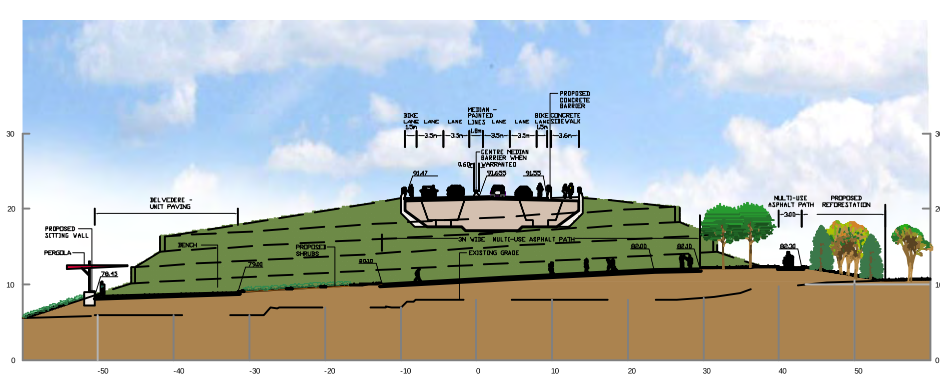
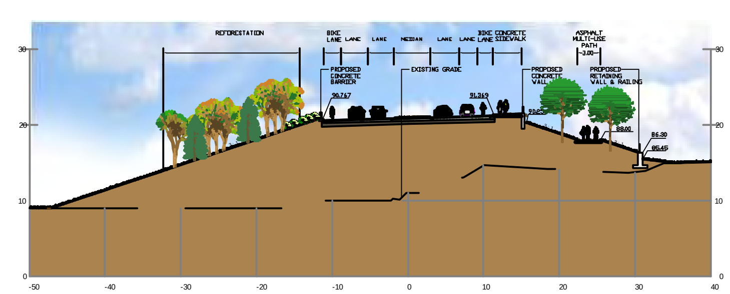
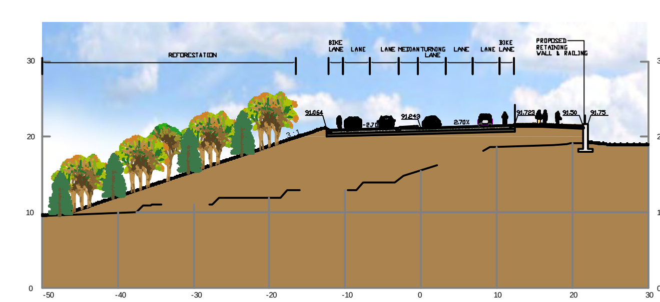
Tentative Property Requirements







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PROJECT:
CATARAQUI RIVER THIRD CROSSING
EA - STAGE 2
ENVIRONMENTAL STUDY REPORT

DRAWING:
EAST SIDE ROAD AND LANDSCAPE CONCEPT

J.L.Richards
ENGINEERS·ARCHITECTS·PLANNERS
J.L. Richards
& Associates Limited
203-863 Princess Street
Kingston, ON Canada
K7L 5N4
Tel: 613 544 1424
Fax: 613 544 5679

DESIGN:
DRAWN:
CHECKED:
PLOTTED: 26-Jan-12

DRAWING NO.: 4-26
JLR NO: 23446-02

9. Based on projected traffic volumes and patterns, it is proposed that:

   a) The following intersections would be signalized:

      i. John Counter Boulevard – Montreal Street;

      ii. Gore Road – Point St. Mark Drive – Gore Road Library; and

      iii. Gore Road – Kingston Road 15; and

   b) The Ascot Lane access onto John Counter Boulevard would have stop sign controls.

Table 4.18 below summarizes the preliminary opinion of probable capital cost for the alternative bridge designs and the four-lane shoreland roadway and landscape works, based on the: i) two-lane bridge configuration; ii) three-lane bridge / four-lane bridge substructure configuration; and iii) four-lane bridge configuration. As Table 4.18 indicates, capital cost estimates for the project (in 2011 dollars and excluding applicable taxes) range from:

1. $114 million to $120 million for the two-lane bridge scenario.

2. $145 million to $179 million for the three-lane bridge / four-lane bridge substructure scenario.

3. $161 million to $196 million for the four-lane bridge scenario.

In addition, the preliminary opinion of probable maintenance cost for the project (in 2011 dollars and excluding applicable taxes) is estimated to be up to $4,000 per lane km, or from $25,000 for the two-lane bridge configuration, to $30,000 for the three-lane bridge / four-lane bridge substructure configuration, to $35,000 for the four-lane bridge configuration.

.2 In-Water Bridge Construction Options

As introduced during Stage 1 of this EA study, temporary access into the Cataraqui River would be required for bridge construction equipment to install the pile foundations, construct the piers and install the superstructure. The three temporary in-water construction access options included the installation of a temporary earth berm, the use of dredging for construction barges or the installation of a temporary work bridge. These options are discussed below as they relate to the project site location.

A. Temporary Earth Berm

The temporary earth berm would involve infilling an area with earth material and capping it with gravel to provide a temporary roadway. Given that the water surface elevation is at roughly 74 m, the height of the berm would have to be at an elevation of around 76 m to ensure that the top of the berm is not impacted by water fluctuations and/or storm events. Moreover, as the elevation at the bottom of the peat layer and/or top of the clay layer within the riverbed ranges from around 66 m (near mid-river) to 71 m (typical), the depth of fill for the berm would also have to range from 5 m to 10 m. Note that the removal of the riverbed substrate would not be required for the berm.

As shown on Drawing 4.27, for bridge construction equipment access, the berm would have to be at least 10 m wide at the top, with an additional 40 m by 25 m area provided around each pier. The area covered by the berm at the toe of the fill would be approximately 6.2 hectares (ha). The berm would span from both riverbanks to the edge of the Rideau Canal's navigable channel. The canal's navigable channel would remain open and would not be affected by the berm. A series of culverts would also be installed in the berm to allow for river flow continuity and species movement. The berm would take up to two to three months to construct during the mid-summer/early fall and would be removed during this same period after the bridge is built. The impacted area would be left to re-vegetate naturally.

B. Dredging

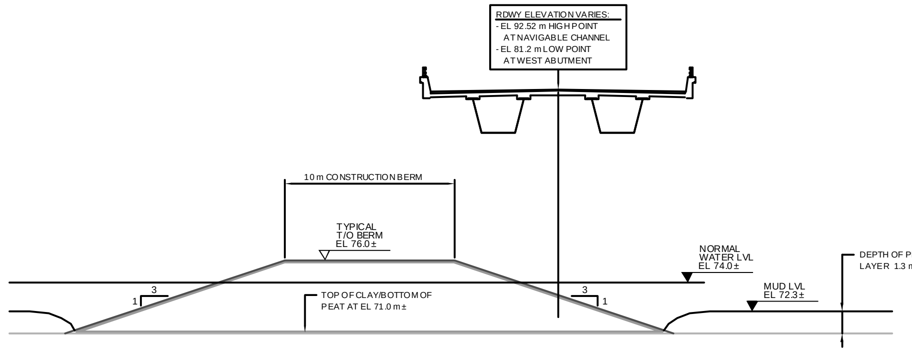
Construction barges need about 3 m of draft for water access. Since the water depth at the project site location is typically 1.5 m (at elevation 74 m), the dredged level should be at about elevation 71 m, or 1.4 m below the mudline. This will remove most of the peat/vegetative layer. As shown on Drawing 4.28, for bridge construction, the bottom width of the dredged area would have to be 15 m, with an additional 45 m by 25 m area provided around each pier. The total dredged area would be about 4.3 ha. Dredging would occur over a two month period during the mid-summer/early fall. Upon completion of the bridge, the dredged channel could either be back-filled or left in place.

C. Temporary Work Bridge

Drawing 4.29 shows an example of a temporary work bridge which would be built adjacent to the permanent bridge. It would also be installed closer to the water than the permanent bridge deck in order to accommodate bridge construction equipment that need vertical reach, such as large crawler cranes. The work bridge at the project site location would consist of 15 m spans with 600 mm diameter pile supports for each span. Incremental span construction starting from each shore would be employed. Based on a 1.2 km shore-to-shore crossing distance, it is estimated that 200 piles would be needed for the work bridge. The area of disturbance from the temporary piles would be about 0.6 ha and while in place, the work bridge would also cause shading to an additional 1.4 ha area, for a total combined impact area of 2 ha. The incremental installation of the work bridge would occur during the mid-summer/early fall. The work bridge would then be removed during this same period after the bridge is built. The temporary piles would either be removed or cut off below the top of the riverbed and left in place. It is estimated that this option would add 8 percent to 12 percent to the preliminary opinion of probable costs shown above in Table 4.18, as compared to the temporary earth berm or dredging options.

Table 4.18
Preliminary Opinion of Probable Capital Cost for the Alternative Bridge Designs (2-Lane, 3-Lane and 4-Lane Bridge Scenarios) and Shoreland Works

Construction Category	Arch With V-Piers			Tube			Box Girder		
	2-Lane Bridge ($)	3-Lane Bridge ($)	4-Lane Bridge ($)	2-Lane Bridge ($)	3-Lane Bridge ($)	4-Lane Bridge ($)	2-Lane Bridge ($)	3-Lane Bridge ($)	4-Lane Bridge ($)
Bridge Works									
Access and Site Preparation	2,700,000	4,000,000	4,000,000	2,700,000	4,000,000	4,000,000	2,700,000	4,000,000	4,000,000
Foundation Excavation and Backfill	1,360,000	2,720,000	2,720,000	1,360,000	1,360,000	1,360,000	1,360,000	1,360,000	1,360,000
Steel Pipe Piles	2,833,000	6,753,000	6,753,000	2,700,000	4,530,000	4,530,000	3,320,000	6,139,000	6,139,000
Installation of Piling	11,050,000	22,550,000	22,550,000	9,350,000	12,000,000	12,000,000	11,685,000	19,650,000	19,650,000
Formwork Only	N/A	N/A	N/A	N/A	N/A	N/A	10,300,000	11,954,000	14,500,000
Formwork and Precast	13,450,000	23,051,000	27,825,000	10,600,000	17,601,000	22,375,000	N/A	N/A	N/A
Reinforcing Steel	3,100,000	5,105,000	5,350,000	1,900,000	2,005,000	2,250,000	9,825,000	11,575,000	14,100,000
Cast-in-Place Concrete Only	N/A	N/A	N/A	N/A	N/A	N/A	23,591,000	32,070,000	37,670,000
Cast-in-Place Concrete and Structural Steel	31,086,000	38,180,000	44,605,000	34,356,000	41,285,000	47,085,000	N/A	N/A	N/A
Bearing Assemblies	9,900,000	14,500,000	14,900,000	8,200,000	10,425,000	10,425,000	8,030,000	10,250,000	10,650,000
Sub-Total	**75,479,000**	**116,859,000**	**128,703,000**	**71,166,000**	**93,206,000**	**104,025,000**	**70,811,000**	**96,998,000**	**108,069,000**
Shoreland Works									
Retaining Walls and Stone Work	3,140,000	3,140,000	3,140,000	3,140,000	3,140,000	3,140,000	3,140,000	3,140,000	3,140,000
Road, Street Light/Signal and Trail Works	5,800,000	5,800,000	5,800,000	5,800,000	5,800,000	5,800,000	5,800,000	5,800,000	5,800,000
Landscaping and Reforestation Works	796,000	796,000	796,000	796,000	796,000	796,000	796,000	796,000	796,000
Pergola, Trellis, Site Furniture and Signage Works	220,000	220,000	220,000	220,000	220,000	220,000	220,000	220,000	220,000
Gore Road Library Dry Stone Wall Relocation Works	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Sub-Total	**9,966,000**	**9,966,000**	**9,966,000**	**9,966,000**	**9,966,000**	**9,966,000**	**9,966,000**	**9,966,000**	**9,966,000**
Mobilization (3%)	2,563,000	3,805,000	4,161,000	2,434,000	3,095,000	3,420,000	2,423,000	3,209,000	3,541,000
Engineering (15%) and Quality Management (3%)	15,380,000	22,829,000	24,960,000	14,604,000	18,571,000	20,518,000	14,540,000	19,254,000	21,246,000
Contingency (20%)	17,089,000	25,365,000	27,734,000	16,226,000	20,634,000	22,798,000	16,155,000	21,393,000	23,607,000
Sub-Total	**35,032,000**	**51,999,000**	**56,855,000**	**33,264,000**	**42,300,000**	**46,736,000**	**33,118,000**	**43,856,000**	**48,394,000**
Total	**120,477,000**	**178,824,000**	**195,524,000**	**114,396,000**	**145,472,000**	**160,727,000**	**113,895,000**	**150,820,000**	**166,429,000**



BERM OPTION - SECTION BETWEEN PIERS

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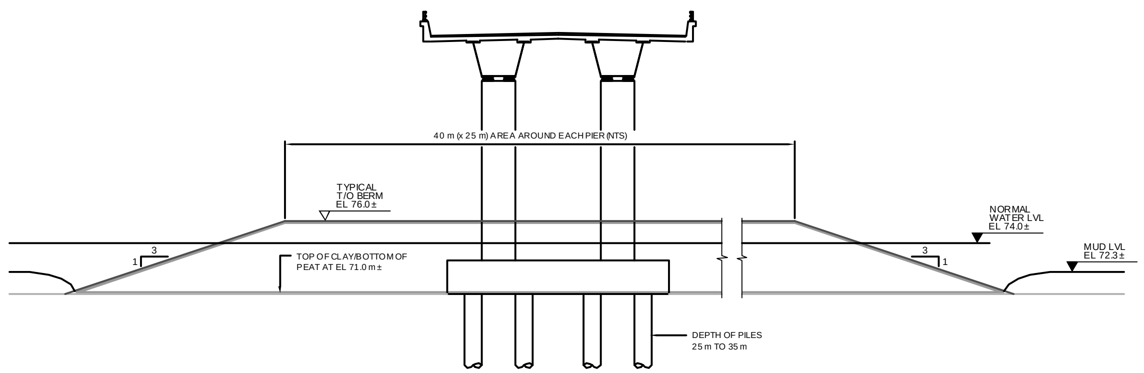

BERM OPTION - SECTION AT PIER

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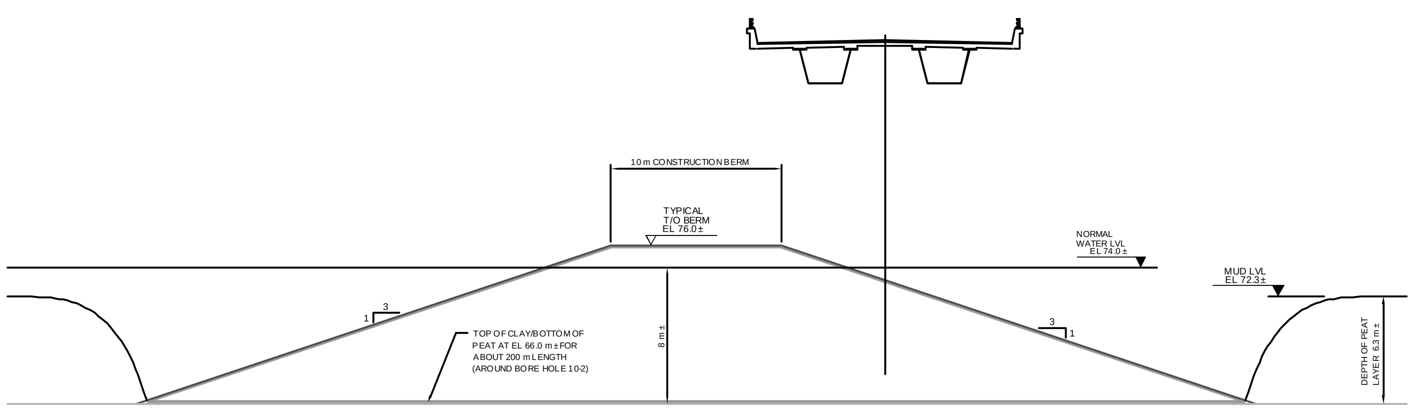

BERM OPTION - SECTION AT DEEP PEAT LAYER

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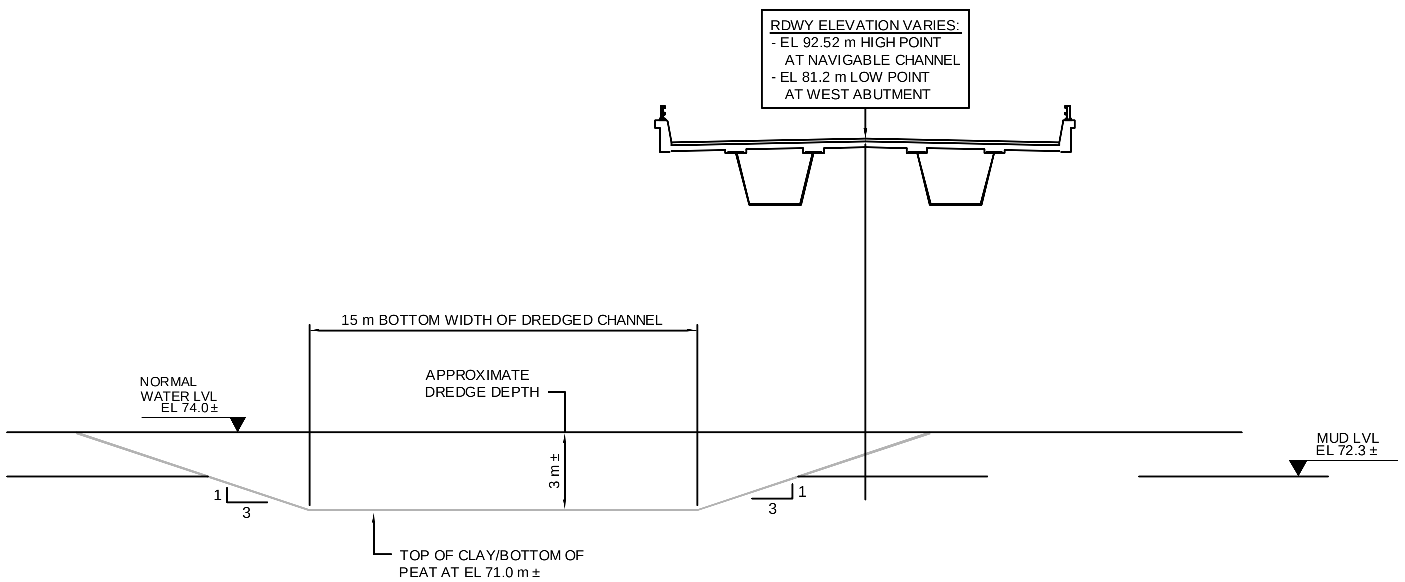
PROJECT:	DRAWING:			DRAWING NO.:
CATARAQUI RIVER THIRD CROSSING EA - STAGE 2 ENVIRONMENTAL STUDY REPORT	IN-WATER BRIDGE CONSTRUCTION OPTION: TEMPORARY EARTH BERM	J.L.Richards ENGINEERS·ARCHITECTS·PLANNERS J.L. Richards & Associates Limited 203-863 Princess Street Kingston, ON Canada K7L 5N4 Tel: 613 544 1424 Fax: 613 544 5679	DESIGN: DRAWN: CHECKED: PLOTTED: 26-Jan-12	4-27 JLR NO: 23446-02



DREDGING OPTION - SECTION BETWEEN PIERS

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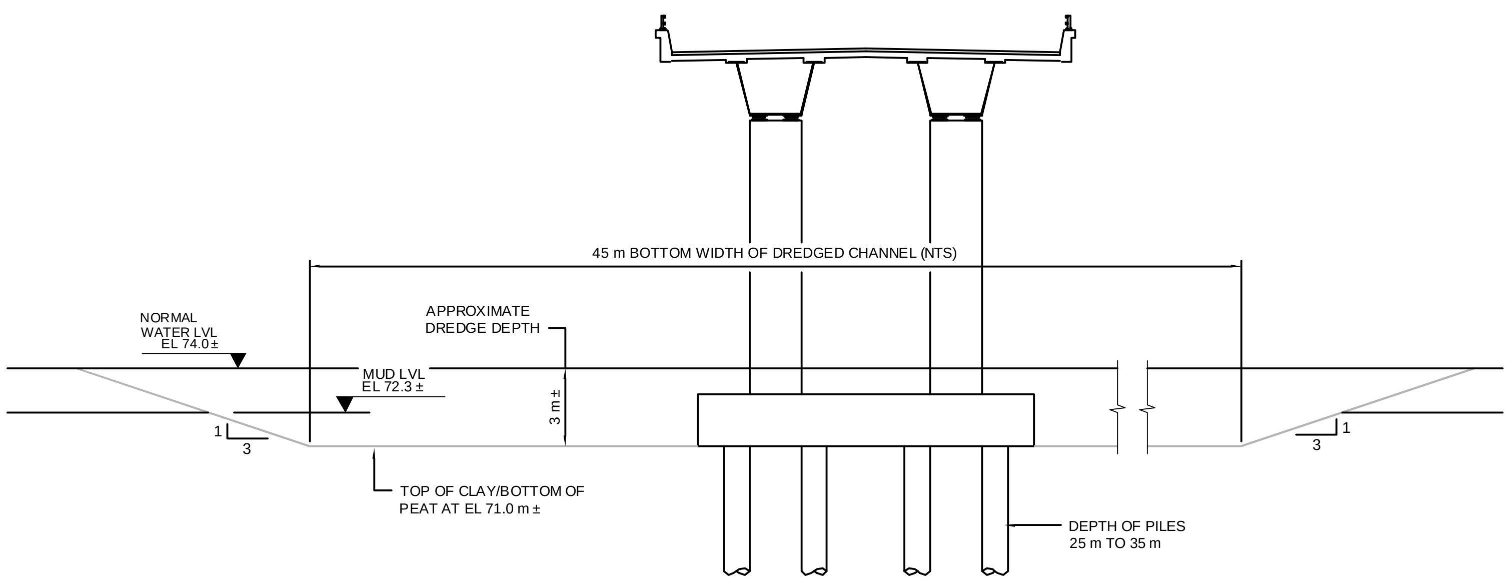

DREDGING OPTION - SECTION AT PIER

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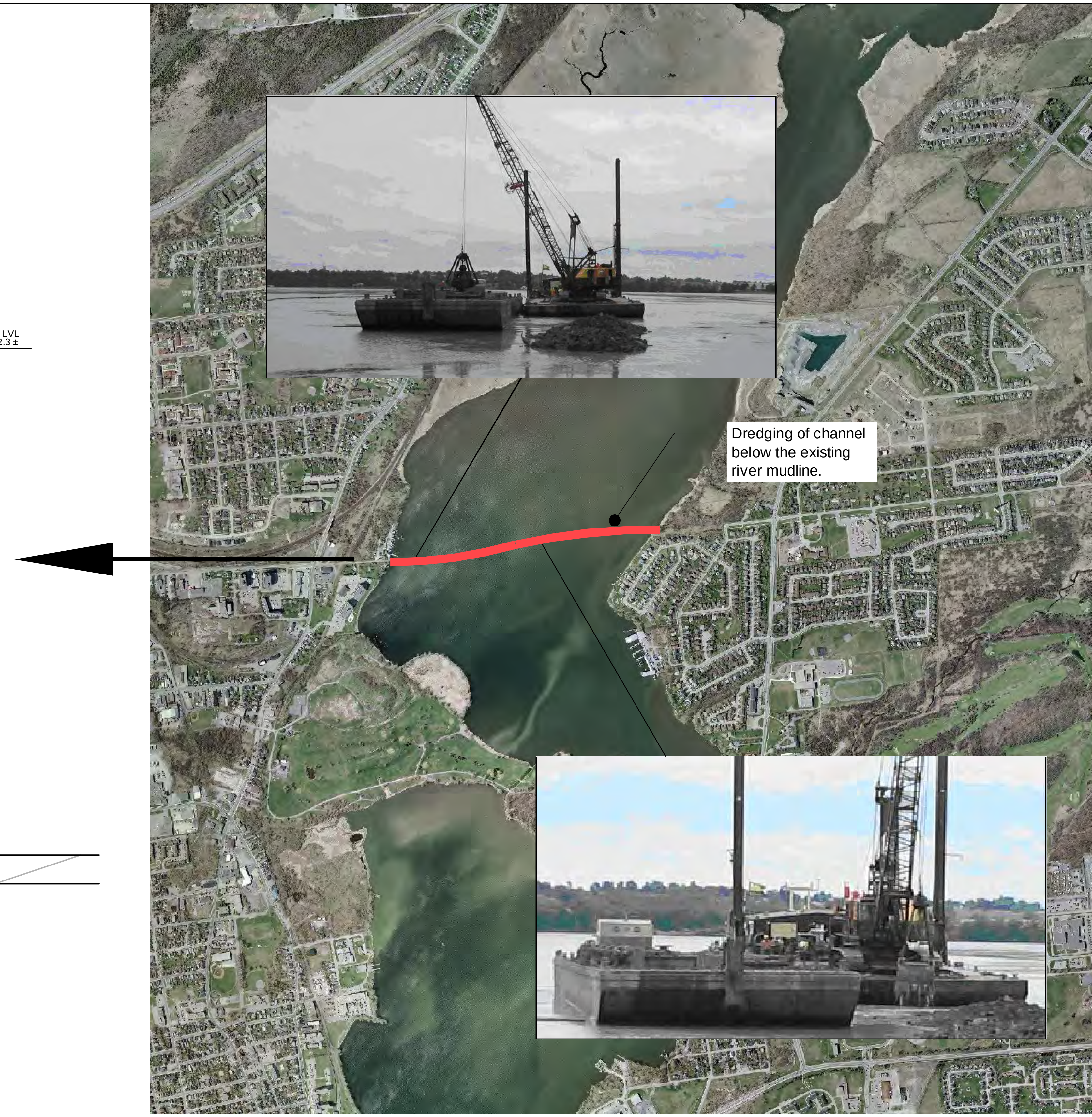

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PROJECT:
CATARAQUI RIVER THIRD CROSSING
EA - STAGE 2
ENVIRONMENTAL STUDY REPORT

DRAWING:
IN-WATER BRIDGE CONSTRUCTION OPTION: DREDGING

J.L.Richards
ENGINEERS·ARCHITECTS·PLANNERS
J.L. Richards
& Associates Limited
203-863 Princess Street
Kingston, ON Canada
K7L 5N4
Tel: 613 544 1424
Fax: 613 544 5679

DESIGN:	DRAWING NO.: 4-28
DRAWN:	
CHECKED:	JLR NO: 23446-02
PLOTTED: 26-Jan-12	

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PROJECT:
CATARAQUI RIVER THIRD CROSSING
EA - STAGE 2
ENVIRONMENTAL STUDY REPORT

DRAWING:
IN-WATER BRIDGE
CONSTRUCTION OPTION:
TEMPORARY WORK BRIDGE

J.L.Richards
ENGINEERS·ARCHITECTS·PLANNERS
J.L. Richards
& Associates Limited
203-863 Princess Street
Kingston, ON Canada
K7L 5N4
Tel: 613 544 1424
Fax: 613 544 5679

DESIGN:
DRAWN:
CHECKED:
PLOTTED: 1-Feb-12

DRAWING NO.: 4-29
JLR NO: 23446-02

.3 Utility Infrastructure

During the Summer of 2010, mail and/or E-mail correspondence was sent by the project team to the following utility providers requesting feedback on whether any utility distribution improvement works could (or should) be incorporated into the bridge designs:

1. Union Gas – Kingston District.
2. Cogeco Cable Canada Ltd.
3. Bell Canada.
4. TransCanada Pipelines Ltd.
5. Trans-Northern Pipelines Inc.
6. Hydro One Networks Inc.
7. Utilities Kingston.
8. City of Kingston.

Hydro One Networks Inc. (Hydro One) and Utilities Kingston confirmed their interests in using the bridge to extend or improve their respective utility distribution systems. As stated earlier, there are three existing Hydro One marine electrical cables (3-phase 44 kV line) that cross the Cataraqui River in the project location area. Hydro One has acknowledged that it would need four 100 mm ducts concealed in the bridge girder superstructure to accommodate the future replacement of this infrastructure. Utilities Kingston, which provides asset management, billing and operational services to utilities in the water and wastewater, natural gas and electricity industries in the City, has made a similar request on behalf of Kingston Hydro.

In addition, and as per the 2007 'Master Plan for Water Supply for the City of Kingston Urban Area' highlighted earlier, Utilities Kingston has also requested that the east-west watermain should be incorporated in the bridge design, as it is required to:

1. Improve water supply to a proposed new water storage tower in the St. Lawrence Business Park (located northeast of the project site location).
2. Improve the redundancy in the municipal water system on the east side of the Cataraqui River.

It is estimated that a 525 mm watermain would be needed, subject to future detailed design and water distribution system modeling confirmation.

4.2.2 Refinement of the Alternative Bridge Designs

This Report acknowledges that there is no single arbiter of 'good' bridge design, especially given the prominence of the project and its location relative to existing land uses. As such, the advantages and disadvantages of the bridge concepts have relied on the fieldwork undertaken at the project site location, the intent of the design objectives and guidelines as well as the technical and public feedback provided at TAC meetings and the Public Information Centre on March 31, 2011.

The assessment of the bridge concepts is divided into the following seven sub-sections:

1. The bridge alignment.
2. The bridge profile.
3. The bridge deck configuration.
4. The alternative bridge designs.
5. The west and east side lands.
6. The in-water effects and bridge construction options.
7. Utility infrastructure considerations.

.1 The Bridge Alignment

As shown on Drawing 4.19, the bridge alignment is a constant gradual s-curve that lands north of the Point St. Mark residential neighbourhood. This alignment offers potential opportunities for:

1. Reduced potential noise and visual impacts on the Point St. Mark community.
2. 'Softer landscaping' along the Gore Road right-of-way on the east shore.
3. A more organic reflection of the bridge within the context of its transitional location between the natural landscape of the Cataraqui River to the north up to Highway 401 and the City's urban landscape which starts to emerge at the project site location.
4. A more expanded viewscape experience for westbound bridge users, in that an open view would be provided of the visible cattail marsh and sloped river valley to the north, followed by the urban landscape on the west and then Belle Island and Belle Park to the south. The reverse of this viewscape experience would be evident for eastbound bridge users, though its effects would not be