April 20, 2015

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Via: e-mail

Attention: Mr. Adolfo Laufer, P. Eng.
Facilities Maintenance Project Engineer

Reference: Electrical Load Study – 421 Osborne Street
Winnipeg Transit Bus Garage Facility

Dear Sir:

Dillon Consulting Limited (Dillon) is pleased to submit our final report to Winnipeg Transit (Transit) for the electrical load study at the Winnipeg Transit Bus Garage located at 421 Osborne Street, Winnipeg.

Background

Winnipeg Transit has embarked on a number of projects within this facility over the years and is planning a number of new projects involving the need to add additional load to the electrical distribution system. Transit is concerned on the overall capacity and availability of the electrical distribution system with these new projects coming on line. In addition, Transit is concerned with the reliability of the main distribution equipment due its age and lack of available spare parts.

Dillon was retained by Transit to perform an electrical load study at this facility to determine the present electrical loading of the main distribution and associated sub-distributions. This should enable Transit to determine the capability to add additional electrical load to the present system.

Investigation and Data Gathering

Our report is based on electrical load data information recorded on site by Schneider Electric Service Department. Their monitoring equipment was installed on site during the period of March 12, 2015 to March 24, 2015. Data from the load monitoring for this period is included in Appendix A. In addition, Transit provided utility billing data for the past 12 months. These bills along with the recorded data show that the peak load values appear to occur during the winter months. Therefore, the peak value shown as 1048 amps appears to accurately represent the true peak.

Load monitoring equipment was connected on the electrical distribution equipment to record the load data information at the following distribution points:

- Main distribution circuit breaker
- Distribution 1 main circuit breaker (Overhaul and Repair Building)
- Distribution 3 main circuit breaker (Garage Building)
- Motor Control Centre VV (MCC-VV) main circuit breaker

The monitoring equipment recorded a wide range of data which may be of interest to Transit. However, for the purpose of this report, the focus will be on the electrical loading information and the availability to add additional load where required. Therefore, we will highlight the following data points:

- Current average (Amps)
- Voltage per phase (Volts)

These data points should provide the necessary information Transit requires to determine if the additional proposed loads can be connected to the existing electrical distribution system.

Results

The average and peak values for the monitoring data points noted above are summarized in the table below at each of the distribution points. In addition, this table also shows the actual current rating, in Amps, of the distributions as follows:

	Main Distribution	Distribution 1	Distribution 3	MCC-VV
Current (Amps) Peak	1048	664	126	126
Voltage L-L Average (Volts)	600	600	600	600
Current Full Load Rating (Amps) Actual Nameplate	2500	1600	600	300
Available Capacity based on full load allowable rating based on 80% rule (Amps)	952	616	354	114

Summary

Based on the above tabulated and calculated information along with the data recorded and included as Appendix A, the available capacity on each of the Distribution points is as follows:

Main Distribution *	952 A
Distribution 1	616 A
Distribution 3	354 A
MCC-VV	114 A

*Note: Distributions 1, 3 and MCC-VV are sub-fed from the Main Distribution, so any load increases on Distributions 1, 3 and MCC-VV will impact the total on the Main Distribution.

In addition to the load study, Transit also requested an evaluation of the existing main distribution switchboard. Schneider Electric provided their review of this equipment and their response is included in Appendix B.

In summary, Schneider Electric advises that this equipment appears to not have been serviced in some time and will likely not be supported by the manufacturer for replacement parts. Spare parts will also become hard to source in case any modifications would be required.

As discussed with Transit, there have already been some issues with the existing equipment whereby circuit breakers were not functioning properly causing problems with the operation of the facility.

We would recommend a staged replacement of this switchboard with new equipment of adequate capacity for future growth over the next 25 years. We would be pleased to discuss this further with Transit to come up with a suitable plan for this changeover to minimize disruption to Transit's operation and within their budgets established. A separate engineering proposal would be required to carry out this work.

We thank you for the opportunity to provide these services to Transit, and look forward to a successful implementation of the proposed work plans.

Please contact the undersigned at (204)453-2301 or bfeuer@dillon.ca should there be any questions or comments regarding this report.

Sincerely,

DILLON CONSULTING LIMITED

Brian Feuer, P. Eng.
Partner

BF/km

Encl: Appendix A – Monitoring data (on CD)
Appendix B – Condition report

Our file: 15-1692

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APPENDIX A

Monitoring Data
(Refer to CD)

APPENDIX B

Condition Report

Schneider Electric
Schneider Canada Services

FIELD SITE VISIT

CUSTOMER: Dillon Consulting Limited **SITE: Osborne Bus Garage**

ATTENTION: Brian Feuer **DATE: March 12, 2015**

REASON FOR VISIT: Equipment Review and collection of Power Monitoring Data

OBSERVATION: Data for the following loads were collected from Noon March 12 to Noon March 23:

Main Distribution (Westinghouse 3000A)
Distribution #1 (1600A)
Distribution #3 (600A)
MCC VV (200A)

CONCLUSION: The main switch gear is 1960 vintage. All the breakers are obsolete. The main Air circuit breaker has no signs of being serviced in recent years. Once it has been serviced a better idea of it's condition can be made. If a number of new breakers are to be added. The customer may want to upgrading the complete board by retrofilling. The existing switchgear structure and wires stay and all the obsolete breakers are replaced with new breakers and mounting system. This allows for more new breakers to be added in the future.
With a quick look at the Power Monitoring data. The Main service is lightly loaded (20 to 30%) with the peak load happening between 6:30 and 7:00 AM at around 35%. The power factor is running between 85 and 90%. (penalty $ when below 90) But the cost may make the pay back to long. Harmonics are OK.

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