

TYPE SELECTION REPORT

Tennessee Hollow NB & SB (Br. No. 34-0164L/R)

Girard NB Ramp (Br. No. 34-0167)

Gorgas Ramp (Br. No. 34-0168)

I. INTRODUCTION

This project proposes to replace the existing southern approach to the Golden Gate Bridge. The two locations covered in this document are at the east end of the project.

The Tennessee Hollow complex includes the Tennessee Hollow NB & SB, Girard NB Ramp and the Gorgas Ramp bridges. These bridges are located in the Low Causeway area of the project. The project plan calls for these bridges to span over a future wetland habitat which will be linked to the Crissy Marsh. The wetland habitat will be subject to tidal influences which limit the minimum deck elevation. The available pier locations are restricted by the planned wetland. Due to the low profile grade, the structure depth has been dictated to be very shallow. In keeping with the theme for the rest of the project, a voided slab with minimal haunch is proposed.

The new structures will be designed in accordance with the AASHTO LRFD Design Specifications (3rd Edition, with 2006 Interim Revisions) and applicable California Amendments.



II. Bridges & Structures

	Bridge Name	Bridge Number	Width	Length	Comments
1	Tennessee Hollow NB	34-0164 R	38'-4" min (& varies)	411'-3 1/2"	8 Span
2	Tennessee Hollow SB	34-0164 L	53'-4" min	390'-0"	7 Span
3	Girard NB - Ramp	34-0167	33'-4" (& varies)	196'-0"	4 Span
4	Gorgas Ramp	34-0168	35'-4" (& varies)	172'-6"	3 Span

III. Geology

The Preliminary Foundation Report (PFR) for the project site has been prepared by the Office of Geotechnical Design - West.

The preliminary subsurface investigation at Tennessee Hollow indicates that the area is underlain by 13 to 26 feet of loose to compact silty and clayey sand interbedded with very soft to soft clay. Below these deposits is very dense silty and clayey sand to a depth of approximately 72 feet. The underlying material, to exploration depth is hard sandy and silty clay and clay. Bedrock was not encountered. Ground water is found in two zones. The upper, unconfined layer, is encountered at approximately 6 feet. The deeper zone, encountered at approximately 20 feet below the ground surface, is confined with a substantial upward vertical gradient. In some borings the potentiometric head was above the ground surface.

IV. Seismic Evaluation

The controlling fault for the project site is the San Andreas with a maximum moment magnitude, $M_w = 8$ located between 9 to 10 KM southwest of the project site. The peak bedrock acceleration (PBA) at this site, based on the California Hazard Map, 1996, as well as the Attenuation Relationship Equation by Sidigh, et. Al. 1997 is estimated to be 0.5g. The potential for surface rupture due to fault movement is considered low.

V. Liquefaction Potential

The Tennessee Hollow area of the project is anticipated to be subject to liquefaction in the lower confined groundwater zone.

VI. Foundation Types

In the Tennessee hollow area, it is proposed to install CIDH piles with permanent casings from the pile cutoff to a depth of approximately 30 feet. The casings are intended to allow for construction of the CIDH piles without risk of an artesian aquifer blowout. Casings can be extended above ground to provide hydrostatic backpressure to prevent blowout.

VII. Seismic Design

Based on the geological data from available sources, the geological profile at various locations of Doyle Drive falls within the California seismic Design Criteria (CSDC), May 1999, types C and D soil profiles. Due to the proximity of the site to the fault, the corresponding standard ARS curves have been modified. The modifications are such that there is no increase in spectral acceleration in periods less than 0.5 seconds and a 20% increase for periods greater than one second. A linear interpolation was used between 0.5 and one second.

VIII. Falsework

Bridge Name	Vehicular Traffic		Pedestrian Traffic		Railroad	
	Location	Temporary Opening	Location	Temporary Opening	Location	Temporary Opening
Tennessee Hollow NB	NA		NA		NA	

Tennessee Hollow SB	NA		NA		NA	
Girard NB - Ramp	NA		NA		NA	
Gorgas Ramp	NA		NA		NA	

IX. Aesthetics

The bridge aesthetic branch is providing aesthetic concepts for the Tennessee Hollow bridge complex. Aesthetic treatments have focused on the haunched superstructure and columns.

Preliminary Aesthetic Features:

Tennessee Hollow complex:

- The superstructure is proposed to be haunched, with a structure depth of 2'-0" at mid span and 3'-6" at the bents. End spans are haunched only at the bents, not at the abutments.
- The overhangs are to have a constant slope terminating at the face of column. This results in a variable width bottom slab.
- The columns are a 2'-3" x 3'-6" square shape.
- An ST-10 Barrier Railing consistent with the rest of the project is to be used.

X. Project Milestones

Project EA: 07-238500	Structures P&Q Date	Structures PS&E Date
Doyle Drive	March, 2009	May, 2009

XI. Tennessee Hollow NB (Br. No. 34-0164 R)

Structure Type	CIP Voided Slab Bridge
Spans	40', 50', 60', 50', 50', 60', 58', 43'-3 1/2"
Structure Depth	2'-0" at mid span and abutments, 3'-6" at piers
Abutments	Seat type Abutments supported on 12" dia. closed ended pipe piles.
Bents	Piers 2, 3, 4, 2-columns Pier 5, 5 columns (Hinge location) Piers 6, 7, 8, 4 columns Rectangular columns supported on 60" dia. CIDH with permanent steel casing to approximately elevation of -24'.
Vertical Clearance	Minimum deck elevation of 13'-4" based on estimated high water during tsunami event.
Temp Vertical Clearance	N/A
Barriers	Type ST-10
Slope Paving	NA
Approaches:	Structure Approach will be Type N(30S).
Drains	To be determined later.
Temp Range	40°F to 90°F

Joints	Joint Seal at abutment: MR = 2"
Utilities	None at this time.
Safety Fence	None
Future Widening	None

XII. Tennessee Hollow NB (Br. No. 34-0164 L)

Structure Type	CIP Voided Slab Bridge
Spans	45', 55', 60', 50', 50', 60', 50'
Structure Depth	2'-0" at mid span and abutments, 3'-6" at piers
Abutments	Seat type Abutments supported on 12" dia. closed ended pipe piles.
Bents	3 columns per pier. Rectangular columns supported on 60" dia. CIDH with permanent steel casing to approximately elevation of -24'.
Vertical Clearance	Minimum deck elevation of 13'-4" based on estimated high water during tsunami event.
Temp Vertical Clearance	N/A
Barriers	Type ST-10
Slope Paving	NA
Approaches:	Structure Approach will be Type N(30S).
Drains	To be determined later.
Temp Range	40°F to 90°F
Joints	Joint Seal at abutment: MR = 2"
Utilities	None at this time.
Safety Fence	None
Future Widening	None

XIII. Girard NB – Ramp (Br. No. 34-0167)

Structure Type	CIP Voided Slab Bridge
Spans	49'-9", 49', 59'-6", 47'-6"
Structure Depth	2'-0" at mid span and abutments, 3'-6" at piers
Abutments	Seat type Abutment at BB. EB is supported by a hinge connection to the Tennessee Hollow NB bridge (34-0165R) Abutment 1 supported on 12" dia. closed ended pipe piles.
Bents	2-columns per pier Rectangular columns supported on 60" dia. CIDH with permanent steel casing to approximately elevation of -24'.
Vertical Clearance	Minimum deck elevation of 13'-4" based on estimated high water during tsunami event.
Temp Vertical Clearance	N/A

Barriers	Type ST-10
Slope Paving	NA
Approaches:	Structure Approach will be Type N(30S).
Drains	To be determined later.
Temp Range	40°F to 90°F
Joints	Joint Seal at abutment: MR = 2"
Utilities	None at this time.
Safety Fence	None
Future Widening	None

XIII. Girard NB – Ramp (Br. No. 34-0167)

Structure Type	CIP Voided Slab Bridge
Spans	53'-9", 65', 53'-9"
Structure Depth	2'-0" at mid span and abutments, 3'-6" at piers
Abutments	Seat type Abutments supported on 12" dia. closed ended pipe piles. Abutment 1 footing includes depressed walkway section to accommodate future "Quartermaster Reach Trail".
Bents	2-columns per pier Rectangular columns supported on 60" dia. CIDH with permanent steel casing to approximately elevation of -24'.
Vertical Clearance	Minimum deck elevation of 13'-4" based on estimated high water during tsunami event.
Temp Vertical Clearance	N/A
Barriers	Type ST-10
Slope Paving	NA
Approaches:	Structure Approach will be Type N(30S).
Drains	To be determined later.
Temp Range	40°F to 90°F
Joints	Joint Seal at abutment: MR = 1 ½"
Utilities	None at this time.
Safety Fence	None
Future Widening	None

XIV. Structure Costs

Bridge Name	Bridge Number	Cost	Area (SF)	Cost/ sf
Tennessee Hollow NB	34-0164R	\$ 10,582,000	20,749	\$ 510
Tennessee Hollow SB	34-0164L	\$ 9,105,000	20,799	\$ 438
Girard NB - Ramp	34-0167	\$ 3,223,000	6,403	\$ 503
Gorgas Ramp	34-0168	\$ 3,372,000	6,383	\$ 528