PHASE 1 - Wind Tunnel Testing of Generic Concepts

COMPLETED
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
FALL
Initiate Phase 1

PHASE 1: Wind Tunnel Testing of Generic Concepts

2007
WINTER
Release Wind Study Report (May 24, 2007)

SPRING
Initiate Preliminary Environmental Studies

PHASE 2: Preliminary Engineering & Environmental Studies

SUMMER
Formally Initiate Environmental Process

2008
FALL
Release Draft EIR/EA

WINTER
Release Final EIR/EA

SPrING
End Environmental Process

Public Agency Input (30 days)

Public Agency Review (45 days)

Public Agency Review (30 days)

Board of Directors Decision - Next Step
GOLDEN GATE BRIDGE SUICIDE DETERRENT SYSTEM STUDY
Concept Testing, Alternative Evaluation & Screening Process

2006
- FALL: Initiate Wind Study

2007
- WINTER: Release Wind Study Report
- SPRING: Initiate Environmental Process
- SUMMER: Phase 2: Refine Engineering Studies
- FALL: Continue Environmental Studies

2008
- WINTER: Release Draft Environmental Document
- SPRING: Phase 2: Finalize Preliminary Engineering
  - Finalize Environmental Studies
  - Execute Historic Preservation Agreement
  - Respond to Comments
- END: Environmental Process; Board of Directors decides next step.
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

1. Notice of Preparation
2. Scoping & Screening
3. Environmental Technical Studies
   - Historic
   - Parklands
   - Visual
4. Prepare Environmental Document
5. Circulate Draft Environmental Document and Receive Public & Agency Input
6. Identify Preferred Alternative
7. Approvals and Release of Final Environmental Document
8. Board Action on Environmental Document
GOLDEN GATE BRIDGE SUICIDE DETERRENT SYSTEM STUDY

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Winter

PHASE 2: Preliminary Engineering & Environmental Studies

Release Final EIR/EA

End Environmental Process

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Release Work Study Report (May 24, 2007)
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%
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.
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 SCALE
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
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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
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 REPLICAED 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 REPLICALED PEDESTRIAN RAILING, SOLID RATIO OF 23%, NET SOLID RATIO OF 16%) BIRDS EYE VIEW FROM OUTBOARD
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Board of Directors Decides Next Step
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