

### **STANDARD LIMITATIONS**

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## 1.0 LIFT STATION INFORMATION

<b>Station Name:</b>	<u>Westwood Lift Station</u>
<b>Location of Station:</b>	<u>482 Westwood Drive</u>
<b>Date of Inspection:</b>	<u>February 10, 2010</u>
<b>Inspected By:</b>	<u>Damir Muhurdarevic, EIT</u>
<b>Inspecting Firm:</b>	<u>MMM Group Limited (MMM)</u>
<b>Client:</b>	<u>City of Winnipeg – Water and Waste Department</u>

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## 2.0 OBSERVATIONS

### 2.1 General

Westwood Lift Station is a conventional lift station with a main floor at ground level and three (3) 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 floor below ground is an access 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 beam system consisting of another a total of 5 beams all connected to each other. Four (4) of the five (5) beams are W150x22. and three (3) of the five (5) beams run parallel to each other and perpendicular to the other two (2). They are welded to each other (top flange to bottom flange) and at ends they are welded to steel plates that are anchored into the walls. Three (3) of the five (5) beams have U-shaped lifting hooks welded to the bottom flanges. One (1) of the five (5) beams has a sliding beam component that carries one of the three (3) hooks. This beam consists of a cut HSS89x89x6.4 that has the bottom half of an S200x27 inserted inside and attached with wheels.

The motor room two floors below ground has one U-shaped lifting hook which is fabricated of 25mm diameter steel rod and is embedded into underside of the first floor below ground cast-in-place concrete slab.

A total of five (5) W150x22 beams are located on the third floor below ground, in the pump room. They each span 3360mm from wall to wall and are welded to vertical steel plates that are anchored to the wall on each end with anchor bolts. They are constructed horizontally and their top halves are filled with concrete.

### 3.0 ANALYSIS AND LOAD RATING

In the main floor beam system, each beam was analyzed for moment resistance and each hook was analyzed for tensile and weld resistance. The moment resistance of one of the W150x22 beams governs the system with a resistance of 4.0 tons. However, this was a complex structural system, thus a factor of safety of 4.0 was applied, to yield a **load rating of 1.0 tons**.

The U-shaped lifting hook located in the motor room was analyzed for pullout resistance of the embedment and tensile resistance of the hook. The thickness of the cast-in-place concrete slab from the floor above was not observed and therefore the embedment length of the hook was only estimated. The concrete was estimated to be 200mm thick and an embedment length of 150mm was used. The governing factor in the hook was the pullout resistance, which was calculated to be 8.3 tons. However, a factor of safety of 4.0 was applied to yield a **load rating of 2.0 tons**.

The W150x22 beams located three floors below ground in the pump room were analyzed for moment resistance of the beams and the shear resistance in the wall connections. The moment resistance of 2.4 tons governed in all five (5) beams. A factor of safety of 2.5 was applied to all beams yielding a **load rating of 1.0 tons**.

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
Five (5) beam system: (W150x22)	5	Main Floor	4.0 tons	4.0	<b>1.0 ton</b>
U-Shaped Lifting Hook	1	Underside of first cast-in-place concrete floor	8.3 tons	4.0	<b>2.0 tons</b>
W150x22 beams	5	Underside of second cast-in-place concrete floor	2.4 tons	2.5	<b>1.0 ton</b>



## 4.0 CONCLUSIONS AND RECOMMENDATIONS

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 beam system's **load rating is recommended to be 1.0 ton**, the U-shaped lifting hook is to be **load rated at 2.0 tons**, and each of the W150x22 beams are to be **load rated at 1.0 tons**.

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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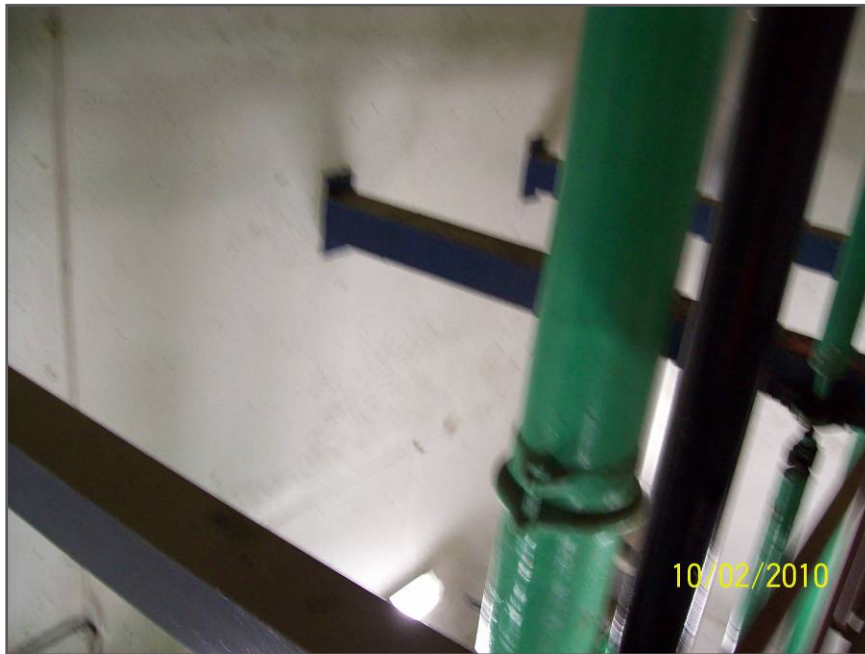
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**Photograph No. 1**

Lifting beams located on the bottom floor



**Photograph No. 2**

Wall connection details of the 5 lifting beams on the bottom floor



**Photograph No. 3**

U-shaped lifting hook located in the motor room



**Photograph No. 4**

Lifting beam system located on the main floor



**Photograph No. 5**

Eye hook welded to the bottom flange of on the beams  
in the beam system located on the main floor



**Photograph No. 5**

Sliding beam component with a hook welded to the flange,  
located in the beam system on the main floor