

2015 MATSQUI DYKE INSPECTION

Prepared By: James Hill

October 2015



CITY OF ABBOTSFORD

32315 South Fraser Way,
Abbotsford, BC
V2T 1W7

TABLE OF CONTENT

LIST OF FIGURES	iii
1.0 INSPECTION SUMMARY.....	1
2.0 2013 MATSQUI DYKE INSPECTION PHOTOS	2
2.1 Dyke Inspection Photos	2
2.2 Flood Boxes and Back Flow Valves at Four Pump Stations Photos	13
APPENDIX A.....	18
Matsqui Dyke Key Map.....	18
APPENDIX B	19
Flood Protection Inspection Report	19

LIST OF FIGURES

Figure 1: MOE Description of Matsqui Dyke	1
Figure 2: Dyke - Station 15+00	2
Figure 3: Dyke - Station 18+50	2
Figure 4: Dyke - Station 22+50	3
Figure 5: Dyke - Station 25+00	3
Figure 6: Dyke - Station 29+00	4
Figure 7: Dyke - Station 30+00	4
Figure 8: Lock Block Wall - Station 32+50	5
Figure 9: Lock Block Section of Dyke - Station 33+50	5
Figure 10: Dyke - Station 40+00	6
Figure 11: Dyke - Station 45+00	6
Figure 12: Dyke - Station 54+00 - Under Abbotsford-Mission Bridge.....	7
Figure 13: Dyke – Station 65+00.....	7
Figure 14: Dyke - Station 75+00	8
Figure 15: Dyke – Station 85+00.....	8
Figure 16: Dyke - Station 90+00	9
Figure 17: Dyke - Station 95+00	9
Figure 18: Dyke - Station 95+00 – One of the Erosion Arcs.....	10
Figure 19: Dyke - Station 100+00	10
Figure 20: Dyke - Station 110+00	11
Figure 21: Dyke - Station 115+00	11
Figure 22: Dyke – Station 120+00.....	12
Figure 23: McLennan Station Flap Gate - Station 18+50.....	13
Figure 24: McLennan Station Fore Bay - Station 18+50.....	13
Figure 25: McLennan Station Tidal Gates - Station 18+50.....	14
Figure 26: Matsqui Station Fore Bay - Station 34+50.....	14
Figure 27: Matsqui Station Tidal Gates - Station 34+50	15
Figure 28: Matsqui Station Flap Gates - Station 34+50	15
Figure 29: Matsqui Station Discharge Tunnel to Fraser River - Station 34+50	16
Figure 30: DeJong Pump Station - Station 58+50	16
Figure 31: Vanderloo Pump Station - Station 65+00	17
Figure 32: Vanderloo Pump Station - Tide Flex Valve - Station 65+00	17

1.0 INSPECTION SUMMARY

Matsqui dyke extends from Harris Rd at Station 10+00 (see key map in Appendix A) on the downstream side to Station 125+00 at Page Rd on the upstream side. The total length of the dyke is 11.5km and it protects approximately 11,500 acres of valuable farmland, homes, highways, JAMES Wastewater Treatment Plant (JAMES Plant) and numerous other public and private facilities in the Matsqui Flood Plain. The Ministry of Environment (MOE) description of this dyke is given in Figure 1.

Abbotsford, City of			
Water Course	Fraser River	Structure Type	Dike
Water Course 2		Ancilliary Works	4 Pump Stations: 2 Flood Boxes
GPS Number	1	Structure Length	11.3 km
Dike Name	Matsqui (Abbotsford dike)	NAD 83 Map Number	92G/SE019
Region	Lower Mainland	Floodplain Maps	D281 & D660
Owner/Administrator	Abbotsford, City of	UTM Northing	5 441 201.45
Address	32315 South Fraser Way	UTM Easting	550837.73
City	Abbotsford	Service Area	4,370 Ha
Province	BC	Land Use	Rural residential, Commercial, Agricultural, Indus
Postal Code	V2T 1W7	Number of Buildings	1,000+
Contact Person	Ms. Stella Chiu	Infrastructure Protected	Roads, Power etc.
Telephone	604 864-5517	Geographic Feature	Riverine
Fax	604 853-2219	Type of Flooding	Spring Freshet
		Local Authority under EPA	Abbotsford, City of
		Regulated under DMA	Yes

Figure 1: MOE Description of Matsqui Dyke

Dykes:

The yearly inspections of the dyke were carried out in May 2015 and Oct 2015. The inspection revealed the dyke is in excellent shape. The vegetation on the dyke was maintained in April 2015; the fall mowing is currently underway. There are no other items that require immediate attention.

Flood Boxes:

Flood boxes, pump discharge gates and tidal gates were inspected in May 2015 and in Oct 2015. The gates were greased and exercised prior to and after the freshet season. All gates were found to in a good condition. There are no other items that require immediate attention.

2.0 2013 MATSQUI DYKE INSPECTION PHOTOS

2.1 Dyke Inspection Photos*



Figure 2: Dyke - Station 15+00



Figure 3: Dyke - Station 18+50

* Please refer to Key Map in Appendix 1 for station numbers.



Figure 4: Dyke - Station 22+50



Figure 5: Dyke - Station 25+00



Figure 6: Dyke - Station 29+00



Figure 7: Dyke - Station 30+00



Figure 8: Lock Block Wall - Station 32+50



Figure 9: Lock Block Section of Dyke - Station 33+50



Figure 10: Dyke - Station 40+00



Figure 11: Dyke - Station 45+00



Figure 12: Dyke - Station 54+00 - Under Abbotsford-Mission Bridge



Figure 13: Dyke – Station 65+00



Figure 14: Dyke - Station 75+00



Figure 15: Dyke – Station 85+00



Figure 16: Dyke - Station 90+00



Figure 17: Dyke - Station 95+00



Figure 18: Dyke - Station 95+00 – One of the Erosion Arcs



Figure 19: Dyke - Station 100+00



Figure 20: Dyke - Station 110+00



Figure 21: Dyke - Station 115+00



Figure 22: Dyke – Station 120+00

2.2 Flood Boxes and Back Flow Valves at Four Pump Stations Photos



Figure 23: McLennan Station Flap Gate - Station 18+50



Figure 24: McLennan Station Fore Bay - Station 18+50



Figure 25: McLennan Station Tidal Gates - Station 18+50



Figure 26: Matsqui Station Fore Bay - Station 34+50



Figure 27: Matsqui Station Tidal Gates - Station 34+50



Figure 28: Matsqui Station Flap Gates - Station 34+50



Figure 29: Matsqui Station Discharge Tunnel to Fraser River - Station 34+50



Figure 30: DeJong Pump Station - Station 58+50



Figure 31: Vanderloo Pump Station - Station 65+00



Figure 32: Vanderloo Pump Station - Tide Flex Valve - Station 65+00

APPENDIX A

Matsqui Dyke Key Map



MATSQUI DYKE
SOUTHERN RAILWAY OF BC TO PAGE PIT
KEYPLAN

OWN BY:	WD	DATE:	2009 12 01
SCALE:	1 : 25,000	REV:	
PAGE:	2 OF 13		

D-982

APPENDIX B

Flood Protection Inspection Report

2015 DIKE INSPECTION CHECK LIST

Dike Name (From database)

MATSON

GPS No. (database)

Water Courses

Paterson River

Dike Section

Date Inspected

Oct. 15/2015

Inspected

Signed

[Signature]

Please also refer to "Flood Protection Works Inspection Guide" from March 2000 for a detailed guide to dike inspection and reporting, available at:

http://www.env.gov.bc.ca/wsd/public_safety/flood/pdfs_word/fld_prot_insp_gd.pdf

**1. Is there any obstruction, deterioration or damage to dike access?
(access routes, ramps, and gates)**

YES	NO	N/A
	✓	

Location(s):

Summary of Issues:

Maintenance Recommendations:

When will Recommendations be Completed:

☐

Supplemental Photos & Descriptions Attached – Section 1

2. Is there any deterioration or damage to the following?

YES	NO	N/A
	✓	

- Dike Crest and slopes (ruts, loss of surfacing material, obstructions, slumping, cracking)

Location(s):

Summary of Issues:

Maintenance Recommendations:

When will Recommendations be Completed:

2015 DIKE INSPECTION CHECK LIST

	YES	NO	N/A
<ul style="list-style-type: none"> Bank Protection (loss of rock, settlement, slumping) 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
<ul style="list-style-type: none"> Flood Boxes/Pump stations (inlet/outlet channels, gate operation, trash racks, debris, erosion, corrosion, structure, mechanical components) 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
<ul style="list-style-type: none"> Culverts/Discharge Pipes (breaks, holes, cracks, corrosion, deterioration) 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			

☐ Supplemental Photos & Descriptions Attached – Section 2

2015 DIKE INSPECTION CHECK LIST

3. Were any of the following serious problems observed? (if yes, please attach a photo or a sketch)

	YES	NO	N/A
<ul style="list-style-type: none"> Seepage (and/or evidence of piping) 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
<ul style="list-style-type: none"> Erosion 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
<ul style="list-style-type: none"> Slumping, cracking, sink holes 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			

2015 DIKE INSPECTION CHECK LIST

	YES	NO	N/A
<ul style="list-style-type: none"> Animal Damage (beavers, animal burrows, cattle, etc.) 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
<ul style="list-style-type: none"> Unauthorized construction (excavations, utilities, structures) 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
<ul style="list-style-type: none"> Channel infilling and aggregation 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			

2015 DIKE INSPECTION CHECK LIST

	YES	NO	N/A
<ul style="list-style-type: none"> Significant flood levels (within free board) within the last 12 months 		✓	
Location(s):			
Summary of Issues:			
Maintenance Recommendations:			
When will Recommendations be Completed:			

☐ Supplemental Photos & Descriptions Attached – Section 3

4. Vegetation Management

<ul style="list-style-type: none"> Hampers or prevents access? 		✓	
Location(s):			
Summary of Issues:			
Maintenance Recommendations:			
When will Recommendations be Completed:			
<ul style="list-style-type: none"> Reduces visibility to each toe? 		✓	
Location(s):			
Summary of Issues:			
Maintenance Recommendations:			
When will Recommendations be Completed:			

2015 DIKE INSPECTION CHECK LIST

	YES	NO	N/A
• Trees in or near dike (within 2m from toe) with potential for uprooting?		✓	
Location(s):			
Summary of Issues:			
Maintenance Recommendations:			
When will Recommendations be Completed:			
• Multi-year vegetation management plan in place?	✓		
If not, please discuss how one will be put into place:			

☐ Supplemental Photos & Descriptions Attached – Section 4

Notes on using this Check List:

1. This check list can be used as an outline for your comprehensive report.
2. Use the dike names and GPS Numbers on the provincial database on web page
http://www.env.gov.bc.ca/wsd/public_safety/flood/fhm-2012/safety_dma_approv.html#river
3. When referring to specific locations use:
 - Chainages from the O&M manual drawings,
 - Major landmarks (roads, bridges, etc.),
 - And if possible, GPS coordinates.
 - **Please do not use local property names.**

2015 SUMAS DYKE INSPECTION

Prepared By: James Hill

October 2015



CITY OF ABBOTSFORD

32315 South Fraser Way,
Abbotsford, BC
V2T 1W7

TABLE OF CONTENTS

LIST OF FIGURES	iii
1.0 INSPECTION SUMMARY	1
2.0 2013 SUMAS DYKE INSPECTION PHOTOS	2
2.1 Dyke Inspection Photos	2
APPENDIX A	6
Sumas Dyke Key Map	6
APPENDIX B	7
MOE Flood Protection Inspection Report	7

LIST OF FIGURES

Figure 1: MOE Description of Sumas Dyke.....	1
Figure 2: Station 160+00 – Looking South West	2
Figure 3: Station 150+00 – Looking South West	2
Figure 4: Station 140+00 – Looking South West	3
Figure 5: Station 130+00 – Looking South West	3
Figure 6: Station 65+00 – Looking South West	4
Figure 7: Station 50+00 Looking South East.....	4
Figure 8: Station 40+00 - Looking South East	5

1.0 INSPECTION SUMMARY

Sumas dyke extends from Vye Rd at Station 10+00 (see key map in Appendix A) on the upstream side to Station 177+00 at Quadling Rd on the downstream side. The total length of the dyke is 16.85KM and it protects approximately 23,500 acres of valuable farmland, homes, highways and numerous other public and private facilities in the Sumas Flood Plain. The Ministry of Environment (MOE) description of this dyke is given in Figure 1.

Abbotsford, City of			
Water Course	Sumas River	Structure Type	Dike
Water Course 2	Fraser River	Ancillary Works	3 Flood Box Valves
GPS Number	3	Structure Length	16.8 km
Dike Name	Sumas Lake Reclamation	NAD 83 Map Number	92GSE010/020
Region	Lower Mainland	Floodplain Maps	D480/D217 & D281
Owner/Administrator	Abbotsford, City of	UTM Northing	5 433 976.89
Address	32315 South Fraser Way	UTM Easting	559 887.48
City	Abbotsford	Service Area	9,227 Ha
Province	BC	Land Use	Rural residential, Commercial, Agricultural, Indus
Postal Code	V2T 1W7	Number of Buildings	2,000+
Contact Person	Ms. Stella Chiu	Infrastructure Protected	Roads, Power etc.
Telephone	604 864-5517	Geographic Feature	Riverine
Fax	604 853-2219	Type of Flooding	Spring Freshet, Fall/Winter, Rainstorm
		Local Authority under EPA	Abbotsford, City of
		Regulated under DMA	Yes

Figure 1: MOE Description of Sumas Dyke

The yearly inspections of the dyke were carried out in May 2015 and Oct 2015. The inspection revealed the dyke is in excellent shape. The dyke mowing was completed by October 13, 2015. There are no other items that require immediate attention.

2.0 2013 SUMAS DYKE INSPECTION PHOTOS

2.1 Dyke Inspection Photos*



Figure 2: Station 160+00 – Looking South West



Figure 3: Station 150+00 – Looking South West

* Please refer to key map in Appendix A.



Figure 4: Station 140+00 – Looking South West



Figure 5: Station 130+00 – Looking South West



Figure 6: Station 65+00 – Looking South West



Figure 7: Station 50+00 Looking South East



Figure 8: Station 40+00 - Looking South East

APPENDIX A

Sumas Dyke Key Map



☐ SUMAS RIVER DYKE STATION
 VYE RD TO BARROWTOWN PUMP STATION
 KEYPLAN

OWN BY: WD	DATE: 2009 11 19
SCALE: 1 : 50,000	REV:
PAGE: 2 OF 10	
D-981	

APPENDIX B

MOE Flood Protection Inspection Report

2015 DIKE INSPECTION CHECK LIST

	YES	NO	N/A
<ul style="list-style-type: none"> Bank Protection (loss of rock, settlement, slumping) 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
<ul style="list-style-type: none"> Flood Boxes/Pump stations (inlet/outlet channels, gate operation, trash racks, debris, erosion, corrosion, structure, mechanical components) 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
<ul style="list-style-type: none"> Culverts/Discharge Pipes (breaks, holes, cracks, corrosion, deterioration) 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			

☐ Supplemental Photos & Descriptions Attached – Section 2

2015 DIKE INSPECTION CHECK LIST

3. Were any of the following serious problems observed? (if yes, please attach a photo or a sketch)

	YES	NO	N/A
<ul style="list-style-type: none"> Seepage (and/or evidence of piping) 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
<ul style="list-style-type: none"> Erosion 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
<ul style="list-style-type: none"> Slumping, cracking, sink holes 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			

2015 DIKE INSPECTION CHECK LIST

	YES	NO	N/A
<ul style="list-style-type: none"> Animal Damage (beavers, animal burrows, cattle, etc.) 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
<ul style="list-style-type: none"> Unauthorized construction (excavations, utilities, structures) 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
<ul style="list-style-type: none"> Channel infilling and aggregation 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			

2015 DIKE INSPECTION CHECK LIST

	YES	NO	N/A
<ul style="list-style-type: none"> Significant flood levels (within free board) within the last 12 months 		✓	
Location(s):			
Summary of Issues:			
Maintenance Recommendations:			
When will Recommendations be Completed:			

☐ Supplemental Photos & Descriptions Attached – Section 3

4. Vegetation Management

<ul style="list-style-type: none"> Hampers or prevents access? 		✓	
Location(s):			
Summary of Issues:			
Maintenance Recommendations:			
When will Recommendations be Completed:			
<ul style="list-style-type: none"> Reduces visibility to each toe? 		✓	
Location(s):			
Summary of Issues:			
Maintenance Recommendations:			
When will Recommendations be Completed:			

2015 DIKE INSPECTION CHECK LIST

	YES	NO	N/A
• Trees in or near dike (within 2m from toe) with potential for uprooting?		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
• Multi-year vegetation management plan in place?		✓	
<p>If not, please discuss how one will be put into place:</p>			

☐ Supplemental Photos & Descriptions Attached – Section 4

Notes on using this Check List:

1. This check list can be used as an outline for your comprehensive report.
2. Use the dike names and GPS Numbers on the provincial database on web page
http://www.env.gov.bc.ca/wsd/public_safety/flood/fhm-2012/safety_dma_approv.html#river
3. When referring to specific locations use:
 - Chainages from the O&M manual drawings,
 - Major landmarks (roads, bridges, etc.),
 - And if possible, GPS coordinates.
 - **Please do not use local property names.**

2015 VEDDER DYKE INSPECTION

Prepared By: James Hill

October 2015



CITY OF ABBOTSFORD

32315 South Fraser Way,
Abbotsford, BC
V2T 1W7

TABLE OF CONTENTS

LIST OF FIGURES	iii
1.0 INSPECTION SUMMARY.....	1
2.0 2013 VEDDER DYKE INSPECTION PHOTOS	2
2.1 Dyke Inspection Photos	2
APPENDIX A.....	5
Vedder Dyke Key Map	5
APPENDIX B	6
MOE Flood Protection Inspection Report	6
APPENDIX C	7
2015 Barrowtown Pump Station – Annual Inspection Report.....	7

LIST OF FIGURES

Figure 1: MOE Description of Vedder Dyke.....	1
Figure 2: Station 40+00 - Looking at Keith Wilson Bridge	2
Figure 3: Station 60+00 – Looking NW along the River Flow	2
Figure 4: Station 65+00 – Looking NW	3
Figure 5: Station 70+00 – looking SW against river flow.....	3
Figure 6: Station 80+00 – Looking NW Along the River Flow	4
Figure 7: Station 82+50 – Barrowtown Flood box	4

1.0 INSPECTION SUMMARY

Vedder dyke in Abbotsford extends from Keith Wilson Bridge at Station 40+00 (see key map in Appendix A) to Station 85+00 at Quadling Rd. The total length of the dyke in Abbotsford is 4.5KM and it protects approximately 23,500 acres of valuable farmland, homes, highways and numerous other public and private facilities in the Sumas Flood Plain. The Ministry of Environment (MOE) description of this dyke is given in Figure 1.

Abbotsford, City of			
Water Course	Fraser River	Structure Type	Dike
Water Course 2	Vedder River	Ancilliary Works	
GPS Number	2	Structure Length	8.4 km
Dike Name	Vedder	NAD 83 Map Number	92GSE010/020
Region	Lower Mainland	Floodplain Maps	D281 & D660
Owner/Administrator	Abbotsford, City of	UTM Northing	5 441 482.41
Address	32315 South Fraser Way	UTM Easting	565948.08
City	Abbotsford	Service Area	11,331 Ha
Province	BC	Land Use	Rural residential, Commercial, Agricultural, Indus
Postal Code	V2T 1W7	Number of Buildings	3,000+
Contact Person	Ms. Stella Chiu	Infrastructure Protected	Roads;Power etc.
Telephone	604 864-5517	Geographic Feature	Riverine (canal)
Fax	604 853-2219	Type of Flooding	Spring Freshet, Fall/Winter, Rainstorm
		Local Authority under EPA	Abbotsford, City of
		Regulated under DMA	Yes
Notes Service area includes 3,200 acres in USA.			

Figure 1: MOE Description of Vedder Dyke

Dykes:

The yearly inspection of the dyke was carried out in May and Oct 2015. The inspections revealed the dyke is in excellent shape. The fall dyke mowing program was completed by October 5, 2015. There are no other items that require any immediate attention.

Barrowtown Pump Station Flood Boxes:

The flap gates were inspected by the City staff and Phoenix Marine Services. All gates were found to be in a good condition. A copy of the report can be found in Appendix C.

2.0 2013 VEDDER DYKE INSPECTION PHOTOS

2.1 *Dyke Inspection Photos**



Figure 2: Station 40+00 - Looking at Keith Wilson Bridge



Figure 3: Station 60+00 – Looking NW along the River Flow

* Please refer to key map in Appendix 1 for station numbers.



Figure 4: Station 65+00 – Looking NW



Figure 5: Station 70+00 – looking SW against river flow.



Figure 6: Station 80+00 – Looking NW Along the River Flow



Figure 7: Station 82+50 – Barrowtown Flood box

APPENDIX A

Vedder Dyke Key Map

APPENDIX B

MOE Flood Protection Inspection Report

2015 DIKE INSPECTION CHECK LIST

Dike Name (From database)

Vedder
(Vedder Canal)
Chilliwack River
Oct-14/2015

GPS No. (database)

Dike Section

Inspected

Signed

Station 37+44 to 80+00
[Signature]

Please also refer to "Flood Protection Works Inspection Guide" from March 2000 for a detailed guide to dike inspection and reporting, available at:

http://www.env.gov.bc.ca/wsd/public_safety/flood/pdfs_word/fld_prot_insp_gd.pdf

**1. Is there any obstruction, deterioration or damage to dike access?
 (access routes, ramps, and gates)**

YES	NO	N/A
	✓	

Location(s):

Summary of Issues:

Maintenance Recommendations:

When will Recommendations be Completed:

☐ Supplemental Photos & Descriptions Attached – Section 1

2. Is there any deterioration or damage to the following?

YES	NO	N/A
	✓	

- Dike Crest and slopes (ruts, loss of surfacing material, obstructions, slumping, cracking)

Location(s):

Summary of Issues:

Maintenance Recommendations:

When will Recommendations be Completed:

2015 DIKE INSPECTION CHECK LIST

	YES	NO	N/A
<ul style="list-style-type: none"> Bank Protection (loss of rock, settlement, slumping) 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
<ul style="list-style-type: none"> Flood Boxes/Pump stations (inlet/outlet channels, gate operation, trash racks, debris, erosion, corrosion, structure, mechanical components) 		✓	
<p>Location(s): <i>BPS.</i></p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
<ul style="list-style-type: none"> Culverts/Discharge Pipes (breaks, holes, cracks, corrosion, deterioration) 		NO ✓	✓
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			

☐ Supplemental Photos & Descriptions Attached – Section 2

2015 DIKE INSPECTION CHECK LIST

3. Were any of the following serious problems observed? (if yes, please attach a photo or a sketch)

	YES	NO	N/A
<ul style="list-style-type: none"> Seepage (and/or evidence of piping) 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
<ul style="list-style-type: none"> Erosion 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
<ul style="list-style-type: none"> Slumping, cracking, sink holes 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			

2015 DIKE INSPECTION CHECK LIST

	YES	NO	N/A
<ul style="list-style-type: none"> • Animal Damage (beavers, animal burrows, cattle, etc.) 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
<ul style="list-style-type: none"> • Unauthorized construction (excavations, utilities, structures) 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
<ul style="list-style-type: none"> • Channel infilling and aggregation 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			

2015 DIKE INSPECTION CHECK LIST

	YES	NO	N/A
<ul style="list-style-type: none"> • Significant flood levels (within free board) within the last 12 months 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			

☐ Supplemental Photos & Descriptions Attached – Section 3

4. Vegetation Management

<ul style="list-style-type: none"> • Hampers or prevents access? 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
<ul style="list-style-type: none"> • Reduces visibility to each toe? 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			

2015 DIKE INSPECTION CHECK LIST

	YES	NO	N/A
• Trees in or near dike (within 2m from toe) with potential for uprooting?		✓	
Location(s):			
Summary of Issues:			
Maintenance Recommendations:			
When will Recommendations be Completed:			
• Multi-year vegetation management plan in place?	✓		
If not, please discuss how one will be put into place:			

☐ Supplemental Photos & Descriptions Attached – Section 4

Notes on using this Check List:

1. This check list can be used as an outline for your comprehensive report.
2. Use the dike names and GPS Numbers on the provincial database on web page
http://www.env.gov.bc.ca/wsd/public_safety/flood/fhm-2012/safety_dma_approv.html#river
3. When referring to specific locations use:
 - Chainages from the O&M manual drawings,
 - Major landmarks (roads, bridges, etc.),
 - And if possible, GPS coordinates.
 - **Please do not use local property names.**

APPENDIX C

2015 Barrowtown Pump Station – Annual Inspection Report

By Phoenix Marine



Diving Report



City of Abbotsford



Barrowtown Pump Station Annual Inspection

Created by	:	Capt. Andrew Frank Korek, MNI, IIMS
Location	:	Abbotsford, B.C.
Date	:	April 21 st & 22 nd , 2015
Diving Team	:	Phoenix Marine Services Inc.
Diving Supervisor	:	Capt. Andrew Frank Korek, MNI, IIMS
Pages in all	:	11 (eleven)
Enclosures	:	Photos.



Phoenix Marine Services Inc.

Barrowtown Pump Station
Annual Inspection

Ref: MD.1254/AK/15

REPORT CONTENTS

1.0 DIVERS FIRST HAND REPORT

2.0 FACILITY DESCRIPTION

3.0 WORK DESCRIPTION

4.0 ENVIRONMENT

5.0 THE CONDITION

6.0 EQUIPMENT USED

7.0 PERSONNEL

8.0 REMARKS & RECOMMENDATION

Phoenix Marine Services Inc.

3816 Old Clayburn Road, Abbotsford, British Columbia V3G 1H8, Canada

Tel: (604) 287 7874 Fax: (604) 287 7830 E-Mail: phoenixmarine@shaw.ca / www.phoenixmarine.ca



Phoenix Marine Services Inc.

Barrowtown Pump Station Annual Inspection

Ref: MD.1254/AK/15

1.0 DIVERS FIRST HAND REPORT

The diving team from Phoenix Marine Services Inc. did at the request of Messrs. City of Abbotsford, attended in two subsequent visits a captioned facility located at Quadling Road Abbotsford, British Columbia, for the purpose of annual inspection. Prior diving operation safety meeting was held and all planned task were discussed. After safety meeting lockout procedures were carried out.

1.0.1 First attendance

April 21st, 2015

0720 hrs	The Diving team arrived at Barrowtown
0729 hrs	Dive trailer in position; flap gates location
0730 hrs	Commenced site setup
0845 hrs	Setup completed
0900 hrs	Safety meeting
0925 hrs	Lockout procedures carried out
0940 hrs	Commenced diving operation
0953 hrs	Diver #1 in the water
0957 hrs	Commenced clearance measurements at flap gates #1 & #2
1020 hrs	Clearance measurements completed
1022 hrs	Flap gate #1 secured for lifting
1040 hrs	Flap gate #1 lifted and secured for maintenance
1057 hrs	Commenced inspection of tideflex valves
1105 hrs	Inspection completed
1107 hrs	Tightening tideflex valves flange bolts assemblies
1132 hrs	Completed maintenance of flap gate #1
1140 hrs	Commenced lifting gate #2 for maintenance
1158 hrs	Flap gate #1 lifted and secured for maintenance
1204 hrs	commenced inspection of the flap gates #1 & #2
1226 hrs	Completed inspection of the flap gates

Phoenix Marine Services Inc.

3816 Old Clayburn Road, Abbotsford, British Columbia V3G 1H8, Canada
Tel: (604) 287 7874 Fax: (604) 287 7830 E-Mail: phoenixmarine@shaw.ca / www.phoenixmarine.ca



Phoenix Marine Services Inc.

Barrowtown Pump Station Annual Inspection

Ref: MD.1254/AK/15

1129 hrs Completed maintenance of flap gate #2
1230 hrs Flap gate #2 lowered and disconnected
1235 hrs Diver #1 out
1300 hrs Ceased diving operation
1455 hrs The Phoenix team left the job site

1.0.2 Second attendance

April 22nd, 2015

0653 hrs The Diving team arrived on site
0701 hrs Commenced site setup
0757 hrs Completed setup of dive spread
0815 hrs Safety meeting
0820 hrs Lockout procedures carried out
0840 hrs Resumed diving operation
0845 hrs Diver #1 in
0852 hrs Commenced bottom and guides clearing
0900 hrs Guides clear, commencing placing stop locks
0937 hrs Completed stop locks placement
0942 hrs Diver #1 out
0945 hrs Diver #2 in
0948 hrs Commenced inspection of the trashracks and
sediment level assessment
0958 hrs Inspection completed
0959 hrs Diver #2 out
1000 hrs Standing/by for pump bay #2 dewatering
1130 hrs Completed diving operation at the pump station
1205 hrs The Phoenix team left the job site

Phoenix Marine Services Inc.

3816 Old Clayburn Road, Abbotsford, British Columbia V3G 1H8, Canada
Tel: (604) 287 7874 Fax: (604) 287 7830 E-Mail: phoenixmarine@shaw.ca / www.phoenixmarine.ca



Phoenix Marine Services Inc.

Barrowtown Pump Station Annual Inspection

Ref: MD.1254/AK/15

2.0 FACILITY DESCRIPTION

Facility name : **Barrowtown Pump Station**

3.0 WORK DESCRIPTION

- a) Flap gates maintenance at discharge structure
- b) Sealing off pump bay #2

4.0 ENVIRONMENT

Weather : Very good
Wind : 5 m/s
Visibility u/w : 0.10 m
Water temp. : 8° C
Work depth : Max. 5.5 m



Phoenix Marine Services Inc.

3816 Old Clayburn Road, Abbotsford, British Columbia V3G 1H8, Canada
Tel: (604) 287 7874 Fax: (604) 287 7830 E-Mail: phoenixmarine@shaw.ca / www.phoenixmarine.ca



Phoenix Marine Services Inc.

Barrowtown Pump Station Annual Inspection

Ref: MD.1254/AK/15

5.0 THE CONDITION

5.0.1 Flap gates at discharge structure

Divers attended subjected location to conduct following tasks;

- Clearance measurements between locking rings and flap gates
- Flap gate inspection
- Inspection of the adjacent concrete structure
- Connect two flap gates to crane lifting slings
- Inspection of flap gate ring
- Flap gate fit check after re-closure

Inspected items were found in satisfactory working condition (see photos 5.0.1a, b, c & d).

Photo 5.0.1 a



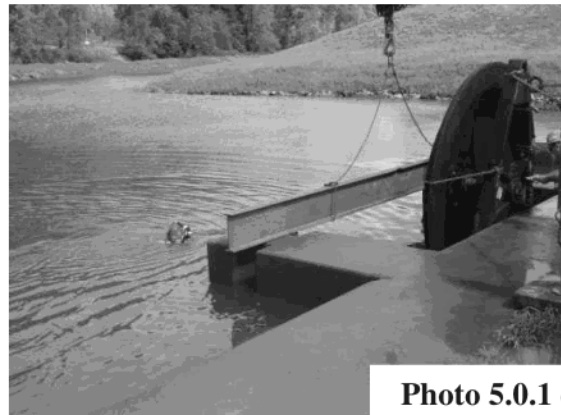
Photo 5.0.1 b



Photo 5.0.1 c



Photo 5.0.1 d



Phoenix Marine Services Inc.

3816 Old Clayburn Road, Abbotsford, British Columbia V3G 1H8, Canada
Tel: (604) 287 7874 Fax: (604) 287 7830 E-Mail: phoenixmarine@shaw.ca / www.phoenixmarine.ca



Phoenix Marine Services Inc.

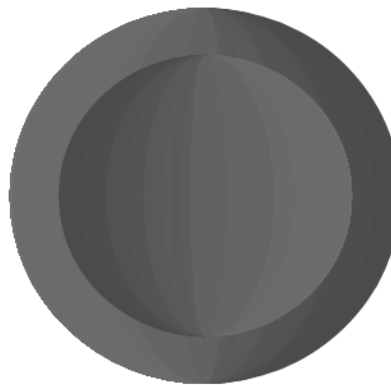
Barrowtown Pump Station Annual Inspection

Ref: MD.1254/AK/15

5.0.1a Clearance measurements were taken between locking rings and the flap gate with feeler gauge and divers reported as follow;

Gate no.1 (West) 38 mm + (gap)

38 mm +



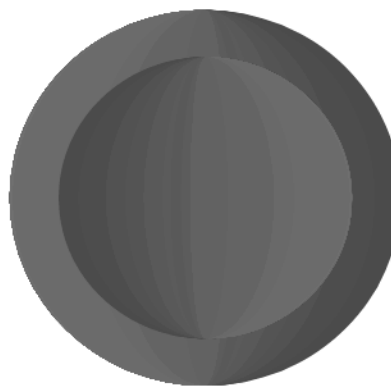
38 mm +

38 mm +

Gate no. 2

1.448 mm

1.020 mm



4.627 mm

2.468 mm

Phoenix Marine Services Inc.

3816 Old Clayburn Road, Abbotsford, British Columbia V3G 1H8, Canada
Tel: (604) 287 7874 Fax: (604) 287 7830 E-Mail: phoenixmarine@shaw.ca / www.phoenixmarine.ca



Phoenix Marine Services Inc.

Barrowtown Pump Station Annual Inspection

Ref: MD.1254/AK/15

5.0.1b Tideflex valve inspection was carried out and divers reported as follow;

- Divers inspected bolted flange assemblies of the *Tideflex* valves installed on gates #3 and #4. All inspected items were reported in satisfactory condition.
- All nuts on the flange assemblies were torque down with hydraulic impact wrench.

5.0.2 Sealing off pump bay #1:

- Divers inspected submerged concrete structure and trash racks. All inspected items were reported in satisfactory condition.
- Slots and guides at the bay #2 were inspected and found free of obstruction and visible mechanical damages.
- Three sections of the stop lock were inserted at the front of the pump compartment. Diver inspected seal tightness between pontoons and at the guides (see photos 5.0.2a, b, c, d & e).



Photo 5.0.2a



Photo 5.0.2b

Phoenix Marine Services Inc.

3816 Old Clayburn Road, Abbotsford, British Columbia V3G 1H8, Canada

Tel: (604) 287 7874 Fax: (604) 287 7830 E-Mail: phoenixmarine@shaw.ca / www.phoenixmarine.ca



Phoenix Marine Services Inc.

Barrowtown Pump Station Annual Inspection

Ref: MD.1254/AK/15



Photo 5.0.2c



Photo 5.0.2d



Photo 5.0.2e

Phoenix Marine Services Inc.

3816 Old Clayburn Road, Abbotsford, British Columbia V3G 1H8, Canada
Tel: (604) 287 7874 Fax: (604) 287 7830 E-Mail: phoenixmarine@shaw.ca / www.phoenixmarine.ca



Phoenix Marine Services Inc.

Barrowtown Pump Station Annual Inspection

Ref: MD.1254/AK/15

6.0 EQUIPMENT USED

During the course of diving operation, following equipment was available:

- ❑ 1 Set of Two Way Diver Communication System
- ❑ 1 Set of Surface Supplied Diving Gear
- ❑ 2 sets of Superlite 27 diving helmets
- ❑ Bailout SCUBA Cylinders
- ❑ CCTV Underwater Video System
- ❑ 2 set of Diving Lights



7.0 PERSONNEL

Diving supervisor	:	Andrew Frank Korek
Diver	:	Jack Ouwehand
Stby. Diver	:	Darren Lambert
Tender	:	Darren Lambert

Phoenix Marine Services Inc.

3816 Old Clayburn Road, Abbotsford, British Columbia V3G 1H8, Canada
Tel: (604) 287 7874 Fax: (604) 287 7830 E-Mail: phoenixmarine@shaw.ca / www.phoenixmarine.ca



Phoenix Marine Services Inc.

Barrowtown Pump Station
Annual Inspection

Ref: MD.1254/AK/15

8.0 REMARKS & RECOMMENDATION

- The captioned facility is kept in impeccable condition. Plant Engineers were able, cooperative and motivated. They were very helpful at all time during the course of diving operations.

This report is presented without prejudice, reserving the right to extend if or where required.

Abbotsford, B.C.
Canada
April 30th, 2015

for **Phoenix Marine Services Inc.**
President
Capt. Andrew Frank Korek, MNI, IIMS
Master Mariner/Marine Surveyor

Phoenix Marine Services Inc.
3816 Old Clayburn Road, Abbotsford, British Columbia V3G 1H8, Canada
Tel: (604) 287 7874 Fax: (604) 287 7830 E-Mail: phoenixmarine@shaw.ca / www.phoenixmarine.ca

2017 MATSQUI DYKE INSPECTION

Prepared By: James Hill

Oct 19, 2017



CITY OF ABBOTSFORD

32315 South Fraser Way,
Abbotsford, BC
V2T 1W7

TABLE OF CONTENT

LIST OF FIGURES	iii
1.0 INSPECTION SUMMARY.....	1
2.0 2017 MATSQUI DYKE INSPECTION PHOTOS	2
2.1 Dyke Inspection Photos	2
2.2 Flood Boxes and Back Flow Valves at Four Pump Stations Photos	14
APPENDIX A.....	19
Matsqui Dyke Key Map.....	19
APPENDIX B	20
2017 Dyke Inspection Checklist	20

LIST OF FIGURES

Figure 1: MFLNRORD Description of Matsqui Dyke	1
Figure 2: Dyke - Station 15+00	2
Figure 3: Dyke - Station 18+50	3
Figure 4: Dyke - Station 22+50	3
Figure 5: Dyke - Station 25+00	4
Figure 6: Dyke - Station 29+00	4
Figure 7: Dyke - Station 30+00	5
Figure 8: Lock Block Wall - Station 32+50	5
Figure 9: Lock Block Section of Dyke - Station 33+50	6
Figure 10: Dyke - Station 40+00	6
Figure 11: Dyke - Station 45+00	7
Figure 12: Dyke - Station 54+00 - Under Abbotsford-Mission Bridge.....	7
Figure 13: Dyke – Station 65+00.....	8
Figure 14: Dyke - Station 75+00	8
Figure 15: Dyke – Station 85+00.....	9
Figure 16: Dyke - Station 90+00	9
Figure 17: Dyke - Station 95+00	10
Figure 18: Dyke - Station 95+00 – One of the Erosion Arcs.....	10
Figure 19: Dyke - Station 100+00	11
Figure 20: Dyke - Station 110+00	11
Figure 23: Dyke – Station 120+00.....	13
Figure 24: McLennan Station Flap Gate - Station 18+50.....	14
Figure 25: McLennan Station Fore Bay - Station 18+50.....	14
Figure 26: McLennan Station Tidal Gates - Station 18+50.....	15
Figure 27: Matsqui Station Fore Bay - Station 34+50.....	15
Figure 28: Matsqui Station Tidal Gates (new seals) - Station 34+50	16
Figure 31: DeJong Pump Station - Station 58+50	17
Figure 32: Vanderloo Pump Station - Station 65+00	17
Figure 33: Vanderloo Pump Station - Tide Flex Valve - Station 65+00	18

1.0 INSPECTION SUMMARY

Matsqui dyke extends from Harris Rd at Station 10+00 (see key map in Appendix A) on the downstream side to Station 125+00 at Page Rd on the upstream side. The total length of the dyke is 11.5km and it protects approximately 11,500 acres of valuable farmland, homes, highways, JAMES Wastewater Treatment Plant (JAMES Plant) and numerous other public and private facilities in the Matsqui Flood Plain. The Ministry of Forests, Lands, Natural Resource Operations and Rural Development (MFLNRORD) description of this dyke is given in Figure 1.

Abbotsford, City of			
Water Course	Fraser River	Structure Type	Dike
Water Course 2		Ancilliary Works	4 Pump Stations: 2 Flood Boxes
GPS Number	1	Structure Length	11.3 km
Dike Name	Matsqui (Abbotsford dike)	NAD 83 Map Number	92G/SE019
Region	Lower Mainland	Floodplain Maps	D281 & D660
Owner/Administrator	Abbotsford, City of	UTM Northing	5 441 201.45
Address	32315 South Fraser Way	UTM Easting	550837.73
City	Abbotsford	Service Area	4,370 Ha
Province	BC	Land Use	Rural residential, Commercial, Agricultural, Indus
Postal Code	V2T 1W7	Number of Buildings	1,000+
Contact Person	Ms. Stella Chiu	Infrastructure Protected	Roads,Power etc.
Telephone	604 864-5517	Geographic Feature	Riverine
Fax	604 853-2219	Type of Flooding	Spring Freshet
		Local Authority under EPA	Abbotsford, City of
		Regulated under DMA	Yes

Figure 1: MFLNRORD Description of Matsqui Dyke

Dykes:

The yearly inspections of the dyke were carried out in May 2017 and Oct 2017. The inspection revealed the dyke is in excellent shape. The vegetation on the dyke was maintained in April and October of this year. There are no other items that require immediate attention.

Flood Boxes:

Flood boxes, pump discharge gates and tidal gates were inspected in May and Oct 2017. The gates were greased and exercised prior to and after the freshet season. All gates were found to be in good condition. Tidal Gates at Matsqui Pump Station had new seals installed. Also Gate #1 was replaced so repair on a gate valve could be done. This gate will be sandblasted, inspected then galvanized before going back into service. There are no other items that require immediate attention.

Bank Erosion:

In December 2015, Erosion Arc F (sixth erosion arc) was discovered and was only 40 m away from the Matsqui Dyke. In March 2016, Provincial funding was received to address the emergency repair. During the work in April 2016, Erosion Arc F expanded downstream (i.e. Erosion Arc F(b)). The repair work of Erosion Arc F(b) was completed in March 2017.

2.0 2017 MATSQUI DYKE INSPECTION PHOTOS

2.1 *Dyke Inspection Photos*^{*}



Figure 2: Dyke - Station 15+00

^{*} Please refer to Key Map in Appendix 1 for station numbers.



Figure 3: Dyke - Station 18+50



Figure 4: Dyke - Station 22+50



Figure 5: Dyke - Station 25+00



Figure 6: Dyke - Station 29+00



Figure 7: Dyke - Station 30+00



Figure 8: Lock Block Wall - Station 32+50



Figure 9: Lock Block Section of Dyke - Station 33+50



Figure 10: Dyke - Station 40+00



Figure 11: Dyke - Station 45+00



Figure 12: Dyke - Station 54+00 - Under Abbotsford-Mission Bridge



Figure 13: Dyke – Station 65+00



Figure 14: Dyke - Station 75+00



Figure 15: Dyke – Station 85+00



Figure 16: Dyke - Station 90+00



Figure 17: Dyke - Station 95+00



Figure 18: Dyke - Station 95+00 – One of the Erosion Arcs



Figure 19: Dyke - Station 100+00



Figure 20: Dyke - Station 110+00



Figure 21: Dyke - Station 110+00 – One of the Erosion Arcs



Figure 22: Dyke - Station 115+00



Figure 213: Dyke – Station 120+00

2.2 Flood Boxes and Back Flow Valves at Four Pump Stations Photos



Figure 224: McLennan Station Flap Gate - Station 18+50



Figure 235: McLennan Station Fore Bay - Station 18+50



Figure 246: McLennan Station Tidal Gates - Station 18+50



Figure 257: Matsqui Station Fore Bay - Station 34+50

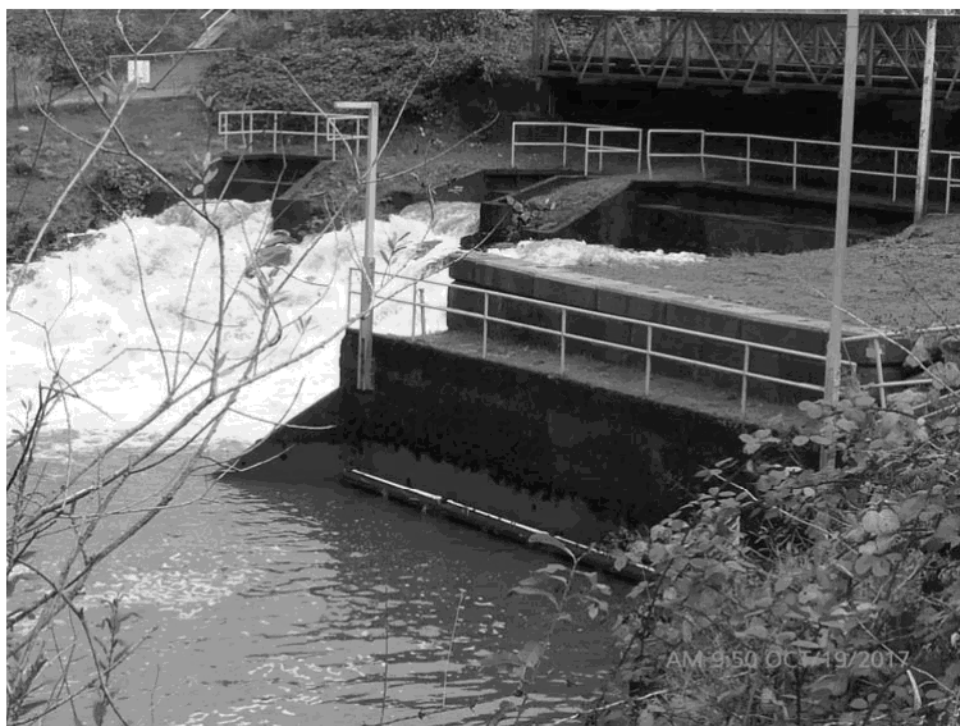


Figure 268: Matsqui Station Tidal Gates (new seals) - Station 34+50



Figure 29: Matsqui Station Flap Gates - Station 34+50



Figure 271: DeJong Pump Station - Station 58+50



Figure 282: Vanderloo Pump Station - Station 65+00

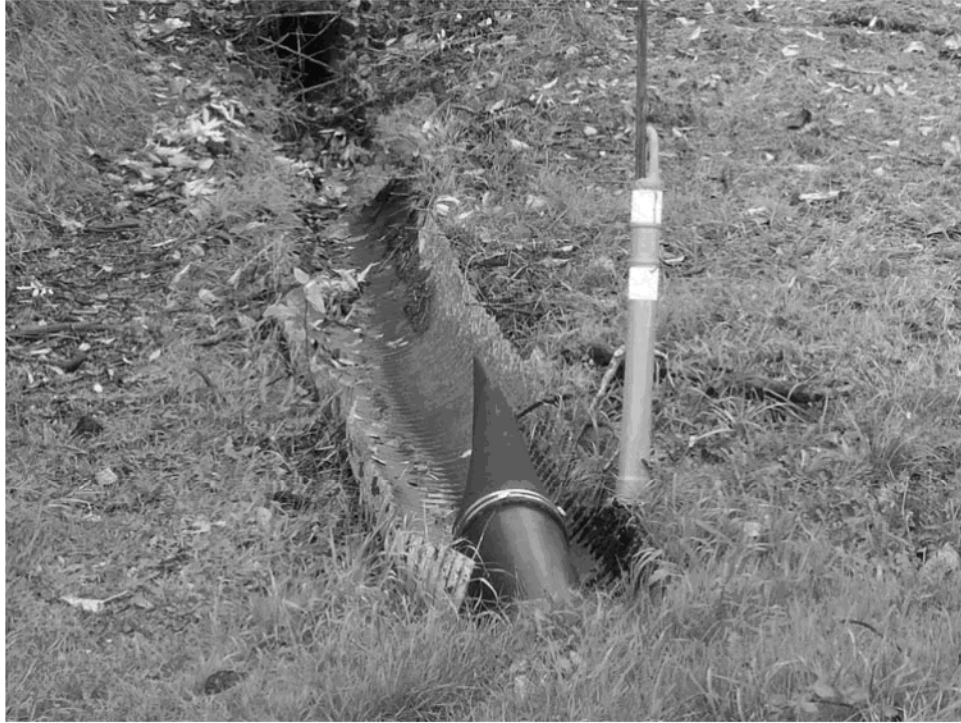


Figure 293: Vanderloo Pump Station - Tide Flex Valve - Station 65+00

APPENDIX A

Matsqui Dyke Key Map



MATSQUI DYKE
SOUTHERN RAILWAY OF BC TO PAGE PIT
KEYPLAN

OWN BY:	WD	DATE:	2009 12 01
SCALE:	1 : 25,000	REV:	
PAGE:	2 OF 13		

D-982

\\PDR\RAINAGE\0982.dwg

APPENDIX B

2017 Dyke Inspection Checklist

2017 DIKE INSPECTION CHECKLIST

Dike GPS No. (From database): <u>1</u>	Dike Name (From database): <u>MATSQUI</u>
Diking Authority:	Local Authority under EPA: <u>ABBOTSFORD CITY OF</u>
Water Course: <u>FRASER RIVER</u>	Dike Section:
Date Inspected: <u>Oct-19 / 2017</u>	Signed: <u>[Signature]</u>

Attach this checklist to your comprehensive report as an appendix. Please also refer to "Flood Protection Works Inspection Guide" (2000) for a detailed guide to dike inspection and reporting:

http://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/integrated-flood-hazard-mgmt/fld_prot_insp_gd.pdf

1. Is there any obstruction, deterioration or damage to dike access?
(access routes, ramps, and gates)

YES	NO <input checked="" type="checkbox"/>	N/A
-----	--	-----

Location(s):	
Summary of Issues:	
Maintenance Recommendations:	
When will Recommendations be Completed:	

2017 DIKE INSPECTION CHECKLIST

2. Is there any deterioration or damage to the following?

	YES	NO	N/A
<ul style="list-style-type: none"> • Dike Crest and slopes (ruts, loss of surfacing material, obstructions, slumping, cracking) 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
<ul style="list-style-type: none"> • Bank Protection (loss of rock, settlement, slumping) 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
<ul style="list-style-type: none"> • Flood Boxes/Pump stations (inlet/outlet channels, gate operation, trash racks, debris, erosion, corrosion, structure, mechanical components) 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			

2017 DIKE INSPECTION CHECKLIST

	YES	NO	N/A
• Culverts/Discharge Pipes (breaks, holes, cracks, corrosion, deterioration)		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
<input type="checkbox"/> Supplemental Photos & Descriptions Attached – Section 2			
3. Were any of the following serious problems observed? (if yes, please attach a photo or a sketch)	YES	NO	N/A
• Seepage (and/or evidence of piping)		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
• Erosion		✓	
<p>Location(s):</p> <p style="text-align: center; font-style: italic;">No new erosion areas at the time of inspection</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			

2017 DIKE INSPECTION CHECKLIST

	YES	NO	N/A
<ul style="list-style-type: none"> Slumping, cracking, sink holes 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
<ul style="list-style-type: none"> Animal Damage (beavers, animal burrows, cattle, etc.) 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
<ul style="list-style-type: none"> Unauthorized construction (excavations, utilities, structures) 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			

2017 DIKE INSPECTION CHECKLIST

	YES	NO	N/A
<ul style="list-style-type: none"> Channel infilling and aggregation 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
<ul style="list-style-type: none"> Significant flood levels (within free board) within the last 12 months 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			

☐ Supplemental Photos & Descriptions Attached – Section 3

4. Vegetation Management

	YES	NO	N/A
<ul style="list-style-type: none"> Hampers or prevents access? 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			

2017 DIKE INSPECTION CHECKLIST

	YES	NO	N/A
• Reduces visibility to each toe?		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
• Trees in or near dike (within 2m from toe) with potential for uprooting?		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
• Multi-year vegetation management plan in place?		✓	
<p>If not, please discuss how one will be put into place:</p>			

☐ Supplemental Photos & Descriptions Attached – Section 4

Notes on using this checklist:

1. **Submission of this checklist alone does not fulfill the requirement of the submission of a comprehensive inspection report.** Requirements for reporting are listed on the Annual Dike Inspection Letter.
2. Please include this checklist as an appendix to the comprehensive report.

2017 DIKE INSPECTION CHECKLIST

3. Use the dike names and GPS Numbers on the provincial database on web page:

http://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/integrated-flood-hazard-mgmt/dikes_listed_by_ownerauthority.pdf

4. When referring to specific locations please use:

- Chainages from the O&M manual drawings,
- Major landmarks (roads, bridges, etc.),
- and GPS coordinates (where possible).
- Do not use local property names.

2017 SUMAS DYKE INSPECTION

Prepared By: James Hill

October 26, 2017



CITY OF ABBOTSFORD

32315 South Fraser Way,
Abbotsford, BC
V2T 1W7

TABLE OF CONTENTS

LIST OF FIGURES	iii
1.0 INSPECTION SUMMARY.....	1
2.0 2017 SUMAS DYKE INSPECTION PHOTOS.....	2
2.1 Dyke Inspection Photos	2
APPENDIX A.....	8
Sumas Dyke Key Map	8
APPENDIX B	9
2017 Dyke Inspection Checklist	9

LIST OF FIGURES

Figure 1: MFLNRORD Description of Sumas Dyke	1
Figure 2: Station 160+00 – Looking South West	2
Figure 3: Station 150+00 – Looking South West	2
Figure 4: Station 140+00 – Looking South West	3
Figure 5: Station 130+00 – Looking South West	3
Figure 6: Station 120+00 – Looking West.....	6
Figure 7: Station 110+00 - Looking West	7
Figure 8: Station 100+00 - Looking West	7
Figure 9: Station 85+00 – Looking South West	5
Figure 10: Station 70+00 – Looking South West	6
Figure 11: Station 65+00 – Looking South West	6
Figure 12: Station 50+00 – Looking South West	7
Figure 13: Station 40+00 – Looking South East.....	7

1.0 INSPECTION SUMMARY

Sumas dyke extends from Vye Rd at Station 10+00 (see key map in Appendix A) on the upstream side to Station 177+00 at Quadling Rd on the downstream side. The total length of the dyke is 16.85KM and it protects approximately 23,500 acres of valuable farmland, homes, highways and numerous other public and private facilities in the Sumas Flood Plain. The Ministry of Forests, Lands, Natural Resource Operations and Rural Development (MFLNRORD) description of this dyke is given in Figure 1.

Abbotsford, City of			
Water Course	Sumas River	Structure Type	Dike
Water Course 2	Fraser River	Ancilliary Works	3 Flood Box Valves
GPS Number	3	Structure Length	16.8 km
Dike Name	Sumas Lake Reclamation	NAD 83 Map Number	92GSE010/020
Region	Lower Mainland	Floodplain Maps	D480/D217 & D281
Owner/Administrator	Abbotsford, City of	UTM Northing	5 433 976.89
Address	32315 South Fraser Way	UTM Easting	559 887.48
City	Abbotsford	Service Area	9,227 Ha
Province	BC	Land Use	Rural residential, Commercial, Agricultural, Indus
Postal Code	V2T 1W7	Number of Buildings	2,000+
Contact Person	Ms. Stella Chiu	Infrastructure Protected	Roads;Power etc.
Telephone	604 864-5517	Geographic Feature	Riverine
Fax	604 853-2219	Type of Flooding	Spring Freshet, Fall/Winter, Rainstorm
		Local Authority under EPA	Abbotsford, City of
		Regulated under DMA	Yes

Figure 1: MFLNRORD Description of Sumas Dyke

The yearly inspections of the dyke were carried out in May 2017 and Oct 2017. The inspection revealed the dyke is in excellent shape. The dyke mowing will be completed by October 31, 2017. There are no other items that require immediate attention.

A summary of inspection of the flood boxes at the Barrowtown Pump Station is included in the 2017 Vedder Dyke Inspection Report.

2.0 2017 SUMAS DYKE INSPECTION PHOTOS

2.1 Dyke Inspection Photos*



Figure 2: Station 160+00 – Looking West



Figure 3: Station 150+00 – Looking Southwest

* Please refer to key map in Appendix A.



Figure 4: Station 140+00 – Looking Southwest



Figure 5: Station 130+00 – Looking Southwest



Figure 6: Station 120+00 – Looking West



Figure 7: Station 110+00 Looking West



Figure 8: Station 100+00 Looking West



Figure 9: Station 85+00 Looking Southwest



Figure 10: Station 70+00 Looking Southwest



Figure 11: Station 65+00 – Looking Southwest



Figure 12: Station 50+00 Looking Southwest



Figure 13: Station 40+00 - Looking Southeast

APPENDIX A

Sumas Dyke Key Map



OWN BY: WD	DATE: 2009 11 19
SCALE: 1 : 50,000	REV:
PAGE: 2 OF 10	



☐ SUMAS RIVER DYKE STATION YVE RD TO BARROWTOWN PUMP KEYPLAN

\\DRAINAGE\0981.dwg

APPENDIX B

2017 Dyke Inspection Checklist

2017 DIKE INSPECTION CHECKLIST

Dike GPS No. (From database): <u>3</u>	Dike Name (From database): <u>Sumas.</u>
Diking Authority:	Local Authority under EPA: <u>Abbotsford, city of</u>
Water Course: <u>Sumas River, Saar Creek.</u>	Dike Section:
Date Inspected: <u>Oct. 24/2017</u>	Signed: <u>[Signature]</u>

Attach this checklist to your comprehensive report as an appendix. Please also refer to "Flood Protection Works Inspection Guide" (2000) for a detailed guide to dike inspection and reporting:

http://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/integrated-flood-hazard-mgmt/fld_prot_insp_qd.pdf

**1. Is there any obstruction, deterioration or damage to dike access?
(access routes, ramps, and gates)**

YES	NO <input checked="" type="checkbox"/>	N/A
-----	--	-----

Location(s):

Summary of Issues:

Maintenance Recommendations:

When will Recommendations be Completed:

2017 DIKE INSPECTION CHECKLIST

2. Is there any deterioration or damage to the following?

	YES	NO	N/A
<ul style="list-style-type: none"> • Dike Crest and slopes (ruts, loss of surfacing material, obstructions, slumping, cracking) 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
<ul style="list-style-type: none"> • Bank Protection (loss of rock, settlement, slumping) 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
<ul style="list-style-type: none"> • Flood Boxes/Pump stations (inlet/outlet channels, gate operation, trash racks, debris, erosion, corrosion, structure, mechanical components) 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			

2017 DIKE INSPECTION CHECKLIST

	YES	NO	N/A
• Culverts/Discharge Pipes (breaks, holes, cracks, corrosion, deterioration)		✓	
Location(s):			
Summary of Issues:			
Maintenance Recommendations:			
When will Recommendations be Completed:			

☐ Supplemental Photos & Descriptions Attached – Section 2

	YES	NO	N/A
3. Were any of the following serious problems observed? (if yes, please attach a photo or a sketch)			
• Seepage (and/or evidence of piping)		✓	
Location(s):			
Summary of Issues:			
Maintenance Recommendations:			
When will Recommendations be Completed:			
• Erosion		✓	
Location(s):			
Summary of Issues:			
Maintenance Recommendations:			
When will Recommendations be Completed:			

2017 DIKE INSPECTION CHECKLIST

	YES	NO	N/A
<ul style="list-style-type: none"> • Slumping, cracking, sink holes 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
<ul style="list-style-type: none"> • Animal Damage (beavers, animal burrows, cattle, etc.) 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
<ul style="list-style-type: none"> • Unauthorized construction (excavations, utilities, structures) 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			

2017 DIKE INSPECTION CHECKLIST

	YES	NO	N/A
• Channel infilling and aggregation		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
• Significant flood levels (within free board) within the last 12 months		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			

☐ Supplemental Photos & Descriptions Attached – Section 3

4. Vegetation Management

	YES	NO	N/A
• Hampers or prevents access?		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			

2017 DIKE INSPECTION CHECKLIST

	YES	NO	N/A
• Reduces visibility to each toe?		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
• Trees in or near dike (within 2m from toe) with potential for uprooting?		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
• Multi-year vegetation management plan in place?		✓	
<p>If not, please discuss how one will be put into place:</p>			

☐ Supplemental Photos & Descriptions Attached – Section 4

Notes on using this checklist:

1. **Submission of this checklist alone does not fulfill the requirement of the submission of a comprehensive inspection report.** Requirements for reporting are listed on the Annual Dike Inspection Letter.
2. Please include this checklist as an appendix to the comprehensive report.

2017 DIKE INSPECTION CHECKLIST

3. Use the dike names and GPS Numbers on the provincial database on web page:

http://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/integrated-flood-hazard-mgmt/dikes_listed_by_ownerauthority.pdf

4. When referring to specific locations please use:

- Chainages from the O&M manual drawings,
- Major landmarks (roads, bridges, etc.),
- and GPS coordinates (where possible).
- Do not use local property names.

2017 VEDDER DYKE INSPECTION

Prepared By: James Hill

October 26, 2017



CITY OF ABBOTSFORD

32315 South Fraser Way,
Abbotsford, BC
V2T 1W7

TABLE OF CONTENTS

LIST OF FIGURES	iii
1.0 INSPECTION SUMMARY	1
2.0 2017 VEDDER DYKE INSPECTION PHOTOS	2
2.1 Dyke Inspection Photos	2
APPENDIX A.....	5
Vedder Dyke Key Map	5
APPENDIX B	6
2017 Dyke Inspection Checklist	6
APPENDIX C	7
2017 Barrowtown Pump Station – Annual Inspection Report.....	7

LIST OF FIGURES

Figure 1: MFLNRORD Description of Vedder Dyke	1
Figure 2: Station 40+00 - Looking at Keith Wilson Bridge	2
Figure 3: Station 60+00 – Looking NW along the River Flow	2
Figure 4: Station 65+00 – Looking NW	3
Figure 5: Station 70+00 – looking SW against river flow.	3
Figure 6: Station 80+00 – Looking NW Along the River Flow	4
Figure 7: Station 82+50 – Barrowtown Flood box	4

1.0 INSPECTION SUMMARY

Vedder dyke in Abbotsford extends from Keith Wilson Bridge at Station 40+00 (see key map in Appendix A) to Station 85+00 at Quadling Rd. The total length of the dyke in Abbotsford is 4.5KM and it protects approximately 23,500 acres of valuable farmland, homes, highways and numerous other public and private facilities in the Sumas Flood Plain. The Ministry of Forests, Lands, Natural Resource Operations and Rural Development (MFLNRORD) description of this dyke is given in Figure 1.

Abbotsford, City of			
Water Course	Fraser River	Structure Type	Dike
Water Course 2	Vedder River	Ancilliary Works	
GPS Number	2	Structure Length	8.4 km
Dike Name	Vedder	NAD 83 Map Number	92GSE010/020
Region	Lower Mainland	Floodplain Maps	D281 & D660
Owner/Administrator	Abbotsford, City of	UTM Northing	5 441 482.41
Address	32315 South Fraser Way	UTM Easting	565948.08
City	Abbotsford	Service Area	11,331 Ha
Province	BC	Land Use	Rural residential, Commercial, Agricultural, Indus
Postal Code	V2T 1W7	Number of Buildings	3,000+
Contact Person	Ms. Stella Chiu	Infrastructure Protected	Roads;Power etc.
Telephone	604 864-5517	Geographic Feature	Riverine (canal)
Fax	604 853-2219	Type of Flooding	Spring Freshet, Fall/Winter, Rainstorm
		Local Authority under EPA	Abbotsford, City of
		Regulated under DMA	Yes
Notes Service area includes 3,200 acres in USA.			

Figure 1: MFLNRORD Description of Vedder Dyke

Dykes:

The yearly inspection of the dyke was carried out in May and Oct 2017. The inspections revealed the dyke is in excellent shape. The fall dyke mowing program was completed by October 24, 2017. There are no other items that require any immediate attention.

Flood Boxes:

The flap gates were inspected by the City staff and Can-Dive Construction Ltd. All gates except #4 tide flex were found to in a good condition. We replaced #4 tide flex with a spare gate valve. A copy of the report can be found in Appendix C.

2.0 2017 VEDDER DYKE INSPECTION PHOTOS

2.1 *Dyke Inspection Photos**



Figure 2: Station 40+00 - Looking at Keith Wilson Bridge



Figure 3: Station 60+00 – Looking NW along the River Flow

* Please refer to key map in Appendix 1 for station numbers.



Figure 4: Station 65+00 – Looking NW



Figure 5: Station 70+00 – looking SW against river flow.



Figure 6: Station 80+00 – Looking NW Along the River Flow



Figure 7: Station 82+50 – Barrowtown Flood box

APPENDIX A

Vedder Dyke Key Map



DWN BY: WD
SCALE: 1 : 15,000
PAGE: 2 OF 7

DATE: 2009 11 30
REV:

D-980

Q VEDDER CANAL DYKE
BARROWTOWN PUMP STATION TO CHILLIWACK BOUNDARY
KEYPLAN

\\DRAINAGE\0980.dwg

APPENDIX B

2017 Dyke Inspection Checklist

2017 DIKE INSPECTION CHECKLIST

Dike GPS No. (From database): <u>2.</u>	Dike Name (From database): <u>Vedder</u>
Diking Authority:	Local Authority under EPA: <u>City of Abbotsford</u>
Water Course: <u>Chilliwack River.</u>	Dike Section:
Date Inspected: <u>Oct. 26/2017.</u>	Signed: <u>[Signature]</u>

Attach this checklist to your comprehensive report as an appendix. Please also refer to "Flood Protection Works Inspection Guide" (2000) for a detailed guide to dike inspection and reporting:

http://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/integrated-flood-hazard-mgmt/fld_prot_insp_gd.pdf

**1. Is there any obstruction, deterioration or damage to dike access?
(access routes, ramps, and gates)**

YES	NO <input checked="" type="checkbox"/>	N/A
-----	--	-----

Location(s):

Summary of Issues:

Maintenance Recommendations:

When will Recommendations be Completed:

2017 DIKE INSPECTION CHECKLIST

2. Is there any deterioration or damage to the following?

	YES	NO	N/A
<ul style="list-style-type: none"> • Dike Crest and slopes (ruts, loss of surfacing material, obstructions, slumping, cracking) 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
<ul style="list-style-type: none"> • Bank Protection (loss of rock, settlement, slumping) 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
<ul style="list-style-type: none"> • Flood Boxes/Pump stations (inlet/outlet channels, gate operation, trash racks, debris, erosion, corrosion, structure, mechanical components) 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			

2017 DIKE INSPECTION CHECKLIST

	YES	NO	N/A
• Culverts/Discharge Pipes (breaks, holes, cracks, corrosion, deterioration)		✓	
Location(s):			
Summary of Issues:			
Maintenance Recommendations:			
When will Recommendations be Completed:			

☐ Supplemental Photos & Descriptions Attached – Section 2

	YES	NO	N/A
3. Were any of the following serious problems observed? (if yes, please attach a photo or a sketch)			
• Seepage (and/or evidence of piping)		✓	
Location(s):			
Summary of Issues:			
Maintenance Recommendations:			
When will Recommendations be Completed:			
• Erosion		✓	
Location(s):			
Summary of Issues:			
Maintenance Recommendations:			
When will Recommendations be Completed:			

2017 DIKE INSPECTION CHECKLIST

	YES	NO	N/A
<ul style="list-style-type: none"> Slumping, cracking, sink holes 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
<ul style="list-style-type: none"> Animal Damage (beavers, animal burrows, cattle, etc.) 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
<ul style="list-style-type: none"> Unauthorized construction (excavations, utilities, structures) 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			

2017 DIKE INSPECTION CHECKLIST

	YES	NO	N/A
<ul style="list-style-type: none"> Channel infilling and aggregation 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
<ul style="list-style-type: none"> Significant flood levels (within free board) within the last 12 months 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			

☐ Supplemental Photos & Descriptions Attached – Section 3

4. Vegetation Management

	YES	NO	N/A
<ul style="list-style-type: none"> Hampers or prevents access? 		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			

2017 DIKE INSPECTION CHECKLIST

	YES	NO	N/A
• Reduces visibility to each toe?		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
• Trees in or near dike (within 2m from toe) with potential for uprooting?		✓	
<p>Location(s):</p> <p>Summary of Issues:</p> <p>Maintenance Recommendations:</p> <p>When will Recommendations be Completed:</p>			
• Multi-year vegetation management plan in place?		✓	
<p>If not, please discuss how one will be put into place:</p>			

☐ Supplemental Photos & Descriptions Attached – Section 4

Notes on using this checklist:

1. **Submission of this checklist alone does not fulfill the requirement of the submission of a comprehensive inspection report.** Requirements for reporting are listed on the Annual Dike Inspection Letter.
2. Please include this checklist as an appendix to the comprehensive report.

2017 DIKE INSPECTION CHECKLIST

3. Use the dike names and GPS Numbers on the provincial database on web page:

http://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/integrated-flood-hazard-mgmt/dikes_listed_by_ownerauthority.pdf

4. When referring to specific locations please use:
- Chainages from the O&M manual drawings,
 - Major landmarks (roads, bridges, etc.),
 - and GPS coordinates (where possible).
 - Do not use local property names.

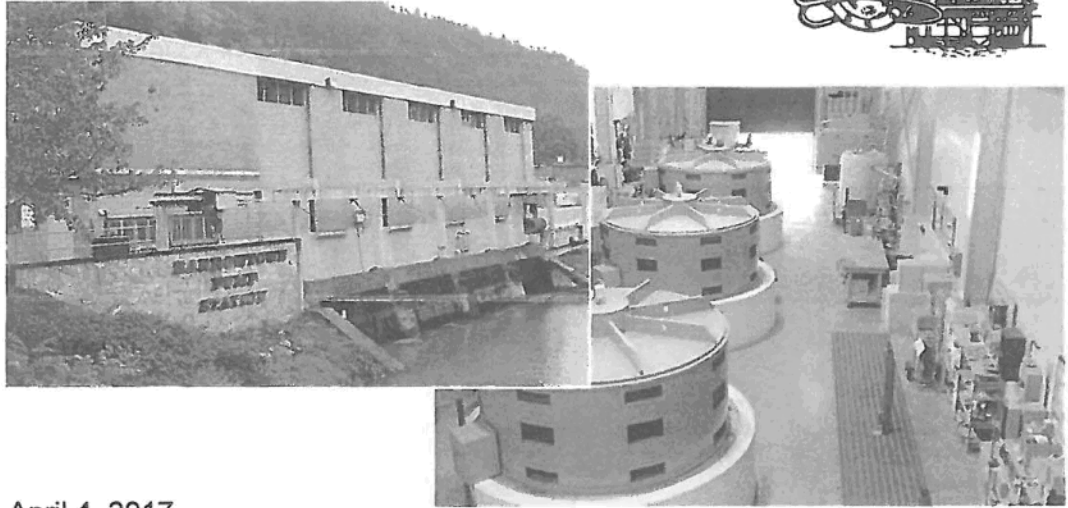
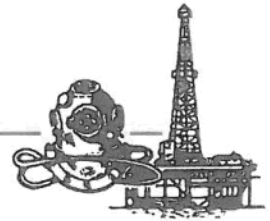
APPENDIX C

2017 Barrowtown Pump Station – Annual Inspection Report

By Can-Dive Construction Ltd.

CAN-DIVE CONSTRUCTION LTD.

Underwater Innovators Since 1966



April 4, 2017

Aron Kerwer, Diving Supervisor
CAN-DIVE Construction Ltd.
216 East Esplanade
North Vancouver B.C.
Canada V7L 1A3

Office 604.984.9131
Mobile 778.837.7800
Fax 604.984.9138

Attention: Mr. James Hill,
City of Abbotsford - Dyking, Drainage and Irrigation
Regarding: Barrowtown Pump Station Diving Inspection

Dear Mr. Hill

On Tuesday March 28th, 2017, CAN-DIVE completed the annual underwater inspection of the downstream Flap Gates and *Tideflex* valves.

Subsequently, on Wednesday March 29th, CAN-DIVE assisted in the placement of stop logs at intake #4, as well as the annual inspection of the exterior trash racks.

Generally our work days were between the hours of 8am - 4:30pm.

To keep costs as low as possible, we proposed to utilize city resources as much as possible in the way of labour. This worked out very well and all crew members from both sides worked well together in completing this project.

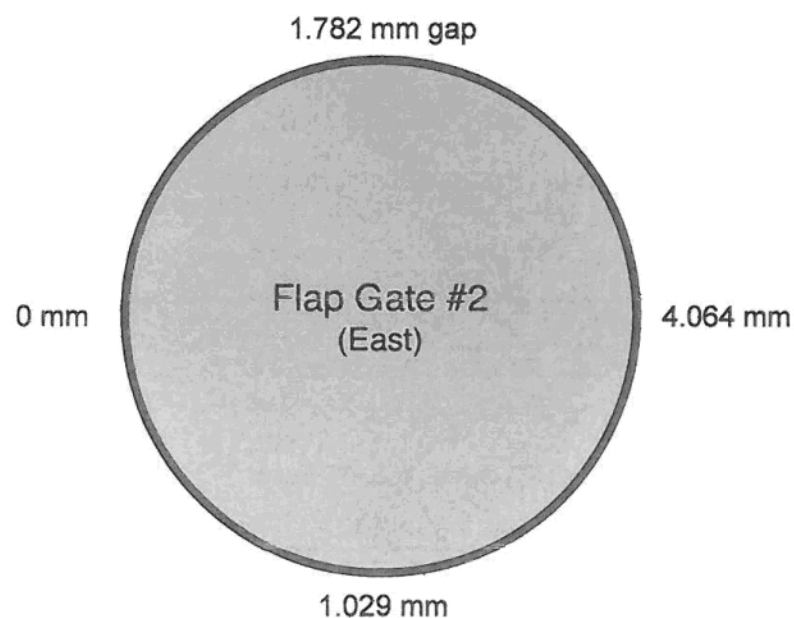
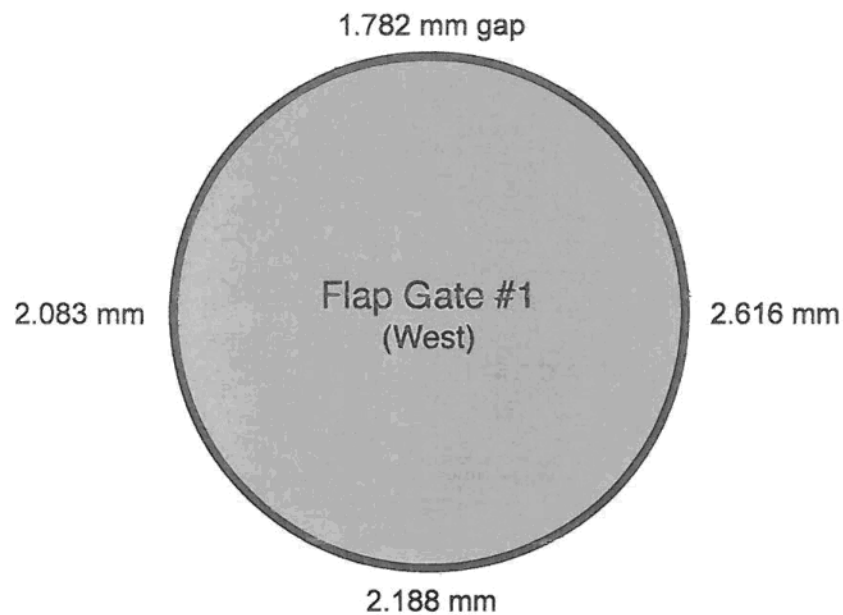
Our 3 man dive crew consisted of:

Aron Kerwer - Diving Supervisor
Mark Kunitzky - Diver
Antoine Lacroix - Diver

The following summarizes the inspection findings:

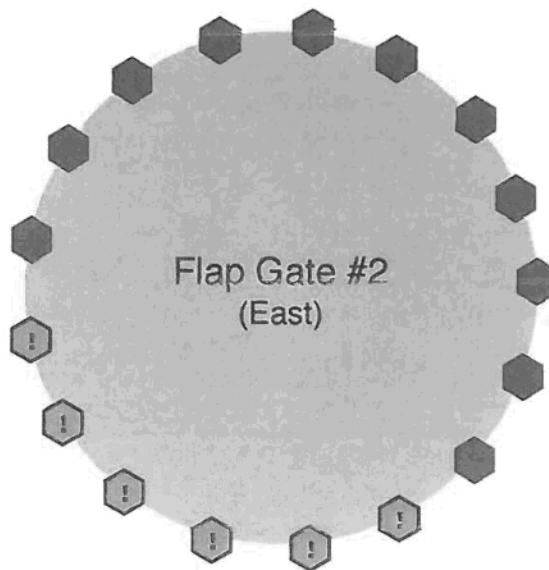
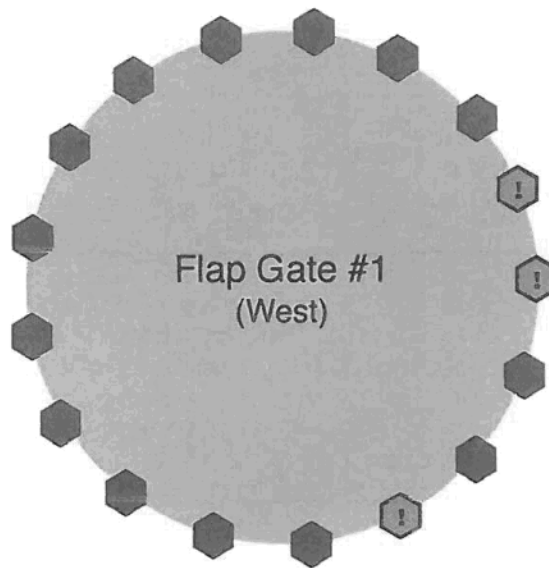
1.0 Flap Gate Inspection (see ref.1-4)

In general, all areas of the water discharge structure appear to be in good condition. Visibility was fair at this location, limited to 6-8 inches. The concrete apron and wing walls were found to be in good condition and free of debris or obstructions. Gap measurements along the sealing face of Flap Gate #4 and #3 were taken at the 12-3-6-9 O'clock positions with the biggest gap found being the one reported. The following diagrams illustrate our findings.



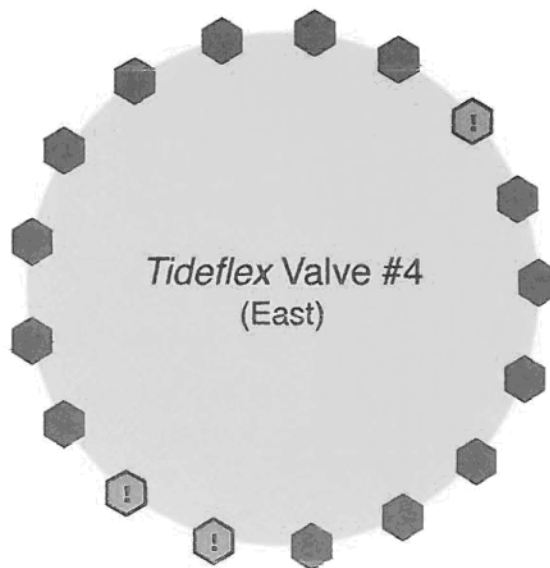
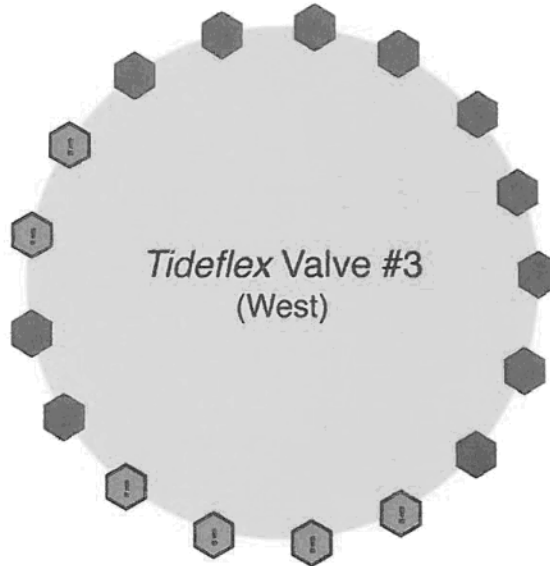
1.1 Flap Gate Nut Tightening (see ref.1-4)

Some of the nuts securing the gate were found finger-loose prior to torquing with our hydraulic impact gun. A total of 17 bolts/nuts secure each gate thimble to the wall (see ref.9). The following diagrams illustrates the location and number of loose nuts on the two Flap Gates.



1.2 *Tideflex* Valve Inspection/Tightening (see ref.9)

Some of the nuts securing the *Tideflex* Valves were found finger-loose prior to torquing with our hydraulic impact gun (see ref.9). Some of the nuts were torqued by hand using a one inch drive ratchet. A total of 17 bolts/nuts secure each *Tideflex* Valve to the wall. The following diagrams illustrates the location and number of loose nuts on the two *Tideflex* Valves.



1.3 Conclusion & Recommendations

Once City crews completed the topside adjustments and inspection of the Flap Gates, the Gates were lowered back into place. The diver disconnected the rigging and once again inspected the Gate for proper fitment. Both Gates were replaced successfully.

As a visiting contractor, we were impressed with the ongoing improvements being made to the facilities at Barrowtown Pump Station, especially in regards to safety and efficiency.

Our only recommendation at this point would be to upgrade the hardware securing the Flap Gates and *Tideflex* Valves. During our inspection, we found there to be adequate thread remaining on the embedded wall studs to add lock-washers to prevent the nuts from becoming loose in the future (see ref.9).

2.0 Trash Rack Inspection (see ref.5-6)

Visibility in water was very poor on the upstream side of the pump station. All underwater inspections were mainly done by feel.

In general, all areas of the trash rack were found relatively clear of debris. What little debris there was found (in the form of sticks, grass and muck), it was mostly localized adjacent to the wing walls on #1 and #4 intakes.

#1 Intake Trash Rack

6 to 8 inches of debris found along the wing wall. Bare concrete sill and apron for the remainder.

#2 Intake Trash Rack

Bare concrete sill and apron all along.

#3 Intake Trash Rack

Bare concrete sill and apron all along.

#4 Intake Trash Rack

12 inches of debris found along the wing wall. Bare concrete sill and apron for the remainder.

All trash rack bars or cross members were found in good condition and free of damage. All connection and hardware was found tight and in good condition. All concrete piers and sills were found in good condition, free of spalling, delamination and large cracks .

2.1 Stop Log Slot inspection & Placement (see ref.7-8)

The inspection was carried out in bay #4 and the slot was found in excellent condition, free of debris and very little surface corrosion on the embedded sealing plate. The metal sealing plate was found to extend down and up both vertical gains and across the bottom sill plate.

After placement of all three stop log sections, the diver inspected the seal and ensured the lifting chains did not interfere with the seal.

2.2 Conclusion & Recommendations

We do not have any recommendations for the trash rack and stop log portion of the project at this time.

It has been our pleasure working with the City of Abbotsford. I trust this information will meet with your approval. Thank you for allowing CAN-DIVE the opportunity to assist you with this project. Should you have any questions, or require further information, please do not hesitate to contact myself.

Best Regards,

A handwritten signature in black ink, consisting of a stylized 'A' followed by a horizontal line and a flourish.

Aron Kerwer
CAN-DIVE CONSTRUCTION LTD.

3.0 Reference Photos

Ref.1

Diver inspection Flap Gates and rigging crane to gate frame.



Ref. 2

City crew opening Flap Gate in preparation for hoisting.



Ref.3

Number 1 Flap Gate being hoisted to its secure position in preparation for inspection.



Ref.4

Securing Flap Gate to truck and bulkhead.



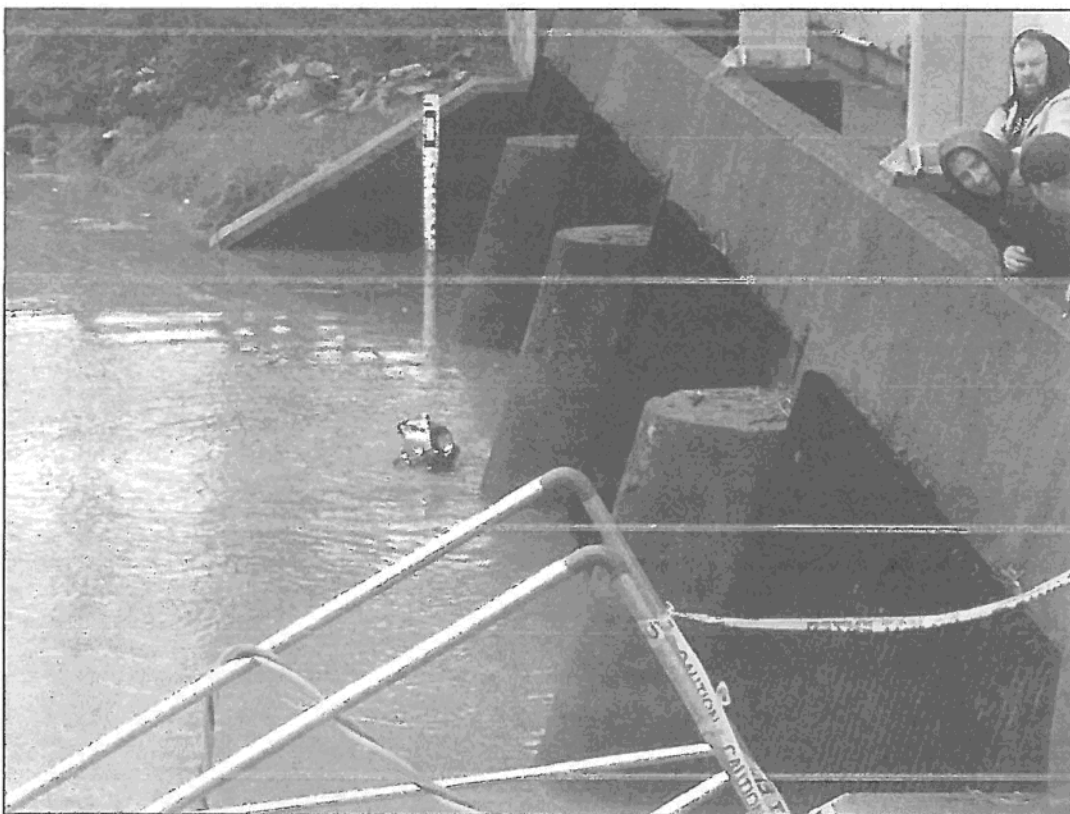
Ref.5

Diver entering water in preparation for Trash Rack inspections.

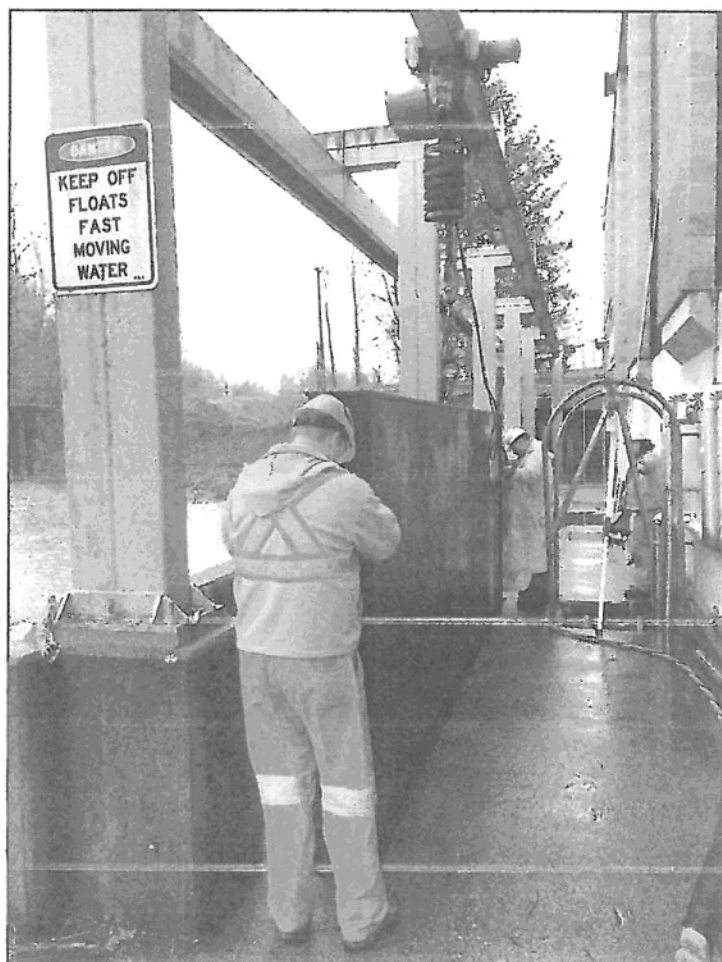


Ref.6

Diver inspecting Trash Racks.



Ref.7
Diver entering #4 pump bay for
stop log inspection.



Ref.8
One of three stop log sections
being lowered in place. Diver
waits by ladder until stop log
lands on bottom.

Ref.9

Close up underwater image of a typical nut fastener showing the available thread for lock washer installation.

