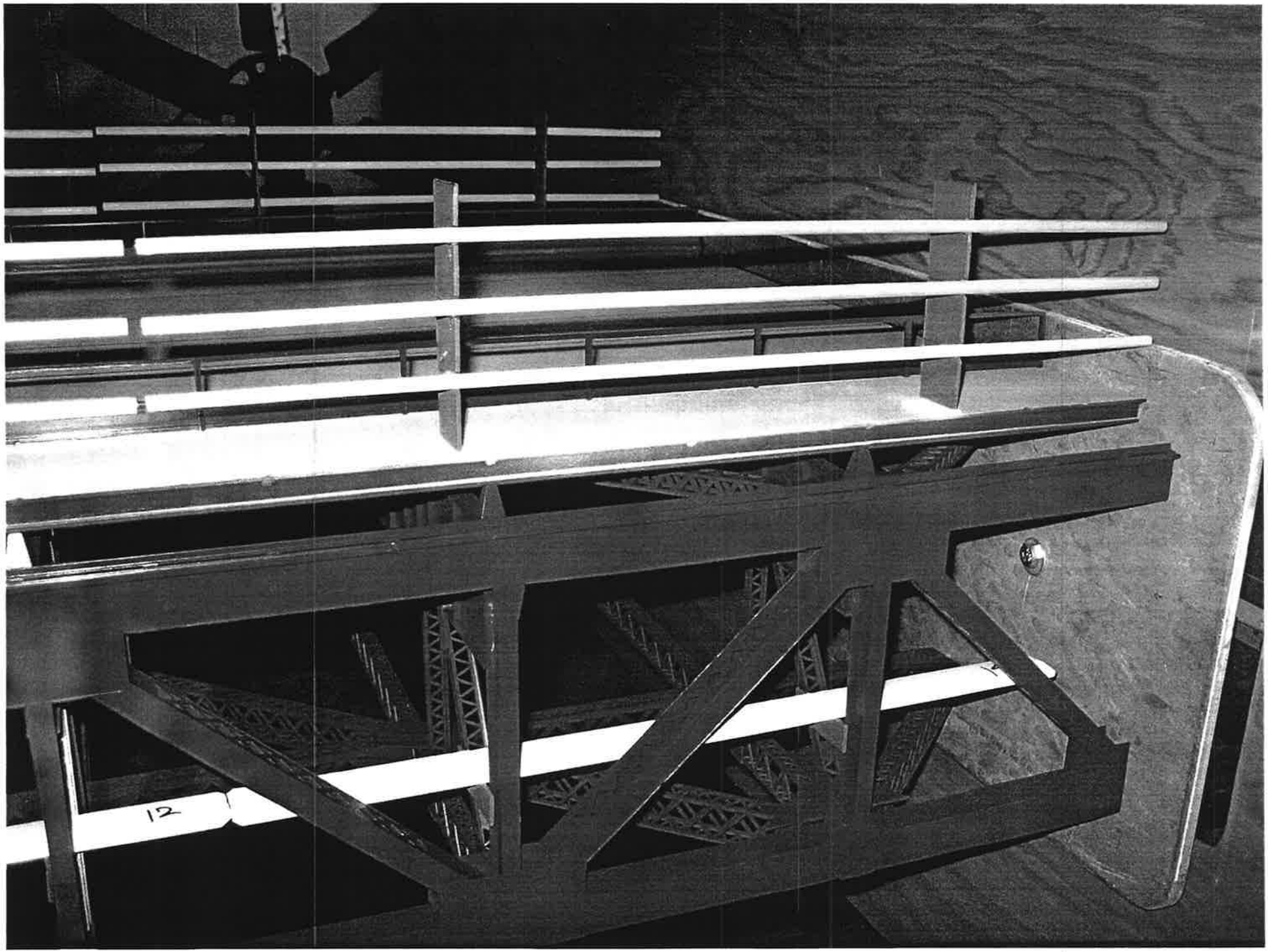


FIGURE 2.1 - CONCEPT 2 : REPLACING THE EXISTING RAILING; WINGLETS UNDER DECK
SCALE : NOT TO SCALE8


12

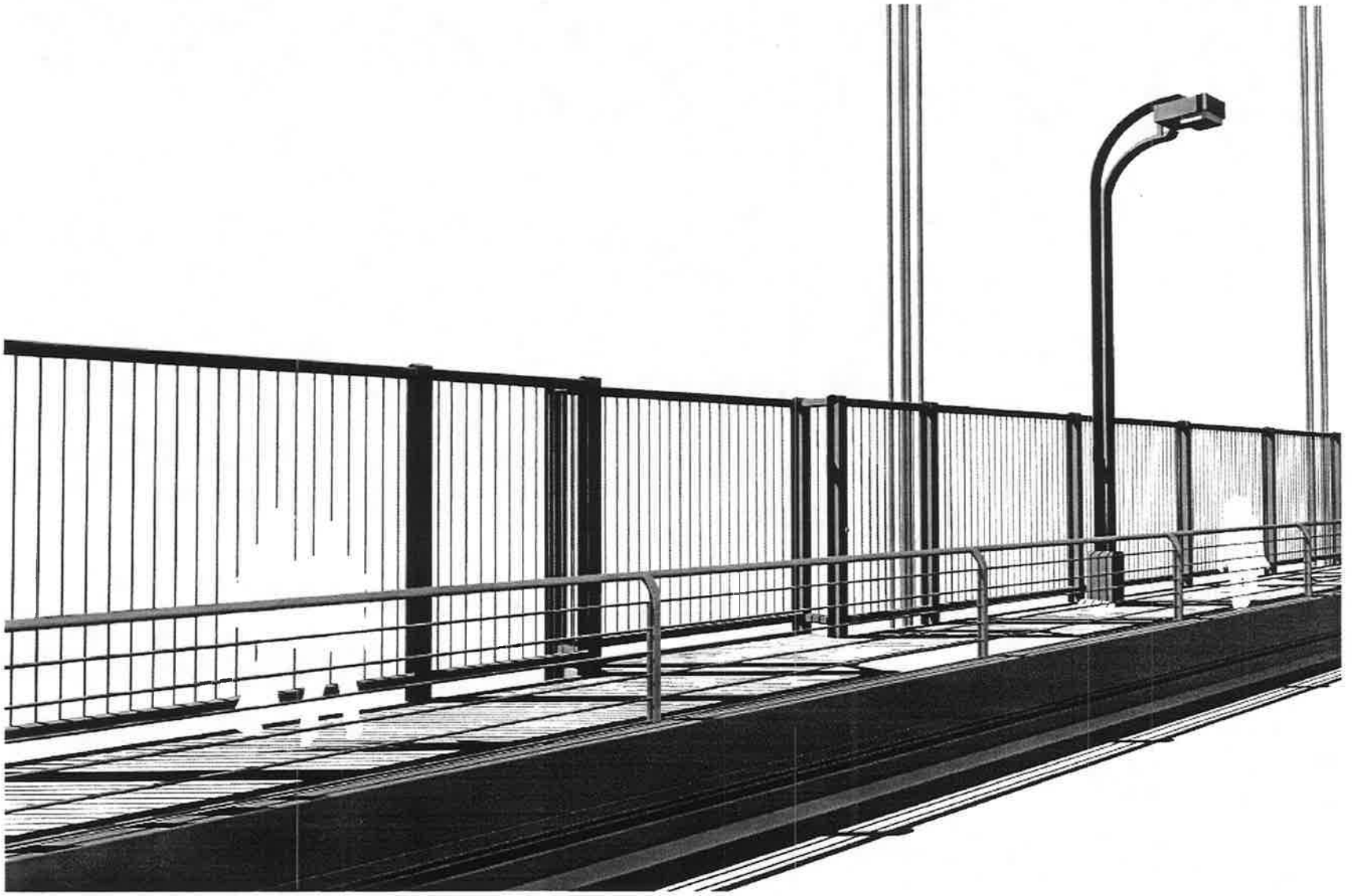


FIGURE 2.2a - EXAMPLE OF CONCEPT 2 (EXAMPLE SHOWN WITH HEIGHT OF 10'-0", NO VISIBLE WINGLET ; 50" UNDER DECK WINGLET ON EAST SIDE AND 48" CATWALK ON WEST SIDE, VERTICAL ROD MEMBERS SPACED AT 6", SOLID RATIO OF 18%)
VIEW FROM ROADWAY

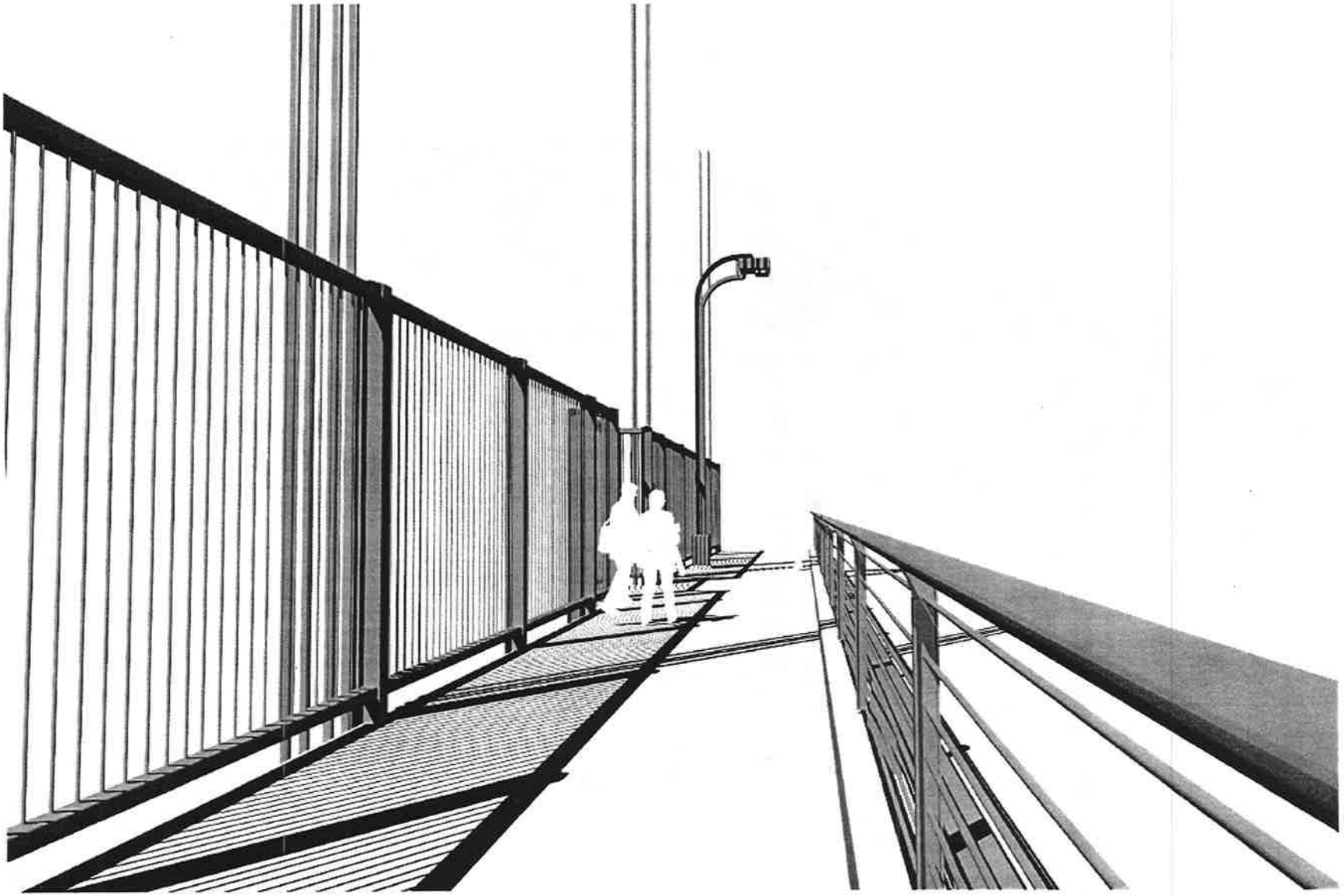


FIGURE 2.2b - EXAMPLE OF CONCEPT 2 (EXAMPLE SHOWN WITH HEIGHT OF 10'-0", NO VISIBLE WINGLET; 50" UNDER DECK WINGLET ON EAST SIDE AND 48" CATWALK ON WEST SIDE, VERTICAL ROD MEMBERS SPACED AT 6", SOLID RATIO OF 18%)
VIEW FROM SIDEWALK

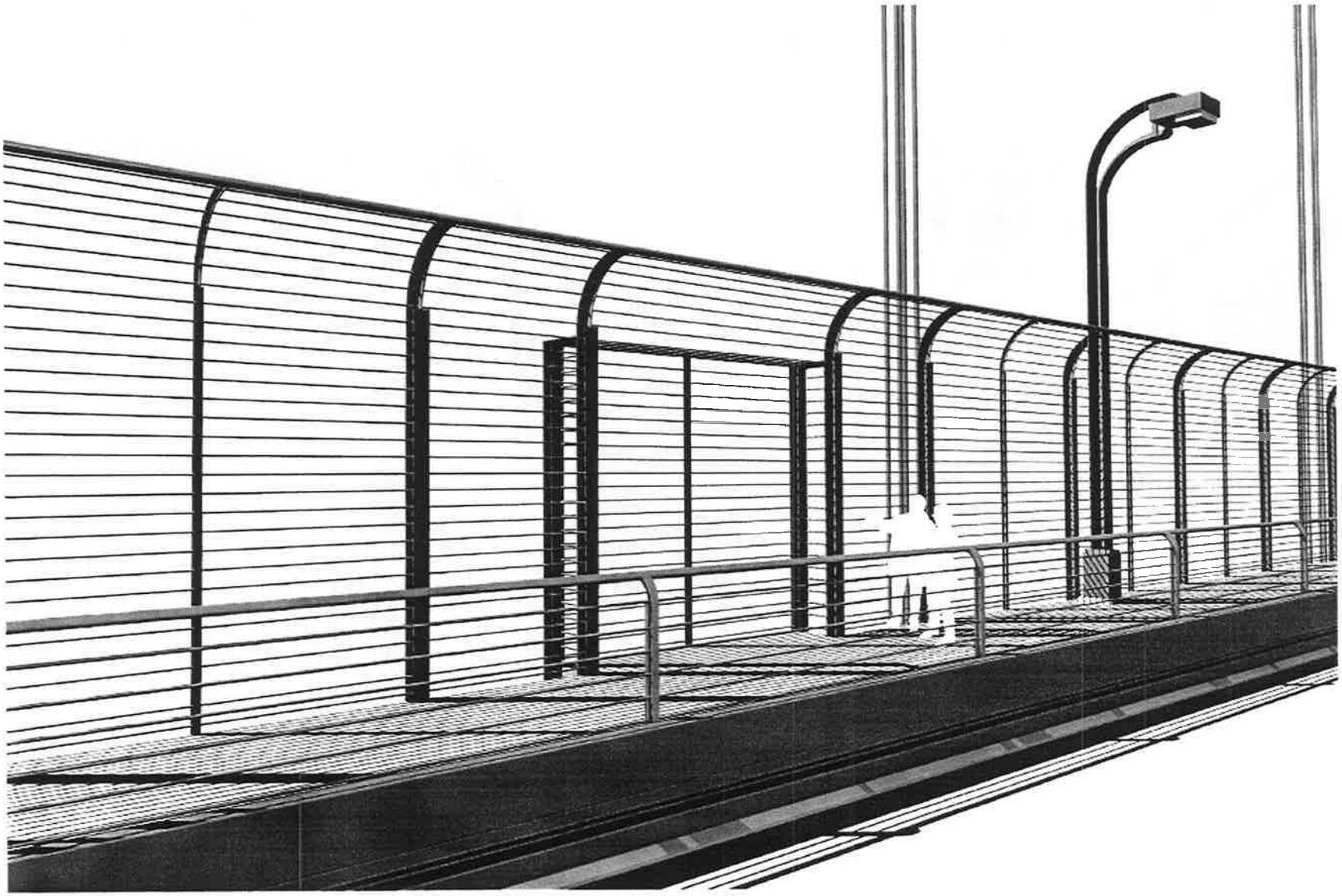


FIGURE 2.3a - EXAMPLE OF CONCEPT 2 (EXAMPLE SHOWN WITH HEIGHT OF 14'-0", NO VISIBLE WINGLET; 50" UNDER DECK WINGLET ON EAST SIDE AND 48" CATWALK ON WEST SIDE, CURVED TOP, HORIZONTAL CABLE MEMBERS SPACED AT 6", SOLID RATIO OF 16%) *VIEW FROM ROADWAY*

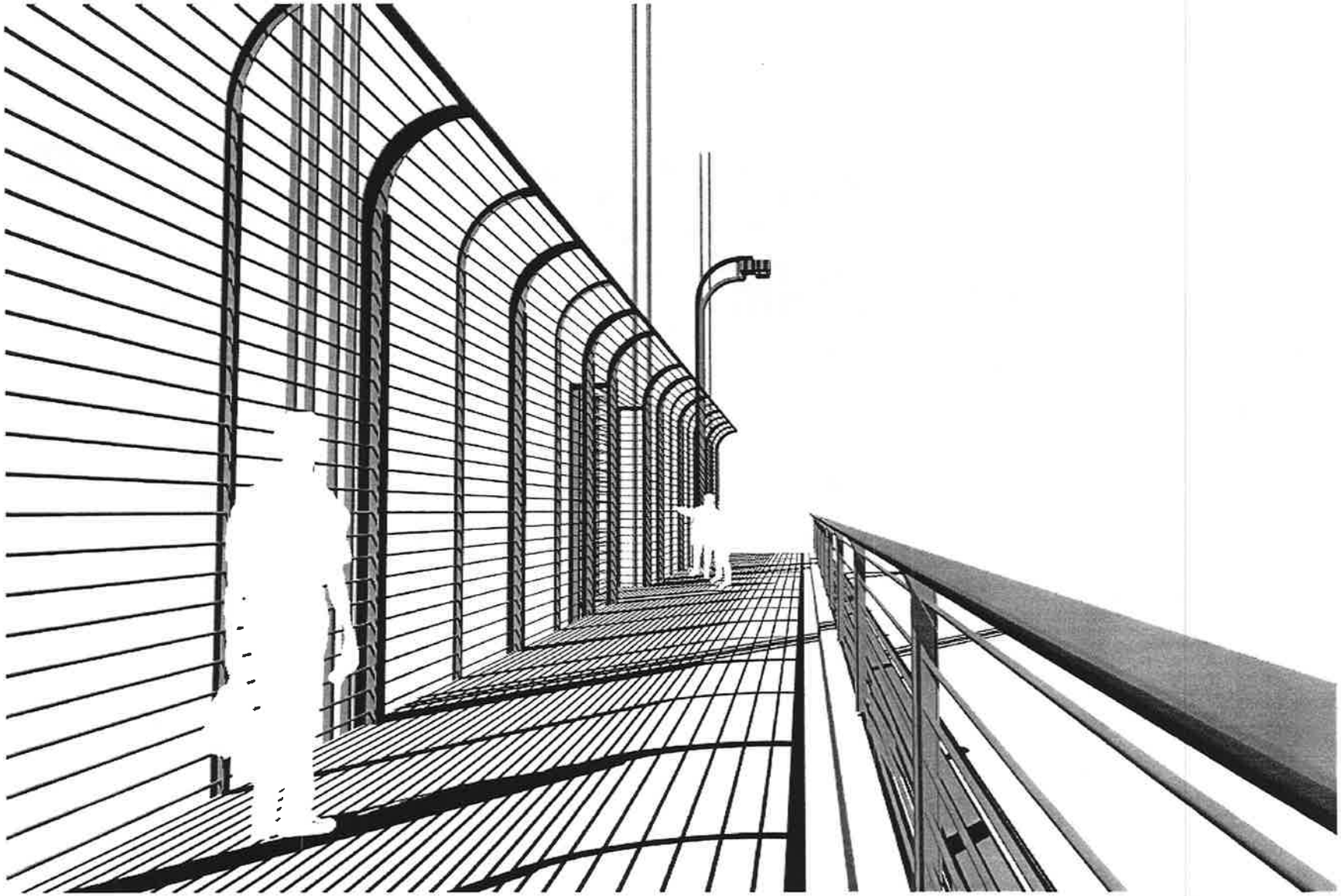


FIGURE 2.3b - EXAMPLE OF CONCEPT 2 (EXAMPLE SHOWN WITH HEIGHT OF 14'-0", NO VISIBLE WINGLET; 50" UNDER DECK WINGLET ON EAST SIDE AND 48" CATWALK ON WEST SIDE, CURVED TOP, HORIZONTAL CABLE MEMBERS SPACED AT 6", SOLID RATIO OF 16%) *VIEW FROM SIDEWALK*

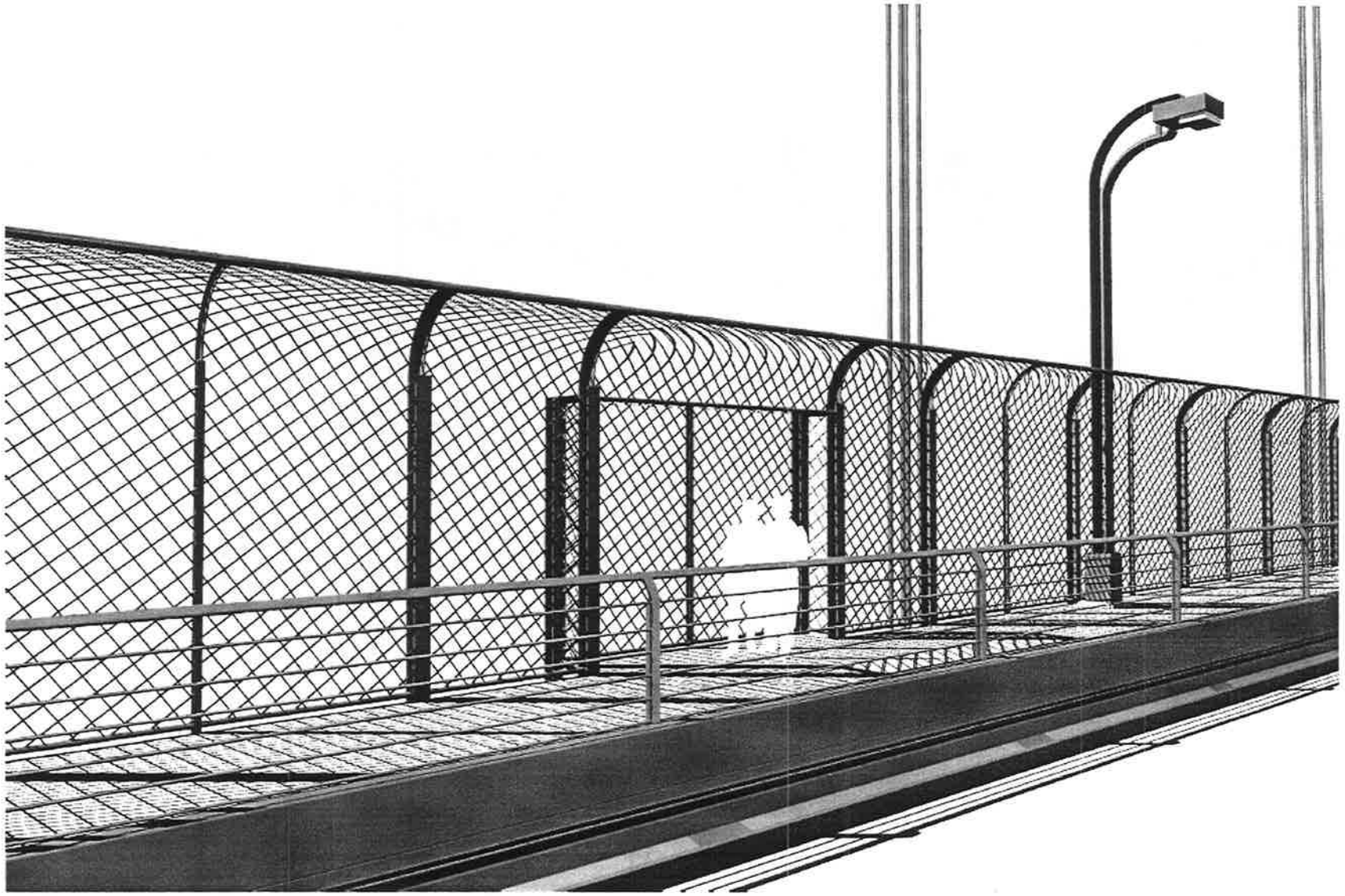


FIGURE 2.4a - EXAMPLE OF CONCEPT 2 (EXAMPLE SHOWN WITH HEIGHT OF 12'-0", NO VISIBLE WINGLET; 50" UNDER DECK WINGLET ON EAST SIDE AND 48" CATWALK ON WEST SIDE, DIAGONAL WIRE MESH OF 6", SOLID RATIO OF 16%)
VIEW FROM ROADWAY

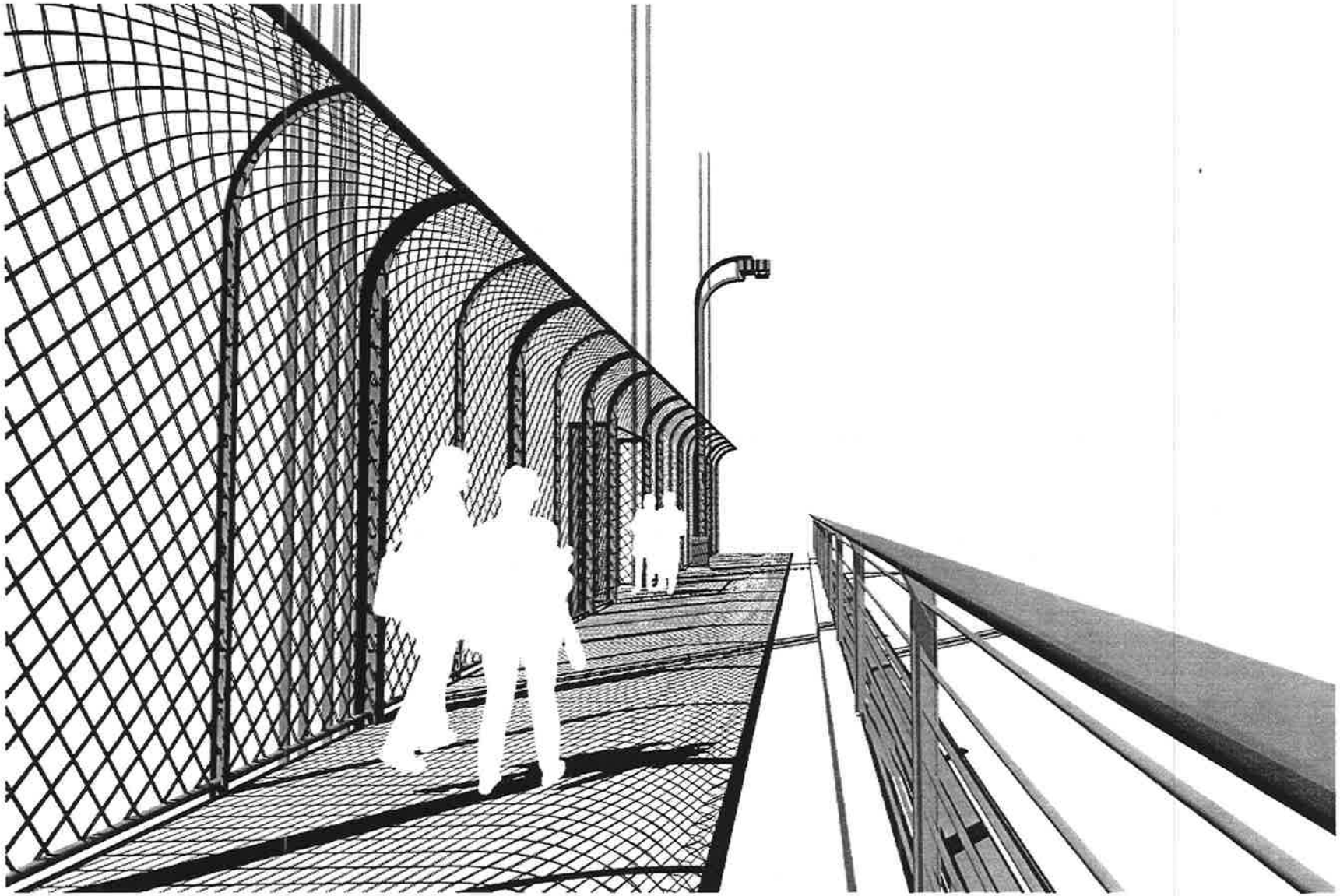


FIGURE 2.4b - EXAMPLE OF CONCEPT 2 (EXAMPLE SHOWN WITH HEIGHT OF 12'-0", NO VISIBLE WINGLET; 50" UNDER DECK WINGLET ON EAST SIDE AND 48" CATWALK ON WEST SIDE, DIAGONAL WIRE MESH OF 6", SOLID RATIO OF 16%)
VIEW FROM SIDEWALK

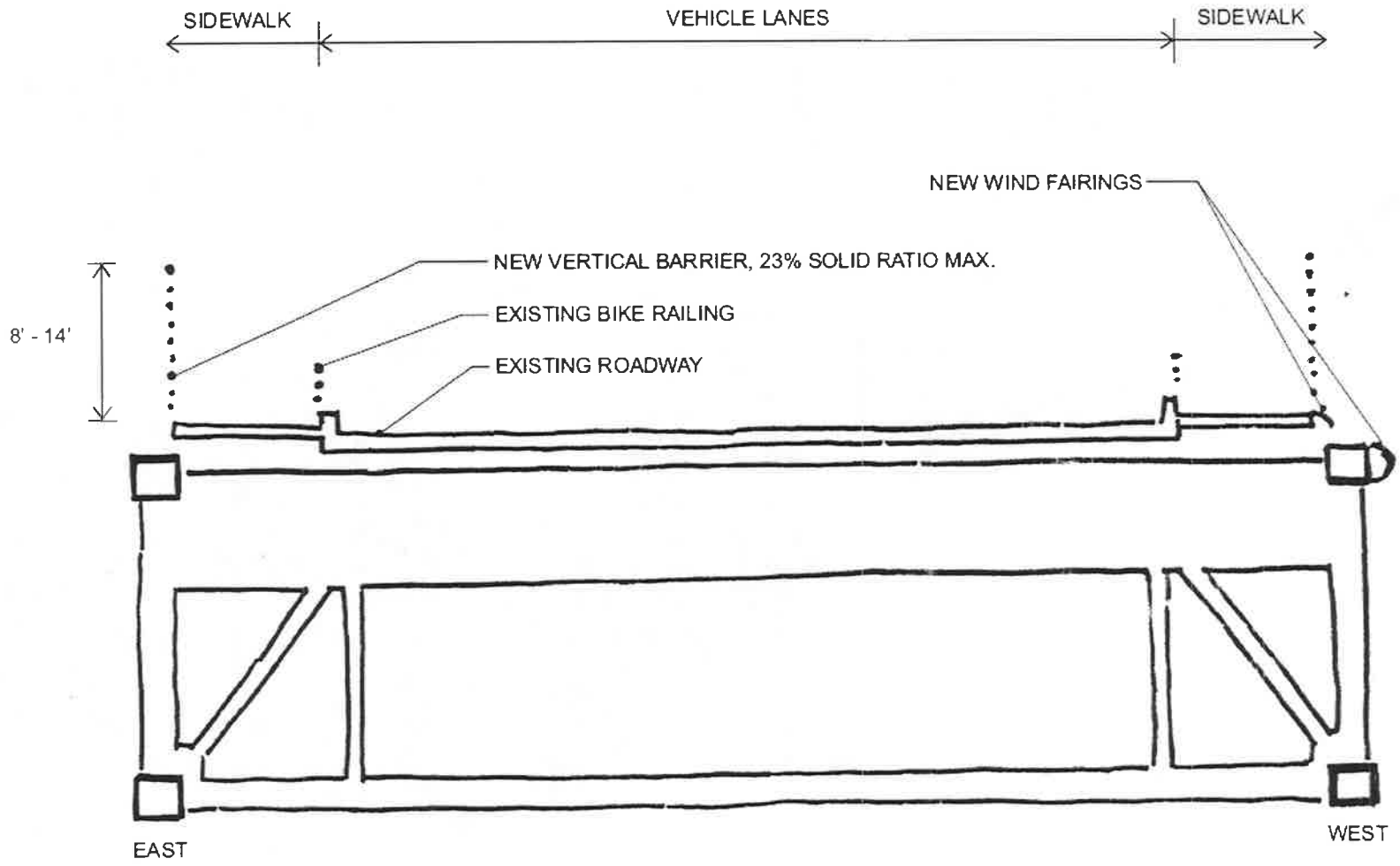
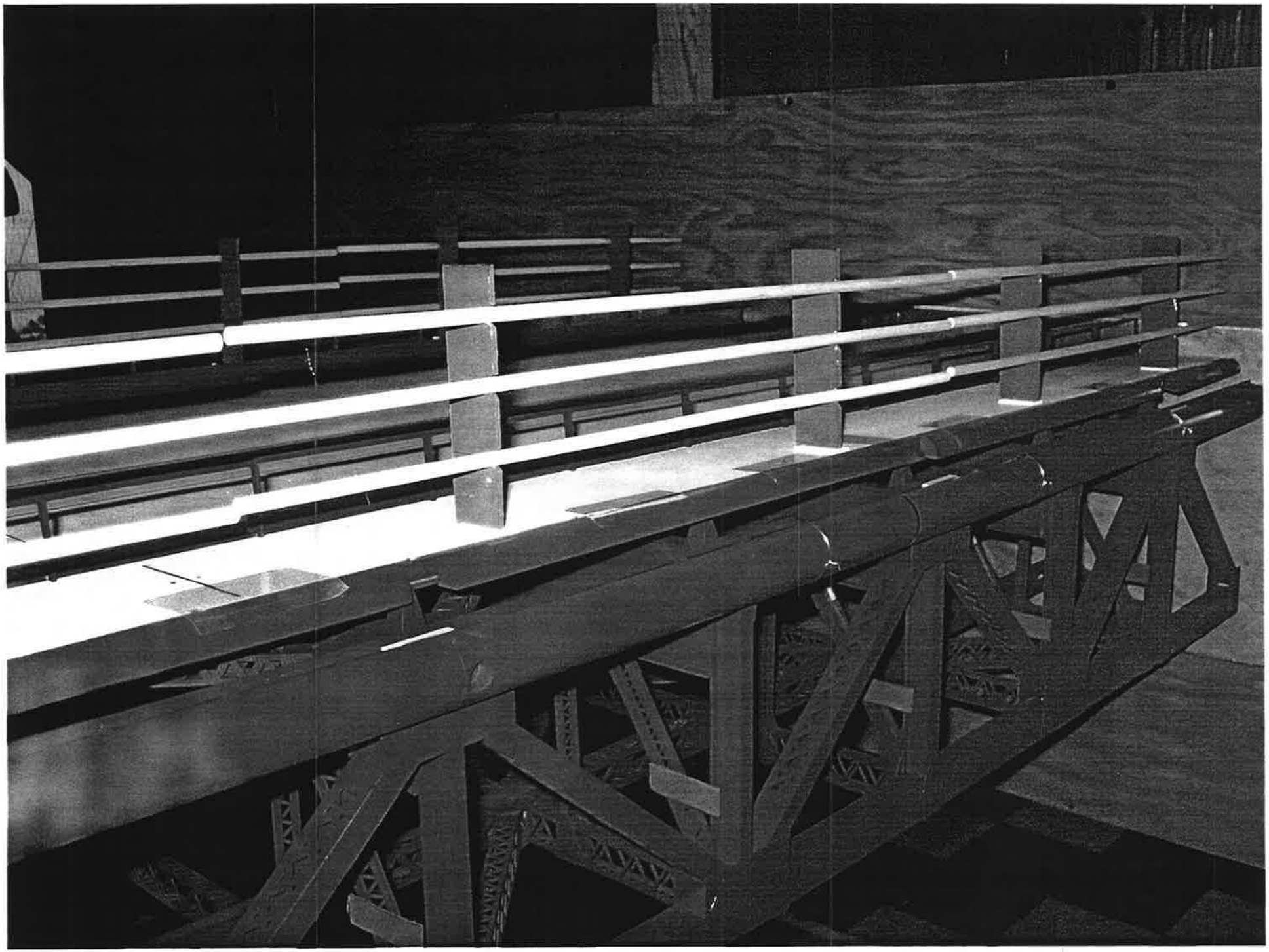
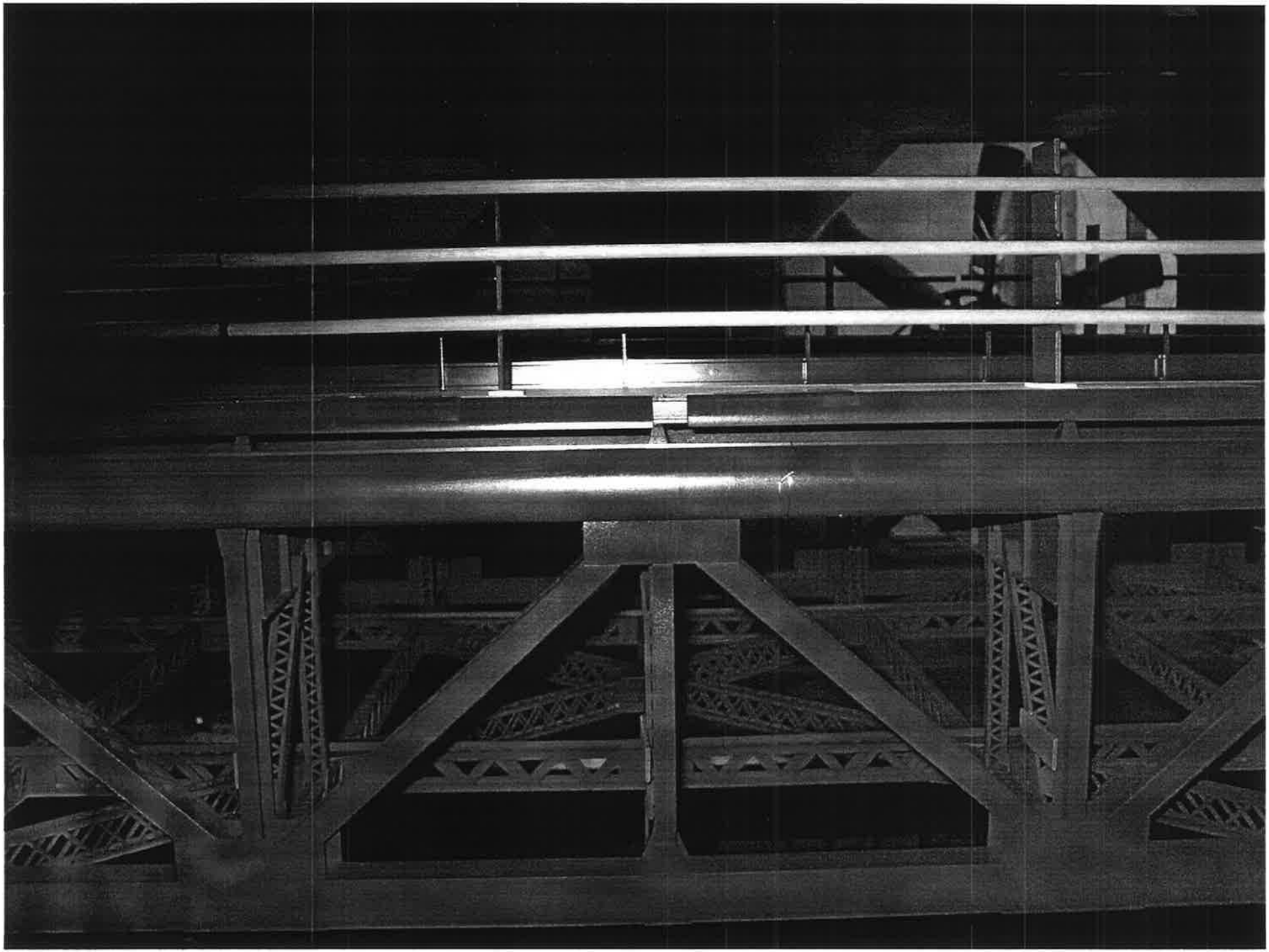


FIGURE 2.5 - CONCEPT 2 : REPLACING THE EXISTING RAILING; WIND FAIRINGS ON TRUSS
SCALE : NOT TO SCALE





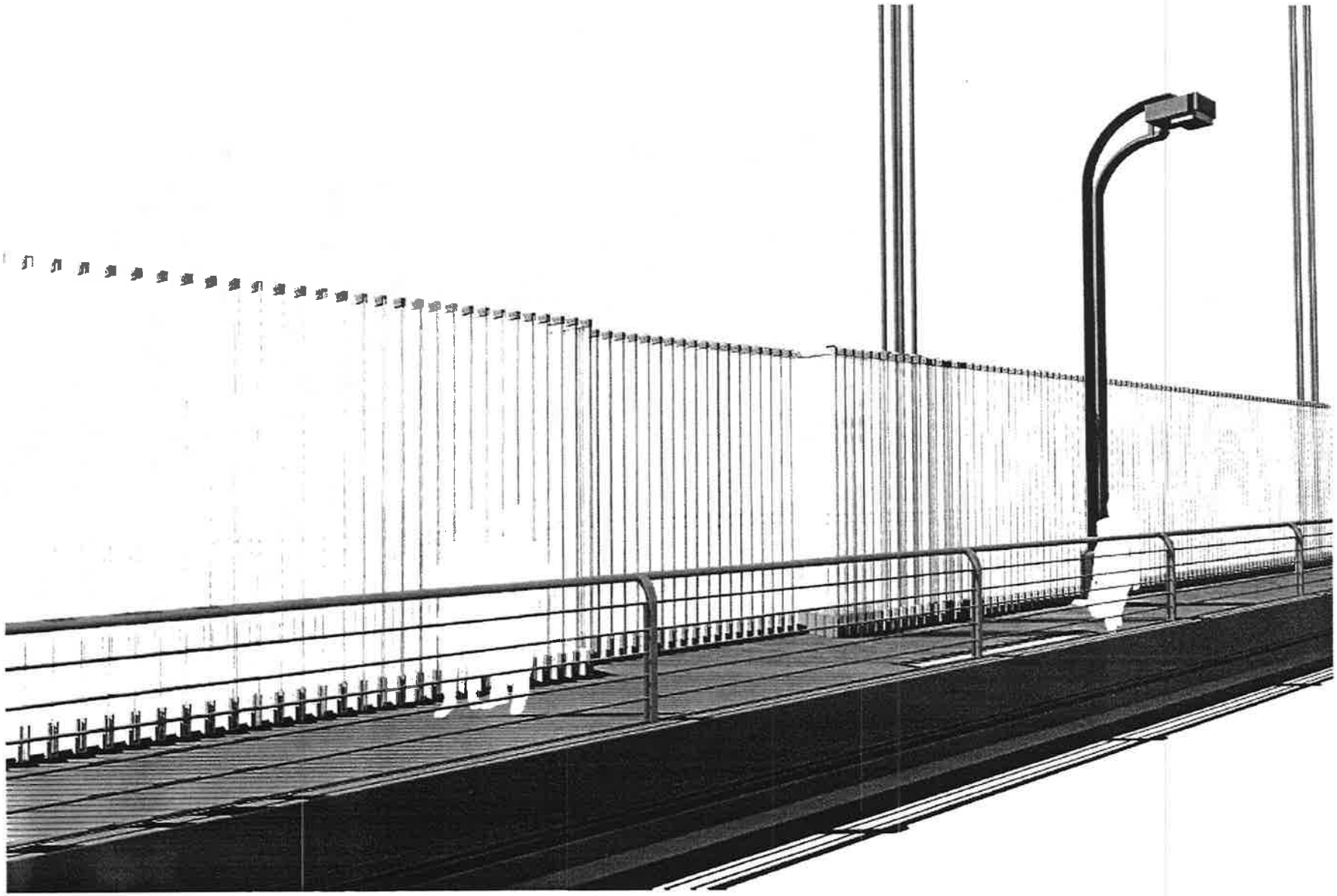
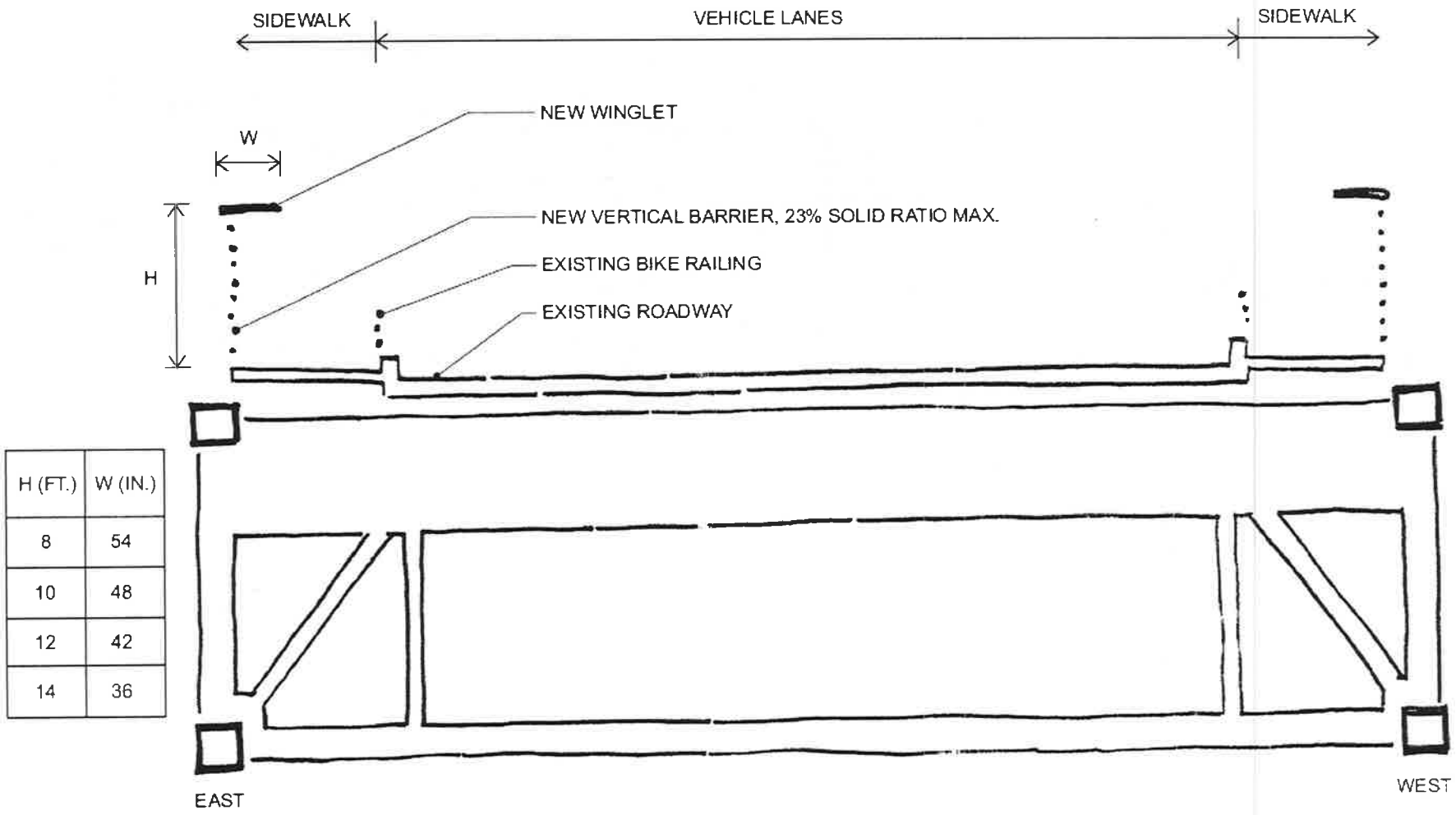


FIGURE 2.6a - EXAMPLE OF CONCEPT 2 (EXAMPLE SHOWN WITH HEIGHT OF 12'-0", NO WINGLET; WIND FAIRINGS ON TRUSS AND SIDEWALK, VERTICAL GLASS PICKETS SPACED AT 7", SOLID RATIO OF 23%) *VIEW FROM ROADWAY*

FIGURE 2.6b - EXAMPLE OF CONCEPT 2 (EXAMPLE SHOWN WITH HEIGHT OF 12'-0", NO WINGLET; WIND FAIRINGS ON TRUSS AND SIDEWALK, VERTICAL GLASS PICKETS SPACED AT 7", SOLID RATIO OF 23%) *VIEW FROM OUTBOARD*



H (FT.)	W (IN.)
8	54
10	48
12	42
14	36

FIGURE 2.7 - CONCEPT 2 : REPLACING THE EXISTING RAILING ; WINGLETS MOUNTED OVER BARRIER
SCALE : NOT TO SCALE

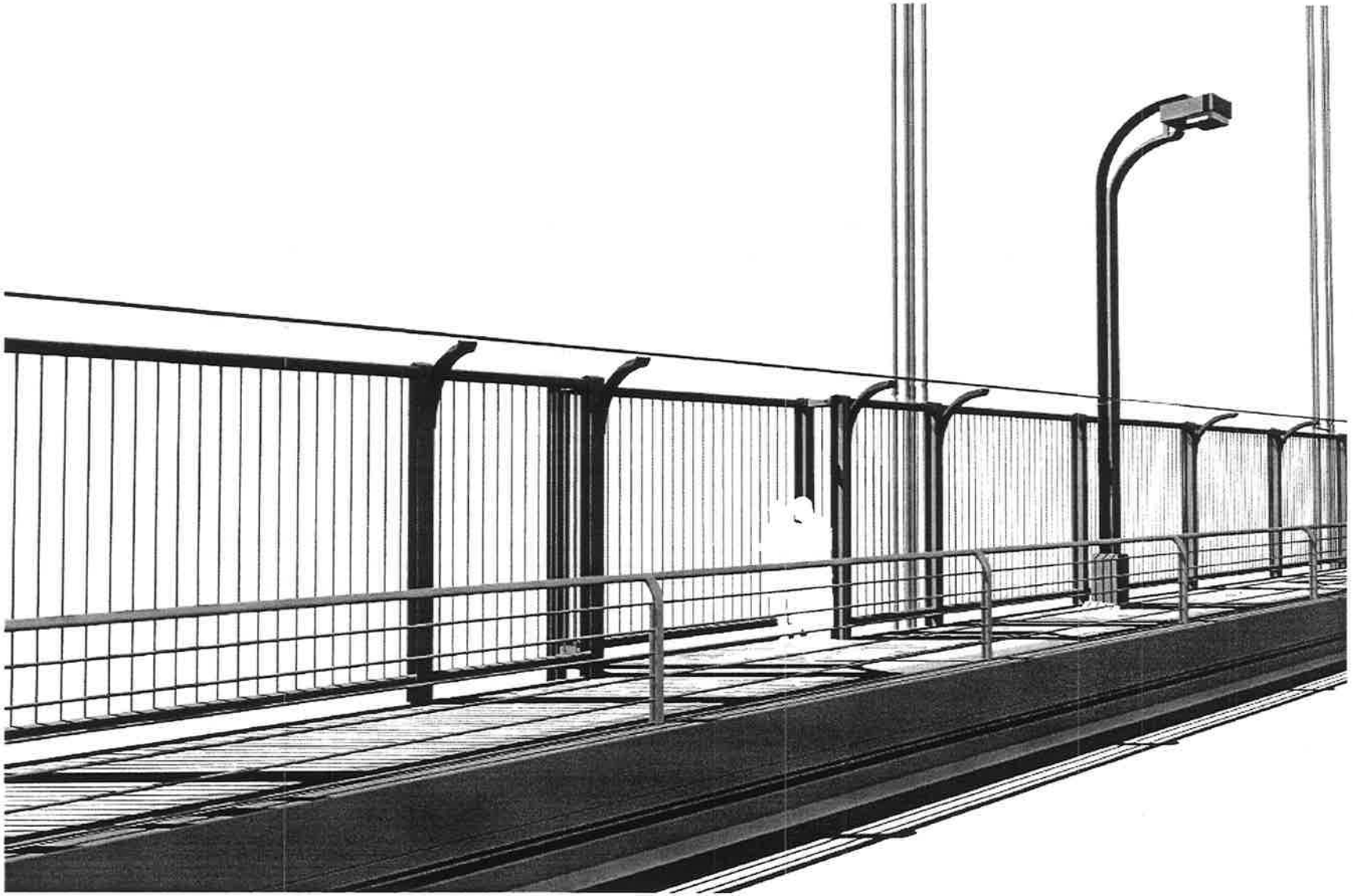


FIGURE 2.8a - EXAMPLE OF CONCEPT 2 (EXAMPLE SHOWN WITH HEIGHT OF 10'-0", 48" TRANSPARENT WINGLET, VERTICAL MEMBERS SPACED AT 6", SOLID RATIO OF 18%) *VIEW FROM ROADWAY*

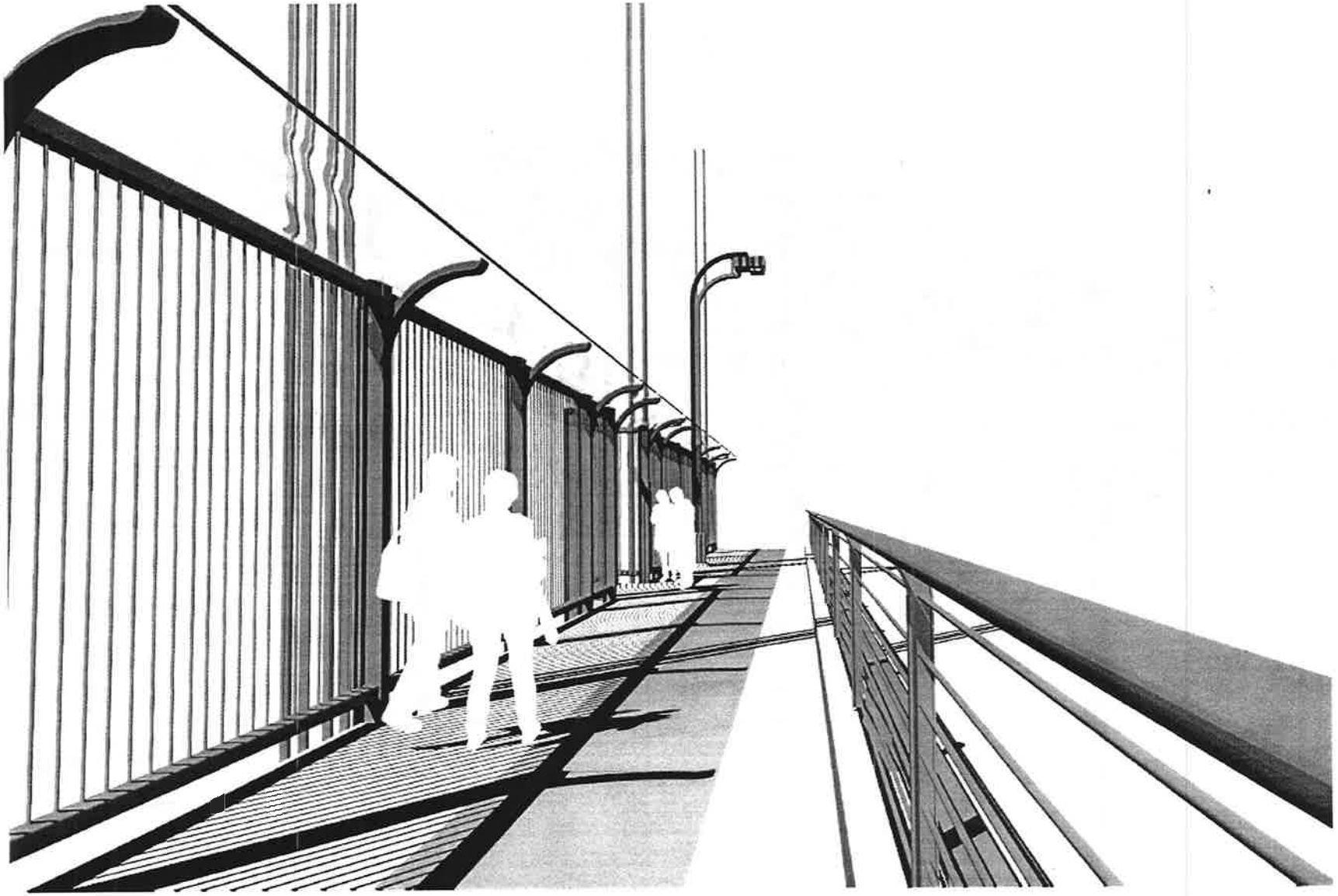


FIGURE 2.8b - EXAMPLE OF CONCEPT 2 (EXAMPLE SHOWN WITH HEIGHT OF 10'-0", 48" TRANSPARENT WINGLET, VERTICAL MEMBERS SPACED AT 6", SOLID RATIO OF 18%) *VIEW FROM SIDEWALK*

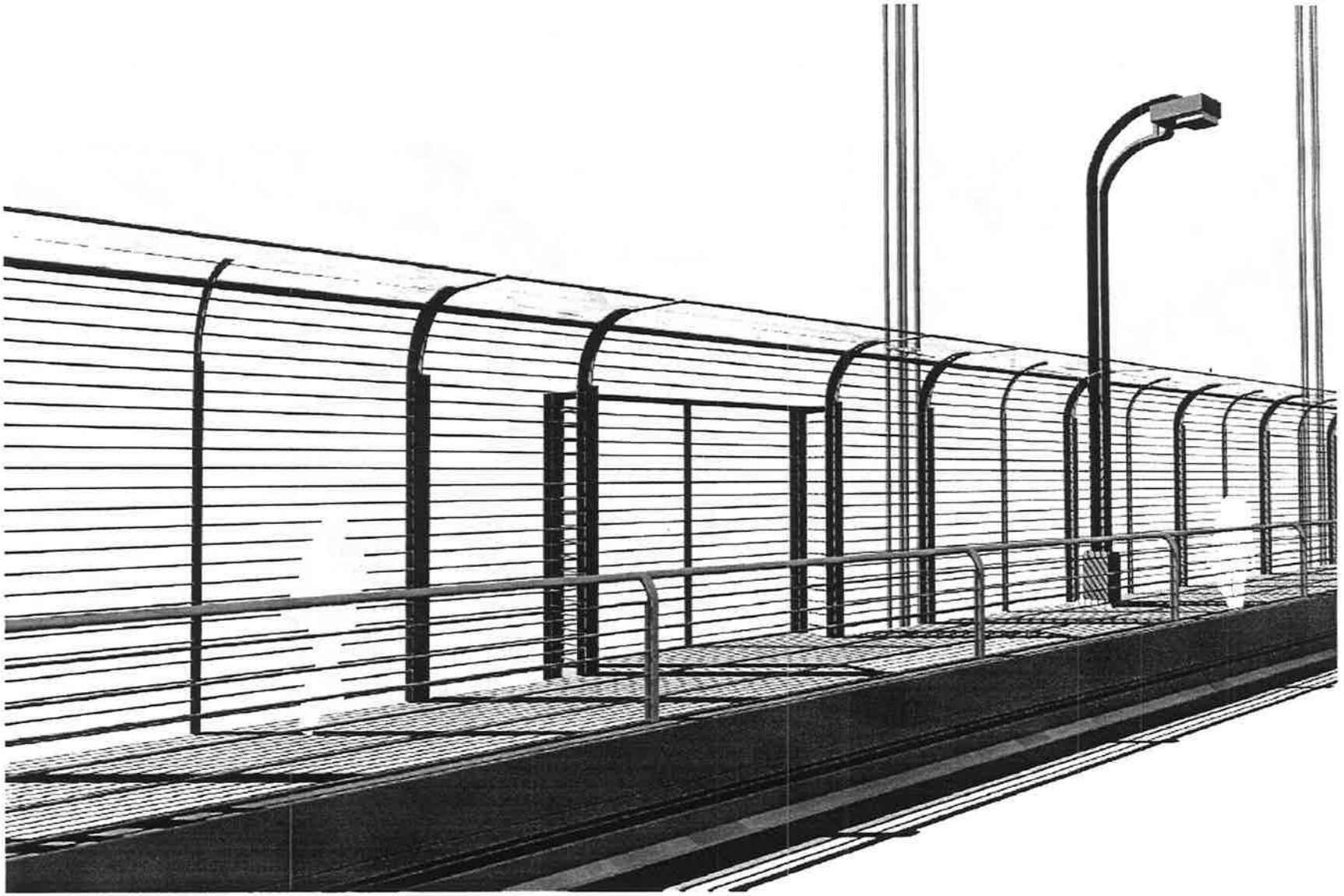


FIGURE 2.9a - EXAMPLE OF CONCEPT 2 (EXAMPLE SHOWN WITH HEIGHT OF 12'-0", 42" TRANSPARENT WINGLET, HORIZONTAL MEMBERS SPACED AT 6", SOLID RATIO OF 17%) *VIEW FROM ROADWAY*

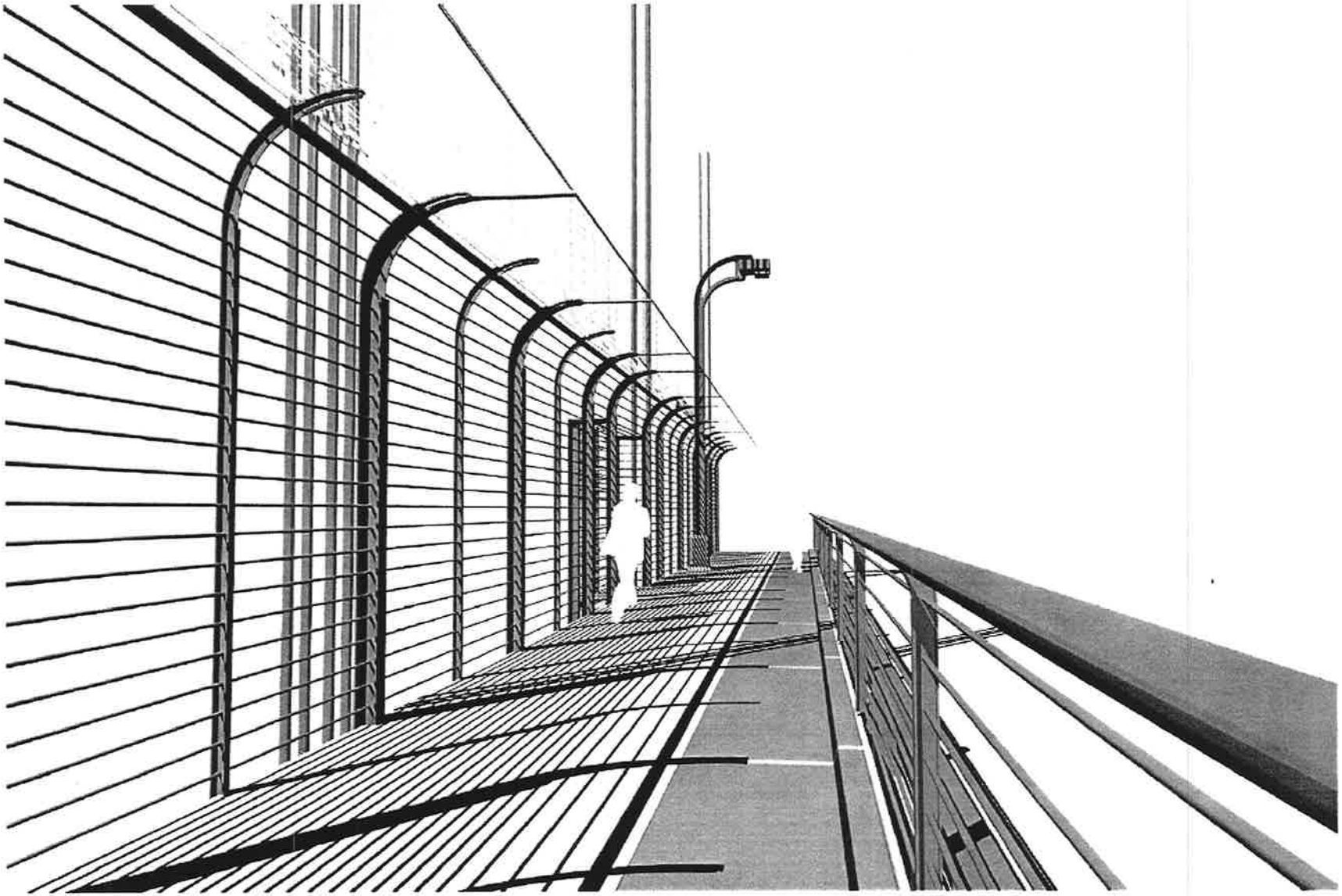


FIGURE 2.9b - EXAMPLE OF CONCEPT 2 (EXAMPLE SHOWN WITH HEIGHT OF 12'-0", 42" TRANSPARENT WINGLET, HORIZONTAL MEMBERS SPACED AT 6", SOLID RATIO OF 17%) *VIEW FROM SIDEWALK*

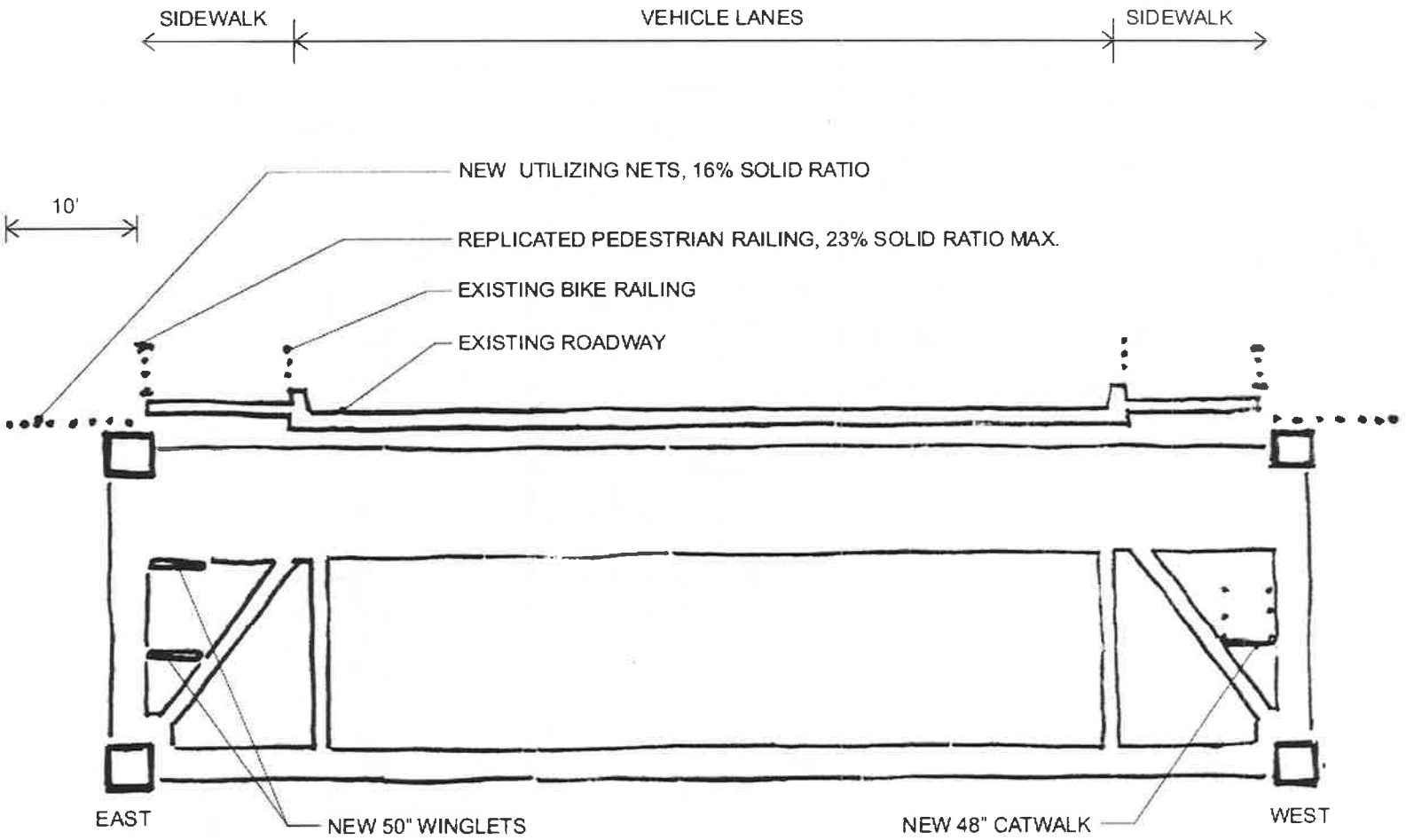
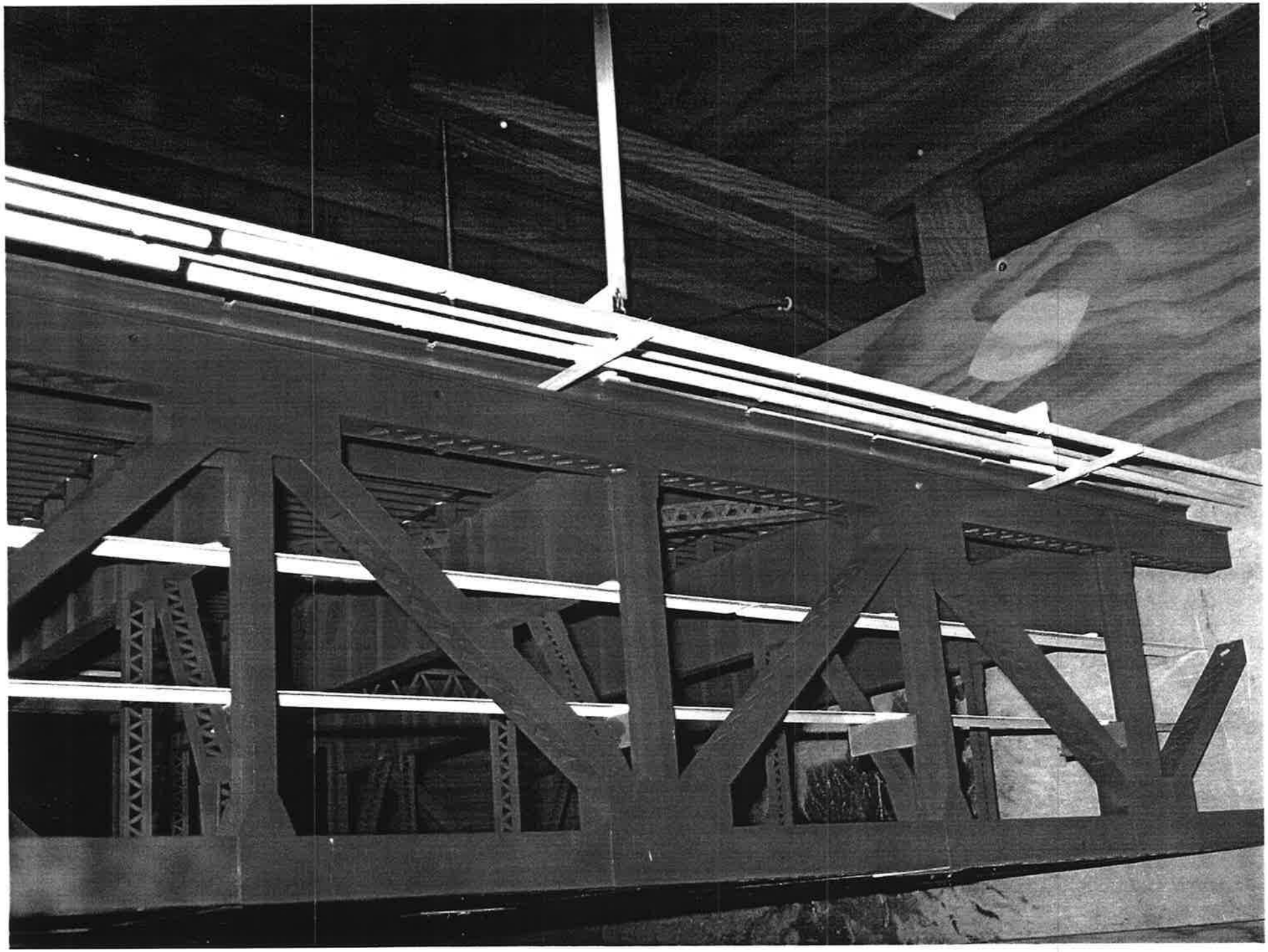


FIGURE 3.1 - CONCEPT 3 : UTILIZING NETS THAT CANTILEVER OUT HORIZONTALLY W/ REPLICATED PEDESTRIAN RAILING
SCALE : NOT TO SCALE



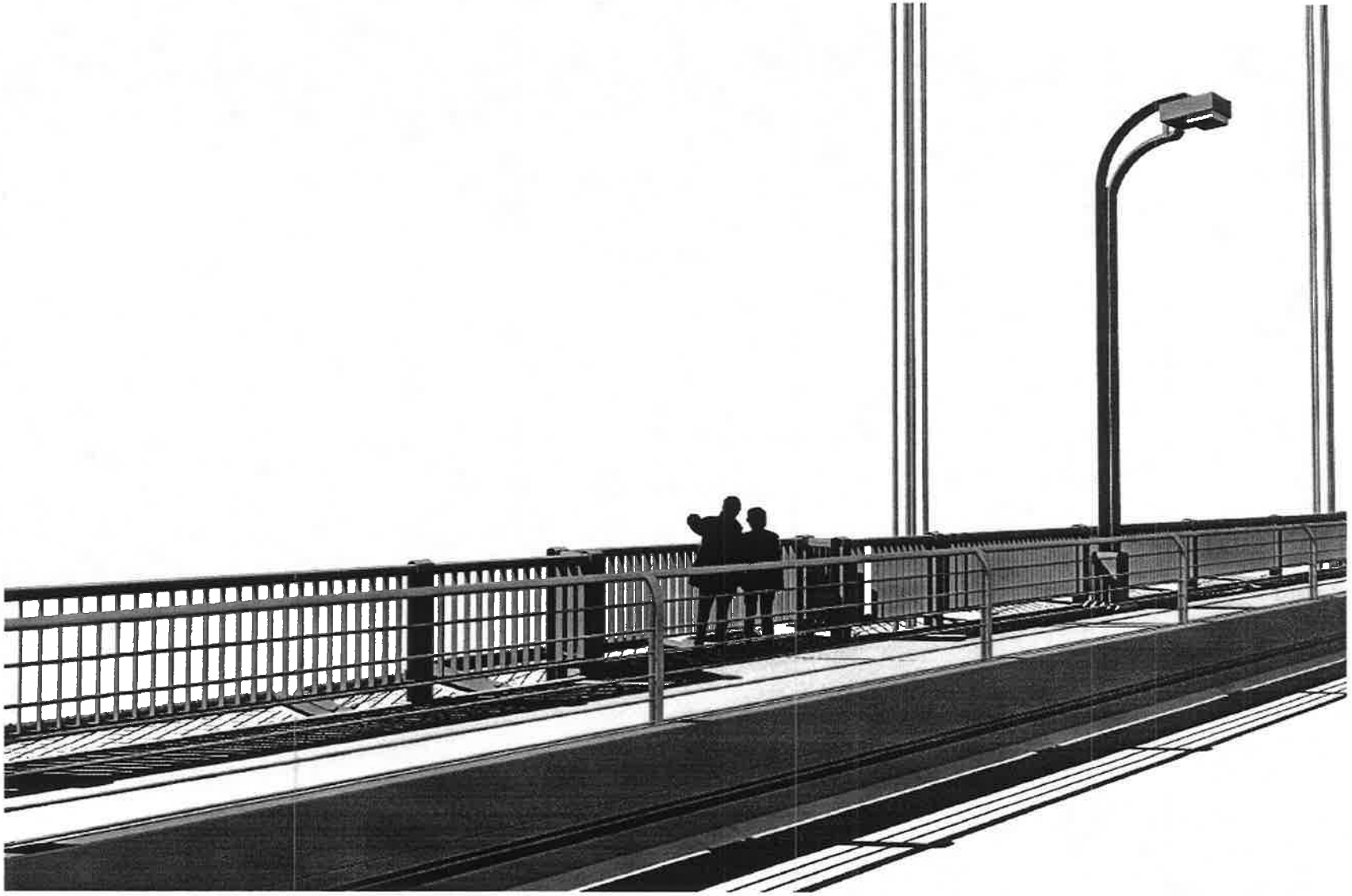


FIGURE 3.2a - EXAMPLE OF CONCEPT 3 (EXAMPLE SHOWN WITH AN UTILIZING NET PROJECTING 10' AT LEVEL OF REPLICATED PEDESTRIAN RAILING, SOLID RATIO OF 23%, NET SOLID RATIO OF 16%) *VIEW FROM ROADWAY*

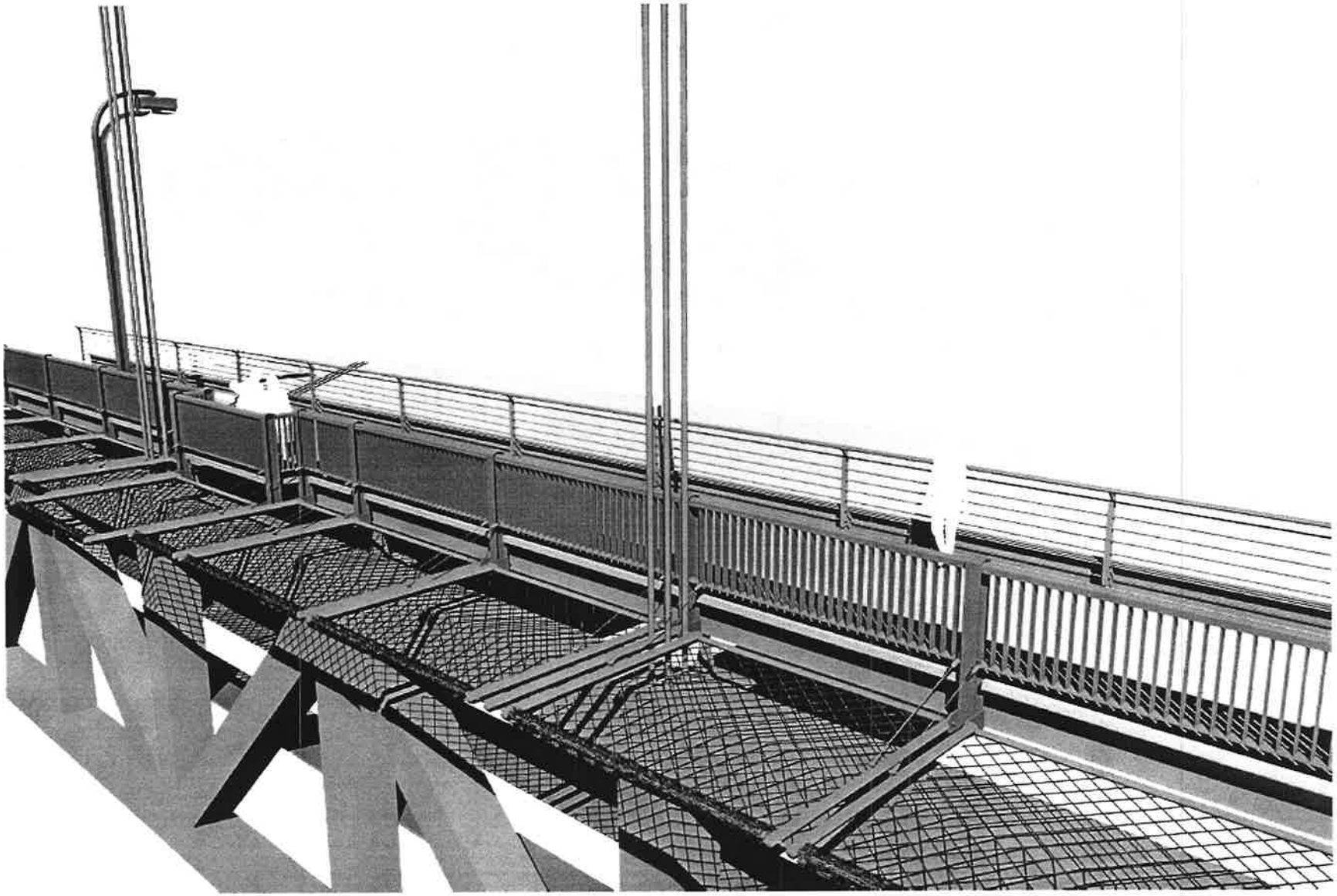


FIGURE 3.2b - EXAMPLE OF CONCEPT 3 (EXAMPLE SHOWN WITH AN UTILIZING NET PROJECTING 10' AT LEVEL OF REPLICATED PEDESTRIAN RAILING, SOLID RATIO OF 23%, NET SOLID RATIO OF 16%) *BIRDS EYE VIEW FROM OUTBOARD*

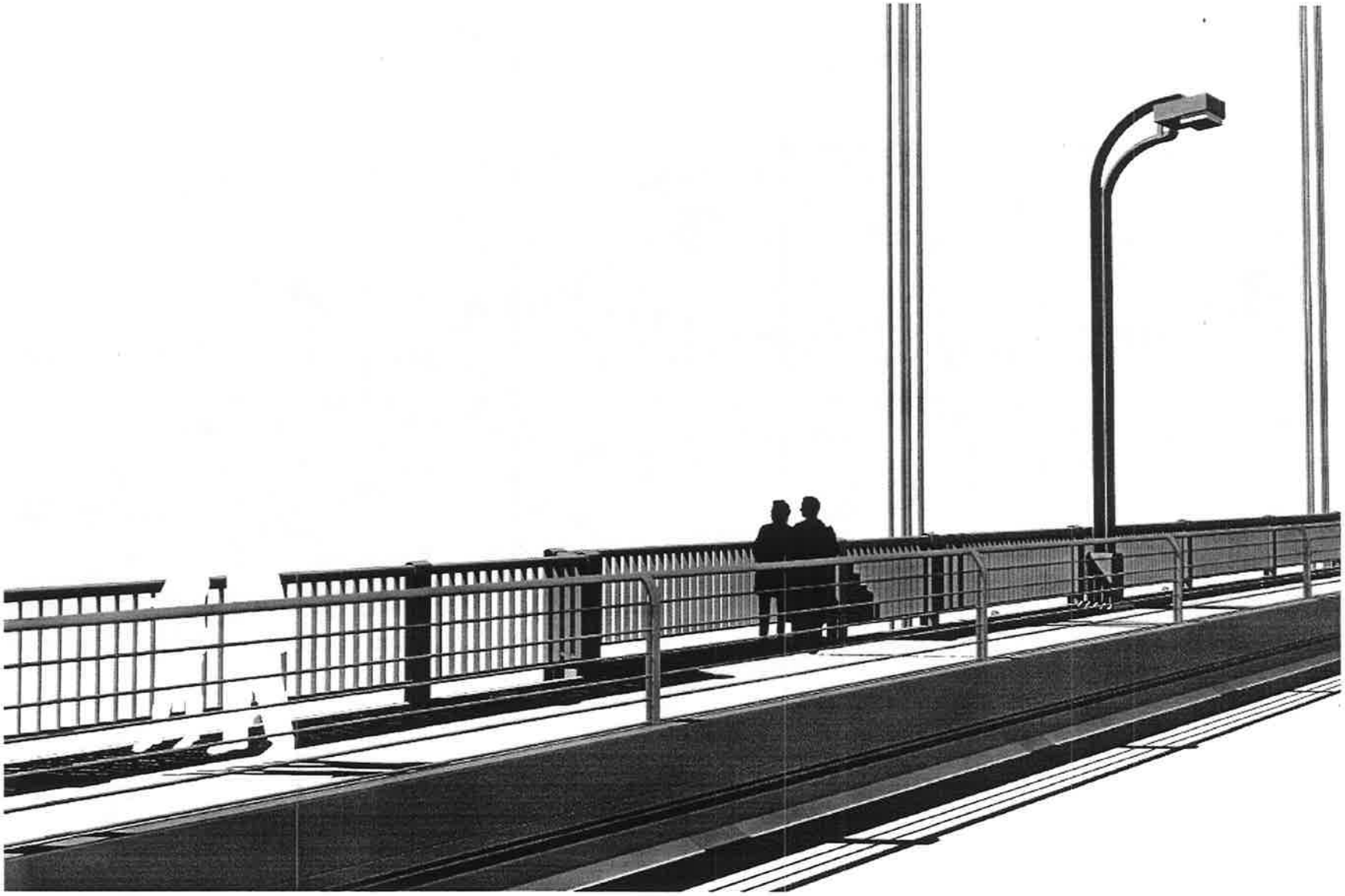


FIGURE 3.3a - EXAMPLE OF CONCEPT 3 (EXAMPLE SHOWN WITH AN UTILIZING NET PROJECTING 10' MOUNTED BELOW REPLICATED PEDESTRIAN RAILING, SOLID RATIO OF 23%, NET SOLID RATIO OF 16%) *VIEW FROM ROADWAY*

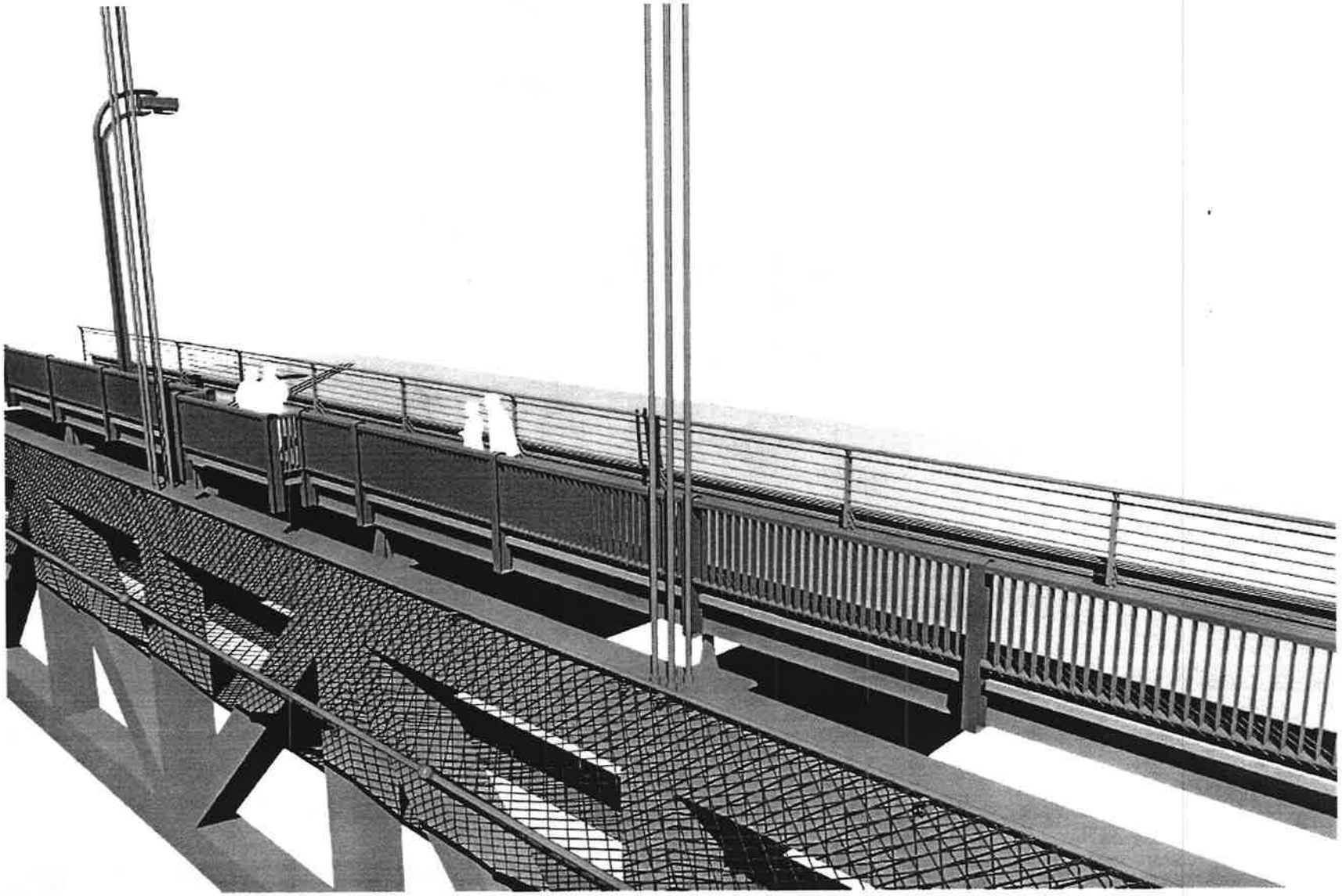


FIGURE 3.3b - EXAMPLE OF CONCEPT 3 (EXAMPLE SHOWN WITH AN UTILIZING NET PROJECTING 10' MOUNTED BELOW REPLICATED PEDESTRIAN RAILING, SOLID RATIO OF 23%, NET SOLID RATIO OF 16%) *BIRDS EYE VIEW FROM OUTBOARD*

GOLDEN GATE BRIDGE SUICIDE DETERRENT SYSTEM STUDY
Key Milestones

2006 | 2007 | 2008

FALL | WINTER | SPRING | SUMMER | FALL | WINTER | SPRING

PHASE 1: Wind Tunnel Testing of Generic Concepts

Initiate Phase 1

Release Wind Study Report (May 24, 2007)

PHASE 2: Preliminary Engineering & Environmental Studies

Initiate Preliminary Environmental Studies

Formally Initiate Environmental Process

Release Draft EIR/EA

Release Final EIR/EA

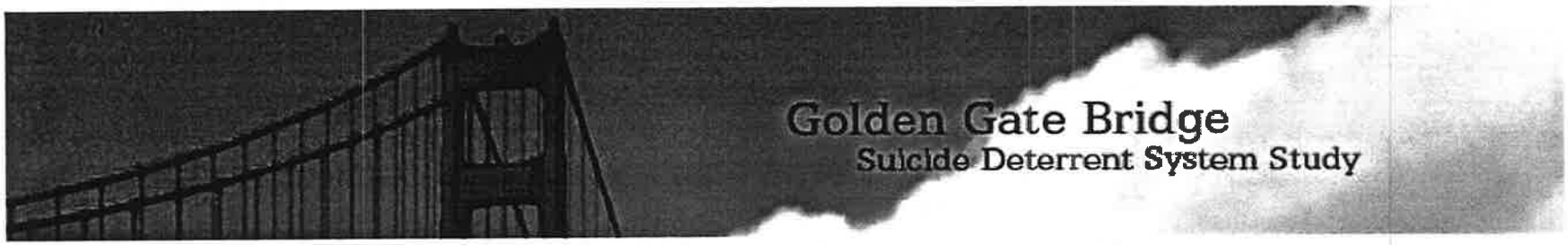
End Environmental Process

Public/Agency Input (30 days)

Public/Agency Review (45 days)

Public/Agency Review (30 days)

Board of Directors Decides Next Step



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GOLDEN GATE BRIDGE
HIGHWAY & TRANSPORTATION DISTRICT
Visit the Website

Welcome

The Golden Gate Bridge, Highway and Transportation District (District), San Francisco, CA, initiated the Golden Gate Bridge Suicide Deterrent System Study (Study) in fall 2006. This special website has been created so that the public can easily access information as the Study progresses.

Stay Informed
To track the Study progress, we encourage you to take a moment and sign-up to receive email updates. We respect your privacy and will only use this information to send you information about this Study.

A user friendly comment form is available to provide input to the Study as it progresses.

What's New

The Phase 1 Wind Study Report is scheduled to be released on May 24, 2007 and will be posted on this website by noon. During Phase 1, several generic concepts for a potential suicide barrier underwent wind tunnel testing to determine the impact on the wind stability of the Bridge.