SRM PROJECTS
PROJECT MANAGEMENT AND TEAM DEVELOPMENT

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 Grit Tank Inspection Report – For Record**
RDN Ref: Project WW-0038 / Equip: T-113, SRM Ref: P0041

Dear Duncan,

Please find attached my summary report and photographs taken on July 14, 2022, during interior inspection of the GNPCC No. 3 Grit 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)

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SRM PROJECTS
PROJECT MANAGEMENT AND TEAM DEVELOPMENT

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

Inspection Date:	July 14, 2022
Equipment:	No. 3 Grit Tank, GNPCC
Ref. Number:	T-113
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 64 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:	
Probe Testing	
Location 1 east wall ~ 900 mm up from floor – uncoated concrete	Approximately 12 mm (1/2”) penetration; concrete at probe location has turned white, likely a result of process attack. Refer to photos 43 and 44.
Location 2 east wall ~ 1,800 mm up from floor – uncoated concrete	Approximately 12 mm (1/2”) penetration; concrete at probe location has turned white, likely a result of process attack. Refer to photos 45 and 46.
Location 3 east wall ~ blister location 1,200 mm up from floor – black (top) and off-white (bottom) coating	Approximately 10 mm (3/8”) penetration; concrete at probe location has turned white, likely a result of process attack. Blister in top black coating; off-white coating below seemed reasonably adhered to the concrete. Refer to photos 47 and 48.
Location 4 south wall ~ 600 mm up from floor – Only off-white (bottom) coating remains in this section (black has delaminated and fallen off)	Approximately 10 mm (3/8”) penetration; thin surface layer of concrete at probe location has turned white, likely a result of process attack. Concrete below is harder. Blister in top black coating; off-white coating below seemed reasonably adhered to the concrete. Refer to photos 49 and 50.
Location 5 floor ~ 600 mm west of pressure relief valve	Approximately 12 mm (1/2”) penetration; concrete at probe location has turned white, likely a result of process attack. Refer to photos 51 and 52.
Location 6 north wall ~ 1,800 mm up from floor – uncoated concrete	Approximately 10 mm (3/8”) penetration; concrete at probe location has turned white, likely a result of process attack. Refer to photos 53 and 54.
Location 7 north wall ~ 300 mm up from floor – uncoated concrete	Approximately 12 mm (1/2”) penetration; concrete at probe location has turned white, likely a result of process attack. Refer to photos 55 and 56.
Location 8 north wall ~ blister location 2,200 mm up from floor – black coated concrete	Approximately 10 mm (3/8”) penetration; concrete at probe location has turned white, likely a result of process attack. Refer to photos 57 and 58.
Location 9 west wall ~ 700 mm up from floor – uncoated concrete	Approximately 12 mm (1/2”) penetration; concrete at probe location has turned white, likely a result of process attack. Refer to photos 60 and 61.

Concrete sounding – general	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 muted/dull, suggesting the surface of the concrete has been softened due to process attack (poor quality concrete not suspected due to above probe observations).
Concrete joint scouring	The joint between the north wall and the floor was scoured out from the east wall to the west wall, especially near the mid-section of the wall (refer to photo 59). The northeast corner wall joint was also scoured out from the floor to about half way up the wall (refer to photos 43 and 62).
Previous concrete coating(s)	It appears that a thick, black concrete coating was applied to the upper part of all four walls of the tank. There are many blisters in this coating and one large section on the south wall has delaminated and fallen off. There is visual evidence of an off-white coating, below the black coating, on the east, south and west walls of the tank. This coating appears to have adhered better as no blisters were observed. Refer to photos 12 – 24 and 30 – 32. There is no visual evidence of a coating being applied to the tank floor. Refer to photos 37 – 39.

N-INT-211

EXIST. VALVE STEM AND DRAIN TRAP HANDLE, COMPLETE WITH VALVE AND DRAIN TRAP, RELOCATED FROM MH 2 TO SUIT

EXIST. MH 2

3"ø AC PIPE

1"ø DRAIN

EXIST. CONDENSATE DRAIN

REMOVE THIS SECTION

CAP OFF

ADAPTOR TO SUIT OR POUR 6" CONC. SURROUND 12" LONG

SEE C/4

SEE 1/5

Probe 8

Probes 6 & 7

Corner joint scoured out half way up from floor

Floor joint scoured out

6/5

4"ø HEAVY WALL PERFO PVC PIPE

Probes 1 & 2

Probe 9

REPLACE THIS SECTION OF 4"ø NCR PIPING WITH 4"ø HEAVY WALL PERFORATED PVC PIPE

SEE D/3

Probe 5

GRIT TANK NO. 3

Probe 3

REMOVE 1"ø DRAIN LINE

6/5

7/5

7'-0"

1'-0"

5'-8"

Probe 4

1"x1" SEALANT

8"

1'-0"

EXIST. MH 3

42"ø RC PIPE

2/5 2/5

3/3

14'

15'

INSTALL WALL SHEAR BOLT OVER FULL HEIGHT OF WALL SEE TYP. DETAIL C/4

SIMILAR SHEAR BOLT ALSO REQUIRED IN TOP 6' OF WALL ON BAYLINE (15)

REMOVE THIS SECTION OF 42"ø RC PIPE

VALVE STEM AND DRAIN TRAP HANDLE - RELOCATE, COMPLETE WITH VALVE AND DRAIN TRAP BELOW, TO MH 2

ACCESS DOWN EXISTING RAMP TO BE MAINTAINED AT ALL TIMES.

4/4 4/5 5/4 5/5

G H J L

PLAN AT ELEV. ± 85.00

SAW CUT

RADIUS TO SUIT MECH'L. EQUIP. REQMT.

1½"

NON SHRINK GROUT

REMOVE EXIST. CONC.

DETAIL A/2

N. T. S.

± 34'-0"

REMOVE TEMPORARY WALL

9"

EL. 90'-0"

10"

4'-9½"

9'-2½"

TK 3562A1

TO SUIT MECH. EQUIPMENT REQUIREMENT.

1'-8"

2'-0"

45°

1'-0"

1'-0"

2'-0"

SEE DETAIL A/3

* VERIFY DIMENSIONS PRIOR TO POURING CONC.

1'-0" 3'-0" 1'-0"

6" LAYER OF ¾" CRUSHED ROCK (TYP.)

SECTION 1/3

1"x 1/2" SEALANT

SAW CUT

REMOVE EXIST. SLAB

(DO NOT CUT REBAR)

DETAIL B/3

G J

2" 3'-8" 2"

6"

REMOVE THIS SECTION OF CHAMBER WALL

L

EL. 92'-0"

5'-2"

1'-0"

CUT OFF THESE RUNGS FLUSH WITH WALL

SEE DETAIL B/3

INFILL WITH COMPACTED SAND

PLUG WITH CONC. AFTER USING BUSH HAMMER TO REMOVE ¼" MIN. FROM PIPE WALL

REMOVE EXIST. PIPE

SECTION 2/3

1"x1" SEALANT

EXIST. MH 2

EL. 78'-0"

EL. 77'-10"

REMOVE EXIST. PIPE FROM EXIST. DROP CHAMBER AT BAYLINE (J) TO OUTSIDE WALL OF MH 3

CUT PIPE FLUSH WITH OUTSIDE WALL OF MH 3

SECTION 3/3

¾" ø CRUSHED ROCK

8"

6"

2" DRAIN ROCK (TYP.)

1½

4" MIN.

VARIES

1'-0" MIN.

FOUNDATION DRAIN DETAIL C/3

N. T. S.

PRESSURE RELIEF VALVE

2"ø DRAIN ROCK

1'-6" 1'-6"

3' DIA.

¾" ø CRUSHED ROCK

DETAIL D/3

N. T. S.

N-INT-211

Markup for SRM inspection report issued October 2022

REVISIONS	ISSUE	DATE	DR'N	CH'D	APP'D	DESCRIPTION	ISSUE	DATE	DR'N	CH'D	APP'D	DESCRIPTION
W.S.S. 117205												

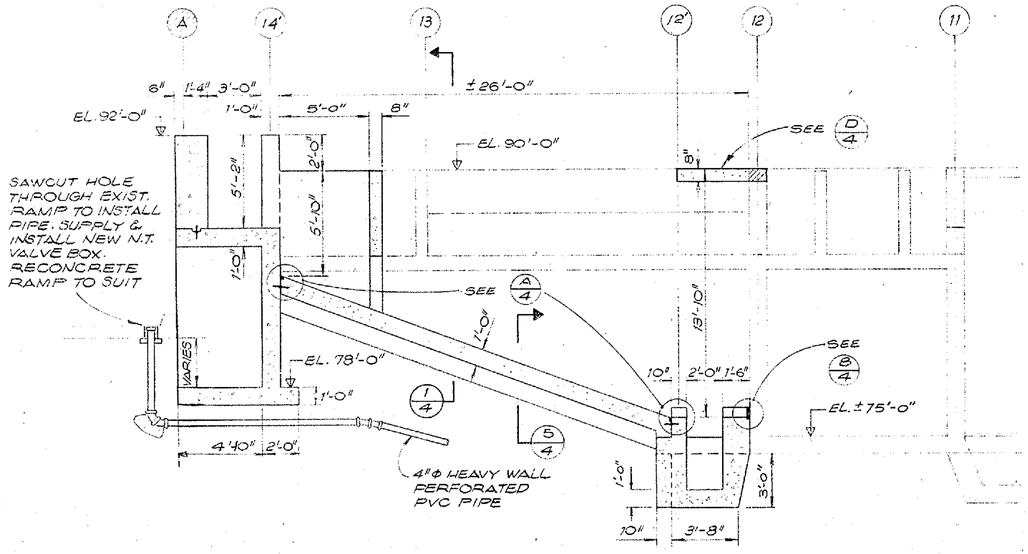
DESIGNED JWCB
DRAWN VB
CHECKED BW BW

DAYTON & KNIGHT LTD.
CONSULTING ENGINEERS
B Welkin 4 July 83

REGIONAL DISTRICT OF NANAIMO
GREATER NANAIMO W.P.C.C.
CONSTRUCTION OF STAGE II EXPANSION – PHASE II
GRIT TANK No.3 DETAILS

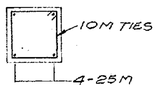
SCALE: 1/4"= 1'-0" OR AS SHOWN | S
DRAWING No. 122.72.4
SHEET 3 OF 21 ISSUE A

N-INT-212



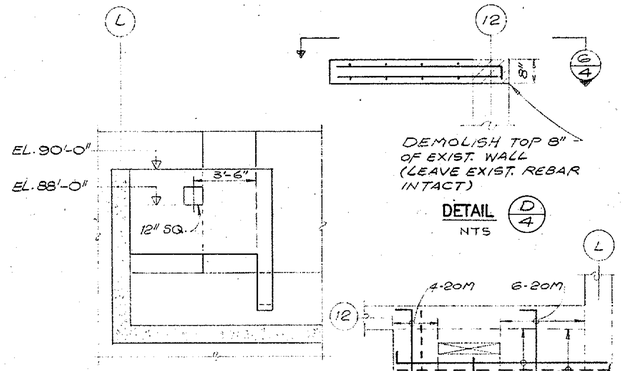
SECTION 4/3

1/4" = 1'-0"

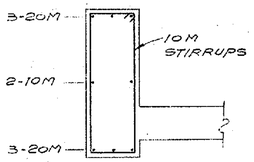


SECTION 2/4

3/4" = 1'-0"



SECTION 1/4



SECTION 3/4

3/4" = 1'-0"

SECTION 6/4

NTS

SECTION 5/4

GENERAL STRUCTURAL NOTES

CONCRETE

1. APPLICABLE SPECIFICATIONS AND CODES: CONCRETE CONSTRUCTION SHALL CONFORM TO CSA, CAN.3-A23.1-M77 AND CAN.3-A23.2-M77.

2. REINFORCING STEEL DETAILS: ALL DETAILING, FABRICATING AND ERECTION OF STEEL REINFORCING BARS, UNLESS OTHERWISE NOTED, SHALL BE IN ACCORDANCE WITH THE "METRIC SUPPLEMENT" IN CONJUNCTION WITH THE "REINFORCING STEEL MANUAL OF STANDARD PRACTICE" AS AVAILABLE FROM THE WESTERN REINFORCING CONTRACTORS ASSOCIATION.

3. MINIMUM REINFORCEMENT: CONCRETE CONSTRUCTION SHALL BE REINFORCED CONCRETE EXCEPT WHERE PLAIN CONCRETE (P/C) IS SPECIFIED ON THE DRAWINGS, IN WHICH CASE NO REINFORCEMENT SHALL BE USED. CONCRETE THAT IS NOT DESIGNATED P/C AND HAS NO REINFORCEMENT INDICATED SHALL BE REINFORCED ACCORDING TO THE FOLLOWING SCHEDULES:

A) STEEL FOR WALLS AND SLABS

REINFORCEMENT EACH WAY

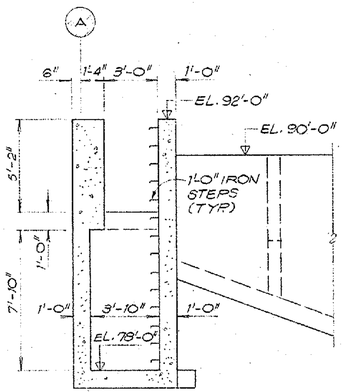
THICKNESS	SIZE	SPACING	POSITION
6	10M	12 C/C	ON ℄
8	15M	12 C/C	ON ℄
10	15M	12 C/C	EF
12	15M	12 C/C	EF
14	15M	12 C/C	EF
16	20M	12 C/C	EF
18	20M	12 C/C	EF
20	20M	12 C/C	EF

MASS CONCRETE SHALL BE REINFORCED WITH 15M BARS AT 12" MINIMUM IN ALL FACES.

B) 10M @ 18" SHALL BE USED AS TRANSVERSE TIES IF NO OTHER REINFORCING IS NOTED.

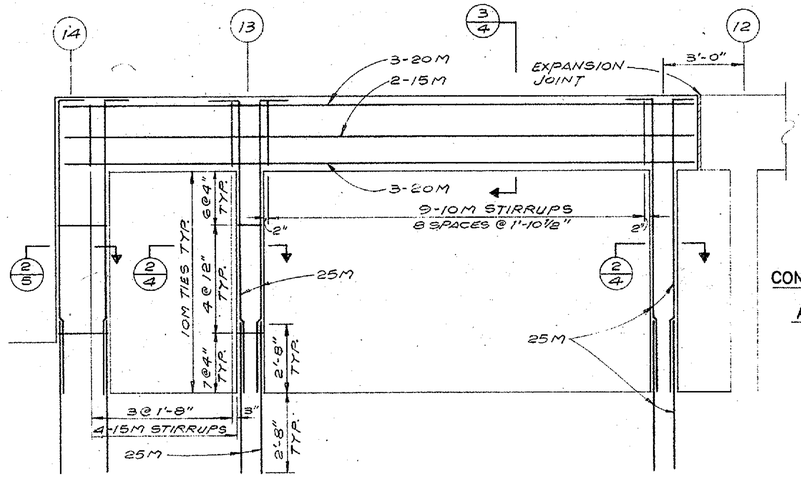
4. CONCRETE COVER: CONCRETE COVER OF REINFORCING BARS, IF NOT SPECIFIED ON THE DRAWINGS, SHALL BE AS FOLLOWS OR SHALL BE EQUAL TO THE DIAMETER OF THE MAIN REINFORCING BAR IT COVERS, WHICHEVER IS LARGER:

	CONDITION	SPECIFIED COVER (inches)
A)	CONCRETE CAST AGAINST GROUND	3
B)	CONCRETE EXPOSED TO EARTH, LIQUIDS OR WEATHER	
	i 20M BARS OR LARGER	2
	ii 10M AND 15M BARS	1½
C)	CONCRETE SLABS OR WALLS NOT EXPOSED TO EARTH, LIQUIDS OR WEATHER	¾
D)	CONCRETE BEAMS OR COLUMNS	2



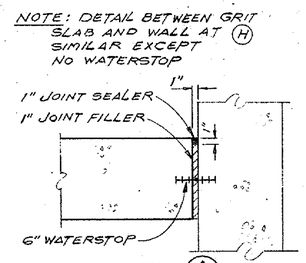
SECTION 5/3

1/4" = 1'-0"



BEAM AND COLUMNS AT LINE L

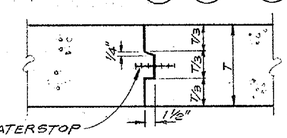
3/8" = 1'-0"



DETAIL A/4

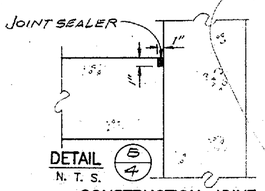
N. T. S.

CONTROL JOINT BETWEEN GRIT TANK BOTTOM SLAB AND WALLS AT BAYLINE 14' 12' & L



VERTICAL CONSTRUCTION JOINT FOR WALLS

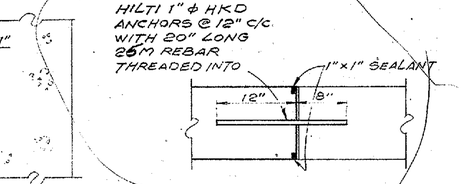
N. T. S.



DETAIL B/4

N. T. S.

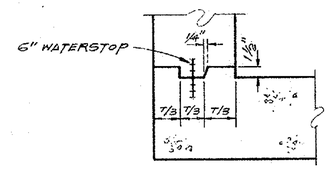
CONSTRUCTION JOINT BETWEEN GRIT TANK COLLECTOR TROUGH AND WALLS AT 12 & J



WALL SHEAR BOLT

DETAIL C/3 C/5

N. T. S.



HORIZONTAL CONSTRUCTION JOINT FOR WALL ON SLAB

N. T. S.

N-INT-212

W.S.B. 115235 REVISIONS	ISSUE	DATE	DR'N	CH'D	APP'D	DESCRIPTION	ISSUE	DATE	DR'N	CH'D	APP'D	DESCRIPTION

DESIGNED JWCB
DRAWN VB/R.S.
CHECKED JWK BW

DAYTON & KNIGHT LTD.
CONSULTING ENGINEERS
B Walker 4 July 89

REGIONAL DISTRICT OF NANAIMO
GREATER NANAIMO W.P.C.C.
CONSTRUCTION OF STAGE II EXPANSION – PHASE II
GRIT TANK No.3 DETAILS

SCALE: AS SHOWN S
DRAWING No. 122.72.4
SHEET 4 OF 21 ISSUE A

N-INT-214

PRIMARY SEDIMENTATION TANK NO.1

PRIMARY SEDIMENTATION TANK NO.2

CONTROL JOINT

4'-6" (TYP.)

TEMPORARY 6"Ø HOLE, INV. FLUSH WITH CHANNEL SLAB

1/8" / FOOT (TYP)

OPENINGS TO SUIT MECHANICAL EQUIP. REQUIREMENTS (TYP)*

TO SUIT MECHANICAL EQUIR REQUIREMENTS (TYP) *

EXIST. CHLORINE CONTACT TANK (NEW PRIMARY SEDIMENTATION TANK NO. 3)

CONC. WALL SEE TYP. DETAIL 4/12

EXIST. MH 2

14'-0" WALL TO WALL

GATE No 4 — GATE No 13 — GATE No 14 — GATE No 5

GATE NO. C

REMOVE EXIST. TEMPORARY WALL

GATE No 6

PLUG EXIST. DRAIN PIPE WITH CONC.

CORE HOLE THROUGH WALL AND GROUT WITH QUICK SETTING GROUT

1/8" / FT.

GR. EL. 85'-2 1/2" (TYP)

GRATING (TYP.)

10'4 OPENING

12"x12" COLUMN

10"Ø OPENING FOR CLEANOUT - SEE 3/8

7'-0"

OPENING TO SUIT* MECH. EQUIPMENT

EXIST. WEIR WALL

REMOVE THIS TEMPORARY CONC. WALL. LEAVE STEEL BEAM INTACT

CONTROL JOINT

GRIT TANK NO. 1

GRIT TANK NO. 2

GRIT TANK NO.3

GATE No25
GATE No26

GATE No23
GATE No24

1/8" / FT.

GR. EL. 85'-2 1/2

CONTROL JOINT

UTILITY STATION (TYP FOR 2) MOUNTED ON HANDRAIL - SEE DETAIL J/14

REMOVE EXIST. TIMBER FLAP GATE AND RELOCATE TO EAST END OF CHANNEL

2" PROCESS WATER (LOCATE 12" BELOW TOP OF WALL AND SECURE TO WALL WITH PIPE BRACKETS TO SUIT)

NEW GRATING, SEE F/14

2" RWL

12"x12" COLUMNS FOR STEEL STEPS THIS AREA SEE SHEET 14

REMOVE THIS SECTION OF WALL

GATE No 2
GATE No 1

GATE NO. A
GATE NO. B

EXIST. MH 3

KEY, BITUMINUS PAINT AND IGAS JOINT FILLER ALL AROUND (TYP.)

CONTROL JOINT

1" JOINT FILLER

12"x18" COLUMNS

12"x18" COLUMNS

WALKWAY CLADDING AND HANDRAIL DETAILS OMITTED TO PRESERVE CLARITY - SEE SHEET 14

LEGEND

▨ - TEMPORARY CONC. WALLS.

* - VERIFY DIMENSIONS PRIOR TO POURING CONCRETE.

PLAN

REVISIONS	ISSUE	DATE	DR'N	CH'D	APP'D	DESCRIPTION

DESIGNED JWCB
DRAWN VB
CHECKED TMB PW

DAYTON & KNIGHT LTD.
CONSULTING ENGINEERS
B Walton 4 July 03

REGIONAL DISTRICT OF NANAIMO
GREATER NANAIMO W.P.C.C.
CONSTRUCTION OF STAGE II EXPANSION – PHASE II
GRIT TANK No.3 DETAILS

SCALE: 1/4" = 1'-0" M
DRAWING No. 122.72.4
SHEET 6 OF 21 ISSUE A

N-INT-214

Exterior Reference Photos

1. GNPCC No. 3 Grit Tank top, looking northwest.

2. GNPCC grit tanks tops, looking northwest – No. 3 Grit Tank in foreground.

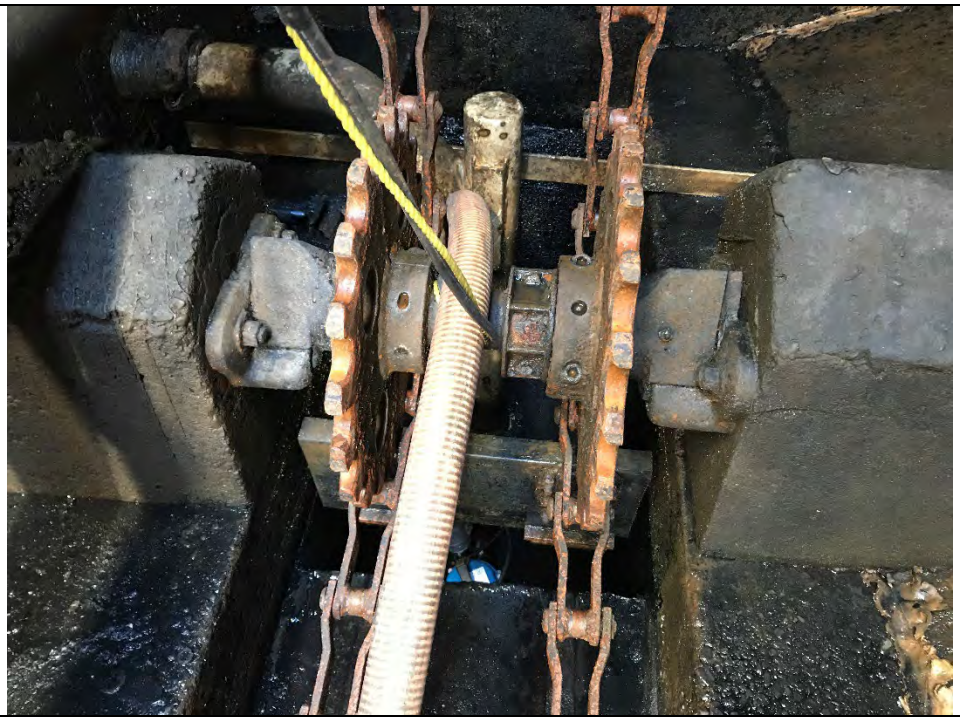
General Interior/Mechanism Reference Photos

3. Collector chain (drive end) and air header, looking east

4. Collector chain and air header, looking west

5. Close-up of collector chain, wear strips and trough looking east.

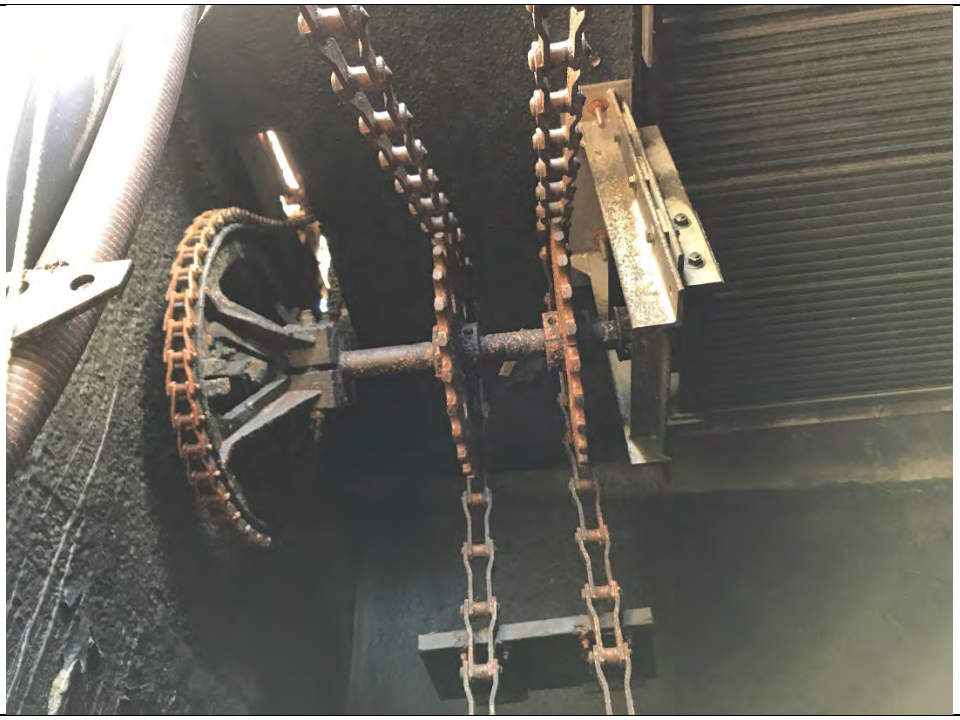
6. Close-up of collector chain, wear strips and trough looking west.



7. Close-up of drive end idler sprockets at east end of collector trough (portable blue sump pump installed for tank entry only).

8. Close-up of collector trough sump permanent suction piping (white, behind chain).

9. Close-up of tail end sprockets at west end of collector trough.



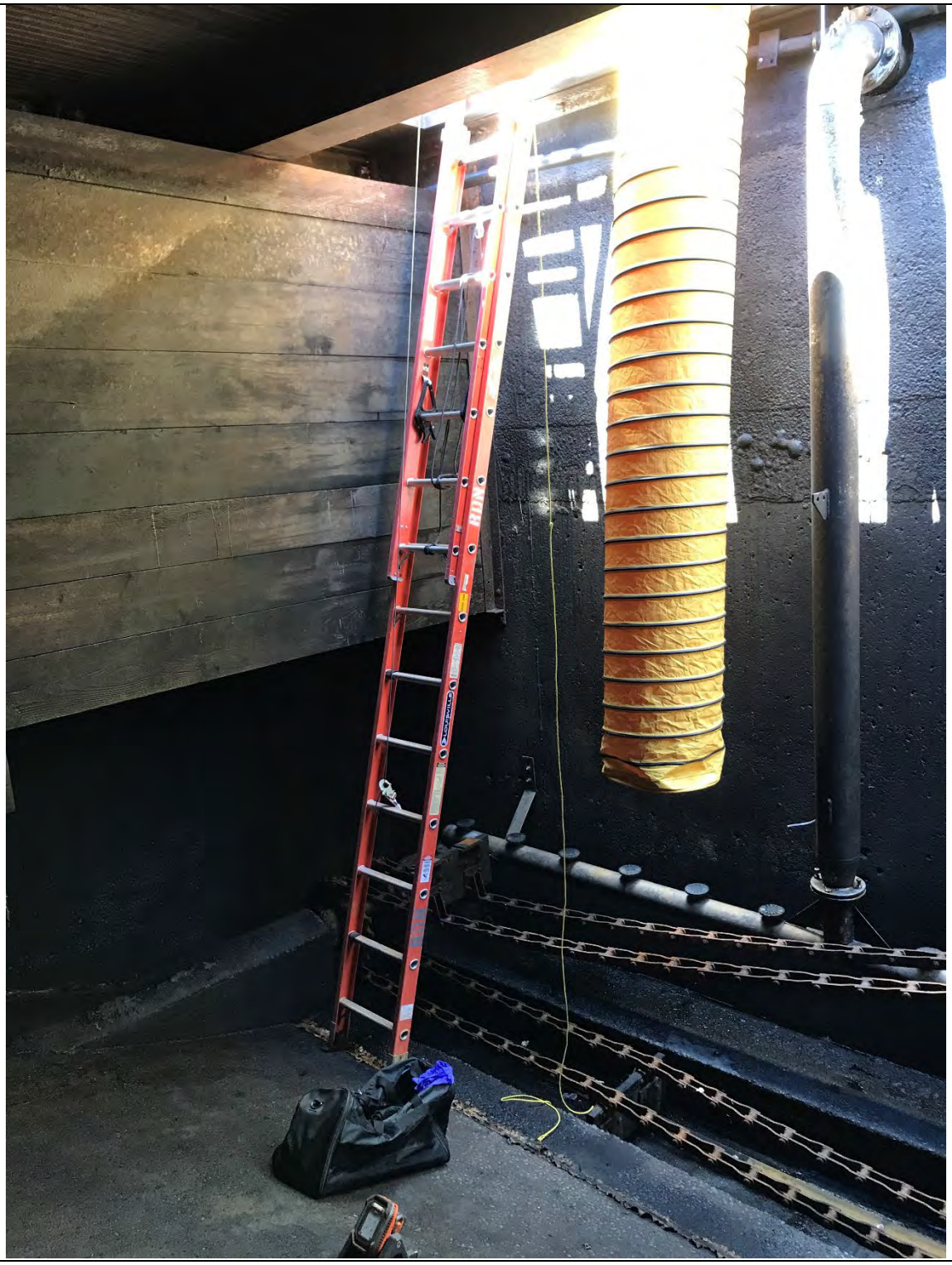
10. Close-up bottom view of drive end sprockets at east end of tank.

11. Close-up of drive end sprockets at east end of tank, looking north. Black wall coating drip lines/blisters/delaminations visible.

12. South wall of tank at east (drive) end (sump pump hose only installed for tank entry). Note coating (drip lines) on upper wall.

13. Center of south wall of tank. Note blisters in black coating on upper wall (lower concrete is uncoated)

14. South wall of tank near west end. Note blisters in black coating on upper wall (lower concrete is uncoated)



15. South wall of tank at west end. Note blisters in black coating on upper wall (lower concrete is uncoated)

16. East wall of tank and inlet box (at right). Note coating (drip lines) on upper wall.

17. Inlet box looking south. Blistered black coating visible.

18. Inside of inlet box looking at southeast corner

19. Inside of inlet box looking at inlet opening (blanked for entry) and southwest corner

20. Bottom of inlet box.

21. East half of south tank wall. Black coating has blistered and delaminated from off-white coating beneath.

22. West half of south tank wall. Black coating has blistered and delaminated from off-white coating beneath.

23. West wall of tank and wooden outlet baffle.

24. West wall of tank (black coated) and start of wooden outlet baffle.

25. Outlet baffle along west wall.

26. Baffle south end support steel.

27. Baffle south end support steel bottom anchor point.

28. Baffle south end support steel top anchor point.

29. Baffle plank connectors.

30. South end of west tank wall behind baffle.

31. Upper north end of west tank wall behind baffle.

32. Lower north end of west tank wall behind baffle.

33. North end of tank outlet weir (wooden baffle in foreground)

34. South end of tank outlet weir (wooden baffle in foreground)

35. North end of tank outlet weir showing top of tank wall (wooden baffle in foreground)

36. South end of tank outlet weir showing top of tank wall (wooden baffle in foreground)

37. East side of tank bottom (uncoated).

38. Center view of uncoated tank bottom – groundwater pressure relief valve at center (ref. dwg: GN-S-PT-201).

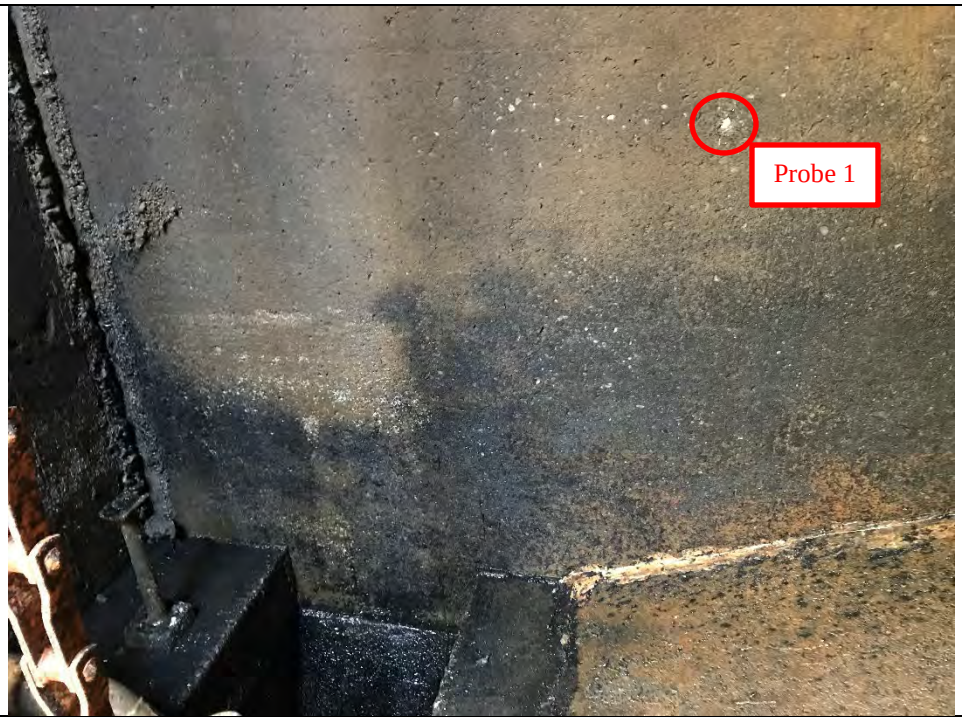
39. West side of tank bottom (uncoated).

40. Tank roof support steel.

41. Tank roof support beam connection at south wall.

42. Tank roof perimeter support at southwest corner.

Specific Interior Reference and Probe Photos



43. East wall probe location 1. Note left corner caulking is scoured out (refer to photo 62 for additional detail).

44. Close-up of probe location 1.

45. East wall probe locations 1 and 2.

46. Close-up of probe location 2

47. East wall probe location 3 near inlet box (beneath blister in black coating).

48. Close-up of probe location 3, beneath blister in black coating. Off-white coating visible beneath black coating.

49. South wall probe location 4, below off-white coating (black top coating has delaminated and fallen off).

50. Close-up of probe location 4.

51. Floor probe location 5, beside pressure relief valve.

52. Close-up of probe location 5.

53. North wall probe location 6.

54. Close-up of probe location 6.

55. North wall probe location 7.

56. Close-up of probe location 7.

57. North wall probe location 8, below blister in black coating.

58. Close-up of probe location 8.

59. Floor to north wall joint caulking scoured out all along.

60. West wall probe location 9 (uncoated concrete).

61. Close-up of probe location 9 (olive and black deposits are not concrete coatings).

62. Northeast wall corner caulking appears to be scoured out.

63. Northwest wall corner not scoured out.

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