



## Structural Evaluation Memo

Date: September 10, 2024

KE Project No.: 24-044

Attention: Brandon Swanson | Acting Director, Community Planning and Building  
City of Carmel-by-the-Sea  
Monte Verde St. Carmel-by-the-Sea  
(831) 620-2024 | bswanson@ci.carmel.ca.us

**Project:** Carmel Beach Existing Stairs: Preliminary Structural Evaluation  
**Location:** North of 10<sup>th</sup> Ave & 12<sup>th</sup> Ave Carmel-By-The-Sea, CA 93923  
**Subject:** Structural Observations and Evaluation of Stairways 4 & 7 at Carmel-By-The-Sea

Dear Mr. Swanson,

On August 26<sup>th</sup>, Kyler Engineering Performed Structural Observations for Stairway 4 and Stairway 7 at Carmel Beach. See Figures 1 and 2 for visual illustrations of stairways. These observations included the Principal Engineer accompanied by (2) staff engineers. Observations were performed above, below, and around each of the stairs. The goal of these observations was to document the existing condition of the structural members of the stairways and included standard pictures, 360-degree videos, and limited exploration with exploratory steel tools to sample areas that appeared to have undergone dry-rot.

For purposes of this memo, Stairway 4 is located just south of 12<sup>th</sup> Ave. and Scenic Rd., and Stairway 7 is located just north of 10<sup>th</sup> Ave. and Scenic Rd. Our work was limited to visual observations, and our recommendations are based on those observations paired with our experience with structural framing best practices. To the best of our knowledge, we found certain elements of the stairs do not have remaining structural integrity to satisfy the expected typical use loading and require replacement or repair.

### **Stairway 4:**

In stairway 4, the 4x4 guardrail posts for the upper flight of the stairs are heavily split. Bolts from the guardrail post and handrails at the top of the flight of stairs to the landing can no longer support the required loading, see Figure 3. Each of the 4x4 posts (approximately 12 posts) and bolts at the upper flight shall be replaced with a 4x6 post per detail 1/SSK1. Some bolts connecting the guardrail post to the stringer at the lower flight of stairs show signs of heavy rust, see Figure 4. Bolts showing high corrosion levels shall be replaced per detail 1/SSK1. Angles and bolts that connect treads to the upper stair stringers are heavily rusted, see Figure 5. Replace all Angles and bolts used for connecting treads to stringer per detail 1/SSK2. Stringers at the top and lower flight of stairs show signs of splitting at the connection points of the guardrail posts and angles for the treads; see Figures 5 and 6. Stringers shall be replaced per detail 1/SSK1. Bolts used to connect posts to the landing and lower flight of stairs show high levels of corrosion. Field-verify all posts for splitting and replace per 1/SSK1 as required. Several support posts are split at notched portions. Field-verify locations and reinforce with SDWH structural screws per 1/SSK3; rusted bolts shall be replaced per detail 1/SSK1. The handrail connection is insufficient to support required loads; it shall be replaced per 1a/SSK1.



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### **Stairway 7:**

In stairway 7, all guardrail posts at the north of the upper flight of stairs are splitting, and the connection bolts that connect the posts and railing are severely rusted, see Figure 8. Please note that our team did not review the 4x4 posts on the southern side of the upper landing due to interference from the landscaping. These posts shall be reviewed by the City of Carmel-by-the-Sea maintenance personnel to check for splitting. All 4x4 posts that are splitting shall be replaced per detail 1 /SSK1. The handrail attached to the guardrail shall be modified per detail 1a/SSK1. Stringers at the bottom of the flight of stairs show signs of splitting at connection points where guardrail posts and stairway angles are bolted through [Refer to Figure 9]. Stringers shall be replaced per detail 1/SSK1 and 1/SSK2. The splitting in the stringer appears to be caused by the handrail post connection. The MIW was recessed into the stringer to allow for the stainless steel tread support, resulting in localized weakness at each handrail support resulting in the stringer failure; therefore, it is our opinion this stringer is not eligible for strengthening. Bolts used to connect steps to the stringer show light corrosion and are relatively loose [Refer to Figure 9]. Bolts shall be replaced per details 1/SSK2. Bolts used to connect posts to the stair landing show high levels of corrosion; some posts show signs of splitting [Refer to Figure 10]. Posts shall be reinforced with SDWH structural screws, and corroded bolts shall be replaced with hot dip galvanized (HDG) bolts and new malleable iron washers (MIWs) as required per 1/SSK3.

### **Limitations:**

Please be advised. We intend these repairs to be temporary, allowing the stairs to be reopened for use while a permanent replacement solution is developed. Because these repairs are temporary, maintenance personnel should pay close attention to further developments, and our office will be contacted if further damage is observed.

Please let us know if you have any questions.

Kind regards,

Matthew R. Kyler, P.E.  
For Kyler Engineering





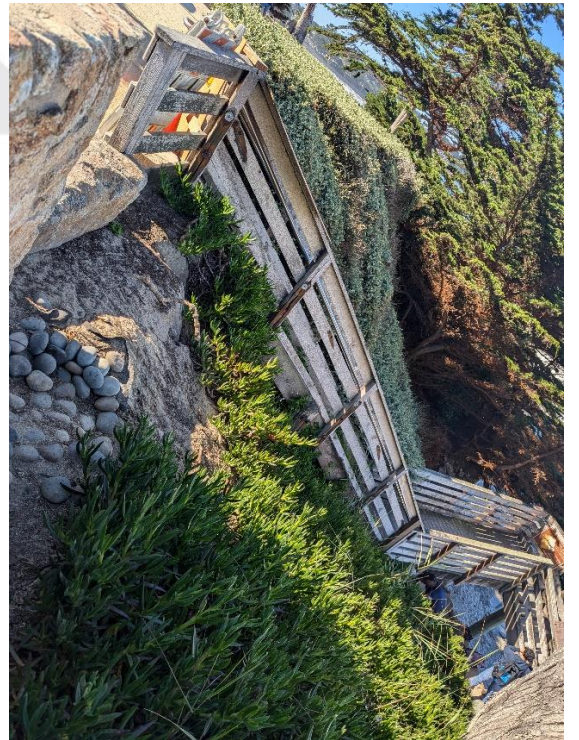
## Structural Evaluation Memo

# Appendix A: Existing Conditions

**Structural Evaluation Memo**



**Figure 1: Stairway #4 from Below and Above**



**Figure 2: Stairway #7 from Below and Above**

**Structural Evaluation Memo**



**Figure 3: Stair #4: Guardrail Post Upper Flight to Landing**



**Figure 4: Stair 4 Guardrail Post/Split Stringer from Landing to Bottom of Stairway**

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*Figure 5: Stair 4 Stringer from Top of Stairway Upper Landing*



*Figure 6: Stairway 4 Split Stringer from Middle Landing to Beach*

**Structural Evaluation Memo**



**Figure 7: Post to Landing Bolted Connection**



**Figure 8: Guardrail Posts-Stringer Bolted Connection**

**Structural Evaluation Memo**



***Figure 9: Stair 7 Split Stringer at Countersunk Post Connections Replace (2) 6x12 Stringers***



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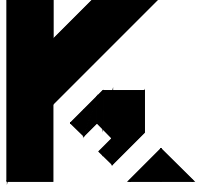


*Figure 10: Post to Landing Bolted Connection*



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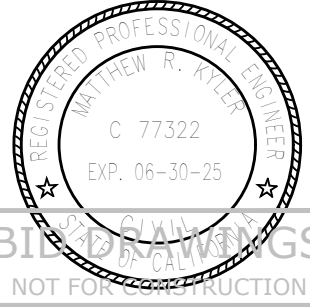
# Appendix B: Structural Sketches (Repair Details)



# KYLER ENGINEERING

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Monterey, CA 93942  
Tel 415-264-2554  
matthewk@kylerengineering.com

JOB : Carmel Beach: Temporary Repairs and Maintenance  
SHEET : SSK1: Guardrail and Stringer Detail  
BY : MRK DATE : 2024-09-09  
SCALE : AS NOTED JOB # : 24-044



(4) 1/4"Øx5" SDS SCREWS TOE  
NAILED INTO  
2x6 FLAT TOP RAILING

1a  
SSK1

(N) 4x6 P.T. POST FLAT TO  
REPLACE (E) 4x4 POST @  
EA. LOCATION  
(REGARDLESS OF  
CONDITION)

2X6 FLAT HORIZ. RAILING w/ (N) (2) 1/2"Ø  
GALVANIZED BOLT w/ M.I.W. & (N) (4)  
SS SDS 1/4"Ø x 3" SCREWS

(E) 6x12 P.T. OR (N) 6x12 P.T. STRINGER,  
REPLACE AT SPLIT LOCATIONS

(E) 4x12 P.T. TREAD,  
REMOVE AND REATTACH,  
PER DETAIL

(2) 1/2"Ø GALVANIZED BOLT  
w/ M.I.W.

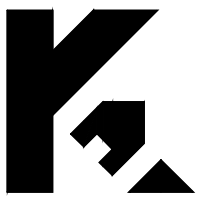
1a  
SSK3

(N) L-2x2x1/4"x0'-3" SS  
w/ (8) SS SDS 1/4"Øx3"

1  
SSK2

# 1 GUARDRAIL AND STRINGER DETAIL

SSK1 SCALE: 1'-1/2" = 1'-0"



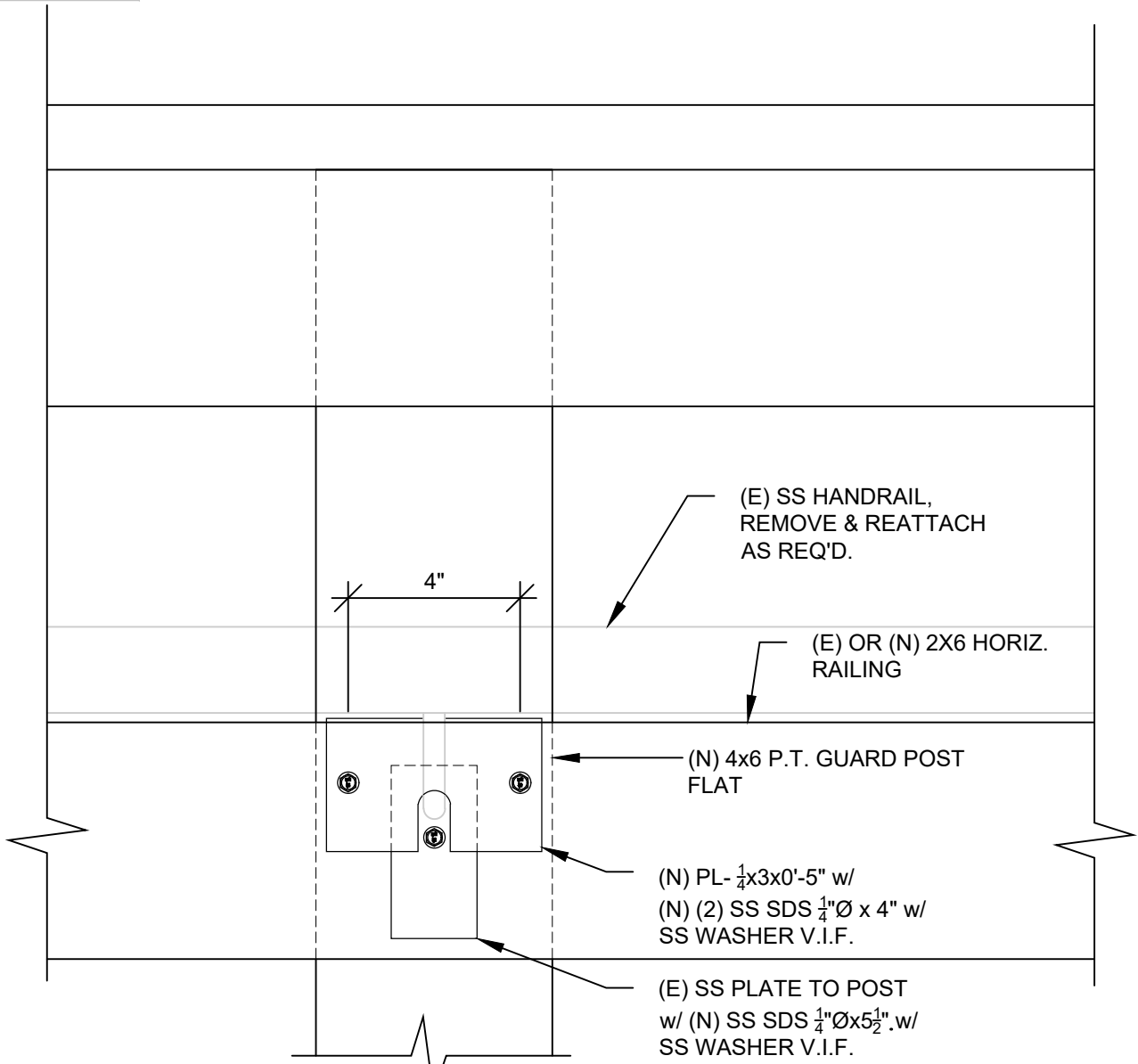
# KYLER ENGINEERING

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Monterey, CA 93942  
Tel 415-264-2554  
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JOB : Carmel Beach: Temporary Repairs and Maintenance  
SHEET: SSK1a: Handrail Detail  
BY: MRK DATE: 2024-09-09  
SCALE: AS NOTED JOB #: 24-044



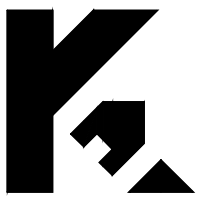
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NOT FOR CONSTRUCTION



1a  
SSK1

## HANDRAIL DETAIL

SCALE: 3" = 1'-0"



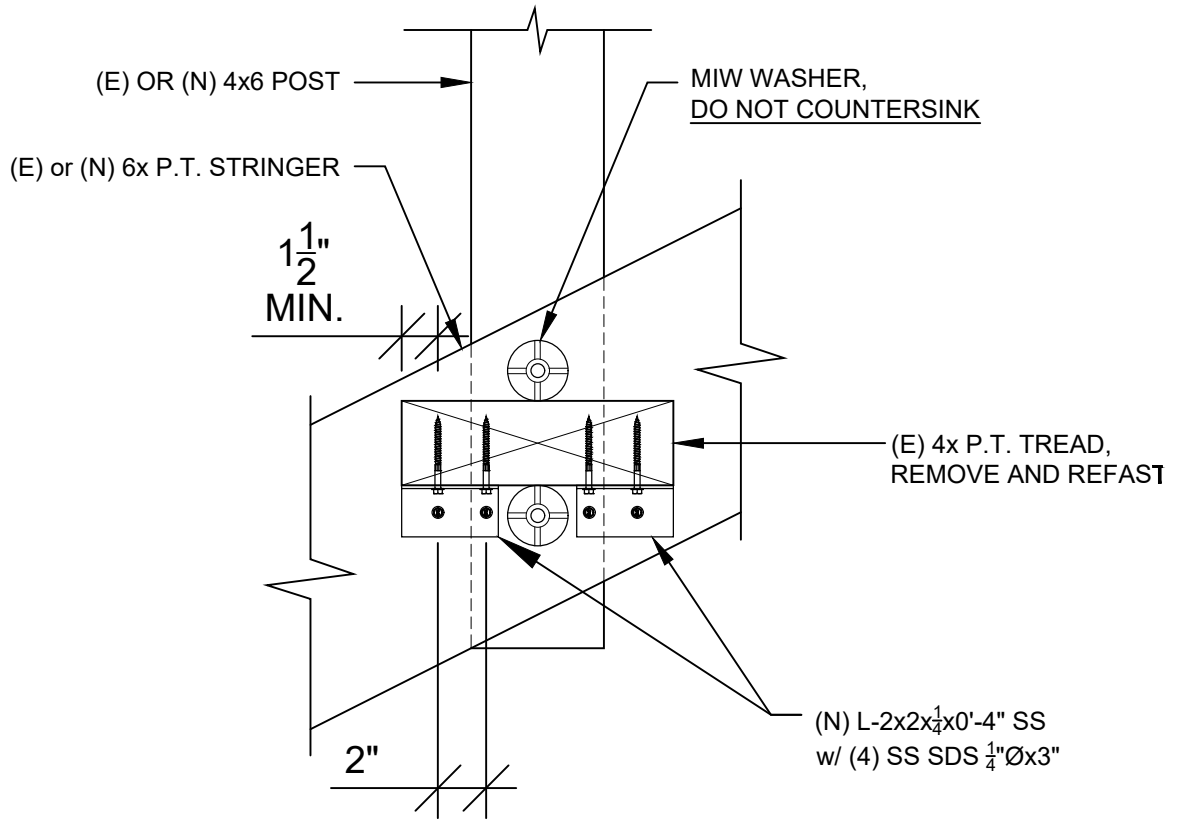
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JOB : Carmel Beach: Temporary Repairs and Maintenance  
SHEET : SSK2: Tread and Stringer Detail  
BY : MRK DATE : 2024-09-09  
SCALE : AS NOTED JOB # : 24-044



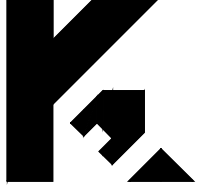
BID DRAWINGS  
NOT FOR CONSTRUCTION



1  
SSK2

## TREAD TO STRINGER DETAIL

SCALE: 1'-1/2" = 1'-0"



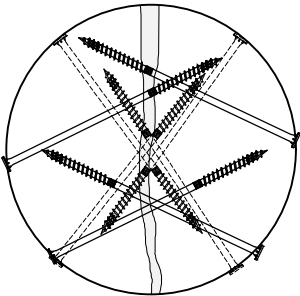
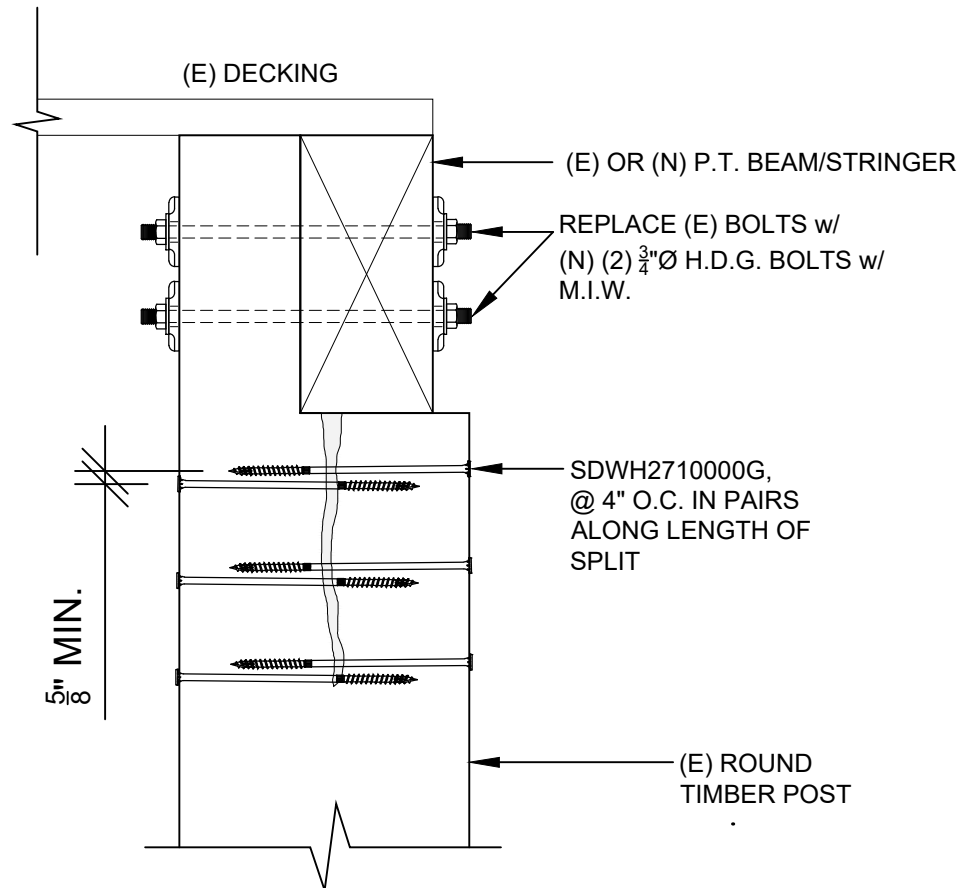
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JOB : Carmel Beach: Temporary Repairs and Maintenance  
SHEET: SSK2 & SSK3: Tread and Stringer Details  
BY: MRK DATE: 2024-09-06  
SCALE: AS NOTED JOB #: 24-044



BIDDING DRAWINGS  
NOT FOR CONSTRUCTION



5" MIN.

1  
SSK3

## COLUMN REINF. DETAIL 1

SCALE: 1'-1/2" = 1'-0"