City of Winnipeg
Streets and Transportation Department
Bridge Engineering Division

Flood '97 Monitoring
Riverbed Soundings

SCOUR INVESTIGATION

97-42

City of Winnipeg
Streets and Transportation Department
Bridge Engineering Division

Flood '97 Monitoring
Riverbed Soundings

SCOUR INVESTIGATION

OCTOBER 1997

WARDROP ENGINEERING INC.

970007-07-00

DRAWING INDEX

REVISED 97.11.17

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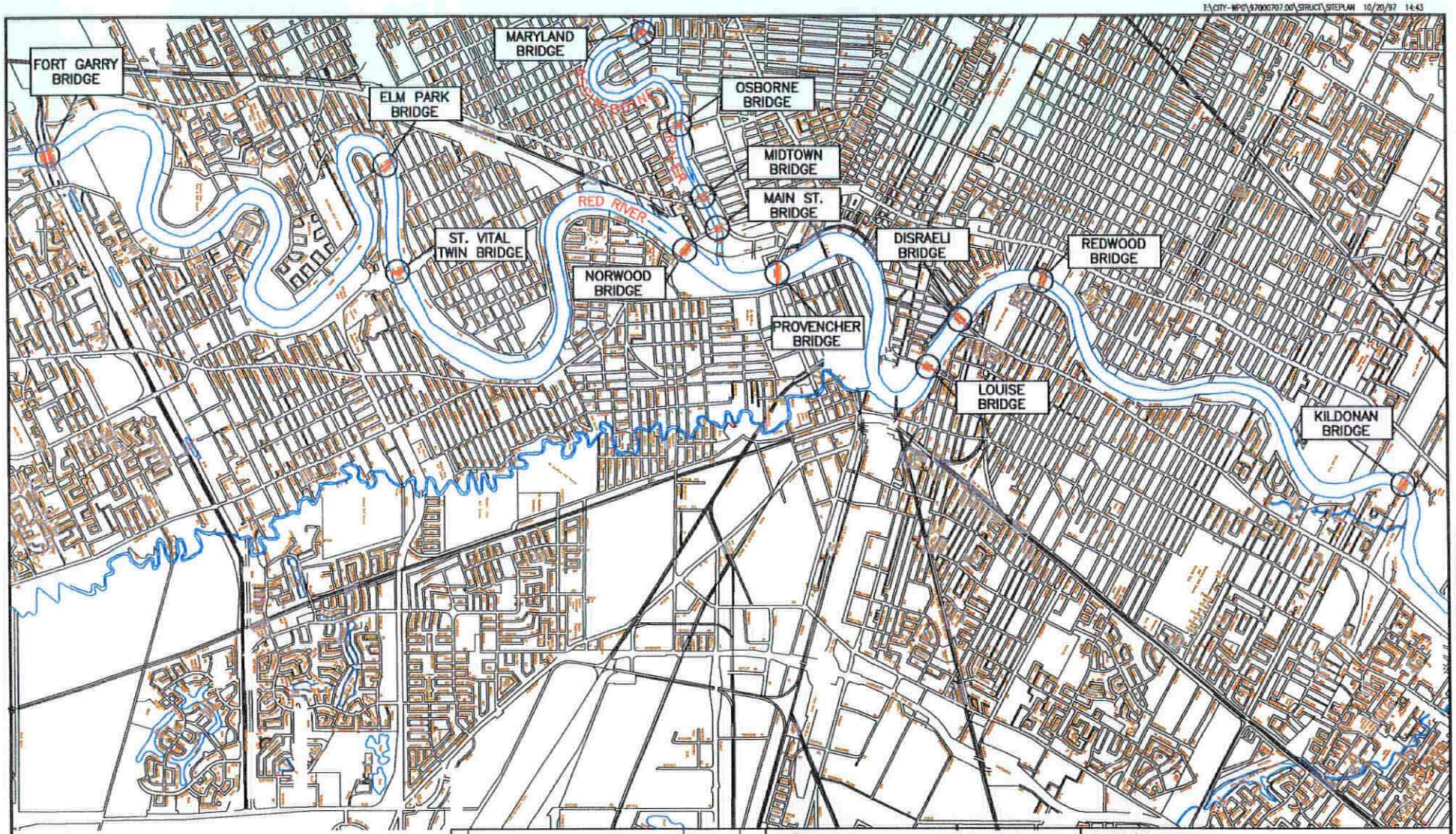

SITE PLAN
N. T. S.

NO.	REVISIONS	DATE	BY
	REVISIONS/ISSUE		

THE CITY OF WINNIPEG
STREETS AND TRANSPORTATION DEPARTMENT
BRIDGE ENGINEERING DIVISION

WARDROP ENGINEERING INC.
WINNIPEG TORONTO THUNDER BAY

FLOOD '97 MONITORING
RIVERBED SOUNDINGS
SCOUR INVESTIGATION
SITE PLAN

DESIGNED BY: A.A.	DRAWN BY: G.I.	DWG NO.	B-SP1-97-S1
CHECKED BY: R.V.G.	DATE: 97.10.07		

1. FORT GARRY BRIDGE (ROUTE 165)

WARDROP Engineering Inc.

Mr. Gord Smith, P.Eng.
Bridge Maintenance Engineer
City of Winnipeg
100 Main Street
Winnipeg, MB R3C 1A4

970007-07-00
July 21, 1997

Dear Mr. Smith:

Re: Fort Garry Bridge - Sonar Survey

Wardrop Engineering performed a sonar survey at the Fort Garry Bridge on June 20, 1997, as part of a comprehensive sonar survey program for several bridges in the City of Winnipeg. Sonar readings were taken to identify riverbed scour which may have been caused as a result of the 1997 spring flood and to provide baseline information for comparison with future sonar surveys.

Sonar data collection was obtained with the help of the City of Winnipeg Harbour Master who provided a boat and operator for the survey. Locations of depth measurements were determined using a total station and the sonar data collected was obtained using a Humminbird LCD depth finder. Sonar readings were taken at approximately 5 m intervals on a grid system, and locations with large variations in depths were focused on using a smaller grid system of approximately 0.5 m. Our survey extended from approximately 30 m upstream to 60 m downstream of the piers.

Attached is a plan view of the Fort Garry Bridge complete with contours showing riverbed elevations of the surrounding area. Also attached are sections taken near the centreline of each bridge structure–one through the south bridge and one through the north bridge.

The following general observations were noted:

- The water level at the Fort Garry Bridge was 224.2 m above sea level on June 20, 1997.
- Average riverbed elevations were between 219.5 to 220.5 m in the main river channel area.
- There was no evidence of significant scour or deposition adjacent to the piers or the general area of the bridge.

If you have any questions, please call.

Sincerely,

WARDROP ENGINEERING INC.

R. van Ginkel, P.Eng.

RVG/ldf
Enclosure

Web Site: http//www.wardrop.com
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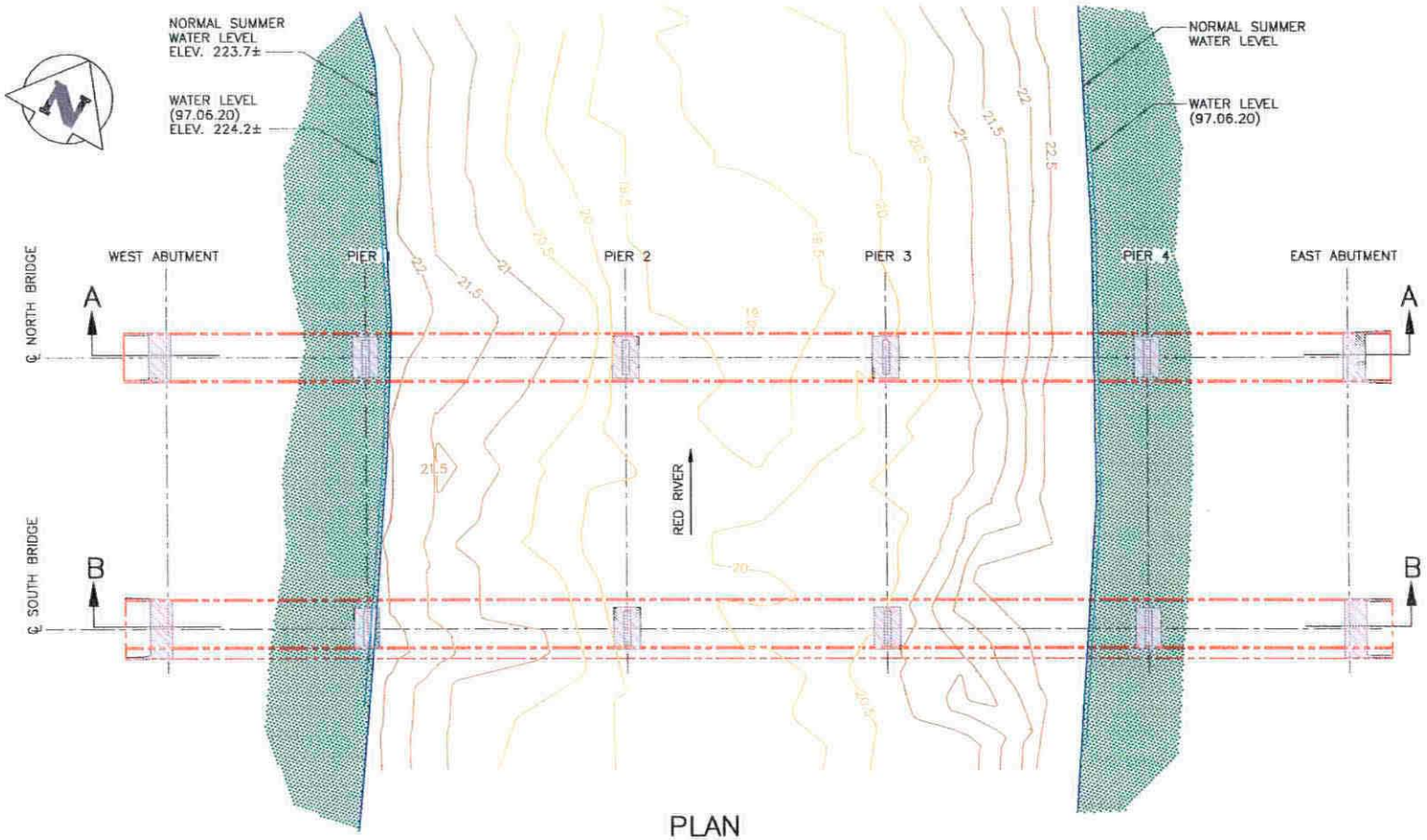

PLAN

NOTE:
WATER LEVEL (97.06.20)
– DATE RIVERBED SOUNDINGS WERE CONDUCTED.

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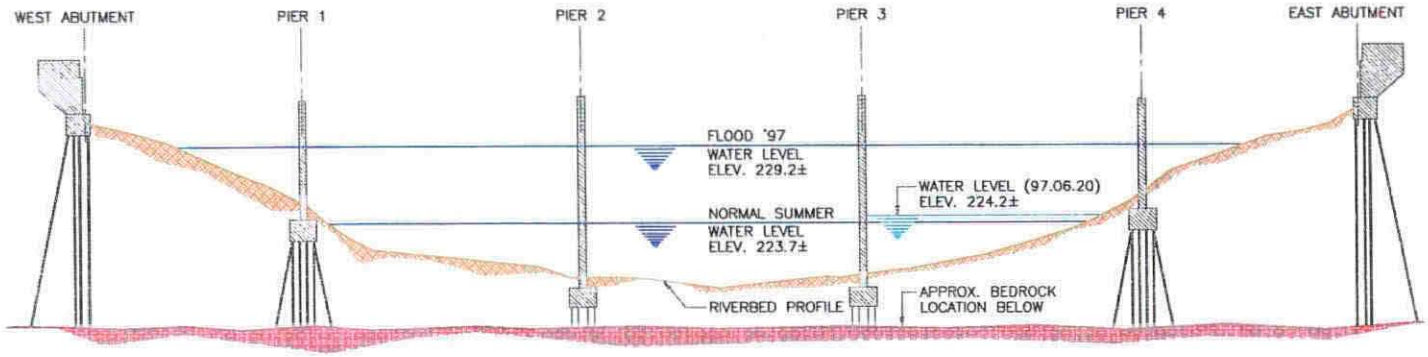
THE CITY OF WINNIPEG
STREETS AND TRANSPORTATION DEPARTMENT
BRIDGE ENGINEERING DIVISION

WARDROP ENGINEERING INC.
WINNIPEG TORONTO THUNDER BAY

FORT GARRY BRIDGE (ROUTE 165) – FLOOD '97 MONITORING
RIVERBED SOUNDINGS

SCOUR INVESTIGATION PLAN

DESIGNED BY: A.A.	DRAWN BY: G.I.	DWG NO.	B173-97-S1
CHECKED BY: R.V.G.	DATE: 97.06.23		



SECTION A–A (AT NORTH BRIDGE)

SCALE: HORIZ. = 1
VERT. = 3

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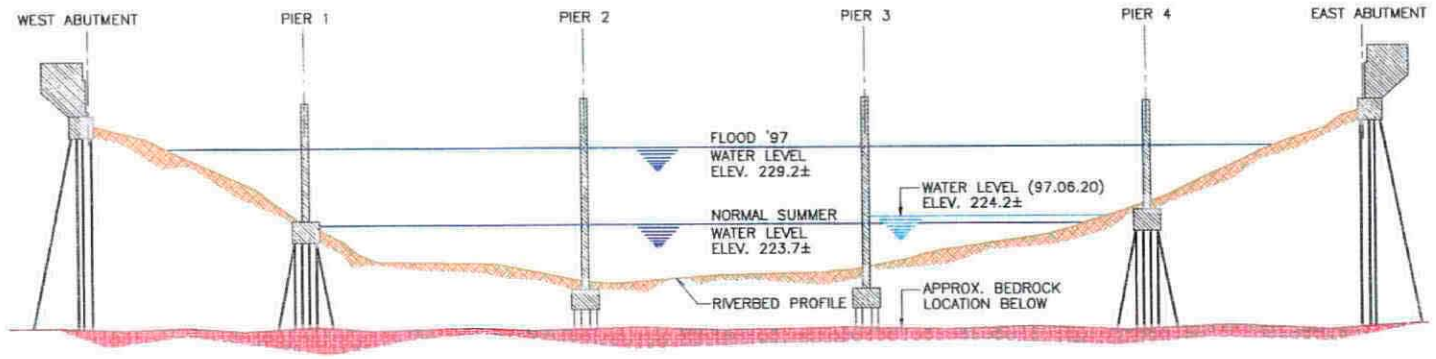
THE CITY OF WINNIPEG
STREETS AND TRANSPORTATION DEPARTMENT
BRIDGE ENGINEERING DIVISION

WARDROP ENGINEERING INC.
WINNIPEG TORONTO THUNDER BAY

FORT GARRY BRIDGE (ROUTE 165) – FLOOD '97 MONITORING
RIVERBED SOUNDINGS

SCOUR INVESTIGATION
SECTION A–A (AT NORTH BRIDGE)

DESIGNED BY: A.A.	DRAWN BY: G.I.	DWG NO.	B173–97–S2
CHECKED BY: R.V.G.	DATE: 97.06.23		



SECTION B–B (AT SOUTH BRIDGE)

SCALE: HORIZ. = 1
VERT. = 3

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THE CITY OF WINNIPEG
STREETS AND TRANSPORTATION DEPARTMENT
BRIDGE ENGINEERING DIVISION

WARDROP ENGINEERING INC.

FORT GARRY BRIDGE (ROUTE 165) – FLOOD '97 MONITORING
RIVERBED SOUNDINGS
SCOUR INVESTIGATION
SECTION B–B (AT SOUTH BRIDGE)

DESIGNED BY: A.A.	DRAWN BY: G.I.	DWG NO.	B173-97-S3
CHECKED BY: R.V.G.	DATE: 97.06.23		

2. ELM PARK BRIDGE

Mr. Gord Smith, P.Eng.
Bridge Maintenance Engineer
City of Winnipeg
100 Main Street
Winnipeg, MB R3C 1A4

970007-07-00
July 21, 1997

Dear Mr. Smith:

Re: Elm Park Bridge - Sonar Survey

Wardrop Engineering performed a sonar survey at the Elm Park Bridge on June 11, 1997, as part of a comprehensive sonar survey program for several bridges in the City of Winnipeg. Sonar readings were taken to identify riverbed scour which may have been caused as a result of the 1997 spring flood and to provide baseline information for comparison with future sonar surveys.

Sonar data collection was obtained with the help of the City of Winnipeg Harbour Master who provided a boat and operator for the survey. Locations of depth measurements were determined using a total station and the sonar data collected was obtained using a Humminbird LCD depth finder. Sonar readings were taken at approximately 5 m intervals on a grid system, and locations with large variations in depths were focused on using a smaller grid system of approximately 0.5 m. Our survey extended from approximately 30 m upstream to 60 m downstream of the piers.

Attached is a plan view of the Elm Park Bridge complete with contours showing riverbed elevations of the surrounding area. Also attached is a section taken near the centreline on the bridge structure.

The following general observations were noted:

- The water level at the Elm Park Bridge was 224.8 m above sea level on June 11, 1997.
- Average riverbed elevations were between 218 to 219.5 m in the main river channel area.
- Scour was identified approximately 5 m to the east side (downstream) of Pier 2 extending from approximately 5 m to the south and 5 m to the north of the pier. It has a total area of approximately 150 m^2 and reached a depth of about 2 m. Total volume of scour is 200 m^3. Also the north side of Pier 2 shows signs of scour.

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Mr. Gord Smith, P.Eng.
City of Winnipeg

July 21, 1997

- There was no evidence of significant deposition adjacent to the piers or the ice breaker located directly south of Pier 2.

If you have any questions, please call.

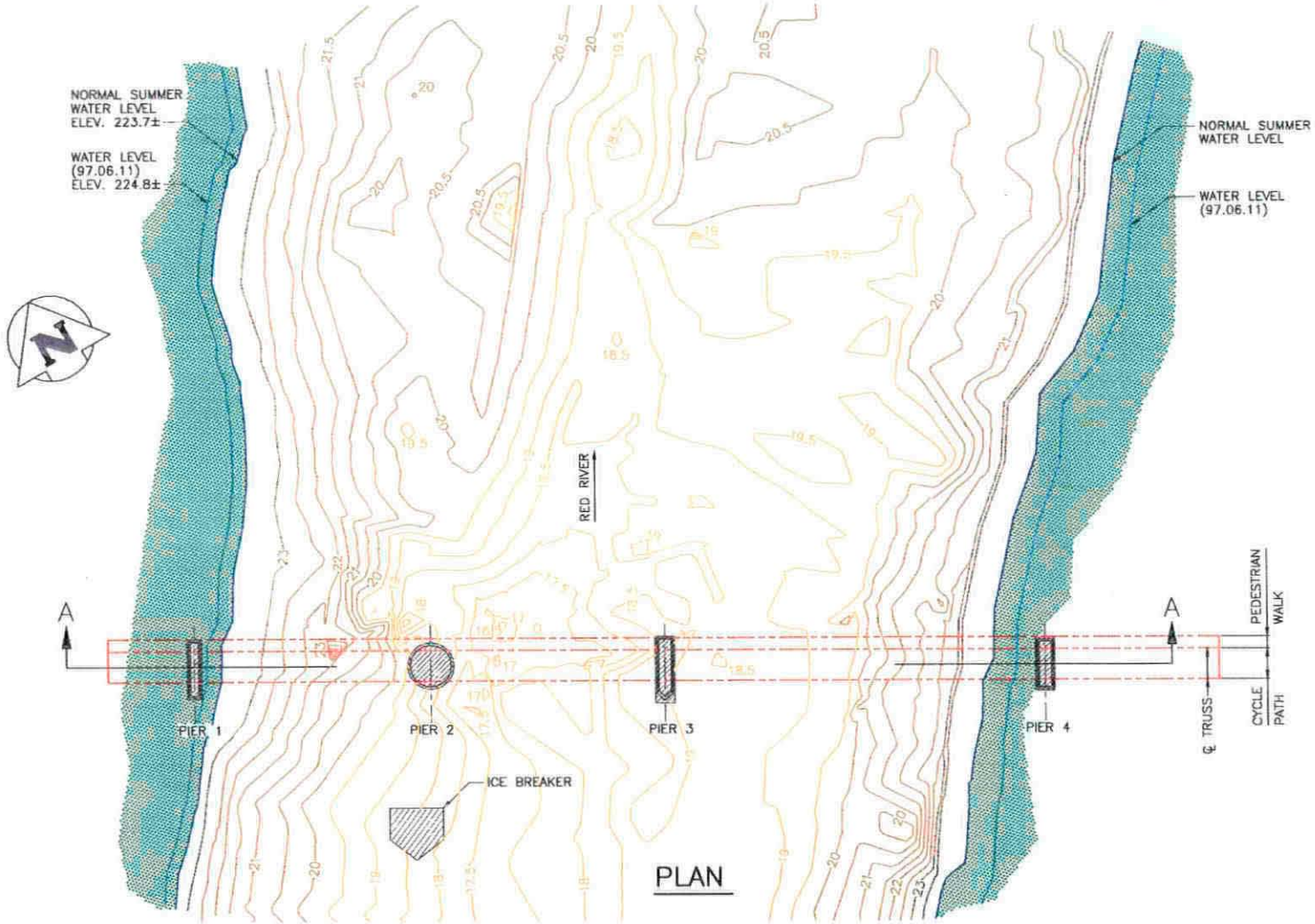
Sincerely,

WARDROP ENGINEERING INC.

R. van Ginkel, P.Eng.

RVG/ldf

Enclosure



NOTE:
WATER LEVEL (97.06.11)
– DATE RIVERBED SOUNDINGS WERE CONDUCTED.

NO.	REVISIONS	DATE	BY
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THE CITY OF WINNIPEG
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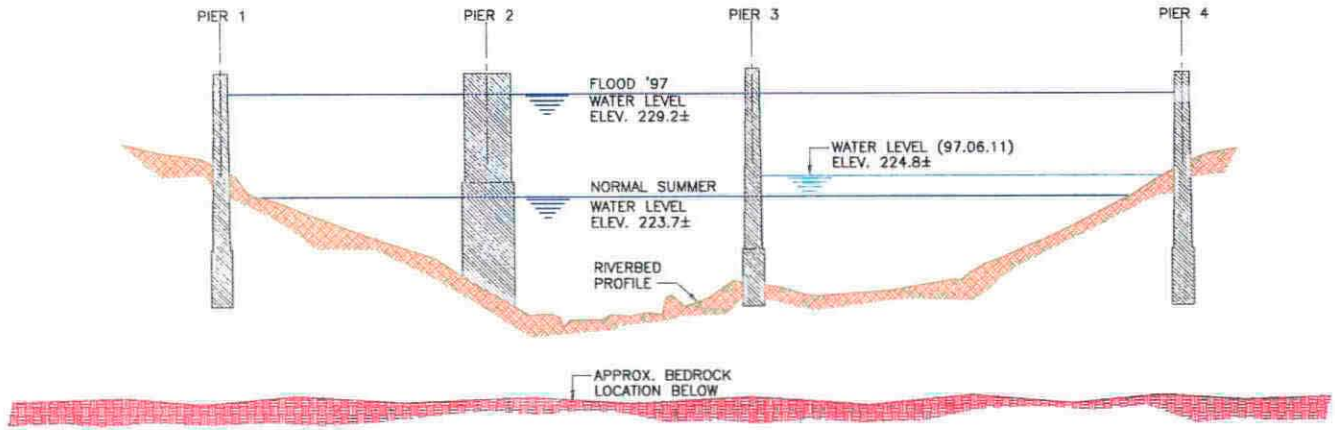
BRIDGE ENGINEERING DIVISION

WARDROP ENGINEERING INC.
WINNIPEG TORONTO THUNDER BAY

ELM PARK BRIDGE – FLOOD '97 MONITORING
RIVERBED SOUNDINGS

SCOUR INVESTIGATION PLAN

DESIGNED BY: A.A.	DRAWN BY: G.I.	DWG NO.	B131–97–S1
CHECKED BY: R.V.G.	DATE: 97.06.16		



SECTION A–A (AT BRIDGE)

SCALE: HORIZ. = 1
VERT. = 3

NO.	REVISIONS	DATE	BY
	REVISIONS/ISSUE		

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BRIDGE ENGINEERING DIVISION

WARDROP ENGINEERING INC.
WINNIPEG TORONTO THUNDER BAY

ELM PARK BRIDGE – FLOOD '97 MONITORING
RIVERBED SOUNDINGS

SCOUR INVESTIGATION
SECTION A–A (AT BRIDGE)

DESIGNED BY: A.A.	DRAWN BY: G.I.	DWG NO.
CHECKED BY: R.V.G.	DATE: 97.06.18	B131–97–S2

3. ST. VITAL TWIN BRIDGE

WARDROP Engineering Inc.

Mr. Gord Smith, P.Eng.
Bridge Maintenance Engineer
City of Winnipeg
100 Main Street
Winnipeg, MB R3C 1A4

970007-07-00
October 23, 1997

Dear Mr. Smith:

Re: St. Vital Twin Bridge - Sonar Survey

Wardrop Engineering performed a sonar survey at the St. Vital Twin Bridge on July 28, 1997, as part of a comprehensive sonar survey program for several bridges in the City of Winnipeg. Sonar readings were taken to identify riverbed scour which may have been caused as a result of the 1997 spring flood and to provide baseline information for comparison with future sonar surveys.

Sonar data collection was obtained with the help of the City of Winnipeg Harbour Master who provided a boat and operator for the survey. Locations of depth measurements were determined using a total station and the sonar data collected was obtained using a Humminbird LCD depth finder. Sonar readings were taken at approximately 5 m intervals on a grid system, and locations with large variations in depths were focused on using a smaller grid system of approximately 0.5 m. Our survey extended from approximately 30 m upstream to 60 m downstream of the piers.

Attached is a plan view of the St. Vital Twin Bridge complete with contours showing riverbed elevations of the surrounding area. Also attached are two sections, one taken near the centreline of the northbound structure and the second taken near the centreline of the southbound structure.

The following general observations were noted:

- The water level at the St. Vital Twin Bridge was 224.3 m above sea level on July 28, 1997.
- Average riverbed elevations were between 218.0 to 220.0 m in the main river channel area.
- We found no evidence of significant scour or deposition adjacent to the piers or in the general area of the bridge.

If you have any questions, please call.

Sincerely,

WARDROP ENGINEERING INC.

R. van Ginkel, P.Eng.

RVG/ldf
Enclosure

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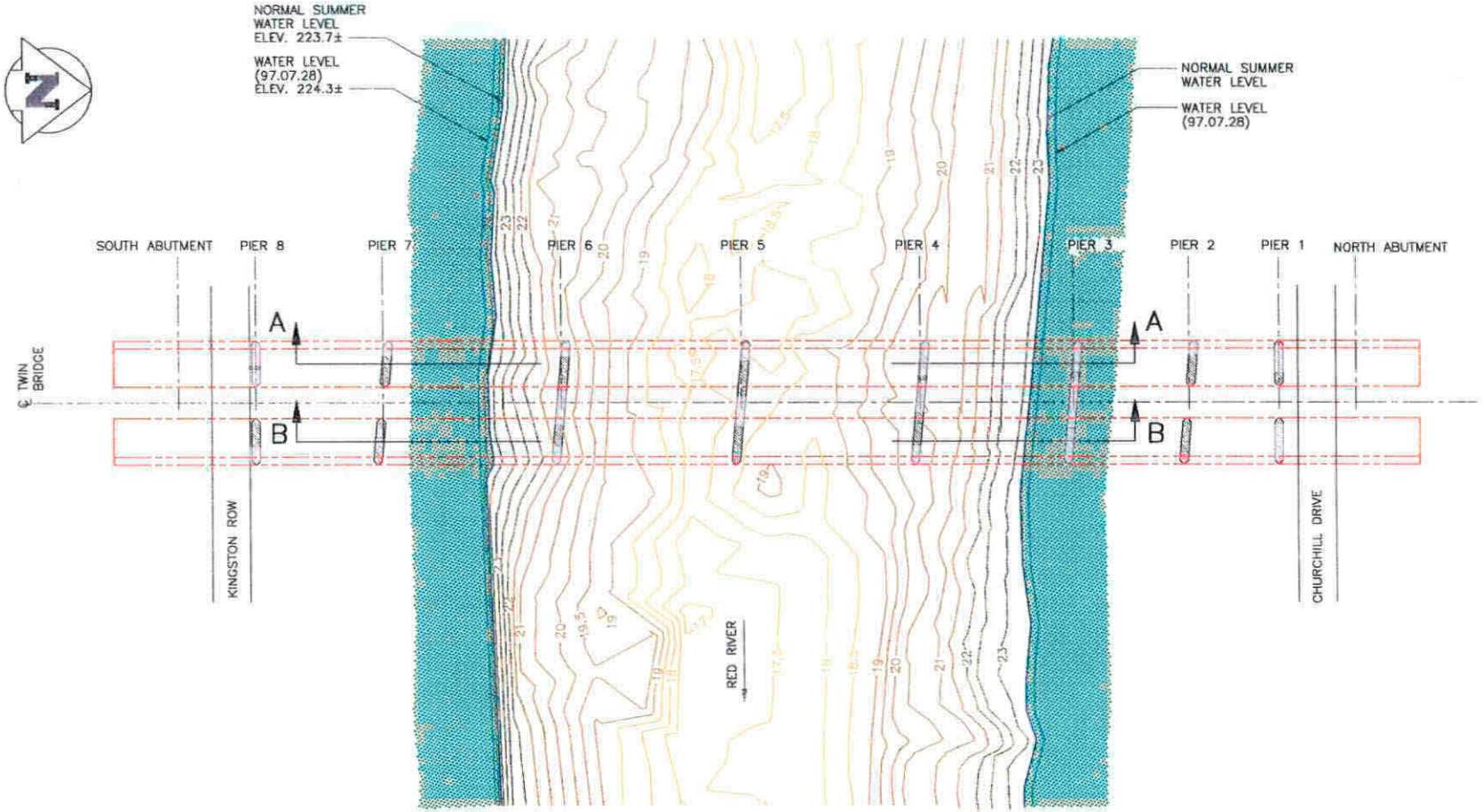

PLAN

NOTE:
WATER LEVEL (97.07.28)
– DATE RIVERBED SOUNDINGS WERE CONDUCTED.

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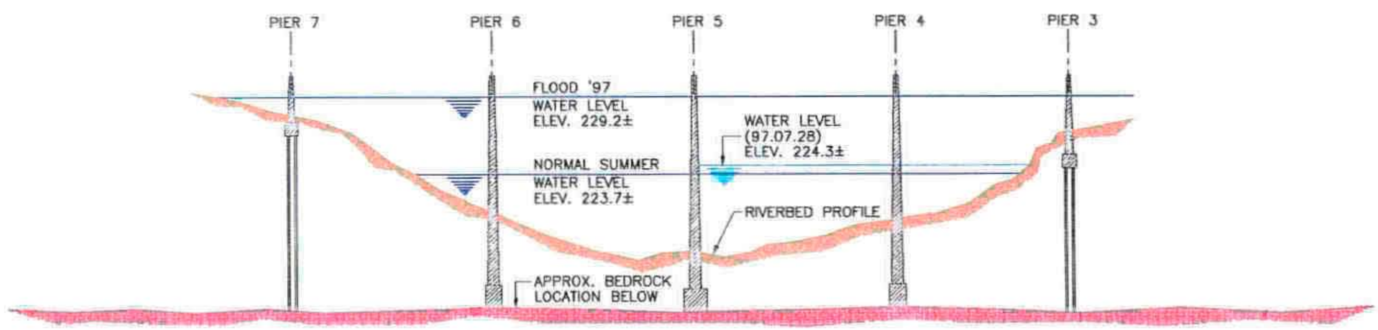
STREETS AND TRANSPORTATION DEPARTMENT
BRIDGE ENGINEERING DIVISION

WARDROP ENGINEERING INC.
WINNIPEG TORONTO THUNDER BAY

ST. VITAL TWIN BRIDGE – FLOOD '97 MONITORING
RIVERBED SOUNDINGS

SCOUR INVESTIGATION PLAN

DESIGNED BY: A.A.	DRAWN BY: G.I.	DWG NO.
CHECKED BY: R.V.G.	DATE: 97.09.23	B116–97–S1



SECTION A–A (AT WEST BRIDGE)

SCALE: HORIZ. = 1
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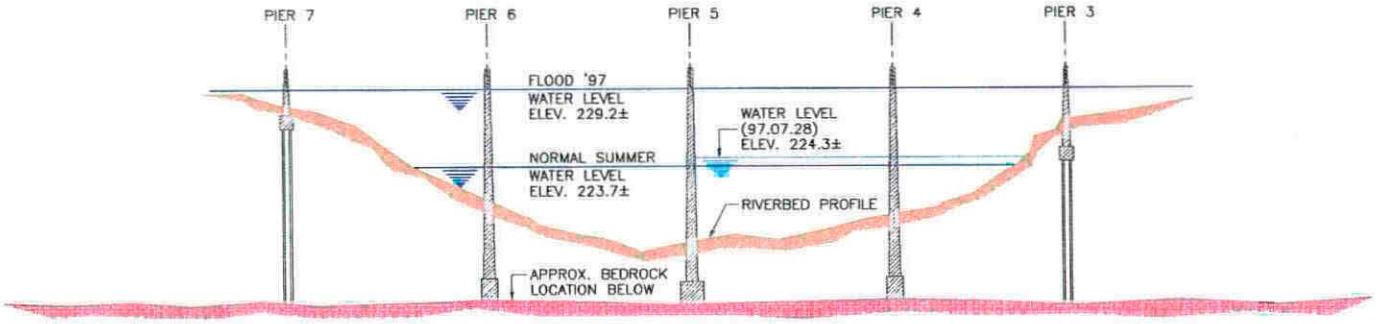
STREETS AND TRANSPORTATION DEPARTMENT
BRIDGE ENGINEERING DIVISION

WARDROP ENGINEERING INC.

ST. VITAL TWIN BRIDGE – FLOOD '97 MONITORING
RIVERBED SOUNDINGS

SCOUR INVESTIGATION
SECTION A–A (AT WEST BRIDGE)

DESIGNED BY: A.A.	DRAWN BY: G.I.	DWG NO. B116–97–S2
CHECKED BY: R.V.G.	DATE: 97.07.24	



SECTION B–B (AT EAST BRIDGE)

SCALE: HORIZ. = 1
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STREETS AND TRANSPORTATION DEPARTMENT
BRIDGE ENGINEERING DIVISION

WARDROP ENGINEERING INC.
WINNIPEG TORONTO THUNDER BAY

ST. VITAL TWIN BRIDGE – FLOOD '97 MONITORING
RIVERBED SOUNDINGS
SCOUR INVESTIGATION
SECTION B–B (AT EAST BRIDGE)

DESIGNED BY: A.A.	DRAWN BY: G.I.	DWG NO.
CHECKED BY: R.V.G.	DATE: 97.07.24	B116-97-S3

4. NORWOOD BRIDGE

Mr. Gord Smith, P.Eng.
Bridge Maintenance Engineer
City of Winnipeg
100 Main Street
Winnipeg, MB R3C 1A4

970007-07-00
October 24, 1997

Dear Mr. Smith:

Re: Norwood Bridge - Sonar Survey

Wardrop Engineering performed a sonar survey at the Norwood Bridge on July 16, 1997, as part of a comprehensive sonar survey program for several bridges in the City of Winnipeg. Sonar readings were taken to identify riverbed scour which may have been caused as a result of the 1997 spring flood and to provide baseline information for comparison with future sonar surveys.

Sonar data collection was obtained with the help of the City of Winnipeg Harbour Master who provided a boat and operator for the survey. Locations of depth measurements were determined using a total station and the sonar data collected was obtained using a Humminbird LCD depth finder. Sonar readings were taken at approximately 5 m intervals on a grid system, and locations with large variations in depths were focused on using a smaller grid system of approximately 0.5 m. Our survey extended from approximately 30 m upstream to 60 m downstream of the piers.

Attached is a plan view of the Norwood Bridge complete with contours showing riverbed elevations of the surrounding area. Also attached is a section taken near the centreline of the bridge structure.

The following general observations were noted:

- The water level at the Norwood Bridge was 225.5 m above sea level on July 16, 1997.
- Average riverbed elevations were between 219.0 to 220.0 m in the main river channel area.
- The riverbed at this bridge location is generally more variable when compared to riverbeds around most other bridge structures on the Red River. The variations are probably due to the ongoing construction activities.
- We found evidence of deposition immediately adjacent to the east end of Pier 2. This small deposition reaches a depth of about 1.0 m at an elevation of 220.5 m and covers a very small area, in the order of a few square metres.

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Mr. Gord Smith, P.Eng.
City of Winnipeg

October 24, 1997

- We found evidence of scour approximately 8 m to the northwest of Pier 1. The scour reaches a deep point at an elevation of about 218.5 m, approximately 0.5 m below the average river bottom elevation of 219.0 m, as previously noted. It covers an area of approximately 20 m^2 and has a volume of approximately 10 m^3.

If you have any questions, please call.

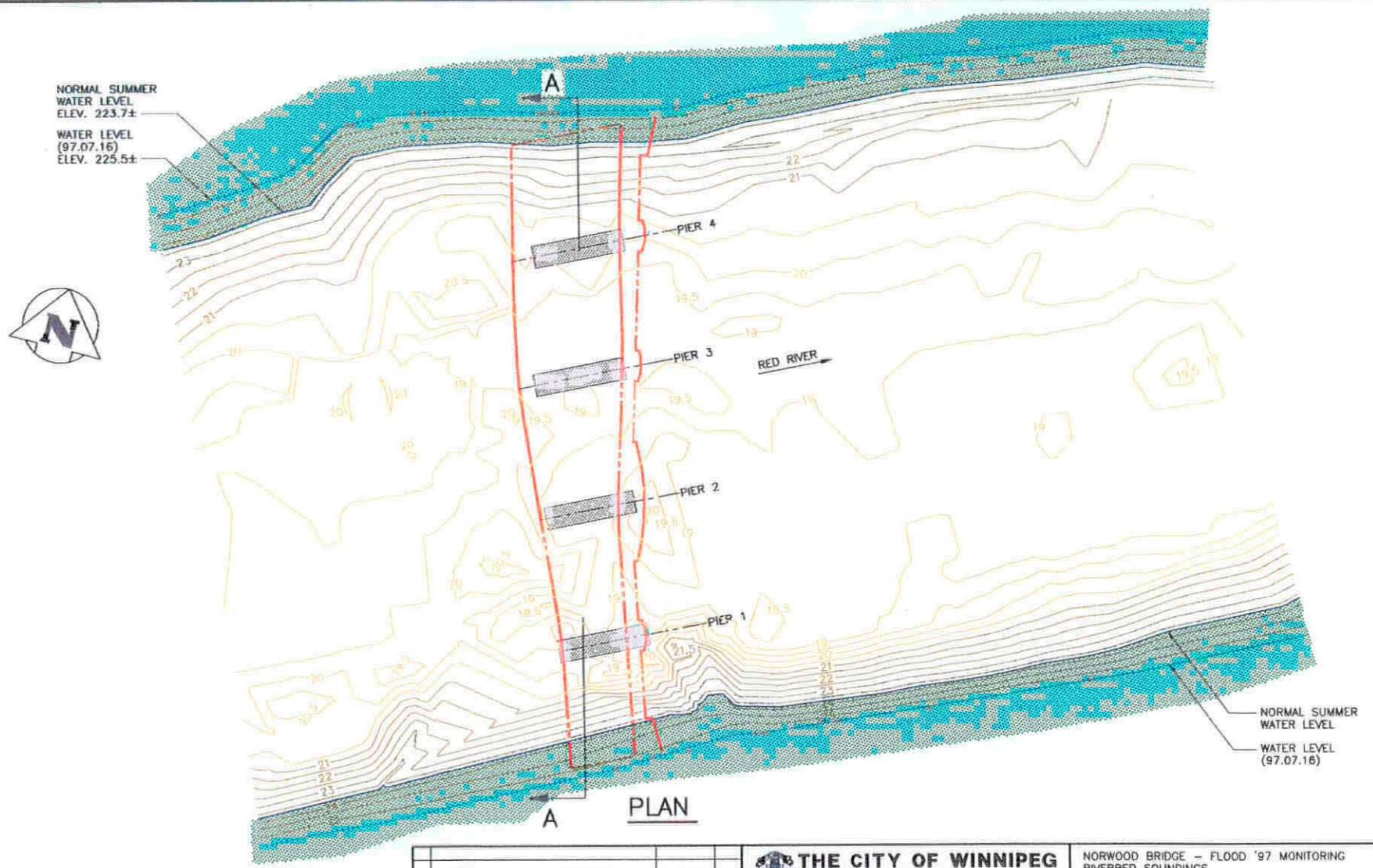
Sincerely,

WARDROP ENGINEERING INC.

R. van Ginkel, P.Eng.

RVG/ldf

Enclosure



NOTE:
WATER LEVEL (97.07.16)
– DATE RIVERBED SOUNDINGS WERE CONDUCTED.

NO.	REVISIONS	DATE	BY
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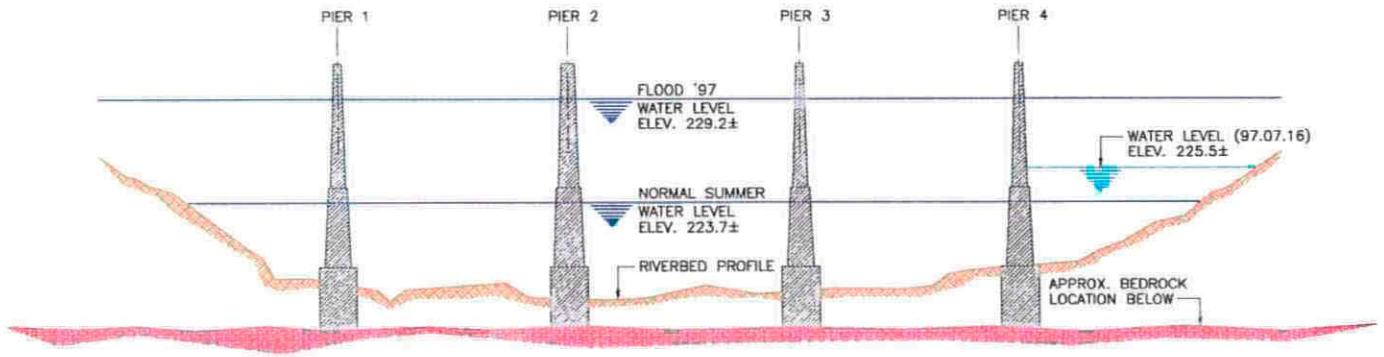
THE CITY OF WINNIPEG
STREETS AND TRANSPORTATION DEPARTMENT
BRIDGE ENGINEERING DIVISION

WARDROP ENGINEERING INC.
WINNIPEG TORONTO THUNDER BAY

NORWOOD BRIDGE – FLOOD '97 MONITORING
RIVERBED SOUNDINGS

SCOUR INVESTIGATION PLAN

DESIGNED BY: A.A.	DRAWN BY: G.I.	DWG NO.
CHECKED BY: R.V.G.	DATE: 97.10.02	B103-97-S1



SECTION A–A (AT BRIDGE)

SCALE: HORIZ. = 1
VERT. = 3

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WARDROP ENGINEERING INC.

NORWOOD BRIDGE – FLOOD '97 MONITORING
RIVERBED SOUNDINGS

SCOUR INVESTIGATION
SECTION A–A (AT BRIDGE)

DESIGNED BY: A.A.	DRAWN BY: G.I.	DWG NO.
CHECKED BY: R.V.G.	DATE: 97.10.02	B103–97–S2

5. PROVENCHER BRIDGE

Mr. Gord Smith, P.Eng.
Bridge Maintenance Engineer
City of Winnipeg
100 Main Street
Winnipeg, MB R3C 1A4

970007-07-00
July 21, 1997

Dear Mr. Smith:

Re: Provencher Bridge - Sonar Survey

Wardrop Engineering performed a sonar survey at the Provencher Bridge on May 23, 1997, as part of a comprehensive sonar survey program for several bridges in the City of Winnipeg. Sonar readings were taken to identify riverbed scour which may have been caused as a result of the 1997 spring flood and to provide baseline information for comparison with future sonar surveys.

Sonar data collection was obtained with the help of the City of Winnipeg Harbour Master who provided a boat and operator for the survey. Locations of depth measurements were determined using a total station and the sonar data collected was obtained using a Humminbird LCD depth finder. Sonar readings were taken at approximately 5 m intervals on a grid system, and locations with large variations in depths were focused on using a smaller grid system of approximately 0.5 m. Our survey extended from approximately 30 m upstream to 60 m downstream of the piers.

Attached is a plan view of the Provencher Bridge complete with contours showing riverbed elevations of the surrounding area. Also attached are four sections–two taken to the north of the bridge, one taken just north of the centreline through the bridge structure, and one taken to the south of the bridge.

The following general observations were noted:

- The water level at the Provencher Bridge was 227.3 m above sea level on May 23, 1997.
- Average riverbed elevations were between 217.5 to 219.5 m in the main channel area.
- Scour was identified at two locations:
  - Centred approximately 30 m northwest (downstream) of Pier 4 and 8 m across (east to west). It measures 25 m by 10 m and is 2 m deep at its deepest point. The scoured area is approximately 250 m^2 and has a volume of approximately 500 m^3. This scour area is the deepest part of the river at the Provencher Bridge location and maintains very strong currents and eddies, even when the general flow of the river is slow.
  - Approximately 10 m north of Pier 3. The scoured area is approximately 200 m^2, with its deepest point being 1 m deep, and a volume of approximately 200 m^3.

...2

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Mr. Gord Smith, P.Eng.
City of Winnipeg

July 21, 1997

- There was no evidence of substantial scour immediately adjacent to the piers.
- Substantial deposition is noted at the north end of Pier 3, in the order of 1 to 2 m in depth.

If you have any questions, please call.

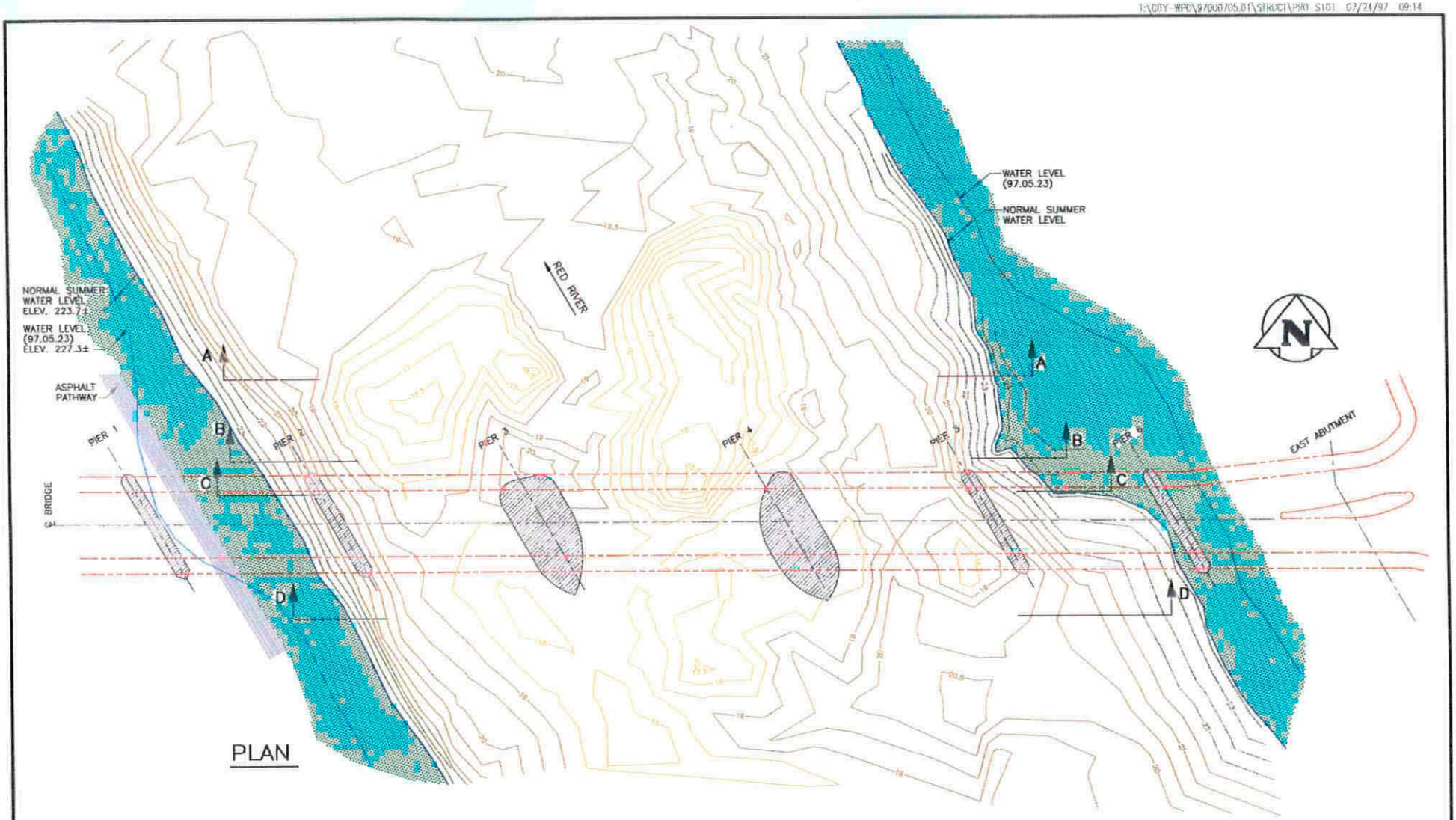
Sincerely,

WARDROP ENGINEERING INC.

R. van Ginkel, P.Eng.

RVG/ldf

Enclosure



PLAN

NOTE:
WATER LEVEL (97.05.23)
DATE THE RIVERBED SOUNDINGS WERE CONDUCTED.

NO.	REVISIONS	DATE	BY
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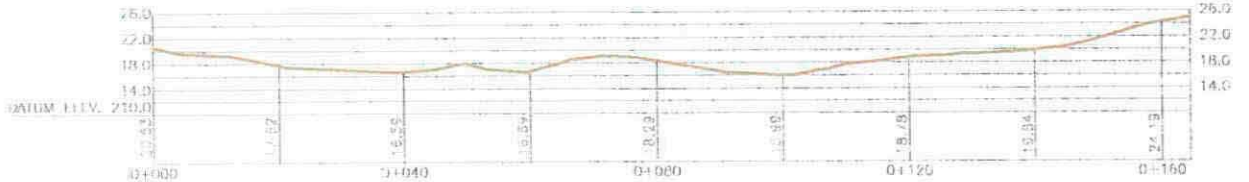
THE CITY OF WINNIPEG
STREETS AND TRANSPORTATION DEPARTMENT
BRIDGE ENGINEERING DIVISION

WARDROP ENGINEERING INC.
WINNIPEG TORONTO THUNDER BAY

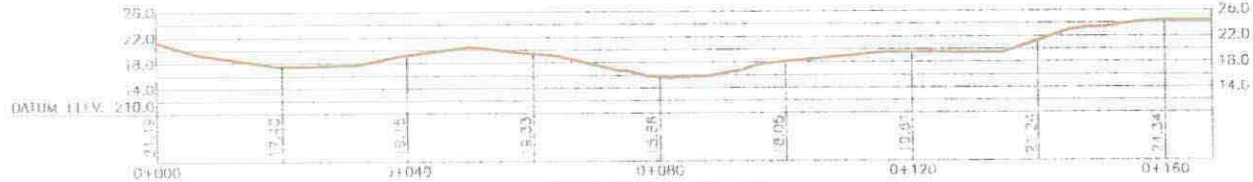
PROVENCHER BRIDGE – FLOOD '97 MONITORING
RIVERBED SOUNDINGS

SCOUR INVESTIGATION PLAN

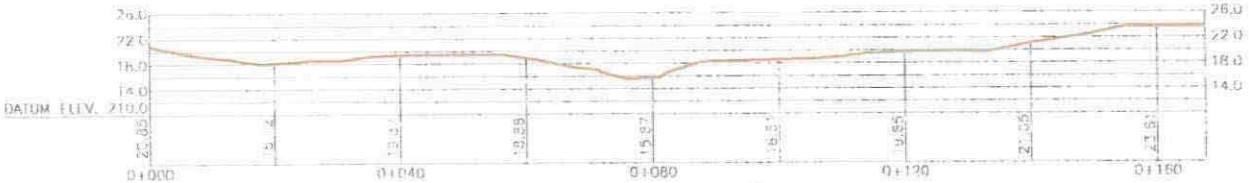
DESIGNED BY: A.A.	DRAWN BY: G.I.	DWG NO.	B110-97-S1
CHECKED BY: R.V.G.	DATE: 97.05.27		



SECTION A–A



SECTION B–B



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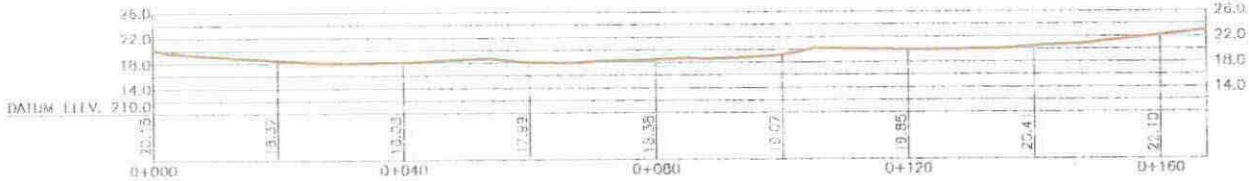


SECTION D–D

NO.	REVISIONS	DATE	BY
	REVISIONS/ISSUE		

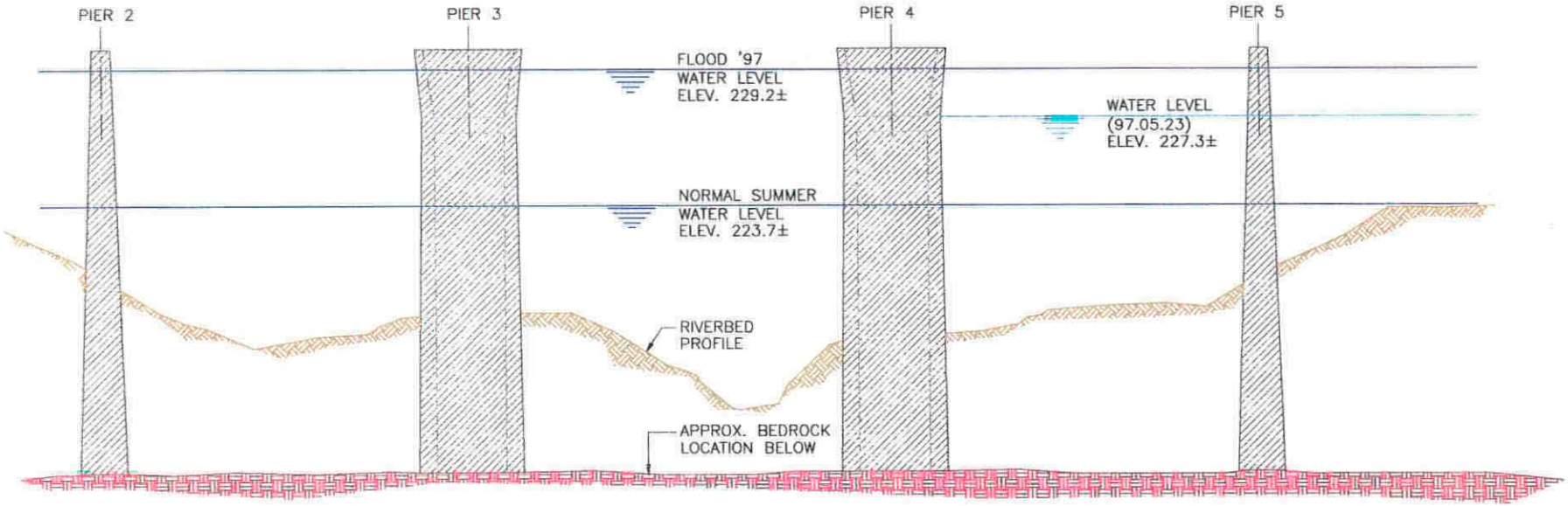
THE CITY OF WINNIPEG
STREETS AND TRANSPORTATION DEPARTMENT
BRIDGE ENGINEERING DIVISION

WARDROP ENGINEERING INC.
WINNIPEG TORONTO THUNDER BAY

PROVENCHER BRIDGE – FLOOD '97 MONITORING
RIVERBED SOUNDINGS

SCOUR INVESTIGATION SECTIONS

DESIGNED BY: A.A.	DRAWN BY: G.I.	DWG NO.
CHECKED BY: R.V.G.	DATE: 97.05.29	B110-97-S2



SECTION AT BRIDGE

SCALE: HORIZ.= 1
VERT. = 3

NO.	REVISIONS	DATE	BY
	REVISIONS/ISSUE		

THE CITY OF WINNIPEG
STREETS AND TRANSPORTATION DEPARTMENT
BRIDGE ENGINEERING DIVISION

WARDROP ENGINEERING INC.
WINNIPEG TORONTO THUNDER BAY

PROVENCHER BRIDGE – FLOOD '97 MONITORING
RIVERBED SOUNDINGS
SCOUR INVESTIGATION
SECTION AT BRIDGE

DESIGNED BY: A.A.	DRAWN BY: G.I.	DWG NO.
CHECKED BY: R.V.G.	DATE: 97.05.27	B110-97-S3

6. LOUISE BRIDGE

Mr. Gord Smith, P.Eng.
Bridge Maintenance Engineer
City of Winnipeg
100 Main Street
Winnipeg, MB R3C 1A4

970007-07-00
July 21, 1997

Dear Mr. Smith:

Re: Louise Bridge - Sonar Survey

Wardrop Engineering performed a sonar survey at the Louise Bridge on June 27, 1997, as part of a comprehensive sonar survey program for several bridges in the City of Winnipeg. Sonar readings were taken to identify riverbed scour which may have been caused as a result of the 1997 spring flood and to provide baseline information for comparison with future sonar surveys.

Sonar data collection was obtained with the help of the City of Winnipeg Harbour Master who provided a boat and operator for the survey. Locations of depth measurements were determined using a total station and the sonar data collected was obtained using a Humminbird LCD depth finder. Sonar readings were taken at approximately 5 m intervals on a grid system, and locations with large variations in depths were focused on using a smaller grid system of approximately 0.5 m. Our survey extended from approximately 30 m upstream to 60 m downstream of the piers.

Attached is a plan view of the Louise Bridge complete with contours showing riverbed elevations of the surrounding area. Also attached is a section taken near the centreline on the bridge structure.

The following general observations were noted:

- The water level at the Louise Bridge was 223.6 m above sea level on June 27, 1997.
- Average riverbed elevations were between 218 to 219 m in the main river channel area.
- There was no evidence of significant scour adjacent to the piers or the ice breaker located directly east of Pier 3.
- There is evidence of deposition in two locations:
  - Extending approximately 2 m outward from all faces of the ice breaker and the north face of Pier 3. The deposition reaches a peak depth of 3 m at an elevation of 221.5 m (assuming an average depth of 218.5 m).

...2

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Mr. Gord Smith, P.Eng.
City of Winnipeg

July 21, 1997

- (cont'd)
  - North of Pier 4 and with an approximate area of 20 m^2, the deposition reaches a peak depth of 2 m at an elevation of 220.5 m (assuming an average depth of 218.5 m).

If you have any questions, please call.

Sincerely,

WARDROP ENGINEERING INC.

R. van Ginkel, P.Eng.

RVG/ldf

Enclosure

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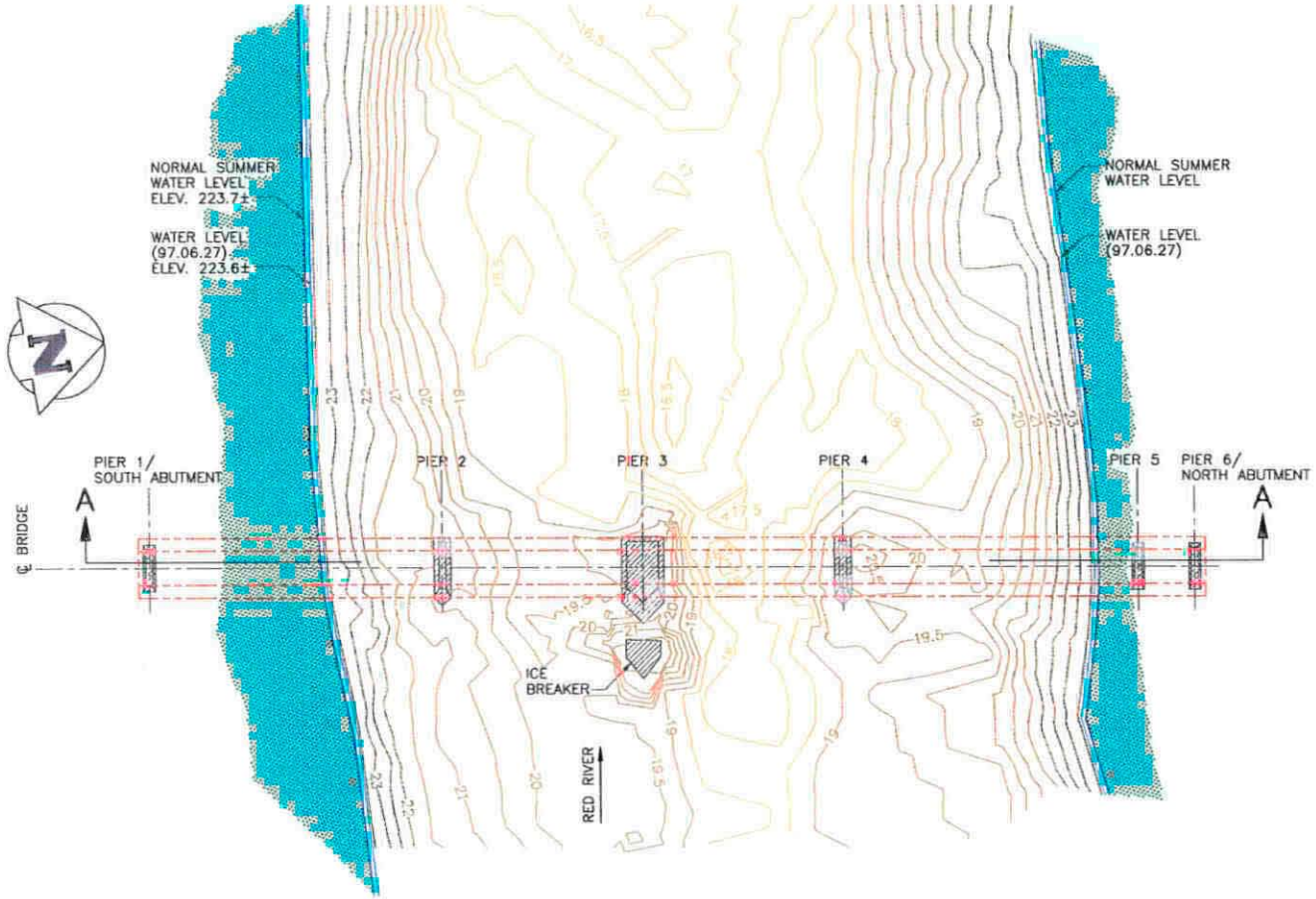


PLAN

NOTE:
WATER LEVEL (97.06.27)
– DATE RIVERBED SOUNDINGS WERE CONDUCTED.

NO.	REVISIONS	DATE	BY
	REVISIONS/ISSUE		

THE CITY OF WINNIPEG
STREETS AND TRANSPORTATION DEPARTMENT
BRIDGE ENGINEERING DIVISION

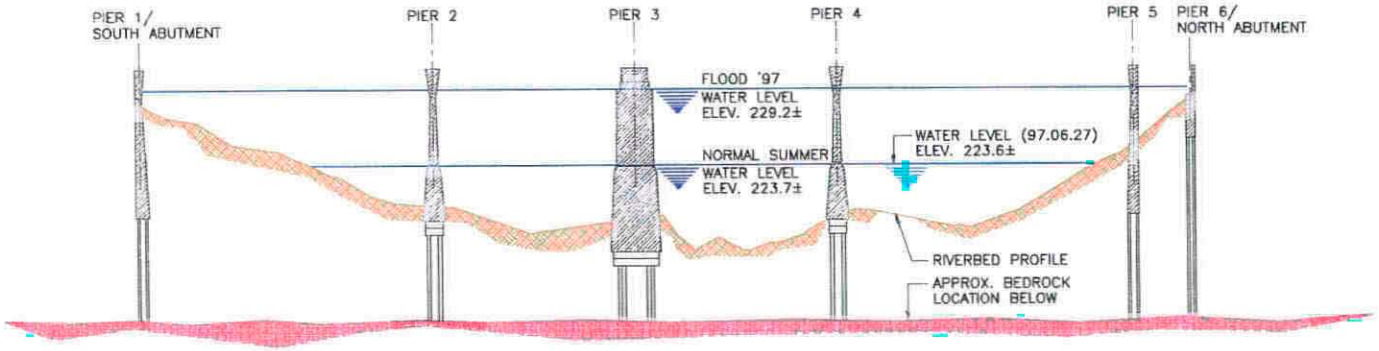
WARDROP ENGINEERING INC.
WINNIPEG TORONTO THUNDER BAY

LOUISE BRIDGE – FLOOD '97 MONITORING
RIVERBED SOUNDINGS

SCOUR INVESTIGATION PLAN

DESIGNED BY: A.A.	DRAWN BY: G.I.	DWG NO.
CHECKED BY: R.V.G.	DATE: 97.06.16	B107-97-S1

W.I.: 970007-97-00-541



SECTION A–A (AT BRIDGE)

SCALE: HORIZ. = 1
VERT. = 3

NO.	REVISIONS	DATE	BY
	REVISIONS/ISSUE		

THE CITY OF WINNIPEG
STREETS AND TRANSPORTATION DEPARTMENT
BRIDGE ENGINEERING DIVISION

WARDROP ENGINEERING INC.
WINNIPEG TORONTO THUNDER BAY

LOUISE BRIDGE – FLOOD '97 MONITORING
RIVERBED SOUNDINGS
SCOUR INVESTIGATION
SECTION A–A (AT BRIDGE)

DESIGNED BY: A.A.	DRAWN BY: G.I.	DWG NO.
CHECKED BY: R.V.G.	DATE: 97.06.16	B107-97-S2

7. DISRAELI OVERPASS AND BRIDGE

Mr. Gord Smith, P.Eng.
Bridge Maintenance Engineer
City of Winnipeg
100 Main Street
Winnipeg, MB R3C 1A4

970007-07-00
October 23, 1997

Dear Mr. Smith:

Re: Disraeli Bridge - Sonar Survey

Wardrop Engineering performed a sonar survey at the Disraeli Bridge on August 11, 1997, as part of a comprehensive sonar survey program for several bridges in the City of Winnipeg. Sonar readings were taken to identify riverbed scour which may have been caused as a result of the 1997 spring flood and to provide baseline information for comparison with future sonar surveys.

Sonar data collection was obtained with the help of the City of Winnipeg Harbour Master who provided a boat and operator for the survey. Locations of depth measurements were determined using a total station and the sonar data collected was obtained using a Humminbird LCD depth finder. Sonar readings were taken at approximately 5 m intervals on a grid system, and locations with large variations in depths were focused on using a smaller grid system of approximately 0.5 m. Our survey extended from approximately 30 m upstream to 60 m downstream of the piers.

Attached is a plan view of the Disraeli Bridge complete with contours showing riverbed elevations of the surrounding area. Also attached is a section taken near the centreline of the bridge structure.

The following general observations were noted:

- The water level at the Disraeli Bridge was 223.6 m above sea level on August 11, 1997.
- Average riverbed elevations were between 217.5 to 219.0 m in the main river channel area.
- We found no evidence of significant scour or deposition adjacent to the piers or in the general area of the bridge.

If you have any questions, please call.

Sincerely,

WARDROP ENGINEERING INC.

R. van Ginkel, P.Eng.

RVG/ldf
Enclosure

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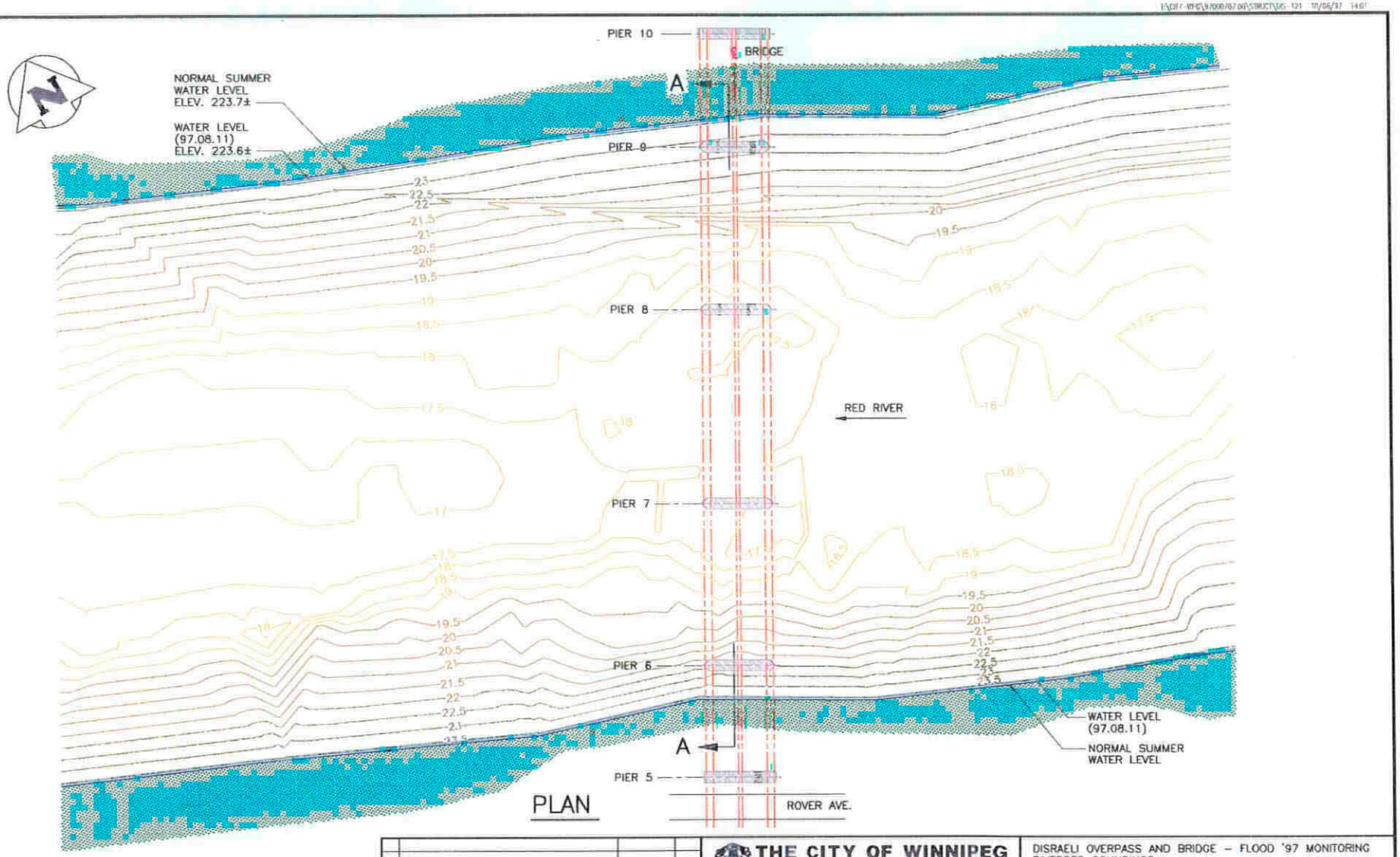

NOTE:
WATER LEVEL (97.08.11)
– DATE RIVERBED SOUNDINGS WERE CONDUCTED.

NO.	REVISIONS	DATE	BY
	REVISIONS/ISSUE		

THE CITY OF WINNIPEG
STREETS AND TRANSPORTATION DEPARTMENT
BRIDGE ENGINEERING DIVISION

WARDROP ENGINEERING INC.
WINNIPEG TORONTO THUNDER BAY

DISRAELI OVERPASS AND BRIDGE – FLOOD '97 MONITORING
RIVERBED SOUNDINGS

SCOUR INVESTIGATION PLAN

DESIGNED BY: A.A.	DRAWN BY: G.I.	DWG NO.	B111-97-S1
CHECKED BY: R.V.G.	DATE: 97.09.12		

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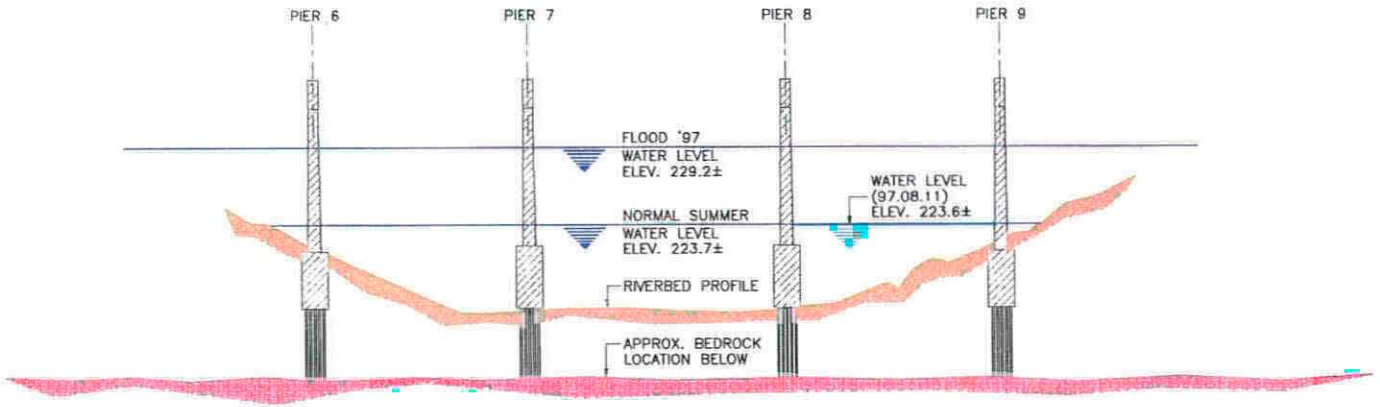

SECTION A–A (AT BRIDGE)

SCALE: HORIZ. = 1
VERT. = 3

NO.	REVISIONS	DATE	BY
	REVISIONS/ISSUE		

THE CITY OF WINNIPEG
STREETS AND TRANSPORTATION DEPARTMENT
BRIDGE ENGINEERING DIVISION

WARDROP ENGINEERING INC.
WINNIPEG TORONTO THUNDER BAY

DISRAELI OVERPASS AND BRIDGE – FLOOD '97 MONITORING
RIVERBED SOUNDINGS
SCOUR INVESTIGATION
SECTION A–A (AT BRIDGE)

DESIGNED BY: A.A.	DRAWN BY: G.I.	DWG NO.
CHECKED BY: R.V.G.	DATE: 97.09.125	B111–97–S2

W.I.D. 97000/07-00-S122

8. REDWOOD BRIDGE

Mr. Gord Smith, P.Eng.
Bridge Maintenance Engineer
City of Winnipeg
100 Main Street
Winnipeg, MB R3C 1A4

970007-07-00
July 21, 1997

Dear Mr. Smith:

Re: Redwood Bridge - Sonar Survey

Wardrop Engineering performed a sonar survey at the Redwood Bridge on June 27, 1997, as part of a comprehensive sonar survey program for several bridges in the City of Winnipeg. Sonar readings were taken to identify riverbed scour which may have been caused as a result of the 1997 spring flood and to provide baseline information for comparison with future sonar surveys.

Sonar data collection was obtained with the help of the City of Winnipeg Harbour Master who provided a boat and operator for the survey. Locations of depth measurements were determined using a total station and the sonar data collected was obtained using a Humminbird LCD depth finder. Sonar readings were taken at approximately 5 m intervals on a grid system, and locations with large variations in depths were focused on using a smaller grid system of approximately 0.5 m. Our survey extended from approximately 30 m upstream to 60 m downstream of the piers.

Attached is a plan view of the Redwood Bridge complete with contours showing riverbed elevations of the surrounding area. Also attached is a section taken near the centreline on the bridge structure.

The following general observations were noted:

- The water level at the Redwood Bridge was 223.6 m above sea level on June 27, 1997.
- Average riverbed elevations were generally between 215.5 to 218 m in the main river channel.
- There is evidence of deposition in two locations:
  - Immediately adjacent to the southwest corner of the ice breaker the deposition reaches a peak depth of 3.5 m at an elevation of 220.5 m and covers approximately 20 m^2 (assuming an average depth of 217 m).
  - Immediately adjacent to the north end of Pier 2 the deposition reaches a peak depth of 2.5 m at an elevation of 219.5 m^2 and covers approximately 20 m^2 (assuming an average depth of 217 m).

...2

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Mr. Gord Smith, P.Eng.
City of Winnipeg

July 21, 1997

- There was no evidence of significant scour adjacent to the piers or the general area of the bridge.

If you have any questions, please call.

Sincerely,

WARDROP ENGINEERING INC.

R. van Ginkel, P.Eng.

RVG/ldf

Enclosure

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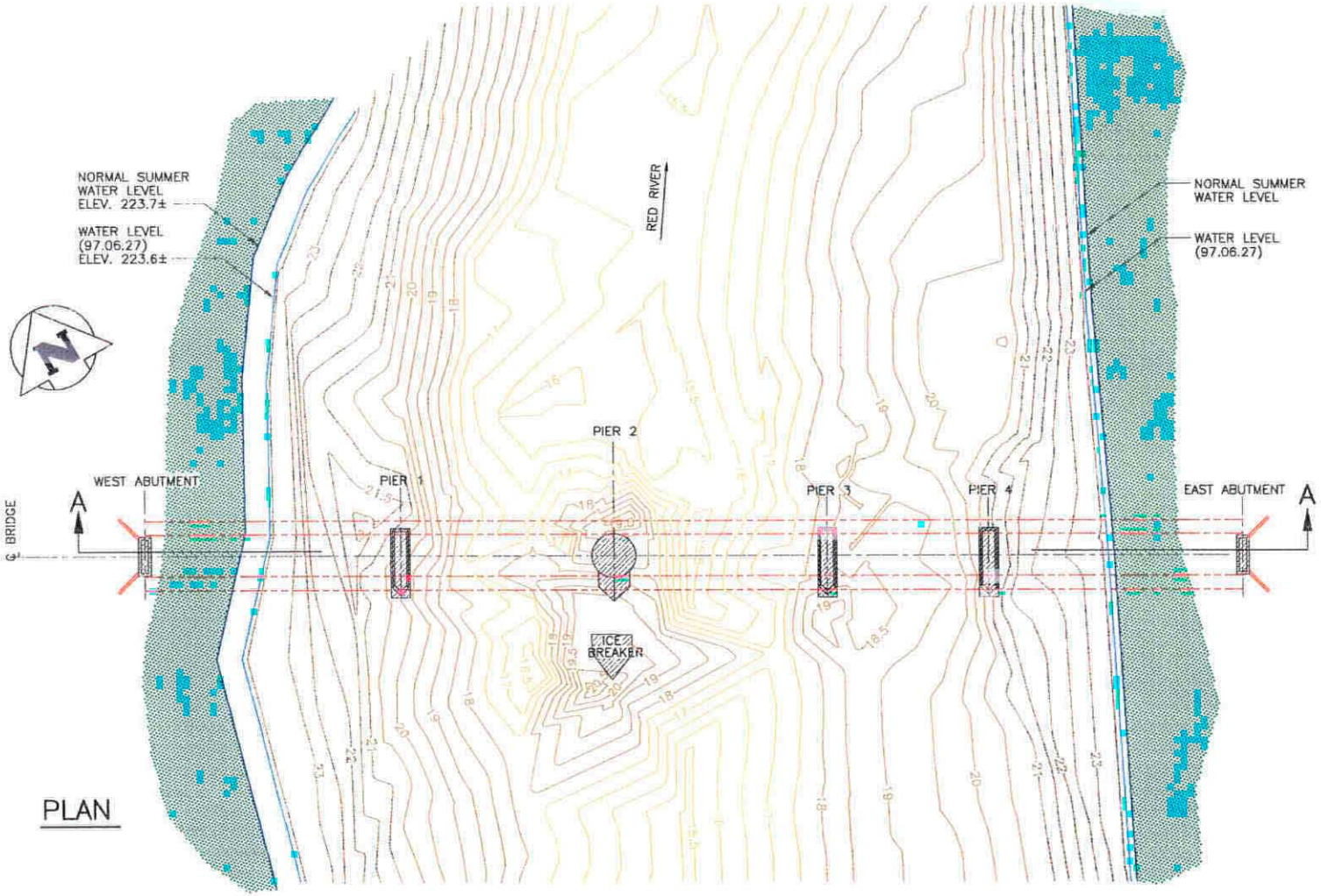


PLAN

NOTE:
WATER LEVEL (97.06.27)
– DATE RIVERBED SOUNDINGS WERE CONDUCTED.

NO.	REVISIONS	DATE	BY
	REVISIONS/ISSUE		

THE CITY OF WINNIPEG
STREETS AND TRANSPORTATION DEPARTMENT
BRIDGE ENGINEERING DIVISION

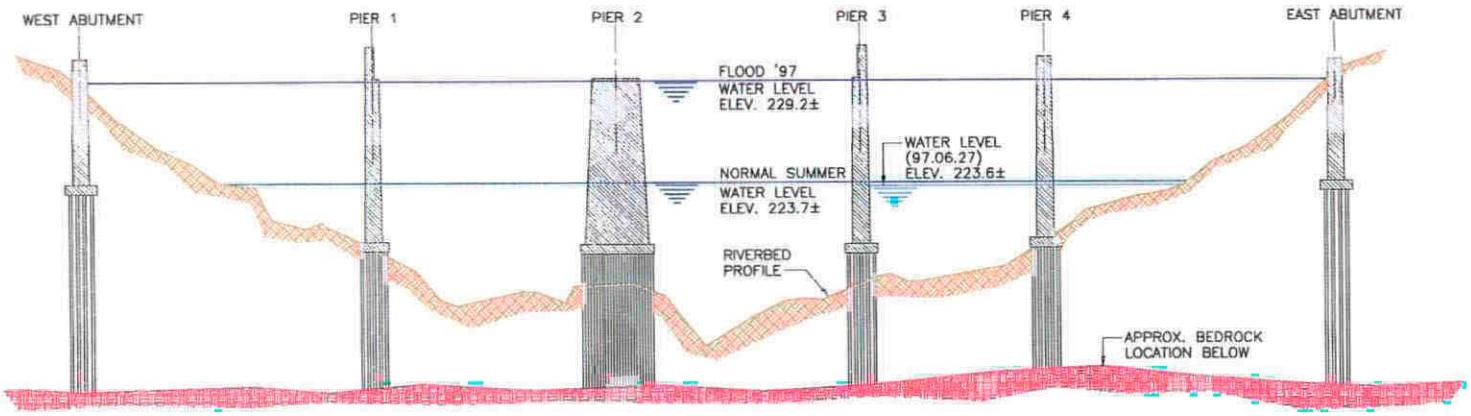
WARDROP ENGINEERING INC.
WINNIPEG TORONTO THUNDER BAY

REDWOOD BRIDGE – FLOOD '97 MONITORING
RIVERBED SOUNDINGS

SCOUR INVESTIGATION PLAN

DESIGNED BY: A.A.	DRAWN BY: G.I.	DWG NO.
CHECKED BY: R.V.G.	DATE: 97.06.30	B113-97-S1

W.E.I. 97000707-00-S51



SECTION A–A (AT BRIDGE)

SCALE: HORIZ. = 1
VERT. = 3

NO.	REVISIONS	DATE	BY
	REVISIONS/ISSUE		

THE CITY OF WINNIPEG
STREETS AND TRANSPORTATION DEPARTMENT
BRIDGE ENGINEERING DIVISION

WARDROP ENGINEERING INC.
WINNIPEG TORONTO THUNDER BAY

REDWOOD BRIDGE – FLOOD '97 MONITORING
RIVERBED SOUNDINGS

SCOUR INVESTIGATION
SECTION A–A (AT BRIDGE)

DESIGNED BY: A.A.	DRAWN BY: G.I.	DWG NO.
CHECKED BY: R.V.C.	DATE: 97.07.14	B113-97-S2

9. KILDONAN CORRIDOR BRIDGE

Mr. Gord Smith, P.Eng.
Bridge Maintenance Engineer
City of Winnipeg
100 Main Street
Winnipeg, MB R3C 1A4

970007-07-00
October 24, 1997

Dear Mr. Smith:

Re: Kildonan Bridge - Sonar Survey

Wardrop Engineering performed a sonar survey at the Kildonan Bridge on July 14, 1997, as part of a comprehensive sonar survey program for several bridges in the City of Winnipeg. Sonar readings were taken to identify riverbed scour which may have been caused as a result of the 1997 spring flood and to provide baseline information for comparison with future sonar surveys.

Sonar data collection was obtained with the help of the City of Winnipeg Harbour Master who provided a boat and operator for the survey. Locations of depth measurements were determined using a total station and the sonar data collected was obtained using a Humminbird LCD depth finder. Sonar readings were taken at approximately 5 m intervals on a grid system, and locations with large variations in depths were focused on using a smaller grid system of approximately 0.5 m. Our survey extended from approximately 30 m upstream to 60 m downstream of the piers.

Attached is a plan view of the Kildonan Bridge complete with contours showing riverbed elevations of the surrounding area. Also attached are three sections, one taken near the centreline of the eastbound structure, one taken near the centreline of the westbound structure, and one taken between the two structures.

The following general observations were noted:

- The water level at the Kildonan Bridge was 225.4 m above sea level on July 14, 1997.
- Average riverbed elevations were between 213.5 to 216.0 m in the main river channel area.
- We found evidence of deposition in two locations:
    - Immediately adjacent to the southwest corner of Pier 3 the deposition reaches a depth of 2.0 m at an elevation of 217.0 m and covers approximately 15 m^2.
    - Approximately 10 m to the south of Pier 3 the deposition reaches a depth of 3.0 to 3.5 m at an elevation of 218.0 to 218.5 m and covers approximately 25 m^2.

...2

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Mr. Gord Smith, P.Eng.
City of Winnipeg

October 24, 1997

- We found evidence of higher than average river bottom elevations along the east and west sides of Pier 3. Through examination of the 1989 as-built drawings of the bridge and our sonar readings, it appears as though this is the original riprap which was placed along both edges of the pier during construction.

- We found evidence of scour approximately 20 m to the west of the south end of Pier 2. The scour reaches a deep point at about 214.5 m, approximately 1.5 m below the average river bottom elevation in that area. It covers an area of approximately 15 m^2 and has a volume of approximately 22.5 m^3. This scour area may be attributed to the transition from riprap to a softer, natural river bottom material.

If you have any questions, please call.

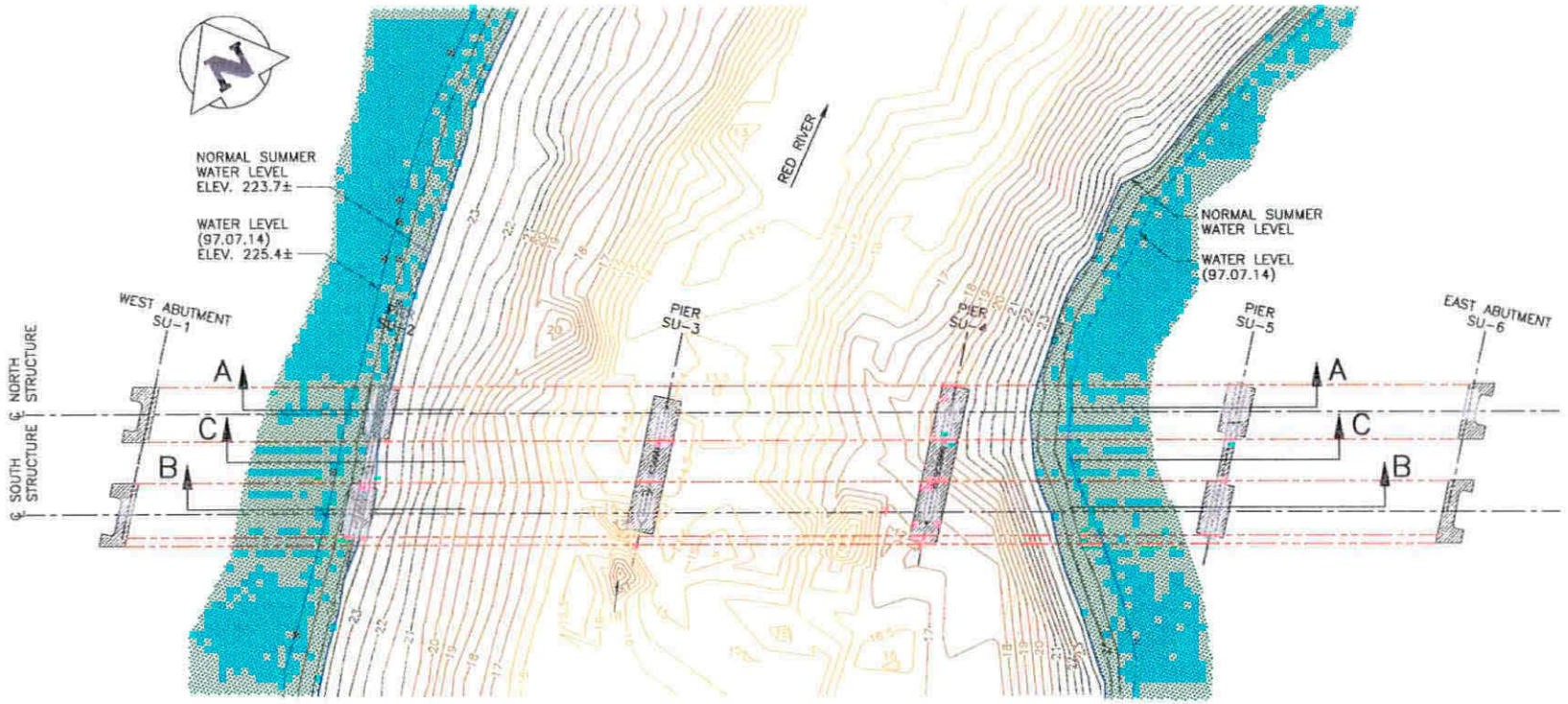
Sincerely,

WARDROP ENGINEERING INC.

R. van Ginkel, P.Eng.

RVG/ldf

Enclosure



PLAN

NOTE:
WATER LEVEL (97.07.14)
– DATE RIVERBED SOUNDINGS WERE CONDUCTED.

NO.	REVISIONS	DATE	BY
	REVISIONS/ISSUE		

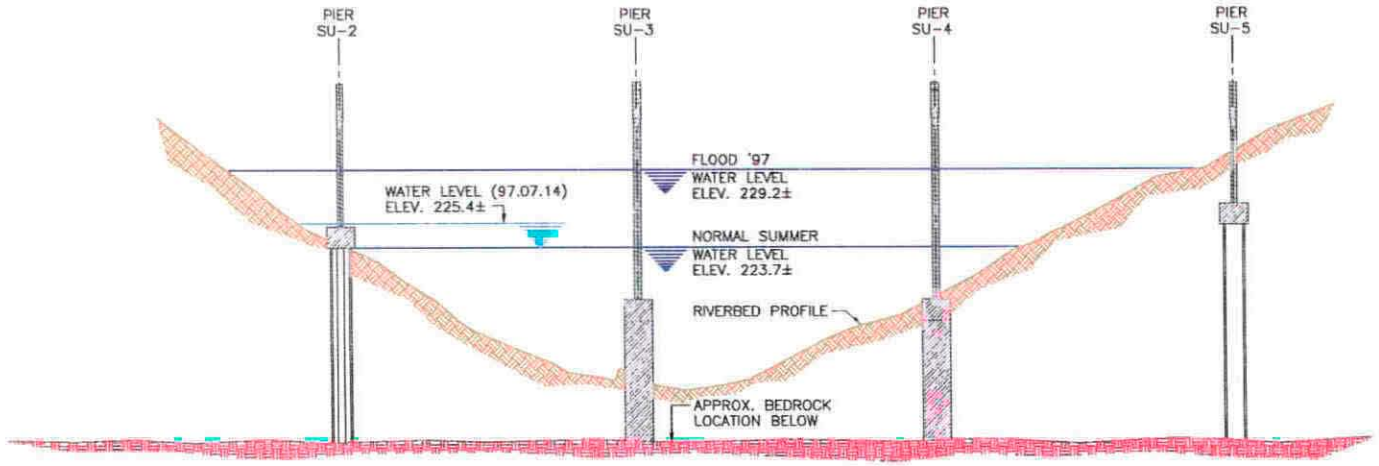
THE CITY OF WINNIPEG
STREETS AND TRANSPORTATION DEPARTMENT
BRIDGE ENGINEERING DIVISION

WARDROP ENGINEERING INC.
WINNIPEG TORONTO THUNDER BAY

KILDONAN CORRIDOR BRIDGE – FLOOD '97 MONITORING
RIVERBED SOUNDINGS

SCOUR INVESTIGATION
PLAN

DESIGNED BY: A.A.	DRAWN BY: G.I.	DWG NO.
CHECKED BY: R.V.G.	DATE: 97.07.17	B216-97-S1



SECTION A–A (AT NORTH BRIDGE)

SCALE: HORIZ. = 1
VERT. = 3

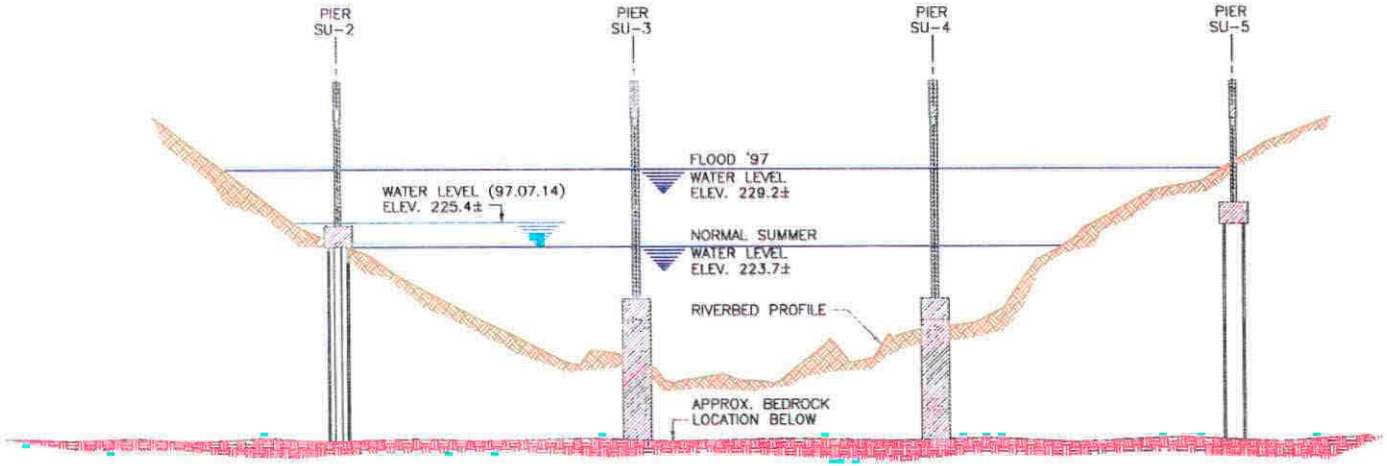
NO.	REVISIONS	DATE	BY
	REVISIONS/ISSUE		

THE CITY OF WINNIPEG
STREETS AND TRANSPORTATION DEPARTMENT
BRIDGE ENGINEERING DIVISION

WARDROP ENGINEERING INC.
WINNIPEG TORONTO THUNDER BAY

KILDONAN CORRIDOR BRIDGE – FLOOD '97 MONITORING
RIVERBED SOUNDINGS
SCOUR INVESTIGATION
SECTION A–A (AT NORTH BRIDGE)

DESIGNED BY: A.A.	DRAWN BY: G.I.	DWG NO.
CHECKED BY: R.V.G.	DATE: 97.07.21	B216–97–S2



SECTION B–B (AT SOUTH BRIDGE)

SCALE: HORIZ. = 1
VERT. = 3

NO.	REVISIONS	DATE	BY
	REVISIONS/ISSUE		

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STREETS AND TRANSPORTATION DEPARTMENT
BRIDGE ENGINEERING DIVISION

WARDROP ENGINEERING INC.
WINNIPEG TORONTO THUNDER BAY

KILDONAN CORRIDOR BRIDGE – FLOOD '97 MONITORING
RIVERBED SOUNDINGS

SCOUR INVESTIGATION
SECTION B–B (AT SOUTH BRIDGE)

DESIGNED BY: A.A.	DRAWN BY: G.I.	DWG NO.
CHECKED BY: R.V.G.	DATE: 97.07.21	B216-97-S3

10. MARYLAND BRIDGE

WARDROP Engineering Inc.

Mr. Gord Smith, P.Eng.
Bridge Maintenance Engineer
City of Winnipeg
100 Main Street
Winnipeg, MB R3C 1A4

970007-07-00
October 23, 1997

Dear Mr. Smith:

Re: Maryland Bridge - Sonar Survey

Wardrop Engineering performed a sonar survey at the Maryland Bridge on July 22, 1997, as part of a comprehensive sonar survey program for several bridges in the City of Winnipeg. Sonar readings were taken to identify riverbed scour which may have been caused as a result of the 1997 spring flood and to provide baseline information for comparison with future sonar surveys.

Sonar data collection was obtained with the help of the City of Winnipeg Harbour Master who provided a boat and operator for the survey. Locations of depth measurements were determined using a total station and the sonar data collected was obtained using a Humminbird LCD depth finder. Sonar readings were taken at approximately 5 m intervals on a grid system, and locations with large variations in depths were focused on using a smaller grid system of approximately 0.5 m. Our survey extended from approximately 30 m upstream to 60 m downstream of the piers.

Attached is a plan view of the Maryland Bridge complete with contours showing riverbed elevations of the surrounding area. Also attached are two sections, one taken near the centreline of the west structure and the second taken near the centreline of the east structure.

The following general observations were noted:

- The water level at the Maryland Bridge was 225.3 m above sea level on July 22, 1997.
- Average riverbed elevations were between 220.5 to 222.5 m in the main river channel area.
- We found no evidence of significant scour or deposition adjacent to the piers or in the general area of the bridge.

If you have any questions, please call.

Sincerely,

WARDROP ENGINEERING INC.

R. van Ginkel, P.Eng.

RVG/ldf
Enclosure

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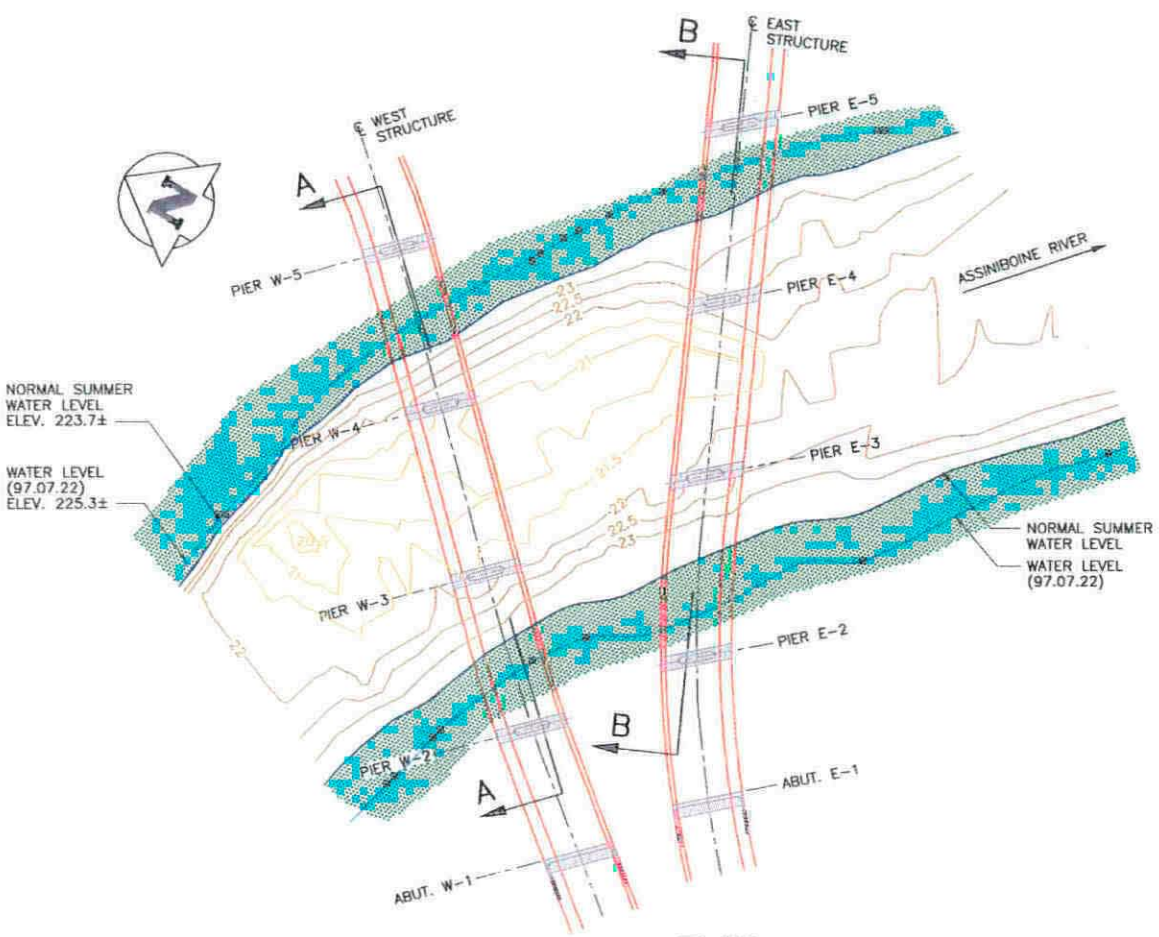


PLAN

NOTE:
WATER LEVEL (97.07.22)
– DATE RIVERBED SOUNDINGS WERE CONDUCTED.

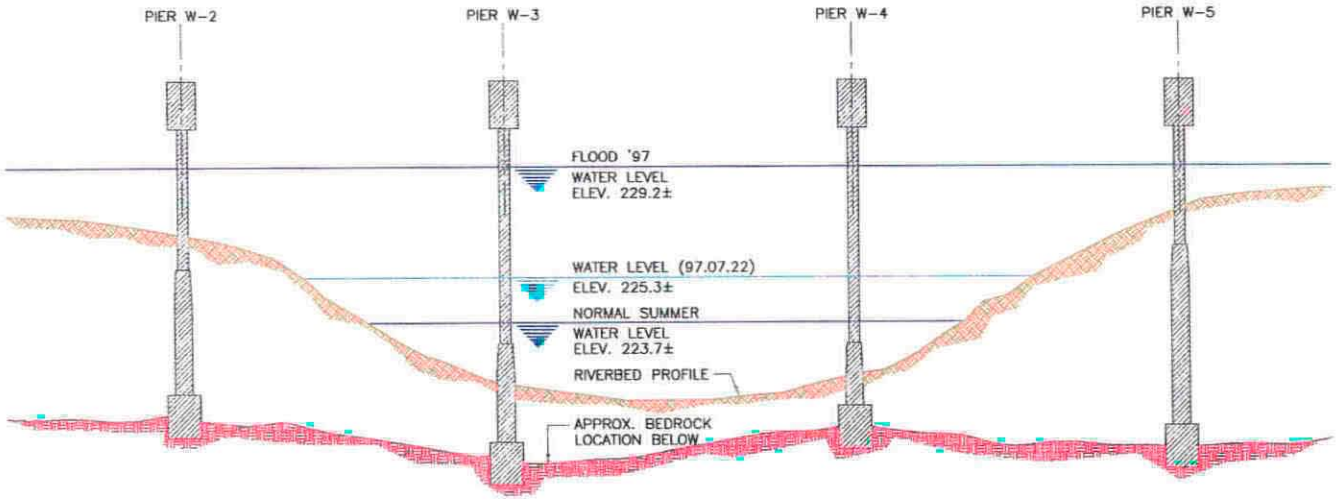
NO.	REVISIONS	DATE	BY
	REVISIONS/ISSUE		

THE CITY OF WINNIPEG
STREETS AND TRANSPORTATION DEPARTMENT
BRIDGE ENGINEERING DIVISION

WARDROP ENGINEERING INC.
WINNIPEG TORONTO THUNDER BAY

MARYLAND BRIDGE – FLOOD '97 MONITORING
RIVERBED SOUNDINGS
SCOUR INVESTIGATION
PLAN

DESIGNED BY: A.A.	DRAWN BY: G.I.	DWG NO.
CHECKED BY: R.V.G.	DATE: 97.08.25	B108-97-S1



SECTION A–A (AT WEST BRIDGE)

SCALE: HORIZ. = 1
VERT. = 3

NO.	REVISIONS	DATE	BY
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THE CITY OF WINNIPEG
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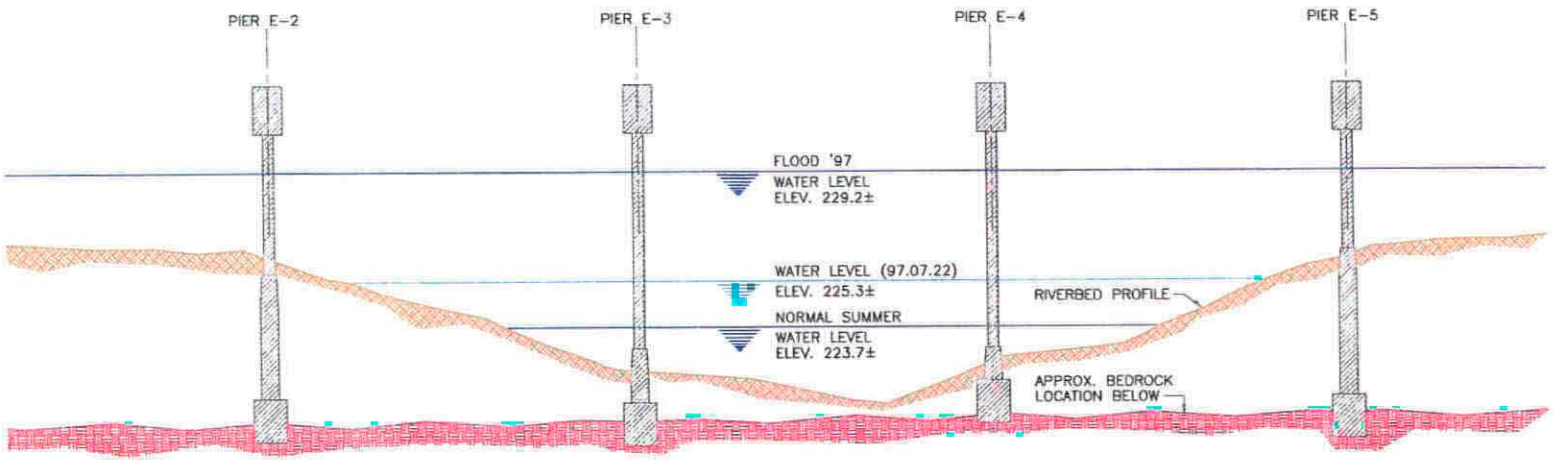
BRIDGE ENGINEERING DIVISION

WARDROP ENGINEERING INC.
WINNIPEG TORONTO THUNDER BAY

MARYLAND BRIDGE – FLOOD '97 MONITORING
RIVERBED SOUNDINGS

SCOUR INVESTIGATION
SECTION A–A (AT WEST BRIDGE)

DESIGNED BY: A.A.	DRAWN BY: G.I.	DWG NO.
CHECKED BY: R.V.G.	DATE: 97.08.26	B108-97-S2



SECTION B-B (AT EAST BRIDGE)

SCALE: HORIZ. = 1
VERT. = 3

NO.	REVISIONS	DATE	BY
	REVISIONS/ISSUE		

THE CITY OF WINNIPEG
STREETS AND TRANSPORTATION DEPARTMENT
BRIDGE ENGINEERING DIVISION

WARDROP ENGINEERING INC.
WINNIPEG TORONTO THUNDER BAY

MARYLAND BRIDGE – FLOOD '97 MONITORING
RIVERBED SOUNDINGS

SCOUR INVESTIGATION
SECTION B-B (AT EAST BRIDGE)

DESIGNED BY: A.A.	DRAWN BY: G.I.	DWG NO.
CHECKED BY: R.V.G.	DATE: 97.08.26	B108-97-S3

W.I. 970007-07-00-S23

11. OSBORNE STREET BRIDGE

Mr. Gord Smith, P.Eng.
Bridge Maintenance Engineer
City of Winnipeg
100 Main Street
Winnipeg, MB R3C 1A4

970007-07-00
October 23, 1997

Dear Mr. Smith:

Re: Osborne Street Bridge - Sonar Survey

Wardrop Engineering performed a sonar survey at the Osborne Street Bridge on August 13, 1997, as part of a comprehensive sonar survey program for several bridges in the City of Winnipeg. Sonar readings were taken to identify riverbed scour which may have been caused as a result of the 1997 spring flood and to provide baseline information for comparison with future sonar surveys.

Sonar data collection was obtained with the help of the City of Winnipeg Harbour Master who provided a boat and operator for the survey. Locations of depth measurements were determined using a total station and the sonar data collected was obtained using a Humminbird LCD depth finder. Sonar readings were taken at approximately 5 m intervals on a grid system, and locations with large variations in depths were focused on using a smaller grid system of approximately 0.5 m. Our survey extended from approximately 30 m upstream to 60 m downstream of the piers.

Attached is a plan view of the Osborne Street Bridge complete with contours showing riverbed elevations of the surrounding area. Also attached is a section taken near the centreline of the bridge structure.

The following general observations were noted:

- The water level at the Osborne Street Bridge was 223.8 m above sea level on August 13, 1997.
- Average riverbed elevations were between 219.5 to 220.5 m in the main river channel area.
- We found no evidence of significant scour or deposition adjacent to the piers or in the general area of the bridge.

If you have any questions, please call.

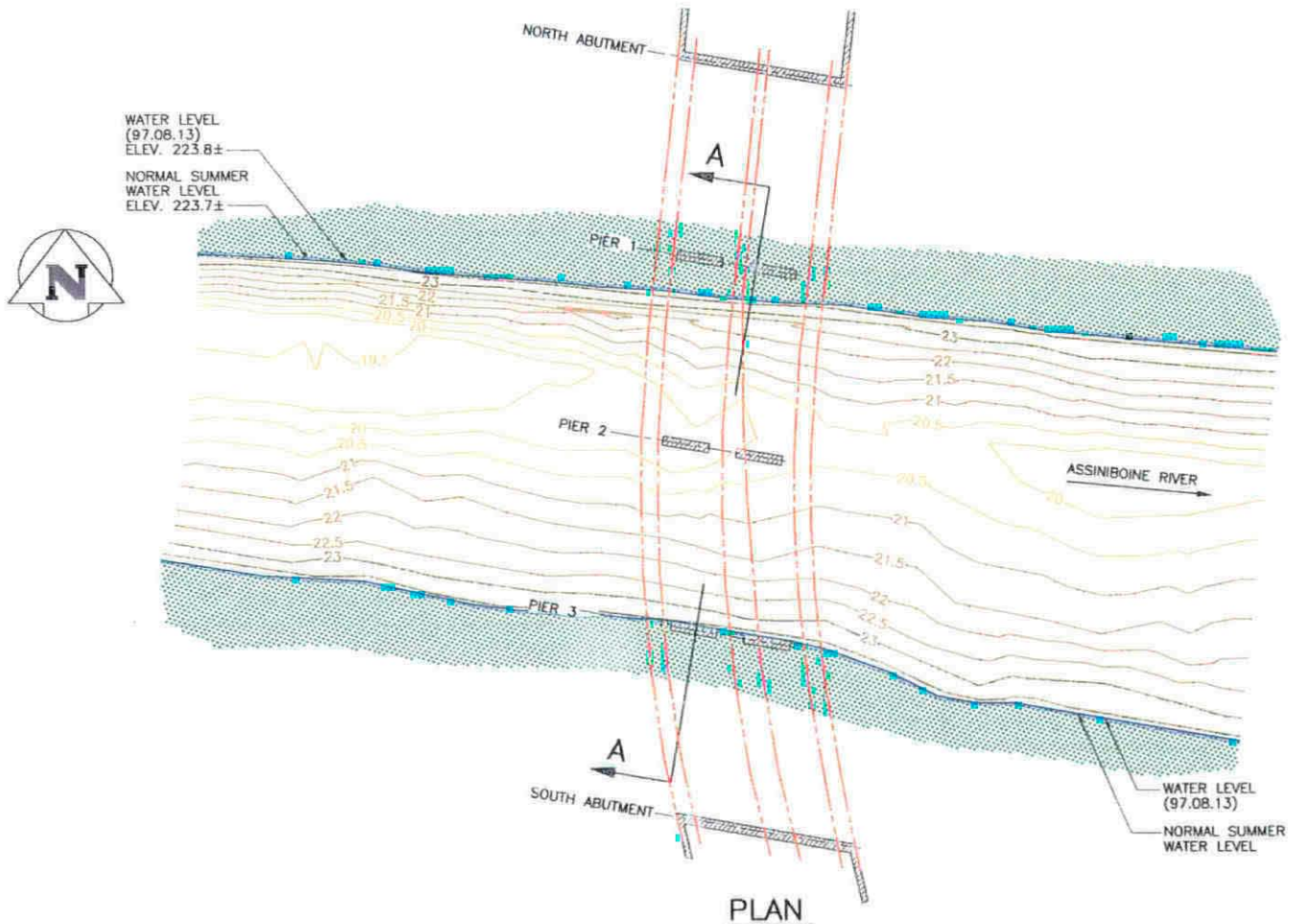
Sincerely,

WARDROP ENGINEERING INC.

R. van Ginkel, P.Eng.

RVG/ldf
Enclosure

Web Site: http//www.wardrop.com
400-386 Broadway, Winnipeg, Mb., Canada, R3C 4M8, Ph: 204-956-0980 Fax: 204-957-5389 E-mail: Winnipeg@Wardrop.com
Winnipeg • Toronto • Thunder Bay • Saskatoon • Asia • Africa



PLAN

NOTE:
WATER LEVEL (97.08.13)
– DATE RIVERBED SOUNDINGS WERE CONDUCTED.

NO.	REVISIONS	DATE	BY
	REVISIONS/ISSUE		

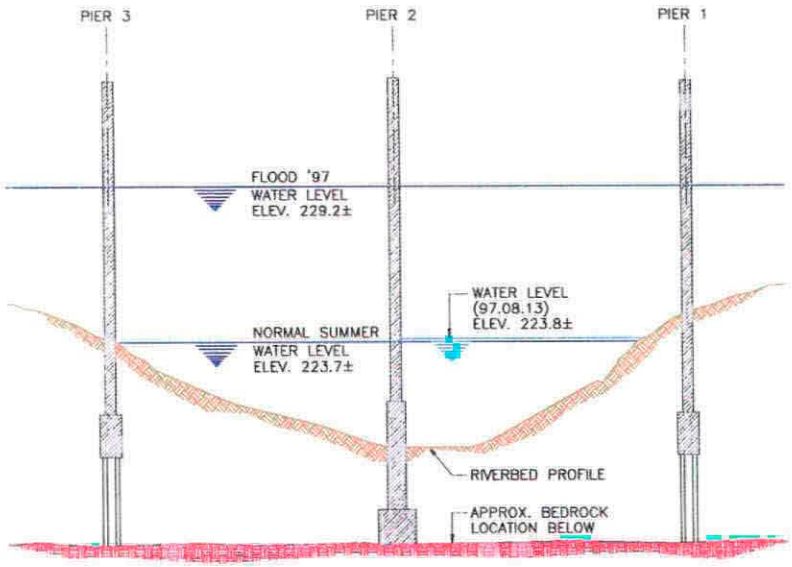
THE CITY OF WINNIPEG
STREETS AND TRANSPORTATION DEPARTMENT
BRIDGE ENGINEERING DIVISION

WARDROP ENGINEERING INC.
WINNIPEG TORONTO THUNDER BAY

OSBORNE STREET BRIDGE – FLOOD '97 MONITORING
RIVERBED SOUNDINGS

SCOUR INVESTIGATION
PLAN

DESIGNED BY: A.A.	DRAWN BY: G.I.	DWG NO.
CHECKED BY: R.V.G.	DATE: 97.08.27	B109-97-S1



SECTION A–A (AT BRIDGE)

SCALE: HORIZ. = 1
VERT. = 3

NO.	REVISIONS	DATE	BY
	REVISIONS/ISSUE		

THE CITY OF WINNIPEG
STREETS AND TRANSPORTATION DEPARTMENT
BRIDGE ENGINEERING DIVISION

WARDROP ENGINEERING INC.
WINNIPEG TORONTO THUNDER BAY

OSBORNE STREET BRIDGE – FLOOD '97 MONITORING
RIVERBED SOUNDINGS
SCOUR INVESTIGATION
SECTION A–A (AT BRIDGE)

DESIGNED BY: A.A.	DRAWN BY: G.I.	DWG NO.
CHECKED BY: R.V.G.	DATE: 97.09.02	B109–97–S2

12. MIDTOWN BRIDGE

WARDROP Engineering Inc.

Mr. Gord Smith, P.Eng.
Bridge Maintenance Engineer
City of Winnipeg
100 Main Street
Winnipeg, MB R3C 1A4

970007-07-00
October 23, 1997

Dear Mr. Smith:

Re: Midtown Bridge - Sonar Survey

Wardrop Engineering performed a sonar survey at the Midtown Bridge on July 28, 1997, as part of a comprehensive sonar survey program for several bridges in the City of Winnipeg. Sonar readings were taken to identify riverbed scour which may have been caused as a result of the 1997 spring flood and to provide baseline information for comparison with future sonar surveys.

Sonar data collection was obtained with the help of the City of Winnipeg Harbour Master who provided a boat and operator for the survey. Locations of depth measurements were determined using a total station and the sonar data collected was obtained using a Humminbird LCD depth finder. Sonar readings were taken at approximately 5 m intervals on a grid system, and locations with large variations in depths were focused on using a smaller grid system of approximately 0.5 m. Our survey extended from approximately 30 m upstream to 60 m downstream of the piers.

Attached is a plan view of the Midtown Bridge complete with contours showing riverbed elevations of the surrounding area. Also attached is a section taken near the centreline of the bridge structure.

The following general observations were noted:

- The water level at the Midtown Bridge was 224.2 m above sea level on July 28, 1997.
- Average riverbed elevations were between 220.0 to 221.0 m in the main river channel area.
- We found no evidence of significant scour or deposition adjacent to the piers or in the general area of the bridge.

If you have any questions, please call.

Sincerely,

WARDROP ENGINEERING INC.

R. van Ginkel, P.Eng.

RVG/ldf
Enclosure

Web Site: http//www.wardrop.com
400-386 BROADWAY, WINNIPEG, MB., CANADA, R3C 4M8, PH: 204-956-0980 FAX: 204-957-5389 E-MAIL: WINNIPEG@WARDROP.COM
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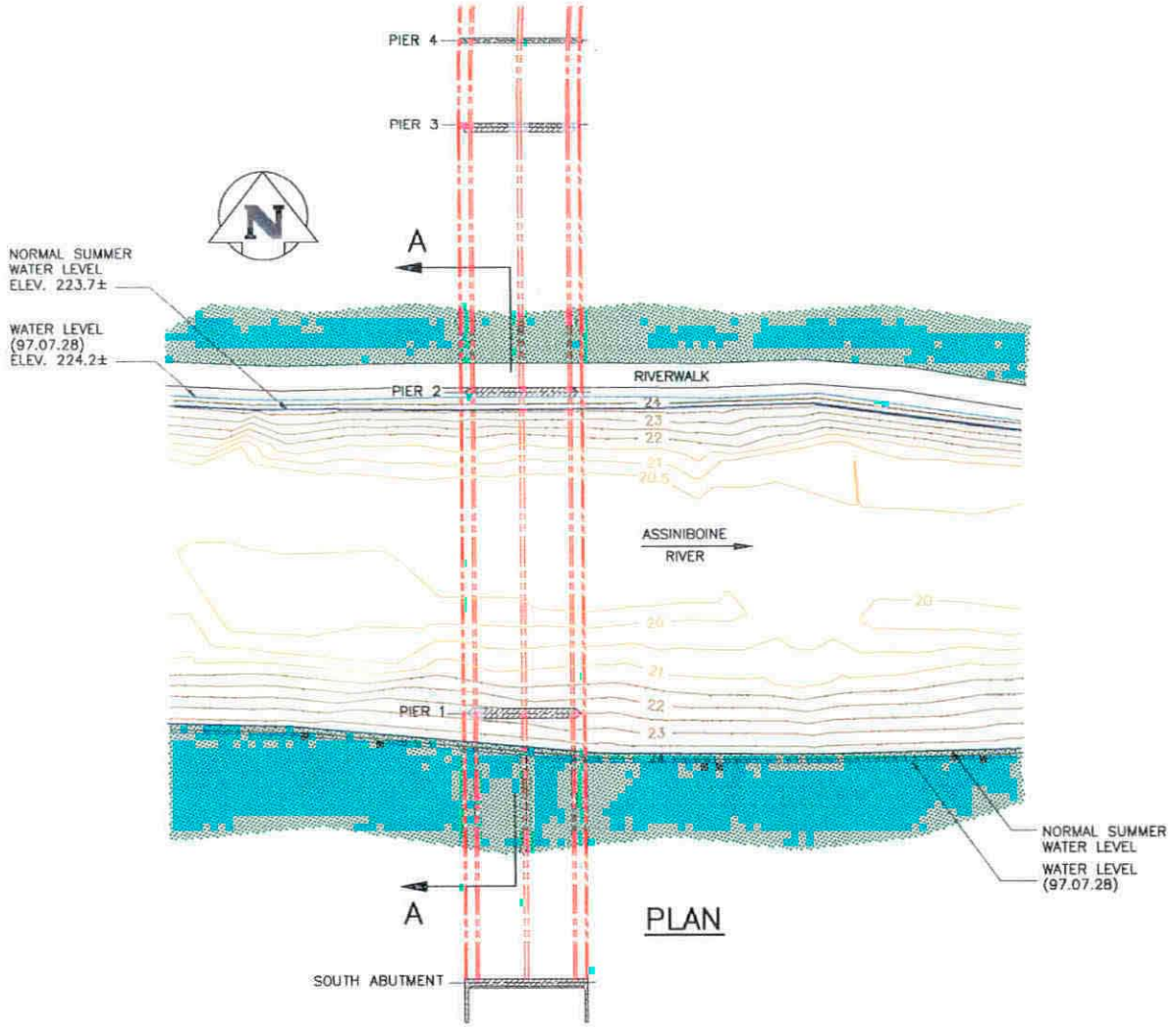

NOTE:
WATER LEVEL (97.07.28)
– DATE RIVERBED SOUNDINGS WERE CONDUCTED.

NO.	REVISIONS	DATE	BY
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THE CITY OF WINNIPEG
STREETS AND TRANSPORTATION DEPARTMENT
BRIDGE ENGINEERING DIVISION

WARDROP ENGINEERING INC.
WINNIPEG TORONTO THUNDER BAY

MIDTOWN BRIDGE – FLOOD '97 MONITORING
RIVERBED SOUNDINGS

SCOUR INVESTIGATION PLAN

DESIGNED BY: A.A.	DRAWN BY: G.I.	DWG NO.	B114–97–S1
CHECKED BY: R.V.G.	DATE: 97.09.11		

WARDROP Engineering Inc.

Mr. Gord Smith, P.Eng.
Bridge Maintenance Engineer
City of Winnipeg
100 Main Street
Winnipeg, MB R3C 1A4

970007-07-00
October 24, 1997

Dear Mr. Smith:

Re: Main Street Bridge - Sonar Survey

Wardrop Engineering performed a sonar survey at the Main Street Bridge on August 12, 1997, as part of a comprehensive sonar survey program for several bridges in the City of Winnipeg. Sonar readings were taken to identify riverbed scour which may have been caused as a result of the 1997 spring flood and to provide baseline information for comparison with future sonar surveys.

Sonar data collection was obtained with the help of the City of Winnipeg Harbour Master who provided a boat and operator for the survey. Locations of depth measurements were determined using a total station and the sonar data collected was obtained using a Humminbird LCD depth finder. Sonar readings were taken at approximately 5 m intervals on a grid system, and locations with large variations in depths were focused on using a smaller grid system of approximately 0.5 m. Our survey extended from approximately 30 m upstream to 60 m downstream of the piers.

Attached is a plan view of the Main Street Bridge complete with contours showing riverbed elevations of the surrounding area. Also attached is a section taken near of the centreline of the bridge structure.

The following general observations were noted:

- The water level at the Main Street Bridge was 223.8 m above sea level on August 12, 1997.
- Average riverbed elevations were between 219.5 to 221.0 m in the main river channel area.
- We found no evidence of significant scour or deposition adjacent to the piers or in the general area of the bridge, apart from temporary riprap work berms used for bridge replacement construction at the north and south banks of the river.

If you have any questions, please call.

Sincerely,

WARDROP ENGINEERING INC.

R. van Ginkel, P.Eng.

RVG/ldf
Enclosure

Web Site: http//www.wardrop.com
400-386 BROADWAY, WINNIPEG, MB., CANADA, R3C 4M8, PH: 204-956-0980 FAX: 204-957-5389 E-MAIL: WINNIPEG@WARDROP.COM
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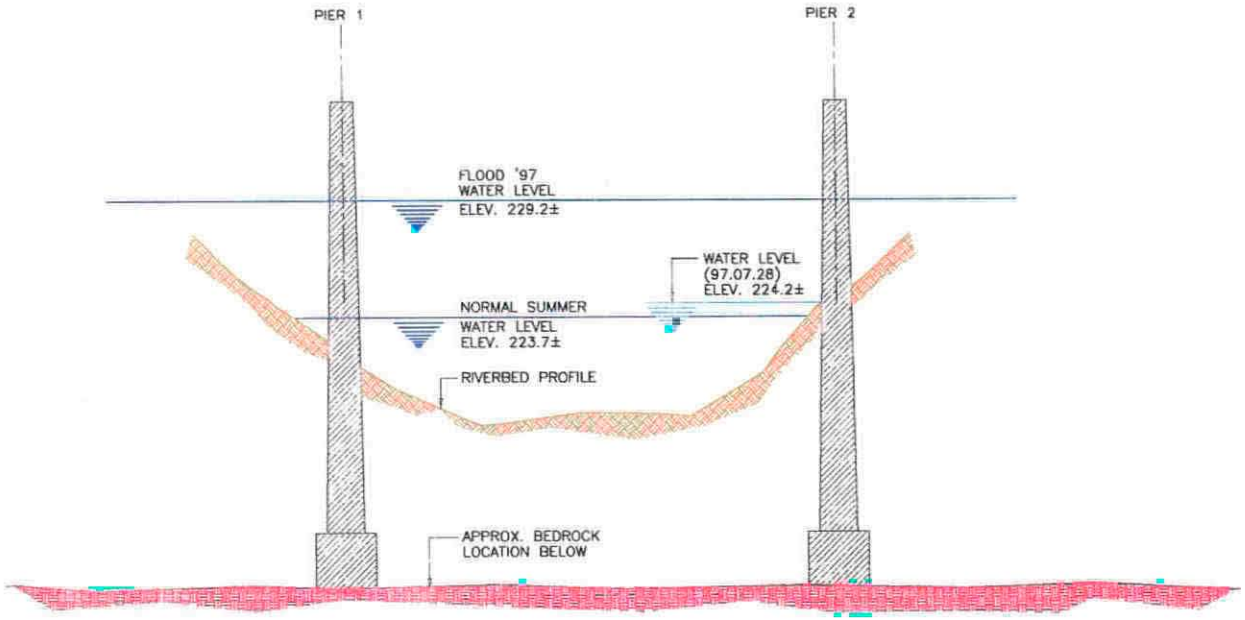

SECTION A–A (AT BRIDGE)

SCALE: HORIZ. = 1
VERT. = 3

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THE CITY OF WINNIPEG
STREETS AND TRANSPORTATION DEPARTMENT
BRIDGE ENGINEERING DIVISION

WARDROP ENGINEERING INC.
WINNIPEG TORONTO THUNDER BAY

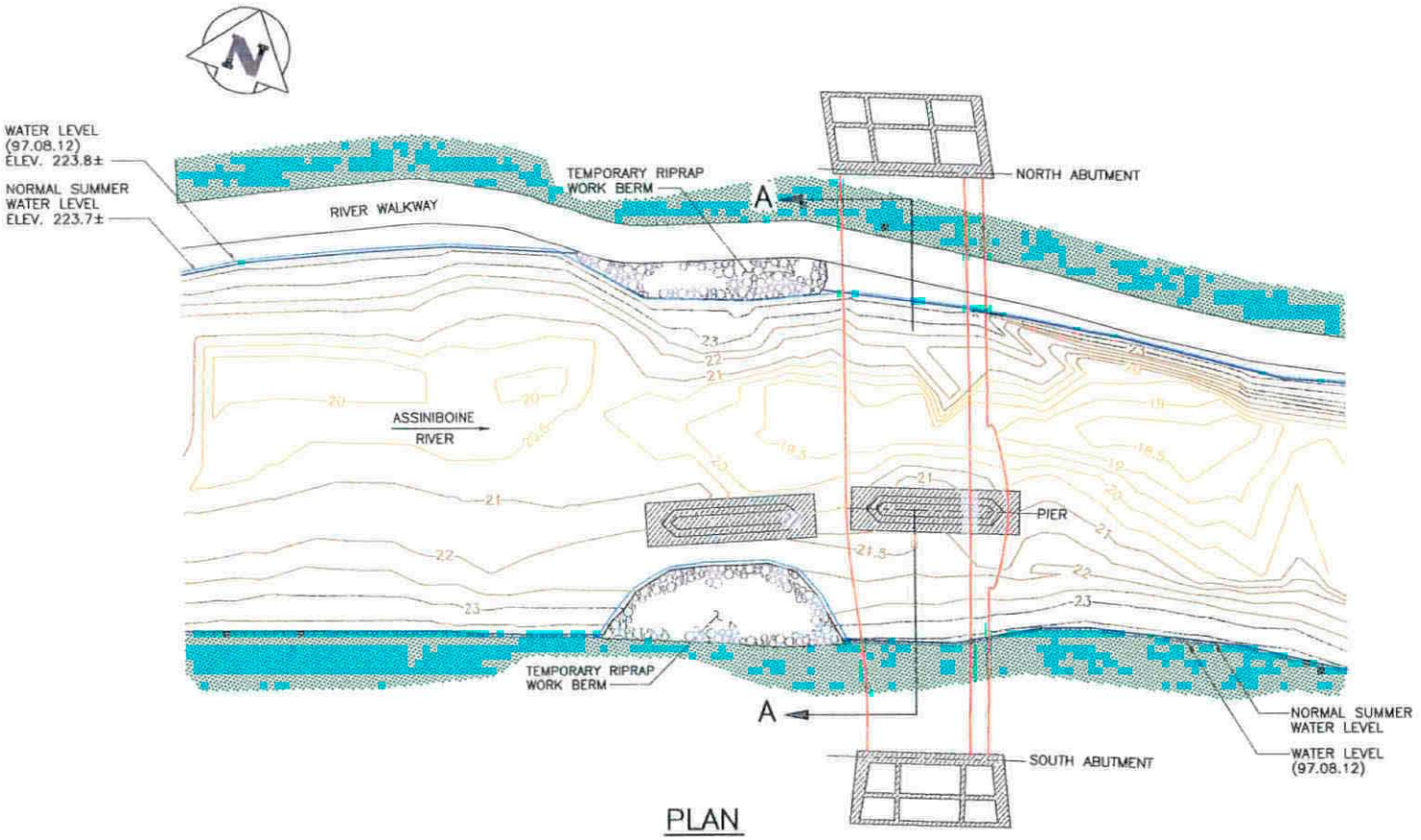
MIDTOWN BRIDGE – FLOOD '97 MONITORING
RIVERBED SOUNDINGS

SCOUR INVESTIGATION
SECTION A–A (AT BRIDGE)

DESIGNED BY: A.A.	DRAWN BY: G.I.	DWG NO. B114–97–S2
CHECKED BY: R.V.G.	DATE: 97.09.12	

W.E.I. 970097-07-00-S112

13. MAIN ST. BRIDGE



PLAN

NOTE:
WATER LEVEL (97.08.12)
– DATE RIVERBED SOUNDINGS WERE CONDUCTED.

NO.	REVISIONS	DATE	BY
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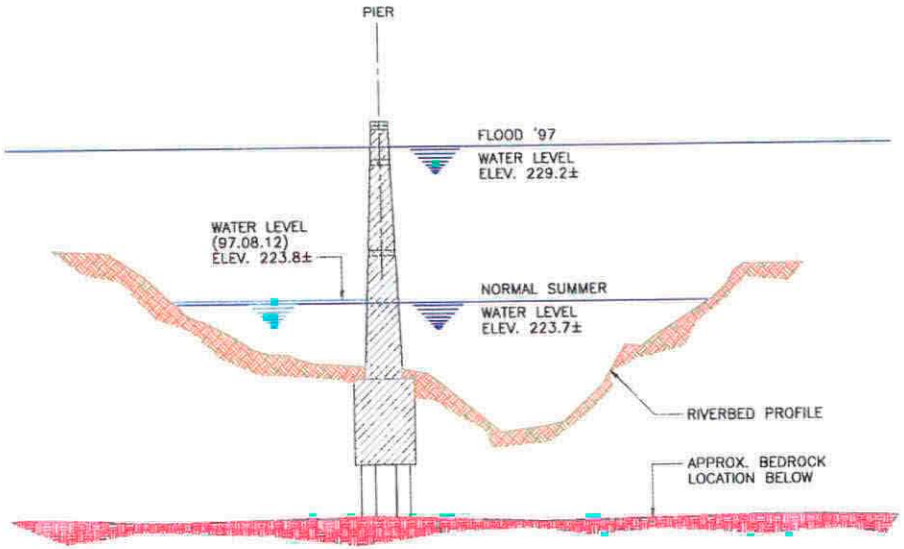
THE CITY OF WINNIPEG
STREETS AND TRANSPORTATION DEPARTMENT
BRIDGE ENGINEERING DIVISION

WARDROP ENGINEERING INC.
WINNIPEG TORONTO THUNDER BAY

MAIN ST. BRIDGE – FLOOD '97 MONITORING
RIVERBED SOUNDINGS

SCOUR INVESTIGATION PLAN

DESIGNED BY: A.A.	DRAWN BY: G.I.	DWG NO.	B104–97–S1
CHECKED BY: R.V.G.	DATE: 97.09.16		



SECTION A–A (AT BRIDGE)

SCALE: HORIZ. = 1
VERT. = 3

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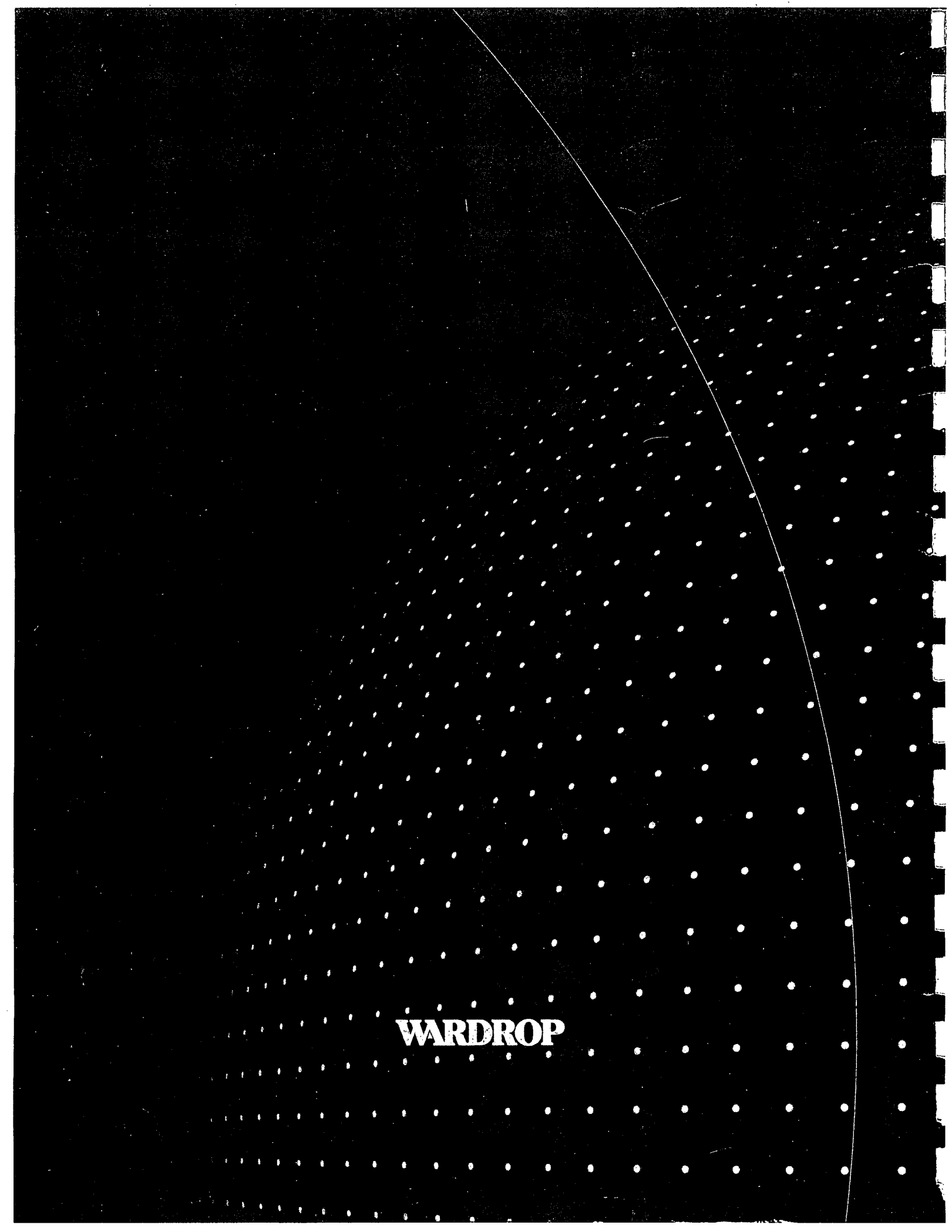
BRIDGE ENGINEERING DIVISION

WARDROP ENGINEERING INC.
WINNIPEG TORONTO THUNDER BAY

MAIN ST. BRIDGE – FLOOD '97 MONITORING
RIVERBED SOUNDINGS
SCOUR INVESTIGATION
SECTION A–A (AT BRIDGE)

DESIGNED BY: A.A.	DRAWN BY: G.I.	DWG NO.
CHECKED BY: R.V.G.	DATE: 97.09.25	B104–97–S2


WARDROP