STANDARD LIMITATIONS

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1.0 LIFT STATION INFORMATION

Station Name:	Riverbend Lift Station
Location of Station:	1736 Portage Avenue
Date of Inspection:	February 11, 2010
Inspected By:	Damir Muhurdarevic, EIT
Inspecting Firm:	MMM Group Limited (MMM)
Client:	City of Winnipeg – Water and Waste Department

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2.0 OBSERVATIONS

2.1 General

Riverbend Lift Station is a conventional lift station with a main floor at ground level and (4) floors below ground level. The lift station is constructed of cast-in-place concrete below ground level and masonry and wood framing above ground level. The main floor contains typical lift station components and controls, the first and second floors below grade are a combined chamber room, the third floor below ground level is a motor room containing the pump motors, and the fourth floor below ground level is a pump room containing wastewater/land drainage pumps. The condition and operation of the pumps and motors was not observed.

2.2 Lifting Devices

The main floor has a lifting W-Beam (175mm high by 93mm wide) that spans 3600mm from wall to wall, where the underside of its flange is welded to a shelf angle on each side. The shelf angles are anchored to the wall with two (2) 17mm anchor bolts. The beam has a sliding hook attached to it.

The combination chamber has four (4) eye-shaped lifting hooks, which are fabricated of 19.4mm diameter steel road and is embedded into the underside of the first floor cast-in-place concrete slab.

The motor room has one (1) eye-shaped lifting hook, which is fabricated of 19.4mm diameter steel road and is embedded into the underside of the second floor cast-in-place concrete slab..

The pump room has four (4) eye-shaped lifting hooks, which are fabricated of 19.4mm diameter steel road and is embedded into the underside of the third floor cast-in-place concrete slab.

The pump room also has a U-shaped lifting hook that is welded to a steel plate anchored into the underside of the third floor cast-in-place concrete slab with four (4) 12.8mm anchor bolts. Significant corrosion was observed in the U-shaped hook, and loss of section area is suspected.

3.0 ANALYSIS AND LOAD RATING

The W-beam on the main floor was analyzed for moment resistance of the beam and the shear resistance of the bolted connection. The shear resistance was found to be the governing factor at 3.0 tons. This was reduced by a factor of 3.0 for a **load rating of 1.0 ton.**

The eye-shaped lifting hooks were analyzed for pullout resistance of the embedment and the tension resistance of the hooks. The thickness of the floor slabs was 200mm thick and an embedment length of 150mm was used. The governing factor was the pullout resistance, which was calculated to be 3.5 tons. However, it is recommended that a factor of safety of 3.5 is applied to yield a **load rating of 1.0 ton.**

The analysis of the U-shaped hook welded to a steel plate determined a rating of 1.0 ton due to the bending of the plate. However due to significant corrosion and suspected loss of section area, this hook needs to be replaced and **not rated for safe use**.

Table 3.1 below is a summary table of lifting device load ratings:

Table 3.1 Load Rating Summary

Type	Quantity	Location	Calculated Resistance	Safety Factor	Load Rating
Lifting W-Beam	1	Main Floor	3.0 tons	3.0	**1.0 ton**
Eye-Shaped Lifting Hooks	9	Undersides of the First, Second, and Third Floor Cast-In-Place Concrete Slabs	3.5 tons	3.5	**1.0 ton**
U-Shaped Lifting Hook	1	Underside of the Third Floor Cast-In-Place Concrete Slab	1.0 tons	n/a	**n/a**

4.0 CONCLUSIONS AND RECOMMENDATIONS

Below is a summary of deficiencies and items requiring further attention.

Table 4.1 Deficiencies

Ref.	Description	Priority
4.1	Replace U-Shaped Lifting Hook located in Pump Room before further use	**A**

Items denoted as Priority A are Must Do Work items and should be addressed immediately.
Items denoted as Priority B are One (1) Year Deferrable items and should be addressed as soon as possible within one (1) year.
Items denoted as Priority C are Three (3) Year Deferrable items and should be addressed within three (3) years.

MMM, through this inspection, does not warrant the lifting devices installation or warrant that the design complies with current codes or standards. As per our analysis, it was concluded that the main floor W-beam is to be **load rated at 1.0 ton**, and the eye-shaped hooks to be **load rated at 1.0 ton.** The U-shaped hook welded to steel was **rated unsafe to use.**

This lift station inspection is limited to a visual inspection lifting members and connections. The inspection pertains to surface material condition only.

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APPENDIX A – Photographs

Photograph No. 1

U-shaped lifting hook welded to a steel plate, located in the pump room

Photograph No. 2

Eye-shaped lifting hooks, located in the motor room

Photograph No. 3

Lifting beam located on the main floor

Photograph No. 4

Lifting beam wall connection detail, covered by dry-wall