

November 16, 2022

Regional District of Nanaimo  
6300 Hammond Bay Road  
Nanaimo, BC V9T 6N2

Attention: **Duncan Taylor**, Manager Engineering Services, Regional & Community Utilities

Subject: **GNPCC No. 3 Primary Sedimentation Tank Inspection Report – For Record**  
RDN Ref: Project WW-0038 / Equip: T-213, SRM Ref: P0041

Dear Duncan,

Please find attached my summary report and photographs taken on July 12, 2022, during interior inspection of the GNPCC No. 3 Primary Sedimentation Tank.

This is intended to help inform scope of work decisions made regarding the RDN's GNPCC Grit and Sedimentation Tank Relining project WW-0038. The report photos may be compared to those in the September 2018 Norske tank inspection report, and may be shared with any RDN staff or consultants/contractors involved in planning or execution of the project.

If you have any questions, or require additional information, please don't hesitate to contact me at your convenience.

Sincerely,



Scot Merriam, BASc (mech)  
Principal Project Manager

c. Craig Hoover (RDN), Rob Skwarczynski (RDN)

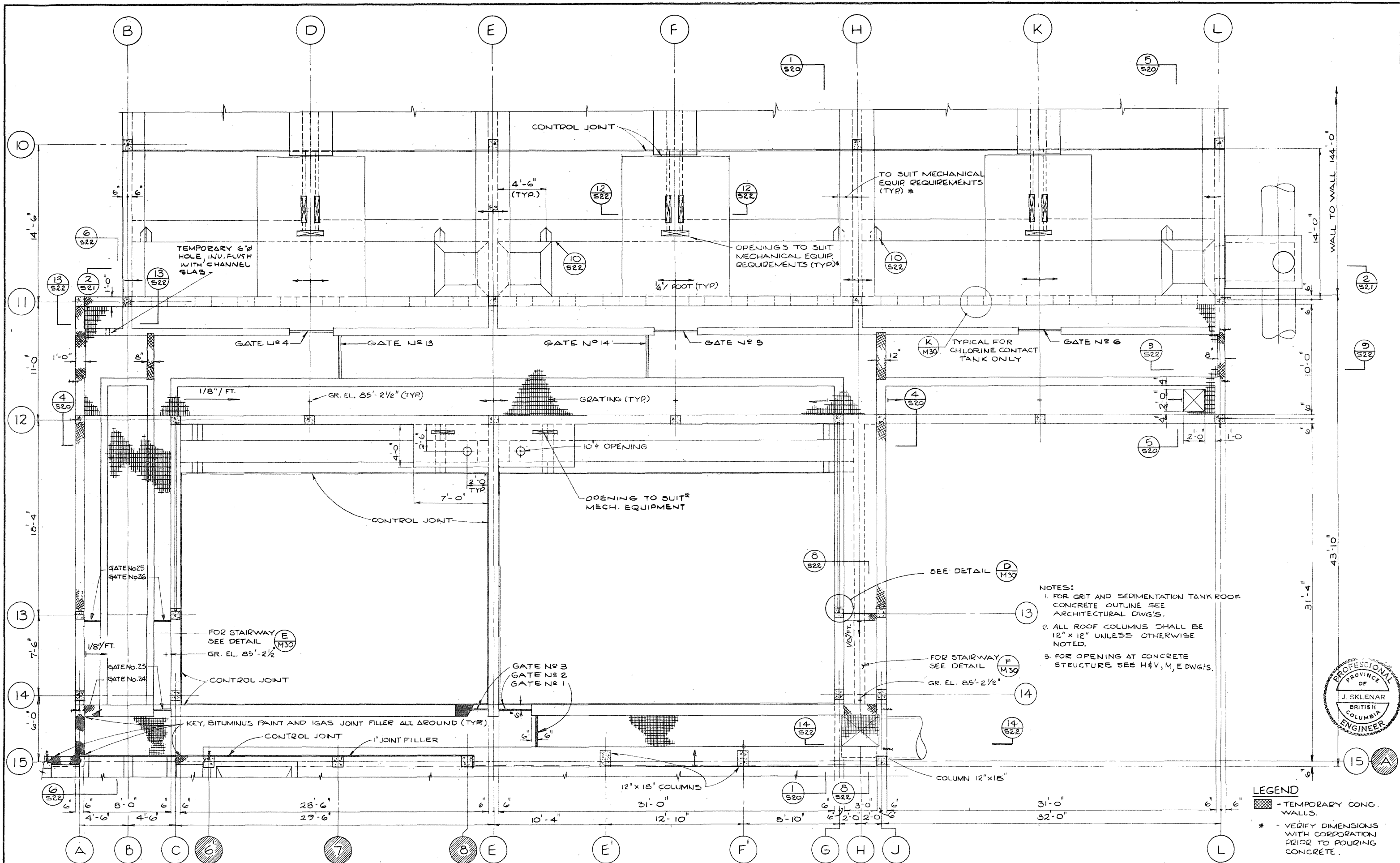
## No. 3 Sed Tank Inspection Report – November 16, 2022 Rev 0

Inspection Date:	July 12, 2022
Equipment:	No. 3 Primary Sedimentation Tank, GNPCC
Ref. Number:	T-213
Scope:	Inspect interior of tank, with a focus on the condition of the concrete walls and floor
Method:	Visual, hammer sounding and probe testing. See photo 104 attached for description of tools used. When probe testing, the probe was typically struck four times with the hammer.
Inspection references or samples:	Photographs and annotated drawings attached
Observations:	
<i>Probe Testing</i>	
Location 1 middle of south wall near inlet ports – blister location – coated concrete	Approximately 10 mm (3/8") penetration below blister in coating; concrete at probe location has turned white, likely a result of process attack. Refer to photos 70 and 71.
Location 2 middle of south wall near inlet ports – blister location – coated concrete	Approximately 10 mm (3/8") penetration below blister in coating; concrete at probe location has turned white, likely a result of process attack. Refer to photos 70 and 72.
Location 3 middle of south wall near wall/floor joint – blister location – coated concrete	Approximately 12 mm (1/2") penetration below blister in coating; concrete at probe location has turned white, likely a result of process attack. Refer to photos 73 and 74.
Location 4 north side of cross collector trough near middle, just east of drive support structure – blister location – coated concrete	Approximately 12 mm (1/2") penetration below blister in coating; concrete appears black and there was liquid discharge and an obvious H <sub>2</sub> S odour when cutting away the blister. Refer to photos 75 and 76.
Location 5 floor in SW corner of west bay adjacent to cross collector trough – uncoated concrete	Approximately 7 mm (1/4") penetration; concrete at probe location has turned white, likely a result of process attack. Refer to photos 77 and 78.
Location 6 south end of west wall near head shaft ~ grid line 10 – coated concrete	Approximately 10 mm (3/8") penetration (loosely attached coating peeled back using scraper before probing). Refer to photos 79, 80 and 81.
Location 7 west wall ~ grid line 10 ~ 800 mm up from floor – coated concrete	Approximately 10 mm (3/8") penetration. Refer to photos 82 and 83.
Location 8 west wall ~ grid line 8 near liquid surface – coated concrete	Approximately 7 mm (1/4") penetration. Refer to photos 84 and 85.

Location 9 west wall ~ grid line 7 ~ 1100 mm up from floor – uncoated concrete	Approximately 10 mm (3/8”) penetration. Refer to photos 86 and 87.
Location 10 west wall ~ grid line 5 ~ 1000 mm up from floor – uncoated concrete	Approximately 10 mm (3/8”) penetration. Refer to photos 88 and 89.
Location 11 west wall ~ grid line 3 near crack ~ 1100 mm up from floor – uncoated concrete	Approximately 12 mm (1/2”) penetration. Refer to photos 90 and 91.
Probe testing – general	The concrete is in general harder below the coating than in uncoated locations in the same general tank area. An exception is where blisters occur; at these locations, the concrete is as soft (or softer) as uncoated concrete.
<i>Concrete cracks</i>	Cracks observed in west wall near probe 11 location and west wall near tail end idler sprocket. Refer to photos 90 and 92.
<i>Concrete erosion/corrosion</i>	Minor concrete erosion/corrosion was noted along the water line of the west wall, between discharge weir boxes. Refer to photo 94.
<i>Concrete honeycomb</i>	Significant honeycomb was observed on both sides of the tank center column on grid line 5. Refer to photos 95, 96, 97 and 98
<i>Misc. concrete damage</i>	The tank center column on grid line 2 has some kind of a cut line going across it. Refer to photo 100.
<i>Mechanism damage</i>	<p>The longitudinal collector return idler shaft tensioners are heavily corroded. Refer to photos 42, 43, 58 and 59.</p> <p>The scum collector worm drive appears to be corroded. Refer to photo 46.</p> <p>The longitudinal collector wear strips (top and bottom) have buckled in both tank bays. Refer to photos 95, 97, 98, 101 and 102.</p>
<i>Discharge weir boxes damage</i>	The discharge weir boxes at the north end of the tank are rusty. Refer to photos 47 – 49 and 64 – 66. Pressure washing and thickness testing would help to assess whether these can be simply repainted to extend their life or if they need to be replaced.
<i>Concrete sounding – general</i>	The surface of uncoated concrete was sounded with a hammer in many wall and floor locations while taking photos. In general, the sounding note was slightly muted/dull, suggesting the surface of the concrete has been softened somewhat due to process attack (poor quality concrete not suspected due to above probe observations).
<i>Concrete joint damage</i>	The joint between the tank south wall and the floor (in the cross collector trough) may be in poor condition. Refer to photo 103
<i>Previous concrete coating(s)</i>	<p>A light brown concrete coating was applied to the south wall and the south half of the east/west walls as well as the sides of the cross collector trough, the drive support structure and a column at grid line 9. There are many blisters in the coating on the south wall and drive support structure east side, with many blisters located in the upper half of the liquid level.</p> <p>Refer to photos 6 – 13, 27, 28 and 34</p>







- NOTES:
1. FOR GRIT AND SEDIMENTATION TANK ROOF CONCRETE OUTLINE SEE ARCHITECTURAL DWG'S.
  2. ALL ROOF COLUMNS SHALL BE 12" X 12" UNLESS OTHERWISE NOTED.
  3. FOR OPENING AT CONCRETE STRUCTURE SEE H&V, M, E DWG'S.

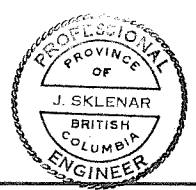
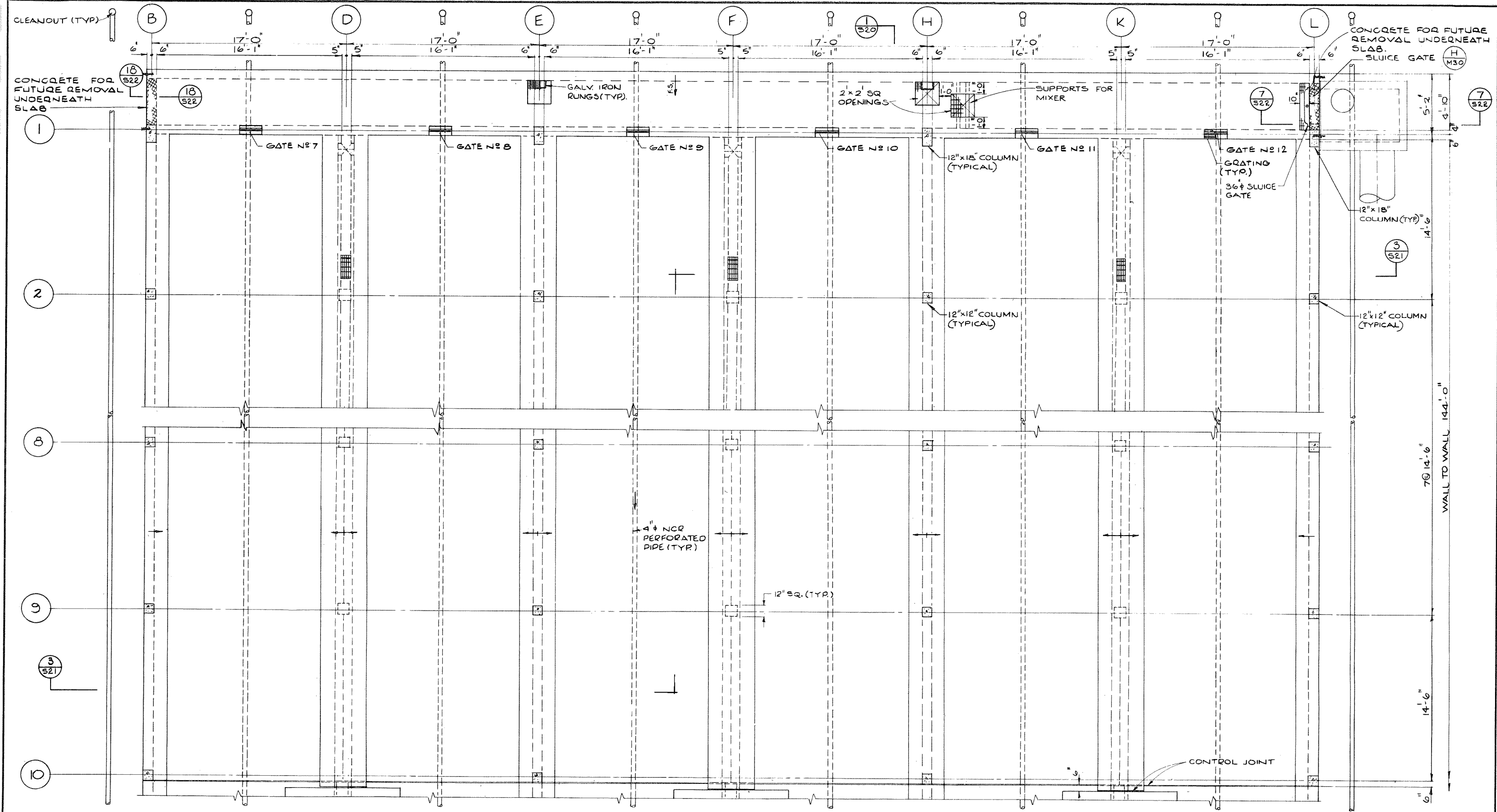
**LEGEND**

TEMPORARY CONC. WALLS.

\* - VERIFY DIMENSIONS WITH CORPORATION PRIOR TO POURING CONCRETE.

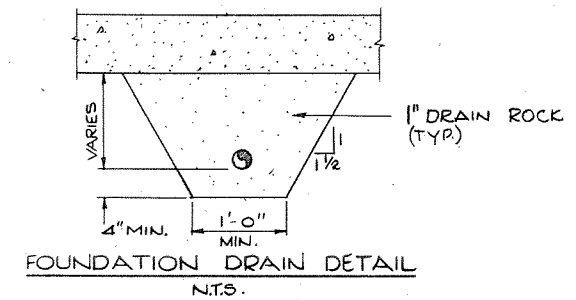


REVISIONS 	ISSUE DATE DRN CHD APPD 	DESCRIPTION 	ISSUE DATE DRN CHD APPD 	DESCRIPTION 	DESIGNED: J.S. DRAWN: T.T.F. & A.S. CHECKED: <i>MB</i> 	<b>DAYTON &amp; KNIGHT LTD.</b> CONSULTING ENGINEERS <i>Sept 11, 1973</i> 	<b>NANAIMO REGIONAL SEWER AUTHORITY</b> <b>GREATER NANAIMO WATER POLLUTION CONTROL CENTRE</b> GRIT AND SEDIMENTATION TANKS - CONCRETE OUTLINE 	SCALE: 1/4" = 1'-0" DRAWING No. 69.7.2. SHEET 517 OF 68 ISSUE A THIS DRAWING REDUCED TO HALF SCALE 
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LEGEND  
 — FINISHED FLOOR SLOPE 1/4" / FOOT.

REVISIONS		DATE	DR'N	CH'D	APP'D	DESCRIPTION		ISSUE	DATE	DR'N	CH'D	APP'D	DESCRIPTION	DESIGNED J.S.	DAYTON & KNIGHT LTD. CONSULTING ENGINEERS  MD Dayton Sept 1 1973	NANAIMO REGIONAL SEWER AUTHORITY GREATER NANAIMO WATER POLLUTION CONTROL CENTRE SEDIMENTATION TANKS - CONCRETE OUTLINE	SCALE: 1/4" = 1'-0" DRAWING No. 69-7-2 SHEET 519 OF 68 ISSUE A THIS DRAWING REDUCED TO HALF SCALE
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Architectural floor plan of a building. The plan is divided into several rooms and areas. Three numbered circles are placed at the top of the plan, indicating specific locations:

- 12**: Located in the upper left corner, above a small room.
- 11**: Located in the upper center, above a large open area.
- 10**: Located in the upper right corner, above a room.

The plan includes a large central hall, a staircase, and a sloped area labeled "SLOPE". The drawing is a black and white line drawing with some shading.

[illegible]SECTION 4  
S17

A circular seal for a Professional Engineer in the Province of British Columbia. The outer ring contains the text "PROFESSIONAL" at the top and "ENGINEER" at the bottom. Inside the ring, the word "PROVINCE" is at the top, "OF" is in the center, and "BRITISH COLUMBIA" is at the bottom. The name "J. SKLENAR" is written across the middle of the seal.

REVISIONS	ISSUE	DATE	DR'N	CH'D	APP'D	DESCRIPTION	ISSUE	DATE	DR'N	CH'D	APP'D	DESCRIPTION	DESIGNED <u>J.S.</u>	DAYTON & KNIGHT LTD. CONSULTING ENGINEERS <i>M.D. Knight</i> Sept 1973	NANAIMO REGIONAL SEWER AUTHORITY GREATER NANAIMO WATER POLLUTION CONTROL CENTRE GRIT AND SEDIMENTATION TANKS - CONCRETE OUTLINE	SCALE: $\frac{1}{4}'' = 1'-0''$
													DRAWN <u>D.B.C. &amp; A.S.</u>			DRAWING No. <u>69-7-2</u>
													CHECKED <u>MB</u>			SHEET <u>520</u> OF <u>68</u> ISSUE <u>A</u>
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## General Interior/Mechanism Reference Photos



1. GNPCC No. 3 primary sedimentation tank west bay, looking north from influent inlet end.



2. GNPCC No. 3 primary sedimentation tank east bay, looking north from influent inlet end.





3. West bay longitudinal collector headshaft mechanism in foreground, cross collector mechanism in background.



4. East bay longitudinal collector headshaft mechanism in foreground, cross collector mechanism in background





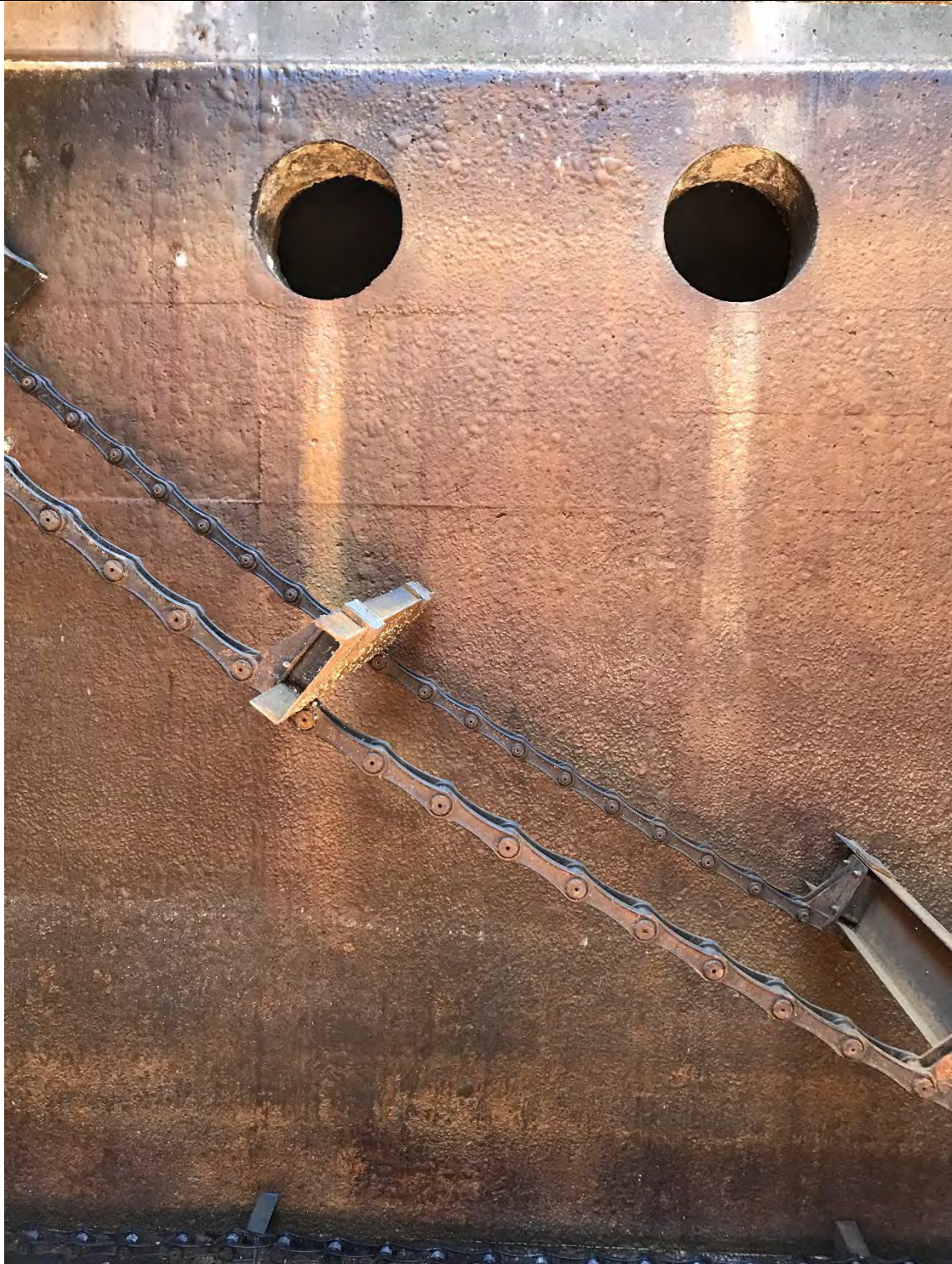
5. From right: West wall, SW corner and south wall of tank.





6. From right: West wall, SW corner and south wall of tank, continued from photo 5 moving east. Note blisters in south wall coating.





7. South wall of tank, continued from photo 6 moving east. Note blisters in south wall coating.





8. South wall of tank, continued from photo 7 moving east. Note blisters in south wall coating.





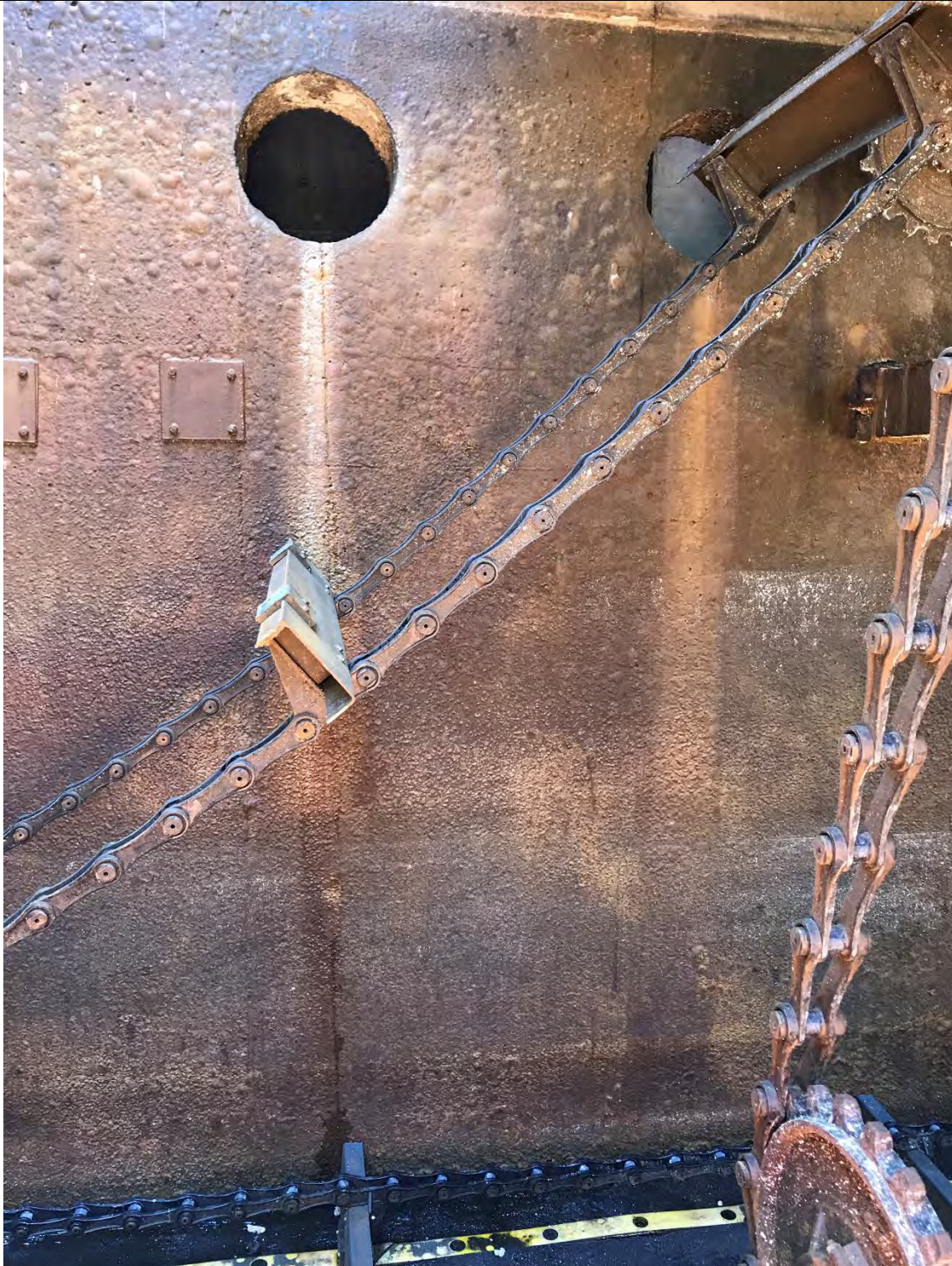
9. South wall of tank, continued from photo 8 moving east. Note blisters in south wall coating.





10. South wall of tank, continued from photo 9 moving east. Note blisters in south wall coating.





11. South wall of tank, continued from photo 10 moving east. Note blisters in south wall coating.





12. South wall of tank, continued from photo 11 moving east. Note blisters in south wall coating.





13. From left: South wall, SE corner and east wall of tank. Note blisters in wall coating.





14. Drive (west) end idler of cross collector





15. Tank wall above drive end idler of cross collector. Few blisters in concrete coating.





16. Tail (east) end idler of cross collector





17. Tank wall above tail end idler of cross collector. Note blisters in concrete coating.





18. West end of cross collector trough





19. Top view of drive (west) end idler shaft and sprockets.



20. Side view of drive (west) end idler shaft and sprockets.





21. East end of cross collector trough





22. Top view of tail (east) end idler shaft and sprockets (grit pump suction piping at left).





23. Side view of tail (east) end idler shaft and sprockets (grit pump suction piping in background).



24. Cross collector head shaft; drive chain at left.





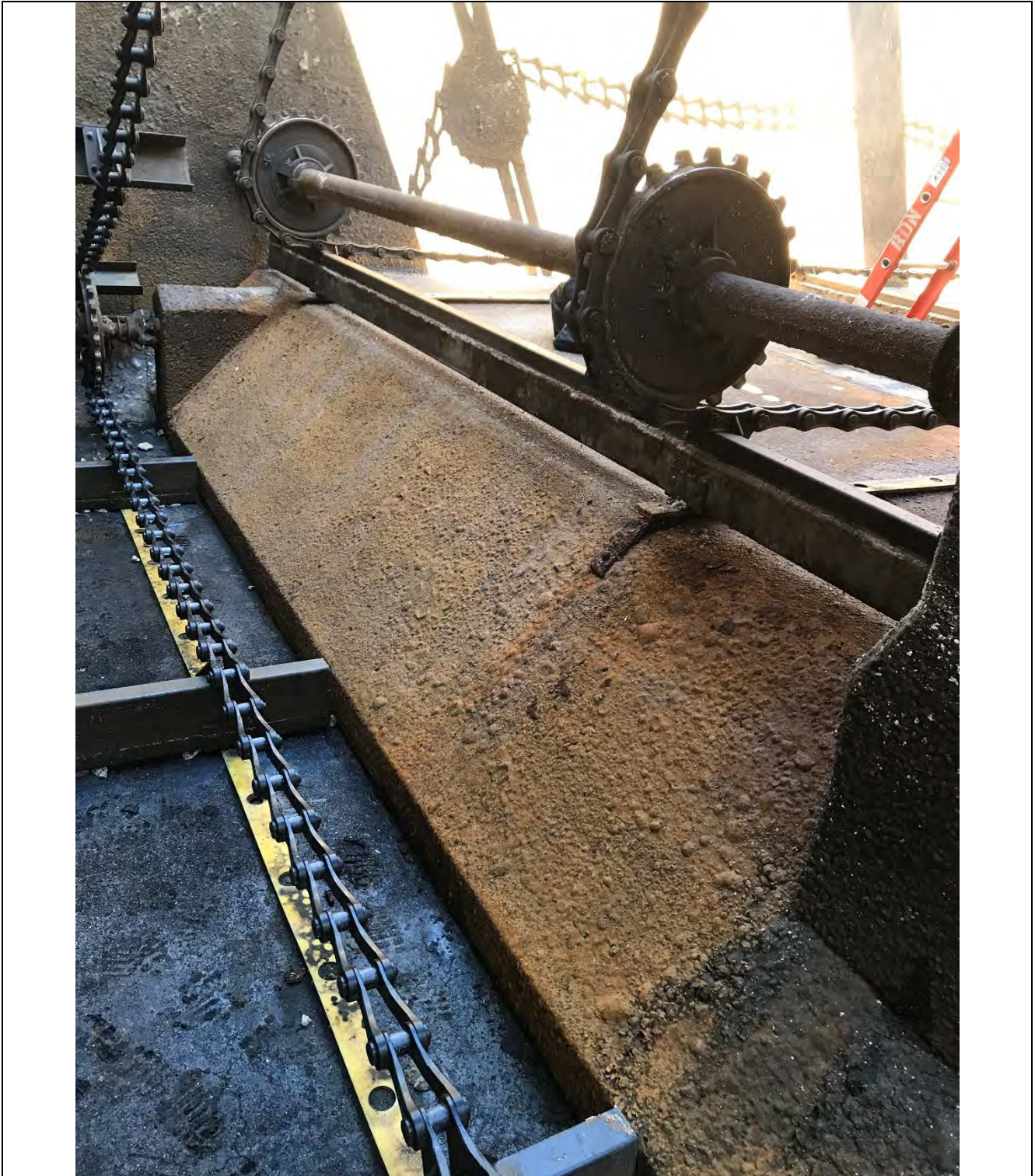
25. Cross collector shaft north end and (bull) drive sprocket in background.





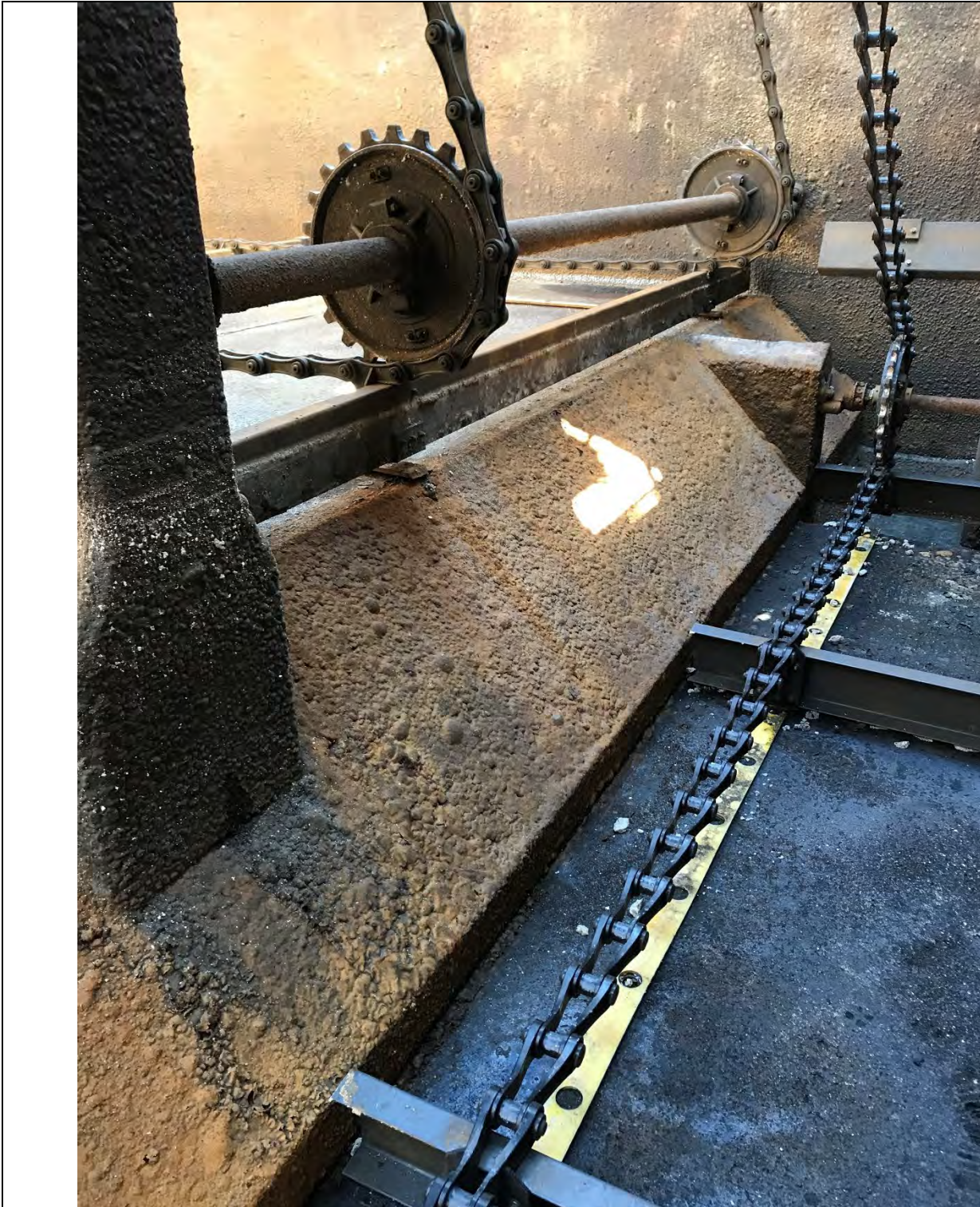
26. Cross collector shaft south end. Note blisters in concrete coating.





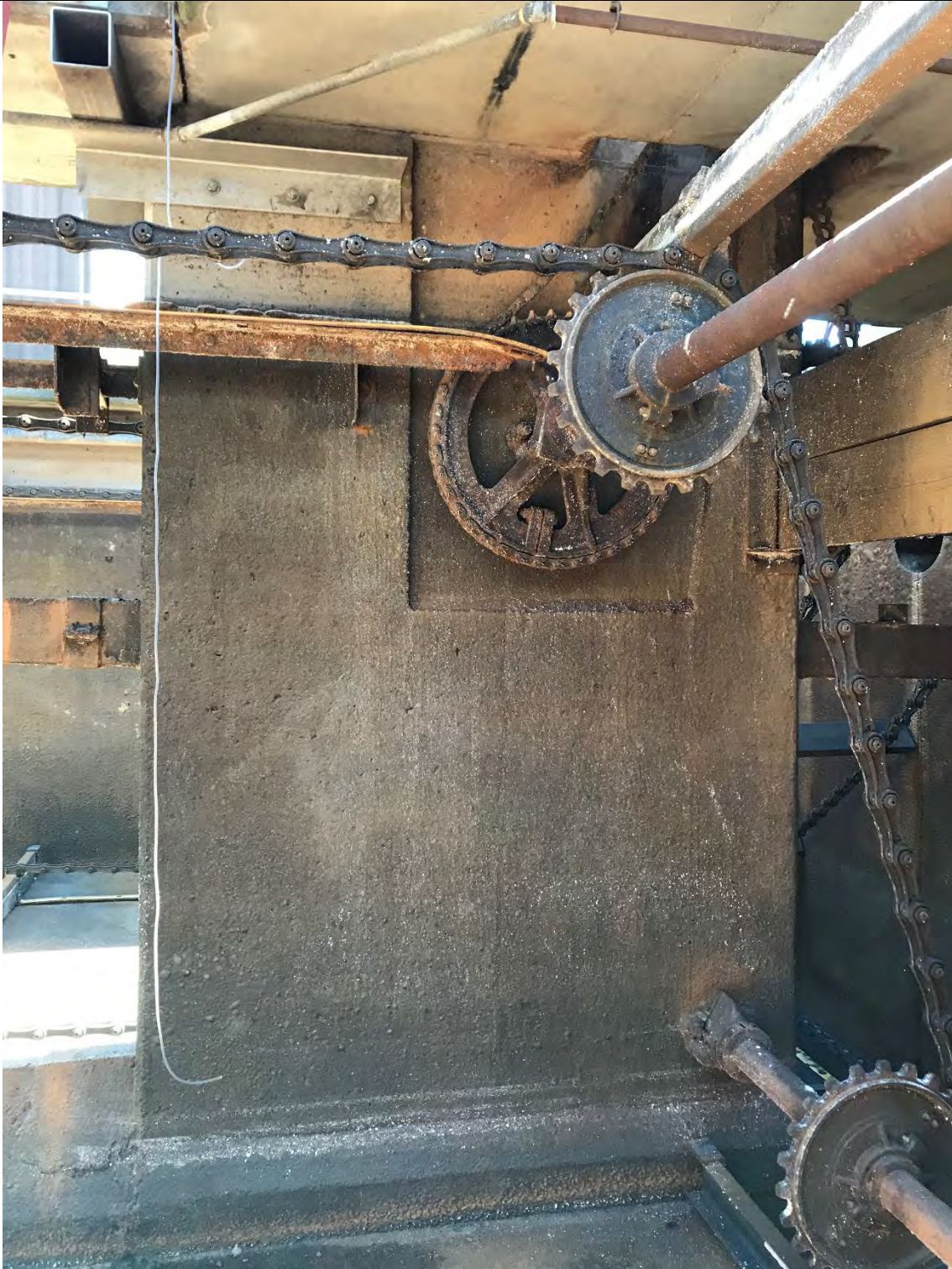
27. Confluence of west longitudinal collector bay with cross collector trough, west bay drive end idler shaft at top. Note blisters in coating.





28. Confluence of east longitudinal collector bay with cross collector trough, east bay drive end idler shaft at top. Note blisters in coating.





29. Elevation of concrete drive support structure looking east. Note few small blisters in concrete coating.





30. West bay longitudinal collector head shaft east end; bull (drive) sprocket at left.



31. West bay longitudinal collector head shaft west end.





32. East bay longitudinal collector head shaft west end; bull (drive) sprocket at right. Note blisters in concrete coating.



33. East bay longitudinal collector head shaft east end





34. Elevation of concrete drive support structure looking west. Note many large blisters in concrete coating.





35. West tank wall near south end (longitudinal collector head shaft visible upper left).





36. West wall of tank, north of photo 35.



37. West wall of tank, north of photo 36. Diagonal line is where concrete coating ends.





38. West wall of tank, north of photo 37. Squiggly light lines on wall are where soft brown buildup has been removed by firehose blasting.



39. West wall of tank, north of photo 38.





40. West wall of tank, north of photo 39. Squiggly light lines on wall are where soft brown buildup has been removed by firehose blasting.



41. West wall of tank, north of photo 40, and tail end idler sprocket at upper right.





42. West bay return idler shaft and sprocket, west end (scum skimmer pipe and baffle in upper background).



43. West bay return idler shaft and sprocket, east end in upper foreground and tail shaft and sprockets (both bays) in lower background.





44. Scum skimmer pipe worm mechanism in upper left, viewed from west bay.





45. West bay west side scum baffle support.





46. West bay east side scum baffle support (scum skimmer pipe worm mechanism visible upper right).





47. Bottom west end of rusty west bay discharge weir boxes (scum baffle visible upper left).



48. Bottom mid-section of rusty west bay discharge weir boxes.





49. Bottom east end of rusty west bay discharge weir boxes (scum baffle visible upper right).



50. Tank center columns viewed from west bay looking northeast. Rusty collector return rails and obsolete grease return HSS visible.





51. Tank center columns viewed from west bay looking northeast, continued south from photo 50 (right column on grid line 9 is coated).



52. Tank center column (coated) and drive support structure viewed from west bay looking southeast, continued south from photo 51.





53. East tank wall near south end (longitudinal collector head shaft visible upper center).





54. East wall of tank, north of photo 53.



55. East wall of tank, north of photo 54. Diagonal line is where concrete coating ends.





56. East wall of tank, north of photo 55. Squiggly light lines on wall are where soft brown buildup has been removed by firehose blasting.



57. East wall of tank, north of photo 55, and tail end idler sprocket at left.





58. East bay return idler shaft and sprocket, east end (scum skimmer pipe and baffle in left background).



59. East bay return idler shaft and sprocket, west end in upper foreground and tail shaft and sprockets (west bay) in lower background





60. East bay scum skimmer pipe and scum baffle west support connections.



61. East bay scum skimmer pipe and scum baffle east support connections.





62. Close-up of scum baffle support in photo 60.





63. Close-up of scum baffle support in photo 61.





64. Bottom east end of rusty east bay discharge weir boxes (scum baffle visible upper right).



65. Bottom mid-section of rusty east bay discharge weir boxes.





66. Bottom west end of rusty east bay discharge weir boxes (scum baffle visible upper left).



67. Tank center columns viewed from east bay looking northwest. Rusty collector return rails and obsolete grease return HSS visible.





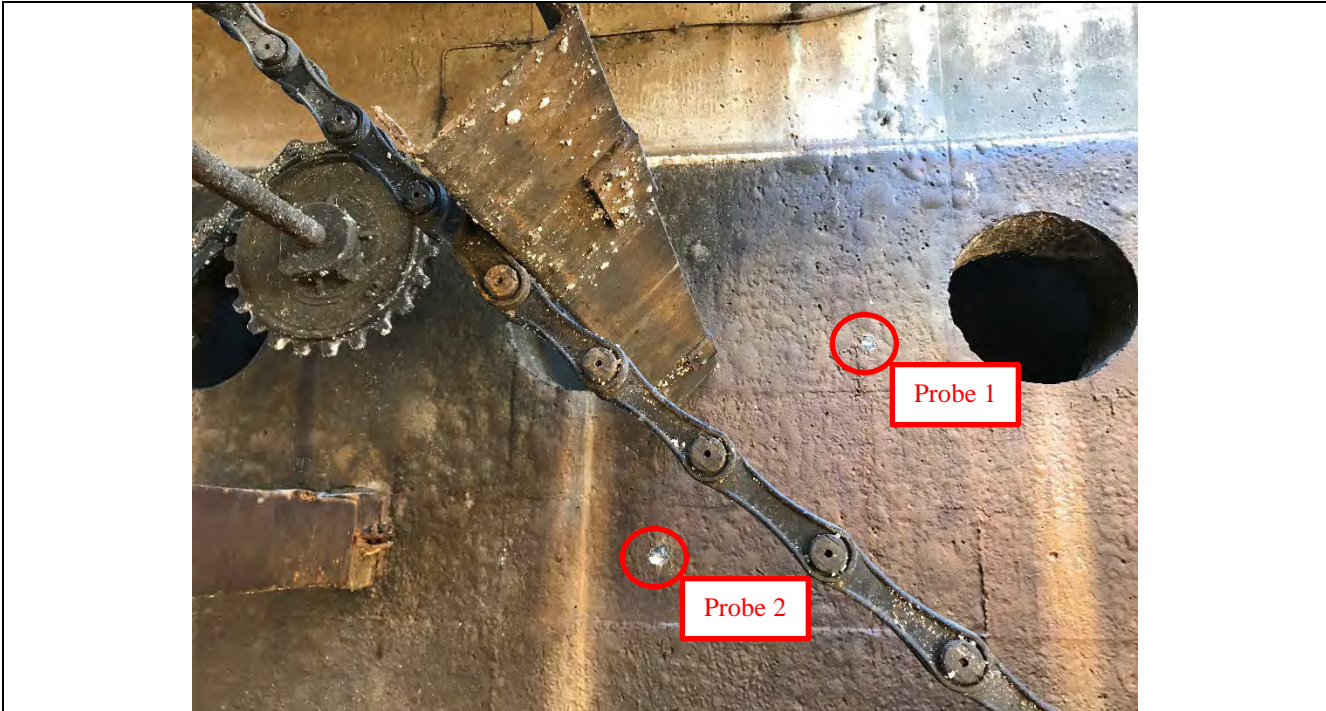
68. Tank center columns viewed from east bay looking northwest, continued moving south from photo 67.



69. Tank center columns and drive support structure (end) viewed from west bay looking southeast, continued south from photo 68.



**Specific Interior Reference and Probe Photos**



70. Inlet (south) wall upper probe locations – both at blisters in concrete coating. Note many other blisters in coating.



71. Close-up of probe location 1.





72. Close-up of probe location 2.



73. Inlet (south) wall lower probe location 3 near center of tank and bottom of cross collector trough (ref. photo 12).





74. Close-up of probe location 3.





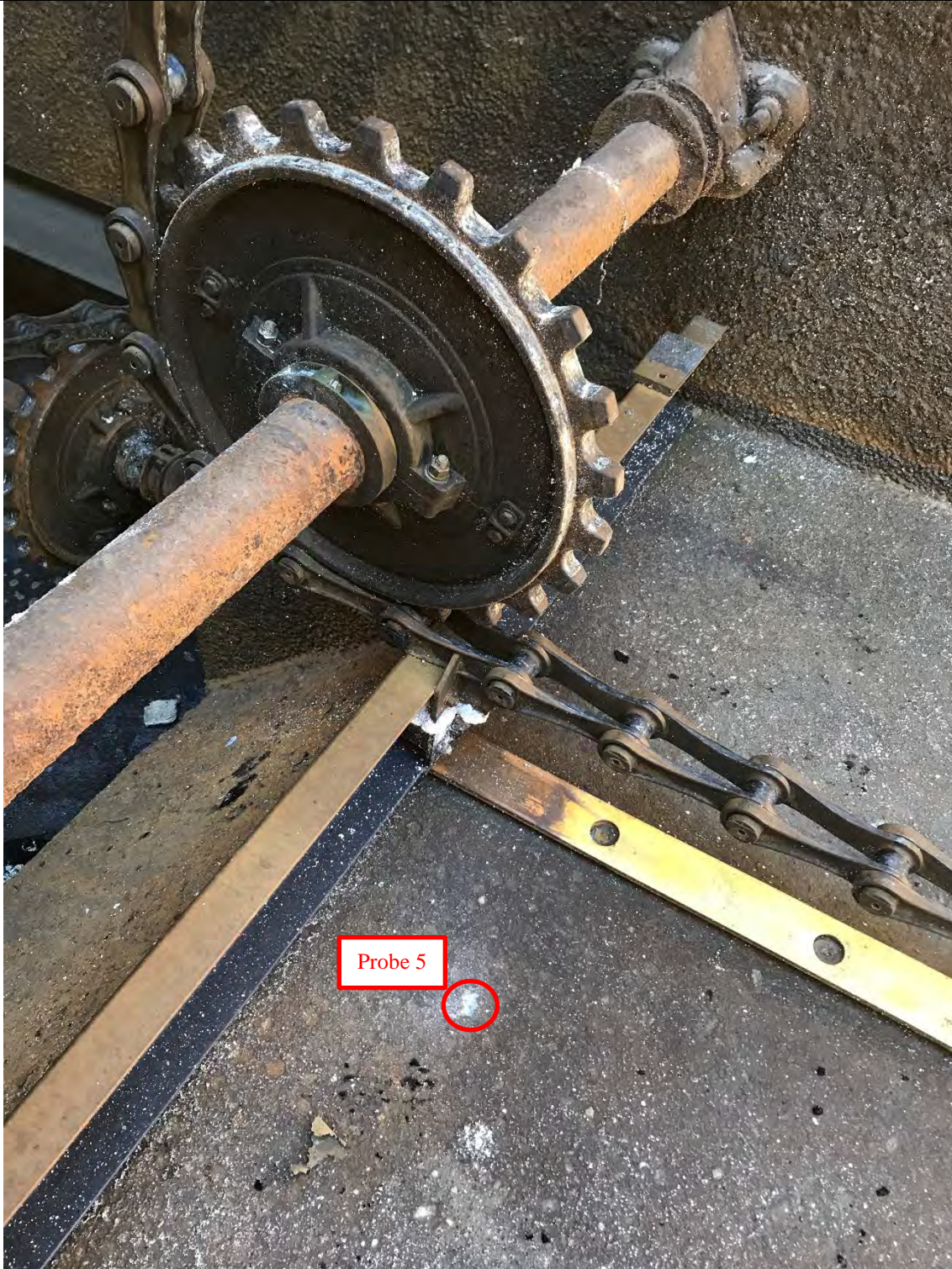
75. Cross collector probe location 4 at blister in concrete coating. Dark area is moisture release from punctured blister.





76. Close-up of probe location 4. Ten inch probe spike included for scale reference.





77. West bay longitudinal collector discharge floor probe location 5





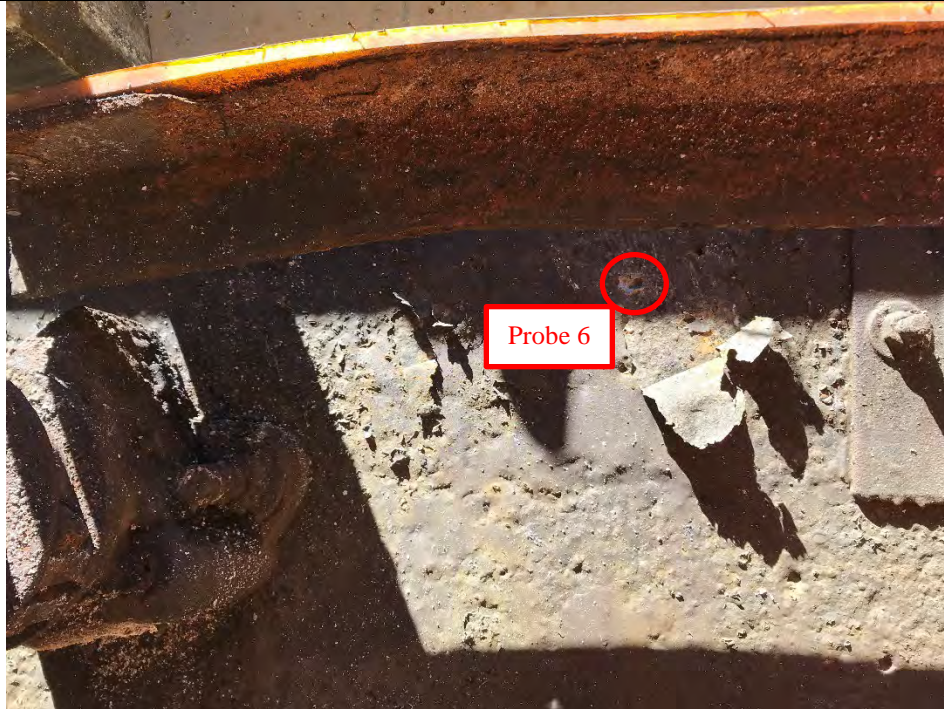
78. Close-up of probe location 5.





79. West bay grid line 10 wall probe location 6 where coating was relatively intact (before probe). Note peeling concrete coating adjacent.



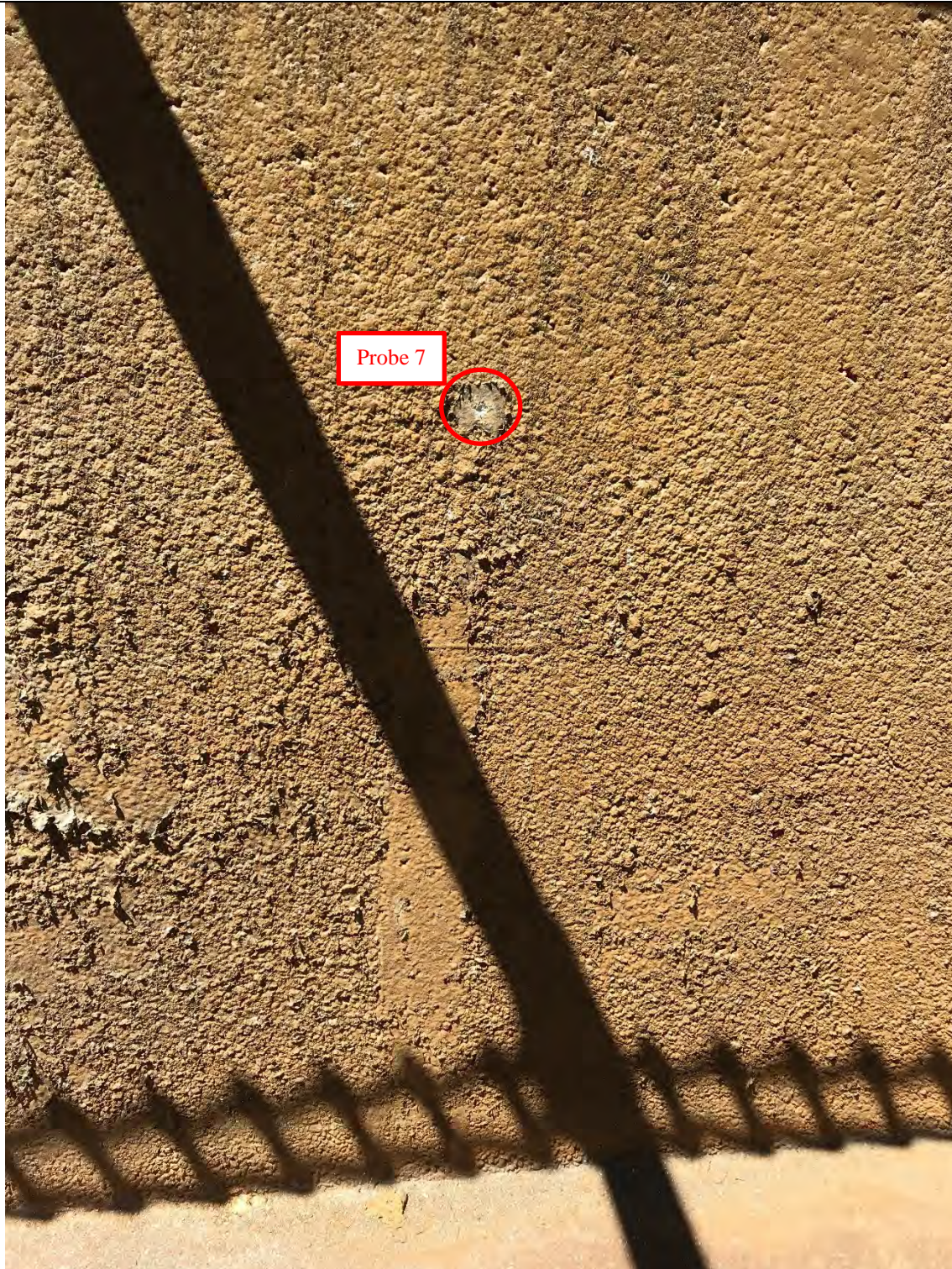


80. West bay wall grid line 10 probe location 6 after coating peeled back and probing completed.



81. Close-up of west bay south wall probe location 6.





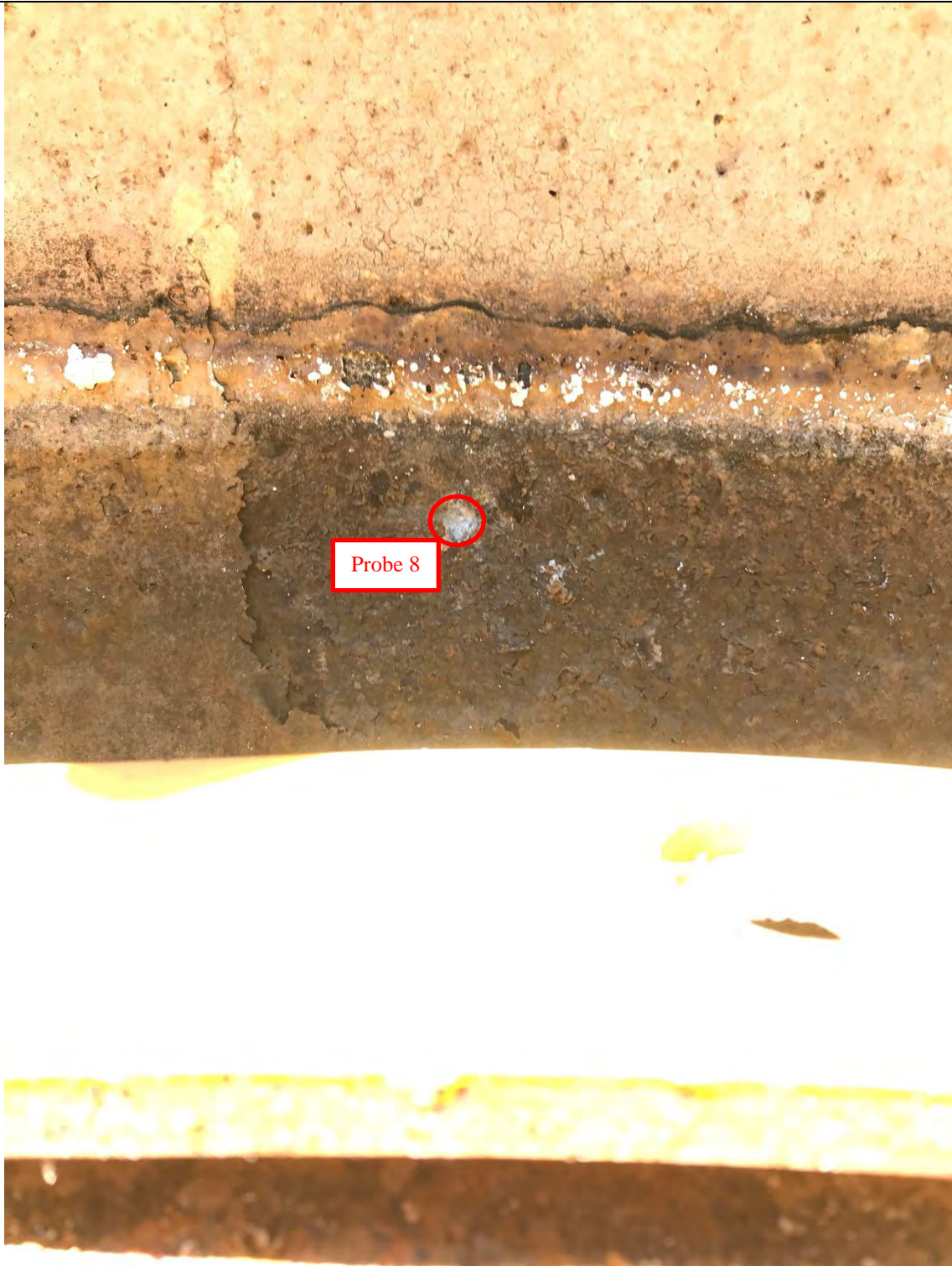
82. West bay grid line 8 wall probe location 7 where first layer of concrete coating was intact.





83. Close-up of west bay wall probe location 7.





84. West bay grid line 8 wall probe location 8, near liquid level, where first layer of coating was intact.





85. Close-up of west bay wall probe location 8.





86. West bay grid line 7 wall probe location 9, in uncoated concrete, adjacent to diagonal line of coating. Brown wall colour at probe area is a soft buildup that can be removed by blasting with a firehose.





87. Close-up of west bay wall probe location 9. Aggregate is exposed but probe penetration is not significantly different than previous.





88. West bay grid line 5 wall probe location 10, in uncoated concrete.





89. Close-up of west bay wall probe location 10.





90. West bay grid line 3 wall probe location 11, in uncoated concrete, adjacent to crack in wall.





91. Close-up of west bay wall probe location 11.





92. Crack in west wall of east bay beside tail end idler sprocket. Note white buildup near water line.





93. Close-up of water line white buildup in photo 92.



94. Water line erosion on west wall between discharge weir boxes.





95. East side of column on grid line 5 – note honeycomb pockets in concrete.





96. Close-up of photo 95 showing honeycomb pockets in concrete.



97. West side of column on grid line 5 – note honeycomb pockets in concrete



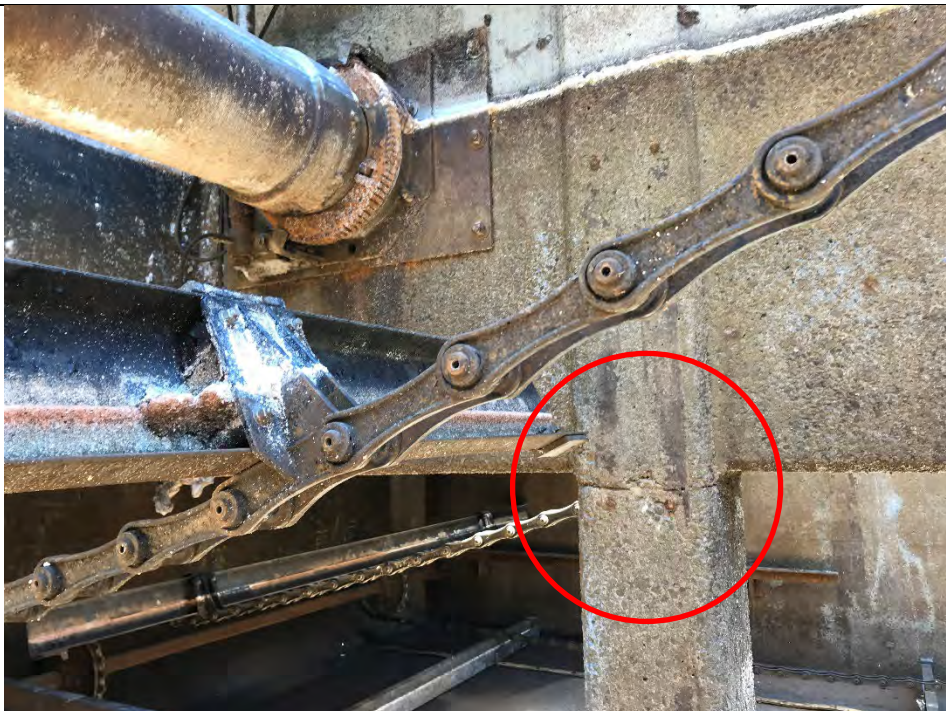


98. Close-up of photo 97 showing honeycomb pockets in column concrete.





99. Coating on column on grid line 9 appears to be in reasonable condition.



100. Horizontal cut line in west side of column on grid line 2 adjacent to old anchor bolts.





101. West bay longitudinal collector yellow return (top) rail wear strips buckled.



102. East bay longitudinal collector yellow return (top) rail wear strips buckled.





103. Wall to floor corner joint in cross collector trough should be re-caulked.





104. Standard household hammer used for concrete sounding and probing, along with wood spike used for probing.