

G. A. Graebe & Associates, Inc.

Civil and Structural Engineers

154 West San Luis Street, Salinas California 93901

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March 2, 2015

City of Carmel-by-the-Sea

Robert A. Mullane, AICP

Community Planning and Building Director

P.O. Drawer G

Carmel-by-the-Sea, CA 93921

Dear Robert,

Pursuant to our contract with the City of Carmel-by-the-Sea, dated November 12, 2014 which covers stairs "1" through "9", and our first amendment to the contract dated February 13, 2015, which covers beach access stair "0", we are pleased to submit the requested work for Structural Preventive Maintenance Program for the ten Carmel Beach Stairways at Carmel Beach, in Carmel, CA 93923.

If you have questions, please contact me at (831) 422-6409 ext. 11. I look forward to hearing from you to further discuss the project.

Sincerely,

Tony Barakat, P.E.

Associate Civil Engineer

G.A. Graebe & Associates, Inc.

Enclosures:

1. Structural maintenance report, pictures and a sketch for Stairs "0" through "9".
2. Total Conceptual Cost.
3. Drawing: Overall Site Plan.
4. USB flash drive.

Survey Data

Stair 9

Beach Access Stair located near Martin Way & Scenic Rd at Carmel Beach in Carmel-by-the-Sea, CA 93921.

Stair Description

The L-shaped concrete and wood stair is approximately 51-ft long with two flights and two landings. See pictures 046, 051, 054, 056, 061, 063, 065.

The upper flight is approximately 24-ft long and has 21 level concrete / stone steps with one 3'-7" intermediate landing, see pictures 053, 061. The lower flight is approximately 18-ft long and has 19 level wood steps, see picture 051. The steps are 4x12 pressure treated wood and bear on 2-in x 2-in x 10-in long galvanized steel angles w/ 4 lag screws to step and 4 lag screws to stringer. See pictures 077, 079.

The riser heights varied from 5-in to 5 1/2-in. The run is approximately 13-in.

The upper flight consists of concrete / stone steps, see picture 054.

The lower wood stair flight width is approximately 4.5-ft. It is bound by two 6x12 pressure treated stringers with guardrails on each side, see pictures 051 & 065.

The guard rail at the lower flight consists of 4x6 pressure treated posts at approximately 5.5-ft spacing w/ 2x6 intermediate wood boards and 2x6 flat top cap. See pictures 046, 064.

The 4'-7" wide x 5'-7" long rectangular landing, see picture 063, consists of 2x12 pressure treated perimeter members connected together with a 9-in x 2-in pre-bent steel plate, see pictures 067, 068, 069, 070, 071. A 3-in x 2-in steel angle with 4 rusted bolts with no heads supports the landing at the concrete edge, see picture 067.

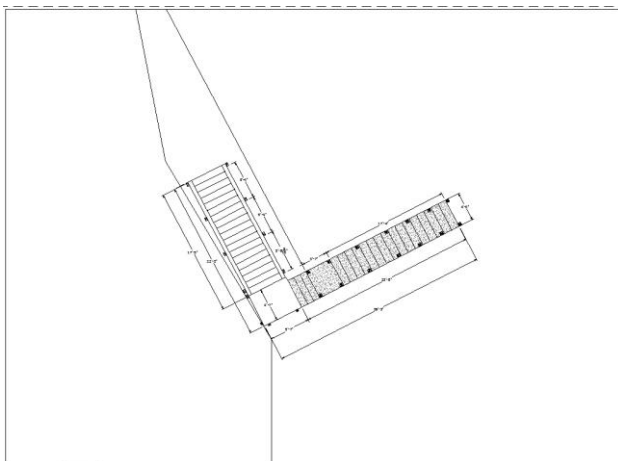
Three interior 2x4 nailers are connected to steel angles / joists that are in turn welded the perimeter composite wood / steel plate beams, see pictures 068, 069.

Three HSS3x2 tube steel diagonal braces support the landing, see pictures 066, 073.

Two x sheathing running in the short direction is nailed to top of landing framing. We measured 4'-6" from bottom of landing to rock and 6'-0" to sand. See pictures 052 and 046 respectively.

The guard rail posts at the upper flight consist of deteriorated / rusted 1-in steel pipe wrapped around with deteriorated wood members, see pictures 102, 103. We counted seven guard rail posts on each side of the upper stair flight, see picture 056.

Both flights have 1 1/2-in galvanized handrail with minor surface rust, see pictures 054 & 065. We measured 32-in clear distance between handrails. The top handrails did not appear aligned, see picture 056. Pictures 114 to 122 were taken on Friday, January 09, 2015. The tide was high and the water covered the bottom of stairs. All other pictures were taken on December 30, 2014.



Stair 9

Nb	Deficiency Description	Picture #	Priority Ranking	Conceptual Remediation	Cost
1	The upper concrete stair flight has deteriorated / rusted steel pipe guard rails wrapped with 1x wood	see picture 054	High	All fourteen guard rail posts at the upper flight need to be removed and replaced with 1 ½-in diameter stainless steel post-installed posts conforming to current building code, see picture 054.	\$7,500
2	We noted excessive moisture in the bottom 4x6 pressure treated guard rail post and severe rust in the bolted connection of post to the stringer.	see pictures 081, 085	High	We recommend replacing the lower wood flight with concrete stairs and stone veneered retaining walls similar to lower flight of stair 4; see pictures 112 & 114 in stair 4.	\$30,000
3	Wet 6x12 pressure treated stringers at the lower wood flight	see pictures 079, 094, 095	High	We recommend replacing the lower wood flight with concrete stairs and stone veneered retaining walls similar to lower flight of stair 4; see pictures 112 & 114 in stair 4.	Cost is included in item 2
4	We noted deteriorated 2 - 6x 12 wood base at the bottom of the stair.	see pictures 087, 094	Moderate	We recommend replacing the lower wood flight with concrete stairs and stone veneered retaining walls similar to lower flight of stair 4; see pictures 112 & 114 in stair 4.	Cost is included in item 2

5	Deteriorated 4x6 pressure treated guard rail post at the bottom of the lower flight, see picture 081.	see picture 081, 094, 095	Moderate	We recommend replacing the lower wood flight with concrete stairs and stone veneered retaining walls similar to lower flight of stair 4; see pictures 112 & 114 in stair 4.	Cost is included in item 2
6	Rusted landing pre-bent steel bearing plates, steel joist angles and bolts, see picture 069. the tube steel diagonal braces have surface rust.	see picture 069, 073	Moderate	We recommend replacing the wood framed landing with concrete landing.	\$8,000
7	Rusted angle bracket between the two guard rail posts.	see picture 046	Moderate	We recommend replacing the lower wood flight with concrete stairs and stone veneered retaining walls similar to lower flight of stair 4; see pictures 112 & 114 in stair 4.	Cost is included in item 2
8	We noted rusted bearing angle connections supporting the wood steps.	see pictures 078, 079	Moderate	We recommend replacing the lower wood flight with concrete stairs and stone veneered retaining walls similar to lower flight of stair 4; see pictures 112 & 114 in stair 4.	Cost is included in item 2
9	Rusted angle bolts at guard rail posts toward the ocean side.	see pictures 046, 088, 097.	Moderate	We recommend replacing the lower wood flight with concrete stairs and stone veneered retaining walls similar to lower flight of stair 4; see pictures 112 & 114 in stair 4.	Cost is included in item 2
10	Rusted / perforated hand rail at the bottom flight.	see pictures 082, 090, 091.	Moderate	Replace rusted / perforated hand rail at the bottom flight with stainless steel one, compliant to building code requirements.	\$6,500

11	We noted green moss at the top of 2x6 rail cap.	see picture 092.	Low	We recommend replacing the lower wood flight with concrete stairs and stone veneered retaining walls similar to lower flight of stair 4; see pictures 112 & 114 in stair 4.	Cost is included in item 2
12	Spalling in concrete steps	see picture 101	Moderate	Saw cut concrete in spalled area, pour high strength non shrink concrete, drill and dowel to repair broken step.	\$1,500
13	Broken 2x6 rail cap.	see picture 057	Moderate	We recommend replacing it with naturally durable wood.	\$1,000
14	White growth appeared on guard rail posts at landing.	see picture 075	Low	We recommend replacing the lower wood flight with concrete stairs and stone veneered retaining walls similar to lower flight of stair 4; see pictures 112 & 114 in stair 4.	Cost is included in item 2
15	Crack in bottom 4x12 stair steps	see picture 096	Low	We recommend replacing the lower wood flight with concrete stairs and stone veneered retaining walls similar to lower flight of stair 4; see pictures 112 & 114 in stair 4.	Cost is included in item 2
Total					\$54,500

The above "conceptual" cost was provided to us by:
 N.C. Construction Inc.
 23002 Muleta Pl. Salinas ca 93908
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 Phone: (831) 206-2403
 Nasonc11@gmail.com

Survey Data

Stair 8

Beach Access Stair located near Santa Lucia Ave & Scenic Rd at Carmel Beach in Carmel-by-the-Sea, CA 93921.

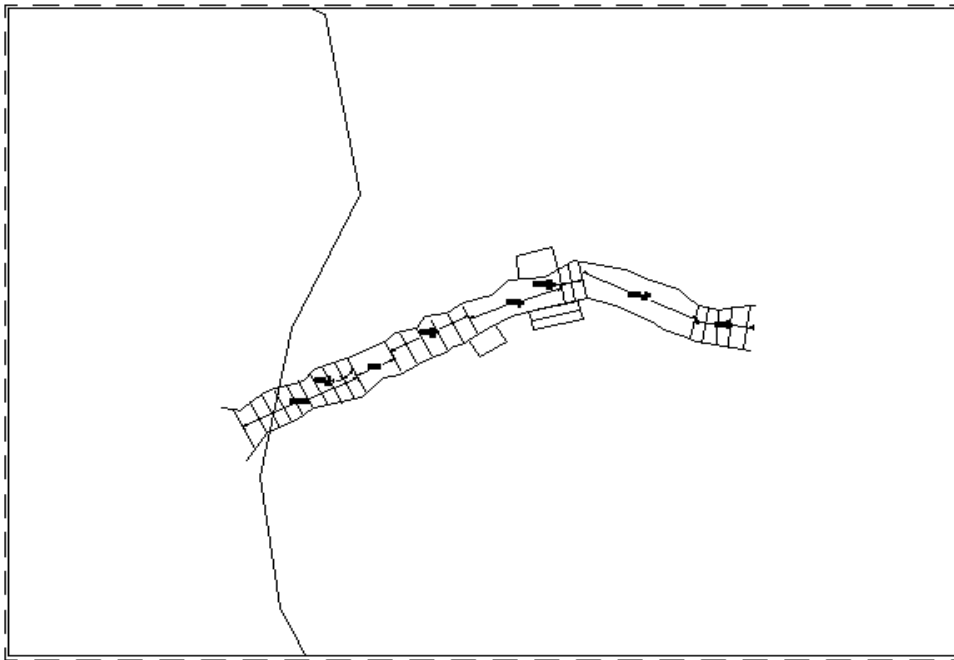
Stair Description

The 24-step single flight curved natural stone stair is approximately 48-ft long with long intermediate steps and a 4-ft x 4.5-ft wash and a 3.5-ft x 4.75-ft trash enclosure, see picture 028. See pictures 019, 020 & 036 for the stairs and picture 028 for the trash enclosure.

The riser height varied from 5-in to 9-in. The step run varied from 14-in to 19-in, see pictures 035 & 039. The landing run varied from 3'-8" to 11'-4".

The stair width is approximately 4.5-ft, see picture 115. It is bound by two stone and mortar retaining walls. The maximum retaining wall height is approximately 3-ft at the lower side, see picture 109.

The guard rail consists of 1 1/2-in diameter galvanized pipe at both sides of the stairs, see picture 112. We measured handrail height of 42-in.



Stair 8

<u>Nb</u>	<u>Deficiency Description</u>	<u>Picture #</u>	<u>Priority Ranking</u>	<u>Conceptual Remediation</u>	<u>Cost</u>
1	We noticed moisture around the guard rail post below the wash and localized muddy conditions at the lower ten steps. Notice how the upper steps appear to be dry	see pictures 029, 031, 032, 033 & 035	High	We recommend further investigation for the cause of the water. A French drain pipe could be a possible solution to divert the water away from the steps. More specific solutions can be proposed once the source of the leak has been determined.	TBD
2	b. The upper 11'-4" landing appeared to have an excessively steep slope.	see picture 113	Moderate	We recommend reducing the slope and adding one or two steps as necessary.	\$15,000
3	The drain in the wash needs maintenance.	see picture 110	Moderate	We recommend periodically cleaning it to prevent flooding.	City of Carmel
Total					\$15,000

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Survey Data

Stair 7

Beach Access Stair located near 13th Ave & Scenic Rd at Carmel Beach in Carmel-by-the-Sea, CA 93921.

Stair Description

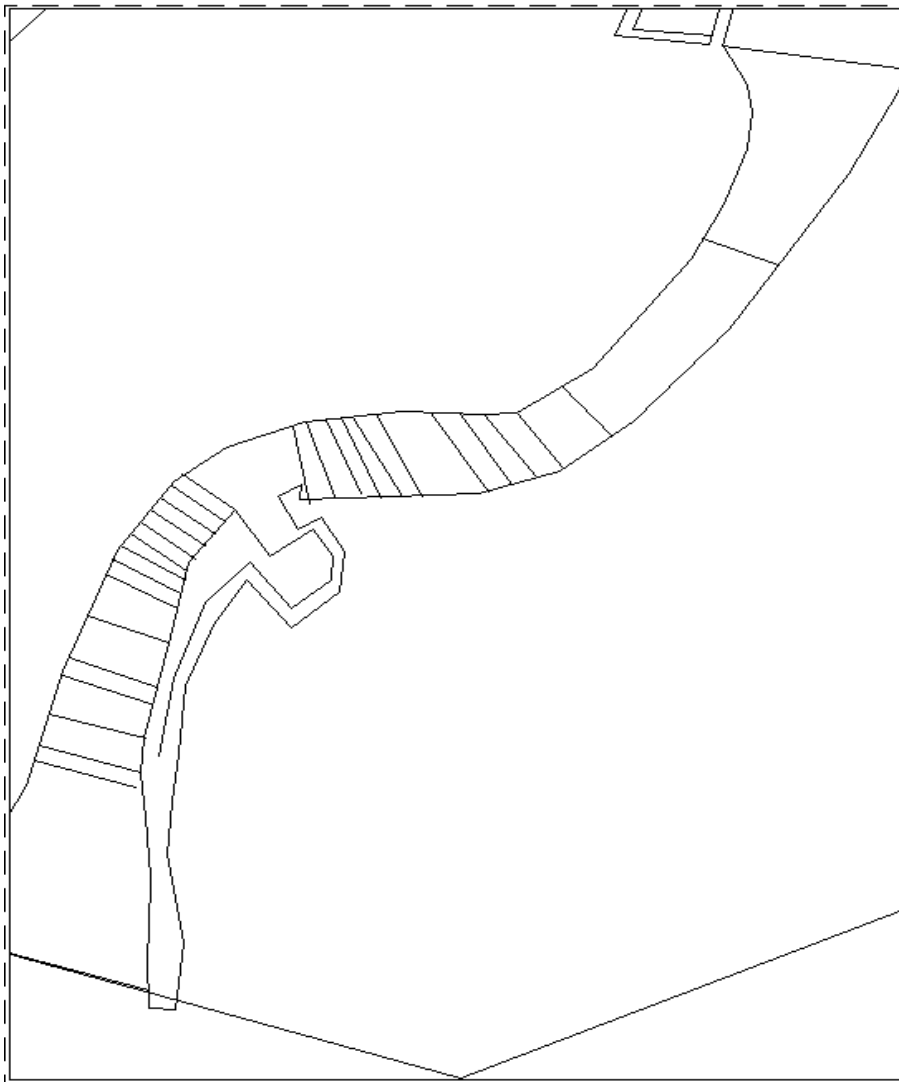
The 28-step single flight curved natural stone stair is approximately 100-ft long with long intermediate steps / landings and a 3-ft x 3.5-ft wash. See pictures 001, 002, 003, 004, 007 & 009.

The stair has sloping weathered stone steps.

The riser height varied from 5-in to 7-in. The run varied from 3-ft to 14-ft at the bottom landing, see pictures 009, 010 & 015.

The stair width is approximately 4-ft and widens at the lowest step to 20'-9", see pictures 009 & 015. It is bound by two stone and mortar retaining walls. The maximum retaining wall height is approximately 5.5-ft at the bottom right side, see picture 009.

The guard rail consists of 1-in diameter galvanized pipe at one side only of the stairs, see picture 003.



Stair 7

<u>Nb</u>	<u>Deficiency Description</u>	<u>Picture #</u>	<u>Priority Ranking</u>	<u>Conceptual Remediation</u>	<u>Cost</u>
1	Surface rust on loose guardrail	see picture 010	Moderate	We recommend replacing the guardrail with code compliant stainless steel.	\$2,500
2	The drain in the wash appeared open with some sand on the side.	see picture 14	Moderate	We recommend periodically cleaning it to prevent flooding.	City of Carmel
Total					\$2,500

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Survey Data

Stair 6

Beach Access Stair located near 12th Ave & Scenic Rd at Carmel Beach in Carmel-by-the-Sea, CA 93921.

Stair Description

The L-shaped wood stair is approximately 70-ft long with two flights and one landing. See pictures 075, 094, 097, 098, 099.

The upper flight is approximately 31-ft long and has 34 level wood steps. The lower flight is approximately 18-ft long and has 20 level wood steps. The steps are 4x12 pressure treated wood and bear on 2-in x 2-in x 10-in long galvanized steel angles w/ 4 lag screws to step and 4 lag screws to stringer. See picture 066.

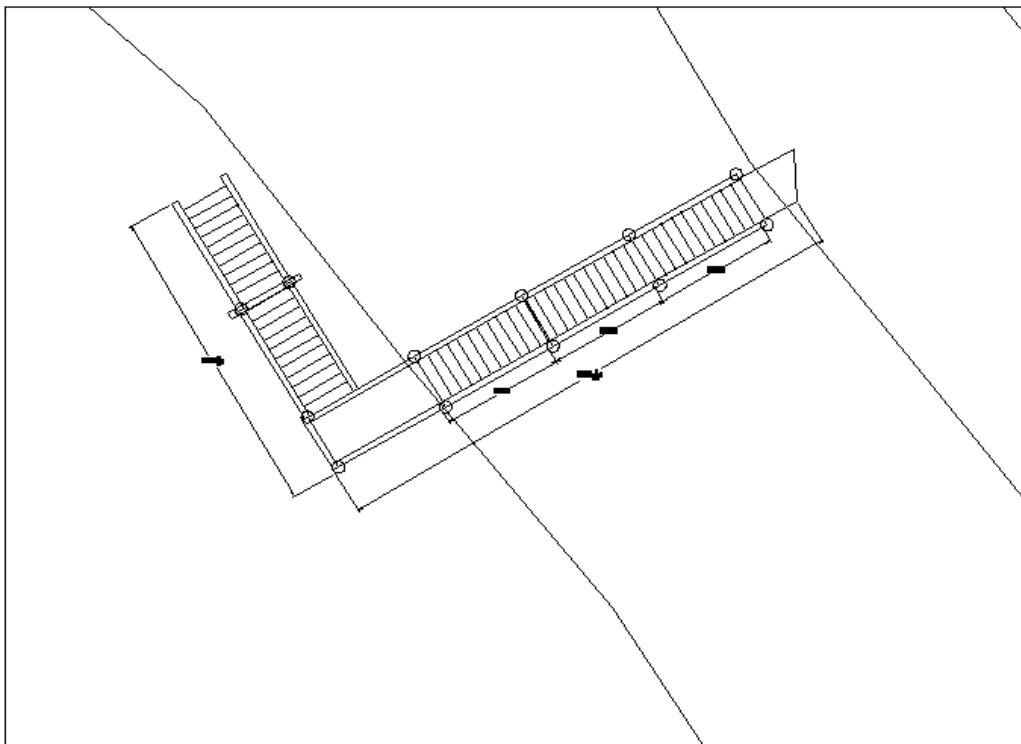
The riser heights varied from 5-in to 5 1/2-in. The run is approximately 11-in.

The stair width is approximately 4-ft. It is bound by two 6x12 pressure treated stringers with guardrails on each side.

The guard rail consists of 4x4 posts at approximately 4-ft spacing w/ 2x6 intermediate wood boards and 2x6 flat top cap. See picture 059.

The 5'-0" wide x 10'-2" long rectangular landing, see picture 086, consists of 6x12 pressure treated perimeter beams connected together with a rusted steel angle, see pictures 062, 063. A single interior 4x12 joist runs parallel to the upper flight hung with stainless steel joist hangers to landing beams, see pictures 061, 063. Two x sheathing running in the short direction is nailed to top of landing framing. We measured 7'-8" from bottom of landing to ground. See picture 076.

The stringers at the upper flight are supported by two pairs of 1-ft diameter timber poles at approximately 10-ft spacing embedded in the ground, see picture 097. The landing is similarly supported by 2-1-ft diameter timber poles, one at each corner, see pictures 075 & 077. The landing beams bear on concrete footing at the opposite end see picture 078.



Stair 6

<u>Nb</u>	<u>Deficiency Description</u>	<u>Picture #</u>	<u>Priority Ranking</u>	<u>Conceptual Remediation</u>	<u>Cost</u>
1	Green moss coated the bottom of the steps, the 6x12 stringers, and 6x12 landing beams.	see pictures 062, 070, 083, 087	Low	We recommend scrubbing off all moss and treating the wood with approved protection material to prevent further deterioration of those members.	\$1,500
2	We noted Splitting in the upper flight posts and the landing guardrail posts, and heavy rust in bolted post connections;	see pictures 056, 057, 058	Moderate	We recommend replacing the guardrail posts as well as the 2x6 intermediate boards and using stainless steel bolted connections. Avoid splicing the 2x6 intermediate boards at the bolted connection. Note that the lower flight guard rail posts and their connections are in satisfactory condition see picture 076.	\$3,500
3	We noted rusted bearing angles between the step and the stringers;	see pictures 064, 065, 066, 069 & 070.	Moderate	We recommend replacing the angle and the screws with stainless steel material w/ same dimensions.	\$2,500
4	We noted rusted bolted connections in the timber poles;	see pictures 056, 058.	Moderate	We recommend replacing all rusted bolts with same size stainless steel.	\$2,500
5	We noted a 3/8-in wide vertical splitting in the 12-in timber pole supporting the lower flight and the landing	see picture 076 A	Moderate	We recommend running two 5/8-in stainless steel machine bolts at the top and bottom of the pole to support the split pieces together.	\$500
6	We noted a 1/4-in wide splitting in the 12-in timber pole supporting the lower flight;	see picture 055	Moderate	We recommend running a 5/8-in stainless steel machine bolt at the top of the pole to support the split pieces together.	\$500

7	We noted splitting in the 12-in timber pole supporting the upper flight	see picture 089	Low	We recommend monitoring this pole.	\$0
8	We noted deteriorated 2x6 guardrail top boards	see picture 085	Moderate	We recommend changing these boards with pressure treated same size boards.	\$1,200
9	The bottom flight terminates in sand for an approximate distance of 9-ft	see pictures 075 & 082	Moderate	We could not verify the framing condition under the sand since it was not accessible. We recommend exposing those buried members and replacing them with pressure treated lumber in case they turn out to be deteriorated.	\$2,500
Total					\$14,700

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Stair 6 - Beach Access Stair located near 12th Ave & Scenic Rd at Carmel Beach in Carmel-by-the-Sea, CA 93921.



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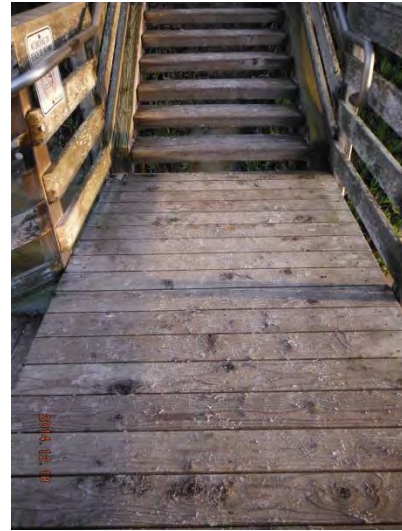


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Stair 6 - Beach Access Stair located near 12th Ave & Scenic Rd at Carmel Beach in Carmel-by-the-Sea, CA 93921.



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Survey Data

Stair 5

Beach Access Stair located near 11th Ave & Scenic Rd at Carmel Beach in Carmel-by-the-Sea, CA 93921.

Stair Description

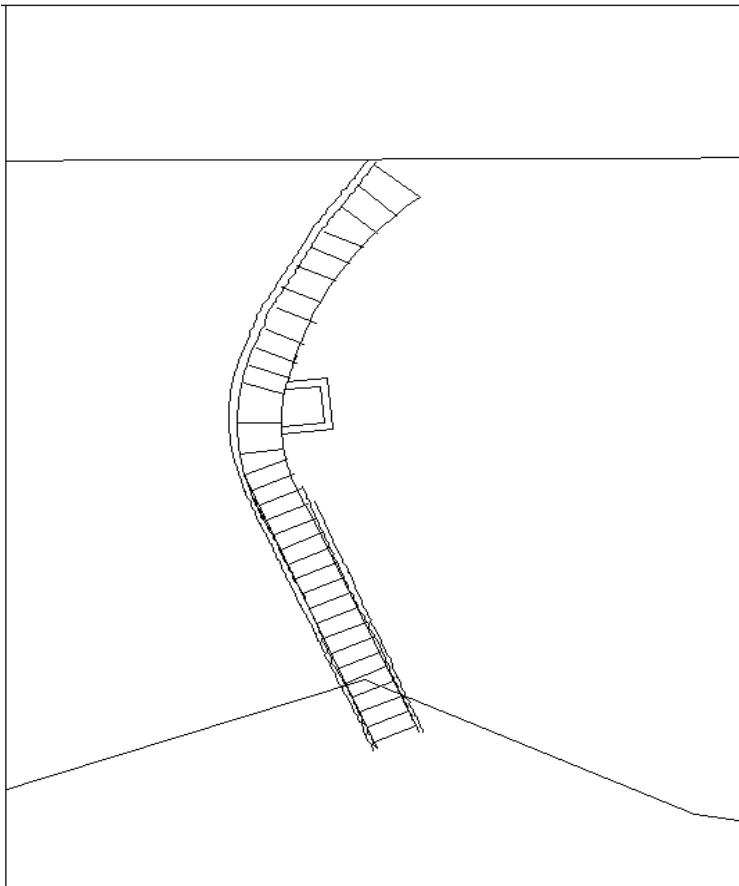
The single flight curved concrete stair is approximately 58-ft long with 30-in long intermediate step / landing and a wash. See pictures 029, 033, 043, 052, 053.

The stair has 39 sloping weathered concrete steps. We could not verify if the cracked concrete is covering natural stone stairs or it is weathered poor mix aggregate.

The average riser height is 6-in. The run varied from 15-in to 18-in.

The stair width is approximately 3'-8". It is bound by two stone and mortar retaining walls. The maximum retaining wall height is approximately 7-ft at the bottom right side, see picture 032.

The guard rail post consists of 1 1/2-in x 40 1/2-in galvanized pipe at approximately 6-ft spacing post-installed into concrete steps, see picture 039, 044. The handrail consists of 1 1/2-in galvanized pipe, see picture 041. The guard rail terminates in sand as shown in picture 031.



Stair 5

<u>Nb</u>	<u>Deficiency Description</u>	<u>See Picture #</u>	<u>Priority Ranking</u>	<u>Conceptual Remediation</u>	<u>Cost</u>
1	Horizontal cracks run left to right on the vertical face of the steps	034, 036	Moderate	We recommend demolishing the existing stairs & rebuilding it similar to the first couple of steps, see picture 050. The existing retaining wall appears to be in satisfactory condition and can stay unless it shows signs of structural defects during demolishing of the existing stairs.	\$15,000
2	Spalling concrete / mortar over what appeared to be natural stone steps	040, 046, 047	Moderate	This item is included in item 1.	Cost is included in item 1.
Total					\$15,000

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Survey Data

Stair 4

Beach Access Stair located south of 10th Ave & Scenic Rd, Carmel Beach in Carmel-by-the-Sea, CA 93921.

Stair Description

The wood & concrete stair is approximately 51-ft long with two wood stair flights and one wood landing and one bottom concrete stair flight with concrete landing. See pictures 099, 100, 101, 105, 110, 111 & 112, 114 & 124.

The first upper flight has 16 sloping wood steps. The second intermediate flight consists of 17 sloping wood steps. The steps are 4x12 pressure treated wood and bear on 2-in x 2-in x 10-in long galvanized steel angles w/ 4 lag screws to step and 4 lag screws to stringer, see picture 131. The lower concrete flight has 9 risers.

The riser heights varied from 5-in to 5 ½-in. The run varied from 11-in to 12-in.

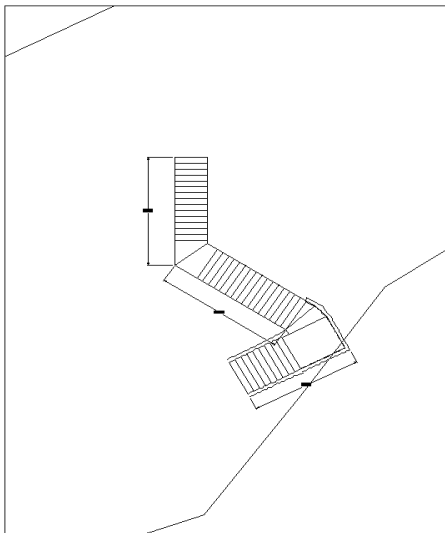
The stair width is approximately 4'-6". It is bound by two 6x12 pressure treated stringers with guardrails on each side.

The guard rail consists of 4x6 posts at approximately 4-ft spacing w/ 2x6 intermediate wood boards and 4x6 flat top cap. See picture 099.

The trapezoidal wood landing consists of 6x12 pressure treated perimeter beams. The crawl space under the landing varied from 1 to 2-ft. See picture 133.

The stringers at the first flight are continuously embedded in the ground. See picture 125.

The stringers at the second flight are supported by 8x8 wood post embedded in the ground at approximately 3-ft spacing, see pictures 091, 092, 096 & 131. The landing is similarly supported by 8x8 wood post embedded in the ground, one at each corner, see pictures 126, 127, 130, . The landing beams bear on concrete footing at the opposite end see picture 090.



Stair 4

<u>Nb</u>	<u>Deficiency Description</u>	<u>See Picture #</u>	<u>Priority Ranking</u>	<u>Conceptual Remediation</u>	<u>Cost</u>
1	In both wood flights, the 4x12 steps, 6x12 stringers and 6x12 landing beams appeared to be in unsatisfactory structural condition due to structural foundation failure. The steps are sloping in the longitudinal direction while the right hand (coming down) guard rail is leaning to the right.	100, 101, 123 at upper flight & 105, 115 at intermediate flight	High	We recommend demolishing the existing wood stair portion and rebuilding it.	\$27,500
2	1 ½-in settlement at the end of some steps	015, 016	High	This item is included in item 1.	Cost is included in item 1
3	4 ½-in lean in the guard rail	018, 019	High	This item is included in item 1.	Cost is included in item 1
4	9 ½-in lean in the guardrail of the bottom wood stair flight	022, 023	High	This item is included in item 1.	Cost is included in item 1
5	Concrete spalling on the second step from the bottom	111	Moderate	We recommend saw cutting the spalled portion of the step, drilling and doweling in existing concrete and pouring new concrete in that portion.	\$4,500
Total					\$32,000

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Survey Data

Stair 3

Beach Access Stair located between 9th & 10th Ave & Scenic Rd at Carmel Beach in Carmel-by-the-Sea, CA 93921

Stair Description

The L-shaped wood stair is approximately 54-ft long with two flights and one landing. See pictures 056, 057, 059, 060, 061.

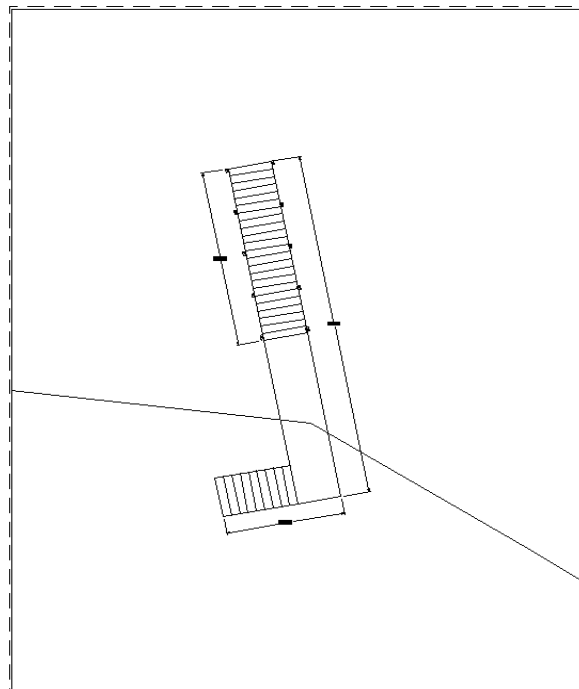
The upper flight has 23 level wood steps. The lower flight consists of 9 level wood steps. The steps are 4x12 pressure treated wood and bear on 2-in x 2-in x 10-in long galvanized steel angles w/ 4 lag screws to step and 4 lag screws to stringer. See picture 084.

The riser heights varied from 6 ½-in to 7 ¼-in. The run is approximately 11-in.

The stair width is approximately 4-ft. It is bound by two 6x12 pressure treated stringers with guardrails on each side.

The guard rail consists of 4x6 posts at approximately 5-ft spacing w/ 2x6 intermediate wood boards and 2x6 flat top cap. See picture 061.

The 4'-9" wide x 20'-0" long rectangular landing consists of 6"x12" pressure treated perimeter beams connected together with a bolted stainless steel angle, see pictures 068, 079 & 080. A single interior 4x12 joist runs in the E-W direction hung with stainless steel joist hangers to landing beams. 2x sheathing running in the N-S direction is nailed to top of landing framing. We measured 0 to 4-ft of crawl space under the landing. See picture 078.



Stair 3

<u>Nb</u>	<u>Deficiency Description</u>	<u>See Picture #</u>	<u>Priority Ranking</u>	<u>Conceptual Remediation</u>	<u>Cost</u>
1	Slight angle between the two stringers that make up the upper flight. The bow is noticeable in the middle or at the splice point. This uneven layout of the stringers affects the nose alignment of the steps.	061	Low	City Assesment: "The stair tread misalignment identified is within the 3/8" allowed by code. The separation of the stringer appears due to slight settlement and wood shrinkage. Proper filler in the gap would be a preventative maintenance item."	T.B.D.
2	Splitting in the upper flight guardrail posts, and heavy rust in bolted post connections	062, 063	Moderate	Replace the guardrail posts as well as the 2x6 intermediate boards and using stainless steel bolted connections. Avoid splicing the 2x6 intermediate boards at the bolted connection as done in picture 062 lower board.	\$1,500
3	Splitting in the 8-in timber pole supporting the upper flight	064, 070 & 087	Low	Replace this pole in kind	\$5,000
4	Rust in the upper flight steel handrail	062 & 067	Moderate	Replace this hand rail with a stainless steel one compliant with the building code requirements.	\$6,500
5	Minor surface rust on the stainless steel angle connecting the lower flight stringer to top of landing.	085 & 086	Low	We will monitor these angles and bolts.	\$0
6	Rusted bolted connection at corner timber pole supporting landing	076	Moderate	Replace bolts and nuts with stainless steel with same size and dimensions	\$1,500
7	Missing 2 bolts in landing guard rail post	075	Moderate	Add stainless steel bolts with same dimensions as the existing bolts.	\$1,300
Total					\$15,800

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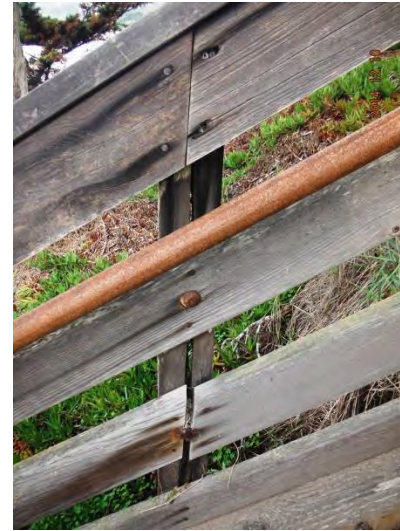
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Stair 3 located between 9th & 10th Ave & Scenic Rd Beach Access Stair located at Carmel Beach in Carmel-by-the-Sea, CA 93921.



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Stair 3 located between 9th & 10th Ave & Scenic Rd Beach Access Stair located at Carmel Beach in Carmel-by-the-Sea, CA 93921.



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Stair 3 located between 9th & 10th Ave & Scenic Rd Beach Access Stair located at Carmel Beach in Carmel-by-the-Sea, CA 93921.



079



080



081



082

Stair 3 located between 9th & 10th Ave & Scenic Rd Beach Access Stair located at Carmel Beach in Carmel-by-the-Sea, CA 93921.



083



084



085



086

Stair 3 located between 9th & 10th Ave & Scenic Rd Beach Access Stair located at Carmel Beach in Carmel-by-the-Sea, CA 93921.



087

2/20/2015

Stair 3 located between 9th & 10th Ave &
Scenic Rd Beach Access Stair located at
Carmel Beach in Carmel-by-the-Sea, CA
93921.

Survey Data

Stair 2

Beach Access Stair located near 9th Ave & Scenic Rd, Carmel Beach in Carmel-by-the-Sea, CA 93921.

Stair Description

The L-shaped wood stair is approximately 48-ft long with two flights and one landing. See pictures 019, 020, 023, 029 & 047.

The upper flight has 23 level wood steps. The lower flight consists of 12 level wood steps. The steps are 4x12 pressure treated wood and bear on 2-in x 2-in x 10-in long galvanized steel angles w/ 4 lag screws to step and 4 lag screws to stringer. See picture 016.

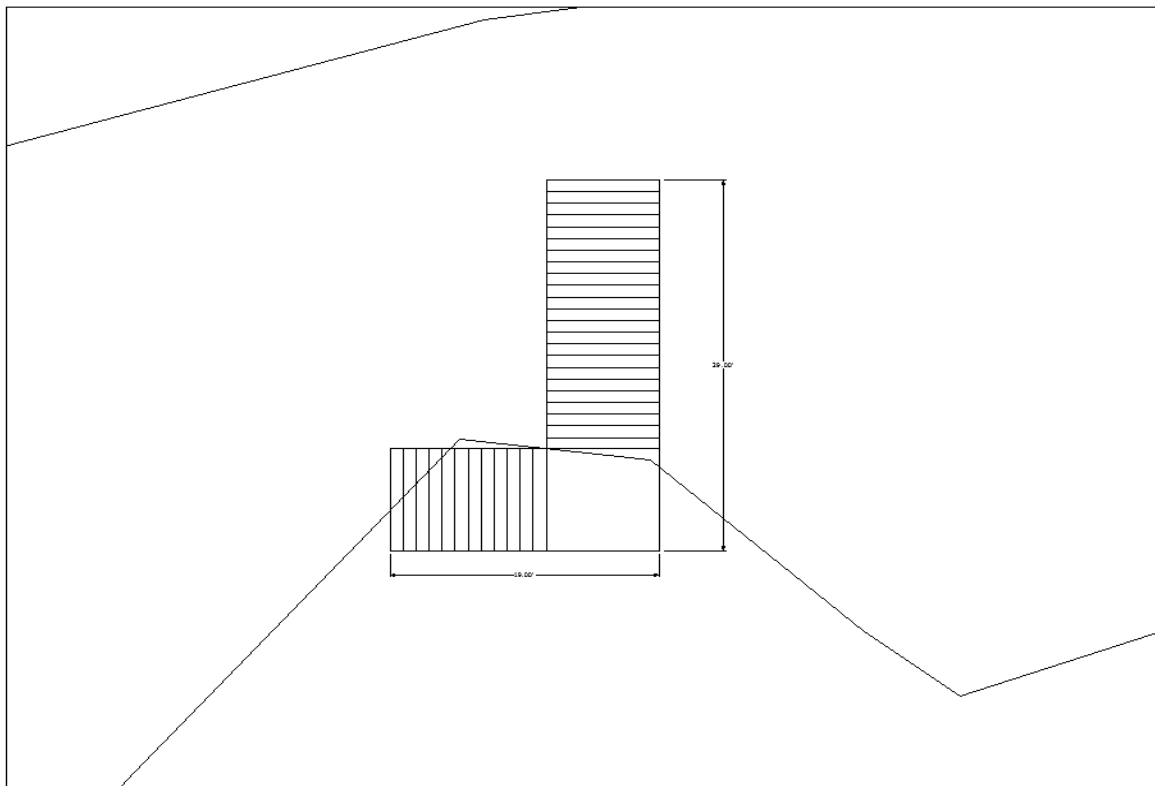
The riser heights varied from 6-in to 6 1/2 -in. The run measured approximately 11-in.

The stair width is approximately 7-ft. It is bound by two 6x12 pressure treated stringers with guardrails on each side. The step length is approximately 11-in.

The guard rail consists of 4x4 posts at 5-ft to 6-ft spacing w/ 2x6 intermediate wood boards and 2x6 flat top cap. See picture 028.

The 8-ft x 8-ft square landing consists of 6"x12" pressure treated perimeter beams with two interior 4x12 joists running in the E-W direction hung with stainless steel HUS412X slant nail joist hangers. 2x sheathing running in the N-S direction is nailed to top of landing framing. We measured 0 to 2-ft of crawl space under the landing. See picture 005.

The stringers at the upper flight are supported by 1'-2" diameter timber pole embedded in the ground at approximately half span. See picture 028. The landing is similarly supported by 4-1'-2" diameter timber poles, one at each corner. See pictures 006, 035, 038, 048.



Stair 2

Nb	Deficiency Description	See Picture #	Priority Ranking	Conceptual Remediation	Cost
1	Splitting in guardrail posts, and heavy rust in bolted post connections	009, 013, 024, 025, 030, 031, 032, 033, 037, 039	Moderate	Replace the guardrail posts as well as the 2x6 intermediate boards and using stainless steel bolted connections. Avoid splicing the 2x6 intermediate boards at the bolted connection as done in picture 032 middle board.	\$2,000
2	Heavy rust in the steel handrail.	010, 011, 034	Moderate	Replace this hand rail with a stainless steel one compliant with the building code requirements.	\$4,500
3	Rusted angle iron connecting the lower flight stringer to top of landing	041, 042	Moderate	Replace this angle and its connecting bolts with stainless steel angle and bolts.	\$1,500
4	Deteriorated end of stringer at the end of the lower flight	044, 045	Moderate	replacing the stringer with pressure treated one having same size and length	\$3,500
5	We noticed minor splitting at the bottom end of the upper flight stringer	-	Low	We will monitor this split on yearly basis.	\$0
Total					\$11,500

The above "conceptual" cost was provided to us by:

N.C. Construction Inc.
 23002 Muleta Pl. Salinas ca 93908
 CCL # 942216
 Phone: (831) 206-2403
 Nasonc11@gmail.com



005



006



009



010



011



013



016



019



020



021



022



023



024



025



028



029



030



031



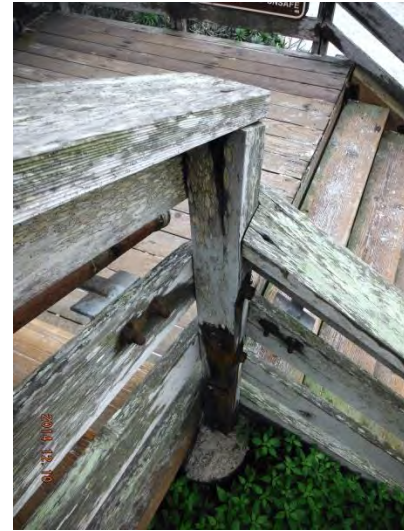
032



033



034



035



037



038



039



041



042



043



044



045



047



048

Survey Data

Stair 1

Beach Access Stair located near 8th Ave & Scenic Rd, Carmel Beach in Carmel-by-the-Sea, CA 93921.

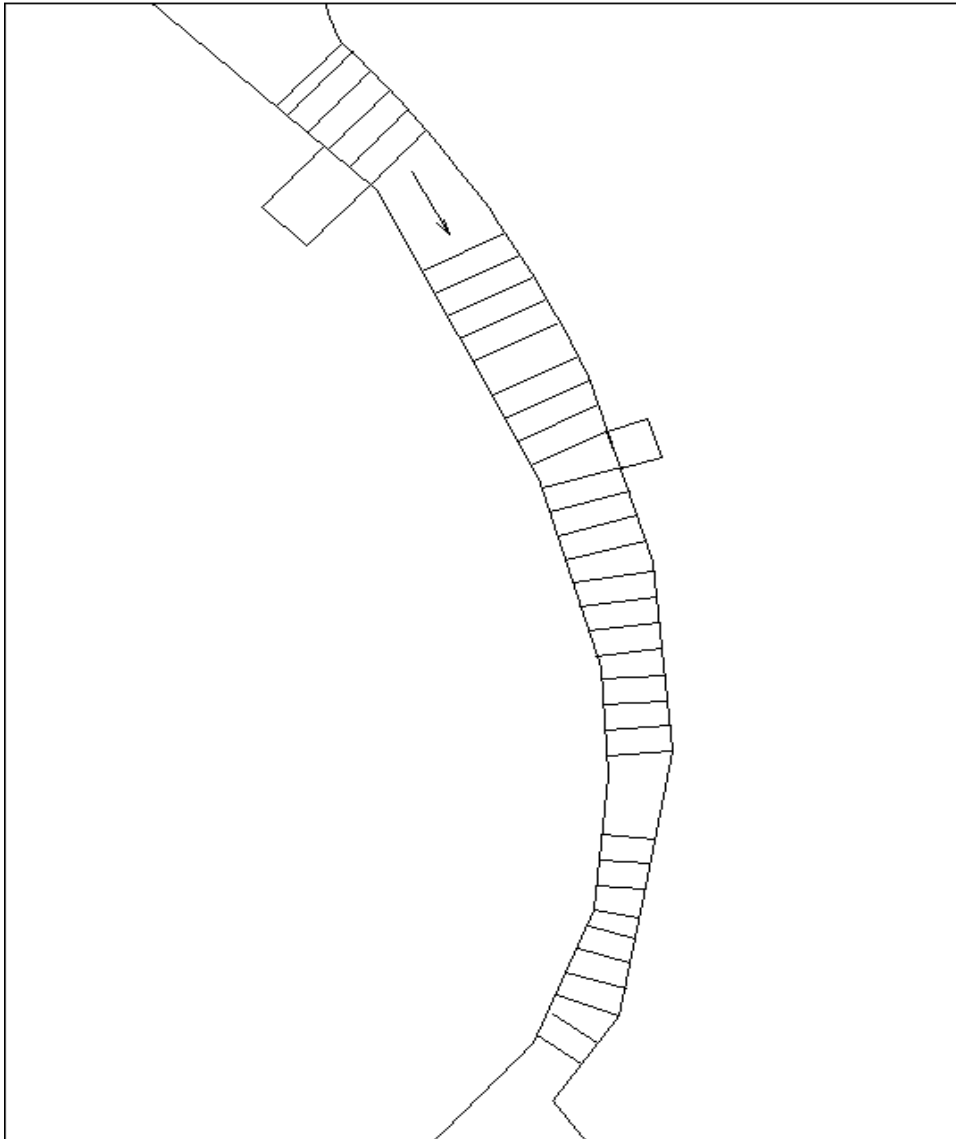
Stair Description

The stone stair is approximately 89-ft long with approximately 30 sloping steps constructed out of mortar and stone. At the end of the ninth step begins an 8.83-ft excessively sloping landing.

The stair width is approximately 3.67-ft. It is bound by a 2-ft to 2.5-ft high stone and mortar retaining wall on each side.

The riser heights are approximately 4-in. The run varied from 1-ft to 4-ft.

A trash enclosure with an approximately 5-ft high free standing wall is located at the bottom of the 9th step. A 2.83-ft square “wash” with a drain, surrounded by a 2.83-ft high stone and mortar retaining wall is located halfway within the stair.



Stair 1

Nb	Deficiency Description	See Picture #	Priority Ranking	Conceptual Remediation	Cost
1	The 8.83-ft landing appears to slope about 9-in in the 8.83-ft run which is approximately 1:12, see picture 001. This slope appears to exceed the maximum slope allowed by the building code	001	High	Reconstruct the landing and insert one 6-in step as necessary.	\$20,000
2	The West free standing trash enclosure wall (towards the beach side) appears to have an undermined footing	001, 010, 011	Moderate	Pour a new 1.5-ft wide x 2-ft deep concrete footing along the undermined footing. The new footing shall be connected to the existing footing using #4 epoxy dowels at 2-ft. The new footing shall be reinforced w/ #4 top and bottom with #3 links at 16-in maximum spacing.	\$6,500
3	The drain in the wash area seems to be clogged	002	Moderate	Clean the drain	City of Carmel
4	All the steps are uneven and sloping down	001	Moderate	Reconstruct excessively sloping steps	\$20,000
5	There are missing stones in the bottom retaining wall	012, 013	Low	Replace the missing stones in kind with high strength mortar.	\$750
Total					\$47,250

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 N.C. Construction Inc.
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 CCL # 942216
 Phone: (831) 206-2403
 Nasonc11@gmail.com



001



002



003



004



010



011



012



013



014

Survey Data

Stair 0

Beach Access Stair located approximately 500-ft North of Ocean Ave in Carmel-by-the-Sea, CA 93921

Stair Description

The wood stair is approximately 124-ft long with five flights labeled F1 through F5 and six landings labeled L1 through L6. It is supported by 45 6x6 posts labeled C1 through C45.

See stair sketch below.

Landings L1 & L2 see pictures 4, 6, 7, 100, 101.

Flight F1 and landing L3 see picture 92.

Flight F2 see picture 93.

Landing L4, flight F3, landing L5, see pictures 32, 33, 91.

Flights F2 & F3, see pictures 54, 55, 56, 82, 85.

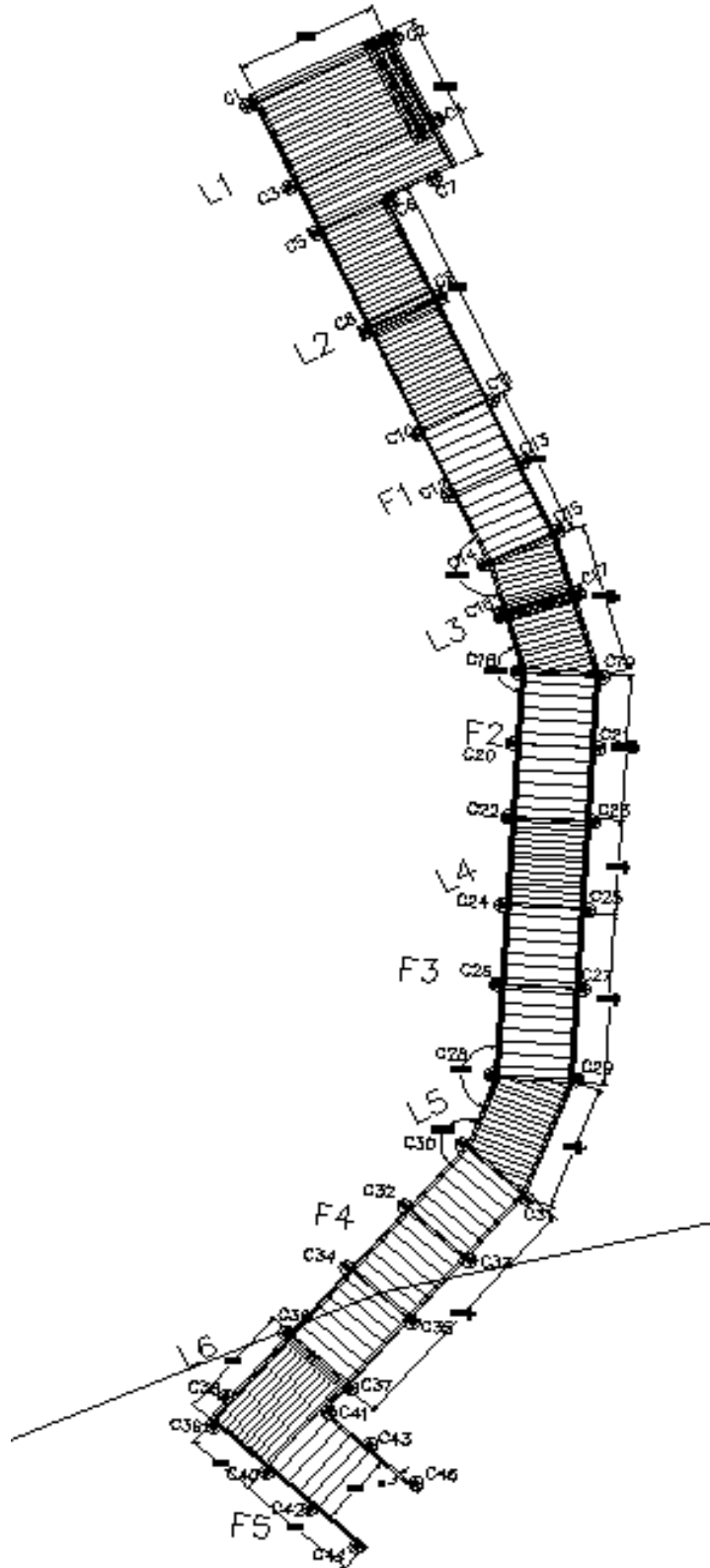
Flight F4 see picture 77.

Landing L6 see pictures 58, 83, 84.

Flight F5 see picture 58.

- Landings L1 through L6 consist of 2x6 straight sheathing connected with wood screws to 2x8 pressure treated landing joists at 14-in on center with LUS26 joist hangers to 4x12 pressure treated rim beams. The beams are bolted to 6x6 pressure treated posts with 2-3/4-in galvanized bolts to steel angles. See picture 1 for bolted connection of landing beam to column C10 at the West end of landing L2. The posts are embedded in 12-in diameter concrete caissons. The opposite posts are interconnected with 3/4-in all threaded tie rod, see pictures 86, 87. Landing L1 has wooden bench consisting of 2x4 pressure treated members bearing on 2-4x10 shaped / bolted beams to posts C2 & C4, see pictures 8, 9 & 10.
- Flights F1 through F5 consists of 4x12 pressure treated wood members bearing on 2-in x 2-in x 10-in long galvanized steel angles w/ 4 lag screws to step and 4 lag screws to stringer. The stair width is approximately 5-ft. The stringers are 4x12 pressure treated bolted to the posts with two 3/4-in galvanized bolts.
- The guard rail consists of five 2x6 pressure treated boards nailed to the 6x6 posts at landings and four 2x6 pressure treated boards at stair flights. We measured a guard rail height of 48-in.
- The handrail consists of 1 1/2-in galvanized pipe, see picture 85.
- We measured a typical run of 11-in (+/-) and a typical rise of 7-in (+/-).

Stair 0



Stair 0

Nb	Deficiency Description	Picture #	Priority Ranking	Conceptual Remediation	Cost
1	The soil around the stair footings is eroding at the south side of flight F4 around column C33.	see pictures 45, 46, 47, 48, 65, 66, 67, 68, 69.	High	We recommend adding missing soil in the eroded / over excavated areas and planting vegetation similar to the opposite side.	City of Carmel
2	Rusted screws on corroded bearing angles	see pictures 30 & 78.	Moderate	We recommend to Brush off loose rust on the corroded bearing angles and apply a minimum of three thin coats of an approved Cold Galvanize Corrosion Inhibitor with ASTM standard per manufacturer specifications.	\$2,500
3	Rust on handrail welds at splice points;	see pictures 41, 89, 90, 95, 96, 98.	Moderate	We recommend to Brush off loose rust and apply a minimum of three thin coats of an approved Cold Galvanize Corrosion Inhibitor with ASTM standard per manufacturer specifications.	\$2,500
4	Checks in top 2x6 pressure treated handrail board.	see picture 57.	Low	We recommend replacing the board in kind.	\$500
5	Cracked concrete caisson in flight F4.	see picture 88.	Low	Fill crack with an approved low-viscosity crack injection epoxy, designed to repair cracks in concrete.	\$200
6	The bottom flight terminates in sand for an approximate distance of 9-ft.	see pictures 58, 59, 71, 72, 73, 74.	Low	We recommend exposing the buried members and replacing them with pressure treated lumber in case they turn out to be deteriorated.	\$2,500
Total					\$8,200

The above "conceptual" cost was provided to us by:

N.C. Construction Inc.

23002 Muleta Pl. Salinas ca 93908

CCL # 942216

Phone: (831) 206-2403

Nasonc11@gmail.com



pic (0)



pic (1)



pic (2)



pic (3)



pic (4)



pic (5)



pic (6)



pic (7)



pic (8)



pic (9)



pic (10)



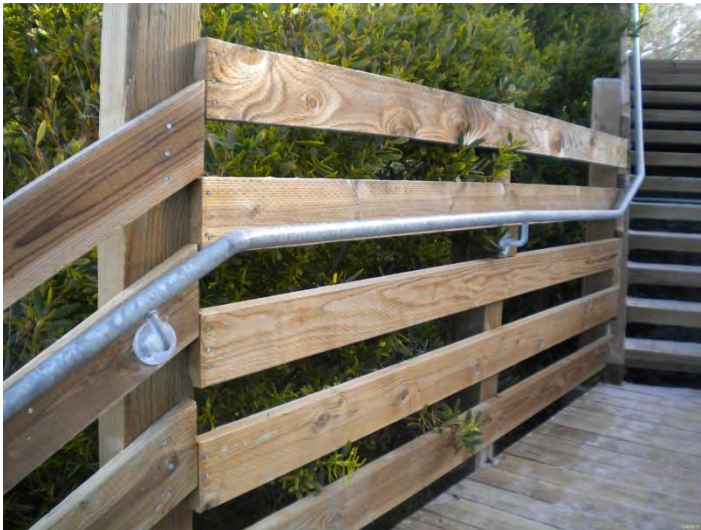
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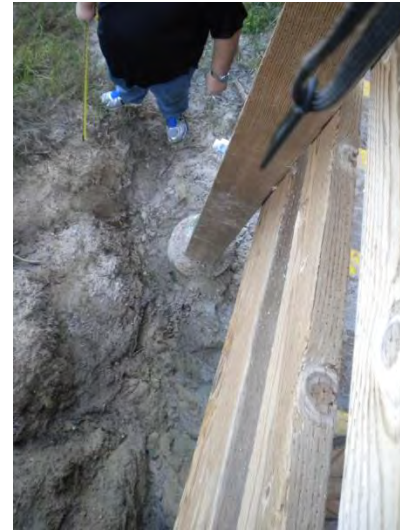
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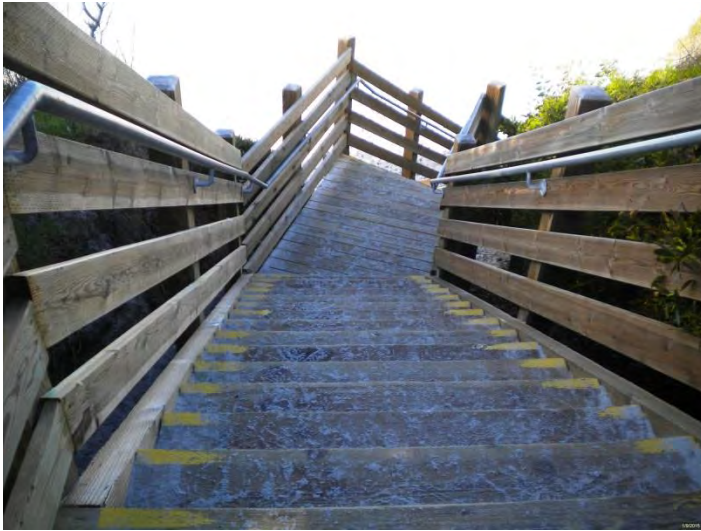
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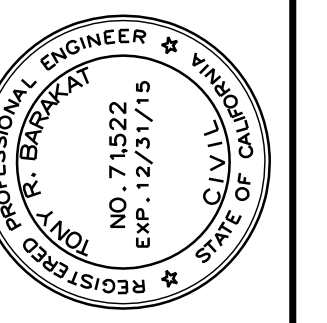
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CARMEL BEACH STAIRS

STRUCTURAL BEACH STAIR MAINTENANCE

CARMEL BY THE SEA, CALIFORNIA

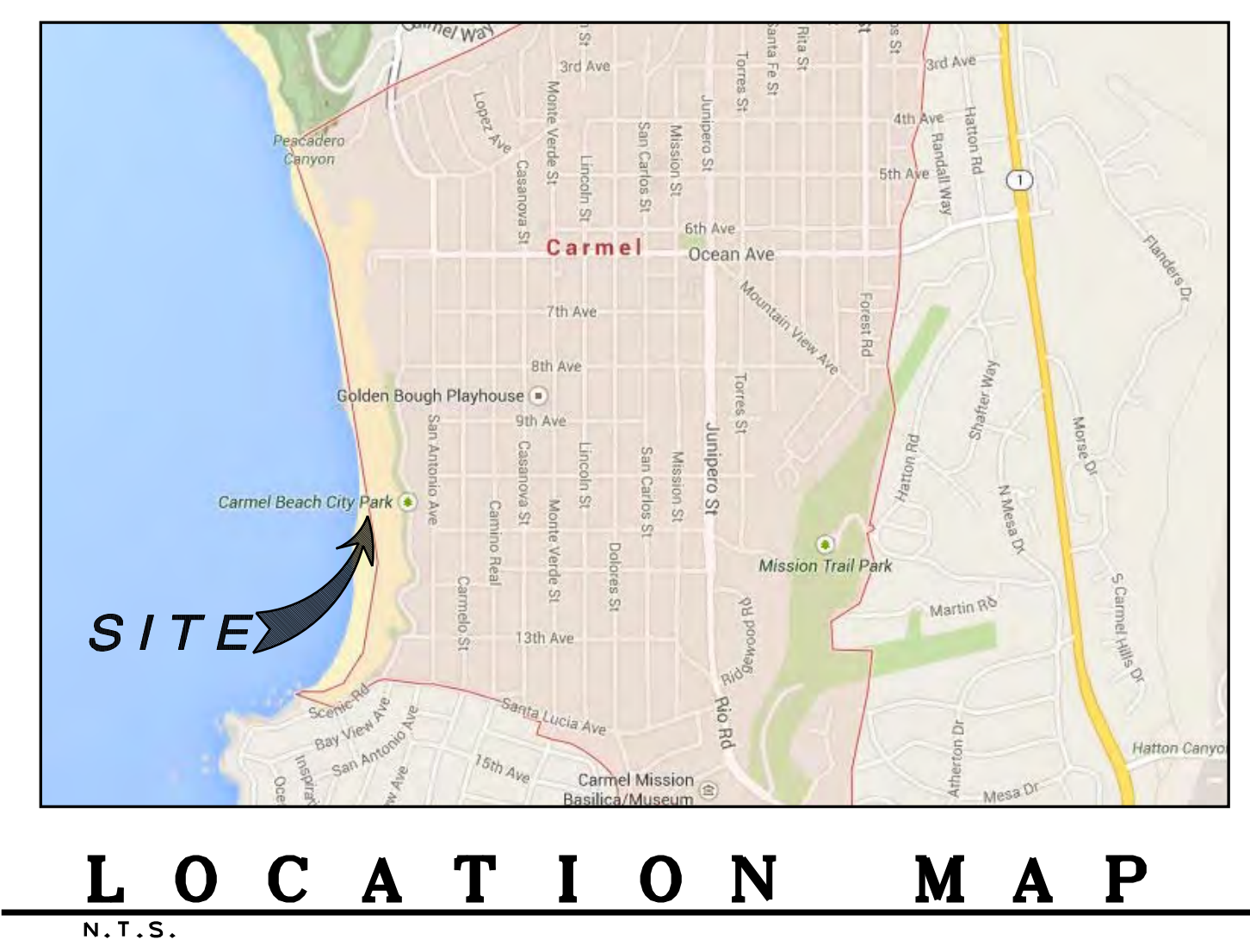
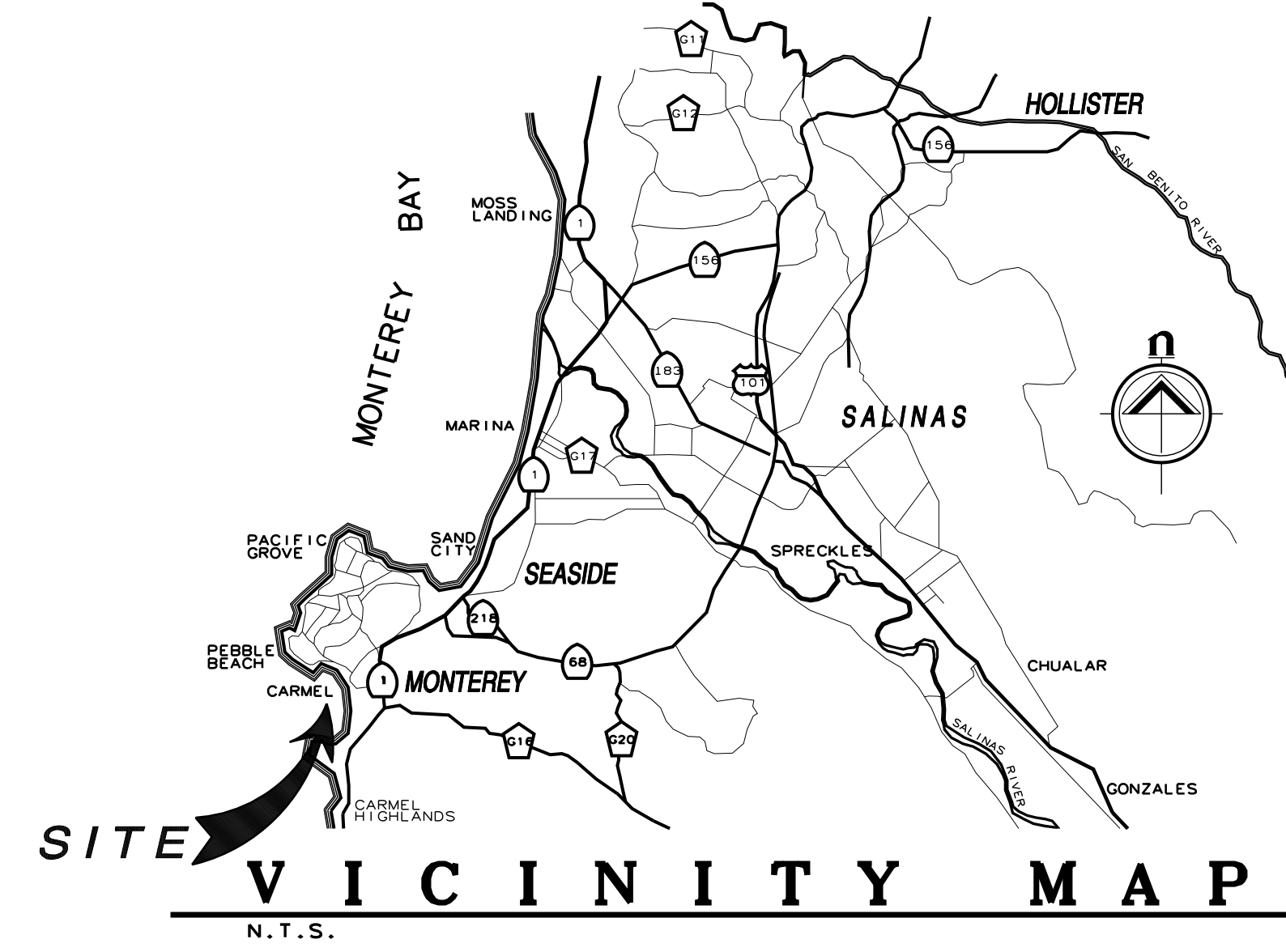
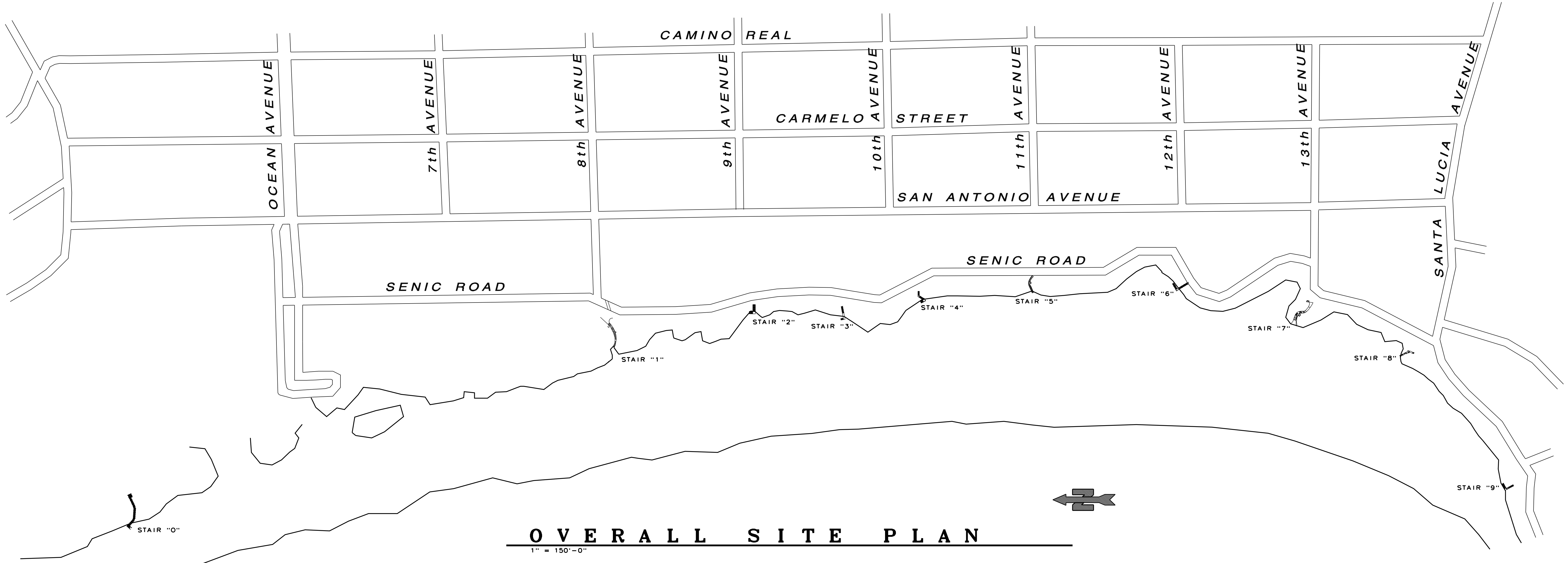
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PREPARED BY:
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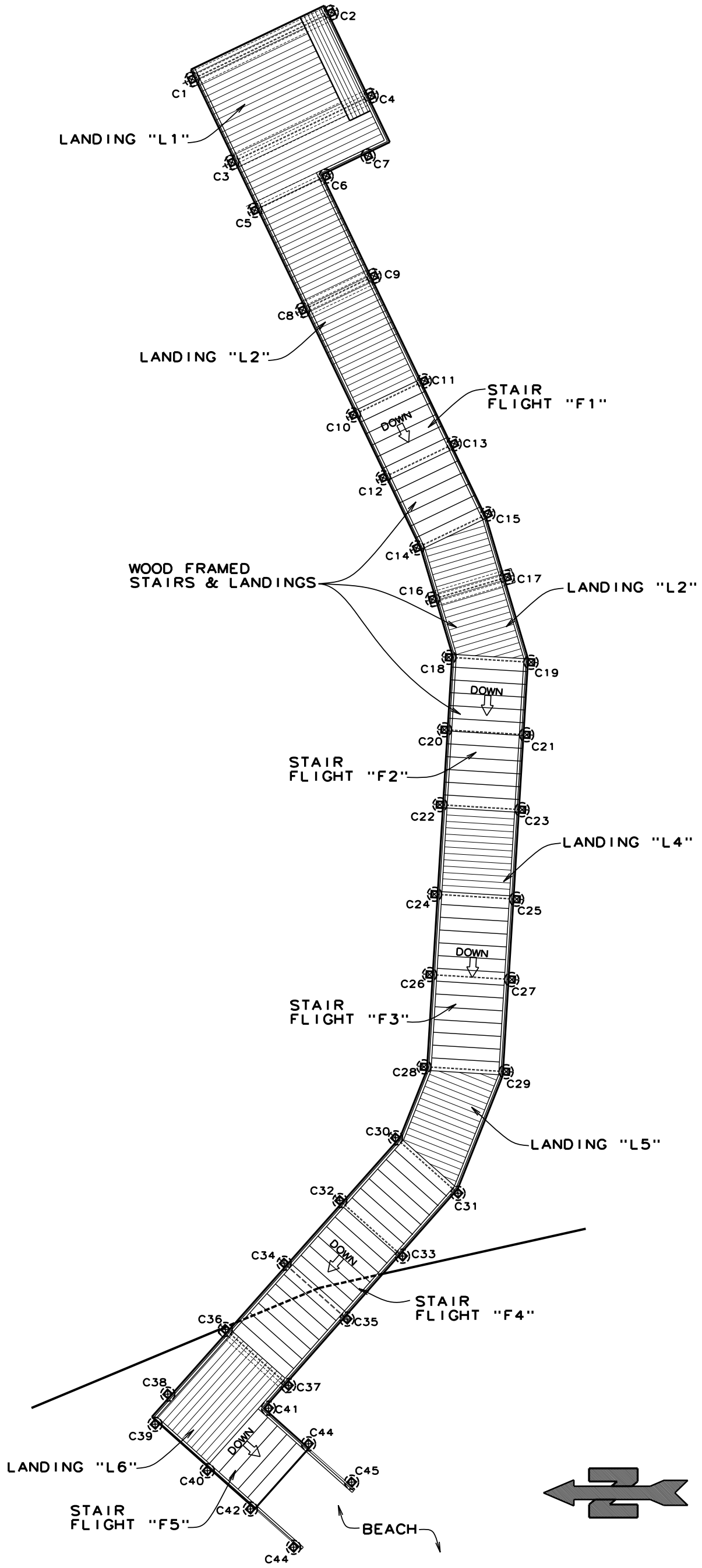
PREPARED FOR:
 MR. ROBERT A. MULLANE
 COMMUNITY PLANNING
 AND BUILDING DIRECTOR
 CARMEL BY THE SEA, CA
 PHONE: (831) 620-2057

STRUCTURAL BEACH STAIR MAINTENANCE
FOR
CARMEL BEACH STAIRS
CARMEL BY THE SEA, CALIFORNIA
OVERALL SITE PLAN



DATE	FEBRUARY 2015
SCALE	AS SHOWN
DRAWN	KDC
CHECKED	WNN
JOB	4808
FILE	4808 - T1
SHEET	T-1
OF SHEETS	

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PLAN VIEW STAIR "0"

1/8" = 1'-0"

NORTH - WEST OF OCEAN AVENUE



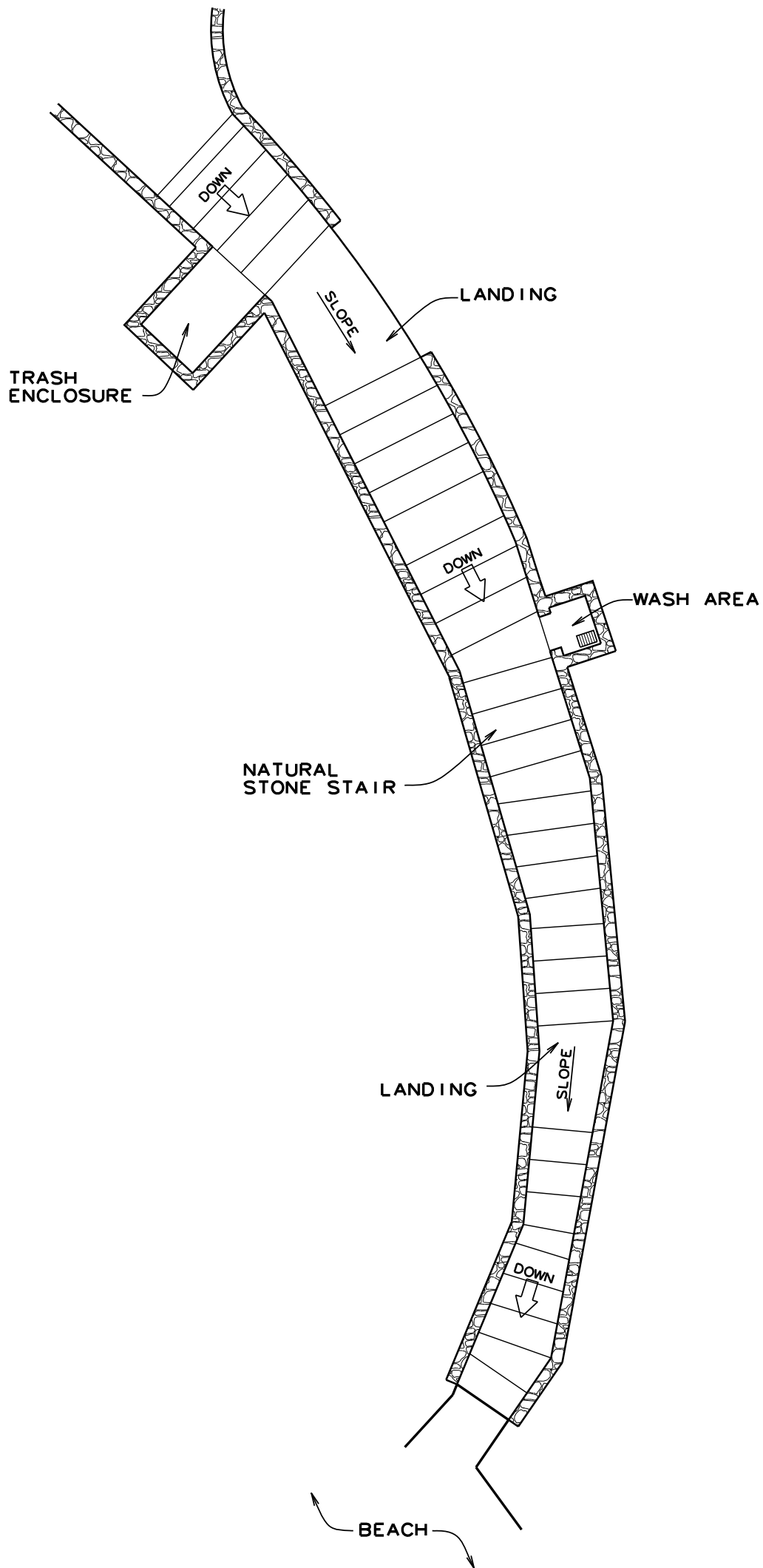
CARMEL BEACH STAIRS
 STRUCTURAL BEACH STAIR MAINTENANCE
 CARMEL BY THE SEA, CALIFORNIA

STAIR "0"

PREPARED FOR:
 MR. ROBERT A. MULLANE
 CARMEL BY THE SEA, CA
 PHONE: (831) 620-2057

PREPARED BY:
GERALD GRAEBE & ASSOCIATES
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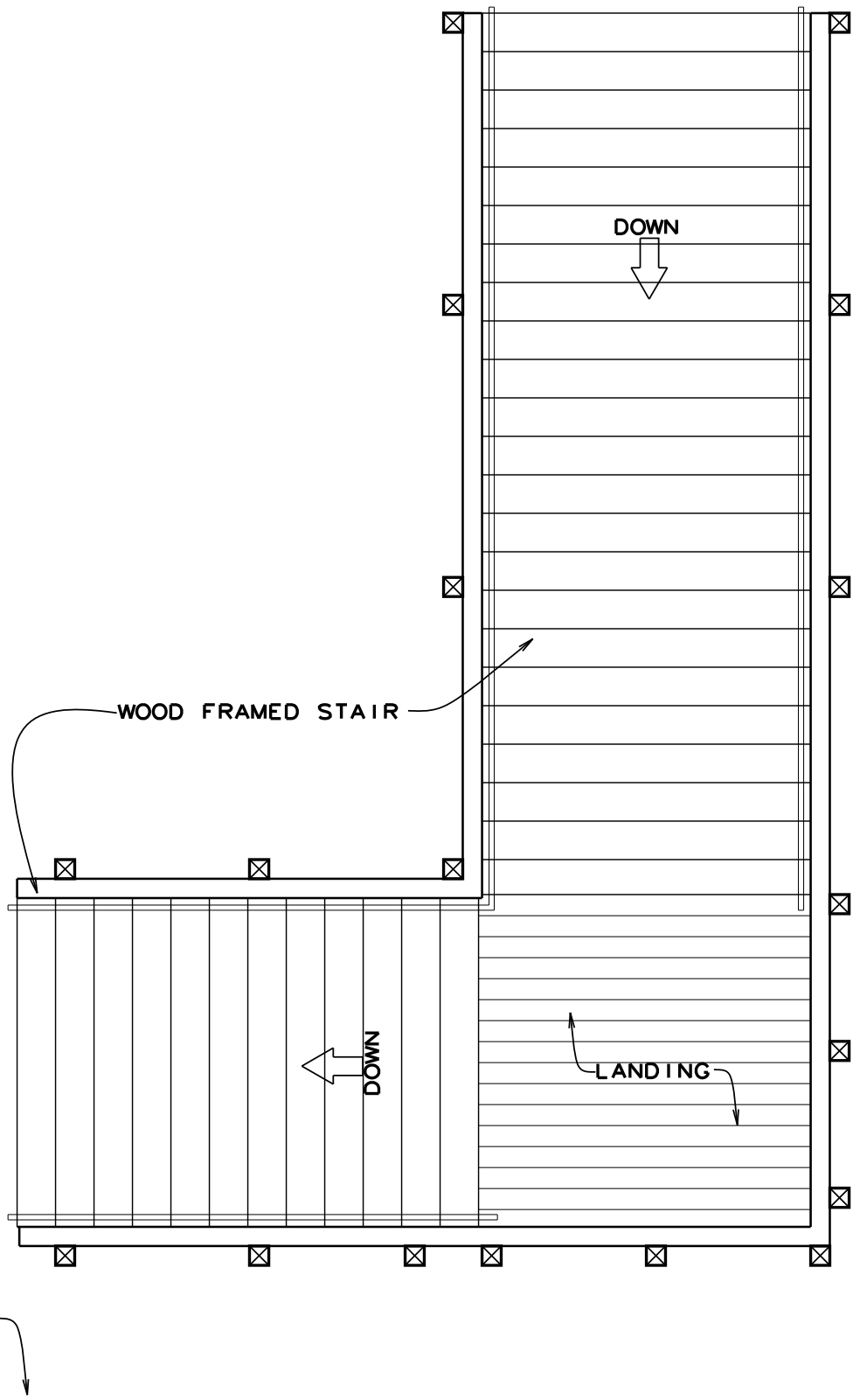
PLAN VIEW STAIR "1"

1/8" = 1'-0"

8th AVENUE AND SCENIC ROAD



<p>CARMEL BEACH STAIRS STRUCTURAL BEACH STAIR MAINTENANCE CARMEL BY THE SEA, CALIFORNIA</p>	<p>PREPARED FOR: MR. ROBERT A. MULLANE CARMEL BY THE SEA, CA PHONE: (831) 620-2057</p>	<p>PREPARED BY: GERALD GRAEBE & ASSOCIATES STRUCTURAL ENGINEERS 154 WEST SAN LUIS ST SALINAS, CALIF. 93901 PHONE: (831) 422-6409 WWW.GRAEBEANDASSOCIATES.COM</p>	<p>DATE FEB. 2015 JOB 4808 SHEET SD1</p>
<p>STAIR "1"</p>			<p>OF SHEETS</p>



P L A N V I E W STAIR "2"

1/4" = 1'-0" 9th AVENUE AND SCENIC ROAD



CARMEL BEACH STAIRS
 STRUCTURAL BEACH STAIR MAINTENANCE
 CARMEL BY THE SEA, CALIFORNIA

STAIR "2"

PREPARED FOR:
 MR. ROBERT A. MULLANE
 CARMEL BY THE SEA, CA
 PHONE: (831) 620-2057

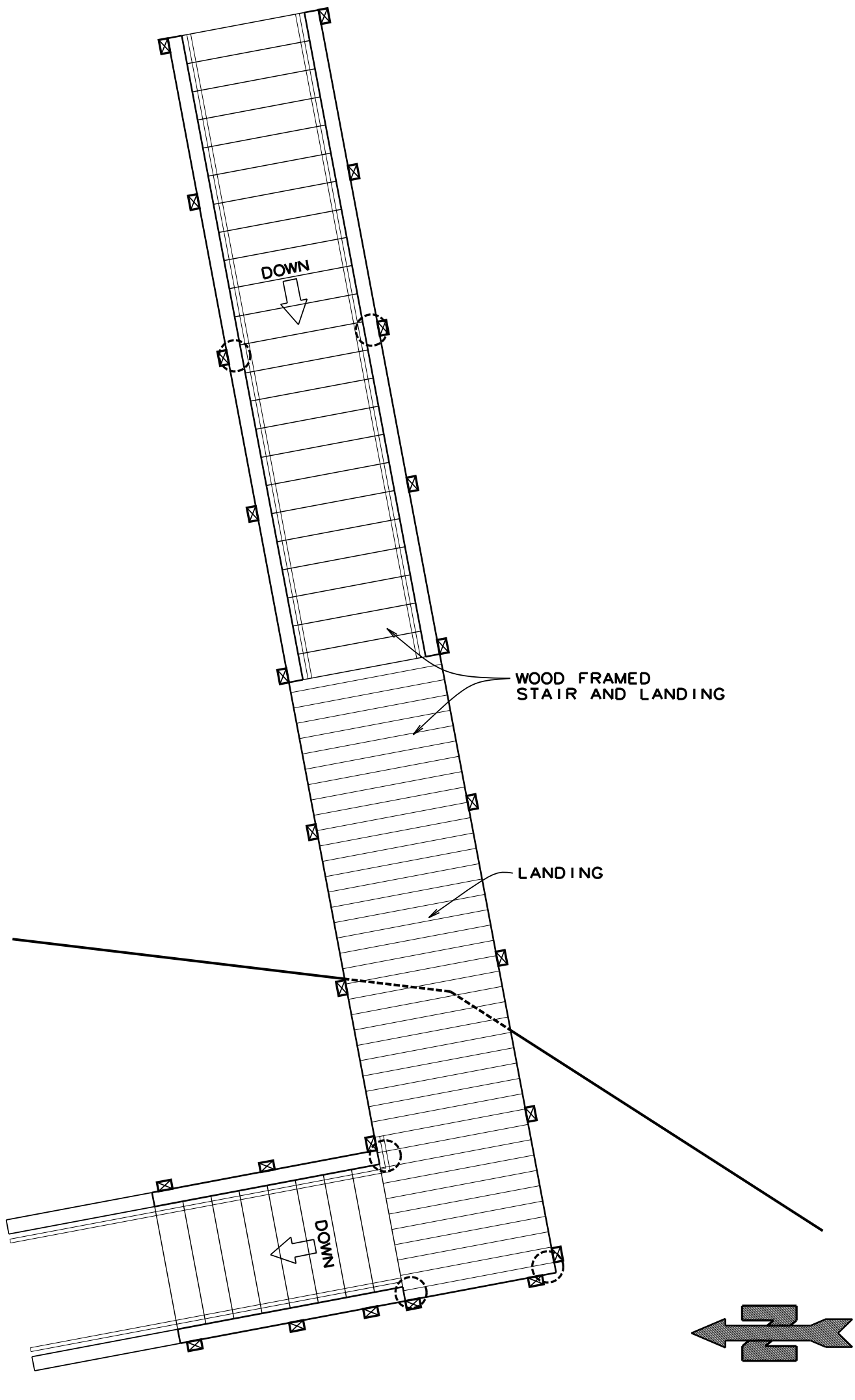
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P L A N V I E W STAIR "3"

1/4" = 1'-0" BETWEEN 9th & 10th AVENUE AND SCENIC ROAD



CARMEL BEACH STAIRS
 STRUCTURAL BEACH STAIR MAINTENANCE
 CARMEL BY THE SEA, CALIFORNIA

STAIR "3"

PREPARED FOR:
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 CARMEL BY THE SEA, CA
 PHONE: (831) 620-2057

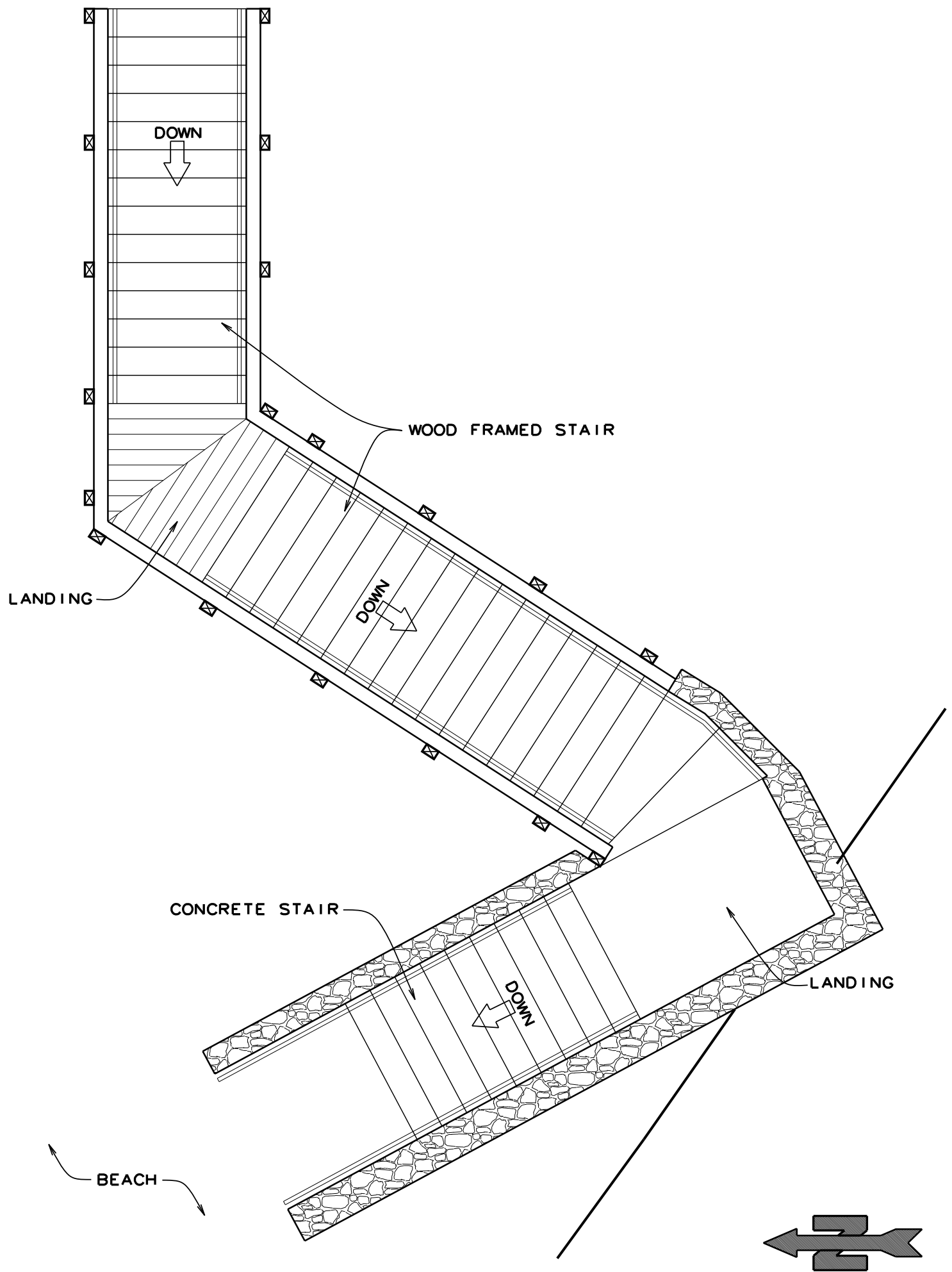
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SD3

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P L A N V I E W "STAIR 4"

1/4" = 1'-0"

10th AVENUE AND SCENIC ROAD



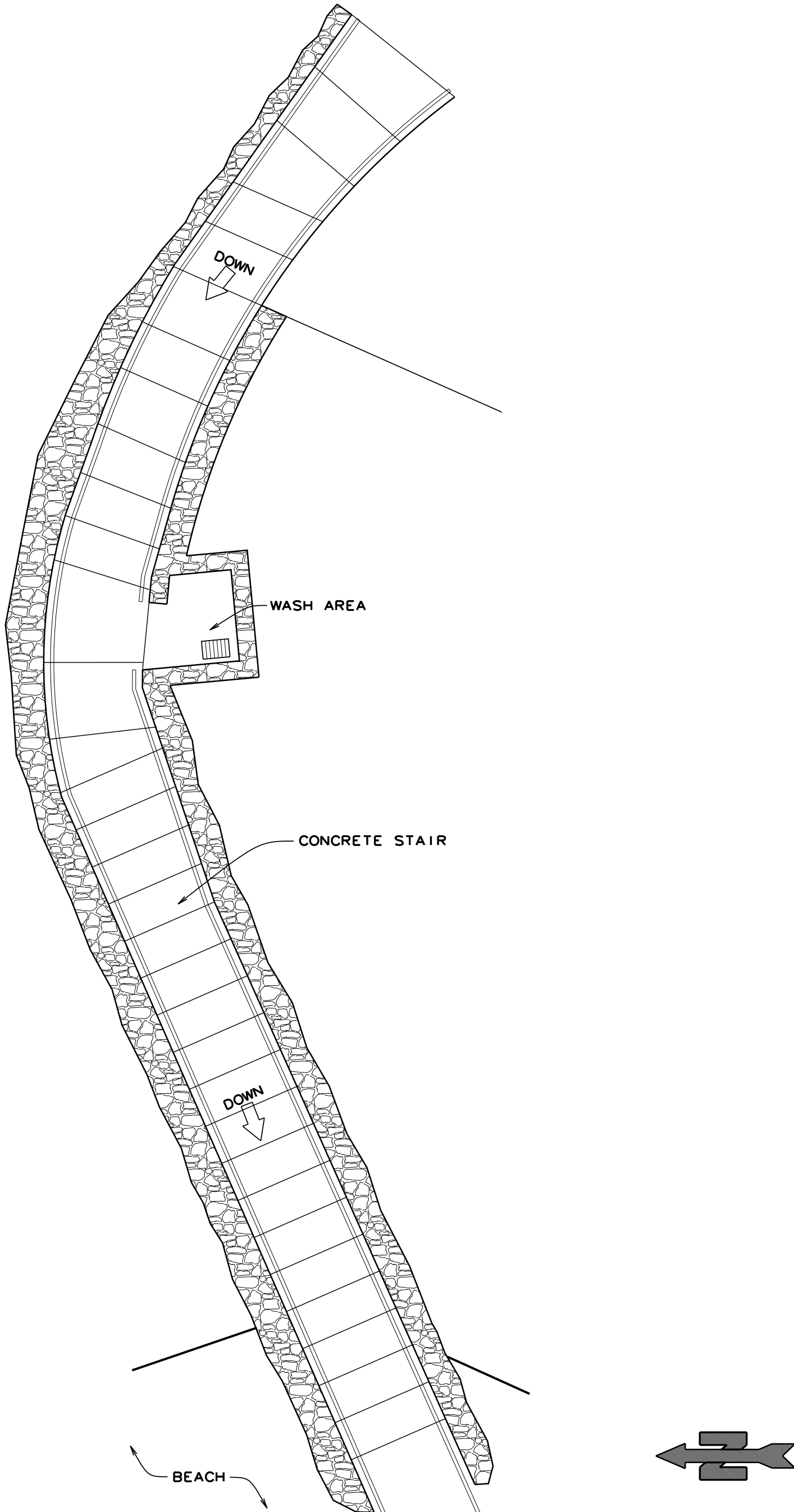
CARMEL BEACH STAIRS
 STRUCTURAL BEACH STAIR MAINTENANCE
 CARMEL BY THE SEA, CALIFORNIA

STAIR "4"

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SD4
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P L A N V I E W STAIR "5"

1/4" = 1'-0"

11th AVENUE AND SCENIC ROAD



CARMEL BEACH STAIRS
 STRUCTURAL BEACH STAIR MAINTENANCE
 CARMEL BY THE SEA, CALIFORNIA

STAIR "5"

PREPARED FOR:

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 CARMEL BY THE SEA, CA
 PHONE: (831) 620-2057

PREPARED BY:

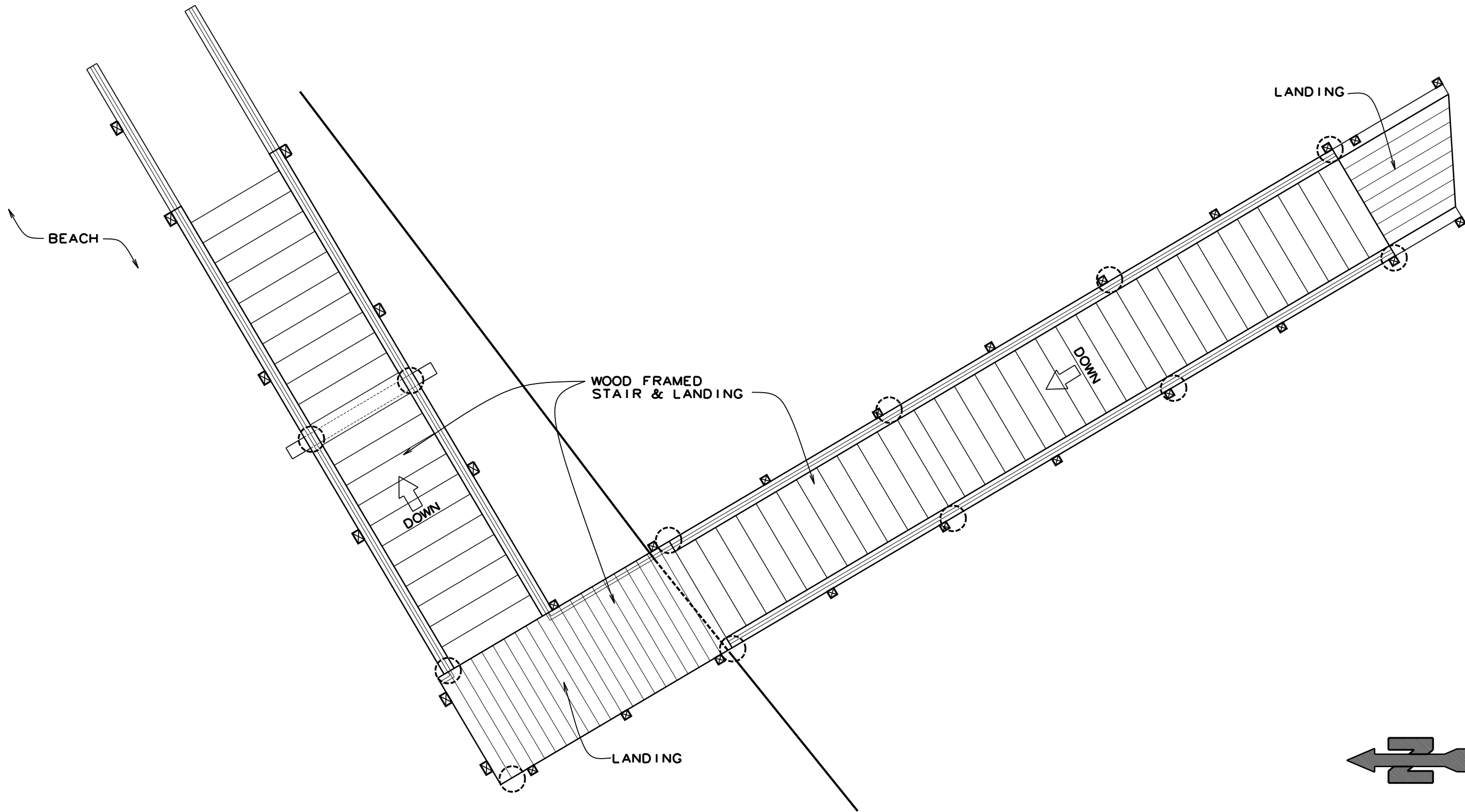
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SD5

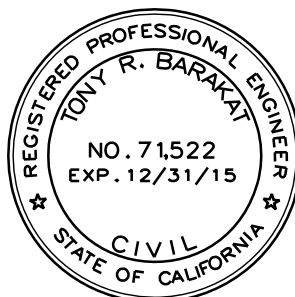
OF SHEETS



PLAN VIEW "STAIR 6"

1/4" = 1'-0"

12th AVENUE AND SCENIC ROAD



CARMEL BEACH STAIRS
 STRUCTURAL BEACH STAIR MAINTENANCE
 CARMEL BY THE SEA, CALIFORNIA

STAIR "6"

PREPARED FOR:
 MR. ROBERT A. MULLANE
 CARMEL BY THE SEA, CA
 PHONE: (831) 620-2057

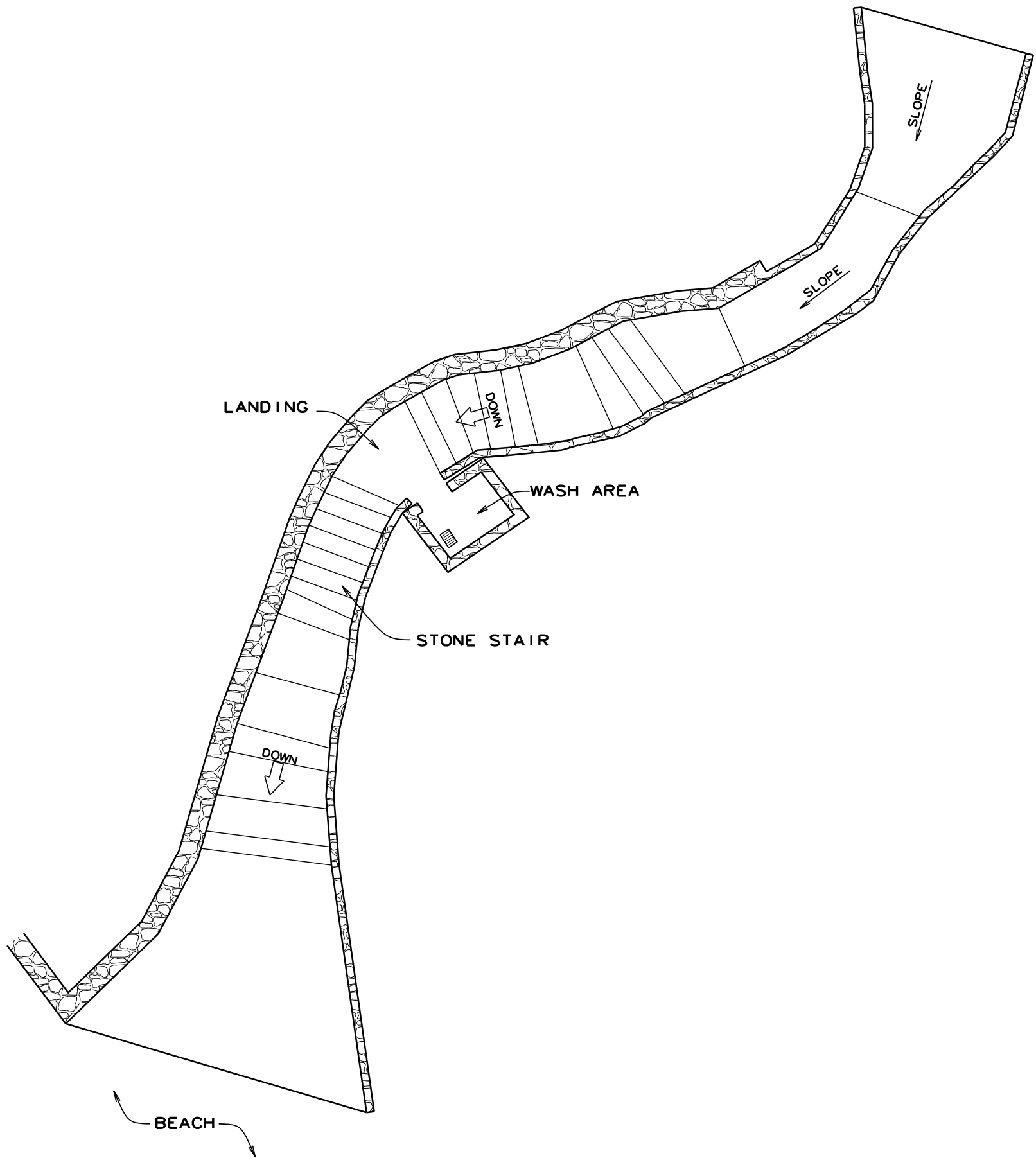
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SD6

OF SHEETS



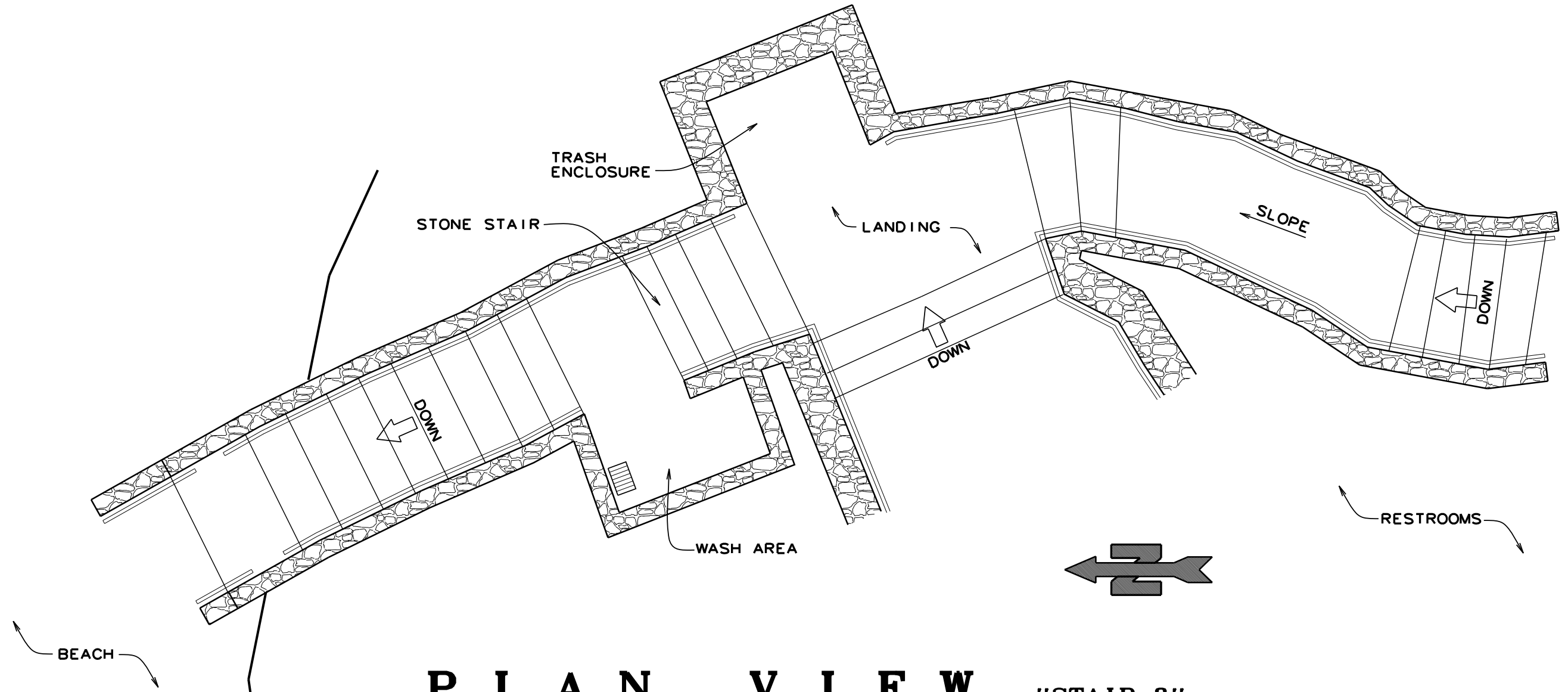
PLAN VIEW STAIR "7"

1/8" = 1'-0"

13th AVENUE AND SCENIC ROAD



<p>CARMEL BEACH STAIRS STRUCTURAL BEACH STAIR MAINTENANCE CARMEL BY THE SEA, CALIFORNIA</p>	<p>PREPARED FOR: MR. ROBERT A. MULLANE CARMEL BY THE SEA, CA PHONE: (831) 620-2057</p>	<p>PREPARED BY: GERALD GRAEBE & ASSOCIATES STRUCTURAL ENGINEERS 154 WEST SAN LUIS ST SALINAS, CALIF. 93901 PHONE: (831) 422-6409 WWW.GRAEBEANDASSOCIATES.COM</p>	<p>DATE FEB. 2015 JOB 4808 SHEET SD7</p>
<p>STAIR "7"</p>	<p>OF SHEETS</p>		<p>OF SHEETS</p>



PLAN VIEW "STAIR 8"

1/4" = 1'-0" SANTA LUCIA AVENUE & SCENIC ROAD



CARMEL BEACH STAIRS
 STRUCTURAL BEACH STAIR MAINTENANCE
 CARMEL BY THE SEA, CALIFORNIA

STAIR "8"

PREPARED FOR:
 MR. ROBERT A. MULLANE
 CARMEL BY THE SEA, CA
 PHONE: (831) 620-2057

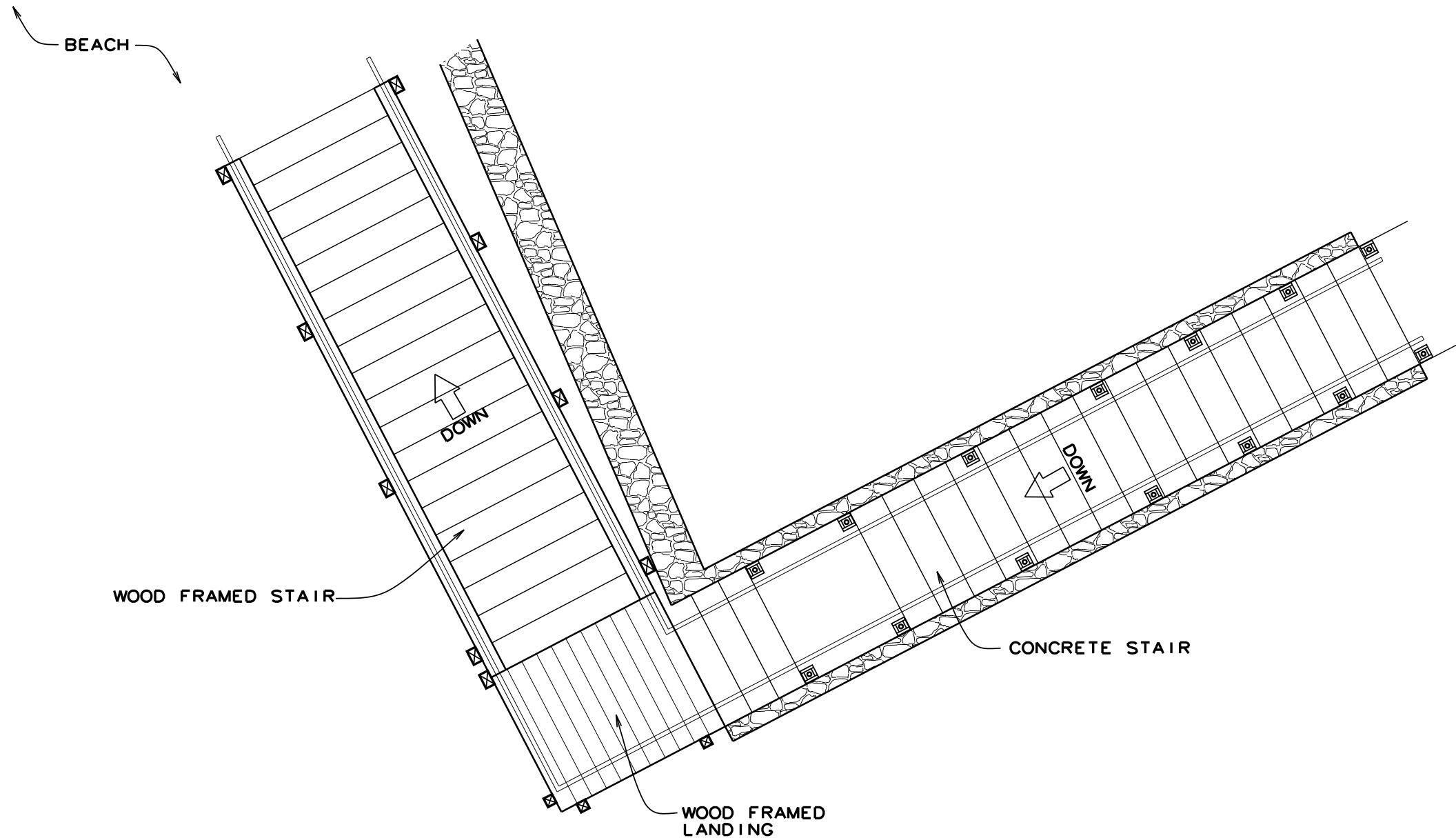
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DATE
FEB. 2015

JOB
4808

SHEET
SD8

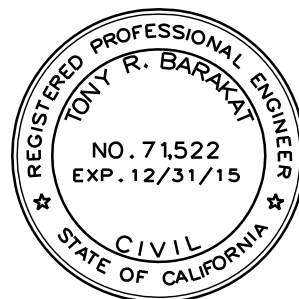
OF SHEETS



PLAN VIEW "STAIR 9"

1/4" = 1'-0"

MARTIN WAY & SCENIC AVENUE



CARMEL BEACH STAIRS
 STRUCTURAL BEACH STAIR MAINTENANCE
 CARMEL BY THE SEA, CALIFORNIA

STAIR "9"

PREPARED FOR:

MR. ROBERT A. MULLANE
 CARMEL BY THE SEA, CA
 PHONE: (831) 620-2057

PREPARED BY:

GERALD GRAEBE & ASSOCIATES

STRUCTURAL ENGINEERS
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DATE
 FEB. 2015

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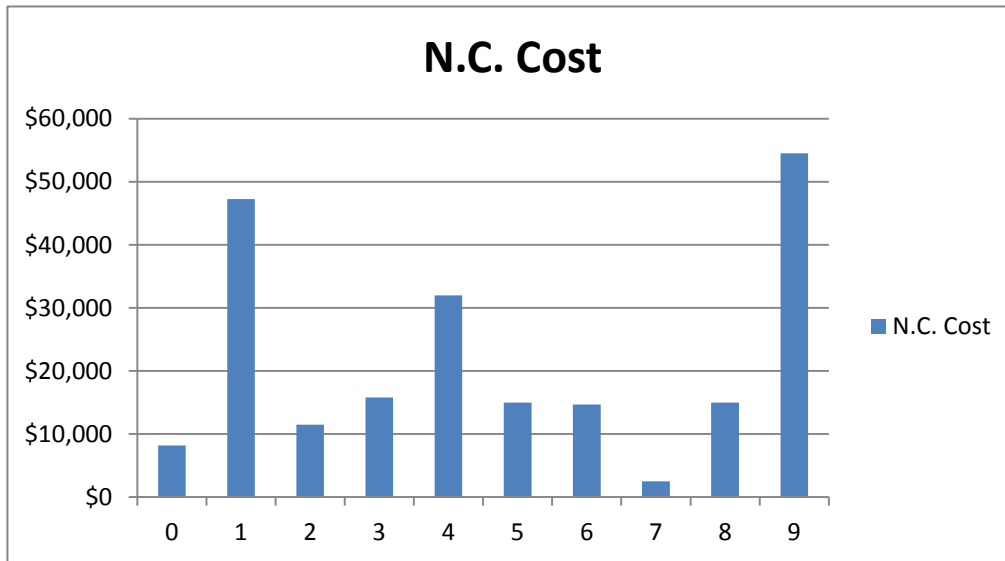
SHEET

SD9

OF SHEETS

Total Conceptual Cost

Stair	N.C. Cost
0	\$8,200
1	\$47,250
2	\$11,500
3	\$15,800
4	\$32,000
5	\$15,000
6	\$14,700
7	\$2,500
8	\$15,000
9	\$54,500
Total	\$216,450



The above "conceptual" cost was provided to us by:
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