### REPORT ON SITE SERVICES STUDY

For

### **TORONTO ZOO**

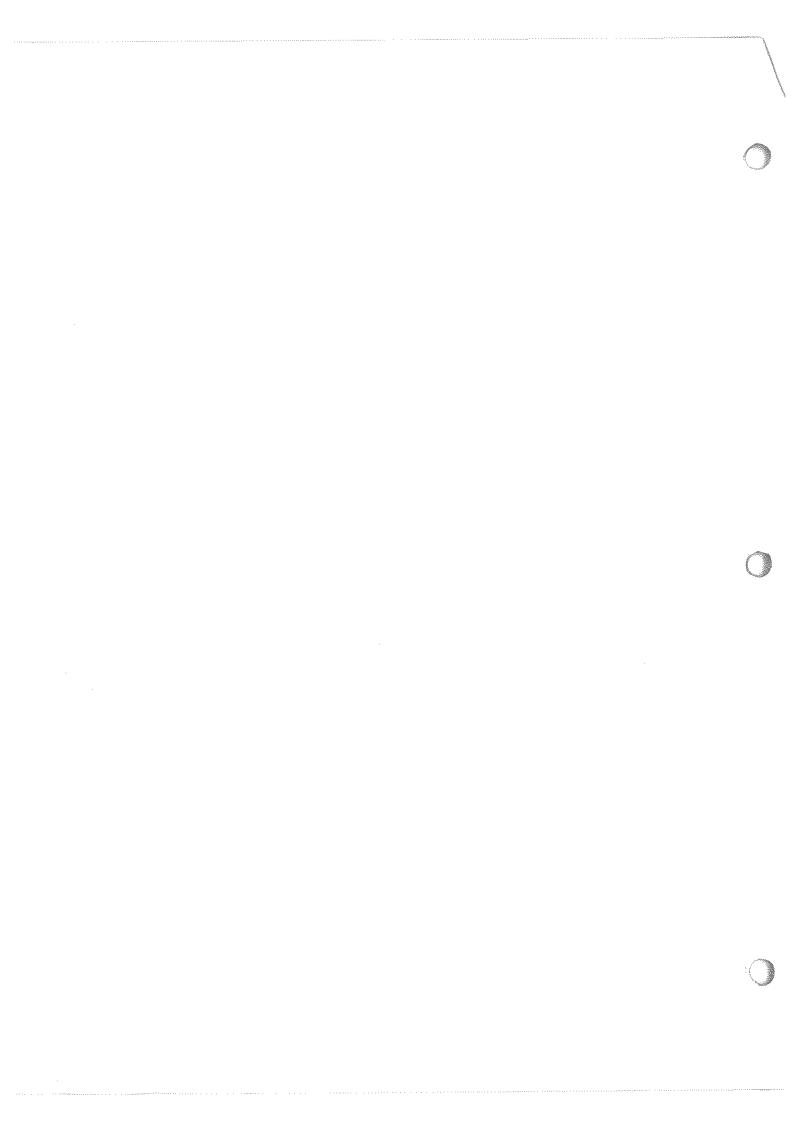
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September, 1999



#### EXECUTIVE SUMMARY

Paradigm Engineering Group Inc. reviewed five systems, which service the site. These are the water, gas, sewer, electrical and communication systems. An overview of each system is found in Section 2 of the Report. This summary is broken down into three components as follows: Terms of Reference, Study Findings and Summary Report.

#### A. Terms of Reference

Subsequent to a proposal dated November 16, 1998, Paradigm Engineering Group Inc. was retained to conduct a Condition Survey of the Toronto Zoo site services located on the Zoo property in Scarborough, Ontario. Authorization to proceed was notified by Mr. Eric Morris, Manager of Facilities and Services on behalf of the Toronto Zoo.

#### B. Study Findings

<u>Water:</u> The physical condition of the water supply and distribution system was found to be generally in good condition. For the most part, the flow rates and water pressures were found to be adequate with the exception of approximately three hydrants where water pressures were found to be low. The findings also revealed that adequate water is available to service the current needs of the Zoo. Any proposed addition or expansion to the Zoo requiring water supply must address the above low-pressure problem.

There are two key areas of concern with the water supply system namely;

- 1. The entire site is currently supplied from a single line connected to the City. Should a major line break requiring the shut down of the water system occur on a day when the Zoo is very busy with visitors needing access to water, there will be a significant negative consequence, hence we have recommended that consideration be given to the installation of a second linefeed to the Zoo from another City main. For the short term, the sections of water mains that have leaked in the past should be replaced. The cost of this immediate repair is shown in the Appendices.
- 2. The existing water mains hydrant connections contain some dead ends without a loop. The above feature is not in conformance with the requirements of the City of Scarborough, which required that all lines leading to the fire hydrant be looped.

The long term solution to the first problem is to install a second line fee at an approximate budget cost of \$1,000,000. The solution to the second concern is to install loops at all hydrants without loops. Detailed discussion of these concerns and their corrective measures are given in the Appendices.

<u>Gas:</u> The physical condition of the Gas supply and distribution system was found to be generally in good condition. For the most part, the gas flow rates and pressures were found to be adequate. The findings also revealed that adequate gas is available to service the current needs. The adequacy of proposed expansions, including extension of gas facilities to the Eurasia exhibits area will be determined after design loads are known.

<u>Sewers</u>: The audit of the sewer system revealed that the sewer system has adequate capacity to service current needs and proposed expansions, however the entire storm and sanitary sewers contains a significant level of debris. We have recommended a complete flushing of the system to enhance its functional capacity.

Electrical: The audit of the electrical system indicates that there is adequate electrical capacity to service current needs, but any further expansion or addition to electrical energy loads must contemplate and include upgrading the electrical service. The electrical systems and equipment are in fair condition, despite the high incidence of failures. Given the age of the system and the reported frequency of disruption of operation resulting from power failures, we will recommend a phased replacement of all underground cables and submersible transformers.

<u>Communication:</u> The audit of the communication system indicates that there is adequate capacity to service current needs and proposed expansions. The communication equipment and systems are in good condition.

#### C. Summary Cost Report

The attached Portfolio Summary Report details the projected cost requirements for Capital Improvements, Required Repairs and Preventive Maintenance.

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#### 1.0 INTRODUCTION

#### 1.1 Terms of Reference

Subsequent to a proposal dated November 16, 1998, Paradigm Engineering Group Inc. was retained to conduct a Condition Survey of the Toronto Zoo site services located on the Zoo property in Scarborough, Ontario. Authorization to proceed was notified by Mr. Eric Morris, Manager of Facilities and Services on behalf of the Toronto Zoo.

#### 1.2 Scope of Work

In general, the scope of work consists of a Condition Survey of the water, gas, electrical and communication/data services and storm/sanitary sewer systems on the site to determine if any deficiencies exist. The study was broken down into 2 phases:

Phase I

Facility Audit

Phase II

Development of Life Cycle Repair/Replacement and Maintenance Program

Details of the complete scope of work are contained in the Request for Proposal Document and the Proposal.

#### 1.3 Study Goals

The objective of this assignment is to evaluate the existing functional and physical adequacy and capacity of the existing site services at the Toronto Zoo (Zoo) complex and identify retrofit / replacement / repair / maintenance / expansion needs. This survey will address the needs of the Zoo by ensuring that the existing facilities are adequate to meet both the existing demand and reasonably foreseeable future expansion to Zoo facilities.

The Site Services Study is a comprehensive study of the condition of the utility systems and their components. The audit includes a complete inventory of the current use and capacity of the services. A summary of the goals of this project is:

- 1. Identify and quantify current deficiencies in all components of the services.
- Develop an understanding of the future needs of the Zoo complex so that the Zoo can predict
  the funding necessary to maintain the services in an appropriate condition after the reduction
  or elimination of the current required repairs liability.
- 3. Provide an inventory of the existing use of the services including renewal cost allocation.
- 4. Use the study as the basis of a dynamic management tool which will continue to provide an accurate record of the state of the physical plant. The system should be capable of predicting the funding required to maintain desired conditions and will foster the creation of multi-year comprehensive capital implementation plans.

#### 1.4 Study Methodology

Each utility system and site component is inspected and measured. The costs associated with each component are grouped into 3 distinct categories as follows:

#### Type 1: Required Repairs Costs

This category includes costs to rectify actual component deficiencies. All components of the systems, which exhibit or suffer from actual deficiencies at the time of this audit, are referred to as "Required Repairs". These deficiencies will require to be rectified in order to ensure that the components continue to serve their intended functions. All costs associated with required repairs are Required Repairs costs.

#### Type 2: Preventive Maintenance Costs

This category will affect all the components of the systems requiring periodic inspections/servicing and maintenance. For example, a sump pump requiring cleaning every year will be classified under preventive maintenance.

#### Type 3: Capital Improvement Costs

All site servicing systems/components are captured under this category. The repair and replacement of a component is a function of the natural wear/tear and the life expectancy of a component. Over the life of a project, components require periodic renewals in order to maintain the integrity of the facility. All costs associated with capital improvements are called capital improvement costs.

All visible deficiencies for the entire physical plant are identified. Each of the utility and site systems is examined and the remaining useful life of each component is estimated. Finally, the current replacement value of the utility systems and site components is calculated.

The Site Services Study includes deficiencies and anticipated requirements of the utility systems and site components. This comprehensive approach produces a total profile for the entire plant within a conceptual framework consistent with the standard approach for such service systems.

As a physical plant continues to age, additional components wear out. The analysis of life cycle maintenance costs is projected over a long period (25 years for the systems) in order to obtain reasonable average annual projections of the amount of money each component will require to maintain existing conditions.

The information gathered during this audit is analyzed and entered into PEG's Facility Renewal Planning software. The software generates the following three types of reports:

<u>Portfolio Summary Cost Report:</u> This report provides a highly condensed summary of the costs associated with each cost type. The cost columns over the 25-year planning horizon are divided into 10 groups. The costs for the first five years are given on a year by year basis. The costs for the remaining 20 years are put into five (5) year groups. All the future costs are inflated to reflect cost escalation and inflation. The last column gives the subtotal.

<u>Detailed Cost Report:</u> This report provides a condensed summary of the costs associated with each element of repair requirement. The cost columns over the 25-year planning horizon is divided into 10 groups and is similar to the Portfolio Summary Cost described above.

Recommendation Report: This report provides a detailed description of each repair requirements. The report is divided into 7 columns. Column 1 gives an identity number to each repair need. Column 2 describes the location of the repair need. Column 3 gives the priority of the work required relative to other work requirements. A description of the priorities is given below. Column 4 gives the category of the work required. Column 5 gives the description of the deficiency resulting in the need for repairs. Column 6 describes the correction needed to rectify the problem. Alternative solutions are also described. Column 7 gives the budget cost in today's dollar for rectifying the deficiency. The format of the recommendation report for Capital Improvement Costs is slightly different and self-explanatory, consisting of 14 columns.

#### Priority Ranking Of Recommended Repairs

Each observed required repair is assigned a number that defines the priority of the work relative to others.

Priority No.	Description
1	Repairs of a safety nature where deficiencies have significant probability of harm to people and animals causing death and severe injury.
2	Repairs of a safety nature where deficiencies have significant probability of causing damage to health and minor injuries.
3	Repairs where deficiencies have a risk of consequential damage with high financial cost.
4	Repairs where deficiencies have risk of consequential damage with medium financial cost.
5	Repairs where deficiencies have a risk of consequential damage with low financial cost.
6	Repairs where deficiencies have no risk of consequential damage but are necessitated by the need for upgrades to improve or replace building components.

#### Categories Definition

All building systems and components repair/retrofit costs are grouped into categories, which define their impact.

Category Name:	Description
	These are costs, which arise as a result of regulatory
	requirements from all regulatory agencies. For
Regulatory:	example, costs incurred to upgrade existing access to
	achieve barrier free access for the handicapped will
	fall into this category.
	These are costs associated with energy conservation
	measures. For example, costs incurred to upgrade
Energy:	lighting fixtures from incandescent to florescent, etc.
	There are costs, which are related to the overall
	integrity and soundness of a building, particularly the
Building Integrity:	building envelope and structural systems. For example, rusting and delamination of concrete
	cladding, cracking of caulking.
	These are costs, which are associated with life and
	health safety concerns. For example, costs incurred
Life Safety:	to repair damaged of missing exit signs, dysfunctional
Life Salety.	heat detectors, etc.
	These are costs associated with health safety,
	primarily arising from air quality concern. For
	example, costs incurred to clean the ductwork to
Air Quality:	improve the quality and flow of air.
	These are costs, which are associated with upgrading
	systems to meet their functional requirements. For
	example, upgrading lighting to higher lux levels,
Functional:	repairing flashing to shed water away from joints,
	etc.
	These are cost that is associated mainly with integrity
	of interior finishes and a esthetic considerations. For
Appearance	example, missing acoustic ceiling tiles, soiled carpet,
	missing cover plates, etc.
	These are costs associated with the removal of
Hazardous Material:	hazardous materials.
	These are costs associated with environmental
Environmental:	concerns such as implementation of the BEPAC
Environmental.	program, costs to implement the 3R program, etc.
	program, some to implement the six program, ear

#### 1.5 Description of the Complex

The Zoo property is a rolling, wooded area approximately 710 acres in extent, with approximately 300 developed acres of discrete, fenced areas for the maintenance and exhibit of wild life from around the world. Individual exhibits are provided with gas, water, electrical and sewage services for the care and comfort of the animals and the patrons, and given the area of the site and its combination of wooded hills and streams, there are several kilometres of underground services to be assessed. All distribution systems are underground. This presents both advantages, such as freedom from damage due to wind, snow, vehicles, animals, etc. and disadvantages such as difficulty of access, flooding, corrosion, etc. Construction of the Zoo complex started approximately 25 years ago and has been on-going since, with further changes and expansions proposed for the near future.

#### 1.6 Acknowledgments and Assembly of the Report

Numerous consultants and specialists have assisted with the investigations and preparation of this document. In some instances, third and fourth opinions have been obtained. Those consulted, including texts, are noted in the appropriate sections.

Under the direction of Paradigm Engineering Group Inc., the following companies comprise the investigation team:

Paradigm Engineering Group Inc.

Prime Consultant

Mechanical/Electrical Engineering

A-1 Fire Hydrant Services (Hydrants, Water Valves)

Inspection/Testing Specialists

Trans Video Inspections

(Camera Survey)

Inspection/Testing Specialists

Trade Gas Services

(Gas Pressure)

Inspection/Testing Specialists

Civil Underground Limited

(Soil excavation)

Inspection/Testing Specialists

The assembly of the information required to prepare this comprehensive Site Services Study was coordinated by Mr. Ernest Onyido, P.Eng of Paradigm Engineering Group Inc.

All files, notes, source data, test results and master files are retained in the offices of Paradigm Engineering Group Inc. and remain the property of the Consultant.

All opinions, conclusions and recommendations are those of the Consultant and represent their best judgement under the natural limitations imposed by the scope of work.

#### 1.7 <u>Life Cycle Costing Assumptions</u>

The determination of the life expectancies and replacement costs is somewhat subjective. Every effort has been made to make the numbers as precise as possible, but the actual life of any component may differ substantially from the estimate made. For this reason, we recommend a dynamic approach to the planning and administration of this long term Retrofit/Replacement Program. This report provides a format. It should be reviewed annually as a part of the budget preparation process to reflect actual results and new information available.

The planning horizon for this project is 25 years, however, the projected costs beyond 5 years has limited accuracy and reliability. As a result, we urge that the schedule be revised and issued every five years. The costs for the first five years are given on a yearly basis. The costs for the remaining 20 years are grouped into 5-year increments. Every five years, all work completed should be entered into the system and the next 5 year period will be expanded into yearly costs.

#### Limitations

This report is limited in scope to only those service system components, which are specifically referenced in the text. Any components not included have not been reviewed.

This report is intended solely for the client named. It should not be distributed further without our knowledge.

All cost estimates are given in current dollars, and are provided for approximate budget purposes only. Accurate figures can only be obtained by preparing detailed specifications, tendering and receiving competitive quotes from suitable contractors. Lifespan projections are estimates only based upon visual evaluation of existing conditions.

As many of the activities covered by the report involve aesthetic qualities, there is an element of judgment in identifying costs and life cycles for certain elements, particularly finishes. While we endeavor to reflect our perception of the existing standards, adjustments to the life cycle cost may be necessary to comply with the expectation of the owners.

#### 2.0 REPORT FINDINGS

#### 2.1 Water System

#### 2.1.1 General Description of the System

The above site is supplied with a 14" diameter water main from the City of Scarborough. The water main consists of various pipe sizes and materials. The 14" and 12" mains are of cast iron pipes. The 10" and 8" are of ductile iron and the 4" and 6" mains are made of PVC pipes. There are 29 Fire Hydrants in the existing yards. The incoming pressure is 50 to 55 psi. However, the static pressure drops to about 30 psi in some areas such as the African Savanna exhibit.

The water system comprises of approximately 12700 linear meters of piping, 29 fire hydrants, 148 Valves of various types, 1 Pumping Station and 1 Water Main Chamber. Detailed quantity take-off of the major system components of the underground plant are provided in Appendix 14.

#### 2.1.2 Audit Procedure

The audit of the water system comprised of a combination of a site walkthrough visual inspection, a review of existing documentation, interviews with maintenance personnel at the Zoo and testing.

#### a) Site Walkthrough Visual Inspection

The site was visited on several occasions to inspect representative samples of valve chambers, shut off valves, and back-flow-preventers and fire hydrants.

#### b) Documentation / History Review

We were provided with the site services layout drawings for the water system. In addition, we were provided with a copy of the Energy Report prepared by the City of Toronto Corporate Services, Energy Management Office for 1997.

All the above documentation was thoroughly reviewed prior to our site inspections.

#### c) Interviews with Zoo and City of Scarborough Personnel

Our inspection team interviewed Mr. Dean Evans and members of his staff during the inspection process to gather information on the types and locations of any known system failures. We also obtained information on the water supply parameters from the City of Scarborough and the Zoo personnel. The audit team also interviewed Mr.Paul Metteta of the City of Scarborough to discuss the requirement of the City of Scarborough for water supply for fire fighting. Mr.Metteta noted that the City of Scarborough requires that the water supply for fire fighting be constructed with a minimum of 8" mains and the mains be constructed in a looped system.

The team also held discussions with various other individuals including Andy Empringham, John Mayock and Steve Doran of the Scarborough Fire Department. The team spoke with Craig Rose of Marshall Macklin and Monagham. Through these discussions, it was revealed that the Scarborough Fire Prevention Department accepted the 1995 modifications to the water main for purposes of fire fighting (see Appendix 17).

A copy of this policy is attached as Appendix 15. The Zoo staff reported that there were two water leaks at the 14" main near the parking lot area. They also stated that the leak was repaired.

#### d) Testing

Testing was conducted on all fire hydrants to determine flow rates, residual GPM and static pressures. Excavation and examination of the buried water mains for reported leaks were completed in April, 1999.

#### 2.1.3 Audit Findings

#### General Condition of the System

The inspection of a representative sampling of the water supply system and a review of test reports revealed that most of the fire hydrants had adequate water flow rates and pressures. The water flow rate and static/residual pressures were reported to be marginal (30 psi) at two fire hydrant locations, namely; African Pavilion/McDonalds restaurant and the Savana Pavilion/Restaurant. The criteria for minimum pressures needed for fire fighting for a given type of facility is established by the Ontario Building and Fire Codes. The Ontario Fire Marshall's Office has published the "Fire Protection Water Supply" guideline for Part 3 in the Ontario Building Code. See Appendix 18. Table 2 gives the minimum water supply flow rates. Except for the reported water leaks, it is our opinion that the water supply system (buried pipes) is in good condition.

Detailed discussion of our observations is given in Appendixes 1 to 3 under the following cost categories:

- i) Required Repairs
- ii) Preventive Maintenance
- iii) Capital Improvement

#### 2.1.4 Comment on Existing Usage/Reserve Capacity and Future Requirements

From our review of the energy report, the water consumption for 1997 was 330,480 cubic meters. In 1995 the consumption was 273,371 cubic meters. There was an increase in water consumption of 20.9% from 1995 to 1997. Our calculations indicate that there is considerable water available to the system, in the order of 5 – 6 times the existing consumption. Water pressure for fire fighting purposes was marginal in some areas. Although water volume is adequate, future expansions or additions to water usage must contemplate upgrading the water system. We have recommended the installation of a second water supply line. This solution will be designed and implemented to address the concern with marginal water pressures. Cost for implementing this system is estimated at approximately \$1.0 M

#### 2.2 Gas System

#### 2.2.1 General Description of the System

The existing facility at the present time is serviced by a 4" diameter gas main. Distributed throughout the site by a combination of 1", 2", 3" and 4" mains. We understand from the Zoo that the design pressure is 50 psi. However, the actual pressure on-site is about 44 psi. The gas service presently supplies heating equipment such as boilers, make-up air-handling units, furnaces, domestic water heaters and rooftop hot water tanks, pool heaters, McDonald Restaurant kitchen equipment, emergency

generators for various Pavilions, etc. Quantity take-offs of the major system components and the underground plant are provided in Appendix 14.

#### 2.2.2 Audit Procedure

The audit of the gas system comprised of a combination of a site walkthrough visual inspection, a review of existing documentation, interviews with Consumers Gas and maintenance personnel at the Zoo and testing.

#### a) Site Walkthrough Visual Inspection

The site was visited on several occasions to inspect representative samples of the gas regulators, valves, connections and the condition of exposed gas pipes. Selected sites for gas flow tests were chosen to permit inspection and examination of the gas distribution and control system.

#### b) Documentation/History Review

We were provided with the site services drawings showing the gas mains and branches. In addition, we were provided with a list of all the gas-fired equipment for various areas and pavilions. We were also provided with the following report:

1. Energy Report prepared by the City of Toronto Corporate Services, Energy Management Office for 1997.

All the above documentation was thoroughly reviewed prior to our site inspections.

#### c) Interviews with Zoo Maintenance Personnel and Consumers Gas

Our inspection team interviewed Mr. Dean Evans, Mr. Gary Bowerman and other members of the Zoo staff during the inspection process to gather information on the types and locations of any known system failures. No system deficiency was reported by Zoo staff, although it was reported by Zoo staff that a gas software survey based on the supply pressure, pipes sizes and lengths, indicated that there is a possible insufficiency in gas supply. The Zoo also reported that the existing Eurasia exhibit presently has no gas supply and heating is currently electric. The Zoo staff stated that it is proposed to supply gas to this area, hence the need to conduct an analysis of the feasibility and cost of this proposal. Mr.Brian Black of Consumers Gas was interviewed and he provided the following information.

- a) Ten years ago, there were gas leaks at the Monorail line and the monkey exhibit area. He stated that significant portions of the gas pipes were replaced.
- b) The Consumers Gas Company does conduct an annual gas leaks survey at the Zoo covering all underground pipes. He stated that the 1999 survey revealed no leaks.
- c) The Consumers Gas Company does not conduct an annual corrosion survey unless leak detection failed.
- d) He stated that all the pipes are protected anodes which slows down the corrosion of steel pipes. He recommended that a corrosion survey be completed to assure the integrity of the gas line system.

#### d) Testing

Gas pressure tests were performed at the main incoming supply and at several other locations including the Indo-Malayan Pavilion and the North Main Service building.

#### 2.2.3 Audit Findings

#### General Condition of the System

An inspection of a representative sampling of gas lines and accessories and a review of the test reports indicated that there is a discrepancy between the design pressure and the actual pressure. The design pressure of 50 psi is higher than the actual test pressure of 44 psi.

Detailed discussion of our observations is given in Appendixes 1 to 3 under the following categories.

- i) Required Repairs
- ii) Preventive Maintenance
- iii) Capital Improvement

#### 2.2.4 Comment on Existing Usage/Reserve Capacity and Future Requirements

From our review of the energy report, the gas consumption for 1997 was 2,011,432 cubic meters. In 1995 the consumption was 1,802,733 cubic meters. There was an increase in gas consumption of 11.6% from 1995 to 1997. Discussion with Consumer's Gas indicate that the available capacity of the existing service in the order of 3 times the existing consumption, hence there is adequate capacity for the expansions proposed for the North America area and Eurasia area. Given that the size of the loadings and point of connection on the gas service for the proposed North American area and Eurasia areas are not known, a definite conclusion cannot be made. If the proposed design load is within the existing supply capacity, no upgrade will be required, otherwise the service will have to be upgraded to deliver higher pressure. Consumers Gas has confirmed that the existing supply pressure can be boosted to deliver up to 60 psi to the Zoo system.

#### 2.3 Sewer System

#### 2.3.1 General Description of the System

The above site has a 14" Class 2400 A.C. sanitary main which connects to the City main. The 12", 10", 8" and 6" diameter branches serve areas and Pavilions.

The storm main is 42" concrete, class IV, which connects from the site through 27", 24", 18", etc. pipes and storm water is dumped into creeks and the Rouge River. Quantity take-offs of the major system components and the underground plant are provided in Appendix 14.

#### 2.3.2 Audit Procedure

The audit of the sewer system comprised of a combination of a site walkthrough visual inspection, a review of existing documentation, interviews with maintenance personnel at the Zoo and testing.

#### a) Site Walkthrough Visual Inspection

The site was visited on several occasions to inspect representative samples of manholes, catch basins, drains and piping.

#### b) Documentation / History Review

We were provided with the sanitary and storm sewer site services drawings. All the above drawings thoroughly reviewed prior to our site inspections.

#### c) Interviews with Zoo Maintenance Personnel

Our inspection team interviewed Mr. Dean Evans and members of his staff during the inspection process to gather information on the types and locations of any known system failures. We were informed of a situation in the African Savannah area where 2-8" lines come together into 1-12" line. Sewer backup has been experienced in this area.

#### d) Testing

Based on information from interviews and drawing review, camera surveys of the sewer systems was conducted.

#### 2.3.3 Audit Findings

#### General Condition of the System

A camera survey of a representative sampling of sanitary and storm sewers was done. Deposits of debris and some calcite formation were observed in the sanitary system. Considering then extensive nature of the sanitary system, together with its age and the environmental condition to which it is subject, the system is in overall good condition.

The storm sewer system had considerably heavier debris deposits, to the point where camera access was blocked in numerous runs. The variety and amount of debris is to be expected considering the uncontrolled nature of materials entering the system. Considering the extensive nature of the storm system, together with its age and environmental and loading conditions to which it is subject, the system is considered to be in good condition. The complete flushing of the system is recommended to bring it up to functional adequacy.

Detailed discussion of our observations is given in Appendixes 1 to 3 under the following categories

- i) Required Repairs
- ii) Preventive Maintenance
- iii) Capital Improvement for the sewer system are given in Appendices 1 3.

#### 2.3.4 Comment On Existing Usage/Reserve Capacity and Future Requirements

Our inspection and review of the videotapes revealed that the existing demand or flow is approximately 20-40% of the available capacity of the sewers. It is our opinion that under the circumstances there is sufficient reserve capacity to accommodate the proposed expansions of Zoo facilities, namely:

• Relocation of the Canadian area to the North American area;

Unlike the electrical and water systems, the actual demand/loading of the storm and sanitary sewer system cannot be precisely quantified. One approach to the determination of existing demand and reserve capacity is to conduct an analysis of storm water run-off and waste water discharge into the system based on the current location of the buildings and facilities and the spatial distribution of the landscaped areas. Results would be compared with information gathered from the original design. The

second approach is to examine and estimate the actual loading in the sewers from a camera survey of selected locations. The latter approach is more realistic and it has been adopted in this study.

#### 2.4 Electrical System

#### 2.4.1 General Description of the System

The Zoo property is served by a 3-ph, 27.6kV line fed from a Scarborough Public Utilities Commission pole line on Old Finch Avenue. The service comes in to outdoor 27.6kV, 600A main switchgear on Zoo property and is distributed at 27.6kV through 28kV, single conductor cables running to a number of buried transformer vaults throughout the grounds. Cables are direct buried in sand-filled trenches between transformers, except where the cables pass under roadways where they are installed in concrete duct banks.

Cables are run as often as possible directly between transformers and from transformers to buildings, but there are some instances where splicing for taps has been done directly in the trench. Exterior transformers are submersible type, ranging from 300kVA to 750kVA, 27.6kV input, 208V/120V output to the utilization equipment inside the buildings. There are 49 exterior transformers in 27 underground vaults and approximately 9 miscellaneous outlets throughout the grounds. The parking lots have 33 lighting standards. Quantity take-offs of the major system components and the underground plant are provided in Appendix 14.

#### 2.4.2 Audit Procedure

The audit of the electrical system comprised of a combination of a site walkthrough visual inspection, a review of existing test documentation and interviews with maintenance personnel at the Zoo

#### a) Site Walkthrough Visual Inspection

The site was visited on several occasions to inspect representative samples of manholes, transformer vaults and exterior switchgear. Selected transformer vaults were de-energized to permit inspection of the transformers and the condition of the cabling and vaults. Twenty-five percent of the vaults were inspected.

#### b) Documentation /History Review

We were provided with the electrical service drawings. In addition, we were provided with two reports on the electrical system, namely:

- 1. G.T. Wood test report on transformers and switchgear dated December, 1994, reference No. 9951.
- Black & McDonald -- High Voltage Maintenance Reports dated August 1999, Reference No. 6621
- 3. Black & McDonald Submersible Transformer Failure/Replacement Report dated August 1999, Reference No.6638
- 4. Energy Report prepared by the City of Toronto Corporate Services, Energy Management Office for 1997.

All the above documentation was thoroughly reviewed prior to our site inspections.

#### c) Interviews with Zoo Maintenance Personnel

Our inspection team interviewed Mr. Dean Evans and members of his staff during the inspection process to gather information on the types and locations of any known system failures. We were informed of approximately 7 cable failures and 2 transformer breakdowns.

#### d) Testing

Based on information from interviews and document review, testing of the electrical system was not deemed necessary and was not conducted.

#### 2.4.3 Audit Findings

#### General Condition of the System

An inspection of a representative sampling of vaults and cable chambers and a review of repair records was done. Considering the extensive nature of the electrical system, together with its age and the environmental conditions to which it is subject, the overall system is in average condition.

Detailed discussion of our observations is given in Appendixes 1 to 3 under the following categories

- i) Deferred Maintenance
- ii) Preventive Maintenance
- iii) Capital Improvement

#### 2.4.4 Comment on Existing Usage/Reserve Capacity and Future Requirements

From our review of the energy report, the electrical energy consumption for 1997 was 10,171,317 kWh. In 1995 the consumption was 10,206,299 kWh. There was a decrease in electrical energy consumption of 0.3% from 1995 to 1997. The Electrical Code requires that the sizing of electrical power services be designed so that the load is no more than 80% of the service capacity. The 1997 demand was reported to be 19031 KW and the available capacity is 22919 KW. This translates to 83% of available capacity. The demand has marginally exceeded the Code prescribed limit. As a result, any further expansion or addition to electrical energy loads must contemplate and include upgrading the electrical service.

Ontario Hydro and the local utilities have been examining their vulnerability to potential Y2K problems and have initiated measures to ensure the continuity of electrical supply.

#### 2.5 Communications/Data

#### 2.5.1 General Condition of the System

Bell Telephone service is provided from the pole line along Old Finch Avenue. The service is routed underground to the Administration Building. Bell Telephone Service is located around Pavilions and restaurant areas to supply public telephones but is not extended to the Paddock areas. The system is serviced by a 50-pair underground cable system. The Zoo provides an internal telephone system (PAX), Mitel No. SX-2000SG, fire detection in each building, computer service and security monitoring. We understand that the Zoo purchased (not leased) the Mitel system in 1994 and installed and service it themselves. The Mitel communication system is serviced by 2-200 pair underground cables run to all buildings and areas of the Zoo. Data and power cables may be routed in the same

trench, duly segregated, and use separate cable chambers. Take-offs of the major system components and the underground plant are provided in Appendix 15.

#### 2.5.2 Audit Procedure

The audit of the communications/data system comprised of a combination of a site walkthrough visual inspection, a review of existing documentation and interviews with Mitel Corporation and maintenance personnel at the Zoo.

#### a) Site Walkthrough Visual Inspection

The site was visited on several occasions to inspect representative samples of connections and cables.

#### b) Documentation /History Review

We were provided with the site services drawings showing the communication line routing.

All the above drawings were thoroughly reviewed prior to our site inspections.

#### c) Interviews with Zoo Maintenance Personnel

Our inspection team interviewed Mr. Dean Evans and other members of his staff during the inspection process to gather information on the types and locations of any known system failures. It was reported by the Zoo that several pairs in the Bell cable between the old Administration building and the Indo-Malayan Pavilion are inoperative.

#### 2.5.3 Audit Findings

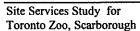
#### General Condition of the System

There have been no reports of dissatisfaction with the Zoo's internal PAX system and all exposed cable and connections which were examined appeared to be in good condition.

#### 2.5.4 Comment on Existing Usage/Reserve Capacity and Future Requirements

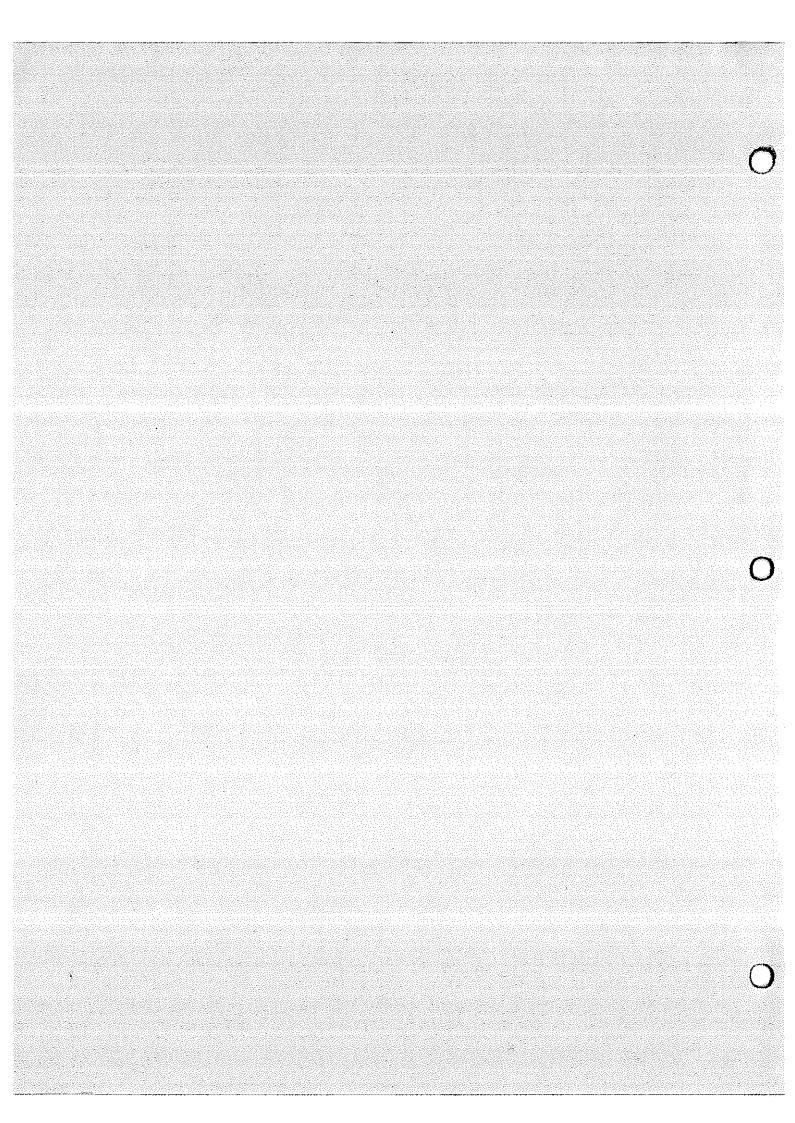
From our discussions with the supplier, we understand that this system is expandable to provide several thousand lines. We conclude that the existing system is suitable to service any anticipated expansion of the Zoo's facilities with respect to voice communication.

The system is not specifically protected against possible Y2K problems, but if it is being used for communication purposes only, with no business or data transfer applications, date problems will not affect this system and equipment, except as incoming power for the system power supply may be adversely affected.



Page 19 Project No:850

## APPENDIX 1 PORTFOLIO SUMMARY REPORT



SITE SERVICES ASSESSMENT FOR LONG TERM	OR LONG TERM									a for L	rioject Namori 30020
FACILITY RENEWAL PLANNING, TORONTO ZOO Scarborough	361A Old Finch Road,		Portfol	ortfolio Summary Report	mary Re	sport			E E	26-Oct-99  Page: 1  METROPOLITAN TORONTO 200	26-0ct-99 <b>Page:</b> 1 TORONTO 200
Building Name	Replacement	2000	2001	2002	2003	2004	2005-2009	2010-2014	2015-2019	2005-2009 2010-2014 2015-2019 2020-2024	SubTotal
Capital Improvement											
Toronto Zoo	\$1,150,000.00	\$85,000	\$118,450	\$108,212	\$79,223	\$187,960	\$286,009	\$571,292	\$406,648	\$392,535	\$2,215,329
Capital Improvement	\$1,150,000	\$85,000	\$118,450	\$108,212	\$79,223	\$187,960	\$266,009	\$571,292	\$406,648	\$392,535	\$2,215,329
Preventive Maintenance											
Toronto Zoo	\$1,150,000.00	\$55,600	\$57,268	\$58,986	\$60,756	\$62,578	\$342,204	\$396,708	\$459,893	\$533,142	\$2,027,135
Preventive Maintenance	\$1,150,000	\$55,600	\$57,268	\$58,986	\$80,756	\$62,578	\$342,204	\$396,708	\$459,893	\$533,142	\$2,027,135
Required Repairs											
Toronto Zoo	\$1,150,000.00	\$338,150						1			\$338,150
Required Repairs	\$1,150,000	\$338,150	2	\$	\$	9	2	8	0\$	\$	\$338,150
		\$478.750	\$175,718	\$167,198	\$139,978	\$250,538	\$608,212	\$968,000	\$868,541	\$925,678	\$4,580,614

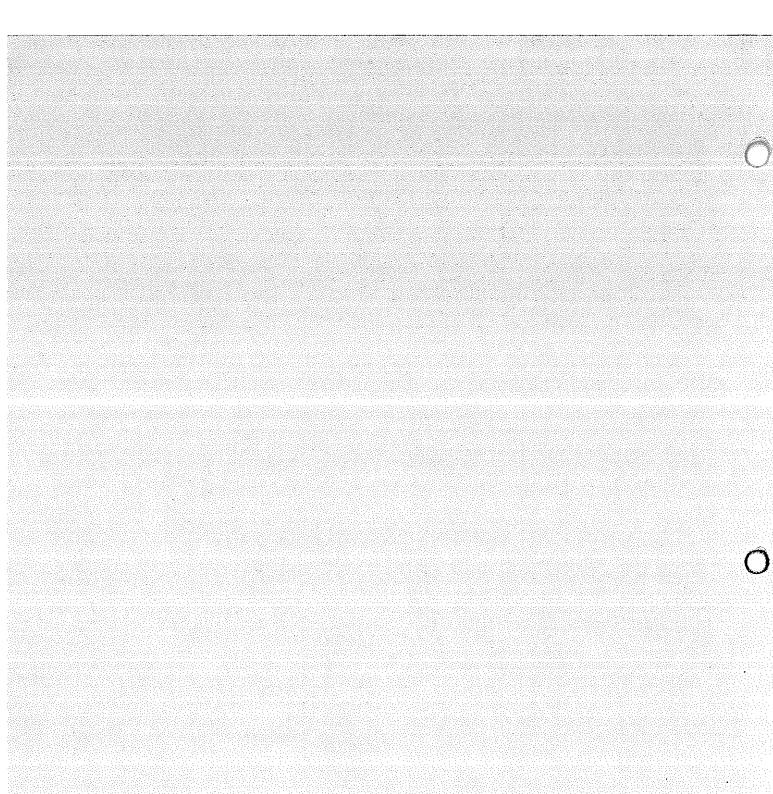


## APPENDIX 2 DETAILED COST REPORT

REQUIRED REPAIRS

CAPITAL IMPROVEMENT

PREVENTIVE MAINTENANCE



SITE SERVICES ASSESSMENT FOR LONG TERM FACILITY RENEWAL PLANNING, TORONTO 200 Scarborough

**Detailed Cost Report** 

Required Repairs **Toronto Zoo** 

26-Oct-99

Project Number 98820

METROPOLITAN TORONTO 200 Page:

٥	Recommendation	ndation	2000	2001	2002	2003	2004	2005-2009	2010-2014	2015-2019	2020-2024	SubTotal
ELECTRICAL	د_											
ELRR-001	Primary and Secondary Cables	Cables	\$20,000									\$20,000
ELRR-002	Flooding of Cables					***************************************						<b>O</b> \$
ELRR-003	Main Outdoor Switchgear	*	\$10,000									\$10,000
ELRR-004	Outdoor Switchgear	***************************************										S
ELRR-005	Vaults		\$3,000			And the state of t						\$3,000
ELRR-006	Power Cables											9
ELRR-007	Transformers											S.
ELRR-008	Black & McDonald Report	nt.	\$45,000									\$45,000
ELECTRICAL	**************************************	Sub Total	\$78,000	98	80	0\$	0\$	0\$	93	08	0\$	\$78,000

WSRR-001 Main		\$100,000							\$100,000
WSRR-002 Hydrant		\$500							 \$500
WSRR-003 Hydrant		\$500							\$500
WSRR-004 Hydrant		\$2,000							\$2,000
WSRR-005 Hydrant		009\$					1		\$800
WSRR-006 Hydrant		\$400							\$400
WSRR-007 Hydrant		\$150							\$150
WSRR-008 Hydrant		\$600							988
WSRR-009 Hydrant		\$500							\$200
WSRR-010 Hydrant		\$2,000							\$2,000
WSRR-011 General		\$40,000							\$40,000
WATER SYSTEM	Sub Total	\$147,280	0\$	9\$	0\$	*	\$ 2	0\$	\$ \$147,280
***************************************									

SSRR-001			000'06\$									\$30,000
SSRR-002			\$300	***************************************								\$300
SSRR-003												O\$
SSRR-004												OS.
SSRR-005												O\$
SSRR-006			\$10,000									\$10,000
SSRR-007			\$2,000									\$2,000
SSRR-008	None		\$65,000									\$65,000
SSRR-009	General		\$600									\$600
DRM/SANITA	STORM/SANITARY SEWER	Sub Total	\$107,900	8	0\$	\$	0\$	9\$	9\$	8	9	\$107,900
The same of the last of the la	The state of the s			THE REAL PROPERTY AND ADDRESS OF THE PERSONS ASSESSED.		The state of the s						

Paradigm Engineering Group Inc.

SITE SERVICES ASSESSMENT F FACILITY RENEWAL PLANNING, TORONTO ZOO Scarborough	SITE SERVICES ASSESSMENT FOR LONG TERM FACILITY RENEWAL PLANNING, TORONTO ZOO Scarborough	ERM ch Road,	Detai	Detailed Cost Report Toronto Zoo Required Repairs	Report				MET	Projec	Project Number 98820 26-Oct-99 Page: 2 METROPOLITAN TORONTO ZOO
ō	Recommendation	2000	2001	2002	2003	2004	2005-2009	2005-2009 2010-2014 2015-2019 2020-2024 SubTotal	2015-2019	2020- 2024	SubTotal
GAS SYSTEM GSRR-003   General		000'5\$	8							a company of the comp	\$5,000
GAS SYSTEM	Sub Total	\$5,000	0\$ 000	0\$	9\$	0\$	8	90	9\$	0\$	\$5,000
Required Repairs	Sub Total	\$338,150	90 \$0	9\$	9\$	9\$	0\$	0\$	0\$	0\$	\$338,150
Toronto 200	Sub Total	\$338,150	950	8\$	9\$	0\$	3	8	8	0\$	\$338,150
	Total	\$338,150	98 99	8	0\$	0\$	8	es .	8	3	\$338,150

SITE SERVICES ASSESSMENT FOR LONG TERM FACILITY RENEWAL PLANNING, 361A OId Finch Road, TORONTO ZOO Scarborough

Detailed Cost Report

Project Number 98820 26-Oct-99

Page:

METROPOLITAN TORONTO 200 \$50,000 \$35,864 \$29,720 \$39,784 \$68,295 \$56,275 \$20,159 \$103,000 \$86,946 \$474,791 \$864,634 SubTotal 2015-2019 2020-2024 \$165,586 \$9,868 \$11,842 \$143,875 \$8,024 \$100,330 \$9,628 2005-2009 2010-2014 \$127,218 \$20,159 \$107,057 \$162,819 \$7,829 \$86,946 \$6,524 \$61,521 \$84,413 \$56,275 \$28,138 2004 \$68,295 \$68,295 2003 Capital Improvement **Toronto Zoo** \$77,976 \$26,523 \$39,784 \$6,365 \$5,305 2002 \$103,000 \$103,000 2001 \$75,000 \$50,000 \$25,000 2000 Replace underground power cables between Repair Transformer Vault -20% every 10 yea Replace underground power cables between Replace underground power cables between Replace underground power cables between Replace Light Standards - 6% every 5 years. Replace 30% of elec. Panels every 5 years. Replace underground power cable between Replace underground cable between North Sub Total Replace transf. 4 every 2 years Recommendation ELECTRICAL

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ELECTRICAL

ELCA-012 ELCA-013

ELCA-010

ELCA-011

ELCA-004

ELCA-006

ELCA-007

ELCA-005

ELCA-008 ELCA-009

WSCA-002	WSCA-002 Replace 20% of water valves every 4 years.	ives every 4 years.	, , , , , , , , , , , , , , , , , , ,			\$90,041		\$114,061		\$144,489	\$348,590
WSCA-003	Replace 20%. Of druinking fountains every 5	ng fountains every 5					\$1,391		\$1,870		\$3,261
WSCA-004	WSCA-004 Replace 30%, Of manholes in 15 years	les in 15 years							\$37,391		\$37,391
WSCA-005	VSCA-005 Replace pumping station in 5 years	in 5 years				***	\$34,778				\$34,778
WSCA-006	WSCA-006 Repairs to 20% water main chamber in 15 yr	in chamber in 15 yr							\$15,580		\$15,580
WSCA-007	WSCA-007 Replace 100 feet of water mains every 2 yrs.	ir mains every 2 yrs.			\$21,218		\$23,881	\$57,130	\$34,049	\$38,322	\$174,600
WATER SYSTEM	X	Sub Total	9\$	88	\$21.218	\$ \$90,041	\$60,050	\$171,191	\$65,668	\$182,811	\$614,200

# STORM/SANITARY SEWER

\$423,855	2	\$186,956	\$226,306	\$11,593	2	2	2	0\$	<b>Q</b>	Sub Total	STORM/SANITARY SEWER	STORM/SANIT
\$46,739		\$48,739						***************************************		Basins in 15 yrs	Replace 50%. Of Catch Basins in 15 yrs	SSCA-010
340,/38		\$46,739								les in 15 yrs	Replace 50%. Of manholes in 15 yrs	SSCA-008
\$107,513			\$107,513								Replace in 10 years.	SSCA-007
\$10,280			\$10,280							rains in 13 yrs	Replace 100% of area drains in 13 yrs	SSCA-005
\$77,898		\$77,898								in 15 yrs.	Repair 50% of manholes in 15 yrs.	SSCA-003
\$107,513			\$107,513							in 10 yrs.	Replace pumping station in 10 yrs.	SSCA-002
\$27,172		\$15,580		\$11,593						y5yns.	Replace pipes - 6 m every 5 yrs.	SSCA-001

# COMMUNICATION SYSTEM

CSCA-002	Allowance for equip, technology unpgrade					•	\$20,159		\$20,159
CSCA-004	Underground communication cables betwee	\$10,000							\$10,000
CSCA-005	Underground communication cables betwee		\$12,380						\$12,380
CSCA-006	Underground communication cables between			\$7,967					\$7,957

Paradigm Engineering Group Inc.

Paradigm Engineering Group Inc.

SITE SERVICES FACILITY RENE TORONTO 200 Scarborough	CES ASSESSMENT F ENEWAL PLANNING, COO	OR LONG TERM 361A Old Finch Road,	oad,		Detaile	etailed Cost Report Toronto Zoo Capital Improvement	Report				ME	Project Number 98820 26-0ct-99 Page: 2 METROPOLITAN TORONTO 200	Project Number 98820 26-0ct-99 Page: 2 ITAN TORONTO 200
e	Recommendation	ndation		2000	2001	2002	2003	2004	2006-2009	2010-2014	2015-2019	2020-2024	SubTotal
CSCA-007	Underground communication cables betwee	ation cables bety	wee	The same and the s	and the state of t	and the second s	\$10,927	- 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1					\$10,927
CSCA-008	Underground communication cables between	ation cables bety	wee					\$10,130					\$10,130
CSCA-009	Underground communication cables betwee	ation cables bet	wee						\$12,752	***************************************			\$12,752
COMMUNICA	COMMUNICATION SYSTEM	Sub Total		\$10,000	\$12,360	\$7,957	\$10,927	\$10,130	\$12,752	\$20,159	0\$	0\$	\$84,284
GAS SYSTEM	TEM												
GSCA-001	Repair Gas system valves - 20% every 2 ye	es - 20% every	2 ye			\$1,061			\$1,194	\$2,857	\$1,702	\$1,916	\$8,730
GSCA-002	Repair gas/fittings - 6 m every two year	every two year	-		\$3,090	***************************************		\$3,377	\$3,690	\$8,437	\$10,075	\$5,748	\$34,416
GSCA-003	Repair regulators/memters - 20% every 5 ye	ars - 20% every	5 ye						\$13,911	\$16,127	\$18,696	\$21,673	\$70,407
GAS SYSTEM	N	Sub Total		0\$	\$3,090	\$1,061	8	\$3,377	\$18,795	\$27,421	\$30,473	\$29,338	\$113,554
Capital Improvement	rovement	Sub Total		\$85,000	\$118,450	\$108,212	\$79,223	\$187,960	\$266,009	\$671,292	\$408,648	\$377,733	\$2,200,627
Toronto Zoo		Sub Total	<u> </u>	\$85,000	\$118,450	\$108,212	\$79,223	\$187,960	\$266,009	\$571,292	\$406,848	\$377,733	\$2,200,627
		Total		\$85,000	\$118,450	\$108,212	\$79,223	\$187,960	\$268,009	\$571,292	\$406,648	\$377,733	\$2,200,627
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SITE SERVICE FACILITY REN	ASSESSMENT F WAL PLANNING,	R LONG TERM		Detaile	etailed Cost Report	Report					Proje	Project Number 98820 26-Ocf-99
TORONTO 200		361A Old Finch Road,		•	<b>Toronto Zoo</b>	ō						Pade:
John Maria				Previ	Preventive Maintenance	nance	:			ME	TROPOLITAN	METROPOLITAN TORONTO ZOO
9	Recommendation	rdation	2000	2001	2002	2003	2004	2005-2009	2005-2009 2010-2014		2015-2019 2020-2024	SubTotal
WATER SYSTEM	EM			TERMÉTOR, CETTURE de medicularité (1980 à 1984) de maistre de la companie de la c	A STANDARD AND THE STANDARD S	вельфизичной с селено с с селено с селе					T	
WSPM-001	Fire Hydrants -Water System	stem	\$5,500	\$5,665	\$5,835	\$6,010	\$6,190	\$33,851	\$39,243	\$45,493	\$52,739	\$200,526
WSPM-002 Fi	Fire Hydrants		\$5,800	\$5,974	\$6,153	\$6,338	\$6,528	\$35,698	\$41,383	\$47,974	\$55,816	\$211,464
WSPM-003 Fi	Fire Hydrants		\$5,800	\$5,974	\$6,153	\$6,338	\$6,528	\$35,698	\$41,383	\$47,974	\$55,816	\$211,464
WSPM-004 G	General		\$4,000	\$4,120	\$4,244	\$4,371	\$4,502	\$24,619	\$28,540	\$33,086	\$38,356	\$145,837
WATER SYSTEM		Sub Total	\$21,100	\$21,733	\$22,385	\$23,067	\$23,748	\$129,865	\$150,549	\$174,628	\$202,326	\$769,290
STORM/SANITARY SEWER	TARY SEWER											
SSPM-001	Catch Basins, Manholes and Drains	and Drains	\$12,000	\$12,360	\$12,731	\$13,113	\$13,508	\$73,857	\$85,620	\$89,258	\$115,087	\$437,511
SSPM-002	Storm/Sanitary sewers		\$10,000	\$10,300	\$10,609	\$10,927	\$11,255	\$81,547	\$71,350	\$82,715	688'96\$	\$364,593
SSPM-003 Bi	Buried Pipes		\$1,000	\$1,030	\$1,061	\$1,093	\$1,128	\$6,155	\$7,135	\$8,271	685'6\$	\$36,459
SSPM-004 Bi	Buried Pipes		\$1,500	\$1,545	\$1,591	\$1,639	\$1,688	\$9,232	\$10,703	\$12,407	\$14,383	\$54,889
STORM/SANITARY SEWER	?Y SEWER	Sub Total	\$24,500	\$25,235	\$26,982	\$28,772	\$27,678	\$150,791	\$174,808	\$202,651	\$234,928	\$893,252
GAS SYSTEM	_											Management of the state of the
GSPM-001 G	Gas Lines and Valves		\$10,000	\$10,300	\$10,609	\$10,927	\$11,255	\$61,547	\$71,350	\$82,715	\$95,889	\$364,593
GAS SYSTEM		Sub Total	\$10,000	\$10,300	\$10,609	\$10,927	\$11,255	\$61,547	\$71,360	\$82,715	\$82,889	\$364,593
Preventive Maintenance	itenance	Sub Total	\$55,600	\$57,268	\$58,986	\$60,756	\$62,578	\$342,204	\$396,708	\$459,893	\$533,142	\$2,027,135
Toronto Zoo	AND THE RESERVE THE PROPERTY OF THE PROPERTY O	Sub Total	\$55,600	\$67,268	\$58,988	\$60,786	\$62,578	\$342,204	\$396,708	\$459,893	\$633,142	\$2,027,136
,		Total	\$55,600	\$57,268	\$58,986	\$60,756	\$62,578	\$342,204	\$396,708	\$459,893	\$533,142	\$2,027,135

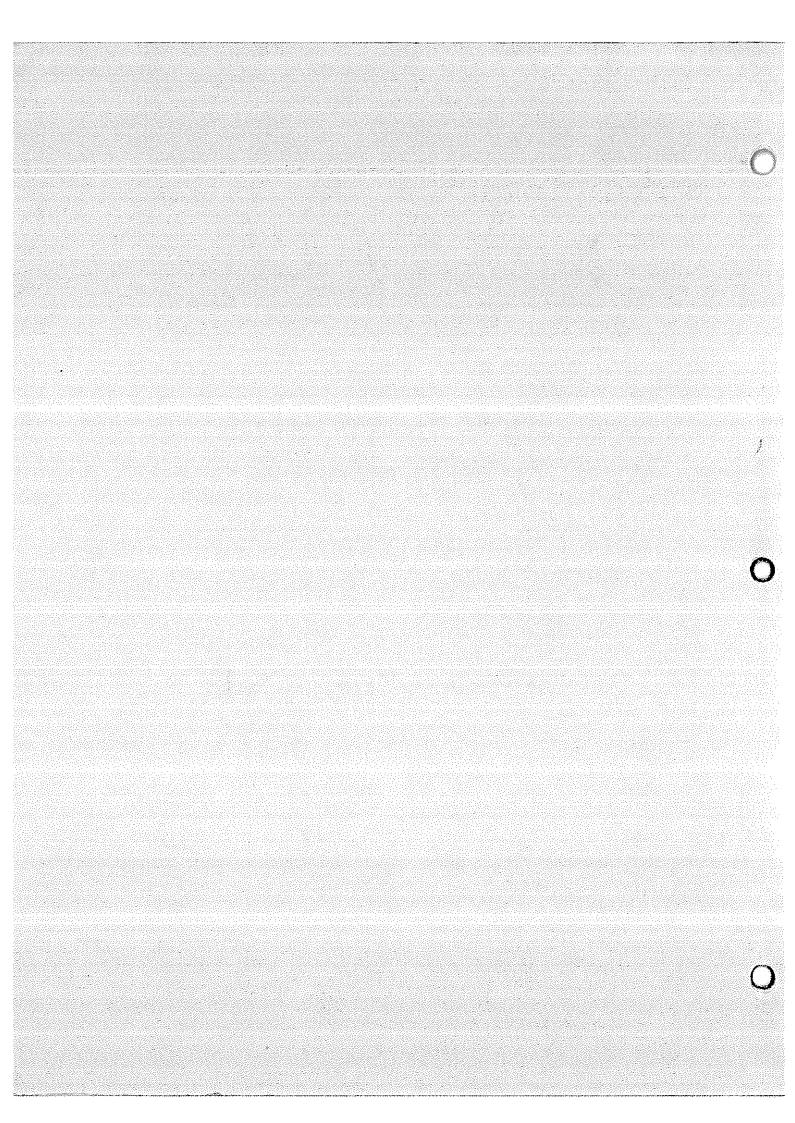


## APPENDIX 3 RECOMMMENDATION REPORT

REQUIRED REPAIRS

CAPITAL IMPROVEMENT

PREVENTIVE MAINTENANCE



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SITE SERV	DATE ACCIDENT		4		
FACILITY RENEW TORONTO 200 Road, Scarborough	SITE SERVICES ASSESSMENT FOR LONG TERM FACILITY RENEWAL PLANNING, TORONTO 200 Road, Scarborough	FOR LONG TERM 3, 361A Old Finch	M Required Repairs Toronto Zoo ELECTRICAL	METROPOL	Project Number 98820 26-0ct-99 <b>Page:</b> 1
Q	Location	Pty Category	Description	Correction   Base   Budge	Base Year Budget Cost
ELRR-001	General General	6 Functional	Primary and secondary cables are haphazardly arranged in the vaults, often buried in the mud on the vault floor.	To avoid damage from the gravel and from workers stepping on the cables, and to lessen tripping hazards in the confined space, it is recommended that cable racks be installed and used in the transformer vaults.	\$20,000.00
ELRR-002	General General	4 Functional	On occasion, vaults and cable chambers are flooded by runoff or temporarily rising water tables. We understand that the drains or weeping tiles have been installed at locations where this is a continuing problem.	We recommend that these vaults be monitored frequently during the spring and after heavy rain. We understand that many cables are up to 25 years old. Althought this age is much lower than the expected life of the cables, it would be prudent to expose them to as little abuse as possible and the use of cable racks is recommended for this purpose. The cost of this item is included in item ELRR-001 above.	\$0.00
ELRR-003	General General	3 Functional	The main outdoor switchgear was observed to suffer from rust and metal damage.	It is recommended that the entire assembly be examined, repainted and recaulked.	\$10,000.00
ELRR-004	General General	3 Functional	It was noted that ice formed inside all windows on the main outdoor switchgear. This indicates the presence of high humidity and condensation which can lead to insulation failure and reduction of electrical spacings.	ain It is recommended that condensation prevention measures be undertaken such as the installation of heaters or forced ventilation. The cost of this is included in item ELRR-003 above.	\$0.00
ELRR-005	General General	6 Functional	Some vaults were not numbered in the field. Vaults were not always numbered on the drawings.	It is recommended that all vaults be consicuously numbered in the field to match the numbering system on the drawings. Un-numbered vaults on the drawings should be assigned numbers.	\$3,000.00

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FACILITY RENEWAL PLANNING, TORONTO ZOO Road, Scarborough	INING, 36	FACILITY RENEWAL PLANNING, 10RONTO ZOO Road, Scarborough	Recommendation Report Required Repairs ELECTRICAL	METROPOL	26-0ct-99 Page: 2 ITAN TORONTO 200
Location	Pty	/ Category	Description	Correction	Base Year Budget Cost
General	φ	Functional	Over the last 5 years, Toronto Zoo reported approximately seven breakdowns related to the 27.6 KV cable. For the most part, the breakdowns were rectified by simply removing and replacing the defective sections of the cable. From our review of the history of these problems and their correction, augmented with our site inspection, the most plausible cause of the cable failures appears to be manufacturing defects.	This problem could be caused by a combination of several factors such as age, environmental condition, loading and manufacturing defects. We did not find any evidence pointing to either environmental conditions or loading as causes of the reported cable failures. Cables are suitable for direct burial and there was no evidence of excessive heat or humidity or corrosive soil conditions. The most plausible cause of this problem is age and manufacturing defects. Given the length of the run of the service cables it is not unexpected to experience some cable failures. From theoretical considerations, it can be expected that up to 10 feet per 1000 feet of cable will fail and be replaced every 12 years. Based on fits, there are two remedial options available. The first one is to replace the entire buried cable system with new cable. This option is not feasible because of cost considerations. The second option is to set aside an annual budget to repair and replace sections of the cable. The cost of this option is given in the section on Capital Improvement. It is further recommended that all occurences of cable failure be properly documented, describing the cost of repair, nature	\$0.00 \$
General		Functional	One transformer blow out was reported at the Lion House in This rate of failure can be anticipated. The theoretical lift 1996. One transformer blow out was reported at the African transformer is 30 years, however, repair of up to 10% is anticipated to a transformer every 10 years. Given the a reson reported that these failures recontractor who installed the units.  Oncluded that repair workmen determined that these failures the contractor who installed the units.  Oncluded that the transformer every 10 years. Given the anticipated. The theorem of the one of transformer failures be documented, including repair cost and the nature and location of repa	This rate of failure can be anticipated. The theoretical life of a transformer is 30 years, however, repair of up to 10% is anticipated to a transformer every 10 years. Given the above facts, and the history of the transformers, it can be resonably concluded that the transformers have performed within expectation. There is no required repair. Allowance for periodic replacements has been made in the section on Capital improvement. We have allowed for replacing 4 transformers every two tears. In addition, we recommend that all accurrences of transformer failures be documented, including repair cost and the nature and location of repair.	\$0.00
General	7	Functional	The High Voltage Maintenance Report completed by Black & McDonald dated August 1999, Reference Number 6621 contained 23 deficiencies. These deficiencies should be rectified.	It is recommeded that all the deficiencies listed in the Black & McDonald Report be rectified. The cost indicated here does not include the cost of replacing the transformers which have been included in the Capital Improvement Schedule.	\$45,000.00

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FACILITY RENEWAL PLANNING, TORONTO 200 Road, Scarborough	FACILITY RENEWAL PLANNING, TORONTO ZOO Road, Scarborough		361A Old Finch	Required Repairs Toronto Zoo WATER SYSTEM	26-Oct-99  Page: 3  METROPOLITAN TORONTO ZOO	26-0at-99 Page: 3 TORONTO 200
Ω	Location	Æ	Pty Category	Description	Correction	Base Year Budget Cost
WSRR-001	General General	<b>ω</b>	Functional	If was reported that on the 14" diameter main there were two leaks which were repaired to remedy the problem temporarily. Three sections of pipe were excavated and exposed for inspection. Approximately 7 feet of the pipes were exposed and at two locations the joints were also exposed. Our inspection of the exposed water mains revealed that the mains were made of ductile iron and that the original protective coatings are still on the pipes. The incidences reported appear to be isolated. There was no evidence of pipe deterioration.	There are two possible solutions to this immediate problem (1) Replace approximately 200 LM of the 14" Main at the vicinity of the leaks. This can be perform at a cost of approximately \$40,000.00 (2) Design and install an alternative incoming main adjacent to the existing main of approximately \$40,000.00 (2) Design and install an alternative incoming main adjacent to the existing main of approximately 8 inches PVC to be brought from the city main and tied to the 14" main upstream. The new adjacent line should be designed to have a valve at the point where it joins the existing main. We estimate that this line will be approximately 600 LM long and tied at a point sufficiently far approximately 600 LM long and tied at a point sufficiently far approximately 600 LM long and tied at the section of the 8 inch main continue to supply the Zoo's minimum water flow requirements. This is an outline specification which must be properly designed by a registered engineer. The budget for this work is (600 x \$175/Im) \$100,000. We recommend the second option because replacing any of the section of the leakage.	\$100,000.00
WSRR-002	General General	4	4 Life Safety	Hydrant: The Hydrant near the South end of the Indo- Malayan Pavilion has a minor leak at the ground flange.	Service and repair the hydrant to stop the leak.	\$500.00
WSRR-003	General General	*	Life Safety	Hydrant: The Hydrant outside the Gorilla exhibit doors, at the inside/outside holding area leaked when fully charged.	Service and repair the hydrant to stop the leak.	\$500.00
WSRR-004	General General	4	Life Safety	Hydrant: The Hydrant near the inside/outside holding reported marginal test pressure.	Retain a serviceman to service this hydrant.	\$2,000.00
WSRR-005	General	*	Life Safety	Hydrant: The secondary valve of the Hydrant North of the North American Pavilion (Century make), seized when in the open position.	Service and repair valve on hydrant.	\$600.00
WSRR-006	General General	m	Functional	Hydrant: Leaks were noted at the operating nut packing on the Hydrant North of the Australasia McDonald's restaurant.	Service and repair. Replace packing.	\$400.00

SITE SERVICES A: FACILITY RENEW/I TORONTO ZOO Road, Scarborough	SITE SERVICES ASSESSMENT FOR LONG TERM FACILITY RENEWAL PLANNING, TORONTO ZOO Road, Scarborough	FOR 361	OR LONG TERM 361A Old Finch	Recommendation Report Required Repairs VATER SYSTEM	METROPOL	Project Number 98820 26-0cf-99 <b>Page:</b> 4 ITAN TORONTO 200
9	Location	<b>3</b>	Pty Category	Description	Correction	Base Year Budget Cost
WSRR-007	General General	w	5 Life Safety	Hydrant: The left 2-1/2" port cap is missing on the Hydrant Souft of the Greenhouse.	Replace missing 2-1/2" port cap.	\$150.00
WSRR-008	General General	KO .	5 Life Safety	Hydrant: The secondary valve box is broken and the lid is missing from the Hydrant at the East side of the garage. Although still operbie, the box has mud in it and needs repair/replacement.	Replace the broken secondary valve box and the lid.	\$600.00
WSRR-009	General General	4	Life Safety	Hydrant: The Hydrant East of Society was flushed, but a flow test could not be done because of the existing site condition (walk ways) and the secondary valve was inoperable since the valve box was full of dirt.	Service and repair valve box.	\$500.00
WSRR-010	General General	ဖ	6 Life Safety	Hydrant: Most of the Hydrants are not identifiable by number or area in the field. It is recommended that the Hydrants be conspicuously numbered in the field to match the numbering system on the drawings.	Provide and install identifying number tags to match the numbering system on the drawings. Complete the numbering system on the drawings.	\$2,000.00

	Name /			The second of		January,
SITE SERVICES A FACILITY RENEW! TORONTO 200 Road, Scarborough	SITE SERVICES ASSESSMENT FOR LONG TERM FACILITY RENEWAL PLANNING, TORONTO ZOO Road, Scarborough	FOR L 361A	OR LONG TERM 361A Old Finch	Recommendation Report Required Repairs Toronto Zoo	METROPOL	Project Number 98820 26-Oct-99 Page: 5 ITAN TORONTO 200
	Location	Pty (	Pty Category	Description	Correction Ba	Base Year Budget Cost
WSRR-011	General General	4	4 Life Safety	The flow and pressure tests on the hydrants revealed that the static and residual pressures ranged from 35 psi upto 65 psi. All fire hydrants tested in excess of 600 gpm at 20 psi. the Ontario Fire Marshal's office design guideline for water supply specifies the minimum water supply flow rate to be 1800L/min for buildings that one storey in building height and does not exceed 600 cubic meter in building height and does not exceed 600 cubic meter in building area. This recorded flow rates and pressures exceed this minimum requirement. The Ontario Building Code and Ontario Fire Code require that all existing and new fire protection systems meet the approval of local Fire chief 1.e., the requirements of the Scarborough Fire Department. The City of Scarborough Fire Department require that fire hydrants be connected to the water main through a looped system. In addition, they require that the water main be 8" but that smaller sizes may be used if hydraulic calculations supporting required water supply were conducted. From our review of the drawings, there are two dead ends in the water system, mainly at the recently developed African Savannah complex. Based on the above observations, the existing water system is not in conformance with the City of Scarborough Fire Department requirement with respect to Scarborough Fire Department requirements of the City of Scarborough Fire Department requirements.	Preliminary consultation with city official reveal that they require as a solution to this problem, that all dead ends be removed from the system and a loop be installed at all fire hydrants. The installation of the loop at each hydrant increases the reliability of water supply. The cost of design and construction of a loop at each hydrant increases the reliability of water supply. The cost of design and construction of a loop to each of the two hydrants will be approximately \$20000 per hydrant at a total cost of \$40,000. This cost is very high and the effectiveness is limited. Hence, we recommend that the Toronto Zoo meet with and negotiate appropriate variance from the city because of the cost prohibitive nature of the remedy. Consideration should be given to the cost of the remedy, the effectiveness of the remedies and the overall impact of the system.	\$40,000.00

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FACILITY RENEW/ TORONTO ZOO Road, Scarborough	FACILITY RENEWAL PLANNING, TORONTO ZOO Road, Scarborough	Se 36	SILE SERVICES ASSESSMENT FOR LONG LERM FACILITY RENEWAL PLANNING, TORONTO ZOO Road, Scarborough	Recommendation Report Required Repairs Toronto Zoo STORM/SANITARY SEWER	METROPOL	26-0ct-99 Page: 6 ITAN TORONTO ZOO
	Location	æ	/ Category	Description	Correction	Base Year Budget Cost
SSRR-001	General General	4	Functional	Storm Sewer: A camera inspection of the storm sewers was conducted at a representative sample of the storm sewer system. The camera inspection revealed various deficiencies in the sewer as listed below. Piping North of indo pavilion has light debris 7m away from manhole 2.	conduct a complete flushing of the entire storm system piping, clean all manhole in the entire complex.	\$30,000.00
SSRR-002	General	10	Functional	One extra manhole is not shown on the drawing.	Update the existing drawing to show one extra existing manhole.	\$300.00
SSRR-003	General General	4	Functional	Piping East of old elephant house had calcite at service connection. Calcite was also noted at othe riocations. Given that only 5% of the entire storm sewer system was inspected with the camera, it is suspected that these deficiencies do occur at other locations.	Conduct scrubbing an reaming of the sewer system at locations were calcite is identified. In order to determine the locations where calcite formation has occurred, a complete camera inspection of the entire storm sewer should be conducted. Scrubbing, reaming and possibly grouting techniques should be employed to rectify the calcite problem. This budget include the price of completing a 100% camera survey of the storm sewer and conducting necessary remedies as described above. The budget for this deficiency is included in the cost of item SSRR-008 shown below.	\$0.00
SSRR-004	General General	4	Functional	Storm Sewer: Piping east of Rouge River has light debris under the flow.	Conduct flushing of the system piping. The cost of this is included in item SSRR-001.	\$0.00
SSRR-005	General	4	Functional	Storm Sewer: Piping under Rouge River has light debris under the flow.	Conduct flushing of the system piping. The cost of this is included in item SSRR-001.	\$0.00
SSRR-006	General General	4	Functional	Sewer backup has been experienced in the African Savannah area where 2 - 8" sanitary lines come together in 1 - 12".	Since camera inspection showed no blockage and only light deposits of debris, it is concluded that the problem arises from a system design deficiency. Retain the services of a qualified engineer to design corrective measures. The solution will involve excavation and replacement of the joints with new pipes to meet current design standard. The budget includes cost of design and construction.	\$10,000.00
SSRR-007	General General	6	Functional	Manholes were not clearly identified in the field.	Identity manholes in the field to match numbers on drawings. Add numbering to drawings.	\$2,000.00

Project Number 98820 26-Oct-99 METROPOLITAN TORONTO ZOO \$65,000.00 \$600.00 **Budget Cost Base Year** Page: flow. The third major deficiency was the formation of calcite in prone to calcite. All locations where this problem occur will be condition. Fourteen of the eighteen runs indicated some form camera survey be conducted throughout the sanitary lines at approximately \$30,000. The problem of ponding will partly be subsoil structure. This solution is very costly and is of limited ment. For the most part, flusing is adequate to ensure proper of deficiency. Given that only approximately 5% of the entire be the result of settlement of the pipe. The most appropriate The deficiencies noted above revealed three major types of ponding and calcite formation. Out of the 18 runs observed, debris blockage. However, in some cases, the ponding may suffer from similar deficiencies to the same degree, In order from light, moderate to heavy debris should be flushed. We addressed after flushing where the ponding is the result of scrubbing, reaming and grouting the joints which are most a cost of \$15000. Following the survey, all areas usffering solution to such deficiency will be to excavate the section suffering fromt his problem, raise the pipe and restore the concluded that the other lines which were not viewed will sanitary sewer lines were inspected, it can be resonably problems namely; heavy to moderate debris in the lines, to rectify these deficiencies, it is recommended that the Determine sewer run and termination and record on the only in 4 of the runs were the lines found to be in good estimate the cost of flusing the entire system to be the lines. The solution to this problem is to conduct shown in the camera survey. We estimate a cost of approximately \$20,000 for this solution Correction drawings. **Toronto Zoo** observed in the line. Heavy catcite was also observed below Gate D to 2nd Manhole South of Gate D - light ponding was revealed a significant level of deficiencies including ponding a service connection. (b) The sewer lines between South of camera was blocked by heavy gravel. (g) Between south of debris buildup. At one location, the camera was blocked as revealed a significant level of deficiencies including ponding noted in the lines. (c) Between 2nd Manhole South of Gate Between 1st manhole west of Eurasia pavilion and north of North American Pavilion - light debris and moerate ponding ponding and moderate debris in the line. (f) Between south manhole 16. the camera was blocked by debris (I) Between debris buildup. At one location, the camera was blocked as west of the Camel Pen and 4th manhole west of the Camel result of the debris. The following are specific observations west corner of the Africa Pav. And 1st manhole of the north as they are listed (a) The sewer lines between 3rd manhole the VAS Rest. And west of manhole 10 -- the camera was Between south east of the Africa Pav. And east entrace of corner of the African Pav. - camera was blocked by debris. moderate ponding was noted in the line. (k) Between south result of the debris. The following are specific observations covering approximately 5% of the sewer lines. The survey covering approximately 5% of the sewer lines. The survey Africa Pav. - camera was blocked by debris. (I) Between Pen - The drawing of the Sewer run is not correct. Sewer of the Savana Rest. And north east of manhole 10 -- the was noted in the line. (e) Between 1 st manhole west of (i) Between south west corner of the Africa Pavilion and D to 3rd. Manhole South of Gate D - A manhole lid was A camera survey of the sanitary sewers was conducted A camera survey of the sanitary sewers was conducted as they are listed (a) The sewer lines between North of 1st manhole west of the Camel Pen. And 2nd manhole south eastcorner of the elephant house and south west Eurasia Pavilion and ending at Eurasia Pavilion - light south west comer of the Elephant House - debris and Gate D to South of Gate D - ponding and debris was blocked by debris. Light ponding was also noted. (h) vest of the Camel Pen. - Moderate debris in the line. Recommendation Report noted in the manhole. Light ponding was noted. (d) run does not run to manhole number 8 as shown. STORM/SANITARY SEWER Required Repairs Description SITE SERVICES ASSESSMENT FOR LONG TERM 361A Old Finch Pty Category 4 Functional 5 Functional ACILITY RENEWAL PLANNING, \_ocation General General General General Road, Scarborough ORONTO 200 SSRR-008 SSRR-009

Paradigm Engineering Group Inc.

Project Number 98820 26-0ct-99 Page: 8 METROPOLITAN TORONTO 200	Base Year Budget Cost	80.00
00	Correction	No action required.
Recommendation Report Required Repairs COMMUNICATION SYSTEM	Description	At the time of this inspection and audit, no failure of either equipment or service cables were observed or reported.
SITE SERVICES ASSESSMENT FOR LONG TERM FACILITY RENEWAL PLANNING, TORONTO ZOO 361A Old Finch Road, Scarborough	Pty Category	0 Functional
SITE SERVICES ASSESSMENT F FACILITY RENEWAL PLANNING, FORONTO ZOO Road, Scarborough	Location	General General
SITE SERVICES AS FACILITY RENEWA TORONTO ZOO Road, Scarborough	A STATE OF THE STA	CSRR-001 General General

SITE SERVICES AS FACILITY RENEWA TORONTO ZOO Road, Scarborough	SITE SERVICES ASSESSMENT FOR LONG TERM FACILITY RENEWAL PLANNING, TORONTO ZOO Road, Scarborough	T FOR G, 361	LONG TERM A Old Finch	Recommendation Report Required Repairs GAS SYSTEM	METROPOL	Project Number 98820 26-Oct-99 Page: 9 METROPOLITAN TORONTO 200
<b>a</b>	Location	Pty	Pty Category	Description	Correction	Base Year Budget Cost
GSRR-003	General General	ro C	5 Functional	Random sampling of the gas regulators and valves revealed that they are not providing adequate pressure. It is concluded that the majority of the gas regulators will suffer similar deficiencies.	Retain a sempling of the gas regulators and valves  Retain a serviceman to check all the regulators, valves and evened that they are not providing adequate pressure. It is accessories and adjust these components as required concluded that the majority of the gas regulators will suffer all imitian deficiencies.	\$5,000.00

\$338,150.00

Project Number 98820 26-Oct-99 Page: 1 METROPOLITAN TORONTO 200	Succ Occ	2050	2007	2020	2007	2002	2051	2052	2023	2054	2055
Numbe 26 Page: ORONT	First Occ	2000	2002	2010	2002	2000	2001	2002	2003	2004	2005
Project TAN T	Rem. Life	0	2	10	2	0	-	2	က	4	20
JOPOL	Age	27	27	27	27	27	30	30	30	30	ଚ
MET	Nom Life	20	8	75	20	ဇ	OS	20	20	9	20
ACCOUNT A STATE OF THE STATE OF	Budget Cost	\$50,000	\$6,000	\$15,000	\$5,000	\$25,000	\$100,000	\$37,500	\$62,500	\$50,000	\$75,000
And the control of th	Quantity	4000	33	27	е	49	4000	1500	2500	2000	3000
	Units	M	each	each	each	each	<u>L</u>	5	1	<u></u>	<b>5</b>
Recommendation Renort Capital Improvement Toronto Zoo	Action	Replace underground cable between North Service to Americas	Replace Light Standards - 6% every 5 years.	Repair Transformer Vault -20% every 10 years	Replace 30% of elec. Panels every 5 years.	Replace transf. 4 every 2 years	Replace underground power cables between Americas & Africa Pav.	Replace underground power cable between Africa and Indo Pav.	Replace underground power cables between Indo Pav. To Front Entrance	Replace underground power cables between Front Entrance & Australasia Pav.	Replace underground power cables between Australasia to North service Pav.
oad, Capital	Description	Underground Service Cable	Light Standards	Transformer Vault	Electrical Panels	Transformers	Underground Power Cables	Underground power cable	Underground power cables	Underground power cables	Underground power cables
SITE SERVICES ASSESSMENT FOR LONG TERM FACILITY RENEWAL PLANNING, TORONTO ZOO Scarborough	Category	Functional	Functional	Functional	Functional	Functional	Maintenance	Functional	Functional	Functional	Functional
NNING	£	6	y y	ဖ	9	φ	ω ω	6	6	9	ဖ
SES ASSESS NEWAL PLA OO	Location	General	General General	General General	General General	General General	General General	General	General General	General General	General General
SITE SERVICES ASSESSMENT FACILITY RENEWAL PLANNING TORONTO 200 Scarborough	<u> </u>	ELCA-004	ELCA-005	ELCA-006	ELCA-007	ELCA-008	ELCA-009	ELCA-010	ELCA-011	ELCA-012	ELCA-013

Paradigm Engineering Group Inc.

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SITE SERVI FACILITY RE	SITE SERVICES ASSESSMENT FACILITY RENEWAL PLANNING	NEN NEN NEN	ũ.		Recommendation Report						Project Number 98820	Numbe	r 98820
TORONTO 200 Scarborough	00:		361A Old Finch Road,	Capit	al Improvement Toronto Zoo WATER SYSTEM				METI	26-0ct-99 <b>Paqe:</b> 2 METROPOLITAN TORONTO ZOO	TAN T	Page: DRONT	26-0ct-99 R: 2 NTO ZOO
9	Location	£	Category	Description	Action	Units	Quantity	Budget Cost	Norm Life	Age	Rem. Life	First	Succ
WSCA-002	General	G	Functional	Valves -Water System	Replace 20% of water valves every 4 years.	each	199	\$80,000	10	27	4	2004	2008
WSCA-003	General General	ø	Functional	Drinking Fountains-Water System	Replace 20%. Of druinking fountains every 5 years	each	18	\$1,200	10	20	\$	2005	2010
WSCA-004	General General	ဖ	Functional	Manholes - Water System.	Replace 30%. Of manholes in 15 years	each	9	\$24,000	20	27	15	2015	2030
WSCA-005	General General	g.	Functional	Pumping Station	Replace pumping station in 5 years	each	-	\$30,000	20	27	5	2005	2025
WSCA-006	General General	ဖ	Functional	Water Main Chamber	Repairs to 20% water main chamber in 15 yrs	each	•••	\$10,000	20	27	15	2015	2035
WSCA-007	General	9	Functional	Buried Water Pipe	Replace 100 feet of water mains every 2 yrs.	LM	12750	\$20,000	20	27	2	2 2002 2004	2004

Paradigm Engineering Group Inc

Recommendation Report

SITE SERVICES ASSESSMENT FOR LONG TERM FACILITY RENEWAL PLANNING, 10RONTO 200 361A Old Finch Road, Scarborough

Toronto Zoo Capital Improvement

STORM/SANITARY SEWER

002	METROPOLITAN TORONTO 200	
ო	Page:	2
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Project Number 98820

<b>Q</b>	Location	£	Category	Description	Action	Units	Quantity	Budget Cost	Norm Life	Age	Rem. Life	First Occ	Succ	
SSCA-001	General General	9	Functional	Pipe & Fittings	Replace pipes - 6 m every 5 yrs.	[M]	19500	\$10,000	75	27	£C .	2005	2010	
SSCA-002	General General	ဖ	Functional	Pumping Station	Replace pumping station in 10 yrs.	Each	329	\$80,000	20	27	<b>£</b>	2010	2030	
SSCA-003	General General	ဖ	Functional	Manholes - Sewer System	Repair 50% of manholes in 15 yrs.	Each	329	\$50,000	99	27	\$	2015	2065	
SSCA-005	General	ဖ	Functional	General	Replace 100% of area drains in 13 yrs	Each	7	\$7,000	04	27	<u>~</u>	2013	2000	
SSCA-007	General	ဖ	Functional	Pumping Station	Replace in 10 years.	each	329	\$80,000	20	27	0	2010	2020	
SSCA-008	General	မှ	Functional	Manholes - Storm System.	Replace 50%. Of manholes in 15 yrs	each	329	\$30,000	SS	27	5	2015	2030	
SSCA-010	General General	ဖ	Functional	Catch Basins - Storm System.	Replace 50%. Of Catch Basins in 15 yrs	each	275	\$30,000	20	27	15	2015	2065	

ENT FOR LONG TERM	ING,	361A Old Finch Road,	
SITE SERVICES ASSESSMENT FOR LONG TERM	FACILITY RENEWAL PLANNING	TORONTO 200	Scarborough

**Toronto Zoo** Recommendation Renort Capital Improvement

**COMMUNICATION SYSTEM** 

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METROPOLITAN TORONTO 200

Project Number 98820

26-Oct-99

<u>Q</u>	Location	<b>₽</b>	Category	Description	Action	Units	Quantity	Budget Cost	Norm Life	Age	Rem. Life	Tire Occ	Succ
CSCA-002	General General	9	Functional	General	Allowance for equip. technology unpgrade	LM		\$15,000	15	*	9	2010	2030
CSCA-003	General	ω ω	Functional	General	Replace undergrd cable	LM	12000	\$7,500	8	27	23	2023	2050
CSCA-004	General General	ω	Functional	Underground Cables	Underground communication cables between North Service to Americas Pavilions.		2000	\$10,000	20	30	0	2000	2050
cscA-005	General General	ဖ	Functional	Undergound Communication Cables	Underground communication cables between Americas to Africa Pavilions.	5	4000	\$12,000	S <sub>S</sub>	စ္တ	_	2001	2051
CSCA-006	General	ဖ	Functional	Underground Communication Cables	Underground communication cables between Africa to Indo Pavilions.	5	1500	\$7,500	92	30	2	2002	2052
CSCA-007	General	ဖ	Functional	Underground Communication Cables	Underground communication cables between Indo Pavilion to Front Entrance.	L	2500	\$10,000	20	30	က	2003	2053
CSCA-008	General	9	Functional	Underground Communication Cables	Underground communication cables between Front Entrance to Australisia Pavilions.	TO THE PROPERTY OF THE PROPERT	2000	000'6\$	20	30	7	2004	2054
CSCA-009	General	9	Functional	Underground Communication Cables	Underground communication cables between Australasia to North Service Pavilions.	<u> </u>	3000	\$11,000	90	OE	က	2005	2055

FACILITY R	FACILITY RENEWAL PLANNING	NEK	Ī		Recommendation Renort						Projec	t Numb	Project Number 98820
TORONTO 200 Scarborough	200 4		361A Old Finch Road,	Car	oital Improvement Toronto Zoo GAS SYSTEM				METF	ROPO	26-0⊄-99 <b>Pade:</b> 5 METROPOLITAN TORONTO ZOO	26 Page: FORONT	26-0ct-99 e: 5 NTO ZOO
2	Location	₹	Location Pty Category	Description	Action	Units	Quantity	Budget Cost	Norm Age Life	Age	Rem. Life	First Occ	Succ
GSCA-001	General General	9	Functional	Valves	Repair Gas system valves - 20% every 2 years	each	The same of the sa	\$1,000	20	20		2 2002	2004
GSCA-002	General	ဖ	Functional	Gas pipes and fittings	Repair gas/fittings - 6 m every two year	ΓΜ	4150	\$3,000	75	27	<u> </u>	2001	2003
GSCA-003	General General	G	Functional	Regulators and Meters	Repair regulators/memters - 20% every 5 years	each	30	\$12,000	52	8	5	2005	2005

NG35 3TIS	SITE SEDVICES ASSESSMENT FOR LONG TERM	7 00	MOST SAC			Droipot Number 0882
SOLE SERVICES A FACILITY RENEW/ TORONTO ZOO Road, Scarborough	STE SENVICES ASSESSMENT FACILITY RENEWAL PLANNING TORONTO 200 Road, Scarborough	5 %	361A Old Finch	Recommendation Report Preventive Maintenance Tor	onto Zoo	Project Number 30020 26-0¢-99 Page: 1 METROPOLITAN TORONTO 200
۵	Location	£	Pty Category	Description	Correction	Base Year Budget Cost
WSPM-001	General General	4	4 Life Safety	Fire Hydrants -Overhauling Servicing	The fire hydrants require overhauling and servicing to maintain all operating parts. Allow for the servicing and overhauling of the fire hydrants once every 5 years at an annual cost of \$ 1100.00	\$5,500.00
WSPM-002	General General	4	4 Life Safety	Fire Hydrants: Fire Flow tests	Conduct annual flow test to check the water pressure and performance of the hydrants on site. Allow an annual budget of \$5800.	nd \$5,800.00 dget
WSPM-003	General General	4	4 Life Safety	Fire Hydrants: Leak Detection Tests	The fire hydrants on site require a leak detection test to be performed on them to determine if there are any defective parts in its assembly. Allow an annual budget of \$5800.	be \$5,800.00
WSPM-004	General General	<b>9</b>	6 Maintenance	Manholes, valve and meter chambers. All site services including manholes, vlave chambers and meters require annual cleaning and inspection.	ices Conduct annual inspection and cleaning of all these equire components on site. Allow an annual budget of \$4000.	\$4,000.00

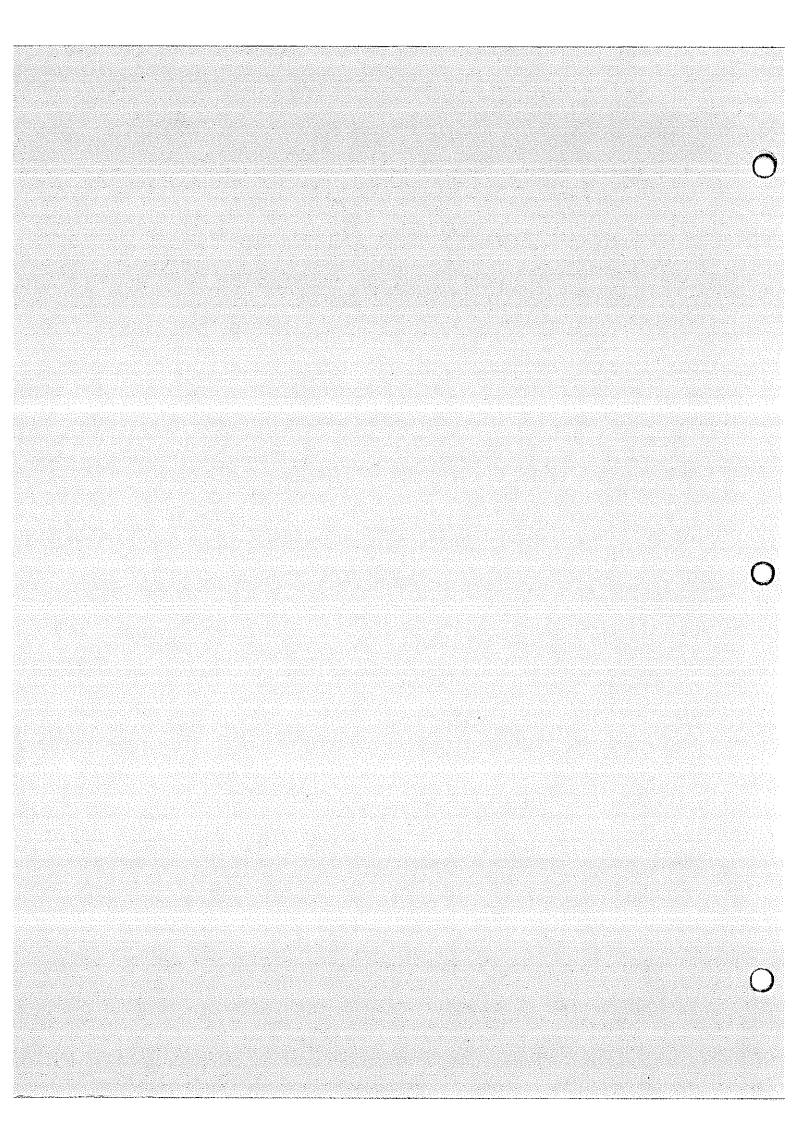
SITE SERVICES AV FACILITY RENEW/ TORONTO 200 Road, Scarborough	SITE SERVICES ASSESSMENT FOR LONG TERM FACILITY RENEWAL PLANNING, TORONTO ZOO Road, Scarborough	NT FOR NG, 361	OR LONG TERM 361A Old Finch	Recommendation Report Preventive Maintenance Toronto Zoo STORM/SANITARY SEWER	METROPOL	Project Number 98820 26-0ct-99 Page: 2 ITAN TORONTO ZOO
A SERVICE OF PERSONS OF THE PERSONS OF T	Location	₹	Pty Category	Description	Correction	Base Year Budget Cost
SSPM-001	General General	υ	6 Maintenance	Catch Basins, Manholes and Area Drains. These site services components require annual cleaning to clear them of dirt and debrits.	Flush these services components once every year. Allow annual budget of \$12000.	\$12,000.00
SSPM-002	General General	ဖ	6 Maintenance	Manholes. Thses site services components require annual cleaning to clear them of dirt and debrits.	Flush these services components once every year. Allow annual budget of \$10000.	\$10,000.00
SSPM-003	General General	ဖ	6 Maintenance	Buried Pipes. A camera survey is required in order to check the integrity of the underground pipes. This survey is recommended to be performed every 10 years.	Buried Pipes. A camera survey is required in order to check Conduct a camera survey of the storm sewer lines every 10 the integrity of the underground pipes. This survey is years. Allow an annual budget of \$ 1000.00 recommended to be performed every 10 years.	\$1,000.00
SSPM-004	General General	ဖ	6 Maintenance	Buried Pipes. A camera survey is required in order to check the integrity of the underground pipes. This survey is recommended to be performed every 10 years.	amera survey is required in order to check Conduct a camera survey of the sanitary sewer lines every underground pipes. This survey is 10 years. Allow an annual budget of \$ 1500.00 be performed every 10 years.	\$1,500.00

Project Number 98820	Page: 3	ORONTO 200	Base Year Budget Cost	\$10,000.00
Project	00	METROPOLITAN TORONTO ZOO	Correction	Retain the services of Consumer Gas or its approved contractor to inspect the gas lines and associated components annually. All equipment on site using gas should be included in this annual inspection. All such appliances should be cleaned to ensure proper gas supply. Allow an annual budget of \$ 1000.00.
Report	Toronto Zoo			ers, and valves check for signs of
Recommendation Report	Preventive Maintenance	GAS SYSTEM	Description	Gas Lines and Valves. Gas lines, meters, and valves require to be inspected periodically to check for signs of leaks, corrosion etc.
NG TERM	361A Old Finch		tegory	6 Maintenance
OR LO	361A C		Pty Category	<b>6</b> Ma
MING,				
SITE SERVICES ASSESSMENT FOR LONG TERM FACILITY RENEWAL PLANNING,	200 prough		Location	General
SITE SERVI FACILITY RE	TORONTO 200 Road, Scarborough		<b>Q</b>	GSPM-001 General

\$55,600.00

and the second of the second o

### APPENDIX 4 1997 ENERGY REPORT



### TORONTO

### 1997 Energy Report

**Toronto Zoo** 

**All Facilities** 

Corporate Services
Energy Management Office, 392-8954

### CITY OF TORONTO

### 1997 Energy Report

### **TORONTO ZOO**

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ENERGY CONSUMPTION vs Adjusted Baseline

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II. MULTI-YEAR ENERGY

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ANNUAL Energy Consumption & Cost

### 1997 Actual Energy CONSUMPTION & COST vs Adjusted Baseline EXECUTIVE SUMMARY ALL FACILITIES

ENERG	ENERGY TYPE		ENERGY CONSUMPTION	SUMPTION			ENERGY COST	COST	
Name & Unit		Adj.Base 1995	Actual 1997	Energy	Percent Change	Adj.Base 1995	Actual 1997	Cost Change	Percent
Electricity	kWh	10,206,299	10,171,317	(34,982)	-0.3%	\$732,724	\$727,829	(\$4,895)	-0.7%
Natural Gas	Ë	1,802,733	2,011,432	208,699	11.6%	\$263,690	\$296,334	\$32,644	12.4%
Heating Oil	litre	13,458	9,228	(4,230)	-31.4%	\$4,433	\$3,058	(\$1,376)	-31.0%
Gasoline	if te	61,427	59,577	(1,850)	-3.0%	\$34,107	\$33,120	(\$988)	-2.9%
Diesel	litre	22,362	28,759	6,397	28.6%	\$10,132	\$13,077	\$2,946	29.1%
Propane	litre	50,973	61,645	10,671	20.9%	\$17,988	\$21,650	\$3,663	20.4%
Water	Ę	28,849,623	30,972,943	2,123,321	7.4%	\$220,768	\$260,329	\$39,561	17.9%
Total	ekWh	30,208,091	32,417,110	2,209,019	7.3%	\$1,283,842	\$1,355,396	\$71,554	2.6%

NOTE:

1) Adj. Base - The 1995 energy consumption and cost are adjusted to the 1997 billing periods, weather conditions and energy costs.

2) Actual - The current year (1997) actual energy consumption and cost.

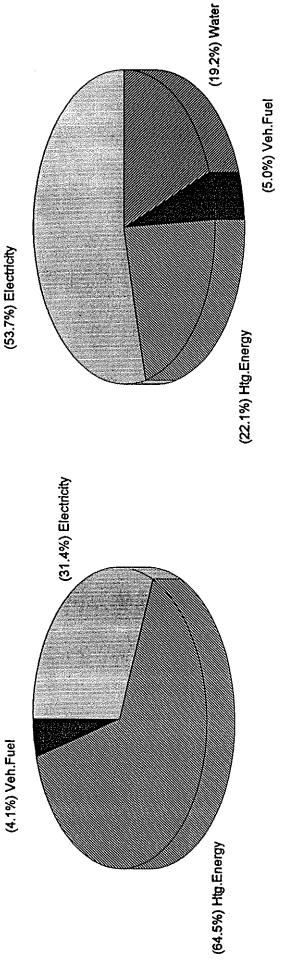
3) ekWh - equivalent kilowatt-hour; water consumption is not included in total energy.

Prepared By: City of Toronto, Corporate Services, Energy Management Office .....Date: 98/3/26 .....File: g:\energy\nu2\uvaffnz.vk4, ExceSum

## ALL FACILITIES 1997 Actual ENERGY CONSUMPTION & COST

## **Energy Consumption**

**Energy Cost** 



Total \$1,355.4 millions

NOTE: Hg Energy includes natural gas & heating oil; Veh. Fuel includes gasoline, diesel and propane.

Total 32,417.1 equivalent megawatt hours

Total 7,375 tonnes CO2

Prepared By: Mater Corporate & Human Resources Dept., Easing Management Office .....Dute: 945/5 .....Filet gi'smorgy/mateurs7/mat

## 1997 Actual ENERGY CONSUMPTION VS Adjusted Baseline MASTER METERS

		Ü	איזי אדוטום.	1	NATU	NATURAL GAS (m³)	£	M	WATER (m)		10	TOTAL (ekWh)	
	FACILITIES	נרני	ברבכוצוכון (אינויו	-					1 7 4	2	A 4. DAA	Action	Darren
		Adi Rase	Actual	Percent	Adj.Base	Actual	Percent	Adj.Base	Actual	Leiceur Leiceur		1001	
		1005	1997	Change	1995	1997	Change	1995	1997	Change	1995	/881	Change
Facility	Facility ID and Name	Cee	200	2									
								-		1	188.060	152.460	-18.9%
2	Domain Ride & Garage Bldg	188,060	152,460	-18.9%	•	ţ	l				52,070	0.120	,82 C8.
<u> </u>		52,070	0 120	20.5%	I	1	ī	1		l	0.01	7	
巴	Finch Barn	32,073	2, 20	200				ı	I	1	14,867	890j6	-39.0%
ט כי	Cate House	14,867	890'6	-39.0%	I	i					700 400	207 600	%9 8
<u> </u>		700 700	207 800	%9 8°	1	l	I	1	1	I	170' 177	20,103	
<u>8</u>	Main Barn	770,122	200,102	100	4 000 700	2 044 432	11 6%	273 371	330.480	20.9%	20.9%   28,307,913 30,531,631	30,531,631	7.9%
=	Zoo Main Meter	9.664,589	9,730,005	~ ?	1,802,733 2,011,432	Z;U:1,432	2		1		200 20	10.08	26 1%
		20.00	10.00	26.1%	I	1	1	l	1	I	20,020	2.0	
	Valley Halla	070'07	000	2 6				1	1	1	33.849	43,968	%6.67
70,7	Zoo Police Stable	33,849	43,968	29.9%	1	1	1				•	•	
				130	2000 1	1 000 100 0 004 400 44 69%	44 60%	273 371	330.480	20.9%	20.9%   28,849,623 30,972,943	30,972,943	7.4%
Total		10,206,299 10,171,317	10,171,317	 % %	1,002,1	2011,402	2/2:1						
3													

### 1997 Actual ENERGY COST VS Adjusted Baseline MASTER METERS

							4741	1000 011		TOT	TOTAL COST	
SAITI HOVE	EL EC.	FLECTRICITY COST	논	NATUR	NATURAL GAS COST	ST	A	WAIER COST		2	2	
							Adi Dago	Action	Dercent	Adi Base	Actual	Dercen
	Adj. Base	Actual	Percent	Adj.Base	Acrual	100 100 100 100 100 100 100 100 100 100	Adj. Dasa			2007	4004	00000
	4005	1007	Change	1995	1997	Change	1995	1887	Change	288	1997	21912
Facility ID and Name	CERT	100										
										\$15 0Q4	512 342	.187%
		070 070	70C 00 F	1	1	1		1	 	1	1	
DR Domain Ride & Garage Bldg	420,034	346,316	2 4 5						1	24 965	\$833	-83.2%
	A 065	4833	-83.2%	I	1	1	1	i	Ī			
FB Finch Ball	44,000	3						1	1	51 387	8850	-38.8%
	64 287	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC	-38 8%	1	1	Ī	I			1 1 1 1 1 1		, , , ,
	700-1							1	I	S 8 6 7	\$16.130	13.4%
	610 617	8.16.130	-13.4%	1	1	l						
			1	0000000	420 A24	12 4%	\$220 768	\$260,329	17.9%	7.9%   \$1,172,030	1,248,985	6.0%
	\$687.572	\$692,323	? ?	000'007¢	けつつつのよう					47006	A 0.04	700 000
	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		700 30	1	1	ī	1	1	1	047,74	+ OO_	e 0.07-
	\$2,245	400,0	S 0.07-							PPS CS	43 667	20 QC
	770 04	e2 667	28 Q%	1	1	ī	ł	1				)
ZPS Zoo Police Stable	**************************************	5	) )			•••••						
									,	6 007 170 74	7007 7007	76.5
	ACT CCT 9	673777 ACT 6737 R29	-0.7%	\$263,690 \$296,334	\$296,334	12.4%	12.4%   \$220,768 \$260,329	\$260,329	17.9%	17.9% \$1,217,182 \$1,264,492	1,264,492	5.5%
lotal	41.06,14											

NOTE: Adj. Base - The 1995 energy consumption and cost are adjusted to the 1997 billing periods, weather conditions and energy costs.

ekWh. Equivalent kilowatt-hour (1 cubic metre of Natural Gas == 10.3417 ekWh). Actual - The current year (1997) actual energy consumption and cost.

Prepared By: City of Toronto, Corporate Services, Energy Management Office .....Date: 98/2/26 .....File: g:\energy\malayag7ma.wk4, ManterMit

## McDONALD RESTAURANTS

# 1997 Actual ENERGY CONSUMPTION VS Adjusted Baseline

FACILITIES	ELECT	ELECTRICITY (KWh)	E CE	NATUR	NATURAL GAS (m³)	na)	W	WATER (m²)		10	TOTAL (ekWh)	
Facility ID and Name	Adj.Base	Actual 1997	Percent Change	Adj.Base 1995	Actual 1997	Percent Change	Adj.Base 1995	Actual 1997	Percent Change	Adj.Base 1995	Actual 1997	Percent Change
AR Africa Restaurant ESB Eurasia Snack Bar MGSB Main Gate Snack Bar MSB Madagascar Snack Bar NAR North America Restaurant	517,885 28,586 72,275 290,282	529,200 45,360 2,800 73,440 321,200	2.2% 58.7% 1.6%	82,097 — — 32,612	73,153 — — 43,743	-10.9% 	6,979 899 1,152 928 7,917	5,008 469 1,269 7,649	-28.2% -47.8% 10.2% -3.4%	1,366,905 28,586 72,275 627,548	1,285,723 45,360 2,800 73,440 773,579	-5.9% 58.7% 
Total		972,000			116,896			15,095			2,180,902	- 11
Total (excl. energy added after 1995)	909,028	969,200	%9.9	114,709	116,896	1.9%	17,875	15,095	-15.6%	2,095,314	2,178,102	4.0%

# McDONALD RESTAURANTS 1997 Actual ENERGY COST VS Adjusted Baseline

FACILMES	ELECT	ELECTRICITY COST	ST	NATURA	NATURAL GAS COST	ST	WA	WATER COST		TOT	TOTAL COST	
Facility ID and Name	Adj.Base 1995	Actual 1997	Percent Change	Adj.Base 1995	Actual 1997	Percent Change	Adj.Base 1995	Actual 1997	Percent Change	Adj.Base 1995	Actual 1997	Percent Change
AR Africa Restaurant ESB Eurasia Snack Bar MGSB Main Gate Snack Bar MSB Madagascar Snack Bar NAR North America Restaurant	\$37,661 \$1,839  \$5,049 \$21,021	\$37,911 \$3,222 \$213 \$5,169 \$22,863	0.7% 75.2% 2.4% 8.8%	\$11,967	\$10,570	-11.7%   37.6%	\$5,400 \$707 \$896 \$721 \$6,148	\$3,888 \$368 \$987 \$553 \$5,899	-28.0% -48.0% 10.2% -23.3% -4.0%	\$55,028 \$2,546 .35,770 \$31,817	\$52,370 \$3,590 \$1,201 \$5,722 \$35,157	4.8% 41.0% 10.8%
Total		\$69,379			\$16,965			\$11,695	****		\$98,039	
Total (excl. energy added after 1995)	\$65,570	\$69,166	5.5%	\$16,615	\$16,965	2.1%	\$13,871	\$11,695	-15.7%	\$95,161	\$96,839	1.8%

NOTE: Adj. Base - The 1995 energy consumption and cost are adjusted to the 1997 billing periods, weather conditions and energy costs.

Actual - The current year (1997) actual energy consumption and cost. ekWh - Equivalent kilowatt-hour (1 cubic metre of Natural Gas = 10.3417 ekWh).





# SUBMETERS 1997 Actual ENERGY CONSUMPTION VS Adjusted Baseline

			MAN SHORE	1	NATIRAL	Al GAS (m²)	ru Lu	W	WATER (m*)		10	TOTAL (ekWh)	*****
	FACILITIES	ELECT	ELECTRICIT (KWII)	(II)				A di Dooo	1citho A	Dercent	Adi Base	Actual	Percent
		Adj.Base	Actual	Percent	Adj.Base	Actual 1997	Change	Adj.base 1995	1997	Change	1995	1997	Change
Facili	Facility ID and Name	1995	7881	Cliange	200		3				I	R 271 892	1
Δüδ	African Pavilion	****	1,225,207	1	434,394	487,994	12.3%	1				31.418	l
0	Africa Phino / Mixed Hoofstock	1	!	1	1	3,038	1 3	1	1		1	1 868 824	i
A A		I	519,028	1	112,177	130,520	16.4%	1		1 1	26.898	24,351	-9.5%
40		1	1	1	7,601	2,333	9.0.6					1 884 580	1
2 2	1	***************************************	395,717	1	122,204	143,968	17.8%	1	I	1		20,003	
֡֝֝֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֡֓֓֓֓֓֓֓		1		1	1	2,029	Ī	-	1	1		40,000	
20.0			1	1	1	1,011	1	1	1	ļ	l	10,455	l
<u> </u>	_	l			1	2,207	1	Į.		1	***************************************	22,824	
덛	Caracal Lynx				000 07	24.752	-10 R%		-	I	446,849	359,400	-19.6%
S S	Domain Ride & Garage Bldg	1	1	I	45,209	24,130	98.8%	l	ł	1	177,456	348,902	%9.96
ī	Elephants House	i	1	1	SCI'/-	101,00	20.00		İ	ı	49.410	47.237	4.4%
Ĺ	Family Centre	1	1	1	4,778	4,008	84.	İ			! !	170 710	Paulifred).
2 8		1		1	1	16,507	1				404 004	440 470	44 102
3	-			1	9.789	10,876	11.1%		1	L	101,234	112,473	67.70
<u>5</u>	_			-	14 984	9.219	-38.5%		1	1	154,958	95,340	38.5%
OHO OHO	_	1			52 524	68 884	31 2%	1	813	1	543,151	712,374	31.2%
9 8 8	_	1	1	1	58,22 58,434	74 902	28.2%	-	1	1	604,305	774,610	28.2%
Ŧ	Hippo House		1	1	1000	300,530	707 7	1		1	ł	3,261,644	Ī
<u>R</u>	Indo-Malayan Pavilion	1	643,067	1	242,524	233,200	207.10	. 1	1	1	695,691	519,293	-25.4%
RB	Indian Rhino Building	1	1	I	0/7/0	20.Z.2.4	0/ t-707-	1	1	1		10,910	1
3	Lion House	1	1	I	1	1,000		1 1	I	I	I	81,038	1
I I	lion House (Hvena)	1	1			0201					1	110 863	I
NHS	-	1	1	1	1	02/01	I			1	l	185,509	I
ξ		1	1	İ	1 8	17,838	1 8%		1	I	410,364	417,119	1.6%
<u>}</u>	Malayan Wood (Village Edge)	l	I	1	39,580	40,004	20.0	i 1	9 330	1	1	4,244,537	1
NSB		1			380,110	410,423	14 00%	***************************************		1	•	542.298	ł
OAB	1	-	258,174	l	24,5/8	47,474	40.0%	i 1	1	I	164.551	184,851	12.3%
<u>8</u>	Orangutan Holding	1	1	l	118'01	1007	2.7.7		I	1		48,565	1
0		1	1	1	I	080,4	1	1 0	7 460	24 E04	250 515	330 307	£ 7%
7.58		275,229	279,597	1.6%	7,280	4,912	-32.5%	2,225	1,409	-34.376	- 1	160,000	3
	١.		3,320,790			1,873,253			11,602			22,693,406	
		076 220	279 597	1.6%	1.655.603	1,806,216	9.1%	2,225	1,459	34.5%	3,725,384	3,926,346	5.4%
Total	Total (excl. energy added after 1990)	677'017	1,0,00										

NOTE: Adj. Base - The 1995 energy consumption and cost are adjusted to the 1997 billing periods, weather conditions and energy costs. Actual - The current year (1997) actual energy consumption and cost.

ekWh - Equivalent kilowatt-hour (1 cubic metre of Natural Gas = 10.3417 ckWh).

# SUBMETERS 1997 Actual ENERGY COST VS Adjusted Baseline

	FACILITIES	ELECT	ELECTRICITY COST	ST	NATUR	NATURAL GAS COST	JST	WA	WATER COST		TO	TOTAL COST	
1	omeN has Of Whiteon	Adj.Base	Actual 1997	Percent	Adj.Base 1995	Actual 1997	Percent Change	Adj.Base 1995	Actual 1997	Percent Change	Adj.Base 1995	Actual 1997	Percent Change
And Car	African Davillon		\$87.411		98	\$72,869	12.8%	1	l	I	ı	\$160,280	1
֝֝֝֝֝֝֝ ֓֞֞֓֞֞֓֞֓֞֓֞֓֞֞֞֞֓֓֞֞֞֞֞֓֓֡	•			t		\$439	ı	1	I	-	l	\$439	1
200	_		\$36.876	1	\$16.748	\$19,526	16.6%	i	1	I	l	\$56,401	1
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	_	1		1	\$390	\$356	-8.6%	1	1	1	\$390	\$356	-8.6%
2			\$28.071	-	\$18,244	\$21,676	18.8%	ļ	ı	I	l	\$49,747	1
	•	•		I	1	\$313	1	1	l	I	1	\$313	1
2 2		ļ	-	Ī	1	\$146	ī	1	l	1	l	\$146	I
<u> </u>		•	1	1	I	\$329	1	1	1	1		\$329	
7 0	Demain Dide & Carago Bldg			1	\$6.496	\$5.221	-19.6%	-		1	\$6,496	\$5,221	-19.6%
ב ט ט	Contain Nee & Carage Con	. 1	1	1	\$2,552	\$5,057	98.2%	1	**************************************	I	\$2,552	\$5,057	98.2%
ב ט	Coming Contro		I	I	\$713	\$684	4.1%	1	1	1	\$713	\$684	4.
ر ک			ı	Ī	: 1	\$2.481	1	1	1	1	1	\$2,481	1
9 2				1	\$1.469	\$1,639	11.6%	****		1	\$1,469	\$1,639	11.6%
5 0				I	\$2,205	\$1,346	-39.0%	1	1	1	\$2,205	\$1,346	-39.0%
5 5 5 7				I	\$7,882	\$10,297	30.6%	1	\$662	1	\$7,882	\$10,297	30.6%
ב פ ב ב פ	Cionides de pirig bullang			I	\$8.740	\$11,246	28.7%	Į	l	1	\$8,740	\$11,246	28.7%
02	Indo Malayan Davijon		\$45,721		\$36,171	\$37,955	4.9%	1	l	-		\$83,676	1
<u>a</u>	Indian Rhino Building	l	 	1	\$10,062	\$7,539	-25.1%	1	I	I	\$10,062	\$7,539	-25.1%
<u> </u>		1	1	1		\$155	l	l	ı	1	1	\$155	1
; <u>;</u>	Lion House (Hyena)	1	i	1	1	\$1,166	1		-	1	-	\$1,166	-
Z Z	-		1	I		\$1,594		ı	-	1		\$1,594	ī
2		l	Į	I	1	\$2,669	1	****	1	1	I	\$2,669	1
3	Malayan Wood (Village Edge)	****	l	l	\$5,915	\$6,021	1.8%	1	1	I	\$5,915	\$6,021	1.8%
ŭ Z	North Services Building	-	1	1	\$57,653	\$61,302	6.3%		\$7,383		-	\$61,302	
OAB	Old Administrative Building		\$18,448		\$3,682	\$4,114	11.7%	1	l		1	\$22,563	I
Ę	Orangitan Holding	****	1	I	\$2,358	\$2,676	13.5%	-	1	1	\$2,358	\$2,676	13.5%
, a	Dolar Bear Holding	1	1	ı	1	\$707	1	1	ļ	ı	1	\$707	i
ZSB	Zoological Society Building	\$19,506	\$19,935	2.2%	\$1,105	\$744	-32.7%	\$1,811	\$1,186	-34.5%	\$22,423	\$22,491	0.3%
Total			\$236,462			\$280,269			\$9,231			\$518,543	
Total	Total (excl. energy added after 1995)	\$19,506	\$19,935	2.2%	\$246,993	\$270,269	9.4%	\$1,811	\$1,186	34.5%	\$71,206	\$74,574	4.7%

NOTE: Adj. Base - The 1995 energy consumption and cost are adjusted to the 1997 billing periods, weather conditions and energy costs.

Actual - The current year (1997) actual energy consumption and cost. ekWh - Equivalent kilowan-hour (1 cubic metre of Natural Gas = 10.3417 ekWh).



II. MULTI-YEAR ENERGY

QUARTERLY Energy Consumption

ANNUAL Energy Consumption & Cost

### MULTI-YEAR QUARTERLY ENERGY CONSUMPTION

(Excluding McDonalds)

3rd QTR

2nd QTR

4th QTR

Tonnes CO2

TOTAL

**ENERGY TYPE** 

1st QTR

Market erreniskete	photographs	1997 A (	TUAL	CONSU	MPTIO		personal de la composition della	--------------------	----------------	------------	-----------	-------------	-----------	------------	--
Electricity	kWh	2,690,350	2,109,088	1,929,473	2,470,406	9,199,317	2,451								
Natural Gas	m³	878,934	332,633	99,944	583,025	1,894,536	4,038								
Heating Oil	Litre	6,263	1,186	<del></del>	1,780	9,229	29								
<b>Gasoline</b>	Litre	10,323	21,799	15,442	12,013	59,577	158								
Diesel Oil	Litre	6,195		10,976	11,588	28,759	84								
Propane	Litre	13,520	14,065	23,846	10,213	61,644	88								
<b>Vater</b>	m³	31,001	71,204	62,328	150,851	315,384	<del></del>								
<b>Fotal</b>	ekWh	12,114,729	5,877,212	3,408,673	8,835,589	30,236,204	6,848								
Tonnes of Co	02	2,674	1,353	834	1,987	6,848	6,848								
		1996 A (	CTUAL	CONSU	MPTIO	N									
Electricity	kWh	3,067,791	2,054,795	1,755,495	2,267,879	9,145,960	2,436								
Natural Gas	m³	838,667	340,400	81,583	545,239	1,805,889	3,849								
Heating Oil	Litre	17,992	4,467		4,723	27,182	85								
Gasoline	Litre	15,894	15,481	16,869	15,702	63,946	170								
Diesel Oil	Litre	6,263	3,922	5,841	4,993	21,019	62								
Propane	Litre	16,309	13,028	17,639	10,613	57,589	83								
Water	m³	45,737	15,462	164,268	70,351	295,818	-(								
Total	ekWh	12,277,030	5,912,019	2,956,743	8,241,665	29,387,456	6,684								
Tonnes of C	02	2,745	1,358	729	1,853	6,684	6,684								
<b>.</b>		1995 A	CTUAL	CONST	MPTIO	N									
Electricity	kWh	2,780,268	2,103,835	2,004,690	2,394,446	9,283,239	2,473								
Natural Gas	m³	706,538	325,526	92,599	496,452	1,621,115	3,455								
Heating Oil	Litre	15,155	5,943	32,333	430,432	21,098	66								
Gasoline	Litre	15,502	15,781	15,325	14,819	61,427	163								
Diesel Oil	Litre	3,584	6,761	6,132	5,885	22,362	66								
Propane	Litre	13,874	12,555	13,980	10,564	50,973	73								
Water	m³	45,009	122,815	119,911	63,195	350,929									
Total	ekWh	10,541,764	5,852,858	3,280,598	7,813,654	27,488,875	6,296								
Tonnes of C		2,365	1,353	810	1,768	6,296	6,296								
		1994 A		O O NI O I											
			CTUAL		MPTIO										
Electricity	kWh	2,635,799	1,751,056	1,552,095	2,173,911	8,112,861	2,161								
Natural Gas	m³	676,728	243,540	87,864	418,476	1,426,608	3,040								
Heating Oil	Litre	12,075	5,180	1,126	6,947	25,328	79								
Gasoline	Litre		22,998	11,000	18,003	52,001	138								
Diesel Oil	Litre		7,993		9,000	16,993	50								
Propane	Litre	17,402	19,829	25,001	21,501	83,733	120								
Water	m <sub>a</sub>	38,327	59,814	36,391	133,259	267,791									
Total	ekWh	9,895,054	4,781,337	2,766,781	7,007,689	24,450,862	5,589								
Tonnes of C	UZ	2,207	1,115	669	1,598	5,589	5,5%								

NOTE: Energy data has not been normalized to billing period nor weather conditions. Water is not included in total energy and CO2.

Prepared By: City of Toronto, Corporate Services, Energy Management Office ..... Date: 98/2/27 ..... File: g:\energy\nux\qtrasc.wki

### FASER ENERGY ACCOUNTING SYSTEM CITY OF TORONTO

TORONTO ZOO
Cost Centre: ZOO FACILITIES
Energy: ALL ENERGY TYPES
Program: MULTIYEAR - ACTUAL ENERGY

Report: COST CENTRE SUMMARY

#1 #1 * * * * * * * * * * * * * * * * *			1995		1996		1997	·
FACILITY ENERGY TYPE NAME			USE	COST	USE	COST	USE	COST
ALL FACILITIES								
ELECTRICITY DEMAND	(KWH	)	10,256,879 20,183	\$769,549	10,109,360 19,143	\$750,680	10,171,317 19,031	\$727,829
NATURAL GAS	(M3	,	1,732,519	\$260,243	1,938,654	\$287,390	2,011,432	\$296,334
HEATING OIL	(L	)	21,099	\$4,947	27,182	\$7,208	9,228	\$3,058
GASOLINE	(L	)	61,427	\$31,758	63,946	\$33,060	59,577	\$33,120
DIESEL OIL	(L	)	22,362	\$9,750	21,018	\$9,164	28,759	\$13,07
PROPANE	(L	>	50,973	\$15,751	57,589	\$20,924	61,645	\$21,65
WATER	(M3	<b>)</b>	368,635	\$274,177	306,823	\$245,629	330,480	\$260,32
TOTAL	(EKW	H )	29,614,634	\$1,366,175	31,723,864	\$1,354,054	32,417,110	\$1,355,39

NOTE: Energy data has not been normalized to billing period nor weather conditions.

### FASER ENERGY ACCOUNTING SYSTEM CITY OF TORONTO

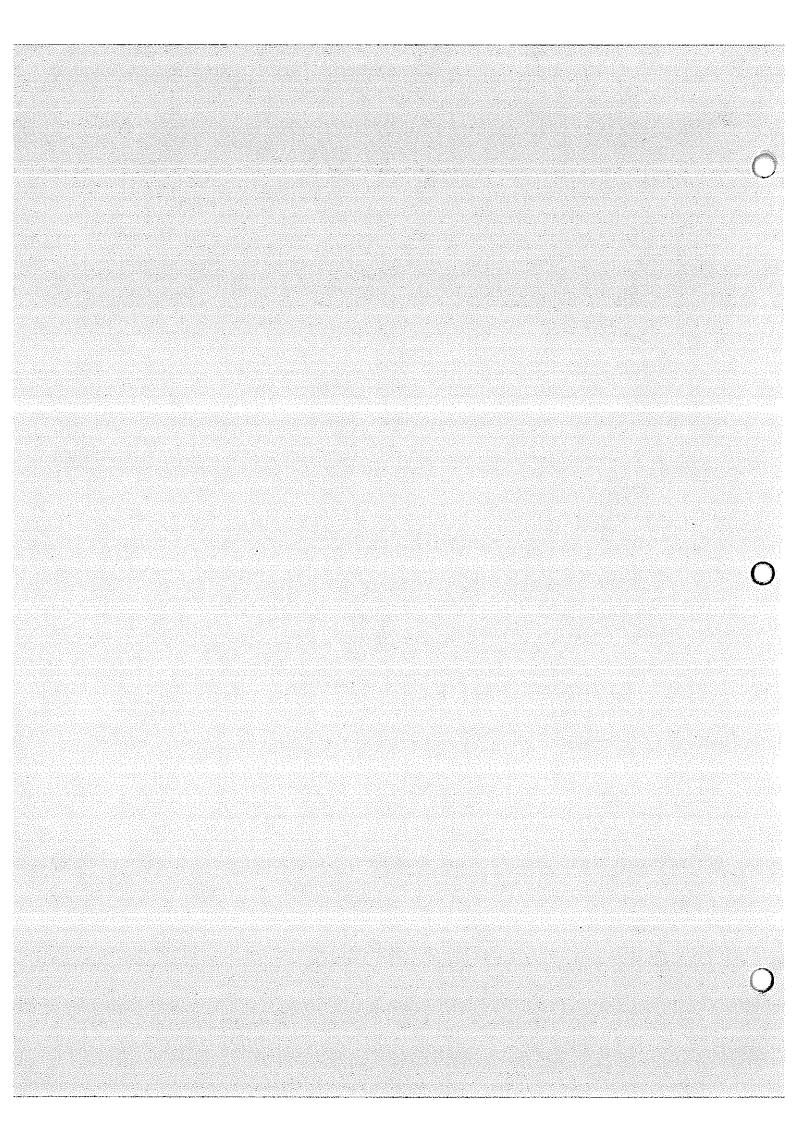
TORONTO ZOO
Cost Centre: MCDONALDS RESTAURANT
Energy: ALL ENERGY TYPES
Program: MULTIYEAR - ACTUAL ENERGY
Report: COST CENTRE SUMMARY

FACILITY			199	5	19	96	19	97
ENERGY TYPE NAME	•		USE	COST	USE	COST	USE	COST
************		-	********		***		**********	
ALL FACILITIES								
ELECTRICITY	(KWH	)	973,640	\$81,680	963,400	\$78,635	972,000	\$69,379
DEMAND	(KW	)	3,256		2,952	·	3,345	******
NATURAL GAS	(M3	)	111,404	\$16,795	134,331	\$19,703	116,896	\$16,965
WATER	(M3	)	17,683	\$13,534	11,102	\$8,691	15,095	\$11,695
TOTAL	(EKWH	)	2,125,746	\$112,009	2,352,612	\$107,028	2,180,903	\$98,039

NOTE: Energy data has not been normalized to billing period nor weather conditions.

### **APPENDIX 5**

### GT WOOD – HIGH VOLTAGE MAINTENANCE REPORT DATED 1995





3354 Mavis Rd. Mississauga, Ont. L5C 1T8 TEL: (905) 272-1696 Fax: (905) 272-1425

February 28, 1995

METRO TORONTO ZOO P.O. Box 280, West Hill, Ontario, M1E 4R5

ATTN: Mr. Dean Evans

**RE:** Your PO #12124

Our Ref #9951

Dear Sir;

In accordance with your request, we have completed the Inspection and Testing of the substation and associated electrical equipment at the above location.

Please find enclosed our test report for your reference.

Thank you for the favour of this business.

Yours very truly,

G.T. WOOD COMPANY LIMITED

L.A. Snow

LAS/jn

Encl.

RSCL/1

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			Marine and the second
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METRO TORONTO ZOO WEST HILL ATTN: MR. DEAN EVANS

REFERENCE NO.: 9951 DECEMBER 1994

### **GENERAL SHEET**

### MAIN OUTDOOR SUBSTATION - SHEETS #1 - #3

The substation fence requires replacement.

- The primary switchgear is showing signs of rust. The entire enclosure requires repainting and recaulking.
- The insulation resistance of the lighting arrestors on the entrance pole was found as follows:

Red Phase - 32 Megohms Yellow Phase - 45 Megohms Blue Phase - 40 Megohms

The above values show internal deterioration. Replacement units are required.

### SHEET #1

- The interphase barriers are showing signs of deterioration. Replacements are required.
- Two (2) of three (3) interrupting units are defective. Replacements are required.
- Two (2) potential indicators were found defective. Replacements were supplied and installed.

### SHEET #2

- The arc blades are missing from this switch. New units are required.
- The interphase barriers are showing signs of deterioration. Replacements are required.
- One (1) potential indicator was found defective. A new unit was supplied and installed.
- A new heater was installed.

### SHEET #3

- The interphase barriers are showing signs of deterioration. Replacements are required.
- A new heater was installed

continued



### METRO TORONTO ZOO **YOUR PO #12124 OUR REF #9951**

A BANOWN OBARAY-2-

### SOCIETY BUILDING

• All equipment was found to be satisfactory.

### INDO-MALAYA PAVILION - SHEETS #11 & #12

The overload devices on both air circuit breakers are leaking fluid. We recommend replacing these liquid filled overload devices with solid state units.

The base of the secondary switchboard is rusting. Repainting is required. ?

### **EURASIA PAVILION - SHEET #18**

The switch handle for this feeder is defective. Replacement is required.

### AFRICA PAVILION - SHEETS #30 & #31

- The overload devices on both air circuit breakers are leaking fluid. We recommend replacing these liquid filled overload devices with solid state units.
- A draw-out handle is required for the breakers

### NORTH AMERICA PAVILION

All electrical equipment was found to be satisfactory.

### ENT. FACILITIES - SHEET #43

The interrupter units for this switch require replacement.

### **VAULT TYPE TRANSFORMERS**

 All transformers and vaults were serviced and left in satisfactory condition. The liquid from each transformer was analyzed for 4 part standard test. Please see the attached test report for results.



TORONTO METRO ZOO CUSTOMER:

**REF NO.:** 9951

LOCATION: WEST HILL, ONTARIO

\*\*\*\*\*\*\*\*\*\*\*\*

The following standards are applicable for transformer oil tests.

It is recommended a sample be tested every 12 months.

(Kilo Volt breakdown A. S. T. M. Standard) For safe and satisfactory operation, this should not be below 25 Kilo DIFFECURIC:

Neutralization Number mg. KCH/g. New oil has a Neutralization Number of approximately .03. As this value increases, oxidation and final sludging is progressively indicated. KID:

(I.F.T. Dynes/OM) New oil has an I.F.T. of 35 - 40 Dynes. This drops very rapidly in early stages of contamination, but serious contamination is not indicated until a value of approximately 14 - 17 dynes is reached. INIERFACIAL TENSION:

New oil has a colour value of approximately No. 1. A change in colour indicates contamination and has value in final evaluation of oil condition. CLOR:

#### TEST RESULTS WERE AS FOLLOWS;

SERIAL NO.	NEUT NO.	COLOUR	IFT	DIELECTRIC
Vault #28				4.6
871934	.02	1 1	42.7	46
871931	.01	1	43.2	25
Vault #1				
871935	.02	1	42.7	35
Vault #26				40
861962	.02	1	41.8	42
Vault #33 861942	.02	1	44.0	30
Vault #29				- •
861972	.01	1	43.0	34
861964	.01	1	40.2	38
Vault #21				
861981	.02	1	39.1	25
871926	.01	1	39.0	31
	.02	1	39.8	
871937	.01	1	39.0	33
Vault #20 861944 871937	.02	1	39.8 39.0	36 33



CUSTOMER: TORONTO METRO ZOO

REF NO.: 9951

LOCATION: WEST HILL, ONTARIO

\*\*\*\*\*\*\*\*\*\*

The following standards are applicable for transformer oil tests.

It is recommended a sample be tested every 12 months.

(Kilo Volt breakdown A. S. T. M. Standard) For safe and satisfactory operation, this should not be below 25 Kilo DIFFICIRIC:

Neutralization Number mg. KCH/g. New oil has a Neutralization Number of approximately .03. As this value increases, oxidation and final sludging is progressively indicated. ACID:

indicated.

INIERFACIAL

(I.F.T. Dynes/CM) New oil has an I.F.T. of 35 - 40 Dynes. This drops very rapidly in early stages of contamination, but serious contamination is not indicated until a value of approximately 14 - 17 dynes is reached.

New oil has a colour value of approximately No. 1. A change in colour indicates contamination and has value in final evaluation of oil condition. CHAR:

TEST RESULTS WERE AS FOLLOWS;

TENSION:

SERIAL NO.	NEUT NO.	COLOUR	IFT	DIELECTRIC
Vault #22	0.0	1	38.4	35
861973	.02	1		28
871933	.02	1	38.2	
861976	.02	1 1	42.7	33
871932	.01		41.9	31
861955	.03	1	42.8	32
861949	.02	1	40.0	35
861952	.02	1	42.6	32
871930	.02	1	41.6	33
861980	.02	1	43.4	37
861975	.01	1	40.7	33
Vault #6				
861979	.01	1	43.6	37
Vault #34				
871936	.01	1	43.0	37
861927	.01	1 1	44.7	41
861971	.01	1	43.0	50
Vault #13				
861951	.02	1.75	42.7	35
861950	.02	1	44.7	40
861954	.02	1	44.0	46
Vault #13A				
LG37990	.01	1	42.6	41



TORONTO METRO ZOO CUSTOMER:

**REF NO.:** 9951

WEST HILL, ONTARIO LOCATION:

\*\*\*\*\*\*\*\*\*\*\*\*

The following standards are applicable for transformer oil tests.

It is recommended a sample be tested every 12 months.

(Kilo Volt breakdown A. S. T. M. Standard) For safe and satisfactory operation, this should not be below 25 Kilo DIFFECTRIC:

KID:

Neutralization Number mg. KCH/g. New oil has a Neutralization Number of approximately .03. As this value increases, oxidation and final sludging is progressively

indicated.

(I.F.T. Dynes/CM) New oil has an I.F.T. of 35 - 40 Dynes. This drops very rapidly in early stages of contamination, but serious contamination is not indicated until a value of approximately 14 - 17 dynes is reached. INIERACIAL INSIN:

New oil has a colour value of approximately No. 1. A change in colour indicates contamination and has value in final evaluation of oil condition. CLOR:

### TEST RESULTS WERE AS FOLLOWS;

SERIAL NO. Vault #12	NEUT NO.	COLOUR	IFT	DIELECTRIC
861963	.01	1	40.6	35
861967	.01	1	43.8	40
861968	.02	1	41.2	36
Vault #35				
871928	.02	1	43.5	42
971929	.01	1	43.9	40
971925	.02	1	44.7	41
Vault #11				
861953	.01	1	42.8	41
Vault #8				
871939	.01	1	42.3	35
Vault #10				
861978	.01	1	44.6	42
861977	.01	1	44.0	44
Vault N/A				
861974	.01	1	44.8	41
Vault N/A				
LG37989	.01	1	44.0	46
Vault N/A				
861966	.02	1	42.1	35



CUSTOMER: TORONTO METRO ZOO

**REF NO.:** 9951

LOCATION: WEST HILL, ONTARIO

\*\*\*\*\*\*\*\*\*\* The following standards are applicable for transformer oil tests.

It is recommended a sample be tested every 12 months.

(Kilo Volt breakdown A. S. T. M. Standard) For safe and satisfactory operation, this should not be below 25 Kilo DIFFECTRIC:

ACID:

Neutralization Number mg. KCH/g. New oil has a Neutralization Number of approximately .03. As this value increases, oxidation and final sludging is progressively indicated.

INIEREACIAL

(I.F.T. Dynes/CM) New oil has an I.F.T. of 35 - 40 Dynes. This drops very rapidly in early stages of contamination, but serious contamination is not indicated until a value of approximately 14 - 17 dynes is reached. TENSION:

New oil has a colour value of approximately No. 1. A change in colour indicates contamination and has value in final evaluation of oil condition. CHOIR:

TEST RESULTS WERE AS FOLLOWS;

SERIAL NO.	NEUT NO.	COLOUR	IFT	DIELECTRIC
Vault N/A LG37991	.01	1	42.3	38
Vault N/A 861965	.01	1	44.0	44
Vault N/A 861965	.01	1	43.2	30
Vault N/A #1-861941	.02	1	44.0	48
<b>#2-86194</b> 0	.02	1.25	44.4 44.0	45 44
#3-861943 No #	.01	î	43.2	42

METRO ZOU

Ref. #9951	1995 SHEET No.
INSPECTION &	EST REPORT FOR SERVICE ENTRANCE POLE & METALCLAD SWITCHGEAR
MAIN INCOMING Interrupter Switch Sp	ecifications: Manuf. Sic ELECTRIC Amps 606
	Cat. # 3416 E. K.V. 27.6
Insulation:	Intact and thoroughly cleaned.
Alignement & Mechanism:	Operated normally. Lubricated where necessary.
Contacts:	Cleaned, conditioned and sealed against oxidation.
Interrupting Units:	SATISFACTORY  SEE GENERAL SHEET. NOTE #/  NOT APPLICABLE
Lightning Arrester Spe	cification Manuf. COR Type DYNAGAF
	Cat. # 46615-30G1 KV. 24
Insulation:	Intact and thoroughly cleaned.
Cementing:	Free from deterioration.
Insulation Resistance Test:	1. 200† 2. 200† 3. 200 <sup>†</sup> megohms The above values are satisfactory.
Fuse Specifications	Manuf. NA
Mountings:	Cat. # K.V Arnp Type
Holders:	Cat. # K.V Amp Type
Refills:	Cat. # K.V Amp Type
Resistance Test:	1
	The above values are satisfactory.  All associated insulation was intact and thoroughly cleaned.  Contact surfaces were cleaned, conditioned and sealed against oxidation.  A spare set of refills should be stored in a convenient location at all times.

G. T. WOOD CO. LTD. 9/27/83

G. T. WOOD CO. LTD. 9/27/83

TREDOCTO SERVICE TO Interrupter Switch Sp	ecifications: Manuf. Sicilificity Amps Loc
	Cat. # 3456884-12 KV. 29
Insulation:	Intact and thoroughly cleaned.
Alignement & Mechanism:	Operated normally. Lubricated where necessary.
Contacts:	Cleaned, conditioned and sealed against oxidation.
Interrupting Units:	☑ SATISFACTORY □ SEE GENERAL SHEET. NOTE # □ NOT APPLICABLE
Lightning Arrester Spe	cification Manuf. C.C. Type DYNAGAP
<b>3</b>	Cat. # 866488-1 KV. 24
Insulation:	Intact and thoroughly cleaned.
Cementing:	Free from deterioration.
Insulation Resistance Test:	1
Fuse Specifications	Manuf. SIC ELECTRIC
Mountings:	Cat. # K.V Amp Type
Holders:	Cat. # 8664484 K.V. 34-5 Amp 300 Type SM-5
Refills:	Cat. # 134250R-4 K.V. 34.5 Amp 150 Type 153.4
Resistance Test:	1. 710 2. 760 3. 760 microhms
	The above values are satisfactory.  All associated insulation was intact and thoroughly cleaned.  Contact surfaces were cleaned, conditioned and sealed against oxidation.  A spare set of refills should be stored in a convenient location at all times.

Ref. # 9951	SHEET No. 4
INSPECTION & T	TEST REPORT FOR SERVICE ENTRANCE POLE & METALCLAD SWITCHGEAR
SOCIETY BUILDING	
Interrupter Switch Sp	ecifications: Manuf. 5) CELECIKIC Amps 600
	Cat. # _234553£4-1 K.V K.V
Insulation:	Intact and thoroughly cleaned.
Alignement & Mechanism:	Operated normally. Lubricated where necessary.
Contacts:	Cleaned, conditioned and sealed against oxidation.
Interrupting Units:	© SATISFACTORY ☐ SEE GENERAL SHEET. NOTE # ☐ NOT APPLICABLE
Lightning Arrester Spe	cification Manuf. C.B. Type IV
	Cat. # 217 117 K.V. 17 M.C.O.V
Insulation:	Intact and thoroughly cleaned.
Cementing:	Free from deterioration.
Insulation Resistance Test:	1. Zoo <sup>-1</sup> 2. Zoo <sup>-1</sup> 3. Zoo <sup>-1</sup> megohms The above values are satisfactory.
Fuse Specifications	Manuf. SEC ELECTRIC
Mountings:	Cat. # K.V Amp Type
Holders:	Cat. # 866446.2 KV. 345 Amp 306 Type 5415
Refills:	Cat. # K.V. 345 Amp 15 Type 153.4
Resistance Test:	1. 2276 2. 2200 3. 2275 microhms
	The above values are satisfactory.  All associated insulation was intact and thoroughly cleaned.  Contact surfaces were cleaned, conditioned and sealed against oxidation.  A spare set of refills should be stored in a convenient location at all times.

	CARTE			Serial No. No 70	90-1
ypo OHAN	H.V2	17.6/16.0	V. 2084 1	<i>12</i>	· 2 /2 °/c
at. Liquid 87?	•	_ Κ.ν.Λ. <u></u>			
4 Impedance	4.58	<del></del>	VECTOR	VIVE WYE	
Iquid Sample					,
ierial No.	Neut. No.	Colour	I.F.T.	Dielectric	Spec. Gravity
		N.T			·
			٠		
		The above results	are entistantory		
		ine above results	the satisfactory.		
Insulation Resistanc		٠		Test Voltage D.C	<i>)</i> .
H.V. to Ground	_ হ/জ	megohms		1000	
L.V. to Ground	200	megohms	• .		
H.V. to L.V	Diakas	megohms			
11.V. to C.V.		The above results	e are salislaciory		
		' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' '	s are sationately	•	
			2.50		
	Station G	rounding System: _	2.30	Ohm	
				*	
-		-			
		**			·
<del></del>					

T. WOOD CO. LTD. 00/03

### TRANSFORMER INSPECTION & TEST SHEET No. 2

### GENERAL CONDITIONS

	Serial No	
Bushings:	Insulation was intact and thoroughly cleaned. Cementing was free from deterioration.	
Gaskets:	SATISFACTORY  SEE GENERAL SHEET. NOTE	
Paint:	SATISFACTORY  SEE GENERAL SHEET. NOTE	
	SATISFACTORY  SEE GENERAL SHEET. NOTE	
Liquid Level:	SATISFACTORY	
Thermometer:	SEE GENERAL SHEET. NOTE  MAXIMUM TEMPERATURE WAS #8 0 C	
Cooling System:	CLEAR  SEE GENERAL SHEET. NOTE	
Gas Detector Relay:	SATISFACTORY SEE GENERAL SHEET. NOTE NOT APPLICABLE	
Terminal Board and/or Tap Switch:	located in position for/00 %vol	ts

Fuse Specifications Manuf. \_\_\_\_\_\_NA

Mountings: Cat. # \_\_\_\_ K.V. \_\_\_ Amp \_\_\_ Type \_\_\_

Holders: Cat. # \_\_\_ K.V. \_\_\_ Amp \_\_\_ Type \_\_\_\_

Refills: Cat. # \_\_\_\_ K.V. \_\_\_ Amp \_\_\_\_ Type \_\_\_\_

Resistance Test: 1. \_\_\_\_\_ 2. \_\_\_\_ 3. \_\_\_ microhms

The above values are satisfactory.

All associated insulation was intact and thoroughly cleaned.

Contact surfaces were cleaned, conditioned and sealed against oxidation. A spare set of refills should be stored in a convenient location at all times.

The above values are satisfactory.

All associated insulation was intact and thoroughly cleaned.

Contact surfaces were cleaned, conditioned and sealed against oxidation. A spare set of refills should be stored in a convenient location at all times.

FLEDENTO TZ Interrupter Switch Spe	ecifications: Manuf. <u>ಎನ</u> ೆ	C ENTITEIC	/	Amps <u>60</u>	0
	Cat. # _	34 563 R4 - T2	K.V	27	
Insulation:	Intact and thoroughly clea	ned.		~	
Alignement & Mechanism:	Operated normally. Lubrica	ated where necessary.			
Contacts:	Cleaned, conditioned and	sealed against oxidation	٦.		
Interrupting Units:	SATISFACTORY SEE GENERAL SHEET NOT APPLICABLE	NOTE #			
Lightning Arrester Spec	cification Manuf.				
	Cat. # _	46159	K.V	24	
Insulation:	Intact and thoroughly cle	aned.			
Cementing:	Free from deterioration.				
Insulation Resistance Test:	1. <u>2లలే</u> The above values are sati	2. Zoo+ isfactory.	3.	2004	megohms
Fuse Specifications	Manuf.	Si CELFCTICIC	er må dellikk mek er dem krale de målikk de	no	<del>,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,</del>
Mountings:	Cat. # K.\	/ Amp		Туре	
Holders:	Cat. # <u>866 44 R K.</u>	/. <u>345</u> Amp _	300	<u>є</u> Туре	5m ·5
Refills:	Cat. # / <u>34040RY</u> K.	/. <u>345</u> Amp _	25	Tcc —— <del>Type</del> -	153.4
Resistance Test:	1, 1980	2. <u>1986</u>	3	190K	microhms
		tisfactory.  The was intact and thorough and the conditioned and t	-		xidation.

A spare set of refills should be stored in a convenient location at all times.

Ref. #	9951

Interrupter Switch Spe	ecifications: Manuf. Siculotici Amps Loo
PADIOCI FEETE	Cat. # 34-6-24-115 KV. 27
Insulation:	Intact and thoroughly cleaned.
Alignement & Mechanism:	Operated normally. Lubricated where necessary.
Contacts:	Cleaned, conditioned and sealed against oxidation.
Interrupting Units:	© SATISFACTORY ☐ SEE GENERAL SHEET. NOTE # ☐ NOT APPLICABLE
Lightning Arrester Spe	
	Cat. # 4665 KV. 24
Insulation:	Intact and thoroughly cleaned.
Cementing:	Free from deterioration.
Insulation Resistance Test:	1
Fuse Specifications	Manuf
Mountings:	Cat. # K.V Amp Type
Holders:	Cat. # 866 4481 K.V. 375 Amp 300 Type 5M-5
Refills:	Cat. # 134125 CY KV. 345 Amp 80 Type 153.4
Resistance Test:	1 2170 3microhms
	The above values are satisfactory.  All associated insulation was intact and thoroughly cleaned.  Contact surfaces were cleaned, conditioned and sealed against oxidation.  A space set of refills should be stored in a convenient location at all times.

lanufacturer'	Je etinghous			7 T 2 Serial No. <u>7</u> 95	156
		76004/16000			_
		К.V.Л5c			<u>.</u>
					CEA
iquid Sample					
al No.	Neul. No.	Colour	I.F.T.	Dielectric	Spec. Gravity
					·
<u>O</u>		The above results	are satisfactory.		
nsulation Resistance	r Test			Test Voltage D.	c.
H.V. to Ground	5/6	megohms		1000	
L.V. to Ground	50	megohms	***		
H.V. to L.V	50	megohms			
		The above result	s are salisfactory.		
	Station (	Grounding System: _	2·5o	Ohm	
				•	
	,				
		₩			

# TRANSFORMER INSPECTION & TEST SHEET No. 2

# GENERAL CONDITIONS

	Serial No
Bushings:	Insulation was intact and thoroughly cleaned. Cementing was free from deterioration.
Gaskets:	SATISFACTORY  SEE GENERAL SHEET. NOTE
Paint:	SATISFACTORY  SEE GENERAL SHEET. NOTE
	SATISFACTORY  SEE GENERAL SHEET. NOTE
Liquid Level:	·
Thermometer:	SATISFACTORY  SEE GENERAL SHEET. NOTE  MAXIMUM TEMPERATURE WAS  40  C
Cooling System:	CLEAR SEE GENERAL SHEET. NOTE
Gas Detector Relay:	SATISFACTORY  SEE GENERAL SHEET. NOTE  NOT APPLICABLE
	•
Terminal Board and/or Tap Switch:	located in position 3 for 17,600 volts

lef.	# 9951			Shee t	#
•	LOW VOLTAGE BREAKER				
EC	Designation: <u>lu</u> IFICATION:	DO - MALAY	A PAV MAIN.		
ع ا					
	Manufacturer : F.P.E			: TH-4143-72	
	Interrupt, Cap: 50KA		Volts	: 600	
	Frame Size : 1600 AMP			: <u>50HZ</u>	
	Elect. Operated: NA			:3	· — · · · · · ·
	Manul. Operated:		Fixed:	/ Draw Out:_	
RIP	PING DEVICE:				
	Type: P.A.		Coil/C.T.	Rating 1600	3000 c
	Longtime P/U: 1600	amp s		NTB seconds	
	Shorttime P/U: 6400	amp s		cycle seconds	
	Grd Fault P/U: →A	amps		NA seconds	
	Instant. P/U : NA	amps	•	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	•
	Fused Rating & Manufacturer:	<del></del>	NΑ		
•	Phase I 200 <sup>+</sup> Phase II			200 <sup>†</sup> megohms	:
<del></del>	RAL:	O.K. NOT			O.K. NOTE
	Exterior Enclosure Condition		12. Lubricate		
2.	Arcing Contacts		_   13. Breaker (	Cleaned	
3:	Main Contacts		_ I4. Enclosure	Cleaned	
4.	Exterior Breaker Condition		_ I5. Bus Conne		
5. 5.	Tripping Device Condition		16. Cable Cor		
э. 7.	Manual Closing Operation  Manual Tripping Operation	<del>-/- </del>	_   17. Voltmeter	Г	. 🗸
3.	Electrical Closing Operation		_ I8. Ammeter	_	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
٠. ٩.	Electrical Tripping Operation			Condition	
・ ・ う.	Secondary Auxillary Contacts		<b>-</b>	Condition	
1.	Breaker Drawout Clusters			hase Indicators	
••	2.02.00.00.00.00.00.00.00.00.00.00.00.00		22. Others		
.earth.	The secondary equipment was serv	iced and	left in satisfactory	condition and	consisted (
			Moulded Case Breake		
		20	Fused Switches		
TH/ 1	1-92R				

	signation: <u>IND</u> C	- MAIAYH	THU - DPME	_ & ENCLOSURES	
FICATION:					
Manufacturer :_	F. P. €		Serial #	: TH - 4124 /72	<u> </u>
Interrupt. Cap :_	50 KA		Volts	: 600	
Frame Size :_	lboonma	·	Туре	50H.2	
Elect. Operated:			Poles	:3	
Manul. Operated:	<u> </u>		Fixed:	/ / Draw Out:	
ING DEVICE:					
Type: PA	-		Coil/C.T.	Rating 1000	amp s
Longtime P/U :	1000	_ amp s	Delay <u>M</u>	IN TIB seconds	
Shorttime P/U:	AN	amp s	Delay	NA seconds	
Grd Fault P/U:	nn	_ amp s	Delay	NA seconds	
Instant. P/U:	4000	_ amp s			
Fused Rating & M	anufacturer:		NA		
Phase 1 _ 2001			Phase III 2		
					o.K.
RAI :		O.K. NOTE	#		0.K.
RAL: Exterior Enclose		O.K. NOTE	#   12. Lubrica		0.K.
RAL: Exterior Enclose Arcing Contacts		O.K. NOTE	# 12. Lubrica 13. Breaker	t e d	/
RAL: Exterior Enclose Arcing Contacts Main Contacts	ure Condition	O.K. NOTE	12. Lubrica 13. Breaker 14. Enclosu	ted Cleaned	<i>/</i>
Exterior Enclose Arcing Contacts Main Contacts Exterior Breake	ure Condition	O.K. NOTE	12. Lubrica 13. Breaker 14. Enclosu 15. Bus Con	ted Cleaned re Cleaned	ノ フ フ
Exterior Enclose Arcing Contacts Main Contacts Exterior Breake Tripping Device	ure Condition r Condition Condition	O.K. NOTE	12. Lubrica 13. Breaker 14. Enclosu 15. Bus Con	ted Cleaned re Cleaned nections onnections	/ / / /
Exterior Enclose Arcing Contacts Main Contacts Exterior Breake Tripping Device Manual Closing	ure Condition r Condition Condition Operation	O.K. NOTE	12. Lubrica 13. Breaker 14. Enclosu 15. Bus Con 16. Cable C	ted Cleaned re Cleaned nections onnections er	/ / / /
Exterior Enclose Arcing Contacts Main Contacts Exterior Breake Tripping Device Manual Closing Manual Tripping	ure Condition r Condition Condition Operation Operation	O.K.   NOTE	12. Lubrica 13. Breaker 14. Enclosu 15. Bus Con 16. Cable C 17. Voltmet	ted Cleaned re Cleaned nections onnections er	/ / / /
Exterior Enclose Arcing Contacts Main Contacts Exterior Breake Tripping Device Manual Closing Manual Tripping Electrical Clos	ure Condition r Condition Condition Operation Operation sing Operation	O.K.   NOTE	12. Lubrica 13. Breaker 14. Enclosu 15. Bus Con 16. Cable C 17. Voltmet 18. Ammeter 19. Arc Chu	ted Cleaned re Cleaned nections onnections er	ノ ノ ノ ノ ノ
Exterior Enclose Arcing Contacts Main Contacts Exterior Breake Tripping Device Manual Closing Manual Tripping Electrical Clos	r Condition  r Condition  Condition  Operation  Operation  Sing Operation  oping Operation	O.K.   NOTE	12. Lubrica 13. Breaker 14. Enclosu 15. Bus Con 16. Cable C 17. Voltmet 18. Ammeter 19. Arc Chu 20. Barrier	ted Cleaned re Cleaned nections onnections er	

Interrupter Switch Spo	ecifications: Mai	nuf. <u> </u>	CIKIC	Amps <u>Goo</u>
TREDER TO MAI	0 0011260 E	Cat. # <u>34663</u>	K.V	27
Insulation:	Intact and thore	oughly cleaned.		
Alignement & Mechanism:	Operated norma	ally. Lubricated where	e necessary.	
Contacts:	Cleaned, condit	ioned and sealed ag	ainst oxidation.	
Interrupting Units:	SEE GENER NOT APPLIC	AL SHEET. NOTE #		
Lightning Arrester Spec	cification	Manuf. <u>CHIO</u>	FRASS	Type <u>G.C.</u>
		Cat. # 46615	9 K.V	24
Insulation:	Intact and thor	oughly cleaned.		
Cementing:	Free from dete	rioration.		
Insulation Resistance Test:		2 es are satisfactory.	<u>200 <sup>1</sup></u> 3.	200 <sup>₹</sup> megohms
Fuse Specifications		Manuf.	NA.	
Mountings:	Cat. #	K.V	Amp	Type
Holders:	Cat. #	K.V	Amp	Type
Refills:	Cat. #	K.V	Amp	Type
Resistance Test:	1	2	3	microhms
	All associated Contact surface	ues are satisfactory. insulation was intac ces were cleaned, co f refills should be sto	inditioned and seale	

SERVICE PLOS Interrupter Switch Sp	pecifications: Manuf. Sicelecter Amps Loc
PADDOCK TECTL	Cat. # 34563R 4-75 KV. 29
Insulation:	Intact and thoroughly cleaned.
Alignement & Mechanism:	Operated normally. Lubricated where necessary.
Contacts:	Cleaned, conditioned and sealed against oxidation.
Interrupting Units:	☐ SEE GENERAL SHEET. NOTE # ☐ NOT APPLICABLE
Lightning Arrester Spe	
	Cat. # 46159 K.V. 24
Insulation:	Intact and thoroughly cleaned.
Cementing:	Free from deterioration.
Insulation Resistance Test:	1 2 3 megohms The above values are satisfactory.
Fuse Specifications	Manuf. Sto EIFCHIC
Mountings:	Cat. # K.V Amp Type
Holders:	Cat. # <u>866.44КТ К.V. 345</u> Amp <u>300</u> Туре <u>Sм5</u>
Refills:	Cat. # 13412524 KV. 544 Amp 20 Type 143 4
Resistance Test:	1 2
	The above values are satisfactory.  All associated insulation was intact and thoroughly cleaned.  Contact surfaces were cleaned, conditioned and sealed against oxidation.

SERVICE EMILLIAGE Interrupter Switch Spe	cifications: Man	uf. <u>51: 116</u>	CIKIC	Amps <i>L</i>	60
PARTICIA TELETITA	ヒハンノ	Cat. # 343UF.E	<u>य गर</u> ्	.v 29	
Insulation:	Intact and thoro	ughly cleaned.			
Alignement & Mechanism:	Operated normal	lly. Lubricated whe	re necessary.		
Contacts:	Cleaned, conditi	oned and sealed a	gainst oxidation.		
Interrupting Units:	E SATISFACTOR  ☐ SEE GENERA  ☐ NOT APPLICA	AL SHEET. NOTE #			
Lightning Arrester Spec	ification	Manuf	c PAPE	Туре	S. 1
	•	Cat. #42 1/2	<u> </u>	(V	
Insulation:	Intact and thoro	ughly cleaned.			
Cementing:	Free from deter	ioration.			
Insulation Resistance Test:	1 The above value	2 es are satisfactory.	200 t	3	megohms
Fuse Specifications		Manuf	Vir saper	· · · · · · · · · · · · · · · · · · ·	
Mountings:	Cat. #	K.V	Amp	Туре	<u> </u>
Holders:	Cat. # <u>२७६५</u>	<i>4₽1</i> KV. <u>≥0</u>	Amp	Type	~ 1 m = 4".
Refills:	Cat. # 12-1/12-	SEY KV	Amp	Type	
Resistance Test:	1	2	963	3	microhms
	All associated Contact surfac	es are satisfactory. insulation was inta es were cleaned, c refills should be si	ct and thoroughlonditioned and s	ealed against o	

Ref. #		195/	
--------	--	------	--

FORT IN THE HOOM	Cat. # =40C= KV 27
Anger 1000	•
Insulation:	Intact and thoroughly cleaned.
Alignement & Mechanism:	Operated normally. Lubricated where necessary.
Contacts:	Cleaned, conditioned and sealed against oxidation.
Interrupting Units:	SATISFACTORY  SEE GENERAL SHEET. NOTE #  NOT APPLICABLE
Lightning Arrester Spe	cification Manuf. <u>CHIO PCHEE</u> Type <u>GC</u>
	Cat. # 46159 K.V. 34
Insulation:	Intact and thoroughly cleaned.
Cementing:	Free from deterioration.
Insulation Resistance Test:	1. <u>-200<sup>†</sup></u> 2. <u>さかり<sup>†</sup></u> 3. <u>こつの<sup>†</sup> megohms</u> The above values are satisfactory.
Fuse Specifications	Manuf. SECEUTTRIS
Mountings:	Cat. # K.v Amp Type
Holders:	Cat. # 84441KV. 345 Amp 366 Type 5465
Refills:	Cat. # Isympe KV. 345 Amp 55 Type 153-1
Resistance Test:	1. 1170 2. 1185 3. 1889 microhms
	The above values are satisfactory.  All associated insulation was intact and thoroughly cleaned.  Contact surfaces were cleaned, conditioned and sealed against oxidation.  A spare set of refills should be stored in a convenient location at all times.

Interrupter Switch Sp	pecifications: Mai	nuf.	1 11:17 13		Amps _	1.68
Fair of the	ir the ilities	Cat. #	54	K.V.		2.7
Insulation:	Intact and thore	oughly clean	ied.		~	
Alignement & Mechanism:	Operated norma	ally. Lubricat	ed where necessary.			
Contacts:	Cleaned, condit	ioned and s	sealed against oxidat	ion.		
Interrupting Units:	SATISFACTO SEE GENER NOT APPLIC	AL SHEET.	NOTE #			
Lightning Arrester Spe	ecification	Manuf.	OHIO PRAS	-	_ Туре	GF?
		Cat. #	40159	K.V.	2	. Υ
Insulation:	Intact and thor	oughly clear	ned.			
Cementing:	Free from dete	rioration.				
Insulation Resistance Test:	1. <u> </u>		2. <u>එරේ</u> factory.		3. <u> </u>	megohms
Fuse Specifications		Manuf	ΝΑ			
Mountings:	Cat. #	K.V.	Amp		Ту	/pe
Holders:	Cat. #	K.V.	Amp		Ту	/pe
Refills:	Cat. #	K.V.	Amp		T)	/pe
Resistance Test:	1		2		3	microhms
	Contact surface	insulation vices were cle	sfactory. was intact and thoro eaned, conditioned a old be stored in a co	nd seal	ed agains	

EULPSIA HAMILE	ecifications: Manuf. SACELECTRIC Amps 600
Ten i de la control option option	Cat. # 34563-76, K.V. 27
4 SOUTH	Cat. #
Insulation:	Intact and thoroughly cleaned.
Alignement & Mechanism:	Operated normally. Lubricated where necessary.
Contacts:	Cleaned, conditioned and sealed against oxidation.
Interrupting Units:	SATISFACTORY  SEE GENERAL SHEET. NOTE #  NOT APPLICABLE
Lightning Arrester Spe	Cat. # 4659 KV. 24
Insulation:	Intact and thoroughly cleaned.
Cementing:	Free from deterioration.
Insulation Resistance Test:	1
Fuse Specifications	Manuf. SACTIFICALLO
Mountings:	Cat. # K.V Amp Type
Holders:	Cat. # <u>866чийт</u> К.V. <u>347</u> Amp <u>350</u> Туре <u>5265</u>
Refills:	Cat. # 134125 K 1/2 K.V \$10.5
Resistance Test:	1 2 3 1260 microhms
	The above values are satisfactory.  All associated insulation was intact and thoroughly cleaned.  Contact surfaces were cleaned, conditioned and sealed against oxidation.  A spare set of refills should be stored in a convenient location at all times.

RUKASIA MIVILICA Interrupter Switch Sp		nuf. <u>SECFU</u>	611110	AmpsCcc	<b>5</b>
TEFT ON TO OUT	icold Suir	Cal. 11 340 L= 1	<u> </u>	v. <u>2.7</u>	
Insulation:	Intact and thore	oughly cleaned.		-	
Alignement & Mechanism:	Operated norma	ally. Lubricated wh	ere necessary.		
Contacts:	Cleaned, condit	ioned and sealed	against oxidation.		
Interrupting Units:	☑ SATISFACTO	AL SHEET. NOTE	11	•	
Lightning Arrester Spe	cification	Manuf. OH	10 PANSS	Туре	ρ.
		Cat. # _4615	<u>9                                    </u>	.v. <u>24</u>	
Insulation:	Intact and thore	oughly cleaned.			
Cementing:	Free from dete	rioration.			
Insulation Resistance Test:		2 es are satisfactory	cont.	_ 3. <u></u>	megohms
Fuse Specifications		Manuf.	NΑ		
Mountings:	Cat. #	K.V	Amp	Type _	
Holders:	Cat. #	K.V	Amp	Type _	
Refills:	Cat. #	K.V	Amp	Type _	A AMERICAN
Resistance Test:	1	2		3	microhms
)	All associated Contact surfact	ces were cleaned,	y. tact and thoroughl conditioned and s stored in a conven	ealed against oxi	

Ref. #	9951

	ecifications: Manuf. SEC FILLER Amps Loo
TEETS TO THE	Cat. # 3456374-72 K.V. 27
Insulation:	Intact and thoroughly cleaned.
Alignement & Mechanism:	Operated normally. Lubricated where necessary.
Contacts:	Cleaned, conditioned and sealed against oxidation.
Interrupting Units:	☐ SEE GENERAL SHEET. NOTE # ☐ NOT APPLICABLE
Lightning Arrester Spe	cification Manuf. NA Type
·	Cat. # K.V.
Insulation:	Intact and thoroughly cleaned.
Cementing:	Free from deterioration.
Insulation Resistance Test:	1 2 3megohms The above values are satisfactory.
Fuse Specifications	Manuf. SAC ELECTRIC
Mountings:	Cat. # K.V Amp Type
Holders:	Cat. # <u>81/64/1</u> K.V. <u>34.5</u> Amp <u>300</u> Type <u>SM-5</u>
Refills:	Cat. # 124025RV K.V. 345. Amp 15 Type 152-4
Resistance Test:	1. 7200 2. 2300 3. 2170 microhm
	The above values are satisfactory.  All associated insulation was intact and thoroughly cleaned.  Contact surfaces were cleaned, conditioned and sealed against oxidation.

	DRMER INSPECTI			•
WASIA TAVILLON	TRANS	FORMER 1-1		
mulacturer WESTINGHO	v ° č		. Serial No. <u>국식</u> 의	320
0 LNAN H.V.	27 600 11000	L.V. 2087 1	120 Taps	4-21/2 /0 12
al. Liquid <u>200</u>				sufer
Impedance 5.9	·,	VECTOR	MAE INTA	cea
quid Sample				
al No. Neut. No.	Colour	I.F.T.	Dielectric	Spec. Gravity
•	• • • • • • • • • • • • • • • • • • •		,	
<u> </u>	The above results	s are satisfactory.		
sulation Resistance Test		·	Test Voltage D.	.c.
H.V. to Ground	megohms		100	
L.V. to Ground		£ .	. "	
H.V. 10 L.V	•		•	
11.4. 10 6.1.		s are satisfactory	<b>/.</b>	
Statio	n Grounding System: _	2.50	Ohm	
				•
	·			,
	** **			•

WOOD CO. LTD. 06/83

# TRANSFORMER INSPECTION & TEST SHEET No. 2

# GENERAL CONDITIONS

	Serial No. 849 380	
Bushings:	Insulation was intact and thoroughly cleaned. Cementing was free from deterioration.	•,
Gaskets:	SATISFACTORY  SEE GENERAL SHEET. NOTE	
Paint:	SATISFACTORY SEE GENERAL SHEET. NOTE	
	SATISFACTORY  SEE GENERAL SHEET. NOTE	
Liquid Level:		
Thermometer:	SATISFACTORY  SEE GENERAL SHEET. NOTE  MAXIMUM TEMPERATURE WAS  28  C	
Cooling System:	CLEAR  SEE GENERAL SHEET. NOTE	
Gas Detector Relay:	SATISFACTORY  SEE GENERAL SHEET. NOTE  NOT APPLICABLE	
		•
Terminal Board and/or Tap Switch:	located in position 3 for 23600 vo	lts

LOW VOLTAGE BREAKER V Designation: Eur			_ & ENCLOSURES	
FICATION:	cheri ( I) V	11.7		
Manufacturer : <u>\</u>		Serial #	: '9 8013	
Interrupt. Cap: 50KA	······································		: 600 1208/	(2 a )
Frame Size : 1600 Amf	)		: K-1660	
		Poles	: 3	
Manul. Operated:			/ Draw Out:	
ING DEVICE:				
Type: Colored		Coil/C.T.	Rating Koo	amp s
Longtime P/U: &cc	amp s		1/F, seconds	<del>-</del>
Shorttime P/U: 3200			⊌T/β seconds	
Grd Fault P/U:	amps		- seconds	
Instant. P/U: NA	amp s	***************************************		
Fused Rating & Manufacturer:		n n		
ATION DESISTANCE.		Phase III =	micronns	S
ATION RESISTANCE:  Phase I Phase II		-		s
Phase I Phase II	O.K. NOTE#	Phase III	me g o hms	0.K. N
Phase I Phase II  RAL:  Exterior Enclosure Condition	O.K. NOTE#	Phase III	me g o hms	0.K. N
Phase I Phase II  RAL:  Exterior Enclosure Condition  Arcing Contacts	O.K. NOTE#	Phase III	megohms d Cleaned	0.K. N
Phase I Phase II  Exterior Enclosure Condition Arcing Contacts Main Contacts	0.K.   NOTE#	Phase III	megohms  d Cleaned Cleaned	0.K. N
Phase I Phase II  CAL:  Exterior Enclosure Condition  Arcing Contacts  Main Contacts  Exterior Breaker Condition	O.K.   NOTE#	Phase III	megohms  d Cleaned c Cleaned	0.K. N
Phase I Phase II  Exterior Enclosure Condition Arcing Contacts Main Contacts Exterior Breaker Condition Tripping Device Condition	O.K.   NOTE#	12. Lubricate 13. Breaker C 14. Enclosure 15. Bus Conne	megohms  d Cleaned cctions	0.K. N
Phase I Phase II  Exterior Enclosure Condition Arcing Contacts Main Contacts Exterior Breaker Condition Tripping Device Condition Manual Closing Operation	O.K.   NOTE#	Phase III	megohms  d Cleaned cctions	0.K. N
Phase I Phase II  Exterior Enclosure Condition Arcing Contacts Main Contacts Exterior Breaker Condition Tripping Device Condition Manual Closing Operation Manual Tripping Operation	O.K.   NOTE#	Phase III	megohms  d Cleaned c Cleaned cctions	0.K. N
Phase I Phase II  AL:  Exterior Enclosure Condition Arcing Contacts Main Contacts Exterior Breaker Condition Tripping Device Condition Manual Closing Operation Manual Tripping Operation Electrical Closing Operation	O.K.   NOTE#	Phase III	megohms  d Cleaned cCleaned cctions nnections	0.K. N
Phase I Phase II  Exterior Enclosure Condition Arcing Contacts Main Contacts Exterior Breaker Condition Tripping Device Condition Manual Closing Operation Manual Tripping Operation Electrical Closing Operation Electrical Tripping Operation	O.K.   NOTE#	Phase III	megohms  d Cleaned cctions nnections c Condition Condition	0.K. N
Phase I Phase II  AL:  Exterior Enclosure Condition Arcing Contacts Main Contacts Exterior Breaker Condition Tripping Device Condition Manual Closing Operation Manual Tripping Operation Electrical Closing Operation Electrical Tripping Operation Secondary Auxillary Contacts	O.K.   NOTE#	Phase III  12. Lubricate 13. Breaker C 14. Enclosure 15. Bus Conne 16. Cable Cor 17. Voltmeter 18. Ammeter 19. Arc Chute 20. Barrier C 21. Single Pi	megohms  d Cleaned cCleaned cctions nnections	0.K. N
Phase I Phase II  Exterior Enclosure Condition Arcing Contacts Main Contacts Exterior Breaker Condition Tripping Device Condition Manual Closing Operation Manual Tripping Operation Electrical Closing Operation Electrical Tripping Operation	O.K.   NOTE#	Phase III	megohms  d Cleaned cctions nnections c Condition Condition	0.K. N
Exterior Enclosure Condition Arcing Contacts Main Contacts Exterior Breaker Condition Tripping Device Condition Manual Closing Operation Manual Tripping Operation Electrical Closing Operation Electrical Tripping Operation Secondary Auxillary Contacts	O.K.   NOTE#	Phase III	megohms  d Cleaned cctions nnections ccondition Condition hase Indicators	0.K

Ref.	Ħ	7951
101.	*1	

nterrupter Switch Sp Transcrokers in Th	ecifications: Manuf. State Commerce Amps Loca
(12) in S   S   S   S   S   S   S   S   S   S	Cat. # 3456544 -72 K.V. 23
nsulation:	Intact and thoroughly cleaned.
Alignement & Mechanism:	Operated normally. Lubricated where necessary.
Contacts:	Cleaned, conditioned and sealed against oxidation.
Interrupting Units:	SATISFACTORY SEE GENERAL SHEET. NOTE # NOT APPLICABLE
Lightning Arrester Spe	ecification Manuf. <u>NA</u> Type
	. Cat. # K.V
Insulation:	Intact and thoroughly cleaned.
Cementing:	Free from deterioration.
Insulation Resistance Test:	1 2 3megohms The above values are satisfactory.
Fuse Specifications	Manuf. 5 to proceed to
Mountings:	Cat. # K.V Amp Type
Holders:	Cat. # <u>806.VUK 1</u> KV. 24 5 Amp 200 Type 570.5
Refills:	Cat. # 1840CoRY K.V. 2015 Amp 46 Type 18810
Resistance Test:	1. 1010. 2. 1025 3. 1020 microhn
	The above values are satisfactory.  All associated insulation was intact and thoroughly cleaned.  Contact surfaces were cleaned, conditioned and sealed against oxidation.  A spare set of refills should be stored in a convenient location at all times.

AFRICIA TAVILION Interrupter Switch Sp	ecifications: Mar	nut. <u> cerr</u>	7111	Amps	Loc
TERMENTIO HORTE	1 fime HICH				23
Insulation:	Intact and thore	ughly cleaned.		~	
Alignement					
& Mechanism:	Operated norma	ally. Lubricated who	ere necessary.		-
Contacts:	Cleaned, condit	ioned and sealed	against oxidation.		
Interrupting Units:	☐ SATISFACTO ☐ SEE GENER. ☐ NOT APPLIC	AL SHEET. NOTE	H		
Lightning Arrester Spe	cification	Manuf. <u>OH</u> ங	S Franci	Тур	e DYNA GAY
	,	Cat. # _ 46613	7 - 2.06 (	K.V	24
Insulation:	Intact and thore	oughly cleaned.			
Cementing:	Free from dete	rioration.			
Insulation Resistance Test:		2es are satisfactory		3 <del>_</del>	ంబే megohms
Fuse Specifications		Manuf.	NΥ	***************************************	
Mountings:	Cat. #	K.V	Amp	<del></del>	Type
Holders:	Cat. #	K.V	Amp		Туре
Refills:	Cat. #	K.V	Amp		Туре
Resistance Test:	1	2.		3	microhms
· )	All associated	ues are satisfactor insulation was in ces were cleaned,	tact and thorough		

A spare set of refills should be stored in a convenient location at all times.

Ref. #9951	SHEET NO.26		
INSPECTION & T	TEST REPORT FOR SERVICE ENTRANCE POLE & METALCLAD SWITCHGEAR		
Arrich Trullod Interrupter Switch Sp Freezer To Indo-M	ecifications: Manuf. Specience Amps (00 Amps (00 Amps (100	Insulation:	Intact and thoroughly cleaned.
Alignement & Mechanism:	Operated normally. Lubricated where necessary.		
Contacts:	Cleaned, conditioned and sealed against oxidation.		
Interrupting Units:	SATISFACTORY  SEE GENERAL SHEET. NOTE #  NOT APPLICABLE		
Lightning Arrester Spe	Cat. # K.V K.V 2.9		
Insulation:	Intact and thoroughly cleaned.		
Cementing:	Free from deterioration.		
Insulation Resistance Test:	1. 200† 2. 200† 3. 200 megohms The above values are satisfactory.		

Manuf. **Fuse Specifications** Cat. # \_\_\_\_\_ K.V. \_\_\_\_ Amp \_\_\_\_ Type \_\_\_\_ Mountings: Cat. # \_\_\_\_\_ K.V. \_\_\_\_ Amp \_\_\_\_ Type \_ Holders: Cat. # \_\_\_\_\_ K.V. \_\_\_\_ Amp \_\_\_\_ Type \_\_\_ Refills:

2. \_\_\_\_\_ 3. \_\_\_\_

The above values are satisfactory.

All associated insulation was intact and thoroughly cleaned.

Contact surfaces were cleaned, conditioned and sealed against oxidation. A spare set of refills should be stored in a convenient location at all times.

Resistance Test:

INSPECTION & T	EST	REPORT	FOR	<b>SERVICE</b>	<b>ENTRANCE</b>	<b>POLE</b>	&	METALCLAD	SWITCHGEAR
----------------	-----	--------	-----	----------------	-----------------	-------------	---	-----------	------------

PARIORIE TEC.	Cat. # <u>3456564-17</u> K.V. <u>29</u>							
Insulation:	Intact and thoroughly cleaned.							
Alignement & Mechanism:	Operated normally. Lubricated where necessary.							
Contacts:	Cleaned, conditioned and sealed against oxidation.							
Interrupting Units:	☐ SATISFACTORY ☐ SEE GENERAL SHEET. NOTE # ☐ NOT APPLICABLE							
Lightning Arrester Spe	ecification Manuf Type							
	· Cat. # K.V							
Insulation:	Intact and thoroughly cleaned.							
Cementing:	Free from deterioration.							
Insulation Resistance Test:	1							
Fuse Specifications	Manuf. SC FIECTICIC							
Mountings:	Cat. # K.v Amp Type							
Holders:	Cat. # 8664081 K.V. 345 Amp 300 Type SM 5							
Refills:	Cat. # 13.4125.81. K.V. 24.5 Amp 35 Type 103.4							
Resistance Test:	1							
	The above values are satisfactory.  All associated insulation was intact and thoroughly cleaned.  Contact surfaces were cleaned, conditioned and sealed against oxidation.  A spare set of refills should be stored in a convenient location at all times.							

# TRANSFORMER INSPECTION & TEST SHEET No. 1

-ULCUE TAVILLO	N TE	AN FORMER	-T: 6				
INVICIA TAVILION IPAN FOUMEN TO				Serial No 79' 15"			
o I-NAN		21,007 111,0001	v 208-11	100 Taps _ 4	-24/1/2		
0 1-NAN	H.V	7,000 1 1 1 1 1 1 1 1 1	1 same		·		
l. Liquid <u>350</u>		_ K.V.A		I = i s			
Impedance	y. ()		_ VECTOR	741: 1 MAE			
uid Sample	,				•		
	ut. No.	Colour	i.F.T.	Dielectric	Spec. Gravily		
•							
	•	The above results	are satisfactory.				
nsulation Resistance T	est			Test Voltage D.	c.		
H.V. to Ground	5/9	megohms		1000			
L.V. lo Ground	/00	megohms		7			
H.V. 10 L.V	100	megohms		-,			
•		The above resul	ls are salistactory	<i>'</i> .			
	Station	Grounding System: .	L.50	Ohm			
				•			
		£					
<u> </u>							
		-					

G. T. WOOD CO. LTD. 06/03

# TRANSFORMER INSPECTION & TEST SHEET No. 2

# GENERAL CONDITIONS

	Serial No 795154
Bushings:	Insulation was intact and thoroughly cleaned. Cementing was free from deterioration.
Gaskets:	SATISFACTORY  SEE GENERAL SHEET. NOTE
Paint:	SATISFACTORY  SEE GENERAL SHEET. NOTE
·	SATISFACTORY  SEE GENERAL SHEET. NOTE
Liquid Level:	
Thermometer:	SATISFACTORY  SEE GENERAL SHEET. NOTE  MAXIMUM TEMPERATURE WAS  65  C
Cooling System:	CLEAR SEE GENERAL SHEET. NOTE
Gas Detector Relay:	SATISFACTORY SEE GENERAL SHEET. NOTE NOT APPLICABLE
Terminal Board and/or Tap Switch:	located in position 3 for 23600 volt

# _9951_ LOW VOLTAGE BREAKER/_	/ DISCONN	ECT DEVICE	& ENCLOSURES	
Designation: AFKI				
IFICATION:				
Manufacturer : F.PE			: TH 4126 . 7?	
Interrupt, Cap : 7510			: <u>Uno (126</u>	
Frame Size : 2000 AM		Type	: 744.00 : 5 5	
Elect. Operated:		Poles	: <u>-</u> =	
Manul. Operated:		Fixed:	/ Draw Out:	
PPING DEVICE:				
Type: ?A		Coil/C.T.	Rating <u>2000</u>	_ amp s
Long time P/U : 2000	a.mps	Delay <u>6</u>	, 1.7/f. seconds	
Shorttime P/U: 8000		Delay 150	yelf seconds	
Grd Fault P/U:		Delay	seconds	
Instant. P/U:				
Fused Rating & Manufacturer:				
Phase I 200 Phase II	î. C.	Phase III	<u> ことの</u> megohms	o.K.
ACKAT.	O.K. NOTE#			
. Exterior Enclosure Condition		12. Lubrica		
2. Arcing Contacts			Cleaned	
3. Main Contacts		_	re Cleaned	1
4. Exterior Breaker Condition	<u> </u>		nections	
5. Tripping Device Condition			Connections	
5. Manual Closing Operation		17. Voltmet		
7. Manual Tripping Operation		18. Ammeter		
8. Electrical Closing Operation			ate Condition	
9. Electrical Tripping Operation			r Condition	
O. Secondary Auxillary Contacts		_ ,	Phase Indicators	
1. Breaker Drawout Clusters		22. Others		L
			ory condition and	d consi
The secondary equipment was serv	iced and l	eft in satistact	bere	
1110			X P T X	
1	M	oulded Case Brea used Switches		

Designation: A	IFRICIA PAUL	LION - MCC-A	1	•
FICATION:				
Manufacturer : F.PF		Serial #	: TH 4125.72	-
Interrupt, Cap : Sakfi		Volts	: 600	
Frame Size : 1600 Am	е	Турс	: F.OH -?	
Elect. Operated:		Potes	:	
Manul. Operated:	· · · · · · · · · · · · · · · · · · ·	Fixed:	/ Draw Out:	
RIPPING DEVICE:				
Type: PA	•	Coll/C.T.	Rating <u>/000</u>	amp s
Long time P/U : 1000	amp s	Delay MIA	J T/R seconds	. •
Shorttime P/U:	amp s	Delay	seconds.	•
Grd Fault P/U:	amp s	· Delay	seconds	
Instant. P/U : 4000	amp s		•	
Fused Rating & Manufacturer:		. NA		
			<b>,</b>	
	•		,	
I TTACT RESISTANCE:	•			
	1 42	Phase III	microhms	•
Phase I 35 Phase I	-			
Phase I 35 Phase I	1 42	Phase III		
Phase I 35 Phase I	1 2.00	Phase III	වරයා megohms	ok lavote≴
Phase I 35 Phase I  ATION RESISTANCE:  Phase I 200 Phase I  SENERAL:	-	Phase III	2රයා megohms	о.к.   <b>NOTE#</b>
Phase 1 35 Phase 1  ATION RESISTANCE:  Phase 1 200 Phase 1  SENERAL:  Exterior Enclosure Condition	1 2.00	Phase III	වරය megohms	O.K. NOTE#
Phase 1 35 Phase 1  ATION RESISTANCE:  Phase 1 200 Phase 1  SENERAL:  Exterior Enclosure Condition  Arcing Contacts	0.K. NOTE	Phase III	megohms  ted Cleaned	0.K. NOTE#
Phase 1 35 Phase 1  ATION RESISTANCE:  Phase 1 200 Phase 1  SENERAL:  Exterior Enclosure Condition  Arcing Contacts  Main Contacts	1 2.00	Phase III  12. Lubricat  13. Breaker  14. Enclosu	megohms  red Cleaned re Cleaned	
Phase 1 35 Phase 1  ATION RESISTANCE:  Phase 1 200 Phase 1  SENERAL:  Exterior Enclosure Condition  Arcing Contacts  Main Contacts  Exterior Breaker Condition	0.K. NOTE	Phase III  12. Lubrican 13. Breaker 14. Enclosu 15. Bus Con	megohms  ted Cleaned re Cleaned nections	
Phase 1 35 Phase 1  ATION RESISTANCE:  Phase 1 200 Phase 1  SENERAL:  Exterior Enclosure Condition  Arcing Contacts  Main Contacts  Exterior Breaker Condition  5. Tripping Device Condition	0.K. NOTE	Phase III  12. Lubricat  13. Breaker  14. Enclosut  15. Bus Cont  16. Cable Co	megohms  ted Cleaned re Cleaned nections onnections	
Phase 1 35 Phase 1  ATION RESISTANCE:  Phase 1 200 Phase 1  SENERAL:  Exterior Enclosure Condition  Arcing Contacts  Main Contacts  Exterior Breaker Condition  Tripping Device Condition  Manual Closing Operation	0.K. NOTE/	Phase III  12. Lubricat  13. Breaker  14. Enclosu  15. Bus Cont  16. Cable Cont  17. Voltmet	megohms  ted Cleaned re Cleaned nections onnections	
Phase 1 35 Phase 1  ATION RESISTANCE:  Phase 1 200 Phase 1  SENERAL:  Exterior Enclosure Condition  Arcing Contacts  Main Contacts  Exterior Breaker Condition  Manual Closing Operation  Manual Tripping Operation	0.K. NOTE/	Phase III  12. Lubricat  13. Breaker  14. Enclosu  15. Bus Cont  16. Cable Cont  17. Voltmete  18. Armeter	megohms  ted Cleaned re Cleaned nections onnections	
Phase 1 35 Phase 1  ATION RESISTANCE:  Phase 1 200 Phase 1  SENERAL:  Exterior Enclosure Condition  Areing Contacts  Main Contacts  Exterior Breaker Condition  Manual Closing Operation  Manual Tripping Operation  Electrical Closing Operation	O.K. NOTE	Phase III  12. Lubricat 13. Breaker 14. Enclosu 15. Bus Con 16. Cable Co 17. Voltmet 18. Ammeter 19. Are Chu	megohms  ted Cleaned re Cleaned nections onnections er	
Phase 1 35 Phase 1  ATION RESISTANCE:  Phase 1 200 Phase 1  SENERAL:  Exterior Enclosure Condition  Arcing Contacts  Main Contacts  Exterior Breaker Condition  Manual Closing Operation  Manual Tripping Operation  Electrical Closing Operation  9. Electrical Tripping Operation	O.K. NOTE	Phase III  12. Lubricat  13. Breaker  14. Enclosu  15. Bus Cont  16. Cable Cont  17. Voltmete  18. Armeter  19. Arc Chu  20. Barrier	megohms  ted Cleaned re Cleaned nections onnections er  te Condition Condition	
Phase 1 35 Phase 1  ATION RESISTANCE:  Phase 1 200 Phase 1  SENERAL:  Exterior Enclosure Condition  Arcing Contacts  Main Contacts  Exterior Breaker Condition  Manual Closing Operation  Manual Tripping Operation  Electrical Closing Operation  9. Electrical Tripping Operation  Secondary Auxillary Contacts	O.K. NOTE	Phase III  12. Lubricat  13. Breaker  14. Enclosu  15. Bus Cont  16. Cable Cont  17. Voltmete  18. Armeter  19. Arc Chu  20. Barrier  21. Single	megohms  ted Cleaned re Cleaned nections onnections er	
Phase 1 35 Phase 1  ATION RESISTANCE:  Phase 1 200 Phase 1  SENERAL:  Exterior Enclosure Condition  Arcing Contacts  Main Contacts  Exterior Breaker Condition  Manual Closing Operation  Manual Tripping Operation  Electrical Closing Operation  9. Electrical Tripping Operation	O.K. NOTE	Phase III  12. Lubricat  13. Breaker  14. Enclosu  15. Bus Cont  16. Cable Cont  17. Voltmete  18. Armeter  19. Arc Chu  20. Barrier	megohms  ted Cleaned re Cleaned nections onnections er  te Condition Condition	
Phase 1 35 Phase 1  ATION RESISTANCE:  Phase 1 200 Phase 1  SENERAL:  Exterior Enclosure Condition  Arcing Contacts  Main Contacts  Exterior Breaker Condition  Manual Closing Operation  Manual Tripping Operation  Electrical Closing Operation  Secondary Auxillary Contacts  1. Breaker Drawout Clusters	O.K. NOTE	Phase III  12. Lubrican 13. Breaker 14. Enclosus 15. Bus Cons 16. Cable Cons 17. Voltmete 18. Armeter 19. Arc Chu 20. Barrier 21. Single 22. Others	megohms  ted Cleaned re Cleaned nections onnections er  te Condition Condition Phase Indicators	
Phase 1 35 Phase 1  ATION RESISTANCE:  Phase 1 200 Phase 1  SENERAL:  Exterior Enclosure Condition  Areing Contacts  Main Contacts  Exterior Breaker Condition  Manual Closing Operation  Manual Tripping Operation  Electrical Closing Operation  Secondary Auxillary Contacts	O.K. NOTE	Phase III  12. Lubrican 13. Breaker 14. Enclosus 15. Bus Cons 16. Cable Cons 17. Voltmete 18. Armeter 19. Arc Chu 20. Barrier 21. Single 22. Others	megohms  ted  Cleaned re Cleaned nections onnections er  te Condition Condition Phase Indicators	

Ref. #995.				SH	EET No. 32
INSPECTION & TI	EST REPORT FOR	SERVICE ENTRAN			
NORTH AMERICA TH Interrupter Switch Spe	いいのん ecifications: Mar	nul. <u>Staterr</u>	e 71115	Amps	·
Feeder To Ariski		Cat. # < 467	<u>- 4.7′</u> K.	v27	
Insulation:	Intact and thore	oughly cleaned.		•	
Alignement & Mechanism:		ally. Lubricated wh			
Contacts:	Cleaned, condi	itioned and sealed	against oxidation.		
Interrupting Units:	SATISFACTO SEE GENER NOT APPLI	RAL SHEET. NOTE	#		
Lightning Arrester Spe	ecification	Manuf. OHIC	6159 I	Туре <u> </u>	, p
Insulation:	Intact and the	proughly cleaned.			
Cementing:	Free from del	terioration.			
Insulation Resistance Test:	1. <u>ఎం క</u> The above va	2	<i>ఎ</i> ంల	_ 3 20ct	megohms
Fuse Specifications		Manuf			
Mountings:	Cat. #	K.V	Amp	Type .	
Holders:	Cat. #	K.V	Amp	Туре	
Refills:	Cat. #	K.V	Amp	Туре	

The above values are satisfactory.

All associated insulation was intact and thoroughly cleaned.
Contact surfaces were cleaned, conditioned and sealed against oxidation. A spare set of refills should be stored in a convenient location at all times.

microhms

Resistance Test:

### INSPECTION & TEST REPORT FOR SERVICE ENTRANCE POLE & METALCLAD SWITCHGEAR

Nonth Amenica I	ecifications: Man	uf. <u>*/c c</u>	LE CENTIC		Amp	s <u>6</u>	00
TRAISTORMEN TO	5.	Cat. # _34					
Insulation:	Intact and thoro	ughly cleaned	<b>J.</b>		-	-	
Alignement & Mechanism:	Operated norma	lly. Lubricated	where nec	essary.			
Contacts:	Cleaned, conditi	oned and sea	iled against	oxidation.			
Interrupting Units:	E SATISFACTOR  □ SEE GENERA  □ NOT APPLICA	L SHEET. NO	DTE#				
Lightning Arrester Spec	cification	Manuf	NA		Ту	/pe	
	•	Cat. #	ALL LANGER	к	v	***************************************	· · · · · · · · · · · · · · · · · · ·
Insulation:	Intact and thore	oughly cleaned	d.				
Cementing:	Free from deter	ioration.					
Insulation Resistance Test:	1The above value				_ 3		megohms
Fuse Specifications	·	Manuf	5/c E16	- C7111C	······································		
Mountings:	Cat. #	K.V		Amp	· · · · · · · · · · · · · · · · · · ·	_ Type	
. Holders:	Cat. # 86640	<u> </u>	34 =	Amp <u>3</u>	50	_ Type	<u>Sm 5</u>
Refills:	Cat. # <u>।३००२८</u>	<u>ку</u> к.v	2.4 5	Amp <u>15</u>	- -	Tec T <del>ype</del>	152.4
Resistance Test:	12220	2.	<u> </u>	: 7	_ 3	<u> 2306</u>	microhms
	The above value All associated Contact surface A spare set of	insulation wa es were clear	is intact and ned, conditi	oned and s	ealed ag	ainst ox	

Ref. #				SHEET No. 34
INSPECTION & T	EST REPORT FOR SERVICE ENTRANCE POLE & I	METALCLA	D SWITC	CHGEAR
NORTH AMERICA TO	AUTON ecifications: Manuf. Steeless		Amps _	600
TECDES TO CON	VICE TELDS	K.V	Σ	.7
Insulation:	Intact and thoroughly cleaned.		*	
Alignement & Mechanism:	Operated normally. Lubricated where necessar	ry.		
Contacts:	Cleaned, conditioned and sealed against oxid	ation.		
Interrupting Units:	SATISFACTORY SEE GENERAL SHEET. NOTE # NOT APPLICABLE			
Lightning Arrester Spe	Cat. # _ 41-159			
Insulation:	Intact and thoroughly cleaned.			
Cementing:	Free from deterioration.			
Insulation Resistance Test:	1	1	3. <u>-</u>	megohms
Fuse Specifications	Manuf			
Mountings:	Cat. # K.V An	٦p		Type
Holders:	Cat. # K.V An	np	<u> </u>	Туре
Refills:	Cat. # K.V Ar	mp		Туре

The above values are satisfactory.

All associated insulation was intact and thoroughly cleaned.

Contact surfaces were cleaned, conditioned and sealed against oxidation. A spare set of refills should be stored in a convenient location at all times.

Resistance Test:

Ref. #1-1/1	
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#### INSPECTION & TEST REPORT FOR SERVICE ENTRANCE POLE & METALCLAD SWITCHGEAR

North Finement A Interrupter Switch Sp PADDOCKE FRANCE		nuf. <u>S)c</u> Cat. # <u>34</u>					
Insulation:	Intact and thore				14.4.		
Alignement & Mechanism:	Operated norma	ally. Lubricated	J where ned	cessary.			
Contacts:	Cleaned, condit	ioned and sea	aled agains	t oxidation	١.		
Interrupting Units:	Ø SATISFACTO □ SEE GENER □ NOT APPLIC	AL SHEET. NO	OTE#				
Lightning Arrester Spe	cification	Manuf	OHIO			ype	5P.
		Cat. #	161=9		K.V	24	
Insulation:	Intact and thor	oughly cleane	d.				
Cementing:	Free from dete	rioration.					
Insulation Resistance Test:	1 The above valu			C)	3		megohms
Fuse Specifications		Manuf		er en en en en en en en en en en en en en		<u></u>	
Mountings:	Cat. #	K.V	<u></u>	_ Amp		Туре	
Holders:	Cat. # 86649	<u>del</u> K.V	34.5	_ Amp	300	Туре	JN5
Refills:	Cat. #2 <u>64/?</u>	5 P V KV	54.6	_ Amp	80	1cc Type	119.4
Resistance Test:	1	2.	110	A. 7. 1	3	<u></u>	microhms
	The above val	ues are satisf		nd thoroug	hiv clean	ed .	

Contact surfaces were cleaned, conditioned and sealed against oxidation. A spare set of refills should be stored in a convenient location at all times.

Normal Day 1				Social No	
0 1444	H.V. <u></u>	7600 Y /16000 L	.V. 2087 1	Serial No	11.1.
Hould 200		Κ.V.Λ. <u>5ου</u>	15.60	MAE /WAS	
uid Sample	cul. No.	Colour	i.F.T.	Dielectric	Spec. Gravity
		The above results		•	
ulation Resistance T				Test Voltage D.C.	
H.V. to Ground	100	megohms . megohms			
H.V. lo L.V		The above result	s are satisfactor	y.	
	Station	Grounding System: _	۷.5	Ohm	-
				•	
		-			

G. T. WOOD CO. LTD. 06/83

### GENERAL CONDITIONS

	Serial No.
Bushings:	Insulation was intact and thoroughly cleaned. Cementing was free from deterioration.
Gaskets:	SATISFACTORY  SEE GENERAL SHEET. NOTE
Paint:	SATISFACTORY  SEE GENERAL SHEET. NOTE
	SATISFACTORY  SEE GENERAL SHEET. NOTE
Liquid Level:	
Thermometer:	SATISFACTORY  SEE GENERAL SHEET. NOTE  MAXIMUM TEMPERATURE WAS  52  C
Cooling System:	CLEAR  SEE GENERAL SHEET. NOTE
Gas Detector Relay:	SATISFACTORY  SEE GENERAL SHEET. NOTE  NOT APPLICABLE
	•
Terminal Board and/or Tap Switch:	located in position 3 for 52600 volts

LOW VOLTAGE BREAKER		A PAV. MAIN		
CIFICATION:			West Miles and the second of t	
Manufacturer : 17{		Serial #	: 78017	
Interrupt. Cap: 50KA		Volts	: Lea - 420/2	05)
Frame Size : 1600 A				
Elect. Operated:		Poles	: <u>K-1600</u> : : : :	
Manul, Operated:			/ Draw Out:	
PPING DEVICE:				
Type: 0124		Coil/C.T.	Rating /200	amp s
Longtime P/U: 1100	amp s		N 7/8 seconds	<del></del>
Shorttime P/U: 4000	amps		v7/6 seconds	
Grd Fault P/U:			seconds	
Instant. P/U :	<del></del>	<del></del>		
Fused Rating & Manufacturer:				
				S
				·
Phase I <u>フロロ</u> Phase I	0.K.   NOTE#	Phase III 🚉	മര megohms	0.K. N
Phase I 700 Phase I	0.K.   NOTE#	Phase III	<u>നട</u> megohms	0.K. N
Phase I 700 Phase I  VERAL:  Exterior Enclosure Condition  Arcing Contacts	0.K.   NOTE#	Phase III	megohms ed Cleaned	0.K. NO
Phase I 700 Phase I  NERAL:  Exterior Enclosure Condition  Arcing Contacts  Main Contacts	0.K. NOTE#	Phase III	ed Cleaned e Cleaned	0.K. NK
Phase I 700 Phase I  NERAL:  Exterior Enclosure Condition  Arcing Contacts  Main Contacts  Exterior Breaker Condition	0.K.   NOTE#	Phase III	ed Cleaned e Cleaned ections	0.K. NC
Phase I 700 Phase I  NERAL:  Exterior Enclosure Condition  Arcing Contacts  Main Contacts  Exterior Breaker Condition  Tripping Device Condition	0.K. NOTE#	Phase III	ed Cleaned e Cleaned ections nnections	0.K. NK
Phase I 700 Phase I  NERAL:  Exterior Enclosure Condition  Arcing Contacts  Main Contacts  Exterior Breaker Condition  Tripping Device Condition  Manual Closing Operation	0.K. NOTE#	Phase III	ed Cleaned e Cleaned ections nnections	0.K. N
Phase I 200 Phase I  NERAL:  Exterior Enclosure Condition  Arcing Contacts  Main Contacts  Exterior Breaker Condition  Tripping Device Condition  Manual Closing Operation  Manual Tripping Operation	0.K. NOTE#	Phase III	ed Cleaned e Cleaned ections nnections	O.K. NK
Phase I 700 Phase I  NERAL:  Exterior Enclosure Condition  Arcing Contacts  Main Contacts  Exterior Breaker Condition  Tripping Device Condition  Manual Closing Operation  Manual Tripping Operation  Electrical Closing Operation	0.K. NOTE#	Phase III	ed Cleaned e Cleaned ections nnections r	O.K. NK
Phase I 200 Phase I  NERAL:  Exterior Enclosure Condition  Arcing Contacts  Main Contacts  Exterior Breaker Condition  Tripping Device Condition  Manual Closing Operation  Manual Tripping Operation  Electrical Closing Operation  Electrical Tripping Operation	O.K. NOTE#	Phase III	ed Cleaned e Cleaned ections nnections r e Condition Condition	O.K. NK
Phase I Phase I  NERAL:  Exterior Enclosure Condition  Arcing Contacts  Main Contacts  Exterior Breaker Condition  Tripping Device Condition  Manual Closing Operation  Manual Tripping Operation  Electrical Closing Operation  Electrical Tripping Operation  Secondary Auxillary Contacts	O.K. NOTE#	Phase III	ed Cleaned e Cleaned ections nnections r	O.K. N
Phase I 200 Phase I  NERAL:  Exterior Enclosure Condition  Arcing Contacts  Main Contacts  Exterior Breaker Condition  Tripping Device Condition  Manual Closing Operation  Manual Tripping Operation  Electrical Closing Operation  Electrical Tripping Operation	0.K. NOTE#	Phase III	ed Cleaned e Cleaned ections nnections r e Condition Condition	0.K. N
Phase I Phase I  NERAL:  Exterior Enclosure Condition  Arcing Contacts  Main Contacts  Exterior Breaker Condition  Tripping Device Condition  Manual Closing Operation  Manual Tripping Operation  Electrical Closing Operation  Electrical Tripping Operation  Secondary Auxillary Contacts	O.K.   NOTE#	Phase III	ed Cleaned e Cleaned ections nnections r e Condition Condition	O.K. N
Phase I 700 Phase I  NERAL:  Exterior Enclosure Condition  Arcing Contacts  Main Contacts  Exterior Breaker Condition  Tripping Device Condition  Manual Closing Operation  Manual Tripping Operation  Electrical Closing Operation  Electrical Tripping Operation  Secondary Auxillary Contacts  Breaker Drawout Clusters	O.K. NOTE#	Phase III	ed Cleaned e Cleaned ections nnections r e Condition Condition	0.K. N

### INSPECTION & TEST REPORT FOR SERVICE ENTRANCE POLE & METALCLAD SWITCHGEAR

ENT. FACILITIES	ecifications: Ma	nuf. <u> </u>	4.11.67 × 10	Amps <u>Lo</u>	0
Tec. 7:60 -10 1011	MALYA PA	v. Cat. #3	4163.	K.V. <u>29</u>	
Insulation:	Intact and thor	oughly cleaned	i.	<u>.</u>	
Alignement & Mechanism:	Operated norm	ally. Lubricated	where necessary.		
Contacts:	Cleaned, cond	tioned and sea	led against oxidation	n.	
Interrupting Units:	SATISFACTO SEE GENER NOT APPLI	RAL SHEET. NO	DTE#		
Lightning Arrester Spe	cification	Manuf	OHIO REASS	Type	in P
	•	Cat. #	4615.7	K.V. 20	
Insulation:	Intact and tho	roughly cleane	d.		
Cementing:	Free from det	erioration.			
Insulation Resistance Test:	1. <u>2 o</u> The above val	.ł <u>e                                    </u>	<u>تمن ۲</u> ctory.	3. <u>200 i</u>	megohms
Fuse Specifications		Manuf			, p. 1411-1411-1411-1411-1411-1411-1411-141
Mountings:	Cat. #	K.V	Amp	Type _	
Holders:	Cat. #	K.V	Amp _	Type .	
Refills:	Cat. #	K.V	Amp _	Туре	
Resistance Test:	1	2.		3	microhms
	All associate Contact surf	aces were clea	actory. as intact and thoroug ned, conditioned and	d sealed against ox	

# INSPECTION & TEST REPORT FOR SERVICE ENTRANCE POLE & METALCLAD SWITCHGEAR

EETICA TO VILLAC	ecifications: Manuf. 5 CELECTRIC Amps Local
Insulation:	Intact and thoroughly cleaned.
Alignement & Mechanism:	Operated normally. Lubricated where necessary.
Contacts:	Cleaned, conditioned and sealed against oxidation.
Interrupting Units:	SATISFACTORY  SEE GENERAL SHEET. NOTE #  NOT APPLICABLE
Lightning Arrester Spe	edification Manuf. OHIO PARS Type
·	Cat. # K.V 24
Insulation:	Intact and thoroughly cleaned.
Cementing:	Free from deterioration.
Insulation Resistance Test:	1 2
Fuse Specifications	Manuf. <u>5/c 6 ( = 0777) (</u>
Mountings:	Cat. # K.V Amp Type
Holders:	Cat. # 866 41/8/ K.V. 24-5 Amp 300 Type 345
Refills:	Cat. # 134/25-164 K.V. 34.5 Amp 20 Type 153.4
Resistance Test:	1 2
	The above values are satisfactory.  All associated insulation was intact and thoroughly cleaned.  Contact surfaces were cleaned, conditioned and sealed against oxidation.  A spare set of refills should be stored in a convenient location at all times.

Ref. #	
INSPECTION & T	EST REPORT FOR SERVICE ENTRANCE POLE & METALCLAD SWITCHGEAR
ENT FACILITIES	ecifications: Manuf. 330 ELECTRIC Amps 600
TEMNS FORMER	Cat. # <u>3456374-77</u> K.V. <u>27</u>
Insulation:	Intact and thoroughly cleaned.
Alignement & Mechanism:	Operated normally. Lubricated where necessary.
Contacts:	Cleaned, conditioned and sealed against oxidation.
Interrupting Units:	© SATISFACTORY  SEE GENERAL SHEET. NOTE #  NOT APPLICABLE
Lightning Arrester Spe	Cat. # K.V         K.V
Insulation:	Intact and thoroughly cleaned.
Cementing:	Free from deterioration.
Insulation Resistance Test:	1 2 3megohms The above values are satisfactory.
Fuse Specifications	Manuf S/C ELECTRIC
Mountings:	Cat. # K.V Amp Type
Holders:	Cat. # 8004481 K.V. 245 Amp 300 Type SM 5
Refills:	Cat. # 13404084 KV. 345 Amp 25 Type 153.4
Resistance Test:	1. 1900 2. 1910 3. 1900 microhms
	The above values are satisfactory.  All associated insulation was intact and thoroughly cleaned.  Contact surfaces were cleaned, conditioned and sealed against oxidation.  A spare set of refills should be stored in a convenient location at all times.

cifications, Manuf	•			
	the Euro	71.15	Amps	<u>c</u>
nsin Phy Cat.	# <u> </u>	K.V.	2.3	
Intact and thoroughly	cleaned.		£	
Operated normally. Lub	oricated where ne	cessary.		
Cleaned, conditioned a	and sealed agains	t oxidation.		
☐ SATISFACTORY ☐ SEE GENERAL SHI ☐ NOT APPLICABLE	EET. NOTE #			
ification Manu	uf. <u>certic</u>	+ = +	_ Type	<u>. ( , </u>
Cat.	# 4(6)(59	K.V.	24	
Intact and thoroughly	cleaned.			
Free from deterioratio	n.			
1	2 2. satisfactory.	<u>C</u> 1	3. <u>-                                   </u>	megohms
Man	nuf			
Cat. #	K.V	Amp	Туре _	
Cat. #	K.V	Amp	Type _	
Cat. #	K.V	_ Amp	Type _	
1	2		3	microhms
	Intact and thoroughly Operated normally. Lut Cleaned, conditioned a  SATISFACTORY SEE GENERAL SHI NOT APPLICABLE  Sification Man Cat. Intact and thoroughly Free from deterioration  1	Intact and thoroughly cleaned.  Operated normally. Lubricated where need Cleaned, conditioned and sealed agains  SATISFACTORY SEE GENERAL SHEET. NOTE # NOT APPLICABLE  Cat. #	Intact and thoroughly cleaned.  Operated normally. Lubricated where necessary.  Cleaned, conditioned and sealed against oxidation.  SATISFACTORY SEE GENERAL SHEET. NOTE # NOT APPLICABLE  Sification Manuf. Cat. #	Intact and thoroughly cleaned.  Operated normally. Lubricated where necessary.  Cleaned, conditioned and sealed against oxidation.  SATISFACTORY SEE GENERAL SHEET. NOTE # NOT APPLICABLE  Cat. #

Contact surfaces were cleaned, conditioned and sealed against oxidation. A spare set of refills should be stored in a convenient location at all times.

G. T. WOOD CO. LTD. 9/27/83

A spare set of refills should be stored in a convenient location at all times.

		<u> </u>			
nulacturer	WELTING H	ous e		Serial No. <u>827</u>	394
10 <u>TNEN</u>	H.V. <u>_2</u>	7600 / 16000 L	.v. 2087 1	/?( Taps/	·2 1/2 /
I. Liquid	5 <i>t</i> :	K.V.A275	1253		•
Impedance	1.9	•	_ VECTOR	WY+ / 51 Y A	
		-			
juid Sample				•	· .
ial No.	Neut. No.	Colour	l.F.Υ. ·	Dielectric	Spec. Gravity
					,
•					
		The above results	are satisfactory.		
sulation Resistan	ce Test			Test Voltage D.C	· · · · · · · · · · · · · · · · · · ·
		megohms		1000	
	•	megohms			
•	•	•	••••••	<b>*</b> *	
H.V. to L.V		megohms			
		The above results	s are satisfactory.		•
	Station	Grounding System: _		Ohm	
•				*	
			<u> </u>		
		-			

;.,T. WOOD CO. LTD. 06/83

### GENERAL CONDITIONS

	Serial No. 887194
Bushings:	Insulation was intact and thoroughly cleaned. Cementing was free from deterioration.
Gaskets:	SATISFACTORY  SEE GENERAL SHEET. NOTE
Paint:	SATISFACTORY SEE GENERAL SHEET. NOTE
	SATISFACTORY  SEE GENERAL SHEET. NOTE
Liquid Level:	
Thermometer:	SATISFACTORY  SEE GENERAL SHEET. NOTE  MAXIMUM TEMPERATURE WAS  32  C
Cooling System:	CLEAR SEE GENERAL SHEET. NOTE
Gas Detector Relay:	SATISFACTORY SEE GENERAL SHEET. NOTE NOT APPLICABLE
Terminal Board and/or Tap Switch:	located in position for _27600 volt

ENT	· FACILITI	<u> </u>			
	NISTING HC			Serial No. 750	
<u>6967</u>	н.v. <u>2</u>	76cey/1600 1	.v. 600 y 13	1/7 Taps	<u>7-2/1</u>
I. Llquid	.310	K.V.A. 500/	15.60	<b>-</b> ,	
Impedance _	. 6.7		_ VECTOR	wye/wye.	
uid Sample					
ial No.	Neut. No.	Colour	I.F.T.	Dielectric	Spec. Gravity
•					
•					
	•	The above results	are satisfactory.		
sulation Resist	ance Test			Test Voltage D.	<b>c</b> .
		megohms		/004	<u>,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,</u>
		megohms		· ·	
	65	megohms		#**	
H.V. 10 L.V.			s are salisfactory	·.	
	Station	Grounding System: _	.Z.50	Ohm	
					,
		•			•
•				,	

WOOD CO. LTD, 06/83

### GENERAL CONDITIONS

	Serial No 850912
Bushings:	Insulation was intact and thoroughly cleaned. Cementing was free from deterioration.
Gaskets:	SATISFACTORY  SEE GENERAL SHEET. NOTE
Paint:	SATISFACTORY  SEE GENERAL SHEET. NOTE
	SATISFACTORY  SEE GENERAL SHEET. NOTE
Liquid Level:	
Thermometer:	SATISFACTORY  SEE GENERAL SHEET. NOTE  MAXIMUM TEMPERATURE WAS  45  C
Cooling System:	CLEAR  SEE GENERAL SHEET. NOTE
Gas Detector Relay:	SATISFACTORY SEE GENERAL SHEET. NOTE NOT APPLICABLE
	•
Terminal Board and/or Tap Switch:	located in position 3 for 27600 volts

Designa	AKER / / DISCON		
CIFICATION:			dat-AM-Mark-Nations
Manufacturer : Wes	TING HOUSE	Serial # : c	CP21379-02-A1
Interrupt. Cap:			600
Frame Size :		<del>-</del> -	D8.50
Elect. Operated:			. 3
Manul. Operated:			/ Draw Out: 🗸
·			
PPING DEVICE:			
Type: D13		Coil/C.T. Rat	ing <u>1000</u> amps
Longtime P/U: Lo	40 amps	Delay 20	seconds
Shorttime P/U: 40	•	Delay 30C	
Grd Fault P/U:		Delay	
Instant. P/U:			
Fused Rating & Manufac	cturer:		
Phase   39		- Filase 111 <u>70</u>	HII C I O HIII)
Phase   39 ULATION RESISTANCE: Phase   200			
ULATION RESISTANCE:	Phase 11	Phase III <u>200</u>	megohms O.K.   NO
Phase   200	Phase 11	Phase III <u>200</u>	megohms
Phase   200	Phase II 200  O.K. NOTE#	Phase III <u>200</u>	meg o hms
Phase   200  ERAL:  Exterior Enclosure Co	O.K. NOTE#	Phase III 200	megohms O.K. NO
Phase   200  ERAL:  Exterior Enclosure Co Arcing Contacts	O.K. NOTE#	Phase III 200  12. Lubricated 13. Breaker Cle 14. Enclosure C	megohms O.K. NO aned Cleaned ions
Phase 1 200  ERAL:  Exterior Enclosure Co Arcing Contacts Main Contacts	O.K. NOTE#	Phase III 200  12. Lubricated  13. Breaker Cle  14. Enclosure C	megohms O.K. NO aned Cleaned ions
Phase   200  ERAL:  Exterior Enclosure Co Arcing Contacts Main Contacts Exterior Breaker Cond	Phase II 200  O.K. NOTE#  Ition  Ition  Ition  Ition	Phase III 200  12. Lubricated 13. Breaker Cle 14. Enclosure C	megohms  O.K. NO  aned  Cleaned  ions  ctions
Phase   200  ERAL:  Exterior Enclosure Co Arcing Contacts Main Contacts Exterior Breaker Cond Tripping Device Condi	Phase II 200  O.K. NOTE#  Indition  Ition  Ition  Ition  Ition	Phase III 200  12. Lubricated 13. Breaker Cle 14. Enclosure C 15. Bus Connect 16. Cable Conne 17. Voltmeter 18. Ammeter	megohms  O.K. NO  aned  leaned ions ctions
Phase 1 200  ERAL:  Exterior Enclosure Co Arcing Contacts Main Contacts Exterior Breaker Cond Tripping Device Condi Manual Closing Operat	Phase II 200  O.K. NOTE#  Indition  Ition  Ition  Ition  Ition  Ition	Phase III 200  12. Lubricated 13. Breaker Cle 14. Enclosure C 15. Bus Connect 16. Cable Conne 17. Voltmeter 18. Ammeter 19. Arc Chute C	megohms  O.K. NO  aned  leaned  ions  ctions  Condition
Phase   200  ERAL:  Exterior Enclosure Co Arcing Contacts Main Contacts Exterior Breaker Cond Tripping Device Condi Manual Closing Operat Manual Tripping Opera	Phase II 200  O.K. NOTE#  Ition  Ition  Ition  Oeration  Operation	Phase III 200  12. Lubricated 13. Breaker Cle 14. Enclosure Cle 15. Bus Connect 16. Cable Conne 17. Voltmeter 18. Ammeter 19. Arc Chute Cle 20. Barrier Con	megohms  O.K. NO  aned  leaned  ions  ctions  Condition  ndition
Phase   200  ERAL:  Exterior Enclosure Co Arcing Contacts Main Contacts Exterior Breaker Cond Tripping Device Condi Manual Closing Operat Manual Tripping Opera	Phase II 200  O.K. NOTE#  Indition  Ition Ition Ition Operation  Operation	Phase III 200  12. Lubricated 13. Breaker Cle 14. Enclosure Cle 15. Bus Connect 16. Cable Conne 17. Voltmeter 18. Ammeter 19. Arc Chute Cle 20. Barrier Con 21. Single Phase	megohms  O.K. NO  aned  leaned  ions  ctions  Condition
Phase 1 200  ERAL:  Exterior Enclosure Co Arcing Contacts Main Contacts Exterior Breaker Cond Tripping Device Condi Manual Closing Operat Manual Tripping Opera Electrical Closing Op	O.K. NOTE#  O.K. NOTE#  Ition  Ition  Ition  Oeration  Operation  Contacts	Phase III 200  12. Lubricated 13. Breaker Cle 14. Enclosure Cle 15. Bus Connect 16. Cable Conne 17. Voltmeter 18. Ammeter 19. Arc Chute Cle 20. Barrier Con	megohms  O.K. NO  aned  leaned  ions  ctions  Condition  ndition
Phase   200  ERAL:  Exterior Enclosure Co Arcing Contacts Main Contacts Exterior Breaker Cond Tripping Device Condi Manual Closing Operat Manual Tripping Opera Electrical Closing Op Electrical Tripping Condi Secondary Auxillary Condary	O.K. NOTE#  O.K. NOTE#  Indition  Ition Ition Ition Operation Contacts Iters  It was serviced and leading to the contact of th	Phase III 200  12. Lubricated 13. Breaker Cle 14. Enclosure Cle 15. Bus Connect 16. Cable Conne 17. Voltmeter 18. Ammeter 19. Arc Chute Cle 20. Barrier Con 21. Single Phase 22. Others	megohms  O.K. NO  aned  Cleaned  ions  ctions  Condition  ndition  se Indicators

•	Designation: Ex	T. FASILI	ILS TE		<del></del>	
ોા	FICATION:					
	Manufacturer : VIESTING HOUS	<del>c`</del>	Seri	at # : <u>c P</u>	21379-01.	AI
	Interrupt, Cap : 25KA		Volt	s :	600	
	Frame Size : 600 A		Турс	:	D9:25	····
	Elect. Operated:		Polc	s :	3	
	Manul. Operated:		Fixe	d:/	Draw Out:	
o P	ING DEVICE:					•
	Type: DF.		Coil	/C.T. Ratir	18 <u>600</u>	_ amp s
	Longtime P/U: Loop	amp s	Dela	y <u>20</u>	seconds	•
	Shorttime P/U: 300	amp s	Dela	y <u>Leycie</u>	scc <del>on</del> ds,	•
	Grd Fault P/U:	amp s	·Dela	y <u> </u>	seconds	
	Instant. P/U:	sumb s				•
	Fused Rating & Manufacturer:			_	*	
				•	ı	
ΓΑ	CT RESISTANCE:			_	•	·
				, , , , , , , , , , , , , , , , , , , ,	microhm	\$
		5/	Phase 11	1 . 45		•
•	Phase 1 45 Phase II	5/	Phase II	. 43		
•	Phase I 45, Phase II ATION RESISTANCE:	5/		1 200		
,	Phase I 45 Phase II ATION RESISTANCE:					
) <b>L</b>	Phase I         #E         Phase II           ATION RESISTANCE:         Phase II           Phase I         200         Phase II		Phase II			
)L ER	Phase I 45, Phase II  ATION RESISTANCE:  Phase I 200 Phase II  AL:	200	Phase II	1 <u>200</u> Oricated	me g o hms	0.K. N
)L ER	Phase I         #E         Phase II           ATION RESISTANCE:         Phase II           Phase I         200         Phase II	200	Phase	1 200 Oricated	me g o hms	O.K. N
L ER	Phase I 45 Phase II  ATION RESISTANCE:  Phase I 200 Phase II  AL:  Exterior Enclosure Condition  Arcing Contacts	0.K. NOTE/	Phase 11 12. Lul 13. Bro	oricated taker Clean	megohms ed aned	O.K. N
L ER	Phase I 45, Phase II  ATION RESISTANCE:  Phase I 200 Phase II  AL:  Exterior Enclosure Condition  Arcing Contacts  Main Contacts	0.K. NOTE/	Phase 11  12. Lul  13. Bro  14. End  15. Bu	oricated taker Clean tologics Connection	megohms ed aned	O.K. N
· ER	Phase I 45, Phase II  ATION RESISTANCE:  Phase I 200 Phase II  AL:  Exterior Enclosure Condition  Arcing Contacts  Main Contacts  Exterior Breaker Condition	0.K. NOTE/	Phase 11  12. Lul  13. Bro  14. End  15. Bu	oricated taker Clean	megohms ed aned	O.K. N
· ER	Phase I 45, Phase II  ATION RESISTANCE:  Phase I 200 Phase II  AL:  Exterior Enclosure Condition  Arcing Contacts  Main Contacts  Exterior Breaker Condition  Tripping Device Condition	0.K. NOTE/	Phase 11  12. Lul  13. Bro  14. End  15. Bu  16. Ca	oricated taker Clean tologics Connection	megohms ed aned	O.K. N
L ER	Phase I 45, Phase II  ATION RESISTANCE:  Phase I 200 Phase II  AL:  Exterior Enclosure Condition  Arcing Contacts  Main Contacts  Exterior Breaker Condition  Tripping Device Condition  Manual Closing Operation	0.K. NOTE/	Phase 11  12. Lul  13. Bro  14. End  15. Bu  16. Ca  17. Vo  18. Am	oricated caker Clean closure Cle s Connectio ble Connect	ed aned ns ions	O.K. N
L ER	Phase I 45, Phase II  ATION RESISTANCE:  Phase I 200 Phase II  AL:  Exterior Enclosure Condition  Arcing Contacts  Main Contacts  Exterior Breaker Condition  Tripping Device Condition  Manual Closing Operation  Manual Tripping Operation	0.K. NOTE/	Phase 11  12. Lul  13. Bro  14. End  15. Bu  16. Ca  17. Vo  18. Am  19. Ar	oricated caker Clean closure Cle s Connectio ble Connect Itmeter meter c Chute Cor	megohms  ed aned ns ions	O.K. N
L ER	Phase I 45, Phase II  ATION RESISTANCE:  Phase I 200 Phase II  AL:  Exterior Enclosure Condition  Arcing Contacts  Main Contacts  Exterior Breaker Condition  Tripping Device Condition  Manual Closing Operation  Manual Tripping Operation  Electrical Closing Operation	0.K. NOTE/	12. Lul 13. Bro 14. End 15. Bu 16. Ca 17. Vo 18. Am 19. Ar 20. Ba	oricated caker Clean closure Cle s Connection ble Connect theter meter c Chute Cor	megohms  ed aned ns ions	O.K. N
ER	Phase I 45, Phase II  ATION RESISTANCE:  Phase I 200 Phase II  AL:  Exterior Enclosure Condition  Arcing Contacts  Main Contacts  Exterior Breaker Condition  Tripping Device Condition  Manual Closing Operation  Manual Tripping Operation  Electrical Closing Operation  Electrical Tripping Operation	0.K. NOTE/	12. Lul 13. Bro 14. End 15. Bu 16. Ca 17. Vo 18. Am 19. Ar 20. Ba	oricated caker Clean closure Cle s Connection ble Connect theter meter c Chute Cor	megohms  ed aned ns ions	O.K. N
ER	Phase I 45, Phase II  ATION RESISTANCE:  Phase I 200 Phase II  AL:  Exterior Enclosure Condition  Arcing Contacts  Main Contacts  Exterior Breaker Condition  Tripping Device Condition  Manual Closing Operation  Manual Tripping Operation  Electrical Closing Operation  Electrical Tripping Operation  Secondary Auxillary Contacts	2.00 O.K. NOTE/	12. Lul 13. Bro 14. End 15. Bu 16. Ca 17. Vo 18. Am 19. Ar 20. Ba 21. Si	oricated caker Clean closure Cle s Connection ble Connect theter meter c Chute Cor	megohms  ed aned ns ions	O.K. N
ER	Phase I 45, Phase II  ATION RESISTANCE:  Phase I 200 Phase II  AL:  Exterior Enclosure Condition  Arcing Contacts  Main Contacts  Exterior Breaker Condition  Tripping Device Condition  Manual Closing Operation  Manual Tripping Operation  Electrical Closing Operation  Electrical Tripping Operation  Secondary Auxillary Contacts  Breaker Drawout Clusters	2.00 O.K. NOTE/	Phase 11  12. Lul  13. Bro  14. End  15. Bu  16. Ca  17. Vo  18. Am  19. Ar  20. Ba  21. Si  22. Ot	oricated eaker Clean closure Cle s Connection ble Connect theter meter c Chute Cor rrier Condi	megohms  ed aned ns ions  idition ition Indicators	O.K. N
ER	Phase I 45, Phase II  ATION RESISTANCE:  Phase I 200 Phase II  AL:  Exterior Enclosure Condition  Arcing Contacts  Main Contacts  Exterior Breaker Condition  Tripping Device Condition  Manual Closing Operation  Manual Tripping Operation  Electrical Closing Operation  Electrical Tripping Operation  Secondary Auxillary Contacts  Breaker Drawout Clusters	2.00 O.K. NOTE/	Phase 11  12. Lul  13. Bro  14. End  15. Bu  16. Ca  17. Vo  18. Am  19. Ar  20. Ba  21. Si  22. Ot	oricated eaker Clean closure Cle s Connection ble Connect theter meter c Chute Cor rrier Condi	megohms  ed aned ns ions  idition ition Indicators	O.K. N
· L IER	Phase I 45, Phase II  ATION RESISTANCE:  Phase I 200 Phase II  AL:  Exterior Enclosure Condition  Arcing Contacts  Main Contacts  Exterior Breaker Condition  Tripping Device Condition  Manual Closing Operation  Manual Tripping Operation  Electrical Closing Operation  Electrical Tripping Operation  Secondary Auxillary Contacts	O.K. NOTE/	Phase 11  12. Lul  13. Bro  14. End  15. Bu  16. Ca  17. Vo  18. Am  19. Ar  20. Ba  21. Si  22. Ot	oricated caker Clean closure Cle s Connection ble Connect Itmeter c Chute Cor rrier Condi	megohms  ed aned ns ions  idition ition Indicators	O.K. N



3354 Mavis Rd. Mississauga, Ont. L5C 1T8 TEL: (905) 272-1696 Fax: (905) 272-1425

February 28, 1995

**METRO TORONTO ZOO** P.O. Box 280, West Hill, Ontario, M1E 4R5

ATTN: Mr. Dean Evans

RE: Your PO #12124

Our Ref #9951

Dear Sir;

In accordance with your request, we have completed the Inspection and Testing of the substation and associated electrical equipment at the above location.

Please find enclosed our test report for your reference.

Thank you for the favour of this business.

Yours very truly,

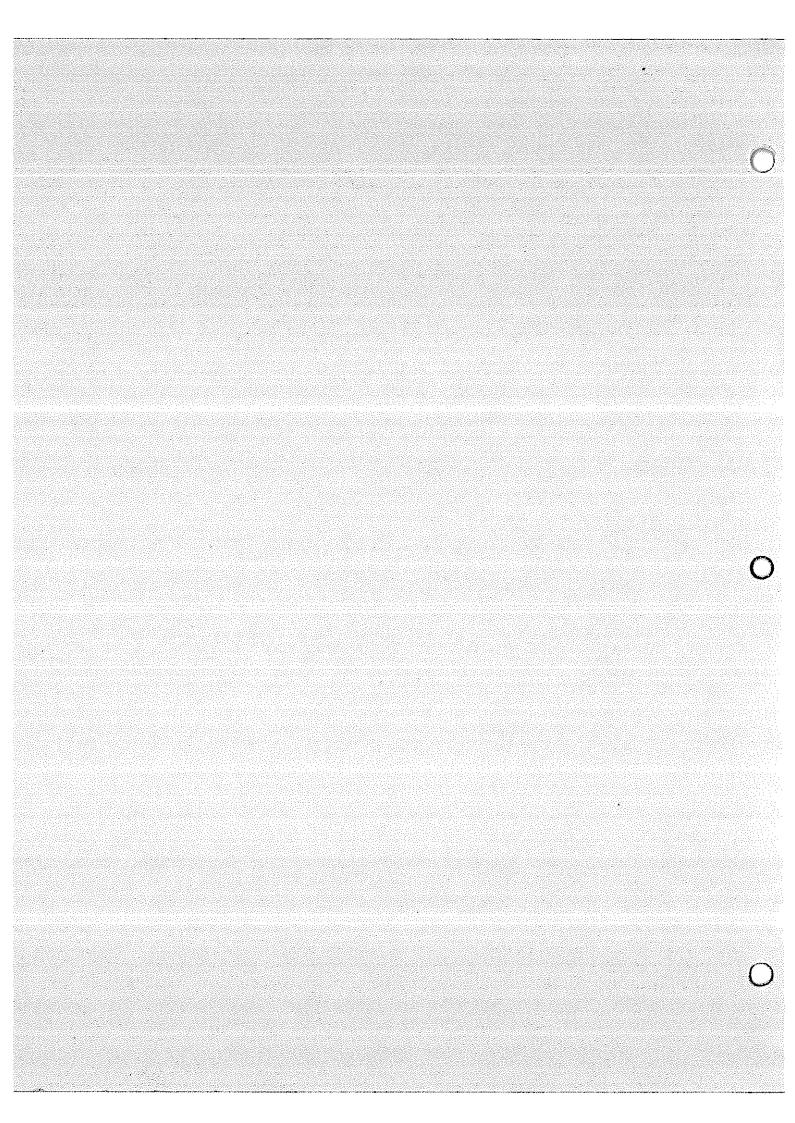
G.T. WOOD COMPANY LIMITED

L.A. Snow LAS/jn

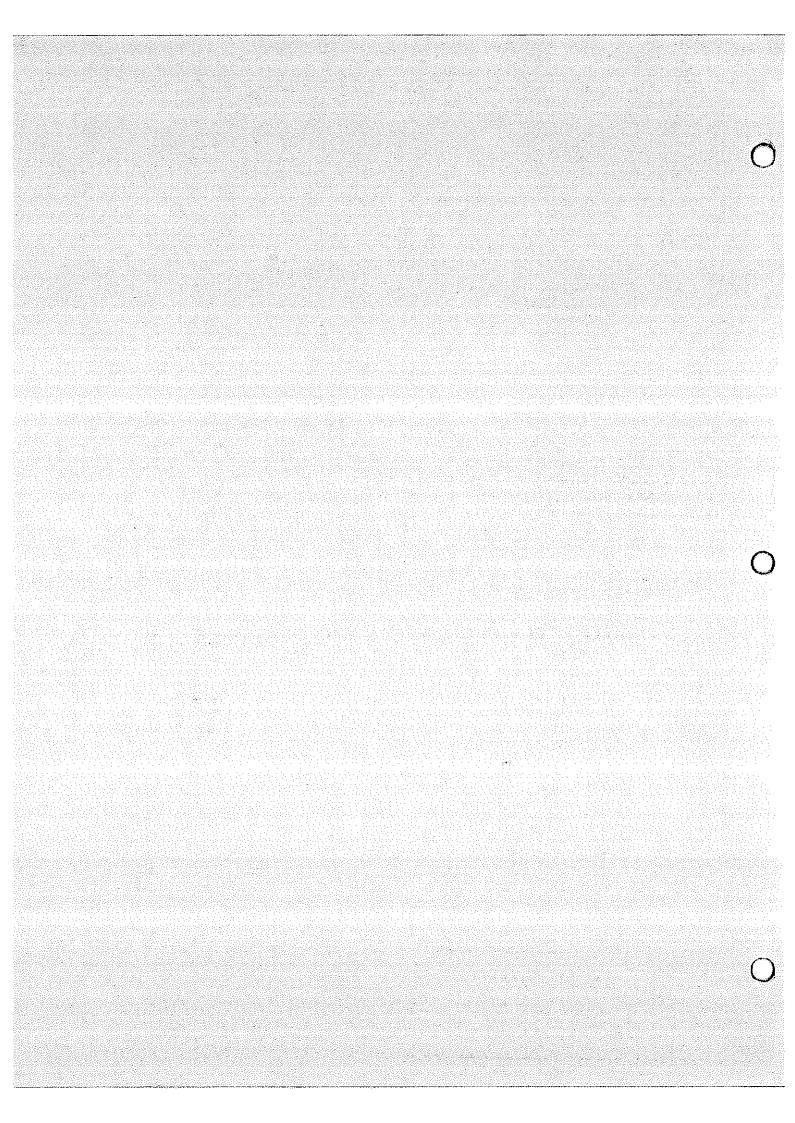
Encl.

RSCL/1

# APPENDIX 6 LIST OF GAS-FIRED EQUIPMENT



# APPENDIX 7 FIRE HYDRANT TEST RESULTS



HYDRANT OPERATION SATISFACTORY HYDRANT OPERATION DEFICIENCY



## A-1 HYDRANT SERVICES LTD.



CUSTOMER NAME: 7	oranto	Metro 2	00	HYDRANT LOCATION:	stol	Indian	Rinollin
SERVICE ADDRESS:	ILOLA 1	Old Kine	L Ane	HYDRANT MAKE: M		, <u></u>	
		Scarl	monab	DATE: FLO 21 PX	,		
ANNUAL PRE	VENTATIVE			ADDITIO	ONAL WO	ORK	
		ox 🛛 🚄	CLOSED 🔲	18. BONNETCOVER	<b>∝</b> □	MA []	MEPLACED []
1. SECONDARY VALVE	LOCATED	NOTVISIBLE	NOPERABLE	19. BONNETBOLTB	ox 🛘	NEA 🔲	REPLACED 🔲
	OR 🗆	ox El	LEAKING	20. SONNET	ox 🛘		REPLACED [
2 HYDRANT OPERATION	ov. □	DIFFICULT []	NOFERABLE	21. BONNETSEAL	ox □		REPLACED [
	wer 🗆	AMT. OF WATER		22. OPERATING NUT	ox □		REPLACED
3. CHECKBARRELFORWA	TER DAY	~ AMI. OF FIRTOR		23. OPERATING NUT O-PING(S)	ox 🗖	N#A 🗋	PEPACK [
				24. STUFFING BOX	ox 🗀	N#A 🔲	MEPLACED [
4. CHECK CAP GASKETS	ок 🖾		REPLACED [	25. THRUST BEARING	ox □	N/A 🔲	REPLACED
	ADS OK	PV8 🔼	LOCSE []	26. BEARING HOUSING	ок 🔲	N/A 🔲	REPLACED
5. CHECK NOZZLES & THRE	LEAKING [	LEADED 🔲	DAMAGED	27. BEARING HOUSING BOLTS	ок 🔲	N/A 🔲	REPLACED
				28. HOUSING COVER	ox □	NA 🔲	REPLACED 🗌
& LUBRICATE HYDRANT	YES 🗗	_	NOT REQUIRED	29. HOUSING COVER BOLTS	ок 🔲	N/A 🔲	MEPLACED [
				30. BEARING HOUSING SEAL(S)	ok 🛚	N/A 🔲	REPLACED [
7. LUBE SCREW	ox 🗹	MISSING 🔲	REPLACED [	31. UPPER OPERATING ROD	ox □		REPLACED 🔲
	0 -	100	· · · · · · · · · · · · · · · · · · ·	82. LOWER OPERATING ROD	ox □		REPLACED
& FLOWTEST	<u> </u>	TOT	U9GPM	39. ROD COUPLING	ox 🛘	N/A 🔲	PEPLACED (
	00 _ PBG		FAILED []	34. COUPLING BOLTS	ox □	N/A 🔲	REPLACED []
9. PRESSURETEST 6_4	OU PBIG	PASSED 🗗	PACED	36. LOWER ROD NUT(S)	ox 🔲		REPLACED [
00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	YES 🗌	COLOUR		36. LOWER ROD STOP PINPLATE	ok □	NYA 🔲	MEPLACED [
10. COLDURCODED	NO 🗗			87. VALVE BALL SEAL(S)	ox □	NA 🗆	PEPLACED [
	YES 🗆	colour_		30. VALVE BALL BOTTOM	ox □	· · · · · · · · · · · · · · · · · · ·	MEPLACED [
11. HYDRANT PAINTED	100			39. VALVE BALL RUBBER	ox □		MEPLACED
12. HYDRANTPUMPED OUT	YES 🗆		±6 □	40. VALVE BALLTOP	<u> </u>	N/A 🗆	REPLACED [
12. HIDRON FORFEDOO!	NVA 🖸			41. MAIN VALVE SEAT	<u>ок 🗌</u>		REPLACED
13. GROUNDFLANGE	SAFETY	BLIANED [	LEAKING 🖸	42. MAIN VALVE SEAT BEAL(S)	ox 🛘		REPLACED [
13. GHOSNOFEMBE	somo 🖪	NA 🗆	DAMAGED LL	43. DRAINVALVE	<u> </u>		REPLACED [
14. REQUIRES BARREL EXT	PATTION		NA 🗆	44. DRAINVALVE SEAL(S)	<u> </u>		REPLACED [
14. HEGOMESON/FEEEDA				45. DRAINVALVE PORT(S)	ox □	CLEARED .	PREPLACED [
15. PUMPER NOZZLE	YES 🖳		TYPE	48. DRAINVALVE COTTER PIN(5)	ox □	N/A 🗆	PEPLACED [
ID. FOR DIVOLEZ	№ 🖸			47. LOWER BARREL	ox □		REPLACED [
16. NOZZLE ORIENTATION	∞ 🗹		IMPROPER 🔲	48. LOWER BARREL FLANGE(S)	ox □	M* 🗆	REPLACED [
76. 110220. 0-12-17				49. UPPER BARREL	ox 🗀		REPLACED [
17. TDAFFIS CULARDS	· oĸ 🛄	NA 🗹		50 UPPERBAPREL FLANGE(S)	<u> </u>	- NA 🗆	REPLACED [
	DAMAGED			51. BARRELEXTENTION(\$)	<u>ox</u>	NA 🛄	REPLACED
SERVICED BY:	W/	- <sub>1</sub> /		E2. PLANGE GASKET(S)	<u>∝ □</u>	MA L	REPLACED
7-1				53. PLANGE BOLTS	ox □	- NA 🗆	MEPLACED []
	100			54. BOOT	ox □	<u>₩</u> □	REPLACED
CUSTOMER REPRES	ENTATIVE:			56. NOZZLE(S)	ox □	RECAULIED	PREPLACED
				56. NOZZLE CAP(8)	ox □		REPLACED
		····	<del></del>	87. NOZZLE RETAINER(8)	ox 🔲	NA 🗌	MEPUACED LI
COMMENTS:				50. THES	ox □		
		···		59. UTHER	ox 🗆		
				<b>60</b> 、200maが	ox 🗆		
	•			<b>61.</b> CTHER	ox □		
				62. OT ES	oĸ □		
*				<b>63.</b> OTHER	ok 🗀		ليا ا







- 1 II ± 5	HYDRANT LOCATION:	4/	Indo	Parille
CUSTOMER NAME: Oranto Metro Loo	2	<u>^ 9</u>	L.MOLO	anna
SERVICE ADDRESS: 36/A Old Finch Ave	HYDRANT MAKE: /50/			
Scarbonniah	DATE: 1)00 21/98			·
ANNUAL PREVENTATIVE MAINTENANCE (APM)	ADDITION	IAL W	ORK	
C (290 D	18. BONNETCOVER	ox □	N/A 🗆	REPLACED [
1. SECONDARY VALVE LOCATED NOT VISUALE NOPERABLE	19. BONNETBOLTS	<u> </u>	N/A 🗆	REPLACED [
OK DE LEAKING	20. BONNET	<u> </u>		REPLACED
2. HYDRANTOPERATION OL DIFFICULT NOPERABLE	21. BONNETSEAL	ок 🗆		REPLACED
3 CHECK BARREL FORWATER WET AMT. OF WATER	22. OPERATING NUT	ок 📙	N/A []	REPACK
DRY 7	23. OPERATING NUT O-PING(5)	ox □	N/A 📙	REPLACED [
4. CHECK CAP GASKETS OK PEPLACED	24. STUFFING BOX	ox □	NVA 🗆	REPLACED
	25. THRUSTBEARING	ox □	NYA 🖸	REPLACED
6. CHECK NOZZLES & THREADS ON THE STATE OF T	26. BEARING HOUSING	<u>∝ □</u>	N#A 🗆	REPLACED [
LEAKING LEAKING D LEADED DAMAGED	27. BEARING HOUSING BOLTS 28. HOUSING COVER	<u>∝ □</u>	NA 🗆	REPLACED
& LUBRICATE HYDRANT YES NOT REQUIRED	29. HOUSING COVER BOLTS	<u>∝ □</u>	NA 🗆	REPLACED
	30. BEARING HOUSING SEAL(S)	oĸ □	N/A 🔲	PEPLACED
7. LUBE SCREW OK A MESSING PEPLACED	31. UPPER OPERATING ROO	<u>∝</u> □		REPLACED [
	32 LOWER OPERATING ROD	ox 🗆		REPLACED (**
a FLOWTEST 36 PITOT 110 USGPM	23. ROD COUPLING	ox 🗆	N/A	PEPLACED
	34. COUPLING BOLTS	ок 🔲	N/A 🔲	REPLACED
9. PRESSURE TEST & LOC PSIG PASSED FAILED .	36. LOWER ROD NUT(8)	ок □		REPLACED
YES COLOUR	36. LOWER ROD STOP PINPLATE	ox 🗆	N/A	REPLACED
10. COLOUR CODED YES COLOUR COLOUR	37. VALVE BALL SEAL(S)	ок 🛚	N/A 🔲	REPLACED
YE9 🗆 COLOR	36. VALVE BALL BOTTOM	ox □		REPLACED [
11. HYDRANT PAINTED NO COLOUR	39. VALVE BALL PUBBER	ок□		REPLACED [
VER C NO C	40. VALVE BALL TOP	ox □	N/A 🗆	REPLACED [
12. HYDRANT PUMPED OUT NA .	41. MAIN VALVE SEAT	ox □		REPLACED .
13. GROUNDFLANGE SAFETY BURNED LEAKING	42. MAIN VALVE SEAT SEAL(S)	ок 🗆		REPLACED [
13. GROUNDFLANGE SOLID ANA DAMAGED	43. DRAINVALVE	ox □		REPLACED [
14 REQUIRES BARREL EXTENTION NA	44. DRAINVALVE SEAL(S)	<u> </u>		MEPLACED [
14. HEQUIRES BAPFEL EXTENTION	46. DRAINVALVE PORT(S)	ox 🗆	CLEARED	REPLACED [
15. PUMPER NOZZLE YES	48. DRAINVALVE COTTER PIN(S)	_ox □	NVA 🗌	PEPLACED [
NO E	47. LOWER BARREL	oĸ □		PEPLACED
16. NOZZLE ORIENTATION OK 2 IMPROPER	48. LOWER BARRISL FLANGE(8)	<u> </u>	NA 🗆	REPLACED
	49. UPPER BARREL	ok □	F7	REPLACED   REPLACED
17. TRAFFIC BOLLARDS OK A TOOCLOSE	50 UPPERBARREL PLANGE(S)	ox □		PEPLACED
DAMAGED [	51. SARREL EXTENTION(S)	ox □	NA D	REPLACED [
SERVICED BY:	52. PLANGE GASKET(8)	<u>∝ □</u>	N# D	PEPLACED [
The Contraction of the Contracti	83. PLANGE BOLTS	ox □		REPLACED
	54. BOOT 55. NOZZLE(S)	ox 🗆	PASCAULICED [	REPLACED [
CUSTOMER REPRESENTATIVE:	56. NOZZLE(S)	ok 🗆		MEPLACED [
	57. NOZZLE RETAINER(S)	ок 🗆		REPLACED
A de la lace	88. 07HZH	ok 🗆		
COMMENTS: Suprant Mas MUNICI	<b>39.</b> 2014€	ок 🗆		
leak at viring bland.	<b>60.</b> (2006)	ок 🗌		
year ou grown grown.	81. OTHER	ox 🗆	]	
/ /	<b>62.</b> OTHES	ок 🗀	)	
	<b>63.</b> • OTHER	ox E	)	

HYDRANT OPERATION SATISFACTORY HYDRANT OPERATION DEFICIENCY



## A-1 HYDRANT SERVICES LTD.



CUSTOMER NAME:	ranto)	Metro 20	Ю	HYDRANT LOCATION:	th d	Appen (	ruco Elep
SERVICE ADDRESS: 3	WIA O	W Finch	Ave	HYDRANT MAKE:	tury	<i>V</i> /	
		Scarlo	orion	DATE: ALC 21975			
ANNUAL PREV	ENTATIVE	MAINTENANO	CE (ÁPM)	ADDIT	IONAL W	ORK	-
1. BECONDARY VALVE	LOCATED	OK	CLOSED []	18. BONNETCOVER  19. BONNETBOLTS	ox □	NA 🗆	REPLACED   REPLACED
<del></del>			<del></del>	20. BONNET	ox □		REPLACED
2. HYDRANT OPERATION	or []	OK []	LEAKING []	21. BONNET SEAL	ox □		REPLACED [
		<del></del>		22. OPERATING NUT	<u>∞. □</u>		REPLACED [
3. CHECK BARREL FOR WAT	TER WET	AMT, OF WATER	<del></del>		<u> </u>	N/A 🔲	REPACK [
	DRY 🖸			23. OPERATING NUT O-RING(S)	ox □	NKA 🗆	REPLACED
4. CHECK CAP GASKETS	ox [2]		REPLACED 🔲	24. STUFFING BOX	ox □	N/A 🗆	REPLACED
		<u></u>		28. THRUST SEARING	ox □	NVA 🗆	REPLACED [
5. CHECK NOZZLES & THRE	ADS OK 🗹	R/8 🖳	LOOSE [	26. BEARING HOUSING	ox 🗆	N/A 🗆	REPLACED
	LEAKING 🗆	LEADED []	DAMAGED L	27. BEAFING HOUSING BOLTS	<u>∝ □</u>	NKA 🗆	REPLACED []
6. LUBRICATE HYDRAMT	YES 🗗		NOT REQUIRED 🔲	28. HOUSING COVER	<u> </u>		REPLACED [
		<u></u>		29. HOUSING COVER BOLTS	ox □	NA 🗆	REPLACED
7. LUBE SCREW	ox 🖽	MISSING 🔲	PREPLACED 🔲	30. BEARING HOUSING SEAL(S)	<u> ∝ □</u>	- Tex C	PREPLACED
				31. UPPER OPERATING ROO	ox □		REPLACED []
a. FLOWTEST	<i>О</i> епо	от. <u></u>	USGPM	32. LOWER OPERATING ROO	<u> </u>	NVA 🗆	MEPLACED
# 100011ED:				33. ROD COUPLING	<u> </u>	NYA 🗆	REPLACED []
9 PRESSURETEST C	//	PASSED 🗔	FAILED 🔲	34. COUPLING BOLTS	ox □		REPLACED [
				35. LOWER ROD NUT(S)	<u>ox □</u>	NVA 🔲	PEPLACED [
10. COLOUR CODED	YES   NO	COLOUR		36. LOWER ROD STOP PINPLATE	<u> </u>	NA 🗆	REPLACED
<u> </u>				37. VALVE BALL SEAL(S)	ox □	MAX L.	PEPLACED
11. HYDRANT PAINTED	YES D	COLOUR		38. VALVE BALL BOTTOM	<u>∝ □</u>		REPLACED
				39. VALVE BALL RUBBER	<u> </u>	NA 🗆	REPLACED [
12. HYDRANT PUMPED OUT	YES 🗗		.0 □	40. VALVEBALL TOP	ox □	· · · · ·	REPLACED
	NA L			41. MAIN VALVE SEAT	ox □	<del>,</del> _	REPLACED
13. GROUND FLANGE	SAFETY	BUPHED	JAKNS []	42. MAIN VALVE SEAT SEAL(8)	ox □		MEPLACED [
	9000	LI AW	38/1-222 2	49. DRAINVALVE	<u> </u>		REPLACED [
14. REQUIRES BARREL EXTE	ENTION		NA 🗆	44. DRAINVALVE SEAL(S)	ox □	CLEAPED []	MEPLACED
				48. DRAINVALVE PORT(8)		<u> </u>	REPLACED [
15. PUMPER NOZZLE	YES D	•	TYPE	46. DRAINVALVE COTTER PIN(8)	<u>∝ □</u>		REPLACED _
		4		47. LOWER BARREL	ox □	N/A 🔲	REPLACED [
16. NOZZLE ORIENTATION	ок 🖾		MPPCPER	48. LOWER BARREL FLANGE(S)	 ∞. □		REPLACED [
				40. UPPERBARREL	ox □	NA 🗆	REPLACED [
17. TRAFFIC BOLLAROS	ox 🔲	N/A 🗗	TODGLOSE LJ	60 UPPER BARREL FLANGE(S)	<u> </u>	N/A 🗆	REPLACED [
	DAMAGED L		<del>)                                    </del>	51. BARREL EXTENTION(S)	ox □		REPLACED [
SERVICED BY	H	0 /		82. FLANGE GASKET(8)	<u>∝ □</u>		REPLACED [
	1n/6			ES. FLANGE BOLTS	<u> </u>		REPLACED
	V			84. BOOT	<u> </u>		REPLACED [
CUSTOMER REPRESE	ENTATIVE:			\$6. NOZZLE(S)	ox □		REPLACED [
				66. NOZZLE CAP(8)	<u>∝ □</u>		REPLACED [
				57. NOZZLE RETAINER(S)	<u>ox</u> □	·	<del>                                      </del>
COMMENTS:				58. STAER	ox □		(
	<del> </del>			<b>69.</b> ○THER	ok 🗆		
<u> </u>				60. (3THER)	<u>ок</u> []	***	
				61. CTHER	ok [		
	<del></del>			62. 574ER	ox 🗀		
				<b>€3.</b> ⊃THES	<u> </u>	<u> </u>	







							<del>-/</del>
CUSTOMER NAME: Ton	onto	Metro	200	HYDRANT LOCATION:	utsid.	e gou	Us da
SERVICE ADDRESS: 3/	111	Old Fin	ch Ave	HYDRANT MAKE: RST	13	/	
	<u></u>	Searlo	roud-	DATE: Dec 219	8		
ANNUAL PREVEN	ITATIVE			ADDITIO	ONAL WO	RK	
				18. BONNET COVER	ок 🛘	NA 🗆	REPLACED [
SECONDARY VALVE LOC	CATED	OK 🗆	OLOSED LL	18. BONNETBOUTS	<u>∞.</u> □	NA D	REPLACED [
<u> </u>		ox 🗆	LEARCIG [2	20. BONNET	ox 🗌		REPLACED [
	or []	DIFFICULT [	DEFERENCE T	21. BONNET SEAL	ox □		REPLACED 🗌
	WET 🗆 🦯	AMT, OF WATER		22. OPERATING NUT	ox 🗆		REPLACED [
	DRY 🗹			23. OPERATING NUT O-RING(8)	ox 🔲	N/A 🔲	REPACK [
		<u> </u>		24. STUPFING BOX	× □	N/A 🔲	REPLACED [
4. CHECK CAP GASKETS	ок 🗹	_	REPLACED	25. THRUST BEARING	o× □	N/A 🔲	REPLACED [
			Z 576 7	28. BEARING HOUSING	ок 🔲	NA 🗆	REPLACED [
5. CHECK NOZZLES & THREADS	OAK 🗹 KING 🔲	RS U	LODSE LL CARLAGED LL	27. BEARING HOUSING BOLTS	ox □	N/A 🔲	REPLACED [
LEAM	~~ <u> </u>	LEADED []		28. HOUSING COVER	× □	N/A 🔲	REPLACED [
6. LUBRICATE HYDRANT	YES 🗹	_	NOT REQUIRED 🔲	29. HOUSING COVER BOLTS	ox □	NA 🗆	PEPLACED [
				30. BEARING HOUSING SEAL(S)	ox □	NVA 🗆	REPLACED [
7. LUBE SCREW	ox 🗖	MISSING 🔲	REPLACED 🗌		<u> </u>		PEPLACED [
			<u> </u>	31. UPPER OPERATING ROD	<del></del>		REPLACED .
8 PLOWTEST 2+	PIT	or 9/2/	2USGPM	32. LOWER OPERATING FIOD			
6 PLONIESI				33. ROD COUPLING	ox □	NVA 🛄	REPLACED (
PRESSURETEST 6	PSIG	PASSED 🔲	FAILED -	34. COUPLING BOLTS	<u> </u>	N/A 🗆	REPLACED [
, FRESSORE 1EST			····	36. LOWER ROD NUT(S)	× □		REPLACED
10. COLOUR CODED	YES 🔲 🖊	COLOUR_		36. LOWER ROD STOP PIN/PLATE	<u> </u>	N/A 🗌	REPLACED _
	NO E			37. VALVE BALL SEAL(S)	ok 🗆	N/A 🗌	REPLACED L
44 LA/DD44/TD49/TED	YES 🗆 🦯	COLOUR		30. VALVE BALL BOTTOM	ox □		REPLACED _
11. HYDRANT PAINTED	NO 🛮			39. VALVE BALL PIUBBER	ox □		REPLACED
A LANDUATO BIOTO OIT	YES 🗆		*:0 □	40. VALVEBALLTOP	ok 🗆	NYA 🔲	REPLACED [
12. HYDRANT PUMPED OUT	N/A			41. MAIN VALVE SEAT	ок□		REPLACED [
- 045	FETY 🗆	BURIED 2	LEA-SNG L	42. MAIN VALVE BEAT SEAL(S)	<b>ж</b> 🗆		REPLACED [
		N/A 🗆	DAMAGED 🗀	43. DRAINVALVE	∞ □		REPLACED [
			🗖	44. DRAINVALVE SEAL(S)	ox □		REPLACED [
14. REQUIRES BARREL EXTENTION	Ν	··	NVA L.J	45. DRAINVALVE PORT(S)	ок 🗀	CLEARED [	PEPLACED [
	YES 🔲			46. DRAINVALVE COTTER PIN(S)	ok 🗋	N/A 🗆	REPLACED [
15. PUMPER NOZZLE	× 2		TYPE	47. LOWER BARREL	<u>ок П</u>		REPLACED [
				48. LOWER BARREL FLANGE(S)	ox □	N/A 🗆	PREPLACED [
16. NOZZLE OPIENTATION	ок 🗷		WARCHER 🗌	49. UPPERBARREL	ox □		REPLACED [
<u> </u>				50 UPPERBARREL FLANGE(S)	<u> </u>	NA 🗆	REPLACED [
17. TRAFFIC BOLLAROS	OK □ \G <b>E</b> 81□	NA 🗆	accorose 🖸		ox □	NA 🗆	REPLACED [
	77	-1		51. BARREL EXTENTION(S)	<u> </u>		REPLACED [
SERVICED BY:	+	1/_	)	52. FLANGE GABGET(S)			
	$Y \wedge \mathcal{N}$	19		63. FLANGE BOLTS	ox ∐_	N/A	
				54. BOOT	<u>∞ □</u>	N/A 🔲	
CUSTOMER REPRESENT	ATIVE:			55. NOZZLE(8)	ox □	RECAULKED	PEPLACED [
				68. NOZZLE CAP(S)	OK []		MEPLACED L
<del></del>		<del>-/</del>	<del></del>	87. NOZZLE RETAINER(S)	ox · □	NVA 🔲	PEPLACED [
COMMENTS:	ant	UNKA	when	58. (CTHOR)	ox □		
1 1 7 7 7 7 7	~~	1		50. 37 -는 뉴	<u> </u>	<u>.</u>	
1 Mu cha	NOOD	Χ,		<b>60.</b> (77-52)	<u> </u>		
1	/			81. ****e=i-	ox 🗆		
<u> </u>				62. DOME	ok 🛘		
				<b>63</b> , (279:57)	ож 🗆		





STOMER NAME: Tozonto Metro Zon	HYDRANT LOCATION: West side of African
RVICE ADDRESS: 3/0/4 Old Finch A	e HYDRANT MAKE: CENTURY
Scarborough	DATE: Dec 21/98
ANNUAL PREVENTATIVE MAINTENANCE (APM)	ADDITIONAL WORK
SECONDARY VALVE 2 S/W OK CLOSE	
LOCATED NOTVISIBLE INOPERABLE	TIL BUTCHELLE
HYDRANTOPERATION ON DIFFERUIT O NOFERAGE	2. 5046)
	21. BOWE 1851
CHECK BARREL FORWATER WET AMT. OF WATER	
DRY	23. OPENAINGNOTOWNO(S) ON CO. NO. CO.
CHECK CAP GASKETS OK 2 REPLACE	
	THE PERSONNELLE CON TO NOT REPLACE
CHECKNOZZLES & THREADS ON RS LCCS	27. BEARING HOUSING BOLTS OK   NIA   REPLAC
LEAGING LEADED B DAMAGE	28. HOUSING COVER OK NA REPLAC
LUBRICATE HYDRANT YES AND NOT REQUIRE	M. 1000H0001D1
	30. SEARING HOUSING SEAL(S) OK NA REPLAC
7. LUBE SCREW OK A MISSING ARPLACE	
	32. LOWER OPERATING ROO OK . REPLAC
A FLOWTEST 49 PITOT 91 U	PM 33. ROD COUPLING OK N/A PEPLAC
	AL COURS POR COURS ON TO NA TO REPLAY
PRESSURETEST C HO PSIG PASSED FALE	36. LOWER ROD NUT(S) OK C PEPLA
YES COLOUR	36. LOWER ROD STOP PINPLATE OK NA REPLA
0. COLOURCODED YES COLOUR COLOUR	37. VALVE BALL SEAL(S) OK NA REPLA
MES []	38. VALVE BALL BOTTOM OK . REPLA
1. HYDRANT PAINTED NO (COLOUR	39. VALVE BALL RUBBER OK
A AMPRIANT DI MIRES COUT YES D	40. VALVE BALL TOP OK NA REPLA
2 HYDRANT PUMPED OUT NA	41. MAIN VALVE SEAT OK . REPLA
1 GROUND FLANGE SAFETY D BUFFLED D LEAKS.	42. MAINVALVE SEAT SEAL(S) OK . REPLA
3. GROUND FLANGE SOUD AWAGE	
A CONTRACTOR OF THE CONTRACTOR	44. DRAINVALVE SEAL(S) OK C REPLA
4. REQUIRES BARREL EXTENTION	45. DRAINVALVE PORT(S) OK CLEARED REPLA
S PHAPPER NOZZI E YES TYPE	48. DRAINVALVE COTTER PIN(S) OK
5. PUMPER NOZZLE NO D	47. LOWER BARREL OK A REPLA
6. NOZZLE ORIENTATION OK S	48. LOWER BARRIEL FLANGE(8) OK NA REPLA
U TOUR CONTINUES ON SE	49. UPPER BARREL OK N REPLA
7. TRAFFIC BOLLARDS OK NA TOOCLOS	50 UPPERBARRIEL FLANGE(8) OK NA NA PEPLA
DAMAGED	51. BARRELEXTENTION(8) OK NA PEPLA
RVICEOBY	52. FLANGE GASKET(8) OK NA REPLA
' $//X/W/$	S3. FLANGEBOLTS OK NA REPLA
- / XV/ -	
USTOMER REPRESENTÀTIVÉ:	
	36. NOZIZOW(3)
	- 0. ADDICATION - 0
OMMENTS:	
	62. OT €5 OK □





USTOMER NAME: //	ment.	Miton	Oras Caro	HYDRANT LOCATION:	ith of	Adrica	m Mc/		
ERVICE ADDRESS:	21.14	ALD Fine	440	HYDRANT MAKE: M	7 1	7			
	Sleif (	Jana.	ATMIA.	DATE: Der, 2/98	<u>'</u>				
	/=> == A == 1		orough	ADDITIONAL WORK					
ANNUAL PRE\	/ENTATIVE	MAINTENANC	E (APIVI)				REPLACED		
1. SECONDARY VALVE		∝ <u>□</u>	CLOSED 🔲	18. BONNET COVER	<u> </u>	N/A 🗆	REPLACED [		
	LOCATED	NOTVISIBLE 2	INCPERABLE [	19. BONNET BOLTS	ox □ ox □	NA L	REPLACED [		
2. HYDRANT OPERATION	OR 🖸	ox 望	LEAKING	20. BONNET	<u> </u>		REPLACED [		
2 110/04/10/2/2/2/2/2	or 🗆	DIFFICULT [	NOPERABLE	21. BONNETSEAL	<u>∝ □</u>	·	REPLACED [		
3. CHECK BARREL FORWA	TER WET	AMT. OF WATER		22. OPERATING NUT		NA 🗆	MEPACK [		
	DRY 📑			23. OPERATING NUT O-PING(S)	<u>∝ □</u>	N/A 🔲	REPLACED [		
4. CHECK CAP BASKETS	ox 🗹		REPLACED [	24. STUFFING BOX 25. THRUST BEARING	ox □	N/A 🗆	REPLACED		
T. Gricon Control					ox □	N/A 🗆	REPLACED		
5. CHECK NOZZLES & THRE	EADS ON	MS 🖸	LCCSE =	26. BEARING HOUSING 27. BEARING HOUSING BOLTS	<u>∝ □</u>	N/A 🖸	REPLACED [		
U. U	LEAKING 🗆	LEADED .	DAMAGED		<u>∝ □</u>	NA D	REPLACED		
6. LUBRICATE HYDRANT	YES 🗗		NOT REQUIRED 🔲	28. HOUSING COVER	ox □	- NA []	REPLACED		
U. LODINOVIC HISIMIII				29. HOUSING COVER BOLTS	<u> </u>	NVA D	REPLACED [		
7. LUBE SCREW		MISSING 🗆	REPLACED [	30. BEARING HOUSING SEAL(S)	<u> </u>		REPLACED		
7. LUBE SCHEW				31. UPPER OPERATING ROD	<u> </u>	<u></u>	REPLACED [/		
FLA	wed a	TOT	USGPM	32. LOWER OPERATING ROD	ok □	NYA 🔲	REPLACED		
a FLOWTEST LAC	<u> </u>	101		33. POD COUPLING	ox □	NA 🗆	REPLACED [		
PRESSURE TEST 6	35 P8KG	PASSED 🖸	FAILED []	34. COUPLING BOLTS	∝ □		REPLACED [		
s. PRESSURE IES: W.L.				36. LOWER ROD NUT(8)	 ox □	N/A 🔲	REPLACED [		
10. COLOURCODED	YES	COLOUR		36. LOWER ROD STOP PINPLATE		NA 🗆	REPLACED [		
	NO 🛭			37. VALVE BALL SEAL(S)	ox □		REPLACED [		
11. HYDRANT PAINTED	YES 🖳	ca.oup		38. VALVE BALL BOTTOM	<u> </u>		REPLACED [		
vi. Interpretti sutres	NO 🖸			39. VALVE BALL RUBBER		N/A 🔲	REPLACED [		
12. HYDRANTPUMPED OUT	YES 🖳		100 E	40. VALVEBALLTOP	<u> </u>		REPLACED [		
	N/A LT			41. MAIN VALVE SEAT	ox □		REPLACED [		
13 GROUND FLANGE	SAFETY 🔲	BURKED [	LEAKING	42 MAIN VALVE SEAT SEAL(S)	ox □		REPLACED [		
13: 0:00:00	<b>\$</b> OU0 🗆	N/A 🗆	DAMAGED	43. DRAINVALVE			REPLACED [		
14. REQUIRES BARRELEXT	TENTION		NA 🗆	44. DRAINVALVE SEAL(S)	<u> </u>	CLEARED	REPLACED [		
THE PROPERTY AND ADDRESS OF THE PARTY AND ADDR				45. DRAINVALVE PORT(8)	o× □	CLEARED	REPLACED		
15. PUMPER NOZZLE	YES 🖳		TYPE	46. DRAINVALVE COTTER PIN(S)	ox □		REPLACED		
	ио 🖸			47. LOWER BARREL	oĸ □	🗅			
16. NOZZLE ORIENTATION	∞ D		IMPROPER 🔲	48. LOWERBARREL FLANGE(S)	ox □	N/A 🔲	REPLACED		
TO PROZEE CHIEFFINITOR				49. UPPERBARREL	ox □	🖸	REPLACED		
17. TRAFFIC BOLLARDS	ox □	NA E	TOO CLOSE 🗍	50 UPPER BARREL FLANGE(S)	oĸ □	- NA []	REPLACED		
17. IMITIO BOOLD 103	DAMAGED .			51. BARREL EXTENTION(8)	<u> ∝ □</u>	N/A []	REPLACED [		
SERVICED BY.	7	<b>1</b>		52 PLANGE GASKET(S)	ok ∐	NA L			
	1/20			II. FLANGEBOLTS	ox □	NA U	REPLACED		
				54. BOOT	ox □	N/A 🔲	REPLACED		
CUSTOMER REPRES	ENTATIVE:			66. NOZZLE(S)	ox [_]	RECAULKED	REPLACED (		
				66. NOZZLE CAP(S)	<u> </u>		REPLACED		
				57. NOZZLE RETAINER(8)	<u> </u>	N/A 🔲	PEPLACED		
COMMENTS:				58. STHUB	<u>∝ □</u>				
			- <del></del>	<b>59.</b> (**=4.6-	ox □_				
				<b>60.</b> (376)=6	ox □				
<u></u>	<u></u>	<u> </u>		<b>01.</b> (77 <del>-3</del> 4)	<u> </u>				
				<b>65</b>	o× □				
				49 - Mes <sup>207</sup>	ox □				



1	7
(	イノ
	./

HYDRANT LOCATION:
DATE:   DEC 2   98
ANNUAL PREVENTATIVE MAINTENANCE (APM)  1. BECONDARY VALVE
18. BONNET COVER
1. SECONDARY VALVE
LOCATED   NOT VISIBLE     INC PERABLE     19. SONNET SOLTS
2. HYDRANT OPERATION OR OL DIFFICULT NOPERABLE 21. BONNET SEAL OK REPLACED  2. CHECK BARRIEL FOR WATER WET AMT. OF WATER 22. OPERATING NUT ORNORS OK NA REPLACED  4. CHECK CAP GASKETS OK REPLACED 23. OPERATING NUT ORNORS OK NA REPLACED  5. CHECK NOZZLES & THREADS OK REPLACED 24. BEARING HOUSING OK NA REPLACED  6. LUBRICATE HYDRANT YES NOT REQUIRED 25. HOUSING COVER BOLTS OK NA REPLACED  20. BONNET OK REPLACED  21. BONNET SEAL OK REPLACED  22. OPERATING NUT ORNORS OK NA REPLACED  23. OPERATING NUT ORNORS OK NA REPLACED  24. BEARING HOUSING BOX OK NA REPLACED  25. THRUST BEARING OK NA REPLACED  26. HOUSING COVER BOLTS OK NA REPLACED  27. BEARING HOUSING BOLTS OK NA REPLACED  28. HOUSING COVER BOLTS OK NA REPLACED  29. HOUSING COVER BOLTS OK NA REPLACED  30. BEARING HOUSING SEALIS) OK NA REPLACED  30. BEARING HOUSING SEALIS) OK NA REPLACED  30. BEARING HOUSING SEALIS) OK NA REPLACED  30. BEARING HOUSING SEALIS) OK NA REPLACED
2. HYDRANT OPERATION  OL.   DIMPROULT   MOREFABLE   21. BONNET SEAL   OK   REPLACED    2. CHECK BARREL FOR WATER   WET   AMT. OF WATER   22. OPERATING NUT   OK   NA   REPLACED    4. CHECK CAP GASKETS   OK   REPLACED   23. OPERATING NUT O-RING(8)   OK   NA   REPLACED    5. CHECK NOZZLES & THREADS   OK   RAS   LOCSE   24. STUPPING BOX   OK   NA   REPLACED    5. CHECK NOZZLES & THREADS   OK   LEADED   LEADED   CAMAGED   27. BEARING HOUSING BOLTS   OK   NA   REPLACED    6. LUBRICATE HYDRANT   YES   NOT REQUIRED   30. BEARING HOUSING SEAL[S)   OK   NA   REPLACED    31. BONNET SEAL
22. OPERATING NUT OK
23. OPERATING NUTO-RING(8) OK
24. STUPPING BOX OK NA PEPLACE  25. THRUST BEARING OK NA PEPLACE  26. THRUST BEARING OK NA PEPLACE  27. BEARING HOUSING OK NA PEPLACE  28. HOUSING COVER BOLTS OK NA PEPLACE  29. HOUSING COVER BOLTS OK NA PEPLACE  29. HOUSING COVER BOLTS OK NA PEPLACE  30. BEARING HOUSING SEAL(S) OK NA PEPLACE  30. BEARING HOUSING SEAL(S) OK NA PEPLACE  30. BEARING HOUSING SEAL(S) OK NA PEPLACE  30. BEARING HOUSING SEAL(S) OK NA PEPLACE
5. CHECK NOZZLES & THRIEADS ON  NS  LOCSE  28. BEARING HOUSING OK  NA  REPLACE  6. LUBRICATE HYDRANT YES  NOT REQUIRED  29. HOUSING COVER BOLTS OK  NA  REPLACE  29. HOUSING COVER BOLTS OK  NA  REPLACE  30. BEARING HOUSING SEAL(S) OK  NA  REPLACE  30. BEARING HOUSING SEAL(S) OK  NA  REPLACE
5. CHECK NOZZLES & THRIEADS OK
5. CHECKNOZZLES& THREADS   LEADED   CAMAGED   27. BEARING HOUSING BOLTS   OK   NA   REPLACE    6. LUBRICATE HYDRANT YES   NOT REQUIRED   28. HOUSING COVER BOLTS   OK   NA   REPLACE    7. BEARING HOUSING COVER BOLTS   OK   NA   REPLACE    8. LUBRICATE HYDRANT YES   NOT REQUIRED   30. BEARING HOUSING SEALIS)   OK   NA   REPLACE    8. LUBRICATE HYDRANT YES   NA   REPLACE    8. HOUSING COVER BOLTS   OK   NA   RE
28. HOUSING COVER BOLTS OK NA REPLACE 29. HOUSING COVER BOLTS OK NA REPLACE 30. BEARING HOUSING SEAL(S) OK REPLACE
29. HOUSING COVER BOLTS OK   NA   REPLACE  30. BEARING HOUSING BEAL(S) OK   NA   REPLACE
CONTRACTOR OF THE PROPERTY OF
7. LUBE SCREW OK MISSING REPLACED 1 11 JOSEPH CONFRATING BOD OK REPLACE
TI. OT ENOUGH TO THE TENE
32. LOWER OPERATING ROO OK REPLACE
8. PLOWTEST OK NA REPLACE
34. COUPLING BOLTS OK NA PEPLACE
9 PRESSURE TEST & PSIG PASSED A FALED 34. COUPLING BOLTS OK A REPLACE
THE COLOUR SECOND STOP PRINTING OK NA REPLACE
10. COLOUR CODED YES COLOUR STATE OF THE PLACE OF THE PLA
YES COLOUR 28. VALVE BALL BOTTOM OK REPLACE
11. HYDRANT PAINTED NO COLOUR. 39. VALVE BALL RUBBER OK NO REPLACE
40. VALVE BALL TOP OK NA REPLACE
12. HYDRANT PUMPED OUT NA 3
BURIED DEAKING 42 MAINVALVE SEAT SEAL(S) OK DEPLACE
13. GROUND FLANGE SOUD NA CONTRACT OATHAGES AS DRAINVALVE OK CONTRACT REPLACE
44. DRAINVALVE SEAL(8) OK REPLACE
14. RECURRES BARREL EXTENTION
15 PLIMPER NOZZLE YES TYPE ST 46. DRAINVALVE COTTER PIN(S) OK NA REPLACE
15. PUMPER NOZZLE NO A7. LOWER BARREL OK NEPLACE
**APROPER [ 48. LOWER BARREL FLANGE(8) OK [] N/A [] REPLACE
16. NOZZLE ORIENTATION OK 2 APROPER 49. UPPERBARPEL OK 1 REPLACE
TODOLOSE   SO UPPERBARRELFIANGE(S) OK   NA   REPLACE
17. TRASPIRESCUARDS DAMAGERY D
SERVICED BY. SE. FLANGE GABKET(8) OK   NA   REPLACE
SS. FLANGEBOLTS OK   NA   REPLACE
SI. BOOT OK NA NA NEPLAC
CUSTOMER REPRESENTATIVE:   86. NOZZLE(S) OK RECAULARD REPLACEMENTS
56. NOZZLECAP(8) OK REPLAC
67. NOZZLE RETAINER(S) OK NA REPLAC
50. CTHES OK □
COMMENTS: 60. THER OK
60. STHER OK [
61. ©™#ER OK □
62 OTHER OK □
<b>63.</b> - 25±55





550 Coronation Dr., Unit # 18 Scarborough, On. M1E 4V1 (416) 282-1665 1-888-349-2493

B 1

CUSTOMER NAME: 70	ronto	Metro	200	HYDRANT LOCATION:	de	dofm	ain tea
SERVICE ADDRESS: 3	Colx	Old Fin	d Ave	HYDRANT MAKE: MU	7	-	
		Searl	ownsh	DATE: DEC 2//99	ζ		
ANNUALPREV	ENTATIVE			ADDITIO	ONAL WO	ORK	
1. SECONDARY VALVE		ox □	CLOSED 🔲	18. BONNETCOVER	ox □	NA 🗆	REPLACED [
	LOCATED	NOTVISIBLE 2	INOPERABLE [	19. BONNETBOLTS	ox 🗆	NA 📙	
2. HYDRANT OPERATION	OR 🗹	ox [2]	LEAKING []	20. BONNET	ox □		REPLACED [
	or 🗀	DIFFICULT [	NOTERALE U	21. BONNETSEAL	<u> </u>		REPLACED [
3. CHECK BARREL FOR WATE	R WET	AMT. OF WATER		22. OPERATING NUT	<u> </u>	N/A 🗌	REPACK [
	DRY 🗗			23. OPERATING NUT O-RING(8)	<u> ∝ □</u>	NYA 🗆	REPLACED [
4. CHECK CAP GASKETS	ок 🗷	,	REPLACED [	24. STUFFING BOX 25. THRUST BEARING	ox □	N/A 🗆	REPLACED [
			<del>/</del>	26. SEARING HOUSING	<u>∞. □</u>	NA 🗆	REPLACED
5. CHECK NOZZLES & THREAD	os ow 🔼	Avs [2]	LOCAS LI	27. BEARING HOUSING BOLTS	ox □	N/A 🗆	REPLACED [
	EAKING [	LEADED 🗌	CAMAGED LL	28. HOUSING COVER	ox □	NYA 🗆	REPLACED [
6. LUBRICATE HYDRANT	YES 🖯		NOT REQUIRED 🔲	29. HOUSING COVER BOLTS	<u>∝ □</u>	NA 🗆	REPLACED [
				30. BEARING HOUSING SEAL(8)		N/A 🗆	REPLACED [
7. LUBE SCREW	ox 🗹	MISSING 🔲	PEPLACED 🔲	31. UPPER OPERATING ROO	<u>∝ □</u>		REPLACED [
		1 - 42		32. LOWER OPERATING ROD	<u>∝ □</u>		REPLACED [
a ROWTEST	<u> </u>	ют <u>1019</u>	USGPM		<u>∝ □</u>	N/A 🔲	REPLACED (
				33. ROD COUPLING	ox □	N/A 🗆	REPLACED
9. PRESSURETEST C.	P8IG	PASSED 🗗	FALED 🗍	34. COUPLING BOLTS	ox □	- NA L	REPLACED [
				35. LOWER ROD NUT(S)	× □	N/A □	REPLACED [
10. COLOUR CODED	YES	COLOUR_		36. LOWER ROD STOP PRIVILATE		NA []	REPLACED [
				37. VALVE BALL SEAL(S)		16V []	REPLACED [
11. HYDRANT PAINTED	YES 🖳	caavr_		38. VALVE BALL BOTTOM	ok □		
	NO 🖾		·- <del></del>	39. VALVE BALL RUBBER	<u> </u>		
12. HYDRANTPUMPED OUT	YES 🖳		:a =	40. VALVEBALLTOP	ox □	N/A 🗌	
	NA 🗗			41. MAIN VALVE SEAT	ox □		
13. GROUND FLANGE	BAFETY D	BUPIED D	E44.3 =	42. MAIN VALVE SEAT SEAL(S)	<u> </u>		REPLACED [
	souo 🗆	N/A 🗆	DAMAGED LLI	43. DRAINVALVE	×		REPLACED [
14. REQUIRES BARREL EXTEN	TION		N/A 🔲	44. DRAINVALVE SEAL(S)	<u> </u>		REPLACED [
				45. DRAINVALVE PORT(S)	<u> </u>	CLEARED [	REPLACED [
15. PUMPER NOZZLE	YES 🔲		TYPE	48. DRAINVALVE COTTER PIN(8)	<u> </u>	N/A 🔲	REPLACED [
	NO 1			47. LOWERBARREL	ox □		REPLACED (
18. NOZZLE ORIENTATION	ox 🗗		менсева 🗀	48. LOWER BARREL FLANGE(S)	<u>∝ □</u>	N/A 🗌	REPLACED [
				49. UPPER BARREL	<u> </u>		REPLACED L
17. TRAFFIC BOLLAROS	ox 🔲	NA 🗗	TOC BLOSE 🔲	50 UPPER BARREL PLANGE(5)	ox 🔲	NA 🗆	REPLACED [
, o	AMAGED 🗆			51. BARREL EXTENTION(S)	ox □	<u> </u>	REPLACED [
ERVICED BY	/		)	52. FLANGE GASKET(S)	<u> </u>	N/A 🗆	REPLACED [
`	IN			53. FLANGE BOLTS	<u> </u>	N/A 🔘	REPLACED {
	1640			54. BOCT	<u> </u>	N/A 🗆	REPLACED [
CUSTOMER REPRESEN	VTATIVE:			58. NOZZLE(S)	<u> </u>	RECAULKED 🗌	PEPLACED [
				66. NOZZLE CAP(S)	<del>ok</del> 🛄		REPLACED [
				57. NOZZLE RETAINER(S)	<u> </u>	N/A 🗆	REPLACED [
COMMENTS:				\$8. 10+@B	o× □		
				59. 카 듀프	ok 🗆		
•				<b>60</b> . 7	<u> </u>		
				<b>61</b> . 선택보다	ox □		
				<b>62</b> . 00% 45 %	ox □		[
				<b>69</b> . 0714g/s	ox □		(

HYDRANT OPERATION SATISFACTORY HYDRANT OPERATION DEFICIENCY





### A-1 HYDRANT SERVICES LTD.



CUSTOMER NAME: Toronto Metro Zoo	HYDRANT LOCATION: Inside Outside holdings
SERVICE ADDRESS: 3(1) A Old Finch	WE HYDRANT MAKE: 2502
Scarbonough	DATE: Dec 2/198
ANNUAL PREVENTATIVE MAINTENANCE (APM	i) ADDITIONAL WORK
	18. BONNETCOVER OK NA REPLACED
1. SECONDARY VALVEOK C CLOSE	
	OK D REPLACED D
2. HYDRANT OPERATION ON DIFFICULT NOTEFALL	
	22. OPERATING NUT OK REPLACED
3. CHECK BARREL FORWATER WET AMT. OF WATER	23. OPERATING NUT O-RING(S) OK NA PEPACK
	24. STUFFING BOX OK NA REPLACED
4. CHECK CAP GASKETS OK A PEPLACE	
	THE REPURED ON THE NAME OF THE PROPERTY OF THE
5. CHECK NOZZLES & THREADS OK AND LEAVING	
BANG LI CEADED LI JAMAGE	28. HOUSING COVER OK NA REPLACED
6 LUBRICATE HYDRANT YES NOT REQUIRE	
	30. BEARING HOUSING SEALIS) OK
7. LUBE SCREW OK MISSING REPLACE	
	32 LOWER OPERATING ROO OK A REPLACED
e PLOWTEST S PITOT 416	USGPM 33. ROD COUPLING SK NA REPLACED
	OW THE SERVICE OF THE
9. PRESSUPETEST & PSIG PASSED FALLE	S6. LOWERROD NUT(S) OK AEPLACED
YES COLOUR	36. LOWER ROD STOP PINPLATE OK   NA   REPLACED
10. COLOUR COOED TES COLOUR	37. VALVE BALL SEAL(8) OK NA REPLACED
YES 🗌 / COOKE	38. VALVEBALL BOTTOM OK REPLACED
11. HYDRANTPAINTED NO COLOUR.	30. VALVE BALL FIUBBER OK . REPLACED .
VE0 □ /	40. VALVE BALL TOP OK NA NA REPLACED
12. HYDRANT PUMPED OUT	41. MAIN VALVE SEAT OK . REPLACED .
13 GROUND FLANCE SAFETY D BURIED D LEAKS	42. MAINVALVE SEAT SEAL(S) OK . REPLACED .
13. GROUND FLANGE BOUTD NA D CAMAGE	ED 43. DRAINVALVE OK REPLACED
	WA . DRAINVALVE SEAL(8) OK . REPLACED .
14. REQUIRES BARREL EXTENTION	45. DRAINVALVE PORT(8) OK CLEARED REPLACED
15 PHARPED NO77/F YES [] TYPE_	46. DRAINVALVE COTTER PIN(S) OK
15. PUMPER NOZZLE NO 3	47. LOWER BARREL OK AEPLACED
16. NOZZLE ORIENTATION OK C	68. LOWER BARRIEL FLANGE(8) OK N/A PEPLACED
16. NOZZLE OPIENTATION OK [L]	49. UPPER BARREL OK REPLACED
17. TRAFFIC BOLLAROS OK AND NA ET TOOCLO	SE 50 UPPERBARRELFLANGE(S) OK NA NA AEPLACED
DAMAGES -	51. BARRELEXTENTION(S) OK NA REPLACED
SEBVICED BY:	62. PLANGE GABKET(8) OK NA REPLACED
- IVXXIA	83. FLANGE BOLTS OK NA REPLACED
	54. BOOT OK NA MEPLACED
CUSTOMER REPRESENTATIVE:	55. NOZZLE(S) OK RECAUUCEO REPLACED
`	84. NOZZLE CAP(8) OK MEPLACED
	57. NOZZLERETAINER(S) OK NA MEPLACED L
COMMENTS: SUID MINT SORES WHEN	1 <del>18. 0 328</del> 3.
- / / / / / / / / / / / / / / / / / / /	59. 35455 OK
July Marsed Gloondary	<u> </u>
The state of the s	61. 0° pt 15
· van van van.	
	65. 以THEE CK [



	, Ibrith American
customer NAME: Torents Metro 200.	HYDRANT LOCATION: West of African MCD
SERVICE ADDRESS: 36 / A Old, Einch Ave	HYDRANT MAKE: M47
Dearbourge	DATE: / DEC 21/98
ANNUAL PREVENTATIVE MAINTENANCE (APM)	ADDITIONAL WORK
1. BECONDARY VALVE OK CLOSED _	18. BONNETCOVER OK NA REPLACED
LOCATED MOTVISIBLE :NOPERABLE	19. BONNET BOLTS OK NA PEPLACED
2 HYDRANTOPERATION OR O OK LEAKING D	20. BONNET OK A REPLACED A
OL DIFFICULTOF STABLE	21. BUNKE1 SEAL
3. CHECK BARREL POR WATER WET AMT. OF WATER	Z. OPDAINGNOI
DRY 🖯	23. OPENING NOT OTHER (3)
4 CHECKCAP GASKETS OK A REPLACED	24. \$10+1NGBOX
4 Check CAP Globel's	25. THRUST BEAUTING
S CHECK NOZZLES & THREADS OK AND THE COURSE THREADS	ZV. BEATHUS TOURS
LEAKING LEAKING LEAKING LEAKING LEAKING LEAKING	27. 60.40.00.00.00.00
8 LUBRICATE HYDRANT YES NOT REQUIRED	20. 1003400075.
6. LUBRICATE HYDRANT YES [] NOT RECOVED []	## TO THE PERSON D
7 LUBE SCREW OK MISSING PREPLACED	30. BECOMMON CONTROL OF THE CONTROL
7. LUBE SCREW OK MISSING MISSING MEPLACED LI	31. OFFICE PARTIES OF
BOWLEST 46 PITOT 1261 USGPM	32. (OMENO-EMINANCE S. D. C. C. C. C. C. C. C. C. C. C. C. C. C.
8. FLOWTEST	3. RECOGNICIO
9. PRESSURETEST C 57 PSIG PASSED FAILED -	3. COPPORTOR
Freedome (ES)	38. LOWERHOOMS(S)
10. COLOURCODED YES COLOUR.	36. COMERHOUSIOP PROPORTE CO. C. C. C. C. C. C. C. C. C. C. C. C. C.
NO LI	37. VALVEDALISCAD)
11. HYDRANT PAINTED YES COLOUR	30. VALVE BALL BOTTON
NO U	01
12. HYDRANT PUMPED OUT YES 110 E	40. VALVEBALL TOP
NA LI	41. MATVACTESSA
13. GROUND FLANGE SAFETY SURED SURED SAFETY	42. MAIN VALVE SEAT SEATIO)
SOLID NA LI DAMAGED LI	43. DAVITALITE
14. REQUIRES BARREL EXTENTION NA	THE SMANNACVE SCALES
	To the state of th
15. PUMPER NOZZLE YES TYPE	
15. PUMPER NOZZLE NO 🖸	
18. NOZZLE ORJENTATION OK 🗵 MPFOPER 🗌	
17. TRAFFIC BOLLARDS OK NA TOOCLOSE	
DAMAGOED	
SERVICED BY:	
CITI /W	
CUSTOMER REPRESENTATIVE:	
	56. NOZZLE CAP(S) CK   NEPLACED    57. NOZZLE RETAINER(S) CK   N/A   REPLACED
COMMENTS:	58. CTHER OK
	80. 7 m/s
	81. 77-99
	62. ეოლი OK □





	,			4		
CUSTOMER NAME: Toronto	Metro 2	200 ,	HYDRANT LOCATION:	outh of	Morth Am	uvican Pa
SERVICE ADDRESS: 3/0/A	Old Fina	Leve	HYDRANT MAKE: Cent	wry_		
	Scarlo	renal	DATE: Dec 2/198	<u> </u>		
ANNUAL PREVENTATIV			ADDITI	ONAL WO	RK	
1/		CLOSED 🔲	18. BONNETCOVER	ок 🗆	N/A 🔲	REPLACED [
1. SECONDARY VALVE LOCATED	OK ☐ NOTVISIBLE ☐	NOPERABLE	19. BONNETBOLTS	ox 🛘	N/A 🔲	REPLACED
		LEAKUNG [	20. BONNET	ox □		REPLACED
2 HYDRANT OPERATION OA C	OK 🖸	INOPERABLE	21. BONNETSEAL	ox □		REPLACED [
	AMT. OF WATER		22. OPERATING NUT	ox □		REPLACED [
3. CHECKBARREL FORWATER WET DRY	AMI. OF WATER		23. OPERATING NUT O-FING(5)	ок 🛚	N/A 🛄	REPACK [
			24. ETUFFING BOX	ок□	N/A 🔲	REPLACED 🔲
4. CHECK CAP GASKETS OK Z	_	PREPLACED [	25. THRUSTBEARING	ок 🔲	N/A 🔲	REPLACED
CHECKANOTTIES A THEFANS OK	RS 🗗	LOOSE [	26. BEARING HOUSING	ox □	N/A 🗆	REPLACED [
5. CHECK NOZZLES & THREADS OF LEAKING	LEADED [	DAMAGED [	27. BEARING HOUSING BOLTS	ок 🔲	NA 🗆	REPLACED [
			28. HOUSING COVER	ox □	NKY 🔲	REPLACED
6. LUBRICATE HYDRANT YES	-	NOT REQUIRED	29. HOUSING COVER BOLTS	ок 🗀	NA 🗆	PEPLACED [
			30. BEAFING HOUSING SEAL(5)	ok □	NKA 🔲	REPLACED .
7. LUBE SCREW OK 🖸	MISSING .	PEPLACED L	31. UPPER OPERATING ROD	ox □		REPLACED
Flowed			32. LOWER OPERATING ROD	ox □		MEPLACED [
8 PLOWTEST COTOCET	PITOT	USGPM	33. ROD COUPLING	ox 🗆	N#A 🗋	REPLACED (
		FAILED [	34. COUPLING BOLTS	o× □	N/A 🗆	REPLACED [
9. PRESSURETEST C 32 PSG	PASSED L	FAILES CS	36. LOWER ROD NUT(S)	<u>ox 🗅</u>		REPLACED [
YES O	COLOUR		36. LOWER ROD STOP PINIPLATE	ox □	N/A	REPLACED [
10. COLOUR CODED NO I			37. VALVE BALL SEAL(S)	ox □	NA 🔲	MEPLACED [
11. HYDRANT PAINTED YES	COLOUPL		36. VALVE BALL SOTTOM	<u> </u>		REPLACED .
11. HYDRANT PAINTED NO C			39. VALVE BALL RUBBER			REPLACED .
12. HYDRANT PUMPED OUT YES		140 🗆	40. VALVE BALL TOP	<u> </u>	NA 🗆	REPLACED [
N/A 🗗			41. MAIN VALVE SEAT	ox □	·	REPLACED
13. GROUND FLANGE BAFETY	BURNED 📙	LEAKING U	42. MAIN VALVE SEAT SEAL(8)	× □		REPLACED [
soup []	NA 🗆	DAMAGED L	43. DRAINVALVE	<u> </u>		REPLACED [
14. REQUIRES BARREL EXTENTION		NA 🗆	44. DRAINVALVE SEAL(S)	ox □	CLEARED	REPLACED
			45. DRAINVALVE PORT(8)	<u> </u>	CLEARED	PEPLACED [
15. PUMPER NOZZLE YES		TYPE	48. DRAINVALVE COTTER PIN(S)	ox □		REPLACED [
мо 🖸	<del>//</del>		47. LOWERBARREL	ox □	NA 🗆	REPLACED [
18. NOZZLE ORIENTATION OK		IMPROPER	49. LOWER BARREL FLANGE(S)	ox □		REPLACED [
			49. UPPER BARREL 50. UPPER BARREL FLANGE(8)	ox □	NA 🗆	REPLACED
17. TRAFFIC BOLLARDS OK DAYAGED D	NA E	TOO CLOSE	S1. BARRELEXTENTION(S)	ox □	NA D	REPLACED [
	-77		82. PLANGE GASKET(8)	ox □	NM []	REPLACED [
SERVICED BY:	601		SI. FLANGE BOLTS	ox 🗆	NMA 🗆	REPLACED [
TO YOU			S4. BOOT		N#A 🔲	REPLACED [
			55. NOZZLE(S)	ox □	RECAULKED	REPLACED
CUSTOMER REPRESENTATIVE:			SA. NOZZLE CAP(S)	ок 🗀		MEPLACED
,			67. NOZZLE RETAINER(8)	ок 🗆	NA 🗆	MEPLACED [
	411 401	6.0 100	SA COMES	ox □		
COMMENTS: SICONAL	ry var	ve surge	<b>80.</b>	ox □		
in MOM ANTI	tom	U	<b>60.</b> (20)HER	ox 🗀		
wi open pour			81. OTHER	ox 🗆		
į , ,			62. OTHER	ox 🗌		
		·····	<b>63.</b> OTHER	ok 🗀		
			S. Ottes	<u> </u>	<u> </u>	





					7 -		7/-	
CUSTOMER NAME: 10	roto	Metro	200_	HYDRANT LOCATION:	E of	Specie	el Frent	
SERVICE ADDRESS: 2	GLA	Old Fin	ch Agre	HYDRANT MAKE: 350	B			
		Searl	oronal	DATE: Dec 21/96	2			
ANNUAL PREV	ENTATIVE		-	ADDITIONAL WORK				
	2'east	ox E	CLOSED 🗍	18. BONNETCOVER	ок□	N/A 🗌	MEPUACED [	
1. SECONDARY VALVE	LOCATED	NOTABLE []	NOPERABLE [	19. BONNETBOLTS	ok 🗆	N/A 🔲	REPLACED [	
	0# []	ox 🖸	LEAKING [	20. BONNET	ok 🛘		REPLACED [	
2 HYDRANTOPERATION	or 🗀	DIFFICULT [	INOPERABLE	21. BONNETSEAL	ox □		REPLACED .	
	, WET .	AMT. OF WATER		22. OPERATING NUT	<u>∝ □</u>		PEPLACED [	
3. CHECK BARREL FOR WATE	DRY 2			23. OPERATING NUT O-RING(S)	ox □	NVA 🔲	PIEPACK [	
				24. STUFFING BOX	ox □	NYA 🔲	REPLACED _	
4. CHECK CAP GASKETS	ox 🗹	/	REPLACED [	25. THRUST BEARING	ox 🗀	N/A 🗌	REPLACED	
	ns ox 🗹	PAS 🗹	LOOSE	26. BEARING HOUSING	ox □	N/A 🔲	PEPLACED [	
5. CHECK NOZZLES & THREA	DS CAN CO	LEADED []	DAMAGED 🔲	27. BEARING HOUSING BOLTS	ox □	N/A 🗌	REPLACED	
				28. HOUSING COVER	ox □	N/A 🗆	REPLACED [	
6. LUBRICATE HYDRANT	YES 🗗	_	NOT REQUIRED	29. HOUSING COVER BOLTS	ок 🗀	N/A 🗆	REPLACED [	
				30. BEARING HOUSING SEAL(S)	ox 🗆	N/A 🗌	REPLACED	
7. LUBE SCREW	ок 🖫	MEBSING	REPLACED [	\$1. UPPER OPERATING ROD	ox □		REPLACED	
		nt 1170		32. LOWER OPERATING ROD	ок 🔲		REPLACED [	
& FLOWTEST7	<u>//</u> РП	TOT	USGPM	33. ROD COUPLING	ox □	N/A 🛄	REPLACED (	
	<del>2</del> 0			34. COUPLING BOLTS	ox □	N/A 🔲	MEPLACED	
9. PRESSURETEST	PSIG	PASSED 🖸	FAILED [	36. LOWER ROD NUT(S)	ок 🔲		REPLACED [	
····	YES 🗆 🗸			36. LOWER ROD STOP PINPLATE	ox 🛘	NA 🗆	REPLACED [	
10. COLOURCODED	NO [3	COLOUR		37. VALVE BALL SEAL(9)	ox □	NVA 🔲	REPLACED [	
·····	YES 🗆 🗸			36. VALVE BALL BOTTOM	ox □		REPLACED [	
11. HYDRANT PAINTED	NO [2]	COLOUR		39. VALVE BALL PUBBER	ox □		REPLACED [	
	YES 🗆		NO []	40. VALVE BALL TOP	ox □	NVA 🔲	PLEPLACED [	
12. HYDPANT PUMPED OUT	, , , , , , , , , , , , , , , , , , ,		140 L:	41. MAIN VALVE SEAT	o× □		REPLACED [	
	SAFETY 🗆	SURED []	LEAKING [	42. MAIN VALVE SEAT SEAL(S)	oĸ 🔲	•	REPLACED [	
13. GROUND FLANGE	souo 🗹	NA C	DAMAGED 🗍	43. DRAINVALVE	ок 🔲		MEPLACED [	
			N/A 🗆	44. DRAINVALVE SEAL(S)	ox □		REPLACED [	
14. REQUIRES BARREL EXTE	NTION	<u> </u>	N#A LJ	46. DRAINVALVE PORT(S)	ок 🔲	CLEAPNED	REPLACED [	
,,,,,,,	YES 🗌	/	TYPE	48. DRAINVALVE COTTER PIN(S)	ox □	N/A 🔲	REPLACED [	
15. PUMPER NOZZLE	~ <del>~</del> =		1176	47. LOWER BARREL	oĸ 🔲		REPLACED [	
			IMPROPER	48. LOWER BARREL FLANGE(S)	ox □	N/A 🔲	REPLACED [	
18. NOZZLE ORIENTATION	ox 🗷		- IMPROPER L	49. UPPERBARREL	ok 🗌		REPLACED [	
	- ox 🗆	NA E	TOO CLOSE	50 UPPER BARREL PLANGE(S)	ок 🔲	N/A 🔲	REPLACED [	
17. TRAFFIC BOLLAROS	OK   AMAGED	NA EJ	100 CLOSE II	51. BARREL EXTENTION(S)	ок 🔲	NA 🗆	REPLACED [	
SPRVICED BY:	1/1	/1		82. FLANGE GASKET(8)	ox []	NKA 🗆	PAEPLACED [	
( X	T 1	///		53. FLANGE BOLTS	οк□	N/A []	REPLACED [	
	( I CX			84. BOOT	ox □	NKA 🗆	REPLACED [	
CUSTOMER REPRESE	NTATIVE:			55. NOZZLE(9)	<b>∝</b> □	RECAULKED 🔲	REPLACED [	
you ( WILL! NEF NESE	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			66. NOZZLE CAP(5)	ox □		REPLACED [	
				67. NOZZLE RETAINER(S)	ox □	N/A 🔲	REPLACED [	
COMMENTO:	_,			88. CTHER	ox □		J	
COMMENTS:				89. ©THER	<b>о</b> к 🛘			
•				<b>60.</b> 37-68	oĸ 🔲			
				81. CTH55	ok 🔲			
				62. 07YER	ок 🗌			
				63. QTHEF.	ox □			



1	_	`,	(
71	7	)	1
	_2	/	

CUSTOMER NAME: Toponto Metro 200	HYDRANT LOCATION: North of Australiasia.
SERVICE ADDRESS: 3(1) A Old Find Ave	HYDRANT MAKE: Me7
Scarbowark	DATE: Dec 21/98
ANNUAL PREVENTATIVE MAINTENANCE (APM)	ADDITIONAL WORK
7404	18. BONNETCOVER OK NA REPLACED
1. SECONDARY VALVE COSEC LOCATED METVISSRE 1 10CFEFABLE	18. BONNETBOLTS OK NA REPLACED
	20. BONNET OK NEPLACED
2 HYDRANTOPERATION ON C OK C LEAKING C	21. BONNET SEAL OK A REPLACED
	22. OPERATING NUT OK
3. CHECK BARREL FORWATER WET AMT. OF WATER	23. OPERATING NUT O-RING(S) OK NA REPACK
	24. STUFFING BOX OK NA PEPLACED
4. CHECKCAP GASKETS OK Z	25. THRUST BEARING OK NA REPLACED
ANS EL LOSSE EL	26. BEARING HOUSING OK NA PEPLACED
5. CHECKNOZZLES & THREADS OK RYS LEOSES LEAKING LEAKIN	27. BEARING HOUSING BOLTS OK . N/A . REPLACED
	28. HOUSING COVER OK NA PEPLACED
6. LUBRICATE HYDRANT YES O NOT REQUIRED	29. HOUSING COVER BOLTS OK NA REPLACED
	30. BEARING HOUSING SEAL(S) OK NA PEPLACED
7. LUBE SCREW OK MISSING REPLACED	31. UPPER OPERATING ROD OK REPLACED
	32. LOWER OPERATING ROO OK A REPLACED
8. FLOWTEST HE PITOT /2(0) USGPM	33. ROD COUPLING OK NA REPLACED
A DESCRIPETEST & SCI PSIG PASSED FAMED	34. COUPUNG BOLTS OK NA REPLACED
9 PRESSURETEST & SUPPRIG PASSED FAMED	36. LOWER ROD NUT(8) OK REPLACED
NA COLOUR COLOUR	36. LOWER ROD STOP PINIPLATE OK NA REPLACED
10. COLOUR CODED NO	37. VALVE BALL SEAL(S) OK NA REPLACED
YES COLOUR	36. VALVE BALL BOTTOM OK PEPLACED
11. HYDRANT PAINTED NO COLOUR	30. VALVE BALL RUBBER OK AEPLACED
12 ADDRAGE HAREDOUT YES 1	40. VALVE BALL TOP OK NA REPLACED
12. HYDRANTPUMPEDOUT NA	41. MAINVALVE SEAT OK . REPLACED
13 GROUND FLANGE SAFETY D BURIED D LEAKING D	42. MAIN VALVE SEAT SEAL(S) OK . REPLACED
13. GROUND FLANGE SOULD NA DEAMAGES	43. DRAINVALVE OK REPLACED
14 DECUMPES RADREL EXTENTION	44. DRAINVALVE BEAL(S) OK . REPLACED
14. REQUIRES BARREL EXTENTION NA LI	45. DRAINVALVE PORT(S) OK CLEARED PEPLACED
TYPE	46. DRAINVALVE COTTER PIN(S) OK N/A REPLACED
15. PUMPER NOZZLE NO 1772	47. LOWER BARREL OK AEPLACED
** NOTE CONSIDER ON THE CONSTRUCTION OF THE CO	48. LOWER BARREL FLANGE(S) OK N/A REPLACED
16. NOZZLE ORIENTATION OK L	49. UPPERBARREL OK APPLACED
17. TRAFFIC BOLLARDS OK NA TODOLOSE	50 UPPER BARREL FLANGE(S) OK NA REPLACED :
17. TRAFFIC BOLLARDS DAMAGED	51. BAPRELEXTENTION(3) OK . N/A . REPLACED
SERVICED BY:	52. FLANGE GASKET(8) OK NA REPLACED
The law to	53. FLANGE BOLTS OK NA REPLACED
	54. BOOT OK NA PEPLACED
CUSTOMER REPRESENTATIVE:	55. NOZZLE(8) OK RECAULKED REPLACED
	66. NOZZLE CAP(8) OK REPLACED
	87. NOZZLE RETAINER(S) OK NA REPLACED
COMMENTS:	88. COHER OK .
	88. ⊴7-4:R OK □
	60. great OK 🔲
	81. CTHER OK
	ez ाम्म्हः ok 🛘
	83. (37he)를 <b>OK</b> 🗋

ок 🔲



#### A-1 HYDRANT SERVICES LTD.

550 Coronation Dr., Unit # 18 Scarborough, On. M1E 4V1 (416) 282-1665 1-888-349-2493



		QL-4FMD	1-888-349-	2493	· -	\	
CUSTOMER NAME:	Toranto	Metro	200	HYDRANT LOCATION:	rith a	LAustr	elasia H.
SERVICE ADDRESS	:3101A	Old, Ein	de Ave	HYDRANT MAKE:	70		
		Scarl	mough	DATE: DUC 21/98	<b>,</b> 		<u></u>
ANNUAL PR	EVENTATIV	E MAINTENAN	ICE (APM)	ADDITIO	ONAL WO	ORK	
1. SECONDARY VALVE		∞ <u>1</u> 2	CLOSED L	18. BONNET COVER	ox □	NVA 🗆	PEPLACED
	LOCATED	NOTVISIBLE [		19. BONNETBOLTS	<u>ок П</u>		REPLACED
2 HYDRANT OPERATIO	<sub>an</sub> ora 🗹	∞⊵∕	LEAKING 🔲	20. BONNET			REPLACED
	ON []	DIFFICULT	NOPERABLE [	21. BONNETSEAL	ox □		REPLACED
3. CHECKBARRELFOR	WATER WET	AMT. OF WATER _		22. OPERATING NUT	<del> </del>		REPACK [
0. 0.20.0	DAY 🗵			23. OPERATING NUT O-RING(S)	× □	N/A 🗌	REPLACED [
4. CHECK CAP GASKET	rs ox 🗗		REPLACED	24. STUFFING BOX	<u> </u>		REPLACED [
4. Checkon dister				25. THRUST BEARING	× □		REPLACED
S. CHECK NOZZLES & T	HERADS OK 1	Avs 🔟	L∞SE 🗓	26. BEARING HOUSING	ox □	NYA ☐	REPLACED [
5. CHECKIOLILIST.	LEAKING [	LEADED 🗌	DAMAGED 🖸	27. BEARING HOUSING BOLTS	×		
A LUBBICATE LOCIDAL	π YES 🗹		NOT REQUIRED	28. HOUSING COVER	ок 🗆	N/A 🗆	
6. LUBRICATE HYDRAN	, , , , , , , , ,	/		29. HOUSING COVER BOLTS	<u>∞ □</u>	N/A	
		MISSING	PEPLACED [	30. BEARING HOUSING SEAL(S)		N/A 🗌	
7. LUBE SCREW	W.C.	##33##3 E3		31. UPPER OPERATING ROO	<u> </u>		
	210	948	USGPM	32. LOWER OPERATING ROD	<u> </u>		REPLACED .
6. FLOWTEST	<u> </u>	-بحرب		33. ROD COUPLING	<u>ox  </u>	NWA 🔲	REPLACED
9. PRESSURETEST	a 5/4 PSIG	PASSED 🗗	FAILED C	34. COUPLING BOLTS	<u> </u>	N/A 🗌	REPLACED
9. PRESSURE (ES)	· · · · · · · · · · · · · · · · · · ·			36. LOWER ROD NUT(S)	<u> </u>		
10. COLOURCODED	YES 🖳	COLOUP_		36. LOWER ROD STOP PINIPLATE	ox □	NA 🗆	
	100			37. VALVE BALL SEAL(S)	<u> </u>	N/A 🗌	
11. HYDRANT PAINTED	YES 🔲	COLOUR		36. VALVE BALL SOTTOM	<u>∝ □</u>		
	NO 🗹			39. VALVE BALL RUBBER	<u> </u>		
12. HYDRANT PUMPED	OUT YES .		29 □	40. VALVE BALL TOP	<u> </u>	NVA 🗋	
	N/A 🗗			41. MAIN VALVE SEAT	<u> </u>		REPLACED [
13. GROUND FLANGE	SAFETY 🔲	BURIED 📮	⊒ екже	42. MAIN VALVE SEAT SEAL(S)	ox □		REPLACED [
	80LID 2	NA 🗆	DAMAGED 🗀	43. DRAINVALVE	ox □		REPLACED L
14. REQUIRES BARREL	EXTENTION	<u></u>	NA 🗆	44. ORAINVALVE SEAL(S)	<u> </u>		REPLACED .
				45. DRAINVALVE PORT(S)	<u> </u>	CLEARED []	REPLACED [
15. PUMPER NOZZLE	YES 🖳		TYPE	48. DRAINVALVE COTTER PIN(S)	<u>∝                                    </u>	NYA 🔲	REPLACED L
	NO 🖸			47. LOWER BARREL	<u> </u>		REPLACED U
16. NOZZLE ORIENTATI	ION OK 🗹		"APPOPER 🔲	48. LOWER BARRIS, FLANGE(S)	ok ∐	NA 🗆	REPLACED [
			_/	49. UPPER BARREL	<u> </u>		REPLACED
17. THAFFIC BOLLAPOS	<b>、</b> ∝□	NVA 🕞	CodLCSE 📮	50 UPPER BARREL FLANGE(S)	× □	N/A [	REPLACED []
	DAMOED -	1	$\rightarrow$	51. BARPEL EXTENTION(8)	ok □	- NA []	REPLACED
SERVICED BY	X17 1	<b>V</b> (		62. PLANGE GABKET(9)	ox □	NA □	REPLACED [
				SS. FLANGE BOLTS	ox □_	N#A	REPLACED
	_\\\/	<u> </u>		54. BOOT	ox □	N/A 🗌	REPLACED [
CUSTOMER REPR	ESENTATIVE:			56. NOZZLE(5)	ox □	RECAULKED	REPLACED []
	<del>-</del>			56. NOZZLE CAP(S)	ox □	A172 [7]	REPLACED .
	<del></del>	<del></del>	<del>' - /</del>	87. NOZZLE RETAINER(S)	ox □	N/A 📗	F
COMMENTS;	raks at	operale	namut	88. CORER	ox □		
- b:		7	<del></del>	59. 3° 4 ii	ox □		
Nacruna	·			60. Jan	ox □		
V 7	•			<b>81.</b> の計画 <b>82.</b> の <b>2</b>	<u> </u>		
				1 M. O T.	~` □		

**43**. 37es:





7 1 11 + 2	INDRAFTI OCATION / H / HA CALL	
USTOMER NAME: / month Melro Loo	HYDRANT LOCATION: South of Greense	<u> </u>
ERVICE ADDRESS: 3/e/ A Old Finch And	HYDRANT MAKE: MC+	
Seastorment	DATE: 120 21/98	
ANNUAL PREVENTATIVE MAINTENANCE (APM)	ADDITIONAL WORK	
1. SECONDARY VALVE DUIL OK E CLOSED	18. BONNETCOVER OK NA PEPLACI	
LOCATED POTVISIBLE [	19. BONNETBOLTS OK NA REPLACE	
2 HYDRANTOPERATION OR C LEAKING	20. BONNET OK REPLACE	
OL DEFICULT SICPERABLE [	21. BONNET SEAL OK APPLACE	
3 CHECK BARREL FOR WATER WET AMT. OF WATER	22. OPERATING NUT OK : REPLAC	
DRY	23. 0-54(180.05; 0-440(5)	
4 CHECKCAP GASKETS OK A REPLACED	- D	_
	25. THRUST SEARING OK NA REPLAC	
5. CHECK NOZZLES & THREADS OK RES COSE COSE	20. BEARMOIROSINO	
6. CHECKNOZZIES & THREADS		
6 LUBRICATE HYDRANT YES NOT REQUIRED		
7. LUBE SCREW OK MISSING THEPLACED		
a PLOWTEST 34 PITOT 1085 USGPM		
A ALUMIESI		
9 PRESSURETEST & PRIG PASSED FALED		
	30. DMENIOONOID)	
10. COLOUR CODED YES COLOUR COLOUR		
11. HYDRANT PAINTED YES COLOUR COLOUR		
No 🔄	33. VALTEGRIZADO	
12 HYDRANT PUMPED OUT YES NO C		
NA C	41. MATTACE DEST	
13. GROUNDFLANGE SAFETY SURIED LEANING LE LE LEANING LE LE LEANING LE LE LEANING LE LE LE LE LE LE LE LE LE LE LE LE LE		
SOUD NA C CAMAGED U		
14. REQUIRES BARREL EXTENTION NA .		
18. PUMPER NOZZLE YES TYPE ST		
NO []	47. LOWER BARREL OK REPLAN	
18. NOZZLE ORIENTATION OK (1) IMPROPER	a. Concrete of the control of the co	
	49. UPPERBARREL OK REPLA	
17. TRAFFIC BOLLARDS OK A TOOCLOSE	50 UPPER BARREL FLANGE(S) OK NA REPLA	
DAMAGED -	61. BARRELEXTENTION(8) OK NA REPLA	
SERVICED BY.	82. PLANGE GASKET(S) OK NVA FEPLA	
The contract of the contract o	83. FLANGE BOLTS OK NA REPLA	
	54. BOOT OK NA REPLA	
CUSTOMER REPRESENTATIVE:	56. NOZZLE(S)	
	57. NOZZLE RETAINER(S) OK NA REPLA	CEU
comments: Left ah inch port cap	58. CTHER OK	—
	59. ○□	
musung.	60. OTHER OK [	
	61. 7%±55 OK □	
	<b>62.</b> उपस्∌ <b>0K</b> □	
	<b>以</b> 。如est	



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CUSTOMER NAME: /	to	Udo	200	HYDRANT LOCATION: </th <th>E ~</th> <th>mont</th> <th>t serve</th>	E ~	mont	t serve
SERVICE ADDRESS:	CIALA	MID FIN	the And	HYDRANT MAKE: 11/	,7 V		
	3(1) /4	Mark	neus	DATE: PLO 2119	R		
ANNUAL PREV	ENTATIVE				ONAL W	ORK	
	3 west	ox 🗹	CLOSED 🗆	18. BONNETCOVER	ox 🛘	N/A 🗆	REPLACED
1. SECONDARY VALVE	LOCATED	NOTVISIBLE []	INCPERABLE	19. BONNETBOLTS	ок 🗆	NA 🗆	REPLACED [
		ox 2	LEAKING [	20. BONNET	ox 🗆		REPLACED [
2. HYDRANT OPERATION	OF Z	OK (≥) D#FFFCULT []	INCPERABLE	21. BONNETSEAL	ок 🛚		REPLACED [
······································	En WET []	AMIT, OF WATER		22. OPERATING NUT	ок 🗆		REPLACED [
3. CHECK BARREL FOR WAT	ER WE'L	AMI. OF WATER		23. OPERATING NUT O-RING(S)	oĸ □	N/A 🔲	PAEPACK [
				24. STUFFING BOX	oĸ 🔲	N/A 🗌	REPLACED [
4. CHECK CAP GASKETS	ок 🗹	_	REPLACED [	25. THRUST BEARING	ок 🔲	N/A 🗆	REPLACED []
<u> </u>		AVS ET	LCCSE [	26. BEARING HOUSING	oĸ □	N/A 🔲	REPLACED [
6 CHECK NOZZLES & THRE	ADS OK E	LEADED	DAMAGED	27. BEARING HOUSING BOLTS	ox 🗌	N/A 🗌	REPLACED [
···-				28. HOUSING COVER	ок 🗆	N/A 🔲	REPLACED [
6. LUBRICATE HYDRANT	YES 🗹		NOT REQUIRED [_]	29. HOUSING COVER BOLTS	ox 🗌	N/A 🔲	REPLACED [
				30. BEARING HOUSING SEAL(S)	ox □	N/A 🔲	REPLACED [
7. LUBE SCREW	ок 🗹	MISSING 🔲	REPLACED []	31. UPPER OPERATING ROD	<b>о</b> к □		REPLACED [
	ZO	1/1 K	7	32. LOWER OPERATING ROD	ок 🗌		REPLACED [
a. PLOWTEST	<u> </u>	ror	USGPM	39. ROD COUPLING	ox []	N/A 🔲	MEMLACED
	7)		51. 53. 3	34. COUPLING BOLTS .	ox □	N/A 🗀	REPLACED [
9. PRESSURETEST C	PSIG	PASSED 3	FAILED 🔲	36. LOWER ROD NUT(S)	ox 🛘		REPLACED
** ***	YES 🗌 🔪	COLOUFL		36. LOWER ROD STOP PINPLATE	ox 🗌	N/A	MEPLACED [
10. COLOURCODED	NO 🖸			37. VALVE BALL SEAL(S)	ок□	N/A 🗌	REPLACED [
	YES 🔲 🐊	COLOUR		38. VALVEBALL BOTTOM	ox 🗌		REPLACED [
11. HYDRANTPAINTED	NO E	catoon		39. VALVE BALL RUBBER	ok 🗀		REPLACED [
	YES 🗌			40. VALVEBALLTOP	ox □	N/A 🔲	REPLACED [
12. HYDRANT PUMPED OUT	NA 🖯			41. MAIN VALVE SEAT	ox □		REPLACED [
42 - 600   100   100	8AFETY 🗆	OURNED [	LEARING [	42. MAIN VALVE SEAT SEAL(8)	ox □		REPLACED
13. GROUND FLANGE	souo 🗹	NA 🗆	DAMAGED	43. DRAINVALVE	<b>∞</b> □		REPLACED [
44 0500 UDGO 04 PDG 1 DGT	2000		N/A 🗆	44. DRAINVALVE SEAL(S)	<b>∞</b> □		REPLACED [
14. REQUIRES BARRELEXTE				45. DRAINVALVE PORT(S)	ox []	CLEARED 🗌	REPLACED [
15. PUMPER NOZZLE	YES 🗆		TYPE	46. OPAINVALVE COTTER PIN(S)	ox □	N/A 🗌	REPLACED [
18. POMPEHINO2212	NO E			47. LOWER BARREL	ox □		REPLACED [
18. NOZZLE ORIENTATION			MPRCPER 🔲	48. LOWER BARREL FLANGE(S)	ox 🔲	N/A 🔲	REPLACED [
III. HOZZIE GRECINATON				49. UPPERBARREL	ож 🔲		PEPLACED [
17. TRAFFIC BOLLARDS	ox □	NA 🗗	700 CLOSE	50 UPPERBARREL FLANGE(S)	ок 🗆	NA 🗆	PEPLACED [
11. 1141. 2000	DAMASED 🗆			51. BARREL EXTENTION(S)	ок. 🔲	NYA 🗋	REPLACED [
SERVICED BY:	77			52. FLANGE GASKET(8)	ox □	N/A	REPLACED _
	100			53. PLANGE BOLTS	ox □	N*A 🔲	PEPLACED _
	NA			54. BOOT	<u> </u>	NA 🔲	REPLACED [
CUSTOMER REPRESE	NTATIVE:			55. NOZZLE(S)	× 🖸	RECAULTED [	REPLACED [
				66. NOZZLE CAP(S)	<u> </u>		REPLACED _
				67. NOZZLE RETAINER(9)	<u> </u>	NKA 🗌	REPLACED L
COMMENTS:				<b>58.</b> (1906	ox □		
	<del></del>			<b>69</b> . 2 <sup>m</sup> -444	ox □		<u>is</u>
•				60. 575-ER	ox □		
				<b>61.</b> 分 <del>65.</del>	ok □		
				<b>62.</b> 05-65	<u> </u>		
				63. 37 1101	ox □		Ĺ





CUSTOMER NAME: Toronto	Metro	200	HYDRANT LOCATION:	Eof	morth &	renice
SERVICE ADDRESS: 3/0/ A	Old Fin	d Ave	HYDRANT MAKE: ML	47		
	Scarl	owah	DATE: Dec 211	98		
ANNUAL PREVENTATIVE	MAINTENAN	CE (APM)	ADDIT	IONAL W	ORK	
1. SECONDARY VALVE ZUNST	ox 🖸	CLOSED 🖸	18. BONNETCOVER	ox □	NVA 🗆	REPLACED [
LOCATED	NOTVISIBLE .	INOPERABLE .	19. BONNETBOLTS	ox □	N#A 🔲	
2 HYDRANTOPERATION OF	ox <u>□</u>	LEAKING 🗌	20. BONNET	ox []		REPLACED
or □	DIFFICULT _	NOPEPAELE [	21. BONNET SEAL	ox □		REPLACED [
3. CHECKBARREL FORWATER WET	AMT. OF WATER		22. OPERATING NUT	<u>ox □</u>	N/A 🔲	REPACK []
DRY 🗗			23. OPERATING NUT O-FRING(8)		NWA 🗆	PEPLACED
4. CHECKCAP GASKETS OK		REPLACED [	24. STUFFING BOX	ox □		REPLACED [
4. Check CAP GAGNETS ON I			25. THRUST SEARING	<u> </u>		REPLACED [
5. CHECK NOZZLES & THREADS ON	N8 🗗	LOCSE 🗀	28. BEARING HOUSING	<u> </u>	NA □	REPLACED [
LEAGNG [	LEADED 🔲	DAMAGED L	27. BEARING HOUSING BOLTS	ox □		PEPLACED [
& LUBRICATE HYDRANT YES		NOT REQUIRED	28. HOUSING COVER	ox □	N/A 🗌	REPLACED [
6. LUBRICATE HYDRANT YES	/		29. HOUSING COVER BOLTS	ox □	N#A 🔲	
7 LUBE SCREW OK	MISSING	PAEPLACED [	30. BEARING HOUSING SEAL(8)	<u>∞ □</u>	N/A 🔲	
7. LUBE SCREW OR L		AD 3000 C	31. UPPER OPERATING ROD	ox 🗀		MEPLACED L
74	тот <u>/085</u>	USGPM	32. LOWER OPERATING ROD	ox □		REPLACED L
PLOWTESTPT	TOT		33. ROD COUPLING	<u> </u>	N/A 🗆	REPLACED (
PRESSURETEST C SO PSIG	PASSED [	FAILED C	34. COUPLING BOLTS	ok 🗆	N/A 🗆	REPLACED [
PRESSURE TEST C 2 PSIG	PASSED [_]		35. LOWER ROD NUT(S)	ox □		PEPLACED
10. COLOURCODED YES	COLOUR		36. LOWER ROD STOP PINIPLATE		N/A 🗌	REPLACED [
NO COLONACODED NO CO			37. VALVE BALL SEAL(S)	ox □	N/A 🗌	PEPLACED _
YES 🗆	COLOUPL		88. VALVE BALL BOTTOM	ox □		REPLACED [
11. HYDRANT PAINTED NO LT			39. VALVE BALL RUBBER	ox □		MEPLACED [
12 MYDRANTE MEED CUIT YES		:æ 🗌	40. VALVE BALL TOP	ox □	NA 🗆	REPLACED [
12. HYDRANTPUMPEDOUT NA			41. MAIN VALVE SEAT	<u>∝ □</u>		REPLACED [
13 GROUND FLANGE SAFETY	BURSED 🗆	LEAKNG 🔲	42. MAIN VALVE SEAT SEAL(S)	<u>∝ □</u>		REPLACED [
13. GROUND FLANGE SOLID	NVA 🗆	DAMAGED [	43. DRAINVALVE	ox □		REPLACED [
TO THE PARTY OF TH		N/A 🗆	44. DRAINVALVE SEAL(S)	ox □		REPLACED [
14. REQUIRES BARREL EXTENTION			45. DRAINVALVE PORT(8)	OK 🗌	CLEARED .	MEPLACED
YES .		TYPE	48. DRAINVALVE COTTER PIN(S)	oĸ 🗆	N/A 🔲	REPLACED [
15. PUMPEA NOZZLE NO	/		47. LOWER BARREL	ox □		REPLACED L
16. NOZZILE ORIENTATION OK		MERCHER D	48. LOWER BARREL FLANGE(S)	ok □	N/A 🗌	REPLACED
16. NOZZLE OPIENTATION OK			49. UPPERBARREL	ox 🔲		REPLACED L
	NVA 🖸	-000L08E	50 UPPER BARREL FLANGE(S)	ox □	NA 🗆	REPLACED [
17. TRAFFIC BOLLARDS			51. BARRELEXTENTION(S)	ox □	N/A 🔲	REPLACED [
SPRVICED BY	_//	)	52. PLANGE GASKET(S)	ox 🗌	N/A 🔲	REPLACED
	16		53. PLANGE BOLTS	ox □	NA 🗆	REPLACED [
			64. BOOT	ox 🗆	NA 🗆	REPLACED
CUSTOMER REPRESENTATIVE:			55. NOZZLE(9)	ox □	RECAULKED 🔲	REPLACED [
			56. NOZZLE CAP(8)	<u> </u>		REPLACED [
, <u></u>			57. NOZZLE RETAINER(8)	ox □	N/A 🔲	REPLACED
COMMENTS: ALCONOMICA	u mal	Jo to	<b>58.</b> 10HBR	ок 🗆		
www.	y ungl	un	<b>6</b> 4、江州3	ok 🗌		
ando dul to	death.		<b>60.</b> (\$755215	ок 🗀		
apa me	<i>"</i>		<b>61.</b> (1995年日	ox 🗆		
<u> </u>			<b>62.</b> ∪T- <u>E</u> R	ox □		
			<b>63.</b> 20最高	ox 🛘		
						•



		1
	10	
(	18,	/

CUSTOMERNAME: Toronta Matro 200	HYDRANT LOCATION: Fast side of garage
SERVICE ADDRESS: 3/4/ Ald Finch Ave	HYDRANT MAKE: CANYON
Scarlorous	DATE: 1) ec 21/98
ANNUAL PREVENTATIVE MAINTENANCE (APM)	ADDITIONAL WORK
1. SECONDARY VALVE 2' ASNAL ON C CLOSED L	18. BONNETCOVER OK NA REPLACED
LOCATED NOTVISIBLE   YOFERABLE	19. BONNETBOLTS OK NA REPLACED
2 MODERATION OR OR OR DEAKING	20. BONNET OK REPLACED
2 HYDRANT OPERATION OL DIFFICULT VOPERABLE	21. BONNETSEAL OK NEPLACED
AMT. OF WATER	22. OPERATING NUT OK
3 CHECK BARREL FOR WATER DRY	23. OPERATING NUT O-RING(S) OK . N/A . REPACK .
	24. STUFFING BOX OK NA REPLACED
4 CHECK CAP GASKETS ON D REPLACED D	25. THRUST BEARING OK N/A REPLACED
OK P RS D LOUIS C	26. BEARING HOUSING OK NA PEPLACED
S CHECK NOZZLES & THREADS ON THE LEADED TAMAGES THEADER THREADER T	27. BEARING HOUSING BOLTS OK NA REPLACED
	28. HOUSING COVER OK NA REPLACED
6. LUBRICATE HYDRANT YES NOT REQUIRED	29. HOUSING COVER BOLTS OK NA REPLACED
	30. BEARING HOUSING SEAL(S) OK NA REPLACED
7. LUBE SCREW OK MISSING PEPLACED	31. UPPER OPERATING ROD OK REPLACED
27 001	32. LOWER OPERATING ROD OK REPLACED .
8 PLOWTEST 23 PITOT 892 USGPM	33 ROD COUPLING OK NA PEPLACED
	34. COUPLING BOLTS OK NA REPLACED
9 PRESSURE TEST & PSIG PASSED FAILED T	35. LOWERROD NUT(S) OK AEPLACED
TES COLOUR	36. LOWER ROD STOP PINPLATE OK NA REPLACED
10. COLOURCODED YES COLOUR COLOUR	37. VALVE BALL SEAL(S) OK NA REPLACED
vec []	36. VALVE BALL BOTTOM OK APPLACED
11. HYDRANTPAINTED NO COLOUR	39. VALVE BALL PUBBER OK REPLACED
12 ANDRANT BURBEDOUT YES BY	40. VALVEBALL TOP OK NA PEPLACED
12 HYDRANT PUMPED OUT	41. MARN VALVE SEAT OK APPLACED
12 GEOLINDELANGE SAFETY SUPRED LEAKING L	42. MAIN VALVE SEAT SEAL(S) OK
13. GROUNDFLANGE SOLID NIA COMMAGED LI	43. DRAINVALVE OK REPLACED
NA DECUIDES DARGEL EXTENTION NA	44. DRAINVALVE SEAL(S) OK NEPLACED
14. REQUIRES BARREL EXTENTION NA L.	45. DRAINVALVE PORT(S) OK CLEARED REPLACED
16 PUNISCANOZZI S YES 1	46. DRAINVALVE COTTER PIN(S) OK NA REPLACED
15 PUMPER NOZZLE NO	47. LOWER BARREL OK A REPLACED
MFROFER	49. LOWER BARREL FLANGE(S) OK N/A REPLACED
16. NOZZLE ORIENTATION OK S	49. UPPER BARREL OK REPLACED
17. TRAFFIC BOLLARDS OK NA TOO CLOSE	50 UPPER BARRIEL PLANGE(S) OK NA REPLACED
17. TRAFFIC BOLLARDS DAMAGED DAMAGED	51. BARREL (EXTENTION(8) OK NA REPLACED
SERVICED BY.	52. PLANGE GASKET(S) OK N/A MEPLACED
	53. FLANGE BOLTS OK N/A REPLACED
PIOX	S4. BOOT OK NA REPLACED
CUSTOMER REPRESENTATIVE:	86. NOZZLE(S) OK RECAULKED REPLACED
	56. NOZZLE CAP(S) OK AEPLACED
1 1	57. NOZZLE RETAINER(S) OK NA NEPLACED
COMMENTS: / CONTRACTOR ATALUE LOOK	68. STRUB
Junaing wave NOX	59. ∴T-63+ OK □
MARON & lid messence (484)	60. 57-1-15 OK
	61. 00% 51.
ALSO, NOX MAS MUCH WILL	<b>€</b> 57-€7 <b>○</b> □
still assaulte win	83. 37-63 OK 🗋



CUSTOMER NAME:

SERVICE ADDRESS:

1. SECONDARY VALVE

2 HYDRANT OPERATION

4. CHECK CAPGASKETS

6. LUBRICATE HYDRANT

9. PRESSURETEST C

10. COLOUR CODED

11. HYDRANT PAINTED

13. GROUND FLANGE

15. PUMPER NOZZILE

16. NOZZLE ORIENTATION

17. TRAFFIC BOLLARDS

SERVICED BY

COMMENTS:

12. HYDRANT PUMPED OUT

14. REQUIRES BARREL EXTENTION

**CUSTOMER REPRESENTATIVE:** 

7. LUBE SCREW

8. FLOW TEST

1 CHECKBARREL FORWATER

& CHECK NOZZLES & THEREADS

### A-1 HYDRANT SERVICES LTD.

		Ug. 41M3	1-888-349-2	2493			
OMER NAME:	monte	Metro	200	HYDRANT LOCATION:	sten	d of 16	nthseru
VICE ADDRESS:	361A	Old Fin	ch Ave	HYDRANT MAKE:	tury	V-	···
		Scar	borough	DATE: Der 21/	78 /		
ANNUAL PRE	VENTATIV	E MAINTENAN	CE (APM)	ADDITIO	ONAL WO	ORK	
SECONDARY VALVE	2 METELS	OK I	CLOSED []	18. BONNETCOVER  19. BONNETBOLTS	ox □	NA 🗆	REPLACED []
HYDRANT OPERATION	0# [] 01. □	OK [2]	LEAKING []	20. BONNET 21. BONNET SEAL	ox □		REPLACED   REPLACED
CHECK BARREL FOR WA	NET .	AMT. OF WATER		22. OPERATING NUT	ox □	N/A 🗆	REPLACED   REPACK
	OK [2]		REPLACED []	23. OPERATING NUT O-RING(S)  24. STUFFING BOX	ox 🗆	NA D	REPLACED [
CHECK CAPGASKETS		Ars 🗗	LCCSE	26. BEARING HOUSING	ox □	MW []	REPLACED
CHECK NOZZLES & THR	LEAKING [	LEADED 🗍	CAMAGED [	27. BEARING HOUSING BOLTS 28. HOUSING COVER	ox □	NYA 🔲	REPLACED [
LUBRICATE HYDRANT	YES 🖸		NOT REQUIRED	29. HOUSING COVER BOLTS	ox □	NKA 🗆	REPLACED
LUBE SCREW	o× □	MESING 🗆	REPLACED [	30. BEARING HOUSING SEAL(8) 31. UPPER OPERATING ROD	ox □	- NA	REPLACED [
FLOW TEST	26 -	пот 945	USGPM	32. LOWER OPERATING ROD 33. ROD COUPLING	ox □	N/A 🗆	REPLACED [
PRESSURE TEST C_	STO PSIG	PASSED 🗌	FAILED 🖸	34. COUPLING BOLTS 36. LOWER ROD NUT(8)	ox □	NA 🗆	REPLACED
COLOUR CODED	YES D	COLOUR		36. LOWER ROD STOP PINPLATE	ox []	N/A []	REPLACED   REPLACED
HYDRANT PAINTED	YES 🗌	COLOUR		37. VALVE BALL BOTTOM  38. VALVE BALL BOTTOM	ox □		REPLACED
	, YES []		<u>-</u>	39. VALVE BALL TOP	ox 🗆	N/A 🗆	MEPLACED [
HYDRANT PUMPED OU	NA 🗗	BURIED []	LEAKING []	41. MAIN VALVE SEAT  42. MAIN VALVE SEAT SEAL(8)	ox □		REPLACED [
GROUND FLANGE	SOUD []	NVA []	DAMAGED 🗍	43. DRAINVALVE	ox □		REPLACED  REPLACED
REQUIRES BARREL EX	TENTION		N/A 🗆	44. DRAINVALVE SEAL(S) 45. DRAINVALVE PORT(S)	ок 🛚	CLEARED 🗌	REPLACED
PUMPER NOZZLE	YES []		TYPE	46. DRAINVALVE COTTER PIN(8) 47. LOWER BARPIEL	ox □	N/A 📗	REPLACED [
NOZZLE ORIENTATION	ox 🗹		IMPROPER []	49. LOWER SAPREL FLANGE(S) 49. UPPER SARREL	ox □	N/A []	REPLACED  REPLACED
TRAFFIC BOLLARDS	ox 🛚	NA B	TCCCLOSE [	50 UPPER BARREL FLANGE(S)	ox □	NA 🗆	REPLACED
VICED BY.	DANGEO [	1)		51. BARRELEXTENTION(9)  52. PLANGE GASKET(5)	ox □	MA 🗆	PEPLACED [
f	TOX			53. FLANGE BOLTS 54. BOOT	ox 🗆	NA L	REPLACED
STOMER REPRES	SENTATIVE:			65. NOZZLE(S)  56. NOZZLE CAP(8)	ox □	RECAULKED [	REPLACED
				57. NOZZLE RETAINER(S)	ок 🗆	N/A 🗆	REPLACED
MMENTS:	<u> </u>			50. Y-FR	ox 🗆		
· -				60. 第55年 61. 第555 61. 第555	ox □		
	•		<u></u>	<b>62.</b> の報告 <b>63.</b> の知識等	ox □		





		——————————————————————————————————————			- 7	1 1 1	1. 7/1
CUSTOMER NAME: 7	nonto	Metro	700 .	HYDRANT LOCATION:	stof	News	ion dola
SERVICE ADDRESS:	Vela (	Old Fin	ch twe	HYDRANT MAKE: 1/k	/ /		
		Scarle	rough	DATE: UPC 23/98	· · · · · · · · · · · · · · · · · · ·		
ANNUAL PREV	ENTATIVE	7 110-0-1-0-1		ADDITI	ONAL WO	ORK	
<del></del>		ox □_/	CLCSED []	18. BONNETCOVER	ок 🗌	N/A	REPLACED []
1. SECONDARY VALVE _	LOCATED	MOTVISIBLE []	CPERABLE []	19. BONNETBOLTS	ox 🛘	NA 🗆	REPLACED
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		« □	LEAKING [	20. BONNET	ож 🔲		REPLACED [
2. HYDRANT OPERATION	on []	DIFFICULT	**CPESABLE :	21. BONNETSEAL	ок 🗆		REPLACED .
<u> </u>	wet 🗆 🗸	AMT. OF WATER		22. OPERATING NUT	oĸ □		REPLACED [
3 CHECK BARREL FOR WATE	DRY 3	AMI. OF WATER		23. OPERATING NUT C-RING(S)	ox □	N/A 🔲	REPACK [
				24. STUFFING BOX	ok 🖸	N/A 🔲	REPLACED 🗌
4 CHECK CAP GASKETS	ox Ø	_	REPLACED .	25. THENUST BEARING	ox 🗆	N/A 🔲	REPLACED [
	ne ox	Avs 🖸	LCCSE 🗍	26. BEARING HOUSING	ox 🗆	NVA 🔲	REPLACED [
5. CHECK NOZZLES & THREA	DS ON [] LEAKING []	LEADED []	DAMAGED -	27. BEARING HOUSING BOLTS	ox □	N/A 🗀	REPLACED [
				28. HOUSING COVER	ox □	NVA 🛄	REPLACED
6. LUBRICATE HYDRANT	YES 🗗		NOT REQUIRED [_]	29. HOUSING COVER BOLTS	ox 🔲	N/A []	REPLACED [
				30. BEARING HOUSING SEAL(S)	ox □	N/A 🗌	REPLACED [
7. LUBE SCREW	οκ⊡	MISSING .	REPLACED [	31. UPPER OPERATING ROO	ox 🗆		REPLACED [
<u> </u>	2 =	07	)	32. LOWER OPERATING ROD	ox 🔲		REPLACED
& FLOWTEST	<u> </u>	тот <u>В 1 /2</u>	USGPM	33. ROD COUPLING	oĸ []	NYA 🗆	REPLACED L
				34. COUPLING BOLTS	ox □	N¥A □	PEPLACED [
PRESSURETEST C.	PSIG	PASSED L	FAILED L	36. LOWER ROD NUT(S)	ok 🗌		REPLACED [
	YES 🗆	COLOUR		36. LOWERROD STOP PINPLATE	ox □	N/A 🔲	REPLACED [
10. COLOUR CODED	NO 🗗	<del></del>		37. VALVE BALL SEAL(S)	ox □	N/A 🔲	PEPLACED .
	YES 🗍 🗸	COLOUR		38. VALVE BALL BOTTOM	ok 🔲		REPLACED [
11. HYDRANT PAINTED	NO 🗖	COLOGI		39. VALVE BALL PUBBER	ox 🛘		REPLACED
	YES 🗆		.9 🗆	40. VALVEBALLTOP	ox []	N/A 🗆	REPLACED [
12. HYDRANT PUMPED OUT	NA 🗹			41. MAIN VALVE SEAT	ox 🗆		REPLACED [
	SAFETY G	BURIED 🗆	<u></u> €4K%3 □	42. MAIN VALVE SEAT SEAL(S)	ok 🔲		REPLACED [
13. GROUND FLANGE	<b>80U0</b>	NVA 🗆	CANAGED U	43. DRAINVALVE	ox □		REPLACED [
	TON.		NVA 🗀	44. DRAINVALVE SEAL(S)	ox □		REPLACED [
14. REQUIRES BARREL EXTER	VIION	/		45. ORAIN VALVE PORT(5)	ox □	CLEAMED [	REPLACED [
44 000000000000000000000000000000000000	YES 🖸		TYPE ST	46. DRAINVALVE COTTER PIN(S)	ox □	NA 🗆	REPLACED
15. PUMPER NOZZLE	NO 🗆			47. LOWER BARREL	ox □		REPLACED [
** NOTE CONSIDER	ox [3∕		IMPROPER [	48. LOWER BARREL FLANGE(8)	<b>∞</b> □	N/A 🔲	REPLACED [
16 NOZZILE ORIENTATION	ж.		/	49. UPPER BARREL	ox 🛘		REPLACED _
17. TRAFFIC BOLLARDS	<u>ж</u> 🗆	NA E		50 UPPER BARREL FLANGE(S)	ok 🛘	NYA 🗆	REPLACED [
17. TRAFFIC BOLDAROS	MARGED 🗆			81. BARRELEXTENTION(8)	ox □	N/A 🗆	REPLACED _
SERVICED BY:	7\	-1	ノ	52 FLANGE GASKET(5)	ox □	NA 🗆	REPLACED [
(111	TIM			53. FLANGE BOLTS	<u> </u>	NYA 🗆	REPLACED [
	10%			54. BOOT	ox □	N/A 🗆	REPLACED _
CUSTOMER REPRESE	NTATIVE:			55. NOZZLE(S)	<u> </u>	RECAULKED	REPLACED L
				56. NOZZLE CAP(S)	<u> </u>	411	REPLACED L
				57. NOZZLE RETAINER(S)	<u> </u>	N/A 🗆	PEPLACED L
COMMENTS:				<b>58.</b> 111-514	<u> </u>		
				<b>60.</b> (774-44)	ox □		<u>E</u>
				<b>60.</b> «Ж <del>ес</del> і	<u> </u>		ָ ר
<del></del>			<del></del>	<b>\$1.</b> <50 <del>550</del> €	<u> </u>		
				<b>62.</b> 37%	<u> </u>		
				<b>63.</b> (379-87)	ok □		<u>_</u>







<u> </u>						,,,,	/ /	<u>a</u>
CUSTOMER NAME: TO	ronto	Metro:	200	HYC	RANT LOCATION:	d Ma	tagaski	r Kestal
SERVICE ADDRESS: 3	WA	Old Fin	ch the	HYI	PRANT MAKE: MU	7		
		Scarbo	nough	DA <sup>*</sup>	E: Dec 23/98	3		
ANNUAL PREVE	NTATIV				ADDITI	ONAL W	ORK	
1. SECONDARY VALVE	1 south	∝ 🗹	CLOSED 🔲	_18	SONNETCOVER	ox □	N/A 🗆	REPLACED [
1	LOCATED	NOTVISIBLE [	INOPERABLE	19	BONNETBOLTS	ox 🗆	NKA 🗆	REPLACED _
2 HYDRANT OPERATION	OR 🖸	ox 🗹	LEAKING 🛄		BONNET	<u> </u>		REPLACED [
2 Historica States	or 🗆	DIFFICULT [	NOFERABLE [		BONNETSEAL	ox □		REPLACED [
3. CHECK BARREL FOR WATER	NET 🖳	AMT. OF WATER		1 —	OPERATING NUT	ok 🗆	<u> </u>	REPLACED [
	DRY 🗹			<b>—</b>	OPERATING NUT O-PING(S)	<u>∞ □</u>	· N/A 🔲	
4. CHECK CAP GASKET8	ox 🗹		REPLACED [		. STUFFING BOX	ox □		
4. Greekour Grandero				1 —	. THRUST BEARING	ox □_	N/A 🗆	REPLACED [
5. CHECK NOZZLES & THREAD	s ox 🖸	#8 <u>2</u>	rcose 🗖	ı —	BEARING HOUSING	<u>ок 🗆</u>	N/A 🔲	REPLACED [
U	EAKING 🔲	LEADED 🗌	CAMAGED L		. BEARING HOUSING BOLTS	<u> </u>	NA 🗌	REPLACED [
6. LUBRICATE HYDRANT	YES 🗗		NOT REQUIRED	ı —	. HOUSING COVER	ox []	N/A 🗆	REPLACED [
C. LODITORI Z TO TO TO TO TO TO TO TO TO TO TO TO TO					HOUSING COVER BOLTS	ox □_		REPLACED [
7. LUBE SCREW	ox 🗗	MIBSING 🔲	REPLACED []	_	BEARING HOUSING SEAL(5)	ox □	N/A []	REPLACED [
. concoren			<u></u>		. UPPER OPERATING ROD	ox □		REPLACED
a FLOWTEST /		тот <i>690</i>	USGPM	. —	LOWER OPERATING ROD	ox □	N/A []	REPLACED
a. PLONVIES:					. ROD COUPLING	o× □	N/A 📙	REPLACED
9. PRESSURETEST CH	₽ PBIG	PASSED [	FALED 🗔	1	. COUPLING BOLTS	OK □	NA L	REPLACED
					LOWER ROD NUT(8)	ox □	<u> </u>	REPLACED
10. COLOUR CODED	YES O	COLOUR		ı —	LOWER ROD STOP PINPLATE	ox □_	N/A 🔲	REPLACED
· · · · · · · · · · · · · · · · · · ·				1 —	VALVE BALL SEAL(8)	OK []	NA 🔲	REPLACED
11. HYDRANT PAINTED	YES 🔲	COLOUR_			. VALVEBALL BOTTOM	ox □		REPLACED
	NO 🗀			1 —	. VALVE BALL RUBBER	ox □	NYA 🗆	REPLACED
12. HYDRANT PUMPED OUT	YES 🖳		% □	1	). VALVEBALLTOP	ox □	NEA L.	PEPLACED
	N/A 🖸			·	I. MAIN VALVE SEAT	ox □	•	PEPLACED
13. GROUND FLANGE	SAFETY	BURIED []	DAMAGED	_	2. MAINVALVE SEAT SEAL(8)	ox □		REPLACED
	sout 🖾	N/A LJ	DAVAGED	<b>—</b>	B. DRAINVALVE	<u>∝ □</u>		REPLACED
14. REQUIRES BARREL EXTEN	TION		NVA 🗆	·	I. DRAINVALVESEAL(8)	<u>∝ □</u>	CLEARED	MEPLACED
				·	S. DRAINVALVE PORT(S)	<u>ox □</u>	NA 🗆	PEPLACED
15. PUMPER NOZZLE	YES D		TYPE	_	L DRAINVALVE COTTER PIN(S)	∝ <u></u>	14 L	REPLACED
<u> </u>	NO E				7. LOWER BARREL	<u>∝ □</u>	NA 🗀	REPLACED
16. NOZZLE ORIENTATION	ox 🗗		MPROPER [	(	LOWER BARREL FLANGE(S)	<u>∝ □</u>	- Max (	REPLACED
<del></del>				<b>—</b>	9. UPPER BARREL	<u> </u>	N#A 🔲	REPLACED
17. TRAFFIC BOLLAROS	ox 🗀	NVA I			UPPER BARREL FLANGE(5)	- ox □	NA 🗆	REPLACED
	Mysep 🗆		<del></del>		1. BARRELEXTENTION(8)	<u>∝ □</u>	NA 🗆	REPLACED
SERVICED BY:		. 1/			2. FLANGE GASKET(8)	ox □	NA D	REPLACED
	[ / }\gamma\chi				3. FLANGE BOLTS	ox □	MA []	REPLACED
					4. BOOT	ox □		REPLACED
CUSTOMER REPRESEN	NTATIVE:			_	6. NOZZLE(S)	ox □		REPLACED
				_	6. NOZZLE CAP(8)	ox □		REPLACED
				1	7. NOZZLE RETAINER(8)	ox □		72.0.00
COMMENTS:				_	A SEUDO	OK [		
				_	<b>9.</b> 075ER <b>9.</b> 075 F	<u>ox                                 </u>		
····					N OTHER	ox [		
,				_	M. 07:558	<u>ж</u> _		
					2. OTHER			
				1 _	<b>3.</b> → 27H-2F.	OK [	<u> </u>	





			7		
CUSTOMER NAME: Tiponto	Meter 200	HYDRANT LOCATION:	nth Am	urican	Doma
SERVICE ADDRESS: 3/0/A	Old Kind Are	HYDRANT MAKE: MG	7		_
Suita	Scarborough	DATE: Dec 23/9	18		
ANNUAL PREVENTATIVI		ADDITI	ONAL WO	RK	
		to BOUNTTONED	ox 🗆	NWA 🗀	REPLACED
1. SECONDARY VALVE 4 north	OK C CLOSED CLOSED C	18. BONNETCOVER	<u>∝ □</u>	NVA 🗆	REPLACED
LOCATED		19. BONNETBOLTS	ox □		REPLACED
2 HYDRANT OPERATION OR	OK OFFICULT OF INCPERABLE OF	20. BONNET 21. BONNETSEAL	ox □		REPLACED
<b>α.</b> ⊔		22. OPERATING NUT	<u>∝ □</u>		REPLACED [
3. CHECK BARREL FORWATER WET DRY	AMT. OF WATER	23. OPERATING NUT O-PING(S)	<u> </u>	N/A 🗆	PEPACK [
		24. STUFFING BOX	ox 🗆	N/A 🗆	REPLACED [
4. CHECK CAP GASKETS OK	REPLACED	25. THRUST BEARING	ok □	N/A 🔲	REPLACED [
		28. SEARING HOUSING	o× □	N/A 🔲	REPLACED [
5. CHECK NOZZLES & THREADS OK	R/S AMAGED DAMAGED C	27. BEARING HOUSING BOLTS	ок 🛚	N/A 🔲	REPLACED
LEAKING L.J	TEXTED E	28. HOUSING COVER	ox □	N/A 🔲	PEPLACED [
6. LUBRICATE HYDRANT YES	NOT REQUIRED	29. HOUSING COVER BOLTS	ок 🗆	N/A 🔲	REPLACED [
		30. BEARING HOUSING SEAL(S)	ок 🔲	N/A 🗆	REPLACED [
7. LUBE SCREW OK C	MISSING REPLACED	31. UPPER OPERATING ROD	ox □		REPLACED [
	7 [ ] [	32. LOWER OPERATING ROD	oĸ 🛚		REPLACED [
8. FLOWTEST P	TITOTUSGPM	39. ROD COUPLING	ок 🗖	N/A 🔲	REPLACED
0.7		34. COUPLING BOLTS	ок 🗌	N/A 🗌	PEPLACED [
PRESSURE TEST C 7. PSIG	PASSED FALED	36. LOWER ROD NUT(S)	ok 🔲		REPLACED [
YES T		36. LOWER ROD STOP PIN/PLATE	oĸ □	N/A 🔲	PREPLACED [
10. COLOUR CODED NO	COLOUR	37. VALVE BALL SEAL(5)	ox □	N/A 🗌	REPLACED
YES 🗌		38. VALVE BALL BOTTOM	ок 🗀		REPLACED [
11. HYDRANTPAINTED NO 1	COLOUR	39. VALVE BALL RUBBER	ox □		MEPLACED [
12 INCOME TO MES TO YES TO	~ =	40. VALVE BALL TOP	ox 🛘	N/A 🗆	REPLACED
12. HYDRANT PUMPED OUT		41: MAIN VALVE SEAT	ox 🗀		REPLACED
13 COOLINGS SAFETY	BURIED ( LEAKING [	42. MAIN VALVE SEAT SEAL(S)	o× □		REPLACED [
13. GROUND FLANGE SOUD SOUD	NA DAMAGES L	43. DRAINVALVE	ox 🛮		REPLACED (
14. REQUIRES BARREL EXTENTION		44. DRAINVALVE SEAL(S)	ox □		REPLACED
14. RECUIRES BANNELEA PER PORT		45. DRAINVALVE PORT(5)	<u>ox □</u>	CLEARED .	REPLACED [
15. PUMPER NOZZLE YES		46. DRAINVALVE COTTER PIN(S)	<u> </u>	NA 🛄	REPLACED
15. PUMPER NOZZLE NO 🖸		47. LOWER BARREL			REPLACED
16. NOZZLE ORIENTATION OK	MPROPER [	48. LOWER BARREL FLANGE(S)	× □	N/A 🗌	REPLACED
10.110.22		49. UPPER BARREL	<u>∝ □</u>		REPLACED !
17. TRAFFIC BOLLARDS OK	NA Z TODOLOSE C	80 UPPERBARREL FLANGE(S)	× □	N/A 🗆	REPLACED
DAMAGED [	$\overline{}$	51. BARREL EXTENTION(S)	<u>∝ □</u>	NKA 🛄	REPLACED
SERVICED BY:	+(-)	52. PLANGE GASKET(S)	oĸ □	N/A 📋	REPLACED
Town		53. PLANGE BOLTS	<u>∝ □</u>	N/A []	REPLACED
100		54. BOOT	ox □	N/A 🗌	REPLACED
CUSTOMER REPRESENTATIVE:		55. NOZZLE(S)	ox □	RECAULICED [	REPLACED
		SE. NOZZLECAP(S)	ox □	N/A 🔲	REPLACED
<u></u>		57. NOZZLE RETAINER(8)	<u> </u>		
COMMENTS:	. <u> </u>	80. 111.12 G	<u> </u>		
		59. ************************************	<u> </u>		
		80. 77	<u> </u>		
•		61. *********	ox □	<del> </del>	
		<b>62</b> 07-55			
		<b>63</b> . (2.6 m)	OK □		





					<del></del>	
CUSTOMER NAME: Toronto	Metro -	200	HYDRANT LOCATION:	ws	rrana	Kestau
SERVICE ADDRESS: 3/0/A	Old Fin	uch trop	HYDRANT MAKE: AU/	<b>\</b>		
	Jean 1	mark	DATE: / 1/2 23/9	8		
ANNUAL PREVENTATIV	E MAINTENANC	E (APM)	ADDITIO	ONAL WO	RK	
ANNOALFILLTEITATI	<del></del>		18. BONNETCOVER	ox 🗆	N/A 🔲	PEPLACED .
1. SECONDARY VALVE	OK O	CLOSED D	18. BONNETBOLTS	o× □	N#A 🔲	REPLACED [
LOCATED			20. BONNET	ox 🗆		REPLACED
2 HYDRANTOPERATION OF C	OK 2	LEAKING L	21. BONNET SEAL	ox □		REPLACED [
	· · · · · · · · · · · · · · · · · · ·		22. OPERATING NUT	ox □		REPLACED [
3. CHECKBARREL FORWATER WET DRY	AMT. OF WATER		23. OPERATING NUT O-PING(S)	ок□	N/A 🔲	REPACK [
			24. STUFFING BOX	ox □	N/A 🗆	REPLACED [
4. CHECK CAP GASKETS OK		REPLACED .	25. THRUST BEARING	ox □	NYA 🗆	REPLACED _
		LCCSE [	26. BEARING HOUSING	ok 🗌	N/A 🗆	REPLACED
5. CHECK NOZZILES & THREADS ON LEAKING	R/S []	DAMAGED	27. BEARING HOUSING BOLTS	ox 🗆	N/A 🔲	REPLACED L
(EARNO L)	<del></del>		28. HOUSING COVER	ox □	NVA 🗆	REPLACED [
8. LUBRICATE HYDRANT YES 🗗		NOT REQUIRED	29. HOUSING COVER BOLTS	ox □	N/A 🔲	REPLACED
	<u>/</u>		30. BEARING HOUSING SEAL(S)	ox 🗆	NA 🗆	REPLACED [
7. LUBE SCREW OK	MISSING 🗆	REPLACED [	31. UPPER OPERATING ROD	ox □		REPLACED
	832		32. LOWER OPERATING ROD	OK 🔲		REPLACED
a FLOWTEST 20	PITOT	USGPM	33. ROD COUPUNG	ox 🗆	N/A 🔲	REPLACED [
		FACED [	34. COUPLING BOLTS	ox 🗆	NVA 🔲	REPLACED
9. PRESSURETEST C PSIG	PASSED Z	PALES CA	35. LOWER ROD NUT(8)	ок 🗆		MEPLACED [
YES 🗆	COLOUR		36. LOWER ROD STOP PIN/PLATE	ox □	NYA 🗆	REPLACED [
10. COLOURCODED NO	00000102		37. VALVE BALL SEAL(S)	<u> </u>	NA 🗆	REPLACED (
YES 🗍	colous		38. VALVE BALL BOTTOM	<u> ∝ □</u>		REPLACED
11. HYDRANT PAINTED NO [			39. VALVE BALL RUSBER	<u> </u>		REPLACED
YES 🗆		to □	40. VALVEBALLTOP	<u> ∝ □</u>	N/A 🔲	MEPLACED
12. HYDRANT PUMPED OUT NA L		<del></del>	41. MAIN VALVE SEAT	ox □		PEPLACED
13. GROUND FLANGE SAFETY	BURKED 🔲	eakha 🗏	42. MAIN VALVE BEAT SEAL(S)	<u> </u>		REPLACED
soup 🗆	NVA 🗆	DAMAGED	43. DRAINVALVE	ox □		REPLACED
14. REQUIRES BARREL EXTENTION		NA 🗆	44. DRAINVALVE SEAL(S)	<u> </u>	CLEARED	REPLACED
			46. DRAINVALYE PORT(S)	<u> </u>	NYA 🗆	REPLACED
15. PUMPER NOZZEE YES		TYPE 57	48. DRAINVALVE COTTER PIN(8)	ox □	<u> </u>	REPLACED
NO LI			47. LOWER BARREL	<u> </u>	N/A []	REPLACED
16. NOZZLE ORIENTATION OK		іменовен 🖸	48. LOWER BARREL FLANGE(8) 49. UPPER BARREL	ox □		REPLACED
		/	50 UPPER BARREL FLANGE(5)	ox 🗆	N/A 🔲	REPLACED
17. TRAFFIC BOLLARDS OK	NA 🗗	TEDELESE 🗆	81. BAPPELEXTENTION(S)	<u>∝ □</u>	NVA 🗆	REPLACED
DAMAGED DAMAGED			52. PLANGE GASIKET(S)	ox □	N/A 🗆	PEPLACED
SERVICED BY:			53. FLANGE BOLTS	ox □	N/A 🗌	REPLACED
			54. BOOT	<u>ок</u> 🗆	N#A [	REPLACED
	<u> </u>		56. NOZZLE(S)	ox 🛘	RECAULKED [	REPLACED
CUSTOMER REPRESENTATIVE:			58. NOZZLE CAP(S)	oĸ []		PEPLACED
			67. NOZZLE PLETAINER(8)	ок 🔲	N/A [	) REPLACED
			58. CTHER	ок 🗀		
COMMENTS:			<b>69.</b> 3°488	OK 🗆		
			<b>80</b> . 기원원	ок [		
			61. CTHER	ok [		
			62. 5" <u></u> "	ок [		
			<b>3.</b> 0756	ок 🗀	] <u> </u>	





					——————————————————————————————————————	-/ / /	77 17
CUSTOMER NAME: To	ronto	Metro	Zvo	HYDRANT LOCATION:	eth of	Chutak	Levilden
SERVICE ADDRESS: 3	(0/A 1	Old Fin	rd Ave	HYDRANT MAKE:			
	<u></u>	Searly	noust	DATE: Dec 23 PS	8		
ANNUAL PREVI	ENTATIVE		,	ADDITIO	ONAL WO	RK	
	<u></u>			18. BONNETCOVER	ok 🗆	N/A 🗆	REPLACED
1. SECONDARY VALVE		OK []	CLOSED L	19. BONNETBOLTS	oĸ □	NYA 🔲	REPLACED
	LOCATED		<del>/</del>		<u>∝ □</u>		REPLACED
2 HYDRANT OPERATION	OR Z	ox 🗵	NOPERABLE	20. BONNET 21. BONNET SEAL	ox □		REPLACED
		DIFFICULT [	WOPE-ASSE	22. OPERATING NUT	oĸ □		REPLACED [
3 CHECKBARRELFORWATE	R WET	AMT. OF WATER		23. OPERATING NUT O-RING(S)	- <del></del>	N/A 🔲	REPACK [
	DAY-			24. STUFFING BOX	ox □	N/A 🗆	REPLACED
4. CHECK CAP GASKETS	ox 🗗	_	REPLACED	25. THRUST BEARING	ox □	N/A 🔲	REPLACED [
		<del></del>		26. BEARING HOUSING		N/A 🗆	REPLACED [
5. CHECK NOZZLES & THREAT	DS OK	R/S 🗹	☐ 3500L ☐ 350AMAC	27. BEARING HOUSING BOLTS	ox □	N/A 🔲	REPLACED [
	LEAKING [	LEADED 🗆	UARAGE L	28. HOUSING COVER	ox □	N/A 🗆	REPLACED
6 LUBRICATE HYDRANT	YES 🗗		NOT REQUIRED	29. HOUSING COVER BOLTS	oĸ □	N/A 🗆	REPLACED [
				30. BEARING HOUSING SEAL(S)		N/A 🗀	REPLACED [
7. LUBE SCREW	ox 🗹	MISSING	REPLACED [	31. UPPER OPERATING ROD	ок 🗆		REPLACED [
	<u> </u>	7 77 7		32 LOWER OPERATING ROD	ox □	···· · · · · · · · · · · · · · · · · ·	REPLACED []
a FLOWTEST	/ PI	тот <u>690</u>	USGPM	33. ROD COUPLING	ox □	NVA 🗆	REPLACED (
0 120111601 3			/	34. COUPLING BOLTS		N/A 🗆	PEPLACED
PRESSURETEST 6.3	L PSIG	PASSED	FARED 🗔		ox □		REPLACED
			<u> </u>	36. LOWER ROD STOP PINPLATE	<u>∞ □</u>	N/A 🔲	REPLACED [
10. COLOUR CODED	YES D	COLOUPL	<del></del>		ox □	N/A 🗆	REPLACED [
				37. VALVE BALL SEAL(S)	ox □		REPLACED
11. HYDRANT PAINTED	YES 🔲	COLOUR		38. VALVE BALL BOTTOM 39. VALVE BALL RUBBER	ox □		REPLACED [
<del></del>	NO []	<del></del>			<u> ∝ □</u>	N/A 🗆	REPLACED [
12. HYDRANT PUMPED OUT	YES 🔲		⊹a <u>□</u>	40. VALVE BALL TOP	ox □	0	PEPLACED
	NA 🗆			41. MAIN VALVE SEAT	ox □		REPLACED [
13. GROUND FLANGE	SWETY E	BURIED	SAMAGED TO	42. MAINVALVE SEAT SEAL(S)  43. DRAINVALVE	<u>∝ □</u>		REPLACED [
	soup 🛄	NA L	34.4320 12		<u>∝ □</u>		PEPLACED [
14. REQUIRES BARREL EXTER	чтом		NA 🗆	44. DRAINVALVE SEAL(S)  45. DRAINVALVE PORT(S)	ox []	CLEARED	REPLACED [
			57	46. DRAINVALVE COTTER PIN(S)	× □	NVA 🗆	REPLACED [
15. PUMPER NOZZLE	YES 🖸		TYPE		<u>∝ □</u>		REPLACED [
	NO 🗆			47. LOWER BARREL	<u>∝ □</u>	N/A 🔲	REPLACED [
16. NOZZLE OFIENTATION	∝⊡∕	•	MERGEER I	48. LOWER BARREL FLANGE(S)	ox □		REPLACED [
			/	49. UPPER BARREL	ox □	NA 🖸	REPLACED [
17. TRAFFIC BOLLABOS	ox □	NA E		50 UPPER BARREL FLANGE(S)	<u> </u>	NYA 🗆	REPLACED [
	DAMAGED	1	$\longrightarrow$	51. BARREL EXTENTION(S)	ox □	NYA 🗆	REPLACED [
SERVICED BY.	X	1	/	52. PLANGE GASKET(8) 53. PLANGE BOLTS	<u> </u>	NA 🗆	REPLACED [
10	$\mathcal{N}_{\mathcal{N}}$		-		ok 🗆	NA 🗆	REPLACED [
		<u> </u>		54. BOOT 55. NOZZI E(S)	<u>∝ □</u>	RECAULIŒO 🗌	REPLACED [
CUSTOMER RÉPRESE	NTATĮVE:			55. NOZZLE(S) 56. NOZZLE CAP(S)	ox □		REPLACED [
	,			57. NOZZLE RETAINER(S)	<u>∝ □</u>	N/A 🗆	REPLACED [
				88. CONCE	<u> </u>		F
COMMENTS:				59. (***EF4	ox □		
				60. y - c - c	<u>∞, □</u>		Č
				81. (*) = 54.	<u>∞. □</u>		
					ox □		
		<del>_</del>		<b>62.</b> (3° ÷ )	ox □		
				<b>63</b> >*****	ب		





				· ·
CUSTOMER NAME: Torranto Metro Loo	HYDRANT LOCATION:	st of	Africa	m journ
SERVICE ADDRESS: 3(e/A Old Kind Ave	HYDRANT MAKE: Cent	uris	/	•
Sentomed	DATE: Her 23/95	7 ′		
ANNUAL PREVENTATIVE MAINTENANCE (APM)	ADDITIO	ONAL WO	RK	
	18. BONNETCOVER	ок 🔲	N/A 🔲	REPLACED [
1. SECONDARY VALVE OK COLOSED	19. BONNETBOLTS	ox 🗆	N/A 🗀	REPLACED [
	20. BONNET	ок 🔲		REPLACED [
2 HYDRANT OPERATION ON ON ON OFFICULT MOPERATED	21. BONNET SEAL	ок□		REPLACED [
	22. OPERATING NUT	ox 🗆		REPLACED [
3. CHECKBARGELFORWATER WET AMT. OF WATER	23. OPERATING NUT O-RING(8)	ox 🗆	N/A 🔲	REPACK [
	24. STUFFING BOX	ox □	NVA 🗆	REPLACED [
4. CHECKCAPGASKETS OK PREPLACED	25. THRUST BEARING	ox 🗆	N/A 🔲	REPLACED [
OX T R/S T LOCUSE LI	28. BEARING HOUSING	ox 🗆	N/A 🔲	REPLACED [
5. CHECK NOZZLES & THREADS ON A LEADED LEADED LEAVED DAMAGED	27. BEARING HOUSING BOLTS	ox 🔲	N/A 🗀	MEPLACED
	28. HOUSING COVER	_ ox □	N/A 🗌	MEPLACED [
6. LUBRICATE HYDRANT YES. NOT REQUIRED	29. HOUSING COVER BOLTS	ox []	NVA 🔲	REPLACED [
	30. BEARING HOUSING SEAL(5)	ox □	NVA 🗆	REPLACED [
7. LUBE SCREW OK MISSING ASPLACED	31. UPPER OPERATING ROD	ox []		PIEPLACED [
	32. LOWER OPERATING ROD	ox □		REPLACED [
8. FLOWTEST /8 PITOT /7 USCPM	33. ROD COUPLING	<b>∞</b> □	NKA 🔲	REPLACED
	34. COUPLING BOLTS	ox 🗀	N/A 🔲	REPLACED
9. PRESSURETEST C PSIG PASSED FALED	35. LOWER ROD NUT(S)	ок 🔲		PEPLACED [
YES COLOUR	36. LOWER ROD STOP PINPLATE	ox □	N/A 🔲	REPLACED (
10. COLOUR CODED NO COLOUR COLOUR	37. VALVE BALL SEAL(S)	ox 🛘	NVA 🔲	REPLACED [
VEC [ ]	38. VALVEBALL BOTTOM	ox □		REPLACED (
11. HYDRANT PAINTED NO COLOUR	30. VALVEBALL RUBBER	ox □		PREPLACED
TO LOCALITY WEST OF THE TOTAL THE TO	40. VALVE BALL TOP		N/A 🗆	REPLACED [
12. HYDRANTPUMPED OUT WAS 1	41. MAIN VALVE SEAT	ок 🔲		REPLACED
AS COCUMENS ANCE SAFETY BURSED E LEARING E	42. MAIN VALVE SEAT SEAL(S)	ox □		PEPLACED [
13. GROUND FLANGE SOLID NIA DAMAGED	43. DRAINVALVE	ок 🔲		REPLACED
	44. DRAINVALVE SEAL(S)	ок 🗆		MEPLACED
14. REQUIRES BARRIEL EXTENTION NA	45. DRAINVALVE PORT(S)	ок 🗋	CLEARED	MEPLACED
YES D TYPE	48. DRAINVALVE COTTER PIN(S)	oĸ □	N/A 🗌	REPLACED
15. PUMPER NOZZLE YES LITYPE	47. LOWER BARREL	ox □		REPLACED
	48. LOWER BARREL FLANGE(S)	ox 🗆	NKA 🔲	REPLACED
16. NOZZLE ORIENTATION OK D MPROPER	49. UPPER BARPEL	ox 🔲		REPLACED
TRAFFIC BOLLARDS OK	50 UPPER BARREL FLANGE(S)	ox □	N/A 🔲	REPLACED
17. TRAFFIC POLLARDS DAMAGED	51. BARRELEXTENTION(S)	ok .□	NA 🗆	REPLACED
SERVICED BY:	52. FLANGE GASKET(8)	. ок 🔲	NWA 🔲	REPLACED
SHAVICED BY.	53. FLANGE BOLTS	ок 🔲	NKA 🔲	REPLACED
	54. BOOT	ox □	NYA 🔲	REPLACED
CUSTOMER REPRESENTATIVE:	55. NOZZLE(S)	ок 🛚	RECAULKED [	REPLACED
CUSTOMER REFRESENTATION.	86. NO27LE CAP(S)	ox □		REPLACED
	57. NOZZLE RETAINER(S)	ox 🗅	NIA 🔲	REPLACED
	<b>58</b> , 675-65	ox □		
COMMENTS:	<b>59.</b> ⊇7 <del>⊢€</del> .Fr	ок 🔲		
	<b>80.</b> OTHER	ox □		
	81. <del>(75245</del> 4	ox □		
•	<b>62</b> , ეты <u>е</u> ц	ок□		





		11 -				77	· +
CUSTOMER NAME:	ronto	Metro	100	HYDRANT LOCATION:	est a	1 soc	ely_
SERVICE ADDRESS: 3	614	Old Fin	rch twe	HYDRANT MAKE: ML	7		
		Searla	rough	DATE: Dec 33/	78		
ANNUAL BEST			7	ADDITIO	ONAL WO	RK	
ANNUAL PREV	ENTAIIV	E MAIN I ENAN	CE (APIVI)	AUUIIII			
1. SECONDARY VALVE	3 west	ок ₫	CLOSEO 🔲	18. BONNETCOVER	<u> </u>	N/A 🛄	REPLACED [
	LOCATED	NOTVISIBLE 🗌	NOPERABLE [	19. BONNETBOLTS	<u> </u>	N/A 🔲	REPLACED L
2. HYDRANT OPERATION	OR 🗹	ox <b>⊴</b>	LEAKING	20. BONNET	ox □		REPLACED
2 1110144110121111011	or 🗆	DIFFICULT [	#OPERABLE	21. BONNETSEAL	ox □		REPLACED
3. CHECK BARREL FOR WATE	R WET	AMT. OF WATER		22. OPERATING NUT	ox □	N/A 🗌	REPACK
	DRY 🖸	/		23. OPERATING NUT O-PING(S)	<u> ∝ □</u>	NA D	REPLACED [
4. CHECK CAP GASKETS	ox 🗹	_	REPLACED 🔲	24. STUFFING BOX	ox □		REPLACED
		<i></i>		25. THRUST BEARING	ox □	NA 🗆	REPLACED
5. CHECK NOZZLES & THREA	<sub>D3</sub> ox [Z̄	Pvs ☐	LOCSE	28. BEARING HOUSING 27. BEARING HOUSING BOLTS	ox □	NYA 🗆	REPLACED [
	LEAKING 🗆	LEADED 🗆	DAMAGED L	28. HOUSING COVER	ox □	NVA 🗆	REPLACED [
6. LUBRICATE HYDRANT	YES 🗹		NOT REQUIRED 🔲	28. HOUSING COVER BOUTS	<u>∝ □</u>	N/A 🗍	REPLACED
				30. BEARING HOUSING SEAL(8)	oĸ □	N/A 🗆	REPLACED
7. LUBE SCREW	ox <b>♂</b>	MESSING 🗆	REPLACED 🗖	31. UPPER OPERATING ROD	o× □		REPLACED
		<u></u>		32. LOWER OPERATING ROD	ox □		REPLACED .
a PLOWIEST THE	red.	тот	U8GPM	33. ROD COUPLING	ox 🗆	N/A 🗆	REPLACED (
	• 77			34. COUPLING BOLTS	ok 🗆	N/A	REPLACED [
9 PRESSURETEST C	PSIG	PASSED 🗹	FAILED	36. LOWER ROD NUT(S)	ox □		REPLACED
	YE8 🗆			36. LOWER ROD STOP PINPLATE	ок 🔲	N/A 🗆	REPLACED _
10. COLOUR CODED	₩ <b>3</b>	COLOUPL		37. VALVE BALL SEAL(S)	oĸ □	N/A 🔲	REPLACED 🔲
	YES 🗌			38. VALVEBALL BOTTOM	ox □		REPLACED [
11. HYDRANT PAINTED	×0 [2]	COLOUPL		39. VALVE BALL PUBBER	ox □		REPLACED [
	YES 🗆		NO []	40. VALVEBALLTOP	ox □	NFA 🔲	REPLACED [
12. HYDRANT PUMPED OUT	NVA 🗖			41. MAIN VALVE BEAT	ox []		REPLACED [
	SAFETY 13	BURIED [	LEAKING 🔲	42. MAIN VALVE BEAT SEAL(S)	ox □		REPLACED 🗌
13. GROUND FLANGE	soup 🗆	N/A 🗆	DAMAGED	43. DRAINVALVE	ox □		REPLACED
			NA 🗆	44. DRAIN VALVE SEAL(S)	ox □		REPLACED [
14. REQUIRES BARREL EXTE	MINOR			45. DRAINVALVE PORT(S)	oĸ □	CLEARED 🗌	REPLACED
44 CHARGO NO.774 E	YES 🔲		TYPE	46. DRAINVALVE COTTER PIN(S)	ox 🗆	NYA 🗆	REPLACED
15. PUMPER NOZZLE	NO 🖸			47. LOWER BARREL	<u> </u>		REPLACED L
18. NOZZLE ORIENTATION	ox 2		BAPROPER 🔲	48. LOWER BARREL PLANGE(\$)	ok □	NWA 🔲	REPLACED
18. NOZZLE ONIENTATION	<u> </u>	<u></u>		49. UPPER BARREL	<u> </u>		REPLACED [
17. TRAFFIC BOLLARDS	- ox □	<del></del>		50 UPPER BARRIEL FLANGE(S)	ox □	N/A []	REPLACED [
	AMAGES T		<del>}</del>	\$1. BARREL EXTENTION(S)	ox 🗆	NA 🗆	REPLACED [
SERVICED BY	//		}	52. PLANGE GASKET(8)	ox □	N/A L	REPLACED [
	100		ノ	53. FLANGE BOLTS	ok □	N/A	REPLACED
	(G)			84. BOOT	ox □	PLECAULICED	REPLACED
CUSTOMER REPRESE	NTATIVE:			66. NOZZLE(8)	ox □	HECKODED [	REPLACED [
				56. NOZZLECAP(S)	ox □	N/A 🗆	REPLACED
	,		+ //	67. NOZZLE RETAINER(S)	<u>∝ □</u>		
COMMENTS: Qual	rant	imalke	to Miri	60. CTMSR 80. WUCG	ox □		
F. 1	J.	1.16		<b>89.</b> 275€E	ox □		<del> </del>
MAT ALL	10	waining	y ·	80. 07 <del>-65</del> 81. 07 <del>-65</del>	<u> </u>		
MARINANA	IN IM	MILLIAN HO	due	62. OTHER	<u>∞.</u> □		C 0 0
-	VI XII	~ //~ // V	TIL	63. OTHER	ox □		
		1 17 4	, /// NT				





								<del>,</del>	
CUSTOMER NAME: 10	ronto	Metro	200.	HYDR	ANT LOCATION:	uth	of s	ocu	ety
SERVICE ADDRESS: 3	lel A	Old Fin	uch Ave	HYDR.	ANT MAKE: ML	7_	<i>V</i>		
		Scarlo	monet	DATE:	Dec 23/9	18			
ANNUAL PREVE	NTATIVE	MAINTENAN	CE (APM)		ADDITIO	ONALV	VORK		
		ox 🛛	CLOSED []	18. 5	ONNETCOVER	ok [	N/A	☐ REP	LACED
1. SECONDARY VALVE	OCATED	NOTVISIBLE 2	NOPEFABLE		ONNET BOLTS	ox [	N/A	REP	LACED (
		∞ E	LEAKING []		ONNET	ox [		REP	LACED
2. HYDRANT OPERATION	OR Z	DIFFICULT [	**OPERABLE [		ONNET SEAL	ox [	}	REF	LACED
<del></del>	<u></u>	AMT. OF WATER		22. 0	PERATING NUT	<b>о</b> к [		REF	PLACED
3. CHECK BARREL FOR WATER	WET D	AMI. OF WATER		23. 0	OPERATING NUT O-PING(S)	ox [	· N/A	D P	EPACK
				<u> </u>	STUFFING BOX	ok [	] N/A	☐ RES	PLACED
4. CHECK CAP GASKETS	ок 🗷	/	REPLACED L	25. 1	HRUST BEARING	ox [	) NA	PAE#	PLACED
	- OV [2	Avs 🖸	ιαsε []	26. (	SEARING HOUSING	OK [	) NYA	☐ PAEJ	PLACED
5. CHECK NOZZLES & THREAD	s OK 🗗 EAKING 🗆	LEADED []	SAMAGED		SEARING HOUSING BOLTS	ок [	) NYA	☐ RE	PLACED
					OUSING COVER	ок [	] NYA	☐ RE	PLACED
6 LUBRICATE HYDRANT	YES 🗗	-	NOTREQUIRED [_]	29. 1	IOUSING COVER BOLTS	ok [	) NYA		PLACED
				30. (	MEARING HOUSING SEAL(S)	ок [	] NVA	☐ AE	PLACED
7. LUBE SCREW	ок 🗷	MISSING 🗍	REPLACED L	31. 1	JPPER OPERATING ROD	ok [		RE	PLACED
	J	127.	7	32.	OWER OPERATING ROD	ok [	)	RE	PLACED
& FLOWTEST	7 PIT	OT	USGPM	83.	ROD COUPLING	ox [	] NVA	☐ PKE	PLACED
	2			34. (	COUPLING BOLTS	ox [	] N/A	☐ PE	PLACED
9. PRESSURETEST C.S	7) P8/0	PASSED 🗗	FARLED	36.	LOWER FIOD NUT(S)	ok [	)	RE	PLACED
	YES 🗆 🦯	COLOUR		36.	LOWER ROD STOP PINPLATE	ok [	] N/A	□ R€	PLACED
10. COLOUR CODED	NO 🗹			37.	VALVE BALL SEAL(S)	ox [	] N#A	☐ RE	PLACED
	YES 🔲 🍃	cacur		38.	VALVE BALL BOTTOM	OK [	]	RE	PLACED
11. HYDRANT PAINTED	NO 🗗	cucon_		39.	VALVE BALL FIUBBER	ож [	]	RE	PLACED
	YES 🗌			40.	VALVE BALL TOP	ож [	] N¥A	RE	PLACED
12. HYDRANTPUMPED OUT	NVA 🖸	/		41.	MAIN VALVE SEAT	ox [	]	PE	PLACED
	SAFETY 3	BURRED []	LEAKING 🗀	42.	MAIN VALVE SEAT BEAL(S)	ox [		RE	PLACED
13. GROUND FLANGE	90UD 🔲	N/A 🔲	DAMAGED III	43.	DRAINVALVE	ок [		RE	PLACED
	201			44.	DRAINVALVE SEAL(S)	ok [	]	RE	PLACED
14. REQUIRES BARREL EXTEN	IKON			45.	DRAINVALVE PORT(S)	ок [	CLEARED	☐ PE	PLACED
15. PUMPER NOZZLE	YES 🗆		TYPE	48.	DRAINVALVE COTTER PIN(S)	ox [	] <del>N/</del> A	RE	PLACED
15. PUMPER NOZZLE	NO 🖸	/		47.	LOWER BARREL	ox [	]	RE	PLACED
16. NOZZLE ORIENTATION	ox 🗗		MPROPER []	48.	LOWER BARREL FLANGE(8)	ОК [	] N/A	<u>□ 86</u>	PLACED
16. NOZZE ONENIATION		/		49.	UPPER BARREL	ОК [	]		PLACED
17. TRAFFIC BOLLARDS	ox 🗗	N/A 🗆	TOO CLESE	60	UPPER BARREL FLANGE(S)	ок [	AVA .		PLACED
II. IRAPPOBATA	MANAGED 🗆			<b>51.</b>	BARREL EXTENTION(8)	OK [	NM		PLACED
SERVICED BY:	<b>X</b> —	-1/1		62.	PLANGE GASKET(S)	ок [	<u> </u>		EPLACED
AU	17/1	/		53.	FLANGE BOLTS	ox [			PLACED
	<i>[ (2)</i> (	,		64.	BOOT	OK [	N/A	=	EPLACED
CUSTOMER REPRESEN	TATIVE:			55.	NOZZLE(S)	ок [			EPLACED
				56.	NOZZLE CAP(S)	OK [			EPLACED
				57.	NOZZLE RETAINER(S)	OK [			EPLACED
COMMENTS:				58.	£T <del>-</del> gra	OK			
	<u> </u>			<b>89</b> .	STHER.	ok [			
,				60.	<b>5</b> 7+46	ОК			
				61.	much	OK		<del> </del>	
				62	<u>ن بنی</u> ت	OK			
				63.	White:	OK	3		





SERVICE ADDRESS: 301 A Old Finch Ave	HYDRANT MAKE: Mu	2		· · · · · · · · · · · · · · · · · · ·
- July Sur July	11.2.2			
Mandonnas.				
NACO WO W OGA O	DATE: HEC 23/	78		= <del></del>
ANNUAL PREVENTATIVE MAINTENANCE (APM)	ADDITIO	ONAL WO	ORK	
1. SECONDARY VALVE 2 UE CLOSED ]	18. BONNETCOVER	ox □	NKA 🗆	REPLACED [
LOCATED NOTVISIBLE   NOPERABLE	19. BONNETBOLTS	ox □	N/A 🔲	REPLACED [
A MOSANTOSESATION OR S OK S LEAKING ]	20. BONNET	ox 🗆		REPLACED [
2 HYDRANTOPERATION ON DIFFICULT INCPERABLE	21. BONNETSEAL	oĸ □		REPLACED
AMT. OF WATER	22. OPERATING NUT	ox 🗆		REPLACED [
3 CHECK BARREL FORWATER DRY	23. OPERATING NUT O-RING(S)		N/A 📙	REPACK [
4 CHECK CAP GASKETS OK A PEPLACED	24. STUFFING BOX		NYA 🗆	REPLACED
4. CHECK CAP GASKETS OK LI REPLACED LI	26. THRUSTBEARING		N/A 🔲	REPLACED [
6. CHECK NOZZLES & THREADS ON A RYS COSE COSE COSE COSE COSE COSE COSE COS	26. BEARING HOUSING	<u> </u>	N/A	REPLACED
B. CHECK NOZZLES & THREADS LEAKING LEADED DAMAGED DAMAGED	27. BEARING HOUSING BOLTS	<u> </u>	N/A 🗆	REPLACED [
6. LUBRICATE HYDRANT YES NOT REQUIRED	28. HOUSING COVER	<u>ок 🗆</u>	N/A	REPLACED [
6. LUBRICATE HYDRANT YES NOT HECKINED	29. HOUSING COVER BOLTS	oK □	NA 🗆	REPLACED
7. LUBE SCREW OK MISSING THE REPLACED	30. BEARING HOUSING SEAL(S)	<u> </u>	NA 🗆	REPLACED
7. LUBE SCREW OK E MISSING E REPLACED E	31. UPPER OPERATING ROD	<u>ox D</u>		REPLACED [
A ROWTEST PURCO PITOTUSGPM	32. LOWER OPERATING ROD	<u> ∝ □</u>		REPLACED [
a PLOWITEST AUGUST PITOT SOUN	33. ROD COUPLING	×□	N/A 🔲	REPLACED (
9. PRESSURETEST & D PSIG PASSED FAILED	34. COUPLING BOUTB	× □	N/A 🔲	REPLACED [
	36. LOWERROONUT(S)	<u>∞ □</u>		PEPLACED [
10. COLOUR CODED YES COLOUR	38. LOWER ROD STOP PINPLATE	× □	N/A 🔲	REPLACED
No B	37. VALVE BALL SEAL(9)	ox □	N/A 🔲	REPLACED [
11. HYDRANT PAINTED YES COLOUR	38. VALVE BALL BOTTOM	ox □		REPLACED [
NO Z	39. VALVE BALL RUBBER	<u> </u>	N/A 🔲	REPLACED [
12. HYDRANT PUMPED OUT YES NO TO	40. VALVE BALL TOP	o× □	NA L	REPLACED
NA I	41. MAIN VALVE SEAT	ox □		REPLACED []
13. GROUNDFLANGE SAFETY BURIED AVAGED CAMAGED	42. MAIN VALVE SEAT SEAL(S)	ox □		REPLACED [
80LID NVA L CAMAGED L	43. DRAINVALVE	<u> </u>		REPLACED
14. REQUIRES BARREL EXTENTION NYA	44. DRAINVALVE SEAL(S)	ox □	CLEARED []	REPLACED [
	45. DRAINVALVE PORT(S)  46. DRAINVALVE COTTER PIN(S)	ox □	N#A 🗆	REPLACED
15. PUMPER NOZZLE  YES   TYPE  TYPE	47. LOWER BARREL	ox □		REPLACED
	48. LOWER BARREL FLANGE(S)	ox □	N/A 🗋	REPLACED
18. NOZZLE ORIENTATION OK   MEROPER	49. UPPER BARREL	ok □		REPLACED [
OK	50 UPPER BARREL FLANGE(S)	<u> </u>	N/A 🗆	MEPLACED [
17. TRAFFIC BOLLARDS OK NA TCC CLCSE	51. BARRELEXTENTION(S)	ox. □	N/A 🔘	REPLACED .
SERVICEDSKIN	82. FLANGE GASKET(8)	ox 🖸	MA 🗆	REPLACED [
	S3. FLANGE BOLTS	- o× □	NA 🗆	REPLACED [
-	54. BOOT	o× □	N/A 🗆	REPLACED [
CUSTOMER REPRESENTATIVE:	55. NOZZLE(S)	ox □	RECAULKED	REPLACED _
OGG! OHIER REPRESENTATION.	86. NOZZLE CAP(9)	ox □		REPLACED [
	57. NOZZLE RETAINER(S)	ox □	N/A 🗆	REPLACED [
COMMENTS: QUALITY UMPLYE TO MINU	58. priežie	ox □		
COMMETALS. AMOUNT MINDER IN MANY	59. Magazi	ox 🗀		
Test die Timalerature & walk-	<b>60.</b> ************************************	ox []		
me your management	61. THEE	ox 🗀		
warks.	<b>62</b> . One;	ox □		
<del></del>	<b>63</b> , 371-97	oĸ 🔲		





CUSTOMER NAME:	nonto	Metro	200	HYDRANT LOCATION:	est of	Harrot	Coge
SERVICE ADDRESS:	3CelA (	Ild Fin	ch kure	HYDRANT MAKE: ML	7		
		Scarl	rownial	DATE: Dec 23/	98		<del>, ,</del>
ANNUAL PREV	/ENTATIVE	MAINTENAN	CE (APM)	ADDITIO	ONAL WO	RK	
1. SECONDARY VALVE		ox □	CLCSED 🗋	18. BONNET COVER	ox □	NFA 🗆	REPLACED [
	LOCATED	NOTVISIBLE 🗵	*KPERABLE	19. BONNETBOLTS	<u> </u>	N/A 🗆	REPLACED .
	OR []	ox 🛭	LEAKING 🔲	20. BONNET	<u>ox □</u>		REPLACED [
2. HYDRANT OPERATION	or 🗀	DIFFICULT [	SICFERABLE 🗍	21. BONNETSEAL	<u>∝ □</u>		REPLACED .
	wet 🗆 🖊	AMT. OF WATER		22. OPERATING NUT	ox □		REPLACED [
3. CHECK BARREL FOR WAT	DRY 🖸			23. OPERATING NUT O-RING(S)	<u> </u>	NYA 🗆	REPACK [
	« <b>□</b>		REPLACED	24. STUFFING BOX	<u> </u>	NYA 🗀	REPLACED [
4. CHECK CAP GASKETS	- CA-	/		25. THRUST BEARING	ox □	NA 🗆	REPLACED [
	OX 🗹	As 🖸	LOCSE 🔲	26. BEARING HOUSING		NYA 🗆	REPLACED .
5. CHECK NOZZLES & THRE	LEAKING .	LEADED 🔲	DAMAGED 🗌	27. BEARING HOUSING BOLTS	<u>∝ □</u>	NA 🔲	REPLACED [
			NOT REQUIRED	28. HOUSING COVER	<u>∝ □</u>	NYA 🗆	REPLACED
6. LUBRICATE HYDRANT	YES 🗖		, with the control of	29. HOUSING COVER BOLTS	<u> </u>	NA 📙	PEPLACED .
	∞ B		REPLACED [	30. BEARING HOUSING SEAL(S)	× □	NYA 🗀	REPLACED [
7. LUBE SCREW	OK LI	MESING 🗆	HEPEACED III	31. UPPER OPERATING ROD	<u>∝ □</u>		REPLACED .
	30 -	1019	USGPM	32. LOWER OPERATING ROD	ox □		REPLACED _
a. FLOWTEST	<u>Х./</u> Рат	OT	050##	33. ROD COUPLING	<u> </u>	NA 🔲	REPLACED (
	44 P8IG	PASSED E	FA-LED	34. COUPLING BOLTS	<u> </u>	N/A 🛄	REPLACED [
9. PRESSURETEST 6		FX38C0 🚨		36. LOWERROD NUT(8)	<u> </u>		REPLACED [
10. COLOUR CODED	YES 🖳 🦯	COLOUR_		36. LOWER ROD STOP PINPLATE	ox □	N4 □	REPLACED
III. COCCOMODOD	NO 🗗			37. VALVE BALL SEAL(S)	<u> </u>	NVA 🛄	REPLACED [
11. HYDRANT PAINTED	YES 🗆 🖊	COLOUR		36. VALVE BALL BOTTOM	ox □		PEPLACED [
II. HIDPORTERATED	№ 🗗			39. VALVE BALL RUBBER	<u> ∝ □</u>		PEPLACED _
12. HYDRANT PUMPED OUT	YES 🗆 🖊		%≎ <u>□</u>	40. VALVE BALL TOP	ox 🗆	N/A 🗔	REPLACED [
12. 11101001110111	N/A 🖸			41. MAIN VALVE BEAT	<u> </u>		REPLACED _
13. GROUND FLANGE	SAFETY 🛄	BURIED 🗹	EARNS 🔲	42 MAIN VALVE SEAT SEAL(S)	<u>∝ □</u>		REPLACED _
	90UD 🗆	NA 🗆	LAMAGED 🗔	43. DRAINVALVE	<u> </u>		REPLACED [
14. REQUIRES BARRELEXT	ENTION		NA 🗆	44. DRAINVALVE SEAL(S)	<u> </u>		
14: 11200112001120				45. DRAINVALVE PORT(S)	<u> </u>	CLEARED .	REPLACED [
15. PUMPER NOZZLE	YES 🖳		TYPE	46. DRAINVALVE COTTER PIN(8)	<u> </u>	NA D	
	NO 🖸	<del></del>		47. LOWER BARREL	<u>∝ □</u>		REPLACED [
18. NOZZLE ORIENTATION	0x E		IMPROPER 🗀	48. LOWER BARREL FLANGE(5)	ок 🗆	N#A 🗆	REPLACED [
				49. UPPER BARREL	oĸ □	[]	REPLACED [
17. TRAFFIC BOLLARDS	· ox 🔲	NA 🖽	TOO GLOSE	50 UPPER BARRIEL RLANGE(S)	ok □	MA 🔲	REPLACED [
	DANNIGED [			51. BARRELEXTENTION(8)	ox □	NA []	REPLACED [
SERVICED BY.	X	66	)	82. FLANGE GASKET(8)			REPLACED [
1 1	1/2/			83. PLANGE BOLTS	ox □		REPLACED [
	1UA			64. BOOT	ox □	RECAULKED	REPLACED [
CUSTOMER REPRES	ENTATIVE: 📉	`		56. NOZZLE(9)	ox □_	HELMUNED []	MEPLACED [
				66. NOZZLE CAP(S)	<u>∝ □</u>	N/A 🔲	REPLACED [
				67. NOZZLE RETAINER(8)	<u>∝ □</u>	14V [7]	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
COMMENTS:				50. CTROS	<u>∝ □</u>		<del></del> }
				<b>59.</b> 07989	ox □		Ē
				60. OTHER	<u>ox □</u>	<del></del>	
				61. OTHER	<u>∝ □</u>	<del></del>	
				<b>42.</b> 0万元元 <b>42.</b> 255.45	<u> </u>		
				<b>63.</b> ⊃Σ63∄	<u>~ ∪</u>		

		A-1 HYDRANT SERVICES	550 Coronation Dr Scarborough, Ont. LTD. 282-1665	M1E 4V1	/	
	SITE NAME 7	, , ,	tro 200	DATE	Dec 21/98	3
general,	LOCATION 3	OLA Old i	wich Ave			•
	TEST DATA					
	TIME OF TEST	10:15am		-1 - 11		#14
	LOCATION OF T	EST: (FLOW) Hyd	(rant (Aus)	ralassa 19	Upnalas!	7-/1- )#
			rant (North	end of Au	stralasia L	undering )"
	MAIN SIZE	4 98 in	<u> </u>	V		
	STATIC PRESSU	•	TO DESCRIPT	ELOW/ILLS G P.M.)	RESIDUAL PRESSURE	
		OUTLETS & ORIFICE SIZE	LE PHOTPRESSURE	775-	Z//a	
	#1 #2	¥ 3 ½	12/,	363	40	
	#3 2	X 2%"	14	1236	34	
	#4					
145						
135						
130						
125						
115						
105						
j 95						
3 90						
- 80 III						
5 75 70						
75 76 65 60						
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5-	500 700	900 1050 1150 1250	1350 1450 1550	1650 1750 18	50 1950 2050	2150 2200 2250
0 200	0400 600 700 800	1000 1100 1200 13			1900 2000 21	00 2200
			FLOW U.S. G.			
mel	COMMENTS	flow	T(ST -	BCUE		
	**************************************				7nx//-	$\overline{M}$
	Authorized Signa	ature	A-1 H	YDRANT Signature_	- 10 XX 1	
	-					

550 Coronation Dr., Unit #18 Scarborough, Ont. M1E 4V1 A-1 HYDRANT SERVICES LTD. 282-1665	1
SITE NAME Toronto Matro 200 DATE DE	x 21/98
LOCATION 3/01 A Old Finch Ave	<sub>a</sub> vere <sub>a</sub> c.
TEST DATA	The second of th
TIME OF TEST 9:00 au	ge) #18 ervice) #19
LOCATION OF TEST: (FLOW) Hydrant (East side of garan	ge) His
(RESIDUAL) Hydrart ( West end of nirth &	ervice) #19
MAIN SIZE (RESIDUAL) HYDRANT ( WEST END OF MERTIN S	
STATIC PRESSURE: 50 PGI	
NUMBER OF OUTLETS & ORIFICE SIZE PITOT PRESSURE FLOW (U.S.G.P.M.) RESIDUA	L PRESSURE
=1 / × 13/4 40 518 4	5
=2 / × 2h 23 × CC	8
*3 2 × 2 / // //C/S	<u></u>
'	
145	
35	
130	
115	
105	
95 95 90 95 90 95 90 95 95 95 95 95 95 95 95 95 95 95 95 95	
75 70 65 60	
ў <sub>65</sub> — — — — — — — — — — — — — — — — — — —	
56	
40	
35 30 30 30 30 30 30 30 30 30 30 30 30 30	
25 20	
7 10 11 11 11 11 11 11 11 11 11 11 11 11	
7 0 200 400 500 600 800 1000 1100 1200 1300 1400 1500 1550 1600 1700 1800 1850 1900 195	0 2000 2050 2100 2150 2200 2
FLOW U.S. G.P.M.	
) <u>CL</u> /## LJ.C. LJ.J .IVI.	and the second
COMMENTS FICH TYST - CREAT	A second
	A

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			RANT SERVICES L	550 Coronation Dr Scarborough, Ont TD. 282-1665	. M1E 4V1	D	log
	SITE NAME _	100	nto Me	tro 200	DA	TE Dec 21	198
>	LOCATION _		Old 1	Funch An	ve		
	TEST DATA					•	<u> </u>
	TIME OF TES		1:00am	<del></del>		of English	Tent) #12
	LOCATION C		2/ /	art, C, N/E	10 11	ar milden	<u>(2)</u>
		(RESID	inch	se voo su	revian in	per purang	7 - P
	MAIN SIZE		50 psi				
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550 Coronation Dr., Unit # 18

Scarborough, On. M1E 4V1

TEL: (416) 282-1665 FAX: (416) 282-7702 1-888-FIX-A-HYD

Metro Toronto Zoo c/o
Paradigm Engineering Ltd.
1300 Don Mills Road, Suite 235,
North York, ON
M3B 2W6

Attention: Mr. Doug Shields

416-444-5211 416-444-9222

INVOICE#:

H9159-1

DATE:

December 30/98

Customers'#:
OUR JOB#:

D.Shields H9159

G.S.T. #:

R100371152

P.S.T.#:

85685569

TERMS:

**NET 15 DAYS** 

DESCRIPTION	AMOUNT	TOTAL
LOCATION: Metro Toronto Zoo		
To bill for the following:		
12 flow tests at \$75.00 each	900.00	

12 flow tests at \$75.00 each 29 hydrant a.p.m.'s at \$40.00 each

1.160.00 2.060.00

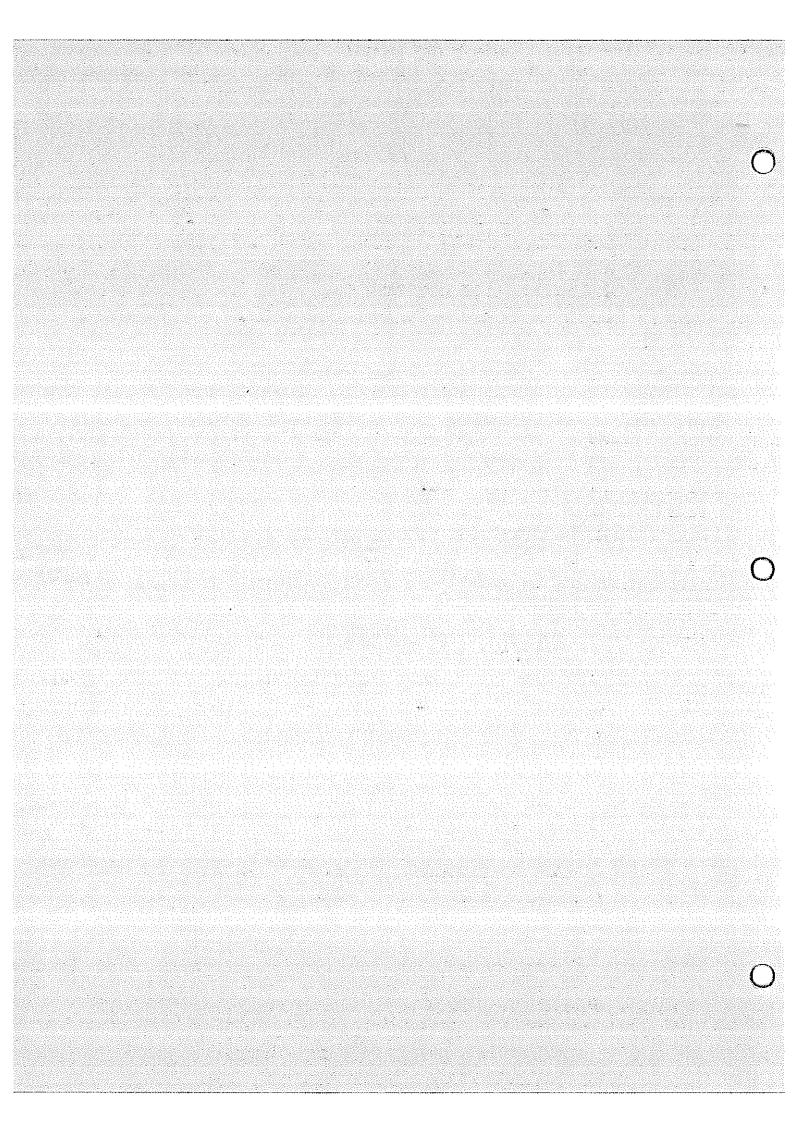
G.S.T.

144.20

TOTAL AMOUNT DUE:

\$ 2,204.20

# APPENDIX 8 GAS TEST RESULTS



Trade Gas Services (Toronto) Ltd.
29 Golden Gate Court
SCARBOROUGH, ONTARIO M1P 3A4



INVOICE

4204

(416) 293-6742 Fax (416) 293-6765 GST #R105339410

PARADIGM ENGINEERING GROUP INC.	DATE Jan 5. 1999	JOB NO
1300 Don Mills Road, Suite 235	JOB NAME Metro Zoo	
North York, Ont. M3B 2W6	JOS LOCATION	

North York, Ont. M3B 2W6	JOB LOCATION		
QUANTITY DESCRIPTION		PRICE	AMOUNT
Test checked gas supply lines as a	requested by		
Paradigm Engineering Group Inc.			
Indo-Malaya Pavilion #1 Test			
To determin the static pressure a	nd working pressure		
at three points (branch lines) of	the gas service.		
11 M meter with Fisher Type 133L-	3 Reg.		
Max inlet 60 P.S.l.			
Max outlet 2 P.S.1.			
2 - National Champion Furnaces 4,	350.000 each.		<del></del>
1 - Pool heater Hayward H-250	250,000 BTU each		
1 - DHW Aerco heater 1,	000,000 BTU each		
1 - Pool heater Hayward H-150	150,000 BTU each		
Shut off each appliance, shut gas	valve at meter		
and tested pressure + 43 P.S.1.			
Shut off appliances, shut gas, re	moved gage and		
started appliances again.			
North Main Service Bldg. #2 Test.			
7 M meter with Fisher type S203 R			
1 - Eng. Air HE40 (Paint Shop)			
2 - Teledyne Laars HB-3000			
2 - Teledyne Laars HB-3500			· ·
4 - Rheem Rund RF76-Z50C (DHW)			
2 - Rheem Rund PV40-36M (DHW)	i i		
Shut off each appliance, shut off	gas valve at meter	SUBTOTAL	
ELERMS:		GST	
Cont	• • • • • • • • • •	401	
		PST	
		TOTAL	<u> </u>
		13-17-12	

#### rade Gas Services (Toronto) Ltd.

29 Golden Gate Court SCARBOROUGH, ONTARIO M1P 3A4



**XEXEMENT** 

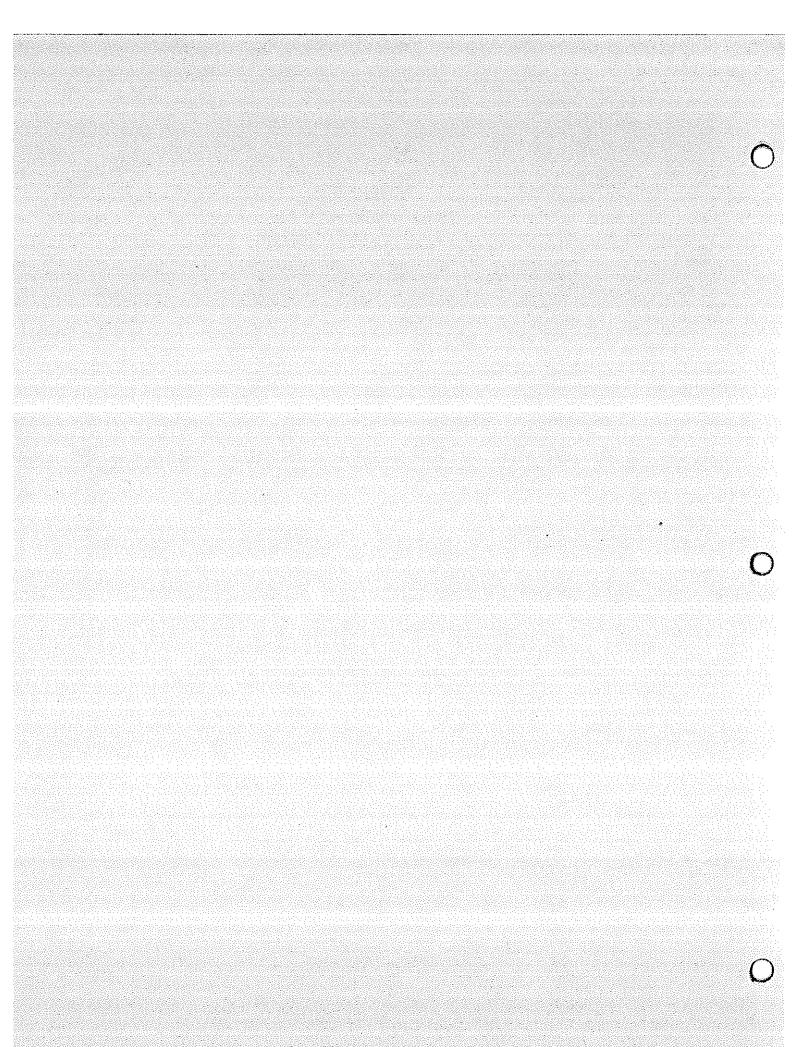
8

(416) 293-6742 Fax (416) 293-6765 GST #R105339410

INVOICE # 4204

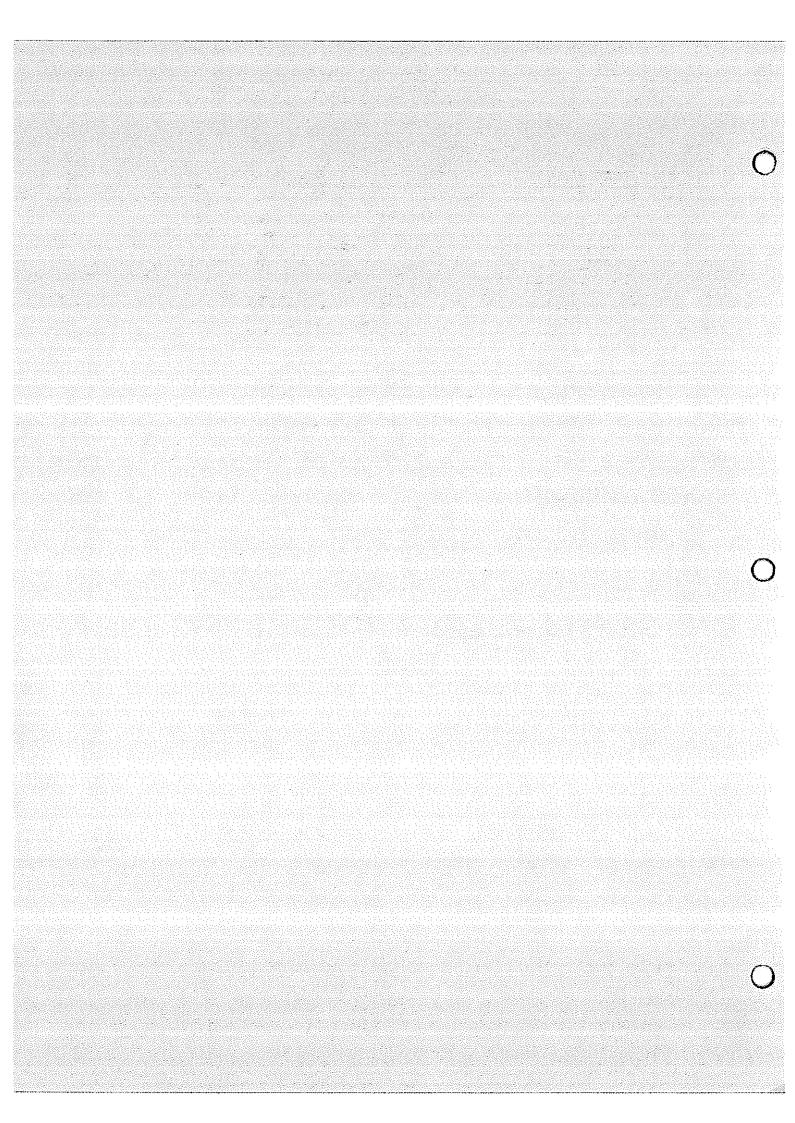
	DATE		JOB NO.
	JOB NAME	<del></del>	
	JOB LOCATION		
ANTITY	DESCRIPTION	PRICE	AMOUNT
and t	ested static pressure = 44 P.S.1.		
Start	ed appliances and tested working pressure		
	P.S.1.		
Shut	off appliances, shut gas at meter and removed		
gage.	!		
Opene	d gas at meter and relit pilots.		
Start	ed appliances up again.		
Consu	mers Gas Main Station #3 Test.		
Remov	ed plug on test point at station.		
Insta	lled gage and checked pressure = 44 P.S.l.		
i	ed gage and installed plug.		

# APPENDIX 9 WATER TEST RESULTS



## **APPENDIX 10**

# SANITARY SEWER TEST RESULTS (PRINT)



CLIENT: METRO TORONTO ZOO.
STREET: NONE GIVEN

INSP. BY: F.H.
DISK No: 01FH
TAPE No: 01FH
PIPE SIZE: 375mm

DATE: Jan 26 1999
TIME: 09:11:07

REF. AREA: WO #1685
FILE NAME: TV191773.RPT
TAPE COUNT: 00:00:00
PIPE TYPE: SANITARY/AC

STARTING LOCATION:

ATION: ENDING LOCATION:

3RD MH N OF THE INDO PAVILLION PIPE DEPTH:4.0m

FLOW DIR: North

2ND MH N OF THE INDO PAVILLION

CAMERA DIR: Against Flow

PIPE DEPTH:N/A-NO ACCESS

	CAMERA DIRECTION>		
STARTING MANHOLE	MOWNT 20 0 Making	ENDING MANHOLE	
03	TOTAL: 32.0 Metres	02	
	FLOW DIRECTION <		

#### Summary Comments

#### LIGHT DEBRIS UNDER THE FLOW.

Distance		Inspection Comments
At	To	<del>"</del>
0.0		Starting manhole - 03
1.5		Moderate steam hampering inspection
32.0		Ending manhole - 02
32.0		End of inspection

CLIENT: METRO TORONTO ZOO.

DATE: Jan 26 1999

STREET: NONE GIVEN

TIME: 09:40:11

INSP. BY: F.H. DISK No: 01FH

REF. AREA: WO #1685 FILE NAME: TVI91774.RPT

TAPE No: 01FH PIPE SIZE: 375mm FLOW DIR: North TAPE COUNT: 00:02:25 PIPE TYPE: SANITARY/AC CAMERA DIR: Against Flow

\_\_\_\_\_\_\_

STARTING LOCATION:

ENDING LOCATION:

2ND MH N OF THE INDO PAVILLION 1ST MH N OF THE INDO PAVILLION PIPE DEPTH:N/A-NO ACCESS PIPE DEPTH:N/A-NO ACCESS

	CAMERA DIRECTION>		
STARTING MANHOLE	TOTAL: 63.5 Metres	ENDING MANHOLE	
02	TOTAL: 03.5 Metres	01	
	FLOW DIRECTION <	¦ '	

#### Summary Comments

EXTRA MH NOT SHOWN ON THE MAP.LIGHT DEBRIS IN THE LINE.

Distance	Inspection Comments
At To	Starting manhole - 02
0.0 7.0 7.0 63.6 63.5 63.5	Light debris in line - Invert Extra manhole not shown Ending manhole - 01 Ending manhole - 01 End of inspection

CLIENT: METRO TORONTO ZOO. DATE: Jan 26 1999 STREET: NONE GIVEN TIME: 10:14:35 REF. AREA: WO #1685 FILE NAME: TVI91775.RPT INSP. BY: F.H. DISK No: 01FH TAPE No: 01FH TAPE COUNT: 00:06:50 PIPE SIZE: 200mm PIPE TYPE: SANITARY/AC FLOW DIR: West CAMERA DIR: Against Flow \_\_\_\_\_\_ STARTING LOCATION: ENDING LOCATION: EAST OF THE OLD ELEPHANT HOUSE FENCE LINE OF OLD ELELPHNT HOUSE PIPE DEPTH:3.4m PIPE DEPTH: N/A-NO ACCESS CAMERA DIRECTION ----> STARTING ENDING MANHOLE MANHOLE TOTAL: 51.0 Metres 04

FLOW DIRECTION <----

#### Summary Comments

#### LIGHT CALCITE AT A SERVICE CONNECTION.

Distan	ce	Inspection Comments
At	To	
0.0		Starting manhole - 04
3.4		Light calcite at service connection - 2 O'clock
51.0		Ending manhole - 05
51.0		End of inspection

(

DATE: Jan 26 1999 CLIENT: METRO TORONTO ZOO. TIME: 10:36:17 STREET: NONE GIVEN REF. AREA: WO #1685 INSP. BY: F.H. FILE NAME: TVI91776.RPT DISK No: 01FH TAPE COUNT: 00:12:55 TAPE No: 01FH PIPE SIZE: 200mm PIPE TYPE: SANITARY/AC FLOW DIR: West CAMERA DIR: Against Flow \_\_\_\_\_\_ \_\_\_\_\_\_ ENDING LOCATION: STARTING LOCATION: FENCE LINE OF OLD ELEPHANT HOUSE ELEPHANT WATERING HOLE PIPE DEPTH: N/A-NO ACCESS PIPE DEPTH: N/A-NO ACCESS CAMERA DIRECTION ----> STARTING ENDING MANHOLE MANHOLE TOTAL: 66.0 Metres FLOW DIRECTION <----

#### THE PIPE APPEARS TO BE IN GOOD CONDITION

Distance		Inspection Comments
At	To	
0.0		Starting manhole - 05
66.0		Ending manhole - 06
66.0		End of inspection

CLIENT: METRO TORONTO ZOO. DATE: Jan 26 1999 TIME: 10:43:06 STREET: NONE GIVEN REF. AREA: WO #1685 FILE NAME: TVI91777.RPT TAPE COUNT: 00:17:10 PIPE TYPE: SANITARY/AC CAMERA DIR: Against Flow INSP. BY: F.H. DISK No: 01FH TAPE No: 01FH
PIPE SIZE: 200mm
FLOW DIR: West \_\_\_\_\_\_\_ STARTING LOCATION: ENDING LOCATION: ELEPHANT WATERING HOLE PIPE DEPTH:N/A-NO ACCESS BUSH CAMP PIPE DEPTH: N/A-NO ACCESS CAMERA DIRECTION ---> ENDING STARTING MANHOLE MANHOLE TOTAL: 70.0 Metres

----- FLOW DIRECTION <----

Summary Comments

#### THE PIPE APPEARS TO BE IN GOOD CONDITION

Distance Inspection Comments
At To
0.0 Starting manhole - 06
70.0 Ending manhole - 07
70.0 End of inspection

Report generated by Ratech Data Tech V Sewer TV Inspection System

CLIENT: METRO TORONTO ZOO. DATE: Jan 26 1999 STREET: MAIN PARKING LOT "P" SECTION TIME: 11:50:34

INSP. BY: F.H. DISK No: 01FH REF. AREA: WO #1685 FILE NAME: TVI91778.RPT TAPE COUNT: 00:21:55 TAPE No: 01FH PIPE SIZE: 525mm PIPE TYPE: SANITARY/AC FLOW DIR: East CAMERA DIR: With Flow

\_\_\_\_\_\_\_\_\_\_\_

STARTING LOCATION:

ENDING LOCATION: 1ST MH E OF THE RIVER 2ND MH E OF THE RIVER PIPE DEPTH: N/A-NO ACCESS PIPE DEPTH:5.3m

CAMERA DIRECTION ----> STARTING ENDING MANHOLE MANHOLE TOTAL: 92.5 Metres 08 FLOW DIRECTION ---->

\_\_\_\_\_

#### Summary Comments

#### LIGHT DEBRIS UNDER THE FLOW.

Inspection Comments Distance To Αt 0.0 Starting manhole - 08 Ending manhole - 09 End of inspection 92.5 92.5

CLIENT: METRO TORONTO ZOO.

STREET: MAIN PARKING LOT "P" SECTION

DATE: Jan 26 1999
TIME: 12:26:58

INSP. BY: F.H.
DISK No: 01FH
TAPE No: 01FH
TIPE SIZE: 525mm
FLOW DIR: East

REF. AREA: WO #1685 FILE NAME: TVI91779.RPT TAPE COUNT: 00:26:05 PIPE TYPE: SANITARY/AC CAMERA DIR: With Flow

STARTING LOCATION:

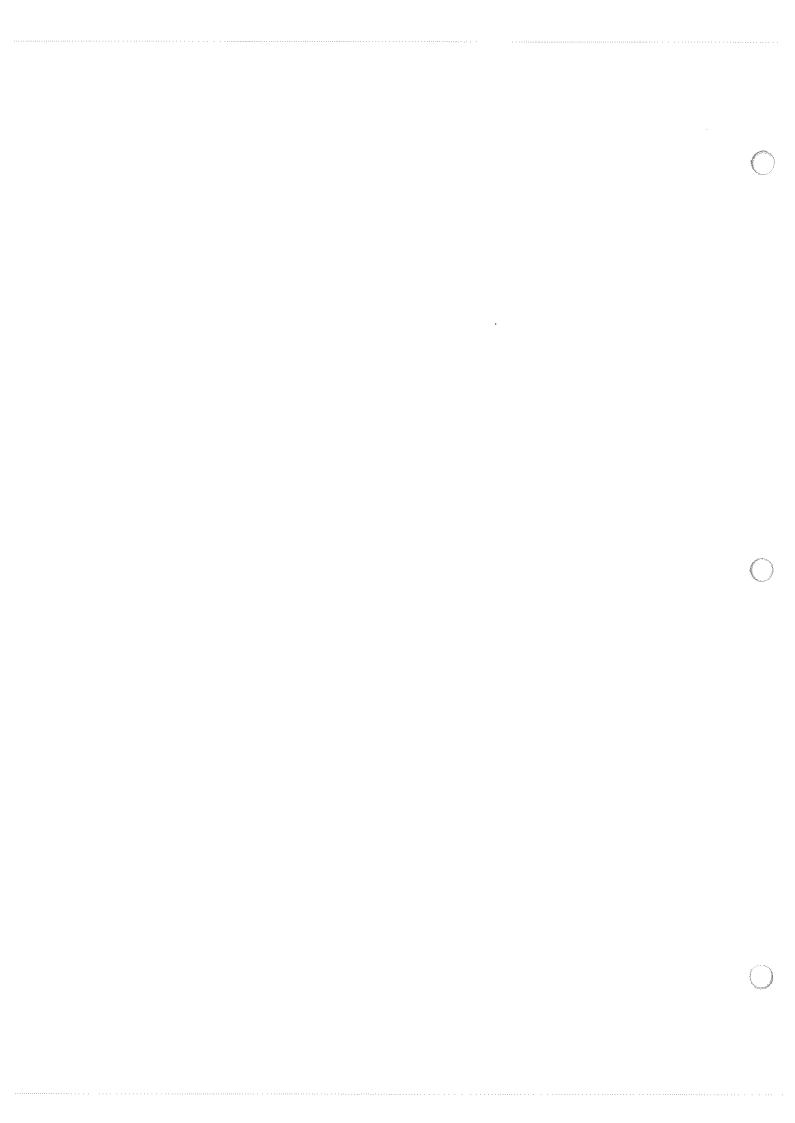
1ST MH E OF THE RIVER PIPE DEPTH:N/A-NO ACCESS ENDING LOCATION:
1ST MH W OF THE RIVER
PIPE DEPTH:N/A-NO ACCESS

	CAMERA DIRECTION>	
STARTING MANHOLE		ENDING MANHOLE
	TOTAL: 81.0 Metres	10
09	;	
	FLOW DIRECTION>	

Summary Comments

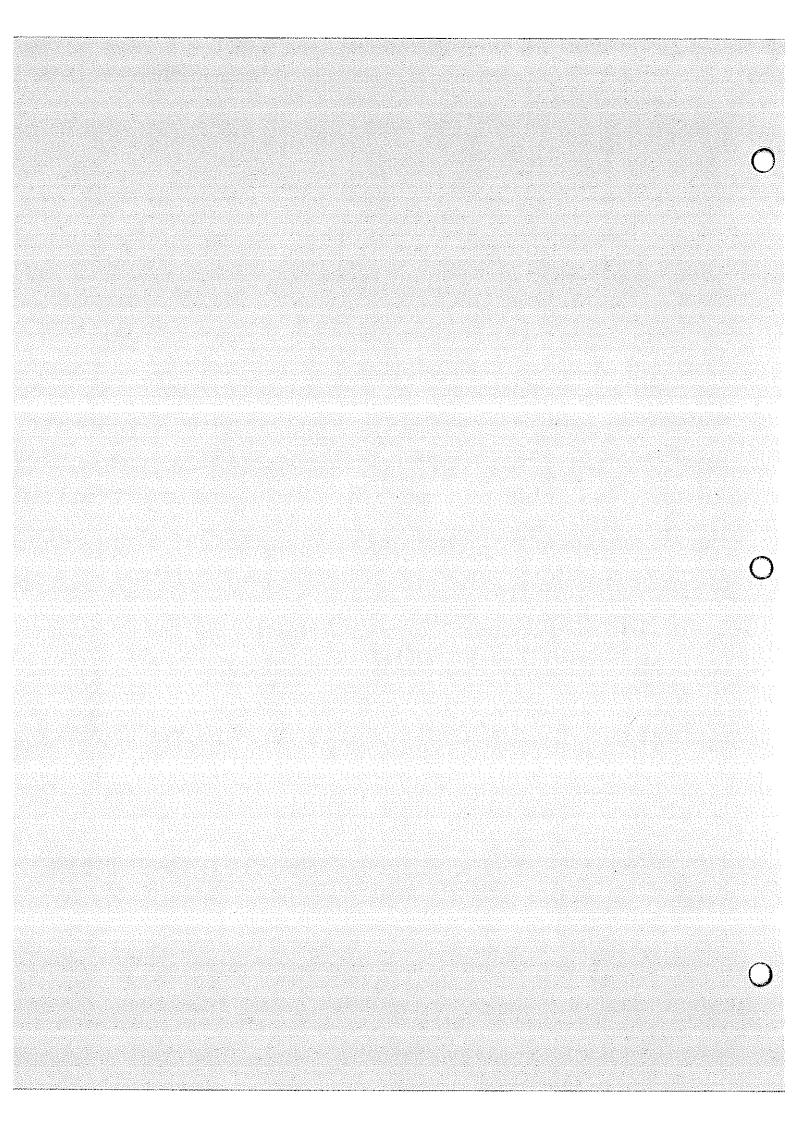
#### LIGHT DEBRIS UNDER THE FLOW.

Distance		Inspection Comments
At 0.0 81.0 81.0	То	Starting manhole - 09 Ending manhole - 10 End of inspection

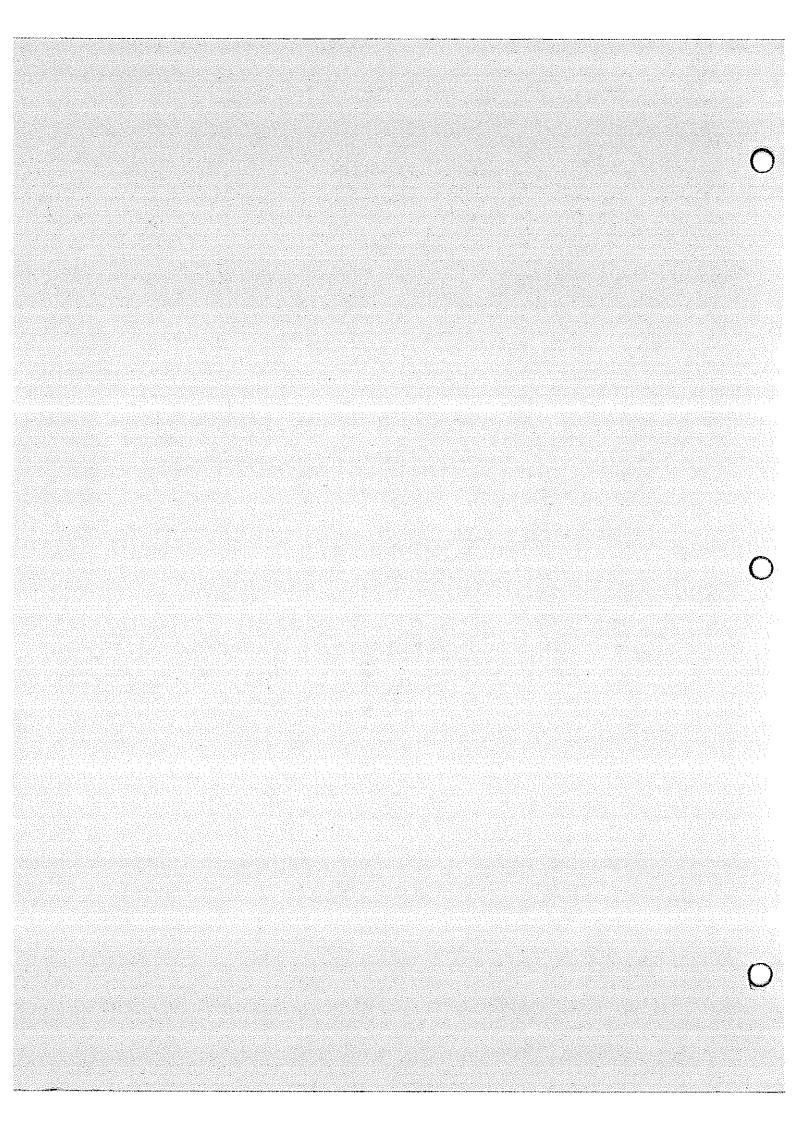


## **APPENDIX 11**

# SANITARY SEWER TEST RESULTS (VIDEO)



## APPENDIX 12 STORM SEWER TEST RESULTS (PRINT)



CLIENT: METRO TORONTO ZOO.

STREET: "D" GATE SOUTH OF OLD FINCH RD

DATE: Feb 5 1999
TIME: 08:22:26

INSP. BY: F.H.

DISK No: 02FH
TAPE No: 02FH
TAPE SIZE: 675mm
FLOW DIR: South

REF. AREA:
FILE HAME: TV190517.RPT
TAPE COUNT: 00:00:00
PIPE TYPE: STORM/CONC
CAMERA DIR: With Flow

STARTING LOCATION: NORTH OF GATE "D" PIPE DEPTH: 2.5m ENDING LOCATION: SOUTH OF GATE "D" PIPE DEPTH:N/A

	CAMERA DIRECTION>	
STARTING MANHOLE		ending Manhole
01	TOTAL: 59.5 Hetres	02
	FLOW DIRECTION>	

#### 

## PONDING AND DEBRIS IN THE LINE. HEAVY CALCITE BELOW A SERVICE CONNECTION.

Distance		Inspection Comments
At	To	
0.0		Starting manhole - 01
1.5	48.4	
4.9	9.1	Moderate debris in line - Invert
9.1		Service connection - 11 O'clock
9.1		Service protruding greater than 1" - 2 O'clock
14.2	58.2	
26.0		Service connection - 11 O'clock
26.0	26.0	
26.9		Service connection - Crown
36.8		Service connection - 11 O'clock
48.4		Service connection - 1 O'clock
59.5		Ending manhole - 02
59.5		End of inspection

#### Trans-Video Inspection Ltd. SEWER TV. INSPECTION REPORT

DATE: Feb 5 1999 CLIENT: METRO TORONTO ZOO. STREET: "D" GATE SOUTH OF OLD FINCH RD TIME: 09:11:29

REF. AREA: INSP. BY: F.H. FILE NAME: TV190518.RPT DISK No: 02FH TAPE COUNT: 00:06:05 TAPE NO: 02FH
PIPE SIZE: 675mm
FLOW DIR: South PIPE TYPE: STORM/CONC CAMERA DIR: With Flow

ENDING LOCATION:

STARTING LOCATION: 2MD MH S OF OF "D" GATE SOUTH OF GATE "D"

PIPE DEPTH: N/A PIPE DEPTH:N/A

	CAMERA DIRECTION>	RNDING !
STARTING		Manhole
MANHOLE	TOTAL: 46.0 Metres	03
02		03
i		•
	FLOW DIRECTION>	

#### Summary Comments

#### LIGHT PONDING IN THE LINE.

Distance		Inspection Comments
Distar 0.0 1.1 6.7 6.7 15.1 17.6 23.7 31.2 46.0 46.0	13.7	Starting manhole - 02 Service connection - 11 O'clock Service connection - 11 O'clock
70.0		

Trans-Video Inspection Ltd. SEWER TV. INSPECTION REPORT

CLIENT: METRO TORONTO ZOO.

DATE: Feb 5 1999

TIME: 09:19:08

STREET: "D" GATE SOUTH OF OLD FINCH RD

INSP. BY: F.H. DISK No: 02FH TAPE No: 02PH PIPE SIZE: 675mm REF. AREA: FILE NAME: TV190519.RPT

TAPE COUNT: 00:10:50 PIPE TYPE: ETORM/CONC

FLOW DIR: South

CAMERA DIR: With Flow

STARTING LOCATION:

ENDING LOCATION:

2ND MH S OF OF "D" GATE

3RD MH S OF OF "D" GATE PIPE DEPTH: N/A

PIPE DEPTH: N/A

	CAMERA DIRECTION>	ENDING	ł
STARTING		MANHOLE	:
MANHOLE	TOTAL: 40.0 Metres		•
03		04	į
	FLOW DIRECTION>		•

#### Summary Comments

#### MH LID IN THE ENDING MH.

Dista	nce	Inspection Comments
At 0.0 19.6 40.0 40.0	<b>To</b> 38.3	Starting manhole - 03 Light ponding in line MH LID IN THE Ending manhole - 04 End of inspection

Trans-Video Inspection Ltd. SEWER TV. INSPECTION REPORT

CLIENT: METRO TORONTO 200.

DATE: Feb 5 1999

STREET: "D" GATE SOUTH OF OLD FINCH RD

TIME: 09:38:42

INSP. BY: F.H.

REF. AREA: FILE NAME: TV190520.RPT

DISK No: 02FH TAPE No: 02FH PIPE SIZE: 675mm FLOW DIR: South

TAPE COUNT: 00:10:50 PIPE TYPE: STORM/COMC

CAMERA DIR: With Flow

STARTING LOCATION:

ENDING LOCATION:

2ND MH S OF OF "D" GATE

3RD MH S OF OF "D" GATE

PIPE DEPTH: N/A PIPE DEPTH: N/A

CAMERA DIRECTION ----> ENDING STARTING :----Nanhole MANHOLE TOTAL: ----- Hetres 03 FLOW DIRECTION ---->

Trans-Video Inspection Ltd. SEWER TV. INSPECTION REPORT

CLIENT: METRO TORONTO ZOO.

DATE: Feb 5 1999

TIME: 09:39:24

STREET: AREA 8

REF. ARKA:

INSP. BY: F.H. DISK No: 02FH

FILE NAME: TV190521.RPT

TAPE No: 02FH

TAPE COUNT: 00:13:25 PIPE TYPE: STORM/CONC

PIPE SIZE: 600mm PLOW DIR: East

CAMERA DIR: Against Flow

STARTING LOCATION:

1ST MH W OF EURASIA PAV.

PIPE DEPTH: 3.3m

ENDING LOCATION:

N OF NORTH AMERICAN PAV.

PIPE DEPTH: N/A

		CAMERA DIRECTION>		
	STARTING MANHOLE		ending Manhole	
į		TOTAL: 67.0 Metres	06	
1	05			,
		FLOW DIRECTION <		

#### Summary Comments

#### LIGHT DEBRIS AND PONDING IN THE LINE.

Dista	nce	Inspection Comments
At	To	
0.0		Starting manhole - 05
33.1	60.9	Light debris in line - Invert
35.5		Service connection - 9 O'clock
54.4		Service connection - 10 O'clock
60.9	65.4	Moderate ponding in line
67.0		Ending manhole - 06
67.0		End of inspection

#### Trans-Video Inspection Ltd. SEWER TV. INSPECTION REPORT

CLIENT: METRO TORONTO 200.

DATE: Feb 5 1999

TIME: 09:52:20

STREET: AREA 8

INSP. BY: F.H. DISK No: 02FH TAPE No: 02FH REF. AREA:

FILE NAME: TV190522.RPT

PIPE SIZE: 675mm PLOW DIR: East

TAPE COUNT: 00:18:20 PIPE TYPE: STORM/CONC

CAMERA DIR: With Flow

STARTING LOCATION: 1ST MH W OF EURASIA PAV.

ENDING LOCATION: @ URASIA PAV.

PIPE DEPTH: 3.3m

PIPE DEPTH: N/A

	CAMERA DIRECTION>		
STARTING		Ending Manhole	
MANHOLE	TOTAL: 70.0 Metres	07	
05			
*	TIME DIRECTION>		

#### Summary Comments

#### LIGHT PONDING AND DEBRIS IN THE LINE.

Distan	ce	Inspection Comments
At 0.0 1.5 8.7 46.4 67.5 70.0	To 19.0 19.8	Starting manhole - 05 Light ponding in line Moderate debris in line - Invert Service connection - 2 O'clock Internal drop in pipe Ending manhole - 07 End of inspection

#### Trans-Video Inspection Ltd. SEWER TV. INSPECTION REPORT

CLIENT: METRO TORONTO ZOO.

STREET: AREA 8

DATE: Feb 5 1999

TIME: 10:19:52

INSP. BY: F.H.

DISK No: 02FH TAPE No: 02FH
PIPE SIZE: 900mm
PLOW DIR: East REF. AREA:

FILE NAME: TVI90523.RPT TAPE COUNT: 00:18:20 PIPE TYPE: STORM/CONC

CAMERA DIR: With Flow

STARTING LOCATION:

@ URASIA PAV. PIPE DEPTH: 3.6m ENDING LOCATION:

BAST OF MH 07 PIPE DEPTH:N/A

	CAMERA DIRECTION>		
STARTING		ENDING	
Manhole		Manhole	
07	TOTAL: 74.0 Hetres	08	
	PLOW DIRECTION>	 	

#### Summary Comments

#### THE PIPE APPEARS TO BE IN GOOD CONDITION

Dista	nce	Inspection Comments
At	To	
0.0		Starting manhole - 07
3.3		Service connection - 10 O'clock
8.9		Service connection - 2 O'clock
24.0		Service connection - 3 O'clock
27.9		Service connection - 10 O'clock
74.0		Ending manhole - 08
74.0		End of inspection

#### Trans-Video Inspection Ltd. SEWER TV. INSPECTION REPORT

CLIENT: METRO TORONTO 200.

DATE: Feb 5 1999

STREET: AREA 8

TIME: 10:27:06

REF. AREA:

INSP. BY: F.H. DISK No: 02FH

FILE NAME: TVI90524.RPT

TAPE No: 02FH PIPE SIZE: 900mm FLOW DIR: East

TAPE COUNT: 00:26:55 PIPE TYPE: STORM/CONC CAMERA DIR: With Flow

STARTING LOCATION:

RNDING LOCATION: EAST OF MH 08

BAST OF MH 07 PIPE DEPTH:N/A

PIPE DEPTH: N/A

		CAMERA DIRECTION>		
•	STARTING		ENDING MANHOLE	
	MANHOLE	TOTAL: 134.0 Metres		
	80		09	4
ì		PLOW DIRECTION>		

Summary Comments

#### THE PIPE APPEARS TO BE IN GOOD CONDITION

Distance	Inspection Comments
At To 0.0 21.5 103.9 134.0 134.0	Starting manhole - 08 Service connection - 2 O'clock Service protruding greater than 1" - 1 O'clock Ending manhole - 09 End of inspection

#### Trans-Video Inspection Ltd. SEWER TV. INSPECTION REPORT

CLIENT: METRO TORONTO 200.

INSP. BY: F.H.

DISK No: 02FH

TAPE No: 02FH PIPE SIZE: 450mm

FLOW DIR: S/W

STREET: AREA 17

DATE: Feb 5 1999

TIME: 12:02:36

REF. AREA:

FILE NAME: TVI90525.RPT

TAPE COUNT: 00:33:25

PIPE TYPE: STORM/CONC

CAMERA DIR: Against Flow

STARTING LOCATION:

S OF THE SAV. REST. S/S OF ROAD H/E OF MH 10

PIPE DEPTH: N/A

ENDING LOCATION:

PIPE DEPTH: N/A

		CAMERA DIRECTION>		
1	STARTING		ending Manhole	
1	manhole	TOTAL: 29.3 Netres	11	
:	10			
		FLOW DIRECTION <	4	

#### Summary Comments

#### THE CAMERA WAS BLOCKED BY HEAVY GRAVEL. REVERSE SETUP WAS NOT REQUESTED.

Dista	ance	Inspection Comments
λt	To	
0.0		Starting manhole - 10
1.5	9.8	Light debris in line - Invert
4.2		Service connection - 2 O'clock
9.8	29.3	Moderate debris in line - Invert
27.8		Service connection - 2 O'clock
28.7		Service connection - 9 O'clock
29.3	29.3	Heavy debris in line - Invert
29.3		Camera blocked in line
29.3		End of inspection

Trans-Video Inspection Ltd. SEWER TV. INSPECTION REPORT

CLIENT: METRO TORONTO ZOO.

DATE: Peb 5 1999

STREET: AREA 17

TIME: 12:14:58

REF. AREA:

INSP. BY: F.H. DISK No: 02FH

FILE NAME: TVI90526.RPT

TAPE No: 02FH PIPE SIZE: 450mm TAPE COUNT: 00:38:05 PIPE TYPE: STORM/CONC

PLOW DIR: West

CAMERA DIR: With Flow

STARTING LOCATION:

ENDING LOCATION:

S OF THE SAV. REST. S/S OF ROAD WEST OF MH 10 PIPE DEPTH: N/A

PIPE DEPTH: N/A

	CAMERA DIRECTION>	
STARTING MANHOLE		ending Manhole
10	TOTAL: 50.0 Metres	12
	PLOW DIRECTION>	

#### Summary Comments

#### THE CAMERA WAS BLOCKED BY DEBRIS.

Dista	nce	Inspection Comments
At 0.0 23.3 27.9 50.0 50.0	To 50.0 50.0	Starting manhole - 10 Light ponding in line Light debris in line - Invert Camera blocked in line End of inspection

Trans-Video Inspection Ltd. SEVER TV. INSPECTION REPORT

CLIENT: METRO TORONTO ZOO.

DATE: Feb 5 1999

STREET: AREA 18

TINE: 13:20:43

REF. AREA:

FILE NAME: TVI90527.RPT

INSP. BY: F.H.
DISK No: 02FH
TAPE No: 02FH
PIPE 812E: 525mm
FLOW DIR: South

TAPE COUNT: 00:43:10 PIPE TYPE: STORM/CONC

CAMERA DIR: Against Flow

STARTING LOCATION:

ENDING LOCATION:

S/E CORNER OF THE ELEPHANT HOUSE S/E OF AFRICAN PAVILLION

CAMERA DIRECTION ---->

PIPE DEPTH: 3.6m

PIPE DEPTH: N/A

STARTING :----MANHOLE

TOTAL: 42.5 Netres

ENDING MANHOLB

FLOW DIRECTION <----

Summary Comments

#### THE PIPE APPEARS TO BE IN GOOD CONDITION

Distance	Inspection Comments
At To 0.0 23.2 26.7 42.5 42.5	Starting manhole - 13 Service connection - 9 O'clock Service connection - 11 O'clock Ending manhole - 14 End of inspection

Trans-Video Inspection Ltd. SEWER TV. INSPECTION REPORT

CLIENT: METRO TORONTO ZOO.

DATE: Feb 5 1999

TIME: 13:29:01

STREET: AREA 18

INSP. BY: P.H. DISK No: 02FH TAPE No: 02FH PIPE SIZE: 525mm FLOW DIR: South

REF. ARBA:

FILE NAME: TV190528.RPT TAPE COUNT: 00:46:10 PIPE TYPE: STORM/CONC CAMERA DIR: Against Flow

STARTING LOCATION:

ENDING LOCATION:

S/E OF THE AFRICAN PAV.

EAST ENTERANCE AFRICAN PAV.

PIPE DEPTH: N/A PIPE DEPTH: N/A

CAMERA DIRECTION ----> STARTING ENDING HANHOLE MANHOLE TOTAL: 20.2 Hetres FLOW DIRECTION <----

如果是我的心理,我们也是我们们的,我们就是我们的,我们就是我们的,我们就是我们的,我们就是我们的,我们就是我们的,我们就是我们的,我们就是我们的,我们就是我们的 Inchestion Comments

Distance		Inspection Comments
At 0.0 18.0 20.2 20.2	То	Starting manhole - 14 Service connection - 2 O'clock Service protruding greater than 1" - 9 O'clock Camera blocked in line End of inspection

CLIEN STREE	IT: METRO ST: AREA	TORONTO Z 18	300.		13:36:11	77
	DISK P TAPE I PIPE SI	BY: F.H. No: 02FH No: 02FH ZB: 525mm IR: Bast	REF. AREA: FILE MAME: TAPE COUNT: PIPE TYPE: CAMERA DIR:	00:48 STORM	:20 /CONC	
STAR!	STRO TOO	ATION: F THE ELEPI	ENDING LOCATION HANT HOUSE S/W CORNER OF PIPE DEPTH: N/A	the ap	RICAN PAV.	
		(	CAMERA DIRECTION>		ENDING	-
	Starting Manhole	i			NANHOLE	
•	13	•	TOTAL: Metres		16	
i	•					Ĭ

FLOW DIRECTION <----

CLIENT: METRO TORONTO ZOO.

DATE: Feb 5 1999

TIME: 13:38:34

STREET: AREA 18

INSP. BY: F.H.

REF. AREA: FILE NAME: TV190530.RPT

DISK No: 02FH TAPE No: 02PH

TAPE COUNT: 00:48:20

PIPE SIZE: 525mm PLOW DIR: East

PIPE TYPE: STORM/CONC CAMERA DIR: Against Flow

STARTING LOCATION:

ENDING LOCATION:

S/E CORNER OF THE ELEPHANT HOUSE S/W CORNER OF THE APRICAN PAV.

PIPE DEPTH: 3.6m

PIPE DEPTH: N/A

CAMERA DIRECTION ---->

STARTING -----Manhole

TOTAL: 31.2 Metres

ENDING : MANHOLE

FLOW DIRECTION <----

#### Summary Comments

THE CAMERA WAS BLOCKED BY DEBRIS. REVERSE SETUP IS REQUESTED. UNABLE TO GIVE THE SURFACE LENGTH, THERE ARE BUILDING IN BETWEEN THE MH'S

Distance		Inspection Comments
At	To	
0.0		Starting manhole - 13
1.5	31.2	Moderate debris in line - Invert
31.2		Camera blocked in line
31.2		End of inspection

CLIENT: METRO TORONTO ZOO.

DATE: Feb 5 1999

TIME: 13:52:21

STREET: AREA 18

REF. AREA:

FILE NAME: TV190531.RPT

INSP. BY: F.H. DISK No: 02FH TAPE No: 02FH

TAPE COUNT: 00:52:50

PIPE SIZE: 450mm

PIPE TYPE: STORM/PVC

FLOW DIR: East 

CAMERA DIR: With Flow

STARTING LOCATION:

PIPE DEPTH: N/A

ENDING LOCATION:

STARTING LOCATION.

S/W CORNER OF THE AFRICAN PAV.

S/W CORNER OF THE PIPE DEPTH: 3.6m.

S/W CORNER OF THE ELEPHANT HOUSE

CAMERA DIRECTION ----> STARTING :----ENDING : MANHOLE MANHOLE TOTAL: 51.5 Metres PLOW DIRECTION ---->

Summary Comments

> THE PIPE SIZE IS 450mm. THE PIPE MATERIAL IS PVC.DEBRIS IN THE LINE.

Distance		Inspection Comments	
At 0.0 2.2 4.7 51.5 51.5	To 51.5 51.5	Starting manhole - 16 Moderate ponding in line Moderate debris in line - Invert Extra manhole not shown End of inspection	

## Begantt generated by Beinch Bein Beck V Seem TV Dagection System

#### Trans-Video Inspection Ltd. SEWER TV. INSPECTION REPORT

CLIENT: METRO TORONTO 200.

DATE: Feb 5 1999

TIME: 14:03:13

STREET: AREA 18

INSP. BY: F.H.

REF. AREA:

FILE NAME: TV190532.RPT

DISK No: 02FH TAPE No: 02FH

TAPE COUNT: 00:55:35

PIPE SIZE: 525mm FLOW DIR: South PIPE TYPE: STORM/CONC

CAMERA DIR: Against Flow

ENDING LOCATION:

STARTING LOCATION: S/W CORNER OF THE AFRICAN PAV. PIPE DEPTH: N/A

1ST NH N OF MH 16

PIPE DEPTH: N/A

MANHOLE

STARTING

20.5 Metres

ENDING MANHOLE

16

TOTAL:

CAMERA DIRECTION ---->

17

FLOW DIRECTION <----

Summary Commonts

> THE CAMERA WAS BLOCKED BY DEBRIS. REVERSE SETUP WAS NOT REQUESTED.

Dista	nce	Inspection Commonts
λt	To	
0.0		Starting manholo - 16
2.0	20.5	Moderate debris in line - Invert
20.5		Camera blocked in line
20.5		End of inspection

## part generalist by Rahach Inda Total V Busic W Impretium Spal

#### Trans-Video Inspection Ltd. SEWER TV. INSPECTION REPORT

CLIENT: METRO TORONTO ZOO.

DATE: Feb 5 1999

STREET: AREA ?

TIME: 14:38:38

REF. AREA: FILE NAME: TV190533.RPT

DISK No: 02FH TAPE No: 02PH

INSP. BY: F.H.

TAPE COUNT: 00:57:20

PIPE SIZE: 250mm FLOW DIR: West

PIPE TYPE: STORM/CONC CAMERA DIR: With Flow

STARTING LOCATION:

ENDING LOCATION:

1ST MH W OF THE CAMEL PEN

2ND MH W OF THE CAMEL PEN

PIPE DEPTH: 2.1m

PIPE DEPTH: N/A

<b> </b>	CAMERA DIRECTION>		
STARTING '		Ending Manhole	
Manhole	TOTAL: 11.0 Metres	MANITULE	
19		19	
		i	ŧ
	FLOW DIRECTION>		,

#### Summary Comments

#### DEBRIS IN THE LINE.

Distance		Inspection Comments
At	TO	
0.0		Starting manhole - 19
0.0	11.0	Moderate debris in line - Invert
11.0		Ending manhole - 19
11.0		End of inspection

Trans-Video Inspection Ltd. SEWER TV. INSPECTION REPORT

CLIENT: METRO TORONTO ZOO.

DATE: Feb 5 1999

TIME: 14:45:04

STREET: AREA ?

INSP. BY: F.H.

REF. AREA:

FILE NAME: TVI90534.RPT

DISK No: 02FH TAPE No: 02PH

TAPE COUNT: 00:59:00

PIPE SIZE: 300mm

PIPE TYPE: STORM/CONC

FLOW DIR: West

CAMERA DIR: With Flow

STARTING LOCATION:

ENDING LOCATION:

2ND MH W OF THE CAMEL PEN

3RD MH W OF THE CAMEL PEN

PIPE DEPTH: N/A

PIPE DEPTH: N/A

STARTING

CAMERA DIRECTION ---->

ENDING MANHOLB

MANHOLE

TOTAL:

46.5 Hetres

19

FLOW DIRECTION ---->

20

张 斯里里 我可以我们我们也会会说了什么,我们们是有什么我们的问题就是一种我们的话题的话题的话题的话题,我们也会会会会会会会会会会会会会会会会会会会会会会会会会

#### Summary Comments

#### THE PIPE APPEARS TO BE IN GOOD CONDITION

Distance		INSPECTION COMMENTS
At	To	10
0.0		Starting manhole - 19
1.1		Service connection - 9 O'clock
46.5		Ending manhole - 20
46.5		End of inspection

#### Trans-Video Inspection Ltd. SEWER TV. INSPECTION REPORT

CLIENT: METRO TORONTO ZOO.

DATE: Feb 5 1999

TIME: 14:49:40

STREET: AREA ?

REF. AREA:

INSP. BY: F.H. DISK No: 02FH

FILE NAME: TV190535.RPT

TAPE No: 02FH

TAPE COUNT: 01:02:10

PIPE SIZE: 375mm

PIPE TYPE: STORM/CONC CAMERA DIE: With Flow

FLOW DIR: West

STARTING LOCATION:

ENDING LOCATION:

3RD MH W OF THE CAMEL PEN

4TH MH W OF THE CAMEL PEN

PIPE DEPTH: N/A

	CAMERA DIRECTION>	
STARTING	ما ينه من من من من من من من من من من من من من	Ending Manhole
MANHOLE	TOTAL: 55.0 Hetres	
20		21
	FLOW DIRECTION>	

#### Summary Comments

#### THE MAP IS WRONG SUPOSSED TO MEET WITH MH 08.NOT THE CASE.

Distance		Inspection Comments		
At	To			
0.0		Starting manhole - 20		
5.2		Service connection - 2 O'clock		
9.5		Service connection - 9 O'clock		
23.8		Service connection - 10 O'clock		
31.8	55.0	Light ponding in line		
38.0		Service connection - Crown		
38.0	38.0	Moderate calcite in line - Around pipe		
55.0		Ending manhole - 21		
55.0		End of inspection		

Trans-Video Inspection Ltd. SEWER TV. INSPECTION REPORT

CLIENT: METRO TORONTO ZOO.

DATE: Feb 5 1999 TIME: 14:57:35

STREET: AREA ?

INSP. BY: F.H.

REF. AREA:

DISK No: 02FH TAPE No: 02FH

FILE NAME: TV190536.RPT TAPE COUNT: 01:07:35

PIPE SIZE: 375mm FLOW DIR: West

PIPE TYPE: STORM/CONC CAMERA DIR: With Flow

STARTING LOCATION:

ENDING LOCATION:

4TD MH W OF THE CAMEL PEN

5TH MH W OF THE CAMEL PEN

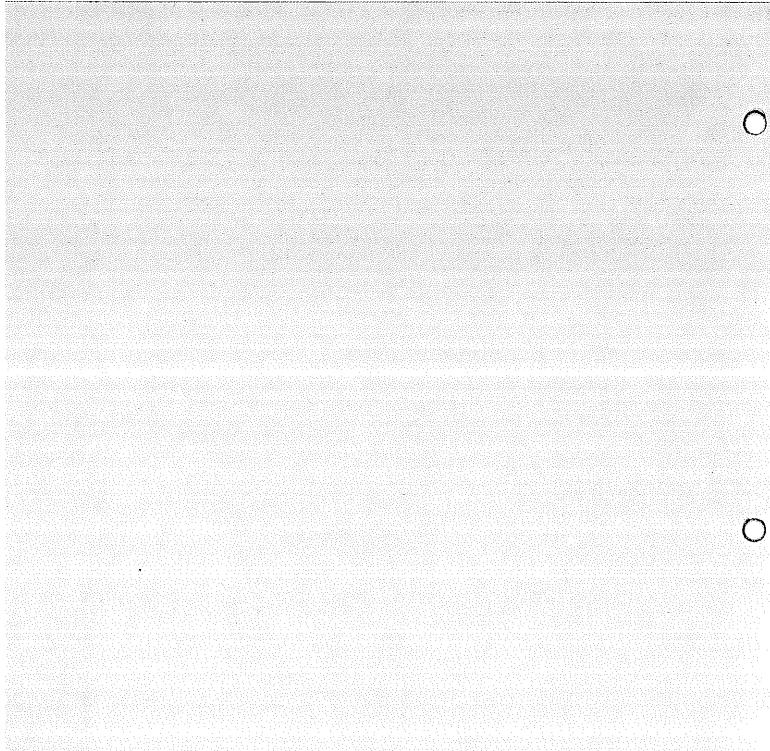
		CAMERA DIRECTION>	
1	STARTING		: ENDING !
i	MANHOLE	!	NANHOLE :
į	· · · · · · · · · · · · · · · · · · ·	TOTAL: 0.0 Metres	
ì	21		oa !
•			
٠		FLOW DIRECTION>	

#### Summary Comments

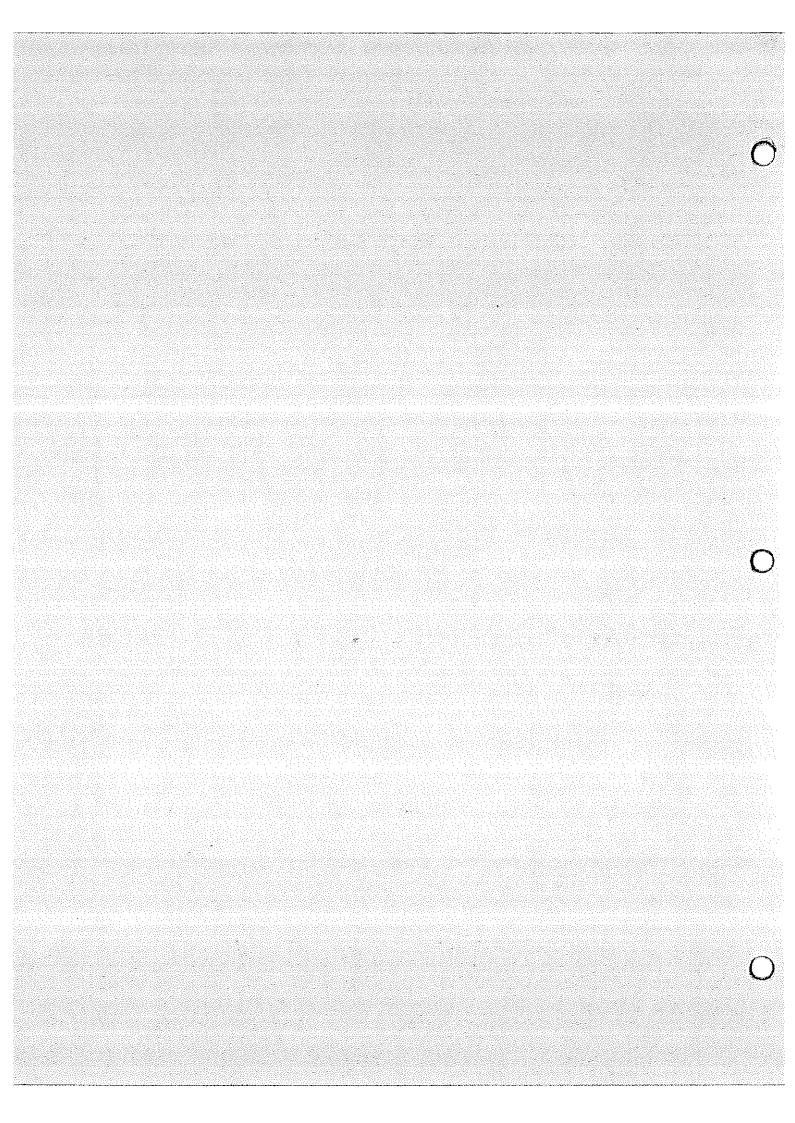
THE CAMERA WAS UNABLE TO MAKE THE BEND IN THE MH.

Distance		Inspection Comments		
At	To	•		
0.0		Starting manhole - 21		
0.0		CAMERA NOT ABLE TO MAKE THE BEND		
0.0		Camera blocked in line		
0.0		End of inspection		

# APPENDIX 13 STORM SEWER TEST RESULTS (VIDEO)



### APPENDIX 14 COMPONENT QUANTITY TAKE-OFFS



## SITE SERVICES COMPONENTS QUANTITY TAKE-OFF

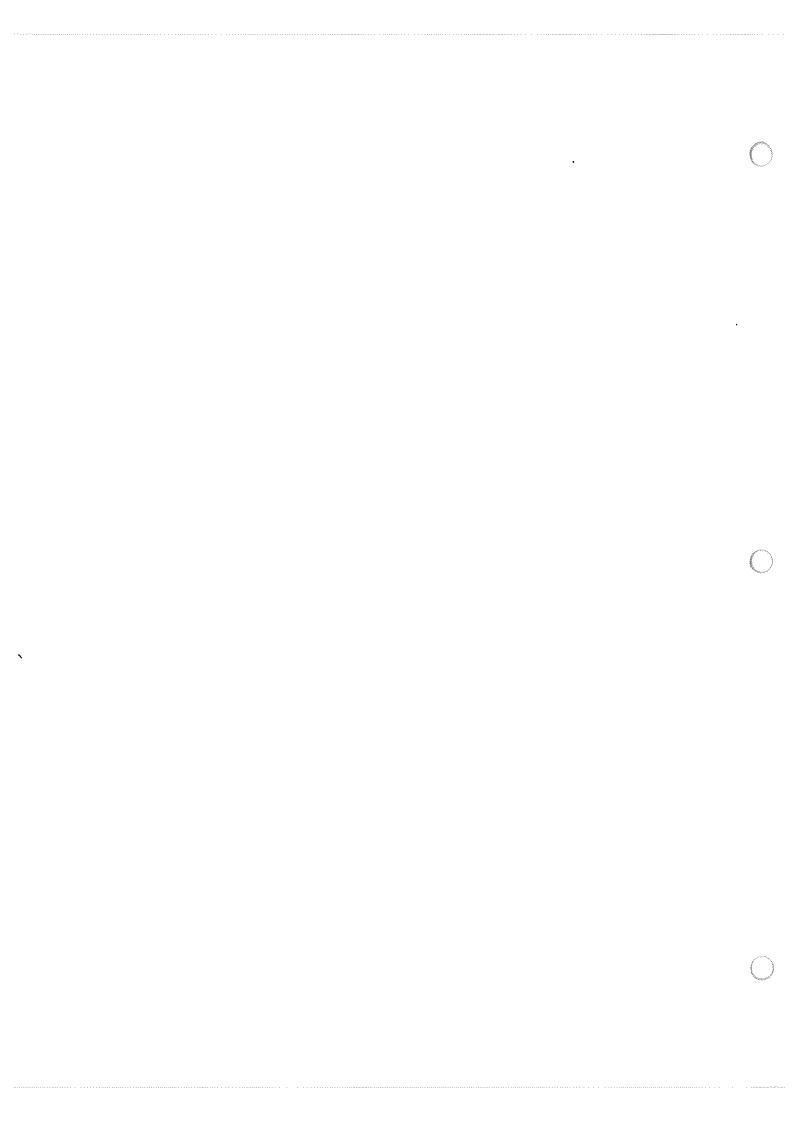
Water Free Hydrard         28         1         5         6         1         1           2 Gate Valves         5         3         12         2         2         10         7         7           5. Building Valves         96         3         12         2         2         3         3         1           6. Building Valves         5         1         7         5         5         1         7         5         1         7         5         1         7         7         1         7         5         1         7 <t< th=""><th></th><th>Totals</th><th>Area 1</th><th>Area 2</th><th>Area 3</th><th>Area 4</th><th>Area 4 Area 5</th><th>Area 6</th><th>Area 7</th><th>Area 8</th><th>Area 9</th><th>Area 10</th><th>Area 11</th><th>Area 12</th></t<>		Totals	Area 1	Area 2	Area 3	Area 4	Area 4 Area 5	Area 6	Area 7	Area 8	Area 9	Area 10	Area 11	Area 12
Fire Hydrant	Water	A THE RESIDENCE AND A PROPERTY OF THE PROPERTY			NAME OF THE PARTY	A CONTRACTOR OF THE PROPERTY O								
Curb Stop         Section	ļ	28		<del></del>						မ	+			•
Main Valve         95         3         12         3         4         20         10           Drinking Foundain         18         2         2         3         1         2         3         1         1         5         1         2         3         1         1         2         3         1         1         6         1         1         7         5         1         1         5         1         1         2         3         1         1         2         3         1         1         4         4         1         1         6         1         1         2         6         1         1         2         6         1         1         2         6         1         1         2         6         1         1         2         6         1         1         4         1         4         1         4         1         4         1         4         1         4         1         4         1         4         1         4         1         4         1         4         1         4         1         4         1         4         1         4         1         4 <t< td=""><td>t</td><td>5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	t	5												
Dinking Vehves   18   2   2   1   7   5   5   5   5   5   5   5   5   5	1	96	- CONTRACTOR OF THE CONTRACTOR	ന					4	20	10			
Building Valves         39         2         2         1         7         5           Main Sprinkler Building Valve         1         1         2         6         1         7         5           Main Sprinkler Building Valve         1         1         2         6         1         2         6           Pumping Stations         6         1         1         6         1         4         14           Pumping Stations         5         1         1         6         1         4         14           Curb Stop         1         1         1         6         4         14         2           Curb Stop         2         1         1         6         4         14         14           Stop Melacy Stations         3         2         2         1         4         14         1           A Spin Melacy Stations         3         2         2         6         2         1         1         1           Spin Melacy Stations         4         4         14         4         14         1         1         1         1           Acade Drains         3         2         4         15 </td <td>ĺ</td> <td>18</td> <td></td> <td></td> <td></td> <td>2</td> <td></td> <td></td> <td></td> <td>2</td> <td>က</td> <td></td> <td></td> <td></td>	ĺ	18				2				2	က			
Main Sprinkler Building Valve   1   1   2   6   Non Freeze Hydrant   9   1   1   2   6   Non Freeze Hydrant   9   1   1   2   6   Non Freeze Hydrant   9   1   1   2   6   Non Freeze Hydrant   9   1   1   2   6   Non Freeze Hydrant   9   1   1   2   6   Non Freeze Hydrant   1   1   1   2   Non Freeze Hydrant   1   1   1   2   Non Freeze Hydrant   1   1   1   2   Non Freeze Hydrant   1   1   1   2   Non Freeze Hydrant   1   1   1   2   Non Freeze Hydrant   1   1   1   2   Non Freeze Hydrant   1   1   1   2   Non Freeze Hydrant   1   1   1   2   Non Freeze Hydrant   1   1   1   2   Non Freeze Hydrant   1   1   2   Non Freeze Hydrant   1   2   3   35   10   Non Freeze Hydrant   2   3   3   3   3   3   Non Freeze Hydrant   3   3   3   3   3   Non Freeze Hydrant   3   3   3   3   3   Non Freeze Hydrant   3   3   3   3   3   Non Freeze Hydrant   3   3   3   3   3   3   Non Freeze Hydrant   3   3   3   3   3   3   Non Freeze Hydrant   3   3   3   3   3   3   3   Non Freeze Hydrant   3   3   3   3   3   3   3   3   Non Freeze Hydrant   3   3   3   3   3   3   3   3   3	1	39			2				-	7	S			
Main Sprinkler Building Valve         1         2         6           Non Freeze Hydrant         1         2         6           Pumping Stations         1         4         14           Pumping Stations         5         1         1         4         14           Pumping Stations         1         1         1         2         6         6           Nater Stations         2         1         1         1         4         14         1           Water Stary Bodd Valve         2         1         1         1         5         6		5			_					3	_			
Non Freeze Hydrant	7. Main Sprinkler Building Valve	-			<b>~</b>							<b></b>		
Pumping Stations         1         6         1         2           1. Pool Valwar/Water Tapp         6         4         14         14           1. Pool Valwar/Water Tapp         50         1         1         4         14           1. Curb Stop/Bidg, Valve         1         1         1         6         1           1. Water Bowl         8         2         6         6         6         6         6           1. Water Bowl         1         1         6         6         6         6         6         6         6         6         6         6         6         6         7	1	6		_					Ψ-	2	9			
Prool Valve/Mater Tap         B         6         4         14         2           Curth StopPlidg Valve         1         1         1         1         4         14         14           C. Curth StopPlidg Valve         1         2         1         5         6         6           S. Water Bowl         2         6	[	-							1					
Currb Stop         50         1         1         4         14         14           A. Vacter Stop/Bidg, Valve         1	10. Pool Valve/Water Tap	8				9					2			
Curb Stop/Bidg, Valve         1	11. Curb Stop	50			_					4	4			-/
Water Bowl         8         2         5           Water Bowl         2         6         6           Water Main Chamber         1         6         7           1. Water Main Chamber         1         6         7           2. Water Main Chamber         1         6         6           3. Water Main Chamber         3         2         6         6           3. Water Spring Post         3         2         6         6         6           Gas Valves         3         2         6         6         6         6         6           Building Valve         4         6         6         6         6         6         6         6         6           Clean Outs         5         4         15         10         2         17         11         1	12. Curb Stop/Bldg. Valve	-												
Sprinklers         2         Problem Chamber         1         Problem Chamber         1         Problem Chamber         1         Problem Chamber         1         Problem Chamber         Water Bowl</td> <td>8</td> <td></td> <td></td> <td>2</td> <td></td> <td></td> <td></td> <td></td> <td>5</td> <td></td> <td></td> <td></td> <td></td>	13. Water Bowl	8			2					5				
S. Water Main Chamber         1         Processor         1	l	2												
Water Spray Post         1         Water Spray Post         1         Acas Surveys         3         2         6         6         6         6         6         6         6         6         6         6         6         6         6         6         7         8         7         8         7	1	-												
ass         ass <td>į.</td> <td>1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	į.	1												
Gas Valves         3         2         6         6         6         6         6         6         7         8         7         8         7         8         7         8         8         8         8         8         8         8         9         9         9         9         9         9         9         9         9         9         9         9         9         9	Gas													
Building Valve         1         Puilding Valve         1         Puilding Valve         1         Puilding Valve         1         Puilding Valve	1. Gas Valves	3			2									
Area Drains         4         2         2         2         2         17         11 <th< td=""><td>1</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th<>	1	1												
Area Drains         4         Area Drains         4         Area Drains         4         Area Drains         4         Area Drains         2         4         15         10         2         2         7         11         1	Sanitary/Storm										1			
Clean Outs         5         46         15         10         2         27         17         11           Man Holes         328         2         36         24         3         12         33         35         10           Man Holes         1         1         1         1         1         1         1           Pool Drains         4         1         1         1         1         1         1           Catch Basin/Man Hole         1         1         1         1         1         1         1           Catch Basin/Man Hole         2         2         2         1         1         1         1         1           Catch Basin/Man Hole         2         2         2         1         2         2         2         2         2         2         2         2         2         2         2         2         2 <t< td=""><td>1. Area Drains</td><td>4</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	1. Area Drains	4												
Catch Basins         275         2 46         15         10         2 27         17         11           Man Holes         328         2         36         24         3         35         10           Pool Drains         1         1         1         1         1         1           Pumping Stations         4         1         1         1         1         1         1           Catch Basin/Man Hole         1 <td></td> <td>5</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>2</td> <td></td> <td></td> <td></td> <td></td>		5								2				
Man Holes         328         24         3         12         33         35         10           Pool Drains         1 </td <td></td> <td>275</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>2</td> <td>27</td> <td>17</td> <td></td> <td></td> <td>2</td>		275							2	27	17			2
Pool Drains         1         2         1         1         2         1         2         1         2         1         2         2         1         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         3 <th< td=""><td></td><td>328</td><td></td><td></td><td></td><td></td><td></td><td></td><td>12</td><td>33</td><td>35</td><td></td><td></td><td>22</td></th<>		328							12	33	35			22
Pumping Stations         4         1         2         3         3         3         3         3         3         3         3         3         3         3         4         2         3         4         3         4         3         4         3         4         3         4	i I	~												`
Catch Basin/Man Hole         1         1         1         1         1         1         1         1         1         1         1         1         1         1         2		4				<del></del>				1	_			
Floor Drain         2         2         2         2         4 <th< td=""><td>7. Catch Basin/Man Hole</td><td>***</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th<>	7. Catch Basin/Man Hole	***												
ectrical Electrical Panels         3         1         1         1         1         4         8         9         8         8         9         8         9         8         9 </td <td></td> <td>2</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>2</td> <td></td> <td></td> <td>***************************************</td> <td></td>		2								2			***************************************	
Electrical Panels         3         1         1         1         4         6           Hydro Outlet         7         4         4         6           Light Standards         33         1         2         7         8           Hydro Vault (transformer)         27         1         3         7         8           Transformer         49         1         3         7         8           Electrical Man Holes         1         3         7         8         8           Junction Boxes         14         8         8         8         8         8           Elec. Post         2         1         1         1         8         8         8	Electrical				<i>-</i>									
Hydro Outlet       7       4       4       4       6         Light Standards       33       1       2       6       6       7       8         Hydro Vault (transformer)       49       7       7       8       7       8       1       8 <td>1. Electrical Panels</td> <td>3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>-</td> <td>1</td> <td></td> <td></td> <td></td> <td></td>	1. Electrical Panels	3							-	1				
Light Standards         33         1         2         1         3         7         8           Hydro Vault (transformer)         49         1         3         7         8           Transformer         49         6         6         8         8           Electrical Man Holes         1         6         8         8         8           Junction Boxes         14         1         1         8	2. Hydro Outlet	7									4			
Hydro Vault (transformer)         27         1         2         1         3         7         8           Transformer         49         1         6         6         6         6         6         6         6         6         6         6         6         6         7         6         7         6         7         7         6         7	3. Light Standards	33		:					-					
Transformer         49         - <t< td=""><td></td><td>27</td><td></td><td></td><td></td><td>-</td><td></td><td></td><td>~</td><td>3</td><td>7</td><td></td><td></td><td></td></t<>		27				-			~	3	7			
Electrical Man Holes         1         6           Junction Boxes         14         1           Elec, Post         2         1		49												
Junction Boxes         14		•												
Elec, Post	7. Junction Boxes	14										- Landa Barrella Barr		
		2				-				_				

# SITE SERVICES COMPONENTS QUANTITY TAKE-OFF

			Г	1	-		1				
	Area 13	Area 14	Area 15	Area 16	Area 17	Area 18	Area 19	Area 20	Area 21	Area 22	Area 23
Water					MARIE TO COMPANY OF THE PARTY O	A DE LA COLOR DE L					A P De Company of the
1. Fire Hydrant	ស	_				7		_			
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3. Main Valve	_		2		12	_					-
4. Drinking Fountain	•				က	2	-				
5. Building Valves	īΩ.		2		_						***************************************
6. Man Holes											***************************************
7. Main Sprinkler Building Valve											
8. Non Freeze Hydrant											
9. Pumping Stations											
1-			-			2	~				
11. Curb Stop	2		7		4		3				
12, Curb Stop/Bldg. Valve											
13. Water Bowl											
14. Sprinklers		200					2				
1											
16. Water Spray Post											
Gas			•								
1. Gas Valves											
2. Building Valve											
Sanitary/Storm											
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2. Clean Outs					ന						
3. Catch Basins	22		7		25	30					2
4. Man Holes	2	13	3		64		12				8
5. Pool Drains											
<ol><li>6. Pumping Stations</li></ol>											
7. Catch Basin/Man Hole											
8. Floor Drain									**************************************		
Electrical											automorphism (
1. Electrical Panels											
2. Hydro Outlet			3						***************************************		
3. Light Standards		_	4				19				
4. Hydro Vault (transformer)		2			3		5				***************************************
5. Transformer											
6. Electrical Man Holes										and the sound section of the section	
7. Junction Boxes			7			A A COMMON DA CANADA CA					
8. Elec. Post											

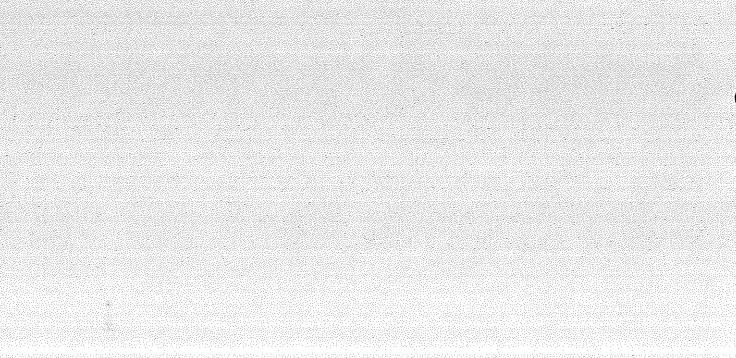
## SITE SERVICES COMPONENTS QUANTITY TAKE-OFF

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. Fire Hydrant		
2. Gate Valves		
3. Main Valve		
4. Drinking Fountain		
<ol><li>Building Valves</li></ol>	***************************************	
6. Man Holes		
7. Main Sprinkler Building Valve		
<ol><li>Non Freeze Hydrant</li></ol>		
9. Pumping Stations		
10. Pool Valve/Water Tap		
11. Curb Stop		
<ol><li>Curb Stop/Bldg. Valve</li></ol>		
13. Water Bowl		
14. Sprinklers		
1	,	_
16. Water Spray Post		
Gas		
1. Gas Valves		
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Sanitary/Storm		
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<ol><li>Catch Basins</li></ol>		
4. Man Holes		
5. Pool Drains		
6. Pumping Stations		
<ol><li>Catch Basin/Man Hole</li></ol>		
8. Floor Drain		
Electrical		
1. Electrical Panels		
2. Hydro Outlet		
3. Light Standards		
4. Hydro Vault (transformer)		
1		
6. Electrical Man Holes		
7. Junction Boxes		
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### **APPENDIX 15**

### CITY OF SCARBOROUGH FIRE PROTECTION WATER SERVICES POILCY



Thomas L. Powell, Fire Chief Guidelines for Water Services for Fire Protection February 26, 1992

Minimum size of water supply:

1. A single private hydrant only -6" (150mm);

2. A single private hydrant and sprinklers and/or standpipes -8" (200mm) to the hydrantion to the sprinklers/standpipe, 6" (150mm) to the rest. Alternatively hydraulic calculations proving the required water supply.

3. Two private hydrants -

8" (200mm). Alternatively hydraulic calculations proving the required water supply.

4. More than two private hydrants -

8" (200mm). Looped system required. (N.B. Main size may be reduced if hydraulic calculations are submitted proving the required water supply.)

Scarborough Public Utilities Commission requirements for domestic water supply taken Note: within building from same water service as the fire protection systems:

1. A 1" domestic supply may be taken from a 6" (150mm) service;

2. A 2" domestic supply may be taken from an 8" (200mm) service;

3. Alternatively hydraulic calculations proving the required water supply for both the fire protection system(s) and the domestic system.

J.P.M.C.

James C. Macdon

Director

Fire Prevention D

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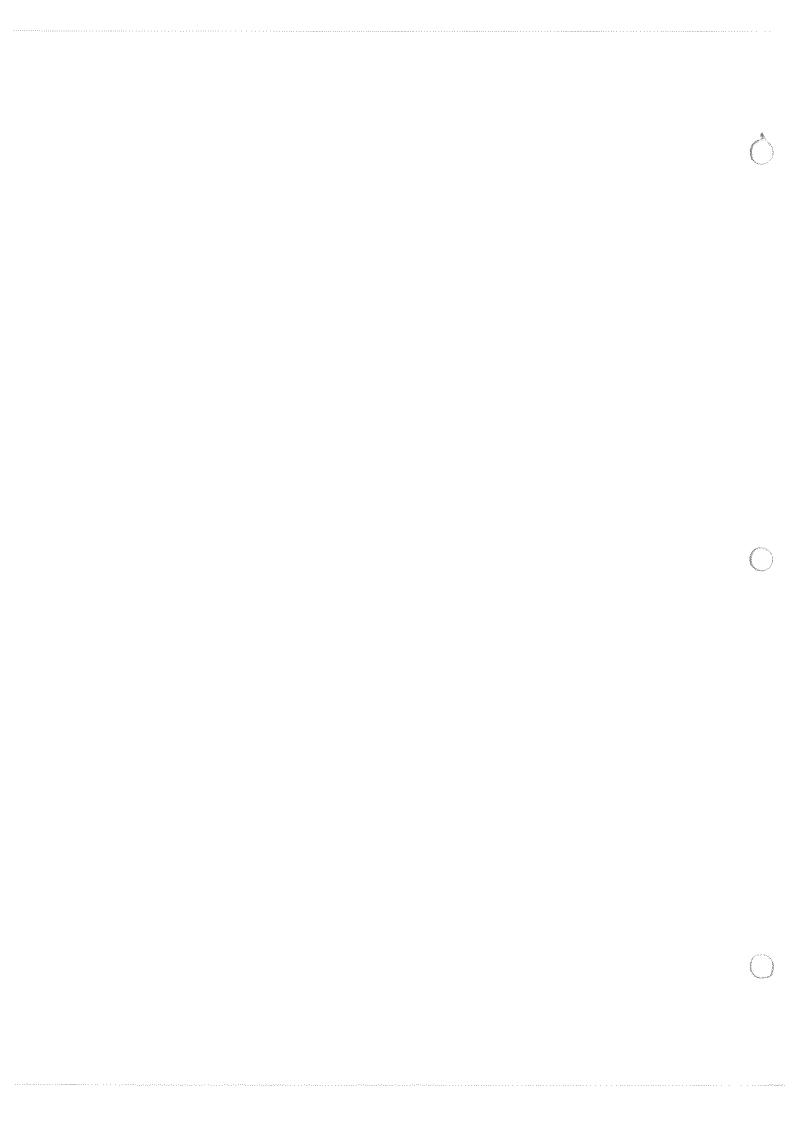
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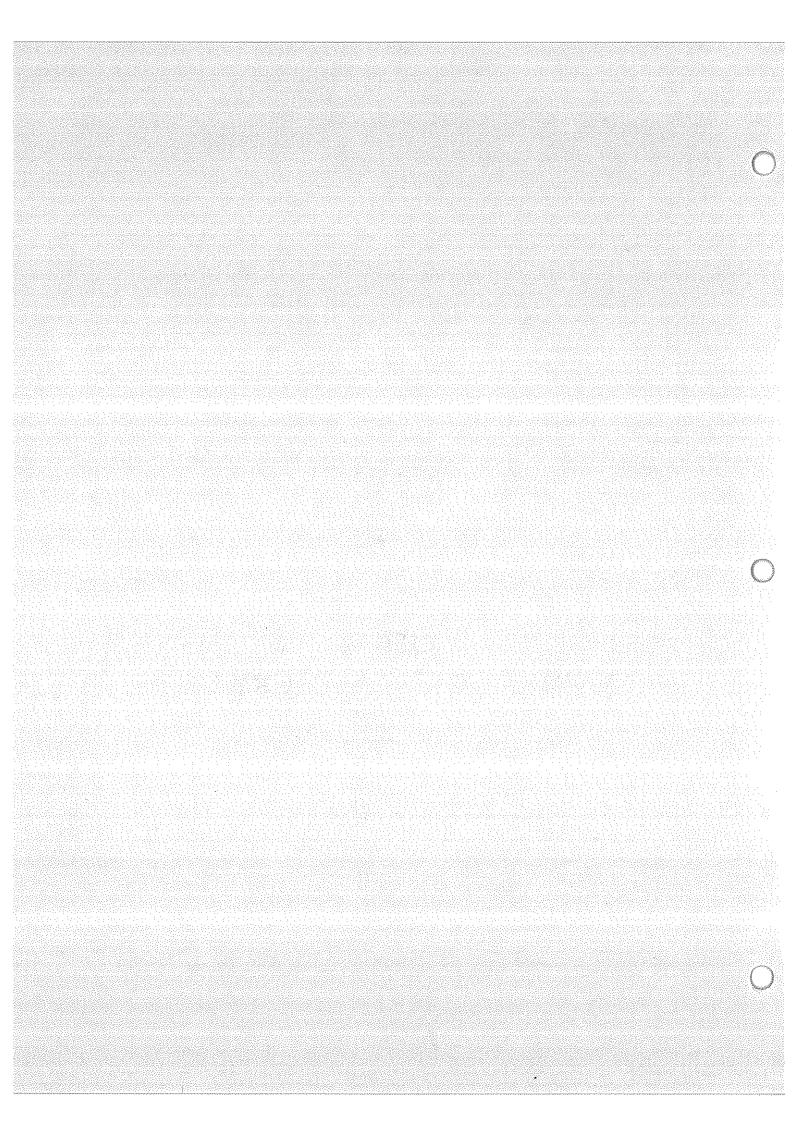
MARIO ZAMMIT 412-4527

RAMDALL LAFRAUCE WIZE WEZ



### **APPENDIX 16**

### CORRESPONDENCE FROM ENBRIDGE CONSUMERS GAS



500 Consumers Road,
Toronto ON M2J 1P8
Tel 416 495-5489
Fax 416 495-6189
Email brian black@cgc.enbridge.com



fax

File Number:

To: Earnes Onyido	From: Brian Black
	No. of pages (including this cover):
Organization: Paradigm Engineering Group	1
Department:	Date: 1999-05-21
Fex: 4440	If this transmission is not received in good order, please call: Sender 416-495-5489
Recipient 416-335-1449	

Re: Metro Toronto Zoo - Natural Gas Supply and Piping

As I had verbally informed you, The pipe on the property of the Metro Toronto Zoo is owned by the Zoo and does not fall under the jurisdiction of Enbridge Consumers Gas. This means that Enbridge Consumers Gas is only able to provide information regarding the gas that is supplied to the system on the Zoo property.

Concerning the present load which is utilized by the zoo under peak hour conditions as supplied by Enbridge Consumers Gas is 1050 M^3 / Hr at a maximum of 45 psi. This pressure could be boosted to deliver 60 psi to the zoo system. The maximum supply that could be provided using present equipment would be 3000 m^3/ Hr. This increase however may be limited by the downstream Zoo piping system. An evaluation should be made by the Metro Toronto Zoo to establish whether any increase in capacity delivered by Enbridge Consumers Gas will be acceptable for the zoo's piping system.

As I mentioned previously, there has been no corrosion survey performed on the Zoo's system in approximately the last 12 years. A leak survey however, is completed annually and was completed three weeks ago for 1999. The results of the leak survey identified no leak indications. It is recommended that a corrosion survey be completed by the Metro Toronto Zoo the secure the integrity of the system and identify any upgrades required in the cathodic protection of the plant.

Flease contact me if you have any further questions.

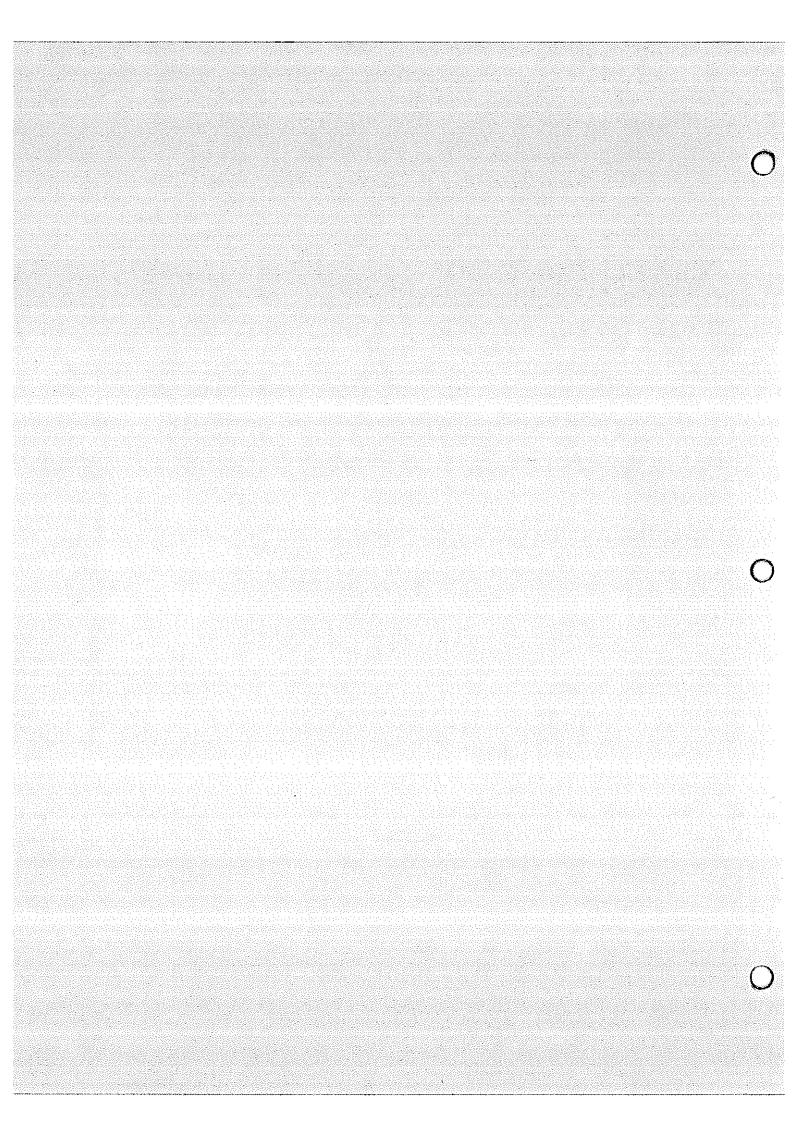
Eirian Black

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### **APPENDIX 17**

### CORRESPONDENCE FROM GRAIG ROSE OF MARSHALL MACKLIN MONAGHAN CONSULTING ENGINEERS



18-93081 memo to file metro toronto zoo

I spoke with Andy Empringham from Scarborough Fire Prevention on Feb. 14 1995. He said that he sent a copy of my Jan. 19 submission to his fire inspector at the City of Scarborough (Steve Doran). He said that they see our design as an improvement to the existing system and will not require the existing mains to be upgraded. He said that he has the final say on this issue and that there was no need for him to provide a letter to me.

Craig Rose

77-61	
18-93081-03-501 Post-it" Fax Note 7671E	Date MAY 19/99 pages 2
TO ERNEST ONYIDO	From CRAIL ROSE
	Co. MMM
Co./Dept	Phone #
Phone #	
Fax # 416 335 1449	Fax #



### **APPENDIX 18**

### FIRE PROTECTION WATER SUPPLY GUIDELINE FOR PART 3 IN THE ONTARIO BUILDING CODE





Office of the Fire Marshal

OFM-TG-07-98



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FIRE PROTECTION
WATER SUPPLY
GUIDELINE FOR PART 3
IN THE ONTARIO
BUILDING CODE

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October 1998

TECHNICAL GUIDELINE

e OBC



OFM-TG-07-98

Fire Protection Water Supply Guideline for Part 3 of the OBC

Office of the Fire Marshal

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June, 1998

OFM Section: Fire Safety Standards at (416) 325-31(k)

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### **ABSTRACT**

This guideline will assist those trying to establish an adequate fire protection-water supply for new and renovated Part 3 buildings as required by Article 3.2.5.7. or Part 11 of the Ontario Building Code. The criteria for Adequate water supply will be detailed and the limitations of this criteria explained. Several other factors will be explained as they relate to the fire protection water supply, such as the fire department, environmental impact and cost.

The guideline provides a method of simple calculation of an on-site water supply, taking into account building occupancy, size, construction and exposure, as well as minimum water duration requirements. Other issues that may effect the need for an on-site water supply or design factors are discussed as well. Sample problems are included to assist the user.

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Fire Protection Water Supply Guideline for Part 3 of the OBC

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### INTRODUCTION

The Office of the Fire Marshal, in cooperation with the Ministry of Municipal Affairs and Housing and the Water Supply Adequacy Committee has developed this guideline to help building owners, consultants and others involved in life safety design of buildings, meet the requirements for "adequate water supply for fire fighting" as found in Part 3 of the Ontario Building Code (OBC). This guideline is not intended for farm buildings or buildings that fall within Part 9 of the OBC.

This guideline has been developed in conjunction with the A-3.2.5.7. Appendix Note on Adequate Water Supply in the 1997 Ontario Building Code.

The primary purpose of this guideline is to provide an adequate fire protection water supply to support evacuation and fire department search and rescue operations during a fire, and prevent fire spread to other buildings.

The secondary purpose of this guideline is to provide a fire protection water supply that can be used to provide a good measure of property protection during the early stages of a fire.

With the exception of sprinklered buildings, this guideline does not intend to provide the optimum for property protection. However with a timely response by a well trained fire department, the water supply designated in this guideline should be sufficient to allow the fire department to extinguish building fires where adverse circumstances are not encountered.

It should be noted that where "property protection" is a primary expectation of the building owner, or where significant environmental contamination from a fire is a concern, other recognized fire protection guidelines should be referenced (such as the Fire Underwriters Survey) to ensure adequate water supplies for manual fire suppression by available fire fighting means, or the building should be sprinklered. Building owners should be made aware of the limitations of the fire protection water supply as required in this guideline, prior to the design and construction of their building and/or the design of an on-site water supply.

It should be noted that other guidelines, such as the Fire Underwriters Survey, should be used when designing water supply systems for newly developed municipal areas, as this fire protection water supply guideline is not intended to address domestic service water needs.

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### OVERVIEW OF THE BUILDING CODE REQUIREMENTS

Article 3.2.5.7. of the Ontario Building Code (OBC) 1997 states: "an adequate water supply for fire fighting shall be provided for every building".

### Q1 What does this mean for unsprinklered buildings?

Fire Protection Water Supply Guideline for Part 3 of the OBC

As interpreted in this guideline, an adequate fire protection water supply for unsprinklered buildings means an immediately available and accessible water supply, with sufficient volume and/or flow to enable the fire department to use their fire hoses to control fire growth until the building is safely evacuated and search and rescue operations have been complete, and to prevent the fire from spreading to adjacent buildings. This water supply should also be sufficient to provide a <u>limited measure</u> of both property protection and protection against fire growth in buildings with contents that could result in a significant environmental impact.

### Q2 What does this mean for sprinklered buildings?

For sprinklered buildings, an adequate fire protection water supply means a reliable water supply providing sufficient water flow for the sprinkler systems in terms of pressure, volume, and duration to limit fire growth until the fire department arrives to suppress the fire. This automatic protection is expected to provide time for the evacuation of buildings, assist the fire department in preventing fire spread to adjacent buildings, limit the environmental impact of fires, and provide significant property protection.

Note: A properly designed sprinkler system, and especially those using modern technology sprinkler heads, will often extinguish a fire even without additional manual fire fighting intervention.

### FIRE DEPARTMENT RESPONSE

### Q1 How does fire department response influence water supply requirements?

Determining an adequate water supply for manual fire protection is not dependent solely on building characteristics. A major factor will be the response time and intervention provided by the local fire department. This guideline assumes a prompt response by a well equipped fire department using modern fire lighting techniques, and assumes that buildings will be evacuated in accordance with established building fire safety plans and fire department pre-fire plans. Where there is no fire department see Q3 in the Special Cases Section.

An immediately available fire protection water supply permits the fire department, at their discretion, to enter a burning building with hose lines to conduct search and rescue operations. The duration of this water supply should, as a minimum, be sufficient to allow complete search and rescue throughout buildings. Once the search and rescue operations are complete, additional water may be required for exposure protection or for fire suppression to limit property damage. Exposure protection and fire suppression to limit property damage go beyond the minimum for life safety as established by water supply requirements set out in this guideline.

The fire department has discretion as to how they will use hose streams on any given fire. Where a limited amount of fire protection water is available on site, decisions will be made on how much water will be used in the initial "search and rescue" stage, the suppression stage and for exposure protection. The Fire Chief may deem it most beneficial to concennate all fire department resources to suppress a fire in its early growth stage, thereby drawing-down the hunted water supply quickly, or may instead "nurse" the limited water supply until the search

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and rescue procedure is completed and then concentrate on exposure protection until supplemental water supplies arrive.

Fire departments serving remote or rural areas often have to respond to a fire with a transportable water supply having a duration of approximately five to ten minutes when using one or two 38 mm hose lines. This provides minimal hose streams allowing immediate search and rescue and fire suppression in small buildings with simple layouts. However, where a fire has had a significant head start, this transported water supply is unlikely to be sufficient to save the building.

For larger, more complex buildings, an on-site fire protection water supply is needed to provide an extended duration of hose stream use by the fire department to allow search and rescue of the building, exposure protection and fire suppression. The volume of this on-site fire protection water supply is dependent on the building size, construction, occupancy, exposure and environmental impact potential, and shall be sufficient to allow at least 30-minutes of fire department hose stream use.

### COST IMPACT

Q1 How significant a cost impact will it be to provide an adequate fire water supply?

Cost impact on buildings constructed in rural or remote areas will typically be more than for buildings constructed within areas provided with municipal water mains. The great majority of existing municipal water systems will be able to satisfy the requirements of this guideline for new building construction. This would not proclude situations where new large "high fire demand" type buildings are being proposed in areas where the municipal water supply is not adequate. In these cases the building owner may need to provide supplemental fire protection water to meet the requirements of this guideline. The building owner may alternatively make design modifications to his building to reduce the water supply requirements. These modifications could include providing firewalls, using noncombustible construction in lieu of combustible construction, sprinklering the building, reducing the amount of window openings exposing a property line, etc.

Buildings constructed in rural or remote areas without a municipal water supply or an adjacent accessible body of water (i.e. river or large pond) may require on-site water storage tanks or a water reservoir for the fire protection water supply required by this guideline. Hydrants, suction connections for fire department "drafting", or underground dry mains may also be needed to provide appropriate building coverage. (See Q7 in the Special Cases Section)

### SIGNIFICANT ADVERSE ENVIRONMENTAL IMPACT

Q1 What types of building fires could result in a significant adverse environmental impact and thus require additional fire protection water supplies?

Any building used for the storage or processing of chemicals or materials should be deemed to have the potential for significant adverse environmental impact, if a fully developed fire would result in significant contamination of ground or surface water through direct runoff or atmospheric dispersion.

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### Q2 What fire protection criteria should be used for these buildings?

Properly designed sprinkler protection should be provided in these buildings to prevent fully developed fires. Sprinklered buildings typically require reduced amounts of water for control or suppression of a fire, thus reducing the potential for environmental impact from contaminated water run-off.

Where sprinkler protection is not provided, other recognized fire protection guidelines (e.g. Fire Underwriters Survey) may instead be used to determine the manual fire fighting water supply needs for these buildings. The Chief Building Official or Fire Official should evaluate these special cases on an individual basis.

Q3 Why do unsprinklered buildings with occupancies that constitute an adverse environmental impact typically require an increased water supply for manual fire fighting?

An increased water supply gives the fire department the option of conducting an all out fire hose suppression attack in the early stages of a fire. A successful hose deluge attack at this time may result in extinguishment before significant amounts of environmentally hazardous chemicals and materials are involved. Note: Unsprinklered buildings will require careful preplanning by fire departments to ensure judicious application of this greater amount of fire fighting water to prevent significant adverse environmental impact due to water run-off.

### WATER SUPPLY REQUIREMENTS

### Q1 How do I determine water supply requirements?

To simplify this guide, requirements have been placed into four categories. It is best to use a process of elimination to determine the correct category of water supply requirements. This guideline is not intended to be used for farm buildings or Part 9 buildings. (see Q8 in the Special Cases Section)

The four categories are:

- · buildings not requiring on-site fire protection water supply
- sprinklered buildings
- buildings requiring on-site fire protection water supply
- additions to existing buildings

### 1. Buildings Not Requiring On-Site Fire Protection Water Supply

- (a) A building would not require an on-site water supply for fire fighting if the building satisfies the criteria set out in Item 1(b) or Item 1(c), provided that:
  - (i) the building is serviced by a municipal water supply system that satisfies Item 3(b), or
  - the fire department can respond with a transportable water supply of sufficient quantity to allow them to conduct an effective search and rescue of the building, determined on the basis of other guidelines or standards (such as NFPA 1231, "Standard on Water Supplies for Suburban and Rural Fire Fighting"). (also see Q1 to Q3 in the Special Cases Section)
- (b) A building does not require an on-site water supply for fire fighting where all the following criteria are met.

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(ii) the building height is 2 stories or less,

(iii) the building does not have a Group B occupancy (care or detention),

(iv) the building does not require a sprinkler system or a standpipe and hose system,

(v) the limiting distance from the property line is at least 13 metres if the building has an F-1 occupancy (high hazard industrial), and

(vi) the building constitutes no significant environmental contamination potential under fire conditions.

(c) A building that exceeds 200 m<sup>2</sup> in building area or 2 storeys in building height may not require an on-site water supply for fire fighting where it has an F-3 occupancy with an insignificant combustible loading (such as found in cement plants, steel stock storage sheds, etc.), as determined by the Chief Building Official.

### 2. Sprinklered Buildings

For sprinklered buildings, NFPA 13, "Standard for the Installation of Sprinkler Systems", as referenced by Article 3.2.5.13. of the Ontario Building Code, shall be used to obtain sprinkler and hosestream water requirements. (see Q1 of the Further Explanation of Guideline Requirements Section)

### 3. Buildings Requiring On-Site Fire Protection Water Supply

(a) Except for sprinklered buildings and as required by Items 3(c) and 3(d), new buildings shall be provided with a supply of water available for fire fighting purposes not less than the quantity derived from the following formula:

$$Q = KVS_{Tot}$$

where

Q = minimum supply of water in litres

K = water supply coefficient from Table 1

V = total building volume in cubic metres

S<sub>Tet</sub> = total of spatial coefficient values from property line exposures on all sides, as obtained from the formula:

$$S_{Tot} = 1.0 + [(S_{Side1}) + (S_{Side2}) + (S_{Side3}) + ... e(c.)]$$

where

S<sub>Side</sub> values are obtained from Figure 1, as modified by

Items 3(e) and (f), and S<sub>Tot</sub> need not exceed 2.0

(see Explaining the Calculations Section)

(b) Except as provided in Item 3(d), water supply flow rates shall not be less than that specified in Table 2. Where the water supply is from a municipal or industrial water supply system then the required flow rate shall be available at a minimum pressure of 140 kPa

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### Office of the Fire Marshal

- (c) Except as provided in Item 3(d), the minimum fire protection water supply (Q) required in Item 3(a) shall not be less than what is needed to provide the minimum flow rate specified in Table 2 for a duration of 30 minutes.
- (d) In elementary and secondary schools, the water supply determined in accordance with Items 3(a) and 3(b) may be reduced. The level of reduction to be applied would be at the discretion of the local jurisdictional authority, and should not exceed 30%. Factors to consider should include fire department response time, fire department resources and the size and complexity of the school building. (see Q10 of the Special Cases Section)
- (e) Where a masonry wall with a minimum fire-resistance rating of 2 hr. and no unprotected openings is provided as an exterior wall, the spatial coefficient (S<sub>5ido</sub>) for this side of the new building may be considered equal to 0. This exterior masonry wall shall be provided with a minimum 150 mm parapet.

Firewalls that divide a structure into two or more buildings may be given similar consideration when evaluating the exposure of the buildings to each other.

(f) The spatial coefficient (S<sub>side</sub>) may be considered equal to 0 when the exposed building is on the same property and is less than 10m<sup>2</sup> in building area.

### 4. Additions to Existing Buildings

- (a) Except as permitted in Items 4(b) and (c), additions to existing buildings shall be provided with a fire protection water supply as required in Items 3(a) to 3(f). (See Q2 in the Further Explanation of Guideline Requirements Section)
- (b) Buildings with new additions falling into any one of the following criteria would not require an additional water supply for fire fighting where:
  - (i) the expanded building complies with all the requirements of Itom 1(a),

(ii) the new addition does not exceed 100m² in building area, or

- the new addition exceeds 100m² hut does not exceed 400m² in building area, contains an assembly, business and personal services, mercantile or low hazard industrial occupancy, is of noncombustible construction, does not result in a significant increase in exposure to other existing buildings, has no combustible storage or process, and is separated from the existing building by a minimum 1 hour fire-rated separation.
- (c) Where a firewall is provided between the new addition and the existing building, the fire protection water supply may be determined in accordance with Items 1(a) and 3(a), using only the building volume of the new addition.

Note: Consideration should be given to designing the water supply to the more stringent requirements of the two separated buildings.

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TABLE 1 WATER SUPPLY COEFFICIENT -- K

	Classific Ta	ation by Grouble 3.1.2.1 o	up or Divisio f the Ontario	n in Accorda Building Co	nce with
TYPE OF CONSTRUCTION	A-2 B-1 B-2 B-3 C	A-4 F-3	A-1 A-3	E F-2	F-1
Building is of noncombustible construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2. of the OBC, including loadbearing walls, columns and arches.	10	12	14	17	23
Building is of noncombustible construction or of heavy timber construction conforming to Article 3.1.4.6. of the OBC. Floor assemblies are fire separations but with no fire-resistance rating. Roof assemblies, mezzanines, loadbcaring walls, columns and arches do not have a fire-resistance rating.	16	19	22	27	37
Building is of combustible construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2. of the OBC, including loadbearing walls, columns and arches. Noncombustible construction may be used in lieu of fire-resistance rating where permitted in Subsection 3.2.2.	18	22	25	31	41
Building is of combustible construction. Floor assemblies are fire separations but with no fire-resistance rating. Roof assemblies, mezzanines, loadbearing walls, columns and arches do not have a fire-resistance rating.	23	28	32	39	53
Column 1	2	3	4	5	6

TABLE 2 MINIMUM WATER SUPPLY FLOW RATES

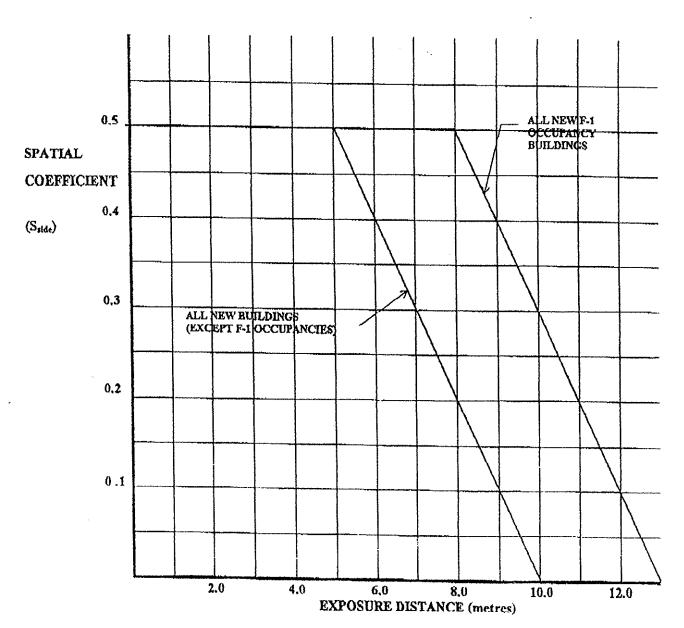
OBC Part 3 Buildings	Required Minimum Water Supply Flow Rate (L/Min.)
One-storey building with building area not exceeding 600m <sup>2</sup> (excluding F-1 occupancies)	1800
All other buildings  Note of Q=KVS <sub>Tet</sub> to referenced in Rem 5(a)	2700 (If $Q \le 1.08,000L$ ) <sup>(1)</sup> 3600 (If $Q > 108,000L$ and $\le 135,000L$ ) <sup>(1)</sup> 4500 (If $Q > 135,000L$ and $\le 162,000L$ ) <sup>(1)</sup> 5400 (If $Q > 162,000L$ and $\le 190,000L$ ) <sup>(1)</sup> 6300 (If $Q > 190,000L$ and $\le 270,000L$ ) <sup>(1)</sup> 9000 (If $Q > 270,000L$ ) <sup>(1)</sup>

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### FIGURE 1

### SPATIAL COEFFICIENT VS EXPOSURE DISTANCE



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### EXPLAINING THE CALCULATIONS

### Q1 What is the "K" factor and how were these values developed?

The K factor, also known as water supply coefficient, is a value that takes into account typical compartmentalization of buildings, combustibility of construction, combustible loading of the building occupancy and evacuation responses by the building occupants.

These factors were developed using the "occupancy hazard classification numbers" and "construction classification numbers" in NFPA 1231, adjusting them to fall within the occupancy classifications of buildings within the Ontario Building Code, and then modifying them so that the final units of the equation are in litres. Table 1 of this guideline lists K values according to type of construction and occupancy classification.

### Q2 What volume is included in "V"?

All spaces below and above grade within a building, measured to the underside of the roof deck, should be included in the volume (cúbic metres) for the fire protection water supply formula. An exception may be made to exclude a non-combustible crawl space (with no combustible services) below a non-combustible floor, located under the lowest building floor area, if it will not be developed in the future or used as a storage area.

### Q3 How are "exposures" measured?

Exposure distances from a new building will be measured from the exterior building faces to the property lines of that building. The distance from the face of the building to the property line shall be determined as per OBC 3.2.3.1.(3). When facing a street, the property line shall be deemed to be the centre of the street.

When facing an existing building (exceeding 10 m<sup>2</sup> in building area) on the same property, the exposure distance (for use in Figure 1) shall be the greater of either the "limiting distance" of the new building face as obtained in OBC 3.2.3.1.(1), or the mid-point between the two buildings.

### Q4 How are spatial coefficient values obtained from Figure 1?

Once the exposure distance for each building face has been determined, these values can be located along the horizontal arm at the bottom of Figure 1. By following straight up from these points the graph line may be intersected providing a spatial coefficient value (Sside) along the left vertical arm of Figure 1. Exposure distance values of at least 10 m. (except F-1 occupancies which require a minimum of 13.0 m) result in a spatial coefficient value of 0.

### Q5 How are multiple exposures calculated?

Where a new building has exposures on more than one side, the percentage increase in the fire protection water supply due to the exposures on each side should be totaled to reflect all exposure protection requirements. [e.g. if exposure to one side results in a 50% increase in water volume (i.e. Sside1 = 0.50), and exposure to another side results in a 25% increase in water volume (i.e. Sside2 = 0.25), then the total increase in water volume for exposure protection is 75%. The totaled spatial coefficient (Stor) is then

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Q6 What is the rationale for the minimum 30 minute water supply duration and what new buildings will be most affected by this requirement?

The minimum 30 minute fire protection water supply duration requirements as stated in Item 3(b), recognizes life safety concerns by providing a dependable and immediately available fire protection water supply for the fire department's use. It is intended that the duration be long enough to allow complete search and rescue of any building by the fire department. This minimum fire protection water supply should also give the fire department a reasonable oppositunity to control and/or extinguish a small fire upon their arrival, thereby preventing its growth and spread to adjacent buildings and limit any negative environmental impact. This minimum 30 minute duration requirement also allows a reasonable time for the fire department to arrange for supplementary water supplies using a water shuttle system for most buildings.

Concerns for minimum fire protection water supply volumes are mostly relevant for building sites not serviced by municipal water supply systems, where an on-site fire protection water supply has to be provided. Building sites serviced by municipal water supply systems will usually be provided with sufficient water volumes for their fire protection needs. The guideline focuses on water supply flow rates at minimum pressures for these buildings. It should be noted however that some municipalities have fairly limited water supply storage capacities and should therefore be evaluated when a new "high demand" building is to be constructed.

Q7 How do exterior 2 hr. rated masonry walls with parapets and no unprotected openings and interior firewalls influence exposure, and thus water supply calculations?

Interior firewalls and exterior masonry walls fire-rated for 2 hours, with parapets and no unprotected openings, are expected to remain in place during the period that fire exposure is greatest. Exposure to adjacent buildings is reduced to a point where additional exposure protection water may not be needed.

Judgment by the Chief Building Official should be used in determining the design of exterior 2 hour firerated masonry walls and interior firewalls with regard to exposures. The usual 6 inch parapet may not be considered adequate exposure protection where a new building exposes a much higher existing building in close proximity. Rather than having to increase the water supply due to exposure, a higher parapet may be sufficient protection. In situations where parapet design or other exposure protection methods do not provide adequate exposure protection for the existing building, then additional exposure fire protection water may be required.

Where firewalls divide a new facility into separate buildings, the fire protection water supply should be sized to the building with the greatest water supply demand.

What would be the impact on fire protection water supply requirements for a new building if an existing exposed property has its own on-site fire protection water supply?

Where a new building exposes an existing property provided with its own independent on-site fire protection water supply, the Chief Fire Official may deduct this water supply from the quantity needed by the new building due to this exposure. This neighbouring water supply should be accessible to the fire department to protect exposed buildings.

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The Chief Fire Official should be satisfied that the two property owners will properly maintain their respective fire protection water supplies for the life of their buildings. This agreement may require approval from the municipality and may be subject to criteria provided by the Building Code Commission.

### FURTHER EXPLANATION OF GUIDELINE REQUIREMENTS

Q1 Regarding sprinklered buildings, where in NFPA 13 are hose stream requirements specified?

NFPA 13 contains the hose stream requirement for sprinklered buildings in the "Occupancy Hazard Fire Control Approach" section (in Chapter 5 of 1992 to 1998 NFPA 13 edition). Within, is a table entitled "Hose Stream Demand and Water Supply Duration Requirements". This table provides total inside and outside hosestream requirements and duration for each hazard classification of sprinkler system design.

A sprinkler contractor designing a sprinkler system for a building will determine the minimum water supply requirements for the sprinkler system. Using the duration period obtained from the above referenced table, the contractor will add the sprinkler and hose stream requirements and calculate the total fire protection water supply required for the building.

Q2 Where new additions are added to existing buildings that do not have an on-site water supply, what volumes of water are considered adequate for life safety and exposure?

Whereas Part 11 of the OBC indicates that only the addition to an existing building is required to conform to OBC Part 3, this might in reality not be adequate to deal with life safety and exposure where fire protection water supply needs are concerned.

When an addition is added to an existing building and water supply calculations are based only on the volume of the addition, the fire protection water supply provided on-site might not be adequate to allow full search and rescue throughout the entire building. As well, exposure to neighbouring buildings from the new addition may not be reflective of the nature and size of a potential fire in the enlarged building. Calculations using the entire volume of an expanded building therefore are the only accurate indication of fire protection water supply needs.

Q3 Does this guideline apply to buildings that are being renovated under Part 11 of the Building Code?

Part 11 of the Building Code should be reviewed to determine the conditions under which Article 3.2.5.7. applies This is found in the Compliance Alternative tables in Part 11.

Where Article 3.2.5.7 does apply, the existing water supply should be evaluated to determine if it is sufficient for the renovated building. Some discretion may be used by the building official if the water supply for the renovated building is not significantly greater than the existing water supply.

### SPECIAL CASES

Q1 Can water transported by the fire department be satisfactory to protect small buildings?

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Smaller buildings of 2 stories or less and with a building area of  $200m^2$  or less, may be adequately protected by a fire department using proper pre-planning methods and transported fire protection water supplies. NFPA 1231, "Standard on Water Supplies for Suburban and Rural Fire Fighting", provides methods to assist the fire department with this pre-planning. Where the fire department does not have the equipment necessary for a proper water shuttle system to adequately protect these smaller buildings as per NFPA 1231, an on-site fire protection water supply should be considered.

### Q2 What extra precautions, if any, should be taken for institutional occupancies?

Buildings with Group B, Division 1, 2 and 3 occupancies should be treated in a special manner with respect to fire protection water supplies. The occupants of these buildings require direct supervisory assistance for phased evacuation during a fire. This could result in a prolonged search and rescue by the fire department. If this type of building is located in areas not serviced by municipal water mains, the fire protection water supply that the fire department is capable of transporting to the site may not be adequate for the duration of this search and rescue period. Only a properly sized on-site fire protection water supply will provide the hose stream duration that the fire department needs. Alternatively, sprinkler protection could be provided.

### Q3 What provisions should be made where fire department response is slow or nonexistent?

For new buildings constructed in areas where fire department response is not expected in a reasonable time, the building should be sprinklered to help ensure safe evacuation. In locations where a fire department pumper truck is not provided, consideration should be given to installing a private water supply capable of providing a minimum 700 kPa (100 psi) water pressure at the required flow rate to permit fire fighters or other persons trained in the use of fire hoses, to effectively use a "fog-nozzle" hose spray on the fire. This type of hose spray is most effective at controlling fires. Alternatively, sprinkler protection could be provided.

### Q4 How should an outdoor reservoir be designed to take into account ice formation?

When designing an open, unheated reservoir to provide a fire protection water supply as required in this guideline, a 600 mm ice depth allowance should be included in the water volume calculations. Where local winter temperature conditions result in a greater ice depth (as typically found on local lakes or ponds), this should be factored into the volume calculations.

### What provisions should be made to ensure that water reservoir supplies do not drop to unsafe levels as a result of evaporation or leakage?

A make-up water supply should be provided to maintain the design volume of fire protection water supply reservoirs. Storage tanks should be provided with limit switches, pressure gauges or water-level gauges to monitor volume.

If make-up water supply for open water supply reservoirs is provided by natural refill methods (i.e. water table seepage) and periods of drought are common, the reservoir capacity should be increased to take into account the reduced water table levels expected from the evaporation of water.

Q6 What standards should be used to provide an acceptable water supply design?

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Tanks should conform to NFPA 22, "Water Tanks for Private Fire Protection", and the local fire department should be consulted to determine appropriate connections for their pumping equipment.

Fire main installations should conform to NFPA 24, "Private Fire Service Mains and Their Appurtenances".

On-site fire pump installations should conform to NFPA 20, "Standard for the Installation of Centrifugal Fire Pumps".

Sprinkler standards other than NFPA 13, "Standard for the Installation of Sprinkler Systems", such as NFPA 13D, "Installation of Sprinkler Systems in One- and Two-Family Dwellings and Mobile Homes", and NFPA 13R, "Installation of Sprinkler Systems in Residential Occupancies Up To and Including Four Stories", may be used where appropriate for the type of building covered by these standards. These other standards should be acceptable to the local jurisdictional authority.

For new buildings that present a special hazard to a community as a result of their size, occupancy or economic importance, the Fire Underwriters Survey Guide should be used to determine suitable water supply and hydrant siting.

**Q7** For evaluation of the fire protection water supply and associated fire hydrants, are there other considerations in addition to those set out in the OBC?

Impounded fire protection water supply for a remote building shall be accessible to the fire department to allow the use of suction lines for drafting either directly from the impounded water source, or from a dry hydrant supplied from the impounded water source. This water source or hydrant shall be located in adherence to OBC 3.2.5.7.(2).

Where at least two widely separated private fire hydrants are required to protect a building and water is to be supplied from a single on-site fire protection water supply (e.g. reservoir), it is acceptable to provide a fire department pumper connection adjacent to the water supply to allow a pumper truck to pump into an underground "dry" main feeding the two remote hydrants. This arrangement permits fire fighters to attach hoses directly to the hydrants or to use a second pumper truck to draw hoosted water from these hydrants.

Existing water flow test information obtained to determine the adequacy of the municipal or private water supply for fire protection of a new building should be evaluated with regard to how dated the test information is, whether the flow test was conducted during high or low demand periods, and the possibility that future development in the area will significantly affect the supply. A current hydraut flow test at the proposed construction site will provide the most accurate information.

When dealing with new buildings serviced by municipal or industrial pressurized fire protection water systems, this guideline specifies a minimum water flow rate at 140 kPa pressure. The 140 kPa pressure is the accepted minimum that most fire departments will allow service mains to be drawn down to. Water main and/or booster pump damage could occur from cavitation at pressures below this level

### Q8 Can this guideline be used for Part 9 of the OBC?

The OBC does not currently require that Part 9 buildings be provided with an adequate water supply for fire fighting. However, this guideline may be used on a voluntary basis to provide a suitable fire protection water supply for these buildings.

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The Water Supply Adequacy Committee recommends that an on-site fire protection water supply as required by this guideline be provided for multi-unit residential (Group C) type buildings (i.e. hotels, motels, apartments, townhouse complexes, etc.) that fall within Part 9 of the OBC. These buildings inherently have delayed building evacuation, resulting in more extensive search and rescue operations, and will likely benefit from an on-site fire protection water supply.

# Q9 How are standpipes and hose systems affected by these requirements?

Where a building requires a standpipe arithose system per the OBC, the standpipe system should continue to be designed to Article 3.2.9.2. The standpipe will draw from the required water supply specific in this guideline, still leaving a significant fire protection water supply for exterior hose stream use.

Q10 Can the water supply requirements of this guideline be reduced in buildings with an established fire safety plan that can ensure a rapid building evacuation?

Elementary and secondary schools have a record of well established and practiced fire safety plans which allow complete school evacuations within 4 minutes. Because of this and the inherent high level of supervision in these types of facilities, a reduction of up to 30% in the fire protection water supply requirements as set out for unsprinklered buildings in this guideline. may be given. However, caution should be used if the duration of water supply is reduce it to less than 30 minute, unless other compensating features are also provided.

Other considerations to keep in mind should include d. abled students and teachers that are being introduced into the general school population. A delayed evaguation may be expected for them. This could result in prolonged search and rescue operations by the fire department and should be considered when determining water supply reductions.

Q11 Can the water supply requirements of this guideline be reduced if alternate fire suppression methods are proposed?

Alternate fire suppression methods may result in reduced water supply requirements when compared to design parameters set out in this guideline. Questions should be directed to the local authority that has jurisdiction over these matters.

Alternative fire suppression methods being considered for allowing a reduction in the water supply requirements of this guideline are, foam/water extinguishing systems, carbon dioxide extinguishing systems or dry chemical extinguishing systems. Exterior water curtain (deluge) systems may be onside rea in lieu of fire protection water supply requirements for exposure purposes.

## WATER SUPPLY ADEQUACY COMMITTEE

Kim Bailey - Office of the Fire Marshal

John Braum - American Water Works Association

Roy Chalk - Ontario Municipal Fire Prevention Officers Association

Steve Penna - Ontario Building Officials Association

David Shantz - Municipal Engineers Association

Tom Eyre - Ontario Municipal Water Association
Don Livingston - Ministry of Housing, Buildings Branch
Ed Coe - Insurers Advisory Organization
Chief Tom Powell - Ontario Association of Fire Chiefs

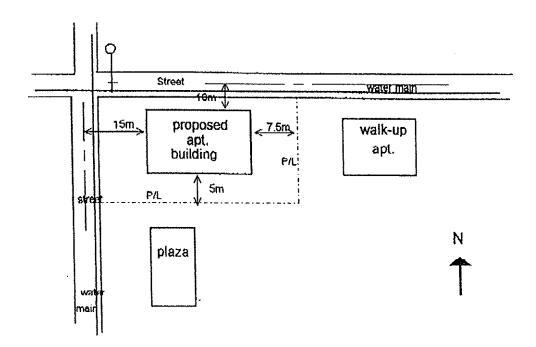
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## **EXAMPLE PROBLEMS**

#### PROBLEM #1

A new apartment building is to be constructed in your municipality. The building will measure 30m by 25m, with 3m between floors, and consists of 3 storeys plus a basement used for storage and laundry facilities. Parking will be outside. The building is to be of combustible construction and is to conform to 1997 OBC 3.2.2.47. An attic space is also provided in this building with a 750m<sup>3</sup> volume. A 30 min. fire separation is provided between the 3rd floor and the attic space. The building is not to be sprinklered nor provided with a standpipe system.

The building is located on a corner lot and faces 2 streets (see diagram). Property lines are located 5m to the south and 7.5m to the east of the proposed building. All of the buildings are serviced by municipal water mains and hydrants. What is the required minimum flow rate of the municipal main for an adequate fire protection water supply?



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## **SOLUTION - PROBLEM #1**

(1) Determine building classification

-residential apartment is Group C

(2) Check parameters of Item 1(a) to determine whether building requires an on-site water supply. - building exceeds 200m², has top stories with significant combustibles and is not a Part 9 building, therefore needs water supply evaluation

(3) Calculate Q=KYSTot

(i) determine K

- from Table I, based on building construction and classification, the water supply coefficient K-18

(ii) calculate the building volume,  $V = L \times W \times H$ 

- use total height of building, 3 storeys plus basement, and attic space (750m3).  $(3m between floors \times 4 floors = 12m)$ 

 $V - (30m \times 25m \times 12m) + 750m^3 = 9750m^3$ 

(iii) Determine Stat from Figure 1

consider each side of the building:

- the north and west sides of the building each face a street and the distance to the centre of the streets exceed 10m, so Sside will be equal to 0.0 on both sides.

- the property line is 5m to the south of the building. From Fig. 1, Sside is equal to 0.5, meaning that a 50% increase in the volume of water will be required to protect this side.

- the property line to the east of the building is 7.5m. From Fig. 1, Sside is equal to 0.25, meaning that a 25% increase in the volume of water will be required to protect this side.

-therefore, because of the exposure on the south and east sides of the building, it will be necessary to increase the total volume of the water by 75% (the sum of all the spatial coefficients from each side).

i.e. 
$$S_{Tot} = 1 + (total \ of \ spatial \ coefficients)$$
  
=  $1 + (0.5 + 0.25)$   
=  $1.75$  (Note:  $S_{Tot}$  need not exceed 2.0)

(4) determine the water supply flow rate

- from Table 2, since the building either exceeds 1 storey or its area is greater than 600 m<sup>2</sup>, and the calculated Q is greater than 270,000 litres, the required minimum water supply flow rate from the municipal system would be 9000 LMin. - this flow rate is required at 140 kPa in accordance with Item 3(b).

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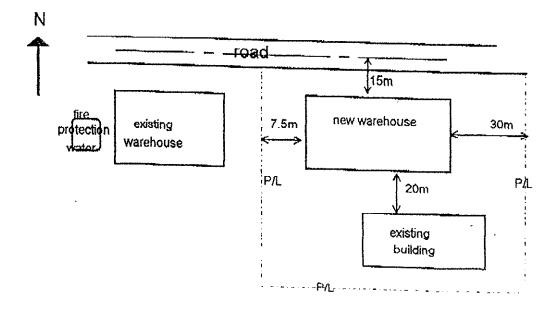
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## PROBLEM #2

A single storey warehouse and distribution center, classified as a low industrial hazard occupancy, is to be built in an area not serviced by a municipal water supply. The building is to be 1500 m<sup>2</sup> in area, 4 metres high and of noncombustible construction conforming to Subsection 3.1.5. of the Ontario Building Code. This building falls within 1997 OBC 3.2.2.80. Storage commodities vary, but in general are farm implements in word crates.

The warehouse faces one street to the north, with property lines 30m to the east and 7.5m to the west. An existing building is located on the same property and will be 20m to the south of the proposed new warehouse. The new warehouse building will have 10% unprotected openings in its south face.

There is a similar type warehouse that has its own 20,000 litre on-site fire protection water supply located to the west. This water supply is determined by the fire department to be reliable and accessible. How much water will be required on site for fire protection of the proposed building?



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## **SOLUTION - PROBLEM #2**

(1) Determine building classification

proposed low hazard warehouse building is Group F-3

(2) Check parameters of Item 1(a) to determine whether building requires an on-site water supply.

building is a Part 3 building as is exceeds 600 m² in area and has a significant combustible loading, therefore needs on-site water supply

(3) Calculate Q=KVSTot

(i) determine K

- from Table 1, based on building construction and classification the water supply coefficient K=19

(ii) calculate the building volume,  $V = Area \times H$ 

$$= (1500 \times 4) = 6000 \text{ m}^3$$

(iii) Determine Stot from Figure 1 by considering each side of the building:

- on the east side of the proposed building the distance to the property line exceeds 10 meters so no increase in water volume is necessary.
- the proposed building faces a street on the north side with distance to the center of the street 10 meters away. No increase in the water volume will be required due to lack of exposure on this side.
- the proposed building faces an existing building on the same property, 20m to the south. The 10% unprotected openings in the south building face of the proposed building results in a "limiting distance" of 2.5m using Table 3.2.3.1.A. of the OBC. Since the midpoint between the two buildings on the same property (10m) is greater than the limiting distance of the south face of the new building, the 10m is deemed the exposure distance. No increase in water volume will therefore be needed from exposure on this side.
- the property line to the west is 7.5 meters from the exterior wall, which means a 25% increase in the volume of water to protect the property on that side. However, the neighbour's warehouse has its own reliable 20,000 litre fire protection water supply, so this can be used to reduce the exposure needs. Exposure calculations should be completed to evaluate the neighbouring water supply, therefore,

$$= 1 + (.25) = 1.25$$

und, Q= KVSTot

 $= 19 \times 6000 \times 1.25 = 142,500$  litres

Of this amount, 28,500 litres (142,500 - 114,000 = 28,500) is required for exposure, of which 20,000 litres is already provided on the exposed property. Therefore an additional 8,500 litres should be added to the on-site water supply to make up the shortfall in exposure protection. Therefore, Q=122,500 litres (114,000 + 8,500 = 122,500).

(4) determine the water supply flow rate

-from Table 2, since the building area exceeds 600m² and the calculated Q is greater than 108,000 litres but less than 135,000 litres, the required minimum water supply flow is 3600 L/Min. However, in accordance with Item 3(b) it must also be confirmed that 3600 L/Min. can be flowed for a minimum 30 minutes. Since a 34 min. duration is achieved (122,500 ± 3600 ≈ 34 min.), this is satisfactory.

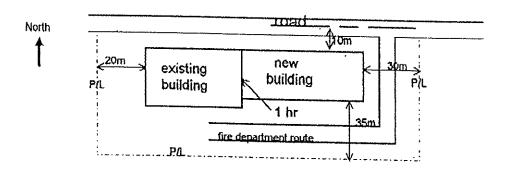
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## PROBLEM #3

An existing 400 m<sup>2</sup> single storey (with basement) school is being provided with a 400 m<sup>2</sup> addition of noncombustible construction. The existing building is of combustible construction with a 45 min. rated roof and basement ceiling (structural supports rated as well), while the new addition is of noncombustible construction as well and meets the requirements of 1997 OBC 3.2.2.25. Both the new and existing buildings are provided with full basements, 2.5 m. in height. The ground floor has a ceiling height of 3.0 m. An attic space is provided in both buildings, each with volume of 800 m<sup>3</sup>. A 1 hr. fire rated separation is the provided between the new and existing structures.

No water mains or hydrants are located in the area. A hose standpipe is voluntarily being provided throughout the entire building, with a booster pump. Distances to the property lines are as indicated on the accompanying sketch. An all volunteer fire department with limited equipment is located within 20 min. of the building site.

What size pond is needed on site (assuming no freezing temperatures), to ensure minimum life safety requirements?



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## SOLUTION - PROBLEM #3

- (1) Determine building classification school building is Group A-2
- (2) Go to Item 4(a) of the water supply guideline. Item 4(b)(iii) indicates that a single storey, noncombustible addition with an assembly occupancy, up to 400m² in building area, with no combustible storage of process and separated from the existing building by a minimum 1 hr. fire separation would not require additional water supplies for fire fighting purposes.
- (3) The local jurisdictional authority however, may also wish to take into consideration the ability of the local fire department to provide an effective water supply shuttle system to this school by using NFPA 1231 as a guide. If equipment is not available to provide effective amounts of water supply, then an on-site water supply may be the best choice. Note that this is what Item 1(a)(ii) is alluding to.
- (4) If an on-site water supply is chosen, it may be sized by calculating Q = KVSTot (i) although OBC Part 11 would only size the on-site water supply to the addition, the fire department should determine if this is sufficient for their search and rescue needs.
  - (ii) assuming the entire building volume is selected to determine Q, determine K from Table 1, based on building construction and classification the water supply the existing building has a coefficient K=18 and the new addition has a coefficient K=16.

(iii) calculate the building volume,  $V=L \times W \times H$   $V_{Existing} = (400 \times 3) + (400 \times 2.5) + 800 = 3000 \text{ m}^3$  $V_{Eddition} = (400 \times 3) + (400 \times 2.5) + 800 = 3000 \text{ m}^3$ 

(iv) Determine Stot

- From Figure 1, since no property lines are less than 10 m away, all Ssides -0.0, therefore no addition water volume is needed for exposures.  $\therefore$  Stoi=1.0

Q = KVSTot = (KVSTot)Existing + (KVSTot)Addition=  $(3000 \times 18 \times 1.0) + (3000 \times 16 \times 1.0)$ = 102,000 litres

This is the required pond size, assuming a means to maintain the water level and no freezing concerns. Note that Item 3(d) also allows a reduction in the water supply and flow rate for schools. This reduction may not be considered due to the all volunteer fire department with limited equipment.

(5) determine the water flow rate

from Table 2, since the building area exceeds 600m² and the calculated Q is less than 108,000 litres, the required minimum water supply flow is 2700 LMin. However, in accordance with Item 3(b) it must also be confirmed that 2700 LMin. can be flowed for a minimum 30 minutes. Since a 38 min. duration is achieved (102,000 ÷ 2700 = 38), this is satisfactory. Note if the water supply was sized to only the addition then a 54,000 litre pond, allowing a 30 minute duration at a flow rate of 1800 LMin. would be required. However, at 2700 LMin., which is a reasonable flow rate for the entire structure, this provides only 20 min. duration.

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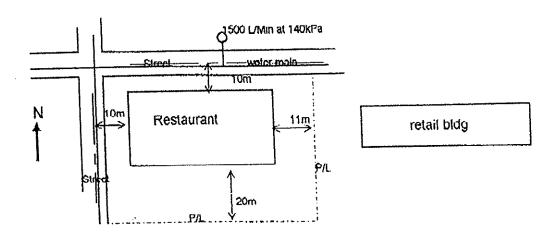
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## PROBLEM #4

A 300 m<sup>2</sup> single storey restaurant is to be constructed of noncombustible construction in a town with a marginal water supply due to old mains and poor gridding. The municipal water reservoir is sized for 1.0 million gallons. The building will have a 3.5 m, high ceiling. No hose standpipe or sprinklers are planned. Is the existing street supply adequate?

Property lines are located 11m to the east and 20m to the south. Street centre line distances are 10m to the north and west.

The fire department routinely arrives at a fire scene in this part of town with a tanker/pumper truck carrying enough water (4500 litres) for two 38 mm hoses adequate for 5 minutes of discharge. The hydrant at the street can provide 1500 L/Min. at 140kPa.



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## SOLUTION - PROBLEM #4

## (1) Determine building classification

-restaurant building is Group A-2 occupancy.

# (2) Check parameters of Item 1(a) to determine whether building requires an on-site water supply.

- -building falls within Part 3
- -huilding area is more than 200m<sup>2</sup> and is not an F-3 occupancy.

## (3) Compare existing water supply with required water supply

- as the building is  $\leq 600m^2$ , the required water supply flow rate from Table 2 for this size building is 1800 L/Min.
- -provided public water supply from hydrant at street is 1500 L/Min at 140kPa (adequate volume of supply)
- -transported water supply by fire department is 4500 litres.
- -the required water supply shortfall from public supply only is (1800 -1500)=300 L/Min. The transported water supply by the fire department will last 15 minutes if used at a flow rate of 300 L/Min (4500/300=15 min.) to make up shortfall from the public supply.

#### (4) Solutions to make up water supply shortfall

Option #1 - as the total water supply that is deemed adequate for this new building is 1800LMin x 30min.= 54000 litres, and the provided water supply is (1500x30) + 4500 = 49500 litres, then require an additional on-site water supply of 4500 litres

Option #2 - provide an additional transportable water supply source (i.e. tanker truck) of 4500 L.

Option #3 - the Chief Fire or Building Official may determine that 1650 LMin is satisfactory based on building occupancy and layout, and the restaurant's fire safety plan. The Chief Fire or Building Official may also determine that "life safety" is no longer a significant concern after 15 minutes in this type of occupancy and the remaining public water supply is satisfactory for exposure concerns.

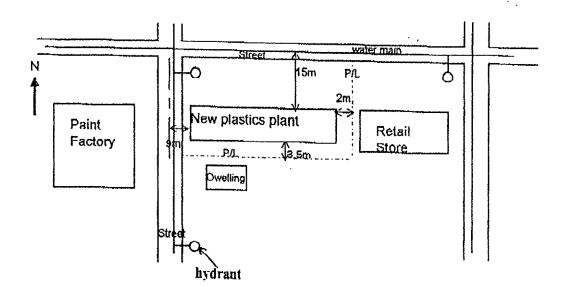
Fire Protection Water Supply Guideline for Part 3 of the OBC

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## PROBLEM #5

A new 4 storey plastics extrusion plant (F-2 occupancy) is being constructed in a town with a marginal water supply. The flat-roofed building will cover a 500 m² area and be 12.0 m. in overall height. Construction is to be combustible and in conformance with 1997 OBC 3.2.2.70. The roof and floor separations have a fire-resistance rating of 45 min. Exposure includes property lines 2m and 3.5m away and street centre lines 9 m and 15m away to the west and north. What is the required water supply from the street mains for this new building?



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### **SOLUTION - PROBLEM #5**

## (1) Determine building classification

-Group F-2 occupancy

# (2) Check parameters of Section (1) to determine whether building requires an on-site water supply.

-building is a Part 3 building as it meets dimensional parameters (i.e. more than 3 stories)

## (3) Calculate Q=KVSTot

- (i) determine K
  - from Table 1, based on building construction and classification, the water supply coefficient K=31

(ii) calculate the building volume, 
$$V = L \times W \times H$$
  
=  $500 \times 12$   
=  $6000m^3$ 

- (iii) determine Stot from Figure 1( consider each side of the building):
  - the street center line to the north is more than 10m away thereby providing no exposure concerns.
  - the street center line to the west is 9m away thereby resulting in an Sside of 0.1
  - the P/L to the east is 2m away resulting in an Sside of 0.5
  - the P/L to the south is 3.5m away, resulting in an Sside of 0.5
  - therefore the resulting total of spatial coefficient values is:

$$S_{Tot} = 1 + (0.1 + 0.5 + 0.5)$$
  
=  $1 + (1.1)$   
=  $2.1$ 

(however as Stot need not exceed 2.0, assume Stot = 2.0)

(iv) therefore, 
$$Q = KVS_{Tot}$$
  
=  $3I \times 6000 \times 2.0$   
=  $372,000$  litres

-It should be confirmed that the municipal reservoir has this reserve fire fighting water supply capacity.

#### (4) Determine the water supply flow rate

- from Table 2, this type of building requires a minimum fire protection water supply flow rate of 9000 L/Min at 140kPa. Water flow tests on street hydrants at the building site should confirm this minimum flow.

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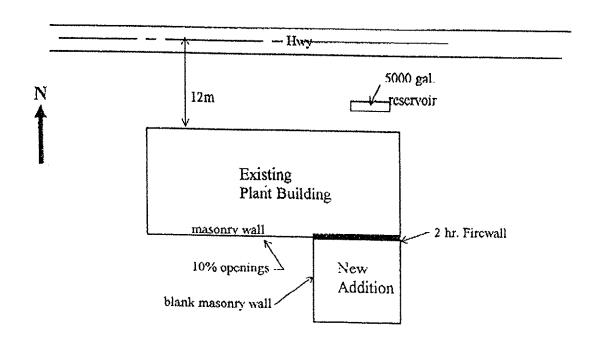
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## **PROBLEM #6**

A 200m<sup>2</sup> single storey flammable liquids storage and paint mixing room is being constructed on the southwest corner of this existing remote 600m<sup>2</sup>, single storey metal parts fabricating and treating plant. The property line is no closer than 60m from the building in the south, east and west directions. The center line of the highway to the north is 12m. An existing 5000 Imp. gal. fire protection water supply is currently provided on-site, with a dry hydrant to provide fire department draft from this reservoir.

The building is located in an area surrounded by agricultural lands used for growing cash crops, and lakes used to provide potable water for the local communities.

The existing building has interior hoses but no sprinklers. The new addition is to be separated from the existing building by a 2 hr. firewall, but is not to be sprinklered. The addition is to be 4m in height and of noncombustible, non-rated construction. The walls of the addition at right-angles to the existing building are blank masonry, while the masonry walls of the existing building at right-angles to the addition has 10% openings. Is the existing water supply sufficient for the addition or the existing building.



Fire Protection Water Supply Guideline for Part 3 of the OBC

OFM-TG-07-98

Office of the Fire Marshal

## SOLUTION - PROBLEM #6:

(1) Determine new building classification

-Group F-1 occupancy

(2) Check parameters of Section (4) fgg this addition. Item 4(c) deals with firewalls separating additions from existing buildings. Check parameters of Section (1) to determine whether addition requires an on-site water supply.

- the addition has an F-1 occupancy and is therefore a Part 3 building. Because the chemical occupancy of the addition may result in a significant adverse environmental potential to the local aquifer, the addition does not fall within Section 1. Therefore check Section (2) and (3).

- (3) Addition is not to be sprinklered so Section (2) does not apply.
- (4) From Section (3) calculate Q for the addition using Q=KVS<sub>Tot</sub>

(i) determine K

- from Table 1, based on building construction and classification, the water supply coefficient K-37

(ii) calculate the building volume,  $V = L \times W \times H$ 

 $= 200 \times 4$ 

~ 800m<sup>3</sup>

(iii) determine Stot from Figure 1( consider each side of the building):

- the P/L to the east, west and south exceeds 13m resulting in Sside values of 0 in each direction.

- to the north the limiting distance to the south exposed wall of the existing building from the blank west wall of the addition is determined from 1997 OBC 3.2.3.1.(1). Because of the blank masonry wall the limiting distance is 0.

- therefore the resulting total of spatial coefficient values is:

$$S_{Tot} = I + (0 + 0 + 0 + 0)$$

= 1.0

(iv) therefore, Q= KVSTot

 $= 37 \times 800 \times 1.0$ 

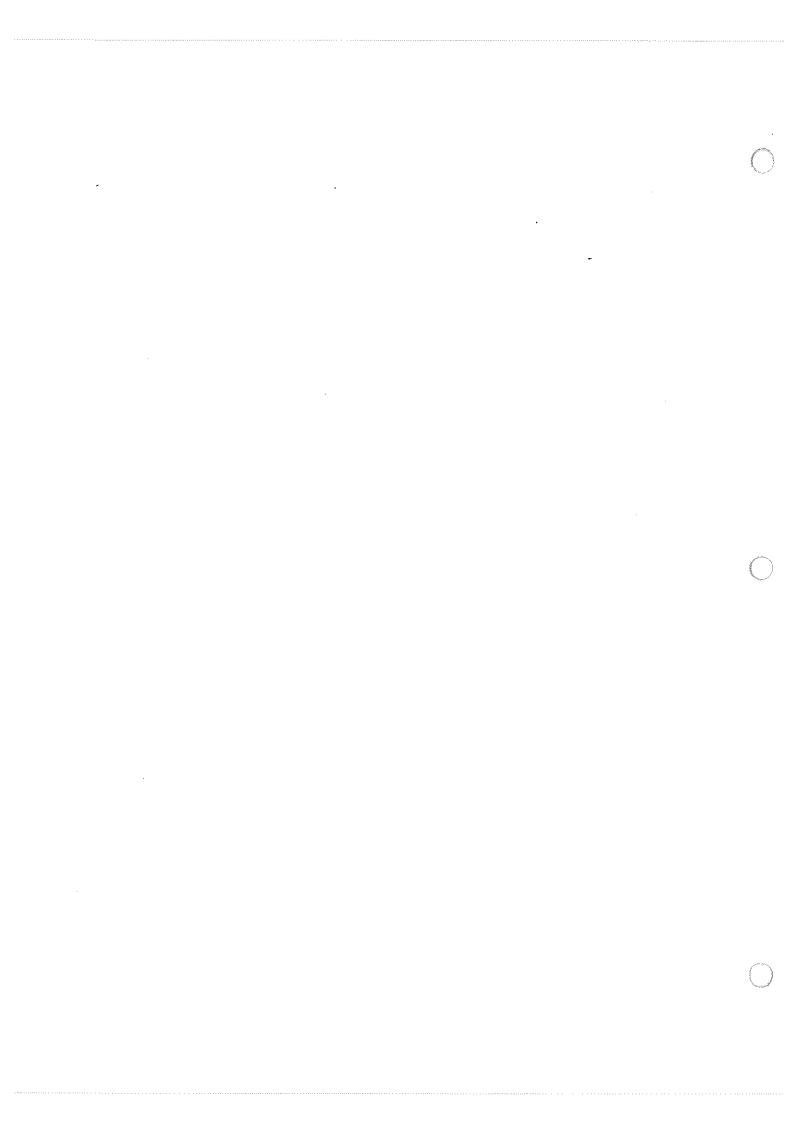
= 29,600 litres

(4) Determine the water supply flow rate

- from Table 2, F-1 occupancy buildings require a minimum fire protection water supply flow rate of 2,700 L.Min. The existing on-site fire protection water supply of 5,000 Imp. gal. (22,750 lirres) can provide this flow rate for 8 minutes.

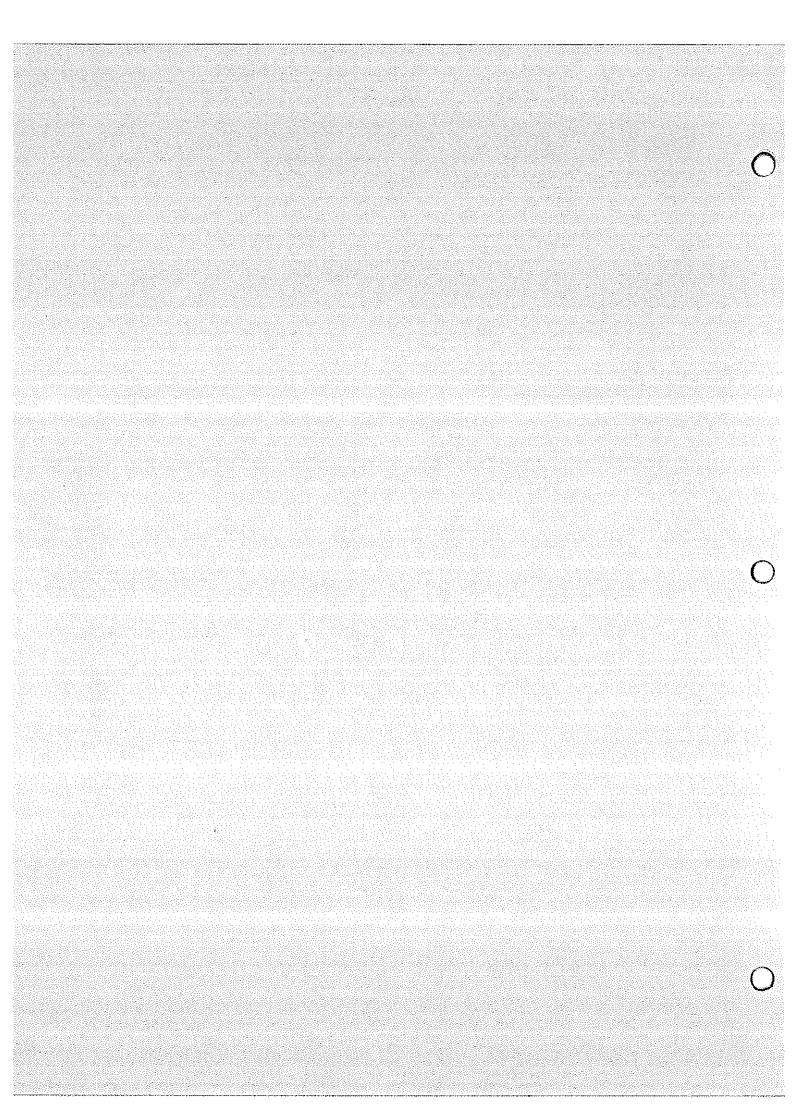
- Since a minimum 30 minute duration in water supply is needed, an additional 58,250 litres of on-site water supply is needed for the addition to make up the shortfall (81,000-22,750).

- The existing building may also be evaluated to see if water supply requirements would be higher. Owner may decide to provide additional water demand if higher. Note: Under the OBC the existing building also has to be evaluated to determine the



# **APPENDIX 19**

BLACK & McDONALD – HIGH VOLTAGE MAINTENANCE REPORTS DATED AUGUST 1999, REFERENCE NO. 6621





31 Pullman Court, Scarborough, Ontario M1X 1E4. Phone: (416)-298-9977 Fax: (416)-298-2907

August 16, 1999

Toronto Zoo 361A Old Finch Ave. Scarborough, Ontario M1B 5K7

ATTENTION:

Mr. Dean Evans, Electrical Supervisor

Subject:

1999 High Voltage Maintenance

Our Reference #:

6621

#### Dear Sir:

During June this year, we completed the *Preventive Maintenance Program* on the high voltage power apparatus located at your site. This work was carried out to the specifications outlined in tender proposal #48 (98-10).

The following sections are included in the report:

- Deficiencies and recommendations
- Inspection Sheets

#### **Intent**

The intent of this program was to evaluate and report on the condition of the high and low voltage equipment in your main and unit substations. This evaluation would detect any problems in their early stages, indicating potential problems in your system that would eventually lead to equipment failure.



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#### **Findings**

The problem areas together with detailed recommendations can be found in section "A". Detailed information pertaining to any of the deficiencies listed in this section can be reviewed with the individual test sheets compiled in section "B". In-order to avoid any unexpected downtime we would recommend taking the necessary corrective measures listed in section "A".

Should you require any further assistance or information, please do not hesitate to contact our office at your convenience. We thank you for the opportunity to have been of service.

Yours sincerely,

**BLACK & McDONALD LIMITED** 

R.P. (Rodger) Morgan

Technical Field Service Division



<b>Technical</b>	Field	Service	Department

31 Puliman Court, Scarborough, Ontario M1X 1E4. Phone: (416)-298-9977 Fax: (416)-298-2907

"A" DEFICIENCIES & RECOMMENDATIONS



31 Pullman Court, Scarborough, Ontario M1X 1E4. Phone: (416)-298-9977 Fax: (416)-298-2907

#### **Deficiencies and Recommendations**

## Main Incoming Switchgear

#### 1.) Main Feeder "DIP" Pole

#### Deficiency:

The main fuses on this pole were found to be out of co-ordination with the downstream switchgear fuses. Both were sized at an amperage of 150E. Due to the subsequent interruptions caused by cable failures, these have been replaced and the pole-mounted fuses re-sized to 200E.

#### Recommendation:

Review sizing and speed (TCC #) requirements with the supply authority. Ensure stock of these S&C SMU-20 style fuse units for future ready availability.

## 2.) Main 27.6kV Incoming Switch

#### **Deficiency:**

The Blue/ Cop arcing interrupter was found to be defective.

#### Recommendation:

Replace this S&C interrupter unit.

#### 3.) Feed to Eurasia Pavilion

#### Deficiency:

The B & C phase interrupters on this switch measure over the readable scale in both positions. They are defective.

#### Recommendation:

Replace these two arcing interrupters.



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### 4.) All Fused Switch Cells

## **Deficiency:**

Due to the power cable failures and the resulting numerous fuse operations, the spare fuse stock in these feeder cells has been significantly depleted.

#### Recommendation:

Restock the spare fuse inventory.

## **North America Pavilion**

## 5.) Loop Feed to Service Building

## Deficiency:

Flash marks were observed on both the left phase barrier and beside the associated lightning arrestor.

### Recommendation:

Replace the phase barrier and touch up cell as required.

#### 6.) Paddock Feeders

#### Deficiency:

Only one spare fuse link is available in the switch/ fuse compartment.

#### Recommendation:

Restock the spare fuse inventory.



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## **Entrance/ Administration Building**

#### 7.) Feeder to Village Edge South

Deficiency:

Only one spare fuse link is available in the switch/ fuse compartment.

#### Recommendation:

Restock the spare fuse inventory.

## **Africa Pavilion**

#### 8.) Paddock Feeder

Deficiency:

No spare fuse links are present in this feeder cell.

#### Recommendation:

Restock the spare fuse inventory.

#### 9.) Main Secondary Breaker

Deficiency:

This FPE 75H-2 (s/n. TH-4126-72) 3000 Amp circuit breaker was found to be mechanically problematic. The breaker failed to consistently trip even though the trip bar was fully engaged. The unit was extensively investigated during the maintenance shutdown and repaired to serviceable condition. Note that this field repair should only be considered as a temporary fix!

#### Recommendation:

Because of the nature of the discovered defects, this unit will require thorough stripping and rebuilding/ service. This will require the removal of the circuit breaker from service and may necessitate the installation of temporary generator power as per your needs.



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#### 10.) MCC1 Circuit Breaker

Note:

Due to the time and personnel involved in investigating of the main circuit breaker, the other smaller breaker designated as "MCC1" was not tested. This unit has been previously reported as problematic and may also need additional servicing.

## **Indo-Malaya Pavilion**

#### 11.) Feeder to Entrance Facilities

Deficiency:

The B\phi cable terminator in this switch cell was found with a top porcelain skirt broken.

#### Recommendation:

The damaged area was sealed with contact cement. No further action is required at the present time.

## 12.) Indo-Malaya Paddock Feeder

**Deficiency:** 

The arc interrupter operator (attached to the switchblade) was found to be broken. As a result the interrupter now does not function.

#### Recommendation:

To restore the interrupter's functionality, the entire Load Interrupter switchblade arm will have to be replaced.



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#### 13.) Indo-Malaya Paddock Feeder

#### Deficiency:

No spare fuse links are present in this cell.

#### Recommendation:

Restock the spare fuse inventory.

# 14.) Main Secondary & DP MB Circuit Breakers

## Deficiency:

- The front flash barrier is missing on the "Main ..." C.B.
- The front flash barriers are cracked on the "DP MB" C.B.
- "DP MB" mechanism was found to be sticking.

#### Recommendation:

- The "DP MB" mechanism was restored to proper operation. No further action is required.
- Replace the flash barriers on both circuit breakers.

## Eurasia Pavilion

## 15.) Paddock Feeders (Centre & South)

#### **Deficiency:**

The Kirk RE12023 interlock is inoperable due to the switch handle being bent out of position. The switch is still operational.

#### **Recommendation:**

If full functionality is desired, then the switch handle must be replaced. If this is not a priority, then the switch is presently functional and requires no further action.



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#### 16.) Paddock Feeders (Centre & South)

#### **Deficiency:**

Only one spare fuse link is available in the switch/ fuse compartment.

#### Recommendation:

Restock the spare fuse inventory.

#### 17.) Eurasia Pavilion Transformer T-1

**Deficiency:** 

The top skirt of the H3 primary bushing was found to be cracked.

Bushing Spec.:

Westinghouse T1; DWG. No. 25kV400A; S.O. 544C638G05

#### Recommendation:

The crack was sealed with epoxy. No further action is required at the present time. *The condition of this bushing should be monitored during subsequent shutdowns.* Subsequent deterioration will require bushing replacement in this Askarel (PCB)-filled equipment.

## Submersible & Pad-Mount Transformers

#### 18.) Submersible Transformers (General)

## Note:

The majority of the approximately 50 units on site are more than 25 years old. These units are approaching the end of their operational service lives. While no one can accurately predict the exact moment of failure for each unit, recent events have shown that they may fail at any time.

A graduated replacement program should be considered by engineering and procurement staff so as to modernise the existing transformer inventory, and prevent unnecessary downtime caused by failures.



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#### 19.) Submersible Transformers Oil Levels

#### Deficiency:

Several of the submersible transformers were observed with the oil level below the manufacturer's recommended fill line. This is likely as a result of there only being a small quantity of oil in the units and them having been sampled on previous occasions.

#### Recommendation:

Purchase a barrel of Voltesso 35 electrical grade insulating oil (or equivalent) to be used to top up the units as needed during future shutdowns. This barrel should be stored in an area where it will be sheltered from elements (moisture, etc.) that can degrade its properties.

# 20.) Submersible Vault #1 (Fed from Service Building) Deficiency:

The "H1B" elbow on this unit (s/n. 871935) was found with burn marks on it.

#### Recommendation:

The elbow and transformer bushing insert should be replaced in the near future

## 21.) Submersible Vault #32 (Fed from N. America)

#### Deficiency:

The manhole gasket on this Red Phase transformer (s/n. 861949) is in poor condition. Improper sealing of the unit can allow the entrance of moisture and degradation of the oil.

#### Recommendation:

Replace this access cover gasket.



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## 22.) Interfacial Tension (IFT) Levels

## **Deficiency:**

Interfacial tension is a measure of the barrier between the oil and water. A lowering of this level is an indication that oil is beginning to degrade.

A number of the transformers had borderline IFT levels. The worst of these is the Vault #18 unit (s/n. LO721-1), which has a measured level of 18.2 dynes/ cm; the N.E.T.A. standard recommended minimum is 32 dynes/ cm.

#### Recommendation:

The Vault #18 transformer should be sampled again within 6 months both to confirm the initial reading and trend for deterioration.

#### 23.) Weston Station

#### Note:

This unit substation was reported to be in poor condition. The station should be shutdown during daylight hours for a thorough evaluation.





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"B" INSPECTION SHEETS



## Technical Field Service Division

31 Pullman Court Scarborough, Ontario. M1X 1E4 Phone: (416) 298-9977 Fax: (416) 298-2907

## **METROPOLITAN TORONTO ZOO**

**Infrared Inspection Report** 

Prepared For: Dean Evans

Date: July 27, 1999

Prepared By: Kevin Josephs

Our Reference: 6621



#### Technical Field Service Division

31 Pullman Court Scarborough, Ontario. M1X 1E4 Phone: (416) 298-9977 Fax: (416) 298-2907

July 27,1999

Metropolitan Toronto Zoo 361A Old Finch Avenue Scarborough, Ontario M1B 5K7

ATTENTION:

Mr. Dean Evans

Subject:

Infrared Inspection Report

Our Reference:

6621

#### Dear Sir:

We have completed your infrared inspection on June 9, 1999. There is list of the areas scanned in this report as well as our findings and recommendations for your review and comment.

Within the report you will find an Infrared Survey Sheet that displays a Thermogram window, below that image there is a 'Profile' window. This window measures the object's temperature along that line in the form of a line graph.

The deficiencies found during the inspection do not warrant any quotation for parts.

We advise that in our opinion the electrical power apparatus as covered in the report, having been inspected, tested and not yet repaired. Sub-stations located in the Indo & Austraialasia Pavilion appears to be in good condition except what's noted f in the applicable section of this report.

If any questions arise regarding these matters, please feel free to contact the undersigned at any time.

Sincerely,

**BLACK & McDONALD LIMITED** 

K. (Kevin) Josephs

Senior Infrared Technologist

Technical Field Service Division

31 Pullman Court Scarborough, Ontario. M1X 1E4 Phone: (416) 298-9977 Fax: (416) 298-2907

## Purpose:

The purpose of an infrared inspection is to detect heat. Heating is normal in an electrical system since it is caused by the flow of current through a conductor. Therefore, the heat we are searching for is heat, which is abnormal. Unusual heating conditions are caused by several phenomena such as:

- Poor Connections Due To:
  - Looseness
  - Dirt
  - Oxidation
  - Over loading
- Other Conditions Producing Heat Are:
  - Load Imbalances
  - Harmonics

## Survey Intent:

It is the intent of this survey to act as a predictive tool in order to detect unforeseen problems in the specified areas of your electrical distribution system. Further, our report will satisfy all requests by your insurance company with respect to the completion of an infrared scanning program.

## Background:

Every body emits infrared heat radiation because of its temperature. Infrared Thermovision systems detect the energy and convert it into a visual picture. Infrared radiation is a direct and proportional function of the body temperature and, by utilizing a special feature (Isotherm) on the infrared System, the temperature differentials can be accurately determined.

The isotherm will appear on a visual image as a series of bright green dots, which have a correspondence to a specific temperature reading.



#### Technical Field Service Division

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## Applications:

Infrared technology is used industry wide as a preventive maintenance tool. All major power consumers use this type of survey on a regular basis. The cost savings associated with the reduction of preventive maintenance man-hours have proved time and time again to justify the cost of the original survey.

## Results:

The results are presented in the form of a video print out of the thermal image as seen by the infrared system operator. A corresponding real life picture of the area in question is also supplied. This allows for easier location of the hot spot, as sometimes it is difficult for the untrained eye to perceive detail from the thermograph.

Technical data relative to the suspect area is also provided. This includes the exact identity of the suspect area and/ or device and/ or component, the load currents, our comments as to the suspected cause and our recommendations pertaining to corrective action.

If the electrical system is operating at 60% of its rated capacity then the following rule of thumb may be used to determine the severity of the condition.

Lemperature Rise	Classification
I - 10 Degrees Ceisius	Minut Problem Repair At Your Convenience
10.00	
10 - 35 Degrees Celsius	Intermediate Problem, Repair Is The Next Three Months
25 N /	
+35 Degrees Celsius	Sericus Problem: Make Repairs (materiately

## Corrective Action:

Infrared technology is one of the truly predictive maintenance tools available today. However, it is only as useful as the corrective action taken to remedy problems, which are discovered.

Therefore, when infrared scanning is carried out it should be done during a period of time when the operation of the facility is as high as possible. It should also be carried out in conjunction with and prior to substation maintenance inspections.

In this way detected problem areas can be corrected with a minimum amount of disruption to the normal operation of the facility.



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#### Technical Field Service Division

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## Indo Pavilion

- Main Electrical Room
- Old Orang Holding
- New Orang Holding
- Lighting Panel(s) Around Exhibit Area
- Gaur Building #1 & #2
- MCC Board (Booster Switch & Fan #16 Door Didn't Open)

## African Pavilion

- Main Electrical Room
- Lighting Panel(s) Around Exhibit Area

## America's Pavilion Building

- Pump Room
- Electrical Room
- Fan Room
- Exhibit Area

## Australasia

- Main Electrical Room
- Boiler Room
- Panel(S) Around the Exhibit Area

# **Education & Main Gift Shop**



## Technical Field Service Division

31 Pullman Court Scarborough, Ontario. MIX 1E4 Phone: (416) 298-9977 Fax: (416) 298-2907

Entrance Facilities
(Front Office Room Locked)

Animal Hospital Building

# North Service Building

- Main Floor
- Shop Area
- Basement
- 3<sup>rd</sup> Floor
- Main Electrical Room



**Technical Field Service Division** 

31 Pullman Court Scarborough, Ontario. M1X 1E4 Phone: (416) 298-9977 Fax: (416) 298-2907

Inspection Results and Recommendations

# **Infrared Survey Sheet**

Job No.:

6621

**Customer:** 

Metropolitan Toronto Zoo

Site Location:

Toronto, Ontario

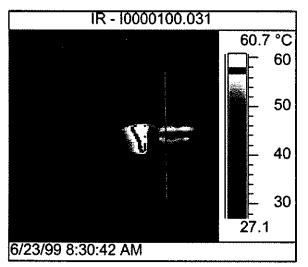
Equipment I.D.:

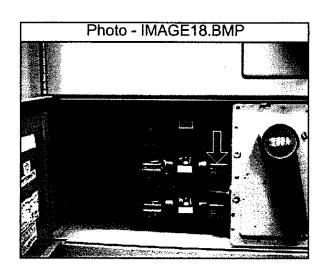
F.P.E. 200A 120/208V Disconnect (Auto Transfer Sw.)

Equipment Location: Indo Pavilion Main Electrical Room

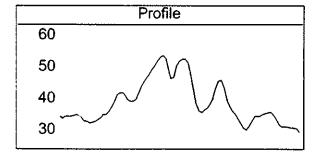
Inspection Date:

5/2/89 1:18:15 AM





Surface Profile Minimum Temperature:	29.7 °C	
Isotherm Area Temperature:	58.0 °C	
Surface Profile Maximum Temperature:	54.0 °C	



	Status
SCANNER DATA	
Scanner Type	THV470 SWB
Serial Number	73010
Level	415
Sens	5
Aperture	0
Filter	NOF
Lens	20
IMAGE OBJ. PAR	<u>:</u>
Emissivity	0.84
Amb. temp.	23.7 °C
Atm. temp.	24.8 °C
Object dist.	1.0 m
Rel Humidity	0.50
Transmission	0.99



# **Infrared Survey Sheet**

Job No.:

6621

**Customer:** 

Metropolitan Toronto Zoo

Site Location:

Toronto, Ontario

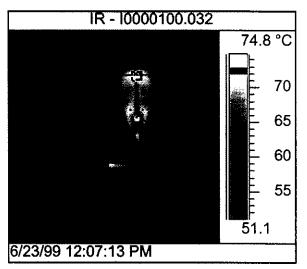
Equipment I.D.:

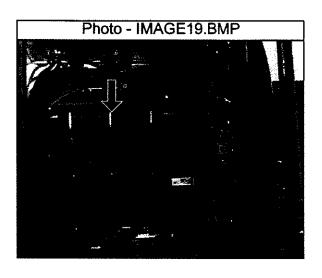
Square 'D' 60A Starter Fan #5 General Supply-EU1001

Equipment Location: Austrialasia Pavilion

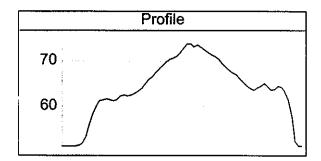
Inspection Date:

5/2/89 5:37:40 AM

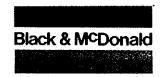




Surface Profile Minimum Temperature:	<51.1 °C
Isotherm Area Temperature:	72.9 °C
Surface Profile Maximum Temperature:	73.9 °C



	Status
SCANNER DATA	
Scanner Type	THV470 SWB
Serial Number	73010
Level	584
Sens	5
Aperture	0
Filter	NOF
Lens	20
IMAGE OBJ. PAR	<u>.</u>
Emissivity	0.81
Amb. temp.	22.9 °C
Atm. temp.	25.2 °C
Object dist.	1.0 m
Rel Humidity	0.50
Transmission	0.99



31 Pullman Court Scarborough, Ontario. M1X 1E4 Phone: (416) 298-9977 Fax: (416) 298-2907

# **Inspection Recommendations**

NB. Please refer to individual infrared inspection sheets by the designation given in the PHOTO window

# 1. F.P.E. 200A 120/208V Disconnect (Auto Transfer Switch) Main Electrical Room (Indo Pavilion)

**Description:** The Centre phase line end fuse clip area recorded a maximum thermal rise of  $54.0 \, \text{C}$ , thus creating a temperature rise of  $30.3 \, \text{C}$  above ambient. The load taken at that time was Top  $\phi \cong 55 \, \text{Amps}$ , Centre  $\phi \cong 70 \, \text{Amps}$ , and the Bottom  $\phi \cong 42 \, \text{Amps}$ .

**Required Action:** Checking this area for proper connection and removing any oxidized agents is necessary to correct the anomaly.

# 2. Square 'D' 60A Starter (Fan #5 General Supply – EU1001 Austrialasia Pavilion

**Description:** The Centre phase blade contact area recorded a maximum thermal rise of 73.9  $\mathbb{C}$ , thus creating a temperature rise of 51.0  $\mathbb{C}$  above ambient. All three phases were balanced at 40 Amps.

**Required Action:** This area needs to disassembled, cleaned and checked for proper connection.



Technical Field Service Depart	rtment
--------------------------------	--------

31 Puliman Court, Scarborough, Ontario MIX 1E4. Phone: (416)-298-9977 Fax: (416)-298-2907

# Main Incoming Outdoor 27.6kV Switchgear



Special Projects Group

#### **Client Information**

Customer	Toronto Zoo	Date	June 15, 1999	
File Number	6621	Tested By	RPM/KH	
Location	361A Old Finch Ave., Scarborough, Ontario			
Equipment I.D.	Main Outdoor Incoming			
Substation	Pole-mounted Supply Fuse			

# High Voltage Power Fuse

	Fuse Holder Namep	late Data		. 445.47.4
Manufacturer	S&C	Voltage	25	kVolt
Туре	SMU-20 Fuse Unit	Current		Amps
Style/Cat #		Serial #		
	Fuse Link Namepla	ate Data		
Туре	SMU-20 Fuse Unit	TCC	119-2	
Style/Cat #		Amps	150 E	· · · · · · · · · · · · · · · · · · ·
	Mechanical Inspe	ections		

- Wechanical inspections					
Description of Inspection	Status	Comments			
Operating Mechanism	OK				
Contact Surfaces	OK				
Contact Penetration	OK				
Contact Alignment	OK				
Fuse Barrel	OK				
Connector Condition	OK				
Insulator Condition	OK				
Phase Barrier Condition	N/A				
Support Structure Condition	OK				
Spare Fuses	?	None seen. Provided by Toronto Hydro			

 Electrical Tests

 Test Description
  $\phi A$   $\phi B$   $\phi C$  A/B
 B/C
 C/A

 Insulation Resistance (MΩ)
 458
 644
 496

 Contact Resistance (μΩ)
 458
 644
 496

 Results Satisfactory
 These units have subsequently been replaced.

T.S. HV\_Fuse



#### TECHNICAL FIELD SERVICE DEPARTMENT

Special Projects Group

# **Client Information**

Customer	Toronto Zoo	Date	June 15, 1999	
File Number	6621	Tested By	RPM/KH/TA	
Location	361A Old Finch Ave., Scarborough, Ontario			
Equipment I.D.	Main Outdoor Incoming			
Substation	Main 27.6 kV			

# High Voltage Air/Load Break Switch

Nameplate Data				
Manufacturer	S&C	Voltage	27	kVolts
Туре	Alduti Indoor	Current	600	Amps
Style #		B.I.L.	150	kVolts
Cat#	34163	Serial #	<b></b>	

Mechanical Inspections				
Description of Inspection	Status	Comments		
Key Interlock	OK			
Operating Mechanism	OK			
Operating Handle Grounding	OK			
Grounding Mat	N/A			
Stationary Contact Surfaces	OK			
Moving Contact Surfaces	OK			
Arcing Contact Surfaces	OK			
Contact Alignment	OK			
Arcing Interrupter	POOR	Blue O Defective		
Connector Condition	OK			
Insulator Condition	OK			
Phase Barrier Condition	OK			
Support Structure Condition	OK/ Fair	Some internal rust damage		

Electrical Tests						
Test Description	φA	φ <i>B</i>	φC	A/B	B/C	C/A
Insulation Resistance (G $\Omega$ )	50.5	28	12.3			
Contact Resistance (μΩ)	56	63	55			7876 551 (24)
Arc Interrupter Res.(Ω)	0.6	0.7	High	121 14 11 12		enter lugare

• ....

T.S. HV\_ABS



#### TECHNICAL FIELD SERVICE DEPARTMENT

**Special Projects Group** 

#### **Client Information**

Customer	Toronto Zoo	Date	June 15, 1999
File Number	6621	Tested By	KH/ TA
Location	361A Old Finch Ave., Scarborough, Ontario		
Equipment I.D.	Feed to Eurasia Pavilion		
Substation	Main Outdoor 27.6 kV		

#### High Voltage Air/Load Break Switch

and the second of the second o	Nameplate D	ata		
Manufacturer	S&C	Voltage	27	kVolts
Туре	Alduti Interrupter	Current	600	Amps
Style #		B.I.L.	150	kVolts
Cat #	34563R4-T2	Serial #		

Mechanical InspectionsDescription of InspectionStatusCommentsKey InterlockOKKirk # RE 12045

OK **Operating Mechanism Operating Handle Grounding** OK Grounding Mat N/A **Stationary Contact Surfaces** OK Cleaned **Moving Contact Surfaces** OK Cleaned **Arcing Contact Surfaces** OK Cleaned Contact Alignment OK **Arcing Interrupter 200R** High Resistance in Closed Position **Connector Condition** OK **Insulator Condition** OK

Phase Barrier ConditionOKSupport Structure ConditionOK

Electrical Tests						
Test Description	φA	φB	φC	A/B	B/C	C/A
Insulation Resistance (M $\Omega$ )						
Contact Resistance (μΩ)	51	53	57			100
Arc Interrupter Res.(Ω)	1.3	*	*		a taran da karan	1.0

Results Satisfactory See Recommendations

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 $<sup>^{</sup>T.S.}$  HV\_ABS



Special Projects Group

#### **Client Information**

Customer	Toronto Zoo	Date	June 15, 1999
File Number	6621	Tested By	KH/TA
Location	361A Old Finch Ave., Scarborough, Ontario		
Equipment I.D.	Feeder to Eurasia Pavilion		
Substation	Main Outdoor 27.6 kV		

# **High Voltage Power Fuse**

	Fuse Ho	lder Name	plate Da	ta		
Manufacturer	S&C			Voltage	34.5	kVolt
Type	SM-5S			Current	300E	Amps
Style/Cat #	86644R1			Serial #		
	Fuse L	ink Namep	late Data	B		
Туре	SM-5			TCC	153-4	
Style/Cat #	134250R4			Amps	150E	
	Mech	anical Insp	ections			
Description of Ins	pection	Status		Cor	nments	
Operating Mechanism		OK				
Contact Surfaces	Contact Surfaces					
Contact Penetration	Contact Penetration					
Contact Alignment		OK				
Fuse Barrel		OK				
Connector Condition		OK				
Insulator Condition		OK				
Phase Barrier Condition	3	OK				
Support Structure Cond	lition	OK				
Spare Fuses		Fair	2 sp	2 spares in cell during inspection		
	E	lectrical To	ests			
Test Description	<b>\$4</b>	φ B	φC	A/B	B/C	C/A
Insulation Resistance (M			ļ		,	
Contact Resistance (μΩ)	630	828	636	eres e		a de la companya de la companya de la companya de la companya de la companya de la companya de la companya de
Results Satisfactory	See Rec	commendati	ons	<u> </u>		

T.S. HV\_Fuse



# TECHNICAL FIELD SERVICE DEPARTMENT

**Special Projects Group** 

# **Client Information**

Customer	Toronto Zoo	Date	June 15, 1999
File Number	6621	Tested By	RPM/KH/TA
Location	361A Old Finch Ave., Scarborough, Ontario		
Equipment I.D.	Feeder to Service Building		
Substation	Main Outdoor 27.6 kV Incoming		

# High Voltage Air/Load Break Switch

Nameplate Data				
Manufacturer	S&C	Voltage	27	kVolts
Туре	Alduti	Current	600	Amps
Style #		B.I.L.	150	kVolts
Cat#	34563R4-T	2 Serial#		

**Mechanical Inspections** 

Description of Inspection	Status	Comments
Key Interlock	OK	Kirk RE 12043
Operating Mechanism	OK	
Operating Handle Grounding	OK	
Grounding Mat	N/A	
Stationary Contact Surfaces	OK	Cleaned
Moving Contact Surfaces	OK	Cleaned
Arcing Contact Surfaces	OK	Cleaned
Contact Alignment	OK	
Arcing Interrupter	OK	
Connector Condition	OK	
Insulator Condition	OK	
Phase Barrier Condition	OK	
Support Structure Condition	OK	

#### **Electrical Tests**

Test Description	φA	φ Β	φC	A/B	B/C	C/A
Insulation Resistance (M $\Omega$ )						
Contact Resistance (μΩ)	49	42	47			i,
Arc Interrupter Res.(Ω)	1.3	1.0	0.5	de la langua		THE RES
Results Satisfactory	OK					

T.S

T.S. HV\_ABS



**Special Projects Group** 

# **Client Information**

Customer	Toronto Zoo	Date	June 15, 1999
File Number	6621	Tested By	RPM/KH/TA
Location	361A Old Finch Ave., Scarborough, Ontario		
Equipment I.D.	Feeder to Service Building		
Substation	Main Outdoor 27.6kV Incoming		

# **High Voltage Power Fuse**

	Fuse Holder Na	meplate Data		
Manufacturer	S&C	Voltage	34.5	kVolt
Туре	SM-5D	Current	300	Amps
Style/Cat #	86644R1	Serial #		
	Fuse Link Nan	eplate Data		
Туре	SM-5	TCC	153-4	
Style/Cat #	134250R4	Amps	150E	
	Machanical I	namaatiana		

Mechanical Inspections					
Description of Inspection	Status	Comments			
Operating Mechanism	OK				
Contact Surfaces	OK				
Contact Penetration	OK				
Contact Alignment	OK				
Fuse Barrel	OK				
Connector Condition	OK				
Insulator Condition	OK				
Phase Barrier Condition	OK				
Support Structure Condition	OK				
Spare Fuses	Poor	One only during inspection			

Electrical Tests					
<b>φ</b> .4	φ <i>B</i>	φC	A/B	B/C	C/A
688	627	623	na e pagaga	glaskit a	
Spares R	equired.				
	<b>ф</b> ∕4 688	φΑ φΒ	φA φB φC 688 627 623	φA φB φC A/B 688 627 623	φA φB φC A/B B/C 688 627 623



<b>Technical</b>	Field	Service	Depar	tment

31 Pullman Court, Scarborough, Ontario M1X 1E4. Phone: (416)-298-9977 Fax: (416)-298-2907

# **North America Pavilion**



**Special Projects Group** 

#### **Client Information**

Customer	Toronto Zoo	Date	June 14, 1999
File Number	6621	Tested By	JRK
Location	361A Old Finch Ave., Scarborough, Ontario		
Equipment I.D.	Loop Feeder to African Pavilion		
Substation	North American Pavilion		

# High Voltage Air/Load Break Switch

Nameplate Data					
Manufacturer	S&C	Voltage	27	kVolts	
Туре	Alduti	Current	600	Amps	
Style #		B.I.L.	150	kVolts	
Cat #	34063R2	Serial #			

**Mechanical Inspections** Description of Inspection Status Comments Key Interlock N/A OK Operating Mechanism **Operating Handle Grounding** N/A **Grounding Mat** N/A OK Stationary Contact Surfaces **Moving Contact Surfaces** OK **Arcing Contact Surfaces** OK **Contact Alignment** OK Arcing Interrupter OK **Connector Condition** OK **Insulator Condition** OK **Phase Barrier Condition** OK Support Structure Condition OK

φ <i>B</i>	φ <i>C</i>	A/B	B/C	C/A
82	02			
82	റാ	100	Charles Tolkers and the Salar	A SHEET AS A STATE OF THE SHEET SHEET
1 04-	92	V2/2/30		12. 20. T. (). 2
0.4	0.4	\$150 E	10 m 10 M	
	1	J-45-Jel-Princip		
	0.4	0.4   0.4	0.4   0.4	0.4   0.4

T.S. HV\_ABS



Special Projects Group

#### **Client Information**

Customer	Toronto Zoo	Date	June 14, 1999
File Number	6621	Tested By	JRK
Location	361A Old Finch Ave., Scarborough, Ontario		
Equipment I.D.	Loop Feed to Service Building		
Substation	North American Pavilion		

# High Voltage Air/Load Break Switch

Nameplate Data					
Manufacturer	S&C	Voltage	27	kVolts	
Type	Alduti	Current	600	Amps	
Style #		B.I.L.	150	kVolts	
Cat#	34063R2	Serial #		······································	

Mechanical Inspections

Description of Inspection	Status	Comments
Key Interlock	N/A	
Operating Mechanism	OK	
Operating Handle Grounding	N/A	
Grounding Mat	N/A	
Stationary Contact Surfaces	OK	
Moving Contact Surfaces	OK	
Arcing Contact Surfaces	OK.	
Contact Alignment	OK	
Arcing Interrupter	OK	
Connector Condition	OK	
Insulator Condition	OK	
Phase Barrier Condition	Fair Foot	Flash Marks Fresent on Barrier, etc.
Support Structure Condition	OK	

**Electrical Tests** 

		TOTAL DEL	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			
Test Description	$\phi A$	φB	φC	A/B	B/C	C/A
Insulation Resistance (MΩ)						
Contact Resistance (μΩ)	90	81	80			7.00
Arc Interrupter Res.(Ω)	0.4	0.3	0.5	7.77	(1) 建筑	

Results Satisfactory See Recommendations

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T.S. HV\_ABS



**Special Projects Group** 

# **Client Information**

Customer	Toronto Zoo	Date	June 14, 1999
File Number	6621	Tested By	JRK
Location	361A Old Finch Ave., Scarborough, Ontario		
Equipment I.D.	Paddock Feeders		
Substation	North American Pavilion		

# High Voltage Air/Load Break Switch

Nameplate Data					
Manufacturer	S&C	Voltage	27	kVolts	
Туре	Alduti	Current	600	Amps	
Style #		B.I.L.	150	kVolts	
Cat#	34563R4-T2	Serial #			

**Mechanical Inspections** 

Description of Inspection	Status	Comments
Key Interlock	OK	Kirk RE12053
Operating Mechanism	OK	
Operating Handle Grounding	N/A	
Grounding Mat	N/A	
Stationary Contact Surfaces	OK	
Moving Contact Surfaces	OK	
Arcing Contact Surfaces	Fair	Surfaces pitted
Contact Alignment	OK	
Arcing Interrupter	OK	
Connector Condition	OK	
Insulator Condition	OK	
Phase Barrier Condition	OK	
Support Structure Condition	OK	

**Electrical Tests** 

Test Description	φA	φ Β	φC	A/B	B/C	C/A
Insulation Resistance (M $\Omega$ )	92	112	153	272	280	300
Contact Resistance (μΩ)	79	82	77	933 P. B.		A Complete
Arc Interrupter Res.(Ω)	0.4	0.4	0.3			
Results Satisfactory	OK	·				

T.S

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Special Projects Group

# **Client Information**

Customer	Toronto Zoo	Date	June 14, 1999
File Number	6621	Tested By	JRK
Location	361A Old Finch Ave., Scarborough	, Ontario	
Equipment I.D.	Paddock Feeders		
Substation	North American Pavilion		

# High Voitage Power Fuse

Fuse Holder Nameplate Data					
Manufacturer	S&C	Voltage	27.6	kVolt	
Туре	SM-5	Current	300E	Amps	
Style/Cat #		Serial #			
	Fuse Link Nan	ieplate Data			
Туре	SM-5	TCC	119-4		
Style/Cat #	264125-R4	Amps	80E		
	3.f121 T				

Wiethanicai Inspections					
Description of Inspection	Status	Comments			
Operating Mechanism	OK				
Contact Surfaces	OK				
Contact Penetration	OK				
Contact Alignment	OK				
Fuse Barrel	OK				
Connector Condition	OK				
Insulator Condition	OK				
Phase Barrier Condition	OK				
Support Structure Condition	OK				
Spare Fuses	Fair	One Spare Present in Cell			

Electrical Tests						
Test Description	ф.4	φB	φC	A/B	B/C	C/A
Insulation Resistance (M $\Omega$ )						
Contact Resistance ( $\mu\Omega$ )	1005	1100	1060			9.10
Results Satisfactory	ОК			······································		

T.S. HV\_Fuse



**Special Projects Group** 

#### **Client Information**

Customer	Toronto Zoo	Date	June 14, 1999
File Number	6621	Tested By	JRK
Location	361A Old Finch Ave., Scarborough,	Ontario	
Equipment I.D.	American Pavilion Trans. #5		
Substation	North American Pavilion		

#### High Voltage Air/Load Break Switch

Nameplate Data				
Manufacturer	S&C	Voltage	27.6	kVolts
Type	Alduti	Current	600	Amps
Style #		B.L.L.	150	kVolts
Cat#	34563R4-T2	Serial #		

**Mechanical Inspections** Description of Inspection Status Comments N/A **Key Interlock** Operating Mechanism OK **Operating Handle Grounding** N/A **Grounding Mat** N/A **Stationary Contact Surfaces** OK **Moving Contact Surfaces** <u>OK</u> **Arcing Contact Surfaces** OK **Contact Alignment** OK **Arcing Interrupter** OK **Connector Condition** OK **Insulator Condition** OK **Phase Barrier Condition** OK **Support Structure Condition** OK

Electrical Tests						
Test Description	φA	φ Β	φC	A/B	B/C	C/A
Insulation Resistance (M $\Omega$ )						
Contact Resistance (μΩ)	37	37	40	45.00	7	
Arc Interrupter Res.(Ω)						
Results Satisfactory	OK					

T.S. HV\_ABS



**Special Projects Group** 

#### **Client Information**

Customer	Toronto Zoo	Date	June 14, 1999
File Number	6621	Tested By	RPM/ TA
Location	361A Old Finch Ave., Scarborough,	Ontario	
Equipment I.D.	North American Pavilion Trans. #5		
Substation	North American Pavilion		

#### **High Voltage Power Fuse**

	Fuse Holder Na	meplate Data		
Manufacturer	S&C	Voltage	27.6	kVolt
Туре	SM-5	Current	300	Amps
Style/Cat #	86644R1	Serial #		
	Fuse Link Nan	neplate Data		
Туре	SM-5	TCC	153-4	
Style/Cat #	134025R4	Amps	15E	
	N. H I			

Mechanical Inspections Description of Inspection Status Comments OK Operating Mechanism Contact Surfaces OK Contact Penetration OK OK Contact Alignment Fuse Barrel OK **Connector Condition** OK Insulator Condition OK **Phase Barrier Condition** OK **Support Structure Condition** OK **Spare Fuses** OK 3 Spares in Cell

**Electrical Tests** B/C C/A Test Description  $\phi B$  $\phi C$ A/B $\phi A$ >999 >999 >999 >999 >999 >999 Insulation Resistance (M $\Omega$ ) Contact Resistance ( $\mu\Omega$ ) 6190 6260 6050 Results Satisfactory OK

T.S. HV\_Fuse



Special Projects Group

#### **Client Information**

Customer	Toronto Zoo	Date	June 14, 1999
File Number	6621	Tested By	RPM
Location	361A Old Finch Ave., Scarbo	orough, Ontario	
Equipment I.D.	T5		
Substation	North American Pavilion		

#### **Power Transformer - Electrical**

Manufacturer	Nar Westinghouse		Vector Group	Y-Y		
Туре	LNAN		Serial #.	827695		
Neutral	Solid		Liquid Type/Vol	Askarel	200	Gal
Rating	300/ 336	kVA	Total Weight	7020		lbs.
Impedance	5.4	%	Primary Voltage	27.6/ 16		kVolt
Phase	3	φ	Secondary Voltage	208/120		Volt
Frequency	60	Hz	BIL	150/45		kVolt

	CH-L+G	CH-G	CH-L	CL-G	CL-H+G
Cap (pF)		280		9154	
Corr. 20 °C					
	ere ere ere ere ere ere ere ere ere ere	Car distant			
Dis. Fact.(%)		5.70		6.56	
Corr. 20 °C.					

Turns Ratio Tests X0-X1. Tap **Primary** Calculated <u>X0-X2</u> <u>X0-X3</u> Volts H0-H1 H0-H2 H0-H3 Ratio 1 2 0.754 27,600 0.746 0.746 0.746 3 4

Tap Position Found & Left	3 (27,600V)
Results Satisfactory	OK
T.S.	······································

 $<sup>^{</sup>T.S.}\ P\_Trans\_Elect$ 



# TECHNICAL FIELD SERVICE DEPARTMENT

**Special Projects Group** 

#### **Client Information**

Customer	Toronto Zoo	Sample Date	June 14, 1999		
File Number	6621	Sampled By	RPM		
Location	361A Old Finch Ave., Scarborough, Ontario				
Equipment I.D.	T5				
Substation	North American Pavilion				

# Oil Analysis

Transformer Data								
Manufacturer Westinghouse Primary Volts 27.6/16 kVolts								
Туре	LNAN	Rating	300/ 336	kVA				
Serial No. 827695 Liquid Volume 200 Gals.								

**Laboratory Tests** 

Type of Test	ASTM No.	Acceptable Limits	Test Results
			1999
Dielectric Breakdown	D877	30 kV	46.7
Neutralization Number	D974	0.05 Max. Mg Koh/G	0.008
Interfacial Tension	D971	32 Dynes/ Cm Min.	N/A
Specific Gravity	D1298	0.84 - 0.91 (Oil)	1.520
Colour	D1500	≤3.5	0.5
Visual Condition	D1524	Clear	Clear
Water Content	D1533	30 ppm (<69kV)	
Power Factor	D924	1.0 % Max @ 25 °C	
PCB Content	D4059	50 ppm Max.	
Inhibitor	D2668	≥0.20%	
Furans	D5837	<100 ppb	
Hydrogen (H2)			
Oxygen & Argon			
Nitrogen (N2)			
Methane (CH4)			
Carbon Monoxide (CO)			
Carbon Dioxide (CO2)			
Ethylene (C2H4)			
Ethane (C2H6)			
Acetylene (C2 H2)			
Total Gas Content			

Comments

Chemical Properties	OK
PCB Content	PCB fluid
Dissolved Gas Content	
1.S.	

T.S. Oil\_Analysis



Special Projects Group

#### **Client Information**

Customer	Toronto Zoo	Date	June 14, 1999		
File Number	6621	Tested By	RPM/ JRK		
Location	361A Old Finch Ave., Scarborough, Ontario				
Equipment I.D.	T5				
Substation	North American Pavilion				

#### Power Transformer -Mechanical

Description of Inspection	Status		Comments
Breather & Silica Gel	N/A		
Explosion Vent Gaskets	N/A		
Pressure Relief Device	OK		
Conservator Tank Gaskets	N/A		
Inspection Cover Gaskets	OK		
Main Cover Gaskets	N/A		
Primary Bushing Gaskets	OK		
Primary Bushing Porcelain	OK		
Primary Bushing Connections	OK		
Secondary Bushing Gaskets	OK		
Secondary Bushing Porcelain	OK		
Secondary Bushing Connections	OK		
Secondary Throat Gaskets	OK		
Radiator	OK		
Pressure Gauge	OK		
Gas Relay	N/A		
Oil Level	OK		
Oil Leaks	OK		
Tank Valves	OK		
Oil Temperature Gauge	OK		
Oil Temperature Run/Max	35 4	0°c	
Winding Temperature Gauge	N/A		
Winding Temperature Run/Max			
Tap Changer			Unit Locked: Inoperable
Paint Condition	OK		
Pad	OK		
Grounding	OK		
Fan Operation	N/A		
Control Wiring	N/A		

 $<sup>^{</sup>T.S.}$  P\_Trans\_Mech



**Special Projects Group** 

# Client Information

Customer	Toronto Zoo	Date	June 14, 1999		
File Number	6621	Tested By	RPM		
Location	361A Old Finch Ave., Scarborough, Ontario				
Equipment I.D.	T5 Secondary				
Substation	North American Pavilion				

#### **Bus Duct**

	Nameplate Data				
Manufacturer	Square D	Voltage	600	Volts	
Туре	I-Line	Current	1000	Amps	
Style	3 Phase, 4 Wire	B.I.L.		kVolts	
Cat #	AF-510-23-FES	Serial #		•	

Mechanical Inspections

Description of Inspection	Status	Comments
Bus Insulation	OK	
Type of Bus Insulation	OK	
Support Insulators	OK	
Interior Clean	OK	Visible Sections Only
Interior Dry	OK	Visible Sections Only
Bus Duct Enclosure	OK	
Bus Duct Enclosure Ventilated	N/A	
Bus Joints Clean & Dry	OK	
Bus Joints Torqued	OK	
Gaskets at Joints	OK	
Grounding	OK.	
Enclosure Paint Condition	OK	
Support Structure	OK	

**Electrical Tests** 

Test Description	t	$\phi A$	$\phi B$	φC	N	A/B	B/C	C/A
Insulation Resistance (MΩ)		1120 126	1260	900		2520	2320	2200
Comments	T						<u>-</u>	
	•							
Results Satisfactory	ОК						· <del></del>	

T.S

T.S. Bus\_Buct

CONTRACTOR MARKET STATE

#### TECHNICAL FIELD SERVICE DIVISION

**Special Projects Group** 

#### **Client Information**

Customer	Toronto Zoo	Date	June 14, 1999
File Number	6621	Tested By	RPM
Location	361A Old Finch Ave., Scar., Ontario		
Equipment I.D.	Main Secondary C.B.		
Substation	North American Pavilion		

# **Low Voltage Air Circuit Breaker**

			N:	ameplate D	ata			
Manufacturer		ITE			Volt	age	600	Volts
Туре		K1600			Fra	me Rating	1600	Amps
Serial #		98012			Int.	Rating	65	kAmps
Relay Type		OD4 D	ashpots	Only	Sen	sors Ratio		Amps
Rating Plug.					Lim	iter Rating	N/A	Amps
			Relay (	Calibration	Results			
	Se	ttings		φA		ÞΒ	φ	C
	P/U	T.D	P/U	T.D.	P/U	T.D.	P/U	T.D.
Long Time	10007	A Inst.						
Short Time								
Instantaneous								
			P/U	T.D.				
Ground Fault								
			Mech	anical Insp	ections	· · · · · · · · · · · · · · · · · · ·		·····
Description	n of Ir	spection	1	Status		Con	iments	
Main & Arcing (	Contac	ets		OK				
Arc Chutes				OK				
Phase Barriers				OK				
Bus & Groundin	g Stal	os		OK				
Interlocks				OK	Rack	Out Only		
Manual Operation	n			OK				
Electrical Opera	Electrical Operation			N/A				
			E	lectrical T	ests			
Test Descr	iption		$\phi A$	φ <i>B</i>	φC	A/B	B/C	C/A
Insulation Resist	ance (	(ΜΩ)	>999	>999	>999	>999	>999	>999
Contact Resistan	ce (µ	$\Omega$ )	25	31	27			

OK

Results Satisfactory
T.S.

T.S. LV\_ACB



Technical	Field	Service	Department	

31 Puliman Court, Scarborough, Ontario M1X 1E4. Phone: (416)-298-9977 Fax: (416)-298-2907

# Africa Pavilion



Special Projects Group

# **Client Information**

Customer	Toronto Zoo	Date	June 16, 1999
File Number	6621	Tested By	KH
Location	361A Old Finch Ave., Scarbord	ough, Ontario	
Equipment I.D.	Feeder to Indo-Malaya Pavilion	1	
Substation	Africa Pavilion		

# High Voltage Air/Load Break Switch

	Nameplate	Data		
Manufacturer	S&C	Voltage	27	kVolts
Туре	Alduti Indoor	Current	600	Amps
Style #		B.I.L.	150	kVolts
Cat #	34063	Serial #		

Mechanical Inspections

Description of Inspection	Status	Comments
Key Interlock	N/A	
Operating Mechanism	OK	
Operating Handle Grounding	N/A	
Grounding Mat	N/A	
Stationary Contact Surfaces	OK	
Moving Contact Surfaces	OK	
Arcing Contact Surfaces	OK	
Contact Alignment	OK	
Arcing Interrupter	OK	
Connector Condition	OK	
Insulator Condition	OK	
Phase Barrier Condition	OK	
Support Structure Condition	OK	

Electrical Tests

φB	φC	A/B	B/C	C/A
540				
540	755	3420	3280	4080
57	65			
0.5	0.9			
	57 0.5	57 65	57 65	57 65

T.S.

T.S. HV\_ABS



**Special Projects Group** 

#### **Client Information**

Customer	Toronto Zoo	Date	June 16, 1999
File Number	6621	Tested By	KH
Location	361A Old Finch Ave., Scarborough, Ontario		
Equipment I.D.	Feeder to North America Pavilion		
Substation	Africa Pavilion		

#### High Voltage Air/Load Break Switch

Nameplate Data				
Manufacturer	S&C	Voltage	27	kVolts
Туре	Alduti	Current	600	Amps
Style #		B.I.L.	150	kVolts
Cat#	34063	Serial #		

**Mechanical Inspections** Description of Inspection Status Comments **Key Interlock** N/A Operating Mechanism OK **Operating Handle Grounding** N/A **Grounding Mat** N/A **Stationary Contact Surfaces** OK **Moving Contact Surfaces** OK OK **Arcing Contact Surfaces Contact Alignment** OK Arcing Interrupter OK **Connector Condition** OK **Insulator Condition** OK **Phase Barrier Condition** OK **Support Structure Condition** OK

**Electrical Tests** Test Description C/A  $\phi B$  $\phi C$ A/BB/C  $\phi A$ Insulation Resistance (M $\Omega$ ) 780 3420 3280 4080 540 755 Contact Resistance ( $\mu\Omega$ ) 38 36 36 Arc Interrupter Res.( $\Omega$ ) 0.7 1.4 0.8 **Results Satisfactory** OK

T.S.

T.S. HV\_ABS



Special Projects Group

#### **Client Information**

Customer	Toronto Zoo	Date	June 16, 1999
File Number	6621	Tested By	KH
Location	361A Old Finch Ave., Scarb	orough, Ontario	
Equipment LD.	Africa Paddock Feeder		
Substation	Africa Pavilion		

#### High Voltage Air/Load Break Switch

100	Nameplate D	ata da da da da da da da da da da da da da		
Manufacturer	S&C	Voltage	27	kVolts
Туре	SM Alduti Indoor	Current	600	Amps
Style #		B.I.L.	150	kVolts
Cat #	34563R4-T2	Serial #		

Mechanical Inspections

Wiedlandar inspections						
Description of Inspection	Status	Comments				
Key Interlock	OK					
Operating Mechanism	OK					
Operating Handle Grounding	N/A					
Grounding Mat	N/A					
Stationary Contact Surfaces	OK					
Moving Contact Surfaces	OK					
Arcing Contact Surfaces	OK					
Contact Alignment	OK					
Arcing Interrupter	OK					
Connector Condition	OK					
Insulator Condition	OK					
Phase Barrier Condition	OK					
Support Structure Condition	OK					

**Electrical Tests** Test Description A/B B/C C/A  $\phi B$  $\phi C$  $\phi A$ 3420 3280 4080 Insulation Resistance (M $\Omega$ ) 780 540 755 Contact Resistance ( $\mu\Omega$ ) 50 50 48 Arc Interrupter Res.( $\Omega$ ) 0.6 0.5 0.5 Results Satisfactory T.S. OK

 $<sup>^{\</sup>text{T.S.}}\,\text{HV\_ABS}$ 



**Special Projects Group** 

#### **Client Information**

Customer	Toronto Zoo	Date	June 16, 1999	
File Number	6621	Tested By	KH	
Location	361A Old Finch Ave., Scarborough, Ontario			
Equipment I.D.	Paddock Feeders			
Substation	Africa Pavilion			

# **High Voltage Power Fuse**

Fuse Holder Nameplate Data					
Manufacturer	S&C	Voltage	27.6	kVolt	
Туре	SM-5	Current	300E	Amps	
Style/Cat #	86644R1	Serial #			

Fuse Link Nameplate Data

Type	SM-5	TCC	
Style/Cat #		Amps	

Mechanical Inspections					
Description of Inspection	Status	Comments			
Operating Mechanism	OK				
Contact Surfaces	OK				
Contact Penetration	OK				
Contact Alignment	OK				
Fuse Barrel	OK				
Connector Condition	OK				
Insulator Condition	OK				
Phase Barrier Condition	OK				
Support Structure Condition	OK				
Spare Fuses	POOR	No Spares in Cell			

Spare Fuses POOR No Spares in Cell

Test Description	<b>φ</b> .4	$\phi B$	φC	A/B	B/C	C/A
Insulation Resistance (M $\Omega$ )						
Contact Resistance (μΩ)	1030	960	1030			activistic des

Results Satisfactory Fair. Spares Required.

T.S. HV\_Fuse

Special Projects Group

#### **Client Information**

Customer	Toronto Zoo	Date	June 16, 1999		
File Number	6621	Tested By	KH/ RPM		
Location	361A Old Finch Ave., Scarborough, Ontario				
Equipment I.D.	McDonald Savannah (Africa Paddock Fed)				

# **Pad-Mounted Distribution Transformer**

Manufacturer	Cam Tran		Year Built	1997		
Туре	ONAN		Serial #	97DC23	31201	
Neutral	Solid		Liquid Type/Vol	Oil	1436	Litre
Rating	500	kVA	Total Weight	3492		Kg
Impedance	5.4	%	Primary Voltage	27.6/ 16	·	KVolt
Phase(s)	3	ф	Secondary Voltage	208/ 120	0	Volt
Frequency	60	Hz	BIL	125		kVolt
Insulation Resist	ance (MΩ)	>505,0	00			

#### Oil Analysis

Type of Test	ASTM No.	Acceptable Limits	Test Results
			1999
Dielectric Breakdown	D877	30 kV Min.	44.4
Neutralization Number	D974	0.05 Max. Mg Koh/G	0.027
Interfacial Tension	D971	32 Dynes/ Cm Min.	40.1
Specific Gravity	D1298	0.84 - 0.91	0.867
Colour	D1500	≤3.5 Max.	<0.5
Visual Condition	D1524	Clear	Clear

	Observations & Comments
Comments:	
Committee of the commit	and a sense of the component of the sense of the contract of t
Results Satisfactory:	OK

T.S.

T.S. P\_Trans\_Elect

#### Special Projects Group

#### **Client Information**

Customer	Toronto Zoo	Date	June 16, 1999		
File Number	6621	Tested By	KH		
Location	361A Old Finch Ave., Scarborough, Ontario				
Equipment I.D.	Padmount to Africa Sub. 3 phases; to T10 3 phases				

#### **Pad-Mounted Distribution Transformer**

Manufacturer	CARTE		Year Built	1996		
Туре	ONAN		Serial #	2B301-0	001	
Neutral	Solid		Liquid Type/Vol	Oil	1023	Litre
Rating	225	kVA	Total Weight	2227		Lbs.
Impedance	4.34	%.	Primary Voltage	27.6/ 16	,	kVolt
Phase(s)	3	ф	Secondary Voltage	208/ 120	0	Volt
Frequency	60	Hz	BIL	125		kVolt
Insulation Resist	ance (MΩ)	435,000	)			

#### Oil Analysis

Laboratory Tests Type of Test ASTM No. **Acceptable Limits** Test Results 1999 Dielectric Breakdown D877 30 kV Min. 32.0 **Neutralization Number** D974 0.05 Max. Mg Koh/G 0.013 **Interfacial Tension** D971 32 Dynes/ Cm Min. 38.6 Specific Gravity D1298 0.84 - 0.91 0.889 Colour D1500 ≤3.5 Max. 0.5 Visual Condition D1524 Clear Clear

	Observations & Comments
Comments:	
Results Satisfactory:	OK

T.S.



**Special Projects Group** 

# **Client Information**

Customer	Toronto Zoo	Date	June 16, 1999
File Number	6621	Tested By	KH
Location	361A Old Finch Ave., Scarboroug	gh, Ontario	
Equipment I.D.	African Pavilion Trans. T-6		
Substation	African Pavilion		

# High Voltage Air/Load Break Switch

	Nameplate D	ata		
Manufacturer	S&C	Voltage	27.6	kVolts
Туре	SM Alduti Indoor	Current	600	Amps
Style #		B.I.L.	150	kVolts
Cat #	34563R4-T2	Serial #		

Mechanical Inspections

Description of Inspection	Status	Comments
Key Interlock	N/A	
Operating Mechanism	OK	
Operating Handle Grounding	N/A	
Grounding Mat	N/A	
Stationary Contact Surfaces	OK	
Moving Contact Surfaces	OK	
Arcing Contact Surfaces	OK	
Contact Alignment	OK	
Arcing Interrupter	OK	
Connector Condition	OK	
Insulator Condition	OK	
Phase Barrier Condition	OK	
Support Structure Condition	OK	

**Electrical Tests** 

Test Description	φA	$\phi B$	φC	A/B	B/C	C/A
Insulation Resistance (M $\Omega$ )	780	540	755	3420	3280	4080
Contact Resistance (μΩ)	38	36	36			
Arc Interrupter Res.(Ω)	0.7	1.4	0.8			
Results Satisfactory	OK					

T.S

T.S. HV\_ABS



**Special Projects Group** 

#### **Client Information**

Customer	Toronto Zoo	Date	June 16, 1999	
File Number	6621	Tested By	KH/ AN	
Location	361A Old Finch Ave., Scarborough, Ontario			
Equipment I.D.	African Pavilion Transformer T-6			
Substation	African Pavilion			

#### **High Voltage Power Fuse**

	Fuse Holder Na	meplate Data		
Manufacturer	S&C	Voltage	27.6	kVolt
Туре	SM-5	Current	300	Amps
Style/Cat #	86641R1	Serial #		

Fuse Link Nameplate Data

Туре	SM-5	TCC	153-4
Style/Cat #	134060R4	Amps	40E

Mechanical InspectionsDescription of InspectionStatusCommentsOperating MechanismOKContact SurfacesOK

Contact Surfaces
OK
Contact Penetration
OK
Contact Alignment
OK
Fuse Barrel
OK
Connector Condition
OK
Insulator Condition
OK
Phase Barrier Condition
OK
Support Structure Condition
OK

Spare Fuses OK 3 Spares in Cell

Electrical Tests						
Test Description	φ.A	$\phi B$	ø C	A/B	B/C	C/A
Insulation Resistance (M $\Omega$ )	>999	>999	>999	>999	>999	>999
Contact Resistance (μΩ)	1760	1733	1760			
	· <b></b>					
Results Satisfactory	OK					

T.S.

<sup>.</sup> T.S. HV\_Fuse

**Special Projects Group** 

#### **Client Information**

Customer	Toronto Zoo	Date	June 16, 1999
File Number	6621	Tested By	KH
Location	361A Old Finch Ave., Scarbo	orough, Ontario	
Equipment I.D.	T-6		
Substation	African Pavilion		

#### **Power Transformer - Electrical**

Manufacturer	Westinghou	se	Vector Group	Y-Y		
Туре	LNAN		Serial #.	795154		
Neutral	Solid		Liquid Type/Vol	Askarel	350	Gal
Rating	750/ 850	kVA	Total Weight	11,900		lbs.
Impedance	6.0	%	Primary Voltage	27.6/ 16		kVolt
Phase	3	ф	Secondary Voltage	208/ 120		Volt
Frequency	60	Hz	BIL	150/45		kVolt

Insulation Tests Prim. With Sec. With Prim. & Sec. Insulation Resistance Prim. Grounded @ 5k / 1k VDC Sec. Grounded To Ground 27.8  $M\Omega$ 27.2 Corrected to 20 °C. 76.2 77.8 The state of the s

	CH-L+G	CH-G	CH-L	CL-G	CL-H+G
Cap (pF)					
Corr. 20 °C					
				and the state of t	e market en
Dis. Fact.(%)					

Dis. Fact.(%)

Corr. 20 °C.

Turns Ratio Tests

Гар	Primary Volts	Calculated Ratio	<u>X0-X1</u> H0-H1	<u>X0-X2</u> H0-H2	<u>Х0-Х3</u> Н0-Н3
1					
2					
3	27,600	0.754	0.747	0.747	0.747
4					
5					

Tap Position Found & Left	3 (27,600V)	
Results Satisfactory	OK	

T.S. P\_Trans\_Elect



# TECHNICAL FIELD SERVICE DEPARTMENT

Special Projects Group

# **Client Information**

Customer	Toronto Zoo	Sample Date	June 17, 1999
File Number	6621	Sampled By	RPM
Location	361A Old Finch Ave., Scarbon	rough, Ontario	
Equipment I.D.	T-6		
Substation	Africa Pavilion		

# Oil Analysis

Transformer Data							
Manufacturer Westinghouse Primary Volts 27.6/16							
Type	LNAN	Rating	750/ 850	kVA			
Serial No.	795154	Liquid Volume	350	Gals.			

Laboratory Tests

Type of Test	ASTM No.	Acceptable Limits	Test Results
			1999
Dielectric Breakdown	D877	30 kV	46.9
Neutralization Number	D974	0.05 Max. Mg Koh/G	0.004
Interfacial Tension	D971	32 Dynes/ Cm Min.	N/A
Specific Gravity	D1298	0.84 - 0.91 (Oil)	1.520
Colour	D1500	≤3.5	0.5
Visual Condition	D1524	Clear	Clear
Water Content	D1533	30 ppm (<69kV)	
Power Factor	D924	1.0 % Max @ 25 °C	
PCB Content	D4059	50 ppm Max.	
Inhibitor	D2668	≥0.20%	
Furans	D5837	<100 ppb	
Hydrogen (H2)			
Oxygen & Argon			
Nitrogen (N2)			
Methane (CH4)			
Carbon Monoxide (CO)			
Carbon Dioxide (CO2)			
Ethylene (C2H4)			
Ethane (C2H6)			
Acetylene (C2 H2)		nejednje indispirator i popializa i	<u> </u>
Total Gas Content			

Comments

Chemical Properties	OK
PCB Content	PCB fluid
Dissolved Gas Content	
TS	

T.S. Oil\_Analysis



Special Projects Group

# **Client Information**

Customer	Toronto Zoo	Date	June 16, 1999			
File Number	6621	Tested By	KH/ RPM/ TL			
Location	361A Old Finch Ave., Scarborough, Ontario					
Equipment I.D.	T-6					
Substation	African Pavilion					

#### **Power Transformer - Mechanical**

Me Description of Inspection	Sta	itus	Comments
Breather & Silica Gel	N	/A	
Explosion Vent Gaskets	N	/A	
Pressure Relief Device	C	K	
Conservator Tank Gaskets	N	/A	
Inspection Cover Gaskets	C	K	
Main Cover Gaskets	N	/A	
Primary Bushing Gaskets	C	K	
Primary Bushing Porcelain	C	K	
Primary Bushing Connections	C	K	
Secondary Bushing Gaskets	C	K	
Secondary Bushing Porcelain	C	K	
Secondary Bushing Connections	C	K	
Secondary Throat Gaskets	C	K	
Radiator	C	K	
Pressure Gauge	C	K	-7 PSI Vacuum
Gas Relay	N	/A	
Oil Level	C	K	
Oil Leaks	C	K	None visible
Tank Valves	C	K	
Oil Temperature Gauge	C	K	
Oil Temperature Run/Max	35	45°C	
Winding Temperature Gauge	N	/A	
Winding Temperature Run/Max			
Tap Changer		•	Unit Locked: Inoperable
Paint Condition	C	K	
Pad	C	K	
Grounding	С	K	
Fan Operation	N	/A	
Control Wiring	N	/A	

T.S.

T.S. P\_Trans\_Mech



**Special Projects Group** 

#### **Client Information**

Customer	Toronto Zoo	Date	June 16, 1999		
File Number	6621	Tested By	KH/TL		
Location	361A Old Finch Ave., Scarborough, Ontario				
Equipment I.D.	T-6 Secondary				
Substation	African Pavilion				

#### **Bus Duct**

	Nameplate Data	10 May 10		
Manufacturer	Square D	Voltage	120/ 208	Volts
Type	Power Clad	Current	3000	Amps
Style	3 Phase, 4 Wire	B.I.L.		kVolts
Cat#	AF-510-23-FES	Serial #		

Mechanical Inspections

Description of Inspection	Status	Comments
Bus Insulation	OK	
Type of Bus Insulation	OK	
Support Insulators	OK	
Interior Clean	OK	Visible Sections Only
Interior Dry	OK	Visible Sections Only
Bus Duct Enclosure	OK	
Bus Duct Enclosure Ventilated	N/A	
Bus Joints Clean & Dry	OK	
Bus Joints Torqued	OK	
Gaskets at Joints	OK	
Grounding	OK	
Enclosure Paint Condition	OK	
Support Structure	OK	

Electrical Tests

Test Description	n	$\phi A$	φ <i>B</i>	φC	N	A/B	B/C	C/A
Insulation Resistance (MΩ)		1170 1570		1920 -		1080	1980	3180
								<del>, ,</del>
Comments								
Results Satisfactory	OK	- //						

T.S.

T.S. Bus\_Buct



Special Projects Group

#### **Client Information**

Customer	Toronto Zoo	Date	June 16, 1999
File Number	6621	Tested By	RPM/ TL/ KH
Location	361A Old Finch Ave., Scar., Ontario		
Equipment I.D.	Main Secondary C.B.		
Substation	African Pavilion		

## Low Voltage Air Circuit Breaker

	Nameplate	Data		
Manufacturer	FPE	Voltage	600	Volts
Type	75H-2	Frame Rating	3000	Amps
Serial #	TH-4126-72	Int. Rating	75	kAmps
Relay Type	Carriere FB600E	Sensors Ratio	3000:1	Amps
Rating Plug.		Limiter Rating	N/A	Amps

**Relay Calibration Results** 

	Setti	ings	φ	A	Ç	b B	q	C
P	P/U	T.D	P/U	T.D.	P/U	T.D.	P/U	T.D.
Long Time	0.85x	7.5		6.021		5.896		
Short Time	7x	0.4		0.477		0.476	·	0.471
Instantaneous	10x			0.094		0.103		0.111
			P/U	T.D.				
Ground Fault	1200	0.066					· · · · · · · · · · · · · · · · · · ·	

Mechanical Inspections

Description of Inspection	Status	Comments
Main & Arcing Contacts	OK	
Arc Chutes	OK	
Phase Barriers	OK	
Bus & Grounding Stabs	OK	
Interlocks	OK	
Manual Operation	POOR	See Deficiencies
Electrical Operation		

**Electrical Tests** 

Test Description	φA	φ Β	φC	A/B	B/C	C/A
Insulation Resistance (M $\Omega$ )	>999	>999	>999	>999	>999	>999
Contact Resistance (μΩ)	40/70	49/ 50	49/48			
Results Satisfactory	NO. See	Deficienc	ries.			

T.S.

T.S. LV\_ACB



Technical Field Service Department

31 Puliman Court, Scarborough, Ontario M1X 1E4. Phone: (416)-298-9977 Fax: (416)-298-2907

# Entrance/ Administration Building



**Special Projects Group** 

#### **Client Information**

Customer	Toronto Zoo	Date	June 15, 1999	
File Number	6621	Tested By	AS, AN	
Location	361A Old Finch Ave., Scarborough, C	361A Old Finch Ave., Scarborough, Ontario		
Equipment I.D.	Feeder to Eurasia Pavilion	Feeder to Eurasia Pavilion		
Substation	Entrance/ Administration Building			

#### High Voltage Air/Load Break Switch

	Nameplate l	Data		
Manufacturer	S&C	Voltage	27.6	kVolts
Туре	Alduti Indoor	Current	600	Amps
Style #		B.I.L.	150	kVolts
Cat#	CDT-2765378	Serial #		

**Mechanical Inspections** Description of Inspection Status Comments Key Interlock N/A Operating Mechanism OK Operating Handle Grounding OK. **Grounding Mat** N/A **Stationary Contact Surfaces** OK **Moving Contact Surfaces** OK Arcing Contact Surfaces OK OK Contact Alignment Arcing Interrupter OK **Connector Condition** OK **Insulator Condition** OK **Phase Barrier Condition** OK **Support Structure Condition** OK

**Electrical Tests** Test Description A/BB/C C/A  $\phi A$  $\phi B$ φC Insulation Resistance (G $\Omega$ ) >505 >505 >505 >505 >505 >505 Contact Resistance ( $\mu\Omega$ ) 58 61 65 Arc Interrupter Res.( $\Omega$ ) 2.0 0.4 1.9 Results Satisfactory OK

T.S. HV\_ABS



**Special Projects Group** 

#### **Client Information**

Customer	Toronto Zoo	Date	June 15, 1999		
File Number	6621	Tested By	AS, AN		
Location	361A Old Finch Ave., Scarborough,	361A Old Finch Ave., Scarborough, Ontario			
Equipment I.D.	Feeder to Indo-Malaya Pavilion	Feeder to Indo-Malaya Pavilion			
Substation	Entrance/ Administration Building				

## High Voltage Air/Load Break Switch

	Nameplate	Data		
Manufacturer	S&C	Voltage	27.6	kVolts
Type	Alduti Indoor	Current	600	Amps
Style #		B.I.L.	150	kVolts
Cat#	34163	Serial #		

Mechanical Inspections

Description of Inspection	Status	Comments
Key Interlock		
Operating Mechanism	OK	
Operating Handle Grounding	OK	
Grounding Mat	N/A	
Stationary Contact Surfaces	OK	
Moving Contact Surfaces	OK	
Arcing Contact Surfaces	OK	
Contact Alignment	OK	
Arcing Interrupter	OK	
Connector Condition	OK	
Insulator Condition	OK	
Phase Barrier Condition	OK	
Support Structure Condition	OK_	

**Electrical Tests** 

Test Description	$\phi A$	$\phi B$	φC	A/B	B/C	C/A
Insulation Resistance (GΩ)	>505	>505	>505	>505	>505	>505
Contact Resistance (μΩ)	77	83	86			
Arc Interrupter Res.(Ω)	0.43	0.40	0.40	100 100 100 100		

T.5

T.S. HV\_ABS



Special Projects Group

#### **Client Information**

Customer	Toronto Zoo	Date	June 15, 1999
File Number	6621	Tested By	AS, AN
Location	361A Old Finch Ave., Scarborough,	Ontario	
Equipment I.D.	Feeder to Village Edge South		<u> </u>
Substation	Entrance/ Administration Building		

## High Voltage Air/Load Break Switch

Nameplate Data					
Manufacturer	S&C	Voltage	27.6	kVolts	
Туре	SM Alduti	Current	600	Amps	
Style #		B.I.L.	150	kVoits	
Cat #	34563-R4-T2	Serial #			

Mechanical Inspections

Description of Inspection	Status	Comments
Key Interlock		
Operating Mechanism	OK	
Operating Handle Grounding	OK	
Grounding Mat	N/A	
Stationary Contact Surfaces	OK	
Moving Contact Surfaces	OK	
Arcing Contact Surfaces	OK	
Contact Alignment	OK	
Arcing Interrupter	OK	
Connector Condition	OK	
Insulator Condition	OK	
Phase Barrier Condition	OK	
Support Structure Condition	OK	

**Electrical Tests** 

Electrical rests						
Test Description	φA	$\phi B$	φC	A/B	B/C	C/A
Insulation Resistance (GΩ)	>505	>505	>505	>505	>505	>505
Contact Resistance (μΩ)	28	28	35	and the		
Arc Interrupter Res.(Ω)	0.3	0.3	0.5			18.00
Arc interrupter Res.(12)	1 0.5	0.5	1 0.5			
Results Satisfactory	OK					

T.5

T.S. HV\_ABS



**Special Projects Group** 

#### **Client Information**

Customer	Toronto Zoo	Date	June 16, 1999
File Number	6621	Tested By	AS, AN
Location	361A Old Finch Ave., Scarborough, Ontario		
Equipment I.D.	Feeder to Village Edge South		
Substation	Entrance/ Administration Building		

#### High Voltage Power Fuse

Fuse Holder Nameplate Data					
Manufacturer	S&C	Voltage	34.5	kVolt	
Type	SM-5S	Current	300E	Amps	
Style/Cat #	86644R1	Serial #			
Fuse Link Namenlate Data					

SM-5 TCC 153-4

Type Style/Cat # 80E 134125R4 Amps

**Mechanical Inspections** Description of Inspection Status Comments Operating Mechanism OK Contact Surfaces OK **Contact Penetration** OK **Contact Alignment OK** Fuse Barrel OK. **Connector Condition** OK **Insulator Condition** OK **Phase Barrier Condition** OK **Support Structure Condition** OK Spare Fuses Fair One only in cell door

**Electrical Tests** Test Description  $\phi B$  $\phi C$ A/B B/C C/A φ4 >505 Insulation Resistance (G $\Omega$ ) >505 >505 >505 >505 >505 Contact Resistance (μΩ) 780 802 802 OK. Spare Links Required. Results Satisfactory

T.S. HV\_Fuse



**Special Projects Group** 

#### **Client Information**

Customer	Toronto Zoo	Date	June 15, 1999	
File Number	6621	Tested By	AS, AN	
Location	361A Old Finch Ave., Scarborough, Ontario			
Equipment I.D.	Entrance Facilities Transformer T-7			
Substation	Entrance/ Administration Building			

#### High Voltage Air/Load Break Switch

	Nameplate D	ata		
Manufacturer	S&C	Voltage	27.6	kVolts
Туре	SM Alduti Indoor	Current	600	Amps
Style #		B.I.L.	150	kVolts
Cat#	34563R4-T2	Serial #		

**Mechanical Inspections** Description of Inspection Status Comments N/A **Key Interlock** OK Operating Mechanism Operating Handle Grounding OK N/A **Grounding Mat Stationary Contact Surfaces** OK OK **Moving Contact Surfaces Arcing Contact Surfaces** OK OK **Contact Alignment** OK **Arcing Interrupter** OK **Connector Condition Insulator Condition** OK **Phase Barrier Condition** OK

**Support Structure Condition Electrical Tests** B/C C/A Test Description φC A/B $\phi B$  $\phi A$ >505 >505 >505 Insulation Resistance (G $\Omega$ ) >505 >505 >505 72 71 75 Contact Resistance ( $\mu\Omega$ ) 0.2 0.4 0.2 Arc Interrupter Res.( $\Omega$ ) Results Satisfactory OK

OK



**Special Projects Group** 

#### **Client Information**

Customer	Toronto Zoo	Date	June 16, 1999	
File Number	6621	Tested By	AS, AN	
Location	361A Old Finch Ave., Scarborough, Ontario			
Equipment I.D.	Entrance Facilities Transformer T-7			
Substation Entrance/ Administration Building				

#### **High Voltage Power Fuse**

	Fuse Holder N	ameplate Data	w., -	.73
Manufacturer	S&C	Voltage	34.5	kVolt
Туре	SM-5S	Current	300E	Amps
Style/Cat #	86644R1	Serial #		
	Fuse Link Na	meplate Data		
Туре	SM-5	TCC	153-4	

 Type
 SM-5
 TCC
 153-4

 Style/Cat #
 86644R1
 Amps
 15E

**Mechanical Inspections** Description of Inspection Status Comments **Operating Mechanism** OK **Contact Surfaces** OK **Contact Penetration OK** Contact Alignment OK OK Fuse Barrel **Connector Condition** OK **Insulator Condition** OK **Phase Barrier Condition OK Support Structure Condition** OK In Cell Door Spare Fuses OK

Electrical Tests						
Test Description	φA	φ Β	φC	A/B	B/C	C/A
Insulation Resistance (G $\Omega$ )	>505	>505	>505	>505	>505	>505
Contact Resistance (μΩ)	5276	5318	5400			1.64
Results Satisfactory	OK				· · · ·	

<sup>&</sup>lt;sup>f.S.</sup> HV\_Fuse



Special Projects Group

#### **Client Information**

Customer	Toronto Zoo	Date	June 15, 1999
File Number	6621	Tested By	AS
Location	361A Old Finch Ave., Scarborough, Ontario		
Equipment I.D.	Entrance Facilities Transformer T-7		
Substation	Entrance/ Administration Building		

#### **Power Transformer -Electrical**

		Na	meplate Data	ang t	y a saidhead a dheadan	
Manufacturer	Westingh	Westinghouse Vector Group Wye Wye				
Туре	LNAN		Serial #.	827694		
Neutral	Solid		Liquid Type/Vol	Askarel	200	Gal
Rating	225	kVA	Total Weight	6450		lbs.
Impedance	5.9	%	Primary Voltage	27.6 Y		kVolt
Phase	3	ф	Secondary Voltage	120/ 208		Volt
Frequency	60	Hz	BIL	150		kVolt

Insulation Tests

Insulation Re @ 5k / 1	esistance k VDC	Prim. With Sec. Grounded	Sec. W Prim. Gro		Prim. & Sec. To Ground
ΜΩ		30	30		
Corrected to	o 20 °C.				
a pro-u					
	CH-L + G	CH-G	CH-L	CL-(	G CL-H+G
Cap (pF)					
Corr. 20 °C					
		me a familia		. 4	
Dis. Fact.(%)					
Corr. 20 °C.					

Turns Ratio Tests

Тар	Primary Volts	Calculated Ratio	<u>X0-X1</u> H0-H1	<u>X0-X2</u> H0-H2	X0-X3 H0-H3
1					
2					
3	27,600	0.753	0.748	0.748	0.748
4					
5					

Tap Position Found & Left	3 (27,600V)
Results Satisfactory	OK

T.S. P\_Trans\_Elect



## TECHNICAL FIELD SERVICE DEPARTMENT

**Special Projects Group** 

#### **Client Information**

Customer	Toronto Zoo	Sample Date	June 15, 1999		
File Number	6621	Sampled By	TL		
Location	361A Old Finch Ave., Scarborough, Ontario				
Equipment I.D.	Entrance Facilities Transformer T-7				
Substation	Entrance/ Administration Building				

## Oil Analysis

Transformer Data					
Manufacturer	Westinghouse	Primary Volts	27.6/ 16	kVolts	
Type	LNAN	Rating	225	kVA	
Serial No.	827694	Liquid Volume	200	Gals.	

**Laboratory Tests** 

Type of Test	ASTM No.	Acceptable Limits	Test Results
			1999
Dielectric Breakdown	D877	30 kV	49.4
Neutralization Number	D974	0.05 Max. Mg Koh/G	0.004
Interfacial Tension	D971	32 Dynes/ Cm Min.	N/A
Specific Gravity	D1298	0.84 - 0.91	1.420
Colour	D1500	≤3.5	0.5
Visual Condition	D1524	Clear	Clear
Water Content	D1533	30 ppm (<69kV)	
Power Factor	D924	1.0 % Max @ 25 °C	
PCB Content	D4059	50 ppm Max.	
Inhibitor	D2668	≥0.20%	
Furans	D5837	<100 ppb	
Hydrogen (H2)			
Oxygen & Argon			
Nitrogen (N2)			
Methane (CH4)			
Carbon Monoxide (CO)			
Carbon Dioxide (CO2)			
Ethylene (C2H4)			
Ethane (C2H6)			
Acetylene (C2 H2)			
Total Gas Content	<del></del>		

Comments

Chemical Properties	OK
PCB Content	PCB Insulating Fluid
Dissolved Gas Content	

T.S.

T.S. Oil\_Analysis



**Special Projects Group** 

#### **Client Information**

Customer	Toronto Zoo	Date	June 15, 1999		
File Number	6621	Tested By	AS, AN		
Location	361A Old Finch Ave., Scarborough, Ontario				
Equipment I.D.	Entrance Facilities Transformer T-8				
Substation	Entrance/ Administration Building				

## High Voltage Air/Load Break Switch

	Nameplate D	ata		
Manufacturer	S&C	Voltage	27.6	kVolts
Type	SM Alduti Indoor	Current	600	Amps
Style #		B.I.L.	150	kVolts
Cat #	34563R4-T2	Serial #		

Mechanical Inspections

1,10	Manister Inspectation	
Description of Inspection	Status	Comments
Key Interlock	N/A	
Operating Mechanism	OK	·
Operating Handle Grounding	OK	·
Grounding Mat	N/A	
Stationary Contact Surfaces	OK	
Moving Contact Surfaces	OK	
Arcing Contact Surfaces	OK	
Contact Alignment	OK	
Arcing Interrupter	OK	
Connector Condition	OK	
Insulator Condition	OK	
Phase Barrier Condition	OK	
Support Structure Condition	OK	

Electrical Tests

1						
Test Description	φA	φB	φC	A/B	B/C	C/A
Insulation Resistance (GΩ)	>505	>505	>505	>505	>505	>505
Contact Resistance (μΩ)	43	49	43	ep engles i		
Arc Interrupter Res.(Ω)	0.3	0.3	0.4			
Results Satisfactory	OK					· · · · · · · · · · · · · · · · · · ·

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r.s. HV\_ABS



**Special Projects Group** 

## **Client Information**

Customer	Toronto Zoo	Date	June 16, 1999
File Number	6621	Tested By	AS, AN
Location	361A Old Finch Ave., Scarborough,	Ontario	
Equipment I.D.	Entrance Facilities Transformer T-8		
Substation	Entrance/ Administration Building		

## **High Voltage Power Fuse**

	Fuse Holder Na	meplate Data		
Manufacturer	S&C	Voltage	34.5	kVolt
Туре	SM-5S	Current	300E	Amps
Style/Cat #	86644R1	Serial #		<del></del>
	Fuse Link Nan	neplate Data		<del> </del>
Туре	SM-5	TCC	153-4	
Style/Cat #	13440R4	Amps	25E	

	cnanicai inspe	cuons	ſ
Description of Inspection	Status	Comments	····
Operating Mechanism	OK		
Contact Surfaces	OK		
Contact Penetration	OK		
Contact Alignment	OK		
Fuse Barrel	OK		
Connector Condition	OK		
Insulator Condition	OK		
Phase Barrier Condition	OK		
Support Structure Condition	OK		
Spare Fuses	OK	In cell door	

	Ele	ectrical To	ests			
Test Description	ф.4	φΒ	φC	A/B	B/C	C/A
Insulation Resistance (G $\Omega$ )	>505	>505	>505	>505	>505	>505
Contact Resistance (μΩ)	2439	2412	2451			ere grant v
Results Satisfactory	OK		<del></del>			
T.S.			··	<del> </del>		

T.S. HV\_Fuse

Special Projects Group

#### **Client Information**

Customer	Toronto Zoo	Date	June 15, 1999
File Number	6621	Tested By	AS
Location	361A Old Finch Ave., Scarborough,	Ontario	
Equipment I.D.	Entrance Facilities Transformer T-8		
Substation	Entrance/ Administration Building		

#### Power Transformer -Electrical

		Na	meplate Data		
Manufacturer	Westingh	ouse	Vector Group	Wye Wye	
Туре	LNAN		Serial #.	850912	
Neutral	Solid		Liquid Type/Vol	Askarel 240	Gal
Rating	500	kVA	Total Weight	8500	lbs.
Impedance	6.7	%	Primary Voltage	27.6 Y	kVolt
Phase	3	ф	Secondary Voltage	600	Volt
Frequency	60	Hz	BIL	150	kVolt

	CH-L+G	CH-G	CH-L	CL-G	CL-H+G
Cap (pF)					
Corr. 20 °C					
<b>Ma</b> landar da da					a e Arganesco
Dis. Fact.(%)					

Dis. Fact.(%)
Corr. 20 °C.

Гар	Primary Volts	Calculated Ratio	<u>X0-X1</u> H0-H1	<u>X0-X2</u> H0-H2	<u>X0-X3</u> H0-H3
1					
2					
3	27,600	2.173	2.178	2.178	2.178
4					
5					-

Tap Position Found & Left	3 (27,600V)	
Results Satisfactory	OK	
T.S.		

T.S. P\_Trans\_Elect



## TECHNICAL FIELD SERVICE DEPARTMENT

Special Projects Group

#### **Client Information**

Customer	Toronto Zoo	Sample Date	June 15, 1999
File Number	6621	Sampled By	TL
Location	361A Old Finch Ave., Scarborough,	Ontario	
Equipment I.D.	Entrance Facilities Transformer T-8		
Substation	Entrance/ Administration Building		

## Oii Analysis

	Transformer Data			
Manufacturer	Westinghouse	Primary Volts	27.6/ 16	kVolts
Туре	LNAN	Rating	225	kVA
Serial No.	850912	Liquid Volume	240	Gals.

Laboratory Tests

Type of Test	ASTM No.	Acceptable Limits	Test Res	ılte
Type of Test	ASTITIO.	Acceptable Limits	1 CSU NCS	99
Dielectric Breakdown	D877	30 kV	<u> </u>	49.0
Neutralization Number	D974	0.05 Max. Mg Koh/G		0.004
Interfacial Tension	D971	32 Dynes/ Cm Min.		N/A
Specific Gravity	D1298	0.84 - 0.91		1.520
Colour	D1500	≤3.5		0.5
Visual Condition	D1524	Clear		Clear
Water Content	D1533	30 ppm (<69kV)		
Power Factor	D924	1.0 % Max @ 25 °C		
PCB Content	D4059	50 ppm Max.		
Inhibitor	D2668	≥0.20%		
Furans	D5837	<100 ppb		
Hydrogen (H2)				
Oxygen & Argon				
Nitrogen (N2)				
Methane (CH4)				
Carbon Monoxide (CO)				
Carbon Dioxide (CO2)			·	
Ethylene (C2H4)				
Ethane (C2H6)				
Acetylene (C2 H2)				
Total Gas Content				

**Comments** 

Chemical Properties	OK
PCB Content	PCB Insulating Fluid
Dissolved Gas Content	

r.s.

T.S. Oil\_Analysis



**Special Projects Group** 

#### **Client Information**

Customer	Toronto Zoo	Date	June 18, 1999		
File Number	6621	Tested By	KH		
Location	361A Old Finch Ave., Scarborough, Ontario				
Equipment I.D.					
Substation	Zoological				

## High Voltage Air/Load Break Switch

	Nameplate Dat	ta		
Manufacturer	S&C	Voltage	29	kVolts
Туре	Alduti Rupter Indoor	Current	600	Amps
Style #		B.I.L.	150	kVolts
Cat #	CDT-2768678	Serial #		

**Mechanical Inspections** 

Description of Inspection	Status	Comments
Key Interlock	OK	
Operating Mechanism	OK	
Operating Handle Grounding	N/A	
Grounding Mat	N/A	
Stationary Contact Surfaces	OK	
Moving Contact Surfaces	OK	
Arcing Contact Surfaces	OK	
Contact Alignment	OK	
Arcing Interrupter	OK	
Connector Condition	OK	
Insulator Condition	OK	
Phase Barrier Condition	OK	
Support Structure Condition	OK	

**Electrical Tests** 

φA	$\phi B$	φC	A/B	B/C	C/A
				,	_
60	58	56	2 mg/3 to 12	a a dila	
1.3	1.1	1.5	7147	100	K S
	60	60 58 1.3 1.1	60     58     56       1.3     1.1     1.5	12 VS 5 (23)	60 58 56 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4

T.S.

T.S. HV\_ABS



Special Projects Group

## **Client Information**

Customer	Toronto Zoo	Date	June 18, 1999		
File Number	6621	Tested By	KH		
Location	361A Old Finch Ave., Scarborough, Ontario				
Equipment LD.					
Substation	Zoological				

## High Voltage Power Fuse

a januar 1965. – Programa Programa 1965. – Programa	Fuse Holder Na	meplate Data		
Manufacturer	S&C	Voltage	34.5	kVolt
Туре	SM-5	Current	600	Amps
Style/Cat #	86644R2	Serial #		
	Fuse Link Nar	neplate Data		
Туре	SM-5	TCC	153-4	

 Type
 SM-5
 TCC
 153-4

 Style/Cat #
 134025R4
 Amps
 15E

Status OK	Comments
OK	
OK	3 Spares in Cell
	OK OK OK OK OK OK OK OK OK

Electrical Tests						
φA	φB	φC	A/B	B/C	C/A	
>999	>999	>999	>999	>999	>999	
5130	4865	5065	Sold State Apple			
OK						
	\$4 >999	φ <b>A</b> φ <b>B</b> >999 >999	φ <i>A</i> φ <i>B</i> φ <i>C</i> >999 >999	\$\phi A\$         \$\phi B\$         \$\phi C\$         \$A/B\$           >999         >999         >999         >999	\$\phi A\$         \$\phi B\$         \$\phi C\$         \$A/B\$         \$B/C\$           >999         >999         >999         >999	

**Special Projects Group** 

#### **Client Information**

Customer	Toronto Zoo	Date	June 18, 1999		
File Number	6621	Tested By	KH/TA		
Location	361A Old Finch Ave., Scarborough, Ontario				
Equipment I.D.	Zoological				

			istribution Trai	asform	1er	
gar Gari	n e e e e e e e e e e e e e e e e e e e	Transfort	ner Nameplate Data	transferra	本書は食い食の	
Manufacturer	CARTE		Year Built	1985		·
Type	ONAN		Serial #	NO790	-1	
Neutral	Solid		Liquid Type/Vol	Oil	872	Litres
Rating	300	kVA	Total Weight	1909		Kg
Impedance	4.58	%	Primary Voltage	27.6/ 16	5	KVolt
Phase(s)	3	ф	Secondary Voltage	208/ 12	0	Volt
Frequency	60	Hz	BIL	150		kVolt
Insulation Resist	ance (MΩ)					

Oil Analysis								
	Laboratory Tests							
Type of Test	ASTM No.	Acceptable Limits	Test Results					
			1999					
Dielectric Breakdown	D877	30 kV Min.	36.3					
Neutralization Number	D974	0.05 Max. Mg Koh/G	0.014					
Interfacial Tension	D971	32 Dynes/ Cm Min.	31,3					
Specific Gravity	D1298	0.84 - 0.91	0.859					
Colour	D1500	≤3.5 Max.	<0.5					
Visual Condition	D1524	Clear	Clear					

	Observations & Comments
Comments:	
refre to the length of the field	Control of the Charles Control of Control of the Co
Results Satisfactory:	OK

T.\$.



Technical Field Service Department	Technical	Field Service	Department
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31 Pullman Court, Scarborough, Ontario M1X 1E4. Phone: (416)-298-9977 Fax: (416)-298-2907

# **Service Building**



**Special Projects Group** 

#### **Client Information**

Customer	Toronto Zoo	Date	June 15, 1999	
File Number	6621	Tested By	JC/ EJ	
Location	361A Old Finch Ave., Scarborough, Ontario			
Equipment I.D.	Feeder to Main Switchgear			
Substation	Service Building			

#### High Voltage Air/Load Break Switch

1.500 p	The Carlo Made of the Carlo	Nameplate Data	the second		
Manufacturer	S&C		Voltage	27	kVolts
Туре	Alduti		Current	600	Amps
Style #			B.I.L.	150	kVolts
Cat#	34063		Serial #		

Cat # 34063 Serial #

Mechanical Inspections

Description of Inspection Status Comments

Key Interlock N/A

Operating Mechanism OK

Operating Handle Grounding OK

Grounding Mat N/A

Stationary Contact Surfaces OK

Stationary Contact Surfaces OK **Moving Contact Surfaces** OK **Arcing Contact Surfaces** OK **Contact Alignment** OK **Arcing Interrupter** OK **Connector Condition** OK **Insulator Condition** OK OK Phase Barrier Condition **Support Structure Condition** OK

**Electrical Tests** Test Description A/BB/C C/A  $\phi B$ Ø C  $\phi A$ Insulation Resistance (M $\Omega$ ) Contact Resistance ( $\mu\Omega$ ) 58 59 57 0.3 0.3 Arc Interrupter Res.( $\Omega$ ) 0.3 Results Satisfactory OK

T.S.



Special Projects Group

## **Client Information**

Customer	Toronto Zoo	Date	June 15, 1999		
File Number	6621	Tested By	JC/ EJ		
Location	361A Old Finch Ave., Scarborough, Ontario				
Equipment I.D.	Feeder to North America Pavilion				
Substation	Service Building				

## High Voltage Air/Load Break Switch

	Nameplate Data		Andrews	
Manufacturer	S&C	Voltage	27	kVolts
Туре	Alduti	Current	600	Amps
Style #		B.I.L.	150	kVolts
Cat #	34063	Serial #		· · · · · · · · · · · · · · · · · · ·

**Mechanical Inspections** 

1VICEHANICAI INS SECTIONS					
Status	Comments				
N/A					
OK					
OK					
N/A					
OK		•			
OK					
	Status   N/A   OK   OK   OK   OK   OK   OK   OK   O	Status   Comments     N/A			

**Electrical Tests** 

Test Description	$\phi A$	φB	φC	A/B	B/C	C/A
Insulation Resistance (M $\Omega$ )						
Contact Resistance (μΩ)	56	55	57			
Arc Interrupter Res.(Ω)	0.5	0.6	0.5	100000		

T.S.

T.S. HV\_ABS



Special Projects Group

## **Client Information**

Customer	Toronto Zoo	Date	June 15, 1999
File Number	6621	Tested By	JC/ EJ
Location	361A Old Finch Ave., Scarborough, Ontario		
Equipment I.D.	Paddock Feeder WEST/ EAST		
Substation	Service Building		

## High Voltage Air/Load Break Switch

Nameplate Data						
Manufacturer	S&C	Voltage	27	kVolts		
Туре	Alduti	Current	600	Amps		
Style #		B.I.L.	150	kVolts		
Cat#	34563R4-T5	Serial #				

Mechanical Inspections

Description of Inspection	Status	Comments
Key Interlock	OK	
Operating Mechanism	OK	
Operating Handle Grounding	OK _	
Grounding Mat	N/A	
Stationary Contact Surfaces	OK	
Moving Contact Surfaces	OK	
Arcing Contact Surfaces	OK	
Contact Alignment	OK	
Arcing Interrupter	OK	
Connector Condition	OK	
Insulator Condition	OK	
Phase Barrier Condition	OK	
Support Structure Condition	OK	

**Electrical Tests** 

Test Description	WEST	EAST		
Insulation Resistance (M $\Omega$ )				
Contact Resistance (μΩ)	57	60		Contract Contract Contract Contract Contract Contract Contract Contract Contract Contract Contract Contract Co
Arc Interrupter Res.( $\Omega$ )	0.6	0.7		
Results Satisfactory	OK. Sin	gle phase fo	eeds x2	

T.S

T.S. HV\_ABS



**Special Projects Group** 

#### **Client Information**

Customer	Toronto Zoo	Date	June 15, 1999		
File Number	6621	Tested By	JC/ EJ		
Location	361A Old Finch Ave., Scarborough, Ontario				
Equipment I.D.	Paddock Feeder WEST/ EAST				
Substation	Service Building				

## **High Voltage Power Fuse**

	Fuse Holder Na	meplate Data	च्यास्त्र	
Manufacturer	S&C	Voltage	34.5	kVolt
Type	SM-5S	Current	300	Amps
Style/Cat #		Serial #		. • · · · · · · · · · · · · · · · · · ·
	Fuse Link Nan	neplate Data		
Туре	SM-5	TCC	153-4	
Style/Cat #	134125R4	Amps	80E	

 Type
 SM-5
 TCC
 153-4

 Style/Cat #
 134125R4
 Amps
 80E

 Mechanical Inspections

Description of Inspection	Status	Comments
Operating Mechanism	OK	
Contact Surfaces	OK	
Contact Penetration	OK	
Contact Alignment	OK	
Fuse Barrel	OK	
Connector Condition	OK	
Insulator Condition	OK	
Phase Barrier Condition	OK	
Support Structure Condition	OK	
Spare Fuses	OK	

T.S. HV\_Fuse



Special Projects Group

#### **Client Information**

Customer	Toronto Zoo	Date	June 15, 1999		
File Number	6621	Tested By	JC/ EJ		
Location	361A Old Finch Ave., Scarborough, Ontario				
Equipment I.D.	Feeder to Service Building				
Substation	Service Building				

## High Voltage Air/Load Break Switch

Nameplate Data						
Manufacturer	S&C	Voltage	27	kVolts		
Туре	Alduti	Current	600	Amps		
Style #		B.I.L.	150	kVolts		
Cat #	34563R4-T2	Serial #				

Mechanical Inspections

Description of Inspection	Status	Comments
Key Interlock	N/A	
Operating Mechanism	OK	
Operating Handle Grounding	OK	
Grounding Mat	N/A	
Stationary Contact Surfaces	OK	
Moving Contact Surfaces	OK	
Arcing Contact Surfaces	OK	
Contact Alignment	OK.	
Arcing Interrupter	OK.	7-7-
Connector Condition	OK	
Insulator Condition	OK	
Phase Barrier Condition	OK	
Support Structure Condition	OK	

Electrical Tests

Test Description	$\phi A$	φB	φC	A/B	B/C	C/A
Insulation Resistance (M $\Omega$ )						
Contact Resistance (μΩ)	51	50	46	-72.11	C - (3) T.A.	Haran Fra
Arc Interrupter Res.(Ω)	0.3	0.3	0.3			stricted a

T.S

T.S. HV\_ABS



Special Projects Group

## **Client Information**

Customer	Toronto Zoo	Date	June 15, 1999	
File Number	6621	Tested By	JC/ EJ	
Location	361A Old Finch Ave., Scar., Ontario			
Equipment I.D.	Feeder to Service Building X-Former #4			
Substation	Service Building			

## High Voltage Power Fuse

	Fuse Ho	lder Name	plate Dat	<b>n</b> (1)			
Manufacturer	S&C			Voltage	34.5	kVolt	
Type	SM-5S			Current	300E	Amps	
Style/Cat #	86644R1			Serial #			
	Fuse Li	ink Namep	late Data				
Type	SM-5			TCC	153-4		
Style/Cat #	134100R4		Amps	65E			
	Mech	anical Insp	ections				
Description of Ins	Status		Comments				
Operating Mechanism	OK			· · · · · · · · · · · · · · · · · · ·			
Contact Surfaces		OK				·	
Contact Penetration		OK					
Contact Alignment		OK					
Fuse Barrel		OK					
Connector Condition		OK					
Insulator Condition		OK					
Phase Barrier Condition	)	OK					
Support Structure Cond	lition	OK	1	<del></del>			
Spare Fuses		OK					
	E	lectrical Te	ests				
Test Description	фА	φ <i>B</i>	φC	A/B	B/C	C/A	
Insulation Resistance (G		>505	>505	>505	>505	>505	
Contact Resistance ( $\mu\Omega$ )	1136	1044	1021				
Results Satisfactory	OK						

T.S. HV\_Fuse

**Special Projects Group** 

#### **Client Information**

Customer	Toronto Zoo	Date	June 15, 1999	
File Number	6621	Tested By	JC/ EJ	
Location	361A Old Finch Ave., Scarborough, Ontario			
Equipment I.D.	T1 27.6kV-600V 3\(\phi\) 4W From HV Board			
Substation	Service Building			

#### **Power Transformer - Electrical**

Manufacturer	Hammond		Vector Group	Wye W	ye	
Туре	ANN/ AFN		Serial #.	DB93F		
Neutral	Solid		Liquid Type/Vol	Dry	Туре	Ga
Rating	1500/2000	kVA	Total Weight	16500		lbs.
Impedance	5.7	%	Primary Voltage	27.6/ 15	5.935	kVolt
Phase	3	ф	Secondary Voltage	600/ 34	7	Volt
Frequency	60	Hz	BIL	150	•	kVolt

	2 46.2		5 E 2 S 5 E 5 F 16	Salar Salar	
	CH-L+G	CH-G	CH-L	CL-G	CL-H+G
Cap (pF)					
Corr. 20 °C					
The second second	Committee Succession				
Dis. Fact.(%)					

Corr. 20 °C.

Тар	Primary Volts	Calculated Ratio	<u>X0-X2</u> H1-H2	X0-X3 H2-H3	<u>X0-X1</u> H3-H1
1	28,980				
2	28,290				
3	27,600	2.177	2.174	2.174	2.174
4	26,910				
5	26,220				

Tap Position Found & Left	3-4 (27,600V)
Results Satisfactory	OK
7.0	

T.S. P\_Trans\_Elect

CHARLES THE FAIR WAS

## TECHNICAL FIELD SERVICE DIVISION

**Special Projects Group** 

## **Client Information**

Customer	Toronto Zoo	Date	June 15, 1999			
File Number	6621	Tested By	JC/ EJ			
Location	361A Old Finch Ave., Scar., Ontario					
Equipment I.D.	Secondary Breaker from T1					
Substation	Service Building					

## **Low Voltage Air Circuit Breaker**

	Namepla	te Data		
Manufacturer	FPE	Voltage	600	Volts
Туре	75H-3	Frame Rating	3000	Amps
Serial #	BH-45339-93	Int. Rating	65	kAmps
Relay Type	USR	Sensors Ratio		Amps
Rating Plug.		Limiter Rating	N/A	Amps

**Relay Calibration Results** 

	Settings		$\phi A$		φ <i>B</i>		φC	
	P/U	T.D	P/U	T.D.	P/U	T.D.	P/U	T.D.
Long Time	2x	1.1x						
Short Time	3X	0.3						
Instantaneous	OFF					,		
			P/U	T.D.				
Ground Fault	0.6	0.45						

**Mechanical Inspections** 

Description of Inspection	Status	Comments
Main & Arcing Contacts	OK	
Arc Chutes	OK	
Phase Barriers	OK	
Bus & Grounding Stabs	OK	
Interlocks	0K	
Manual Operation	OK	
Electrical Operation	N/A	

**Electrical Tests** 

Test Description	φA	$\phi B$	φC	A/B	B/C	C/A
Insulation Resistance (M $\Omega$ )	>999	>999	>999	>999	>999	>999
Contact Resistance ( $\mu\Omega$ )	26	25	25			
Results Satisfactory	OK					



Technical Field Service Department
31 Pullman Court, Scarborough, Ontario M1X 1E4. Phone: (416)-298-9977 Fax: (416)-298-2907

# Eurasia Pavilion



Special Projects Group

#### **Client Information**

Customer	Toronto Zoo	Date	June 18, 1999			
File Number	6621	Tested By	RPM			
Location	361A Old Finch Ave., Scarborough, Ontario					
Equipment I.D.	Feeder to Main Switchgear					
Substation	Eurasia Pavilion					

## High Voltage Air/Load Break Switch

	Namepla	te Data		
Manufacturer	S&C	Voltage	27	kVolts
Туре	Alduti	Current	600	Amps
Style #		B.I.L.	150	kVolts
Cat#	34063R2	Serial #		

Mechanical Inspections

Description of Inspection	Status	Comments
Key Interlock	N/A	
Operating Mechanism	OK	
Operating Handle Grounding	N/A	
Grounding Mat	N/A	
Stationary Contact Surfaces	OK	
Moving Contact Surfaces	OK	
Arcing Contact Surfaces	OK	
Contact Alignment	OK	
Arcing Interrupter	OK	
Connector Condition	OK	
Insulator Condition	OK	
Phase Barrier Condition	OK	
Support Structure Condition	OK	

**Electrical Tests** 

L		• • • • • • • • • • • • • • • • • • • •				and the second second
Test Description	φA	φ Β	φC	A/B	B/C	C/A
Insulation Resistance (G $\Omega$ )	236	232	278	>505	>505	>505
Contact Resistance (μΩ)	48	52	61			
Arc Interrupter Res.(Ω)	1.2	1.3	1.6	468.5		
	·					
Results Satisfactory	l ok					

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T.S. HV\_ABS



Special Projects Group

#### **Client Information**

Customer	Toronto Zoo	Date	June 18, 1999	
File Number	6621	Tested By	RPM/ AN	
Location	361A Old Finch Ave., Scarborough, Ontario			
Equipment I.D.	Feeder to Entrance Facilities			
Substation	Eurasia Pavilion			

#### High Voltage Air/Load Break Switch

Nameplate Data					
Manufacturer	S&C	Voltage	27	kVolts	
Type	Alduti	Current	600	Amps	
Style #		B.I.L.	150	kVolts	
Cat#	34063R2	Serial #			

**Mechanical Inspections** Description of Inspection Status Comments N/A **Key Interlock** Operating Mechanism OK **Operating Handle Grounding** N/A N/A **Grounding Mat** OK **Stationary Contact Surfaces** OK **Moving Contact Surfaces Arcing Contact Surfaces** OK OK **Contact Alignment** Arcing Interrupter OK **Connector Condition** OK OK **Insulator Condition Phase Barrier Condition** OK **Support Structure Condition** OK

Electrical Tests						
φC	A/B	B/C	C/A			
278	>505	>505	>505			
40	7 m 2 m 4 m	ya. ili				
3.6	77.2					
	· <del></del>					

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T.S. HV\_ABS



Special Projects Group

## **Client Information**

Customer	Toronto Zoo	Date	June 18, 1999	
File Number	6621	Tested By	RPM/ AN	
Location	361A Old Finch Ave., Scarborough, Ontario			
Equipment I.D.	Paddock Feeders (Centre & South)			
Substation	Eurasia Pavilion			

## High Voitage Air/Load Break Switch

Nameplate Data					
Manufacturer	S&C	Voltage	27	kVolts	
Туре	SM-Alduti-Indoor	Current	600	Amps	
Style #		B.I.L.	150	kVolts	
Cat #	34363R4-T5	Serial#			

**Mechanical Inspections** 

Description of Inspection	Status	Comments
Key Interlock	POOR	Kirk RE12023 & RE12019
Operating Mechanism	OK	
Operating Handle Grounding	N/A	
Grounding Mat	N/A	
Stationary Contact Surfaces	OK	
Moving Contact Surfaces	OK	
Arcing Contact Surfaces	OK	
Contact Alignment	OK	
Arcing Interrupter	OK	
Connector Condition	OK	
Insulator Condition	OK	
Phase Barrier Condition	OK	
Support Structure Condition	OK	
	Electrical Tes	ts

$\phi A$	φB	φC	A/B	B/C	C/A
60		58			
1.9		0.6	10000000		a di angalente
	(0)	60	60 58	60 58	60 58 44.54.44.45

Results Satisfactory See Deficiencies.



**Special Projects Group** 

#### **Client Information**

Customer	Toronto Zoo	Date	June 18, 1999	
File Number	6621	Tested By	RPM/ AN	
Location	361A Old Finch Ave., Scarborough, Ontario			
Equipment LD.	Paddock Feeders (Centre & South)			
Substation	Eurasia Pavilion			

#### **High Voltage Power Fuse**

Fuse Holder Na	meplate Data		
S&C	Voltage	34.5	kVolt
SM-5S	Current	300E	Amps
	Serial #		
Fuse Link Naı	neplate Data		
SM-5	TCC	153-4	
134125R	Amps	80E	
	S&C SM-5S Fuse Link Nar SM-5	S&C   Voltage     SM-5S   Current     Serial #     Fuse Link Nameplate Data     SM-5   TCC	S&C   Voltage   34.5     SM-5S   Current   300E     Serial #     Fuse Link Nameplate Data     SM-5   TCC   153-4

**Mechanical Inspections** Description of Inspection Status Comments Operating Mechanism OK **Contact Surfaces** OK **Contact Penetration** OK Contact Alignment OK Fuse Barrel OK **Connector Condition** OK **Insulator Condition** OK **Phase Barrier Condition** ŌΚ **Support Structure Condition** QΚ Only One Spare Present in Cell **Spare Fuses** Fair

Electrical Tests							
Test Description	φA	$\phi B$	φC	A/B	B/C	C/A	
Insulation Resistance (M $\Omega$ )							
Contact Resistance (μΩ)	966		1286		10.60		
						<u>.</u>	
Results Satisfactory	Fair. See	Recomm	endations	<b>3.</b>			

<sup>1.5</sup> 



**Special Projects Group** 

## **Client Information**

Customer	Toronto Zoo	Date	June 18, 1999		
File Number	6621	Tested By	RPM		
Location	361A Old Finch Ave., Scarborough, Ontario				
Equipment I.D.	Eurasia Pavilion Transformer –T1				
Substation	Eurasia Pavilion				

## High Voltage Alr/Load Break Switch

	Nameplate Data			
Manufacturer	S&C	Voltage	27.6	kVolts
Туре	SM-Alduti-Indoor	Current	600	Amps
Style #		B.I.L.	150	kVolts
Cat#	34563R4-T2	Serial #		

Mechanical Inspections

Tricenament mapeedons						
Description of Inspection	Status	Comments				
Key Interlock	N/A					
Operating Mechanism	OK					
Operating Handle Grounding	N/A					
Grounding Mat	N/A					
Stationary Contact Surfaces	OK					
Moving Contact Surfaces	OK					
Arcing Contact Surfaces	OK					
Contact Alignment	OK					
Arcing Interrupter	OK					
Connector Condition	OK					
Insulator Condition	OK.					
Phase Barrier Condition	OK	V-10-01-01-01-01-01-01-01-01-01-01-01-01-				
Support Structure Condition	OK					

**Electrical Tests** 

Test Description	$\phi A$	φB	φC	A/B	B/C	C/A
Insulation Resistance (GΩ)	236	232	278	>505	>505	>505
Contact Resistance (μΩ)	41	42	44			
Arc Interrupter Res.(Ω)	0.9	1.2	0.4	71 1,92 19	ententent	Carlinguage

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T.S. HV\_ABS



Special Projects Group

#### **Client Information**

Customer	Toronto Zoo	Date	June 18, 1999		
File Number	6621	Tested By	RPM/ AN		
Location	361A Old Finch Ave., Scarborough, Ontario				
Equipment I.D.	Eurasia Pavilion Trans. #1				
Substation	Eurasia Pavilion				

## High Voltage Power Fuse

	Fuse Holder Na	meplate Data		e Bejand
Manufacturer	S&C	Voltage	34.5	kVolt
Type	SM-5S	Current	300E	Amps
Style/Cat #	86644R1	Serial #		
	Fuse Link Nan	neplate Data		
Туре	SM-5	TCC	153-4	
Style/Cat #	134025R4	Amps	15E	

Mechanical Inspections						
Description of Inspection	Status	Comments				
Operating Mechanism	OK					
Contact Surfaces	OK					
Contact Penetration	OK					
Contact Alignment	OK					
Fuse Barrel	OK					
Connector Condition	OK					
Insulator Condition	OK					
Phase Barrier Condition	OK					
Support Structure Condition	OK					
Spare Fuses	OK	3 Spares in Cell				

Electrical Tests						
Test Description	φA	$\phi B$	φC	A/B	B/C	C/A
Insulation Resistance (M $\Omega$ )	>999	>999	>999	>999	>999	>999
Contact Resistance (μΩ)	6020	5940	6080	19444	e grande g	
Results Satisfactory	ОК					

T.S

T.S. HV\_Fuse

Special Projects Group

#### **Client Information**

Customer	Toronto Zoo	Date	June 18, 1999	
File Number	6621	Tested By	RPM/ TL	
Location	361A Old Finch Ave., Scarborough, Ontario			
Equipment I.D.	Eurasia Pav. Trans. T-1			
Substation	Eurasia Pavilion			

#### Power Transformer -Electrical

		Na	meplate Data			
Manufacturer	Westinghou	ise	Vector Group	Y-Y		
Туре	LNAN		Serial #.	849380		
Neutral	Solid		Liquid Type/Vol	Askarel	200	Gal
Rating	225/ 252	kVA	Total Weight	6450		lbs.
Impedance	5.9	%	Primary Voltage	27.6/ 16		kVolt
Phase	3	ф	Secondary Voltage	208/ 120	•	Volt
Frequency	60	Hz	BIL	150/45		kVolt
		In	ulation Tests			

Insulation Resistance	Prim. With	Sec. With	Prim. & Sec.
@ 5k / 500 VDC	Sec. Grounded	Prim. Grounded	To Ground
ΜΩ	40.0	34.2	
Corrected to 20 °C.	112.0	95.8	
		The second second	

	CH-L+G	CH-G	CH-L	CL-G	CL-H+G
Cap (pF)					
Corr. 20 °C					
The second	and the state of		注:"按定位的16G16	在在 <b>教</b> 理(表面)	1.00
Dis. Fact.(%)					

Corr. 20 °C.

Turns	Ratio	Tests
-------	-------	-------

Primary Volts	Calculated Ratio	<u>X0-X1</u> H0-H1	<u>Х0-Х2</u> Н0-Н2	<u>Х0-Х3</u> Н0-Н3
27,600	0.754	0.746	0.746	0.746
	Volts	Volts Ratio	Volts Ratio H0-H1	Volts Ratio H0-H1 H0-H2

Tap Position Found & Left	3 (27,600V)
Results Satisfactory	OK
TC	

 $<sup>^{</sup>T.S.}\ P\_Trans\_Elect$ 



#### TECHNICAL FIELD SERVICE DEPARTMENT

**Special Projects Group** 

#### **Client Information**

Customer	Toronto Zoo	Sample Date	June 18, 1999	
File Number	6621	Sampled By	TL	
Location	361A Old Finch Ave., Scarborough, Ontario			
Equipment I.D.	T-1			
Substation	Eurasia Pavilion			

#### Oil Analysis

Transformer Data						
Manufacturer	Westinghouse	Primary Volts	27.6/ 16	kVolts		
Туре	LNAN	Rating	225/ 252	kVA		
Serial No.	849380	Liquid Volume	200	Gals.		

Laboratory Tests

	r	J A A D B T T T T T T T T T T T T T T T T T T	T 4 D 14 .
Type of Test	ASTM No.	Acceptable Limits	Test Results
			1999
Dielectric Breakdown	D877	30 kV	48.8
Neutralization Number	D974	0.05 Max. Mg Koh/G	0.008
Interfacial Tension	D971	32 Dynes/ Cm Min.	N/A
Specific Gravity	D1298	0.84 - 0.91 (Oil)	1.520
Colour	D1500	≤3.5	0.5
Visual Condition	D1524	Clear	Clear
Water Content	D1533	30 ppm (<69kV)	
Power Factor	D924	1.0 % Max @ 25 °C	
PCB Content	D4059	50 ppm Max.	
Inhibitor	D2668	≥9.29%	
Furans	D5837	<100 ppb	
Hydrogen (H2)			
Oxygen & Argon			
Nitrogen (N2)			
Methane (CH4)			
Carbon Monoxide (CO)	ř		
Carbon Dioxide (CO2)			
Ethylene (C2H4)			
Ethane (C2H6)			
Acetylene (C2 H2)			
Total Gas Content		· · · · · · · · · · · · · · · · · · ·	
			•

Chemical Properties OK

PCB Content PCB fluid

Dissolved Gas Content ---

<sup>1.5.</sup> 

T.S. Oil\_Analysis



### Special Projects Group

# Client Information

Customer	Toronto Zoo	Date	June 18, 1999	
File Number	6621	Tested By	TL	
Location	361A Old Finch Ave., Scarborough, Ontario			
Equipment I.D.	Eurasia Pavilion Transformer T-1			
Substation	Eurasia Pavilion			

# **Power Transformer - Mechanical**

Description of Inspection		Inspect	Comments
Breather & Silica Gel		/A	Comments
Explosion Vent Gaskets		/A	
Pressure Relief Device		)K	
Conservator Tank Gaskets	<u>.</u>	/A	
Inspection Cover Gaskets		K	· <u></u>
Main Cover Gaskets		7/A	**************************************
Primary Bushing Gaskets	<del></del>	K	
Primary Bushing Porcelain		OR	H3 top skirt split/ cracked
Primary Bushing Connections		K	
Secondary Bushing Gaskets		K	
Secondary Bushing Porcelain	C	K	
Secondary Bushing Connections		K	
Secondary Throat Gaskets	C	K	
Radiator	C	K	
Pressure Gauge	C	K	-0.8 PSI Vacuum
Gas Relay	N	/A	
Oil Level	C	)K	
Oil Leaks	C	)K	None Visible
Tank Vaives	С	)K	
Oil Temperature Gauge	C	)K	
Oil Temperature Run/Max	34	41°C	
Winding Temperature Gauge	N	//A	
Winding Temperature Run/Max		<u> </u>	
Tap Changer			Unit Locked: Inoperable
Paint Condition	C	K	
Pad	C	)K	
Grounding	C	K	One-point grounding
Fan Operation	N	/ <b>A</b>	
Control Wiring	N	/A	

T.S. P\_Trans\_Mech



**Special Projects Group** 

### **Client Information**

Customer	Toronto Zoo	Date	June 18, 1999	
File Number	6621	Tested By	TL	
Location	361A Old Finch Ave., Scarborough, Ontario			
Equipment I.D.	T-1 Secondary			
Substation	Eurasia Pavilion			

### **Bus Duct**

Nameplate Data				
Manufacturer	Square D	Voltage	600	Volts
Туре	I-Line	Current	800	Amps
Style	3 Phase, 4 Wire	B.I.L.		kVolts
Cat #	AF-510-23-FES	Serial #	T1	•

Mechanical Inspections Description of Inspection Status Comments **Bus Insulation** OK Type of Bus Insulation OK **Support Insulators** OK Interior Clean OK Visible Sections Only Visible Sections Only Interior Dry OK **Bus Duct Enclosure** OK **Bus Duct Enclosure Ventilated** N/A Bus Joints Clean & Dry OK **Bus Joints Torqued** OK Gaskets at Joints OK Grounding OK **Enclosure Paint Condition** OK **Support Structure** OK

lectrical	Tests				
$\phi B$	φC	N	A/B	B/C	C/A
1990	2250		4780	4980	5500
	· · · · · · · · · · · · · · · · · · ·				

T.S. Bus\_Buct



**Special Projects Group** 

### **Client Information**

Customer	Toronto Zoo	Date	June 18, 1999
File Number	6621	Tested By	RPM
Location	361A Old Finch Ave., Scar., Ontario		
Equipment I.D.	Main Secondary C.B.		
Substation	Eurasia Pavilion		

### **Low Voltage Air Circuit Breaker**

Nameplate Data					
Manufacturer	ITE	Voltage	600	Volts	
Туре	K-1600	Frame Rating	1600	Amps	
Serial #	98013	Int. Rating	65	kAmps	
Relay Type	OD4 Dashpots Only	Sensors Ratio	800	Amps	
Rating Plug.		Limiter Rating	N/A	Amps	

**Relay Calibration Results** Settings φC φB T.D. P/U T.D P/U P/U T.D. P/U T.D. 800A Long Time Inst. **Short Time** 3200A Instantaneous P/U T.D. **Ground Fault** 

**Mechanical Inspections** Description of Inspection Status Comments Main & Arcing Contacts OK OK Arc Chutes **Phase Barriers** OK **Bus & Grounding Stabs OK** Interlocks OK Rack Out Only Manual Operation OK **Electrical Operation** N/A

Electrical Tests						
Test Description	φA	φB	φC	A/B	B/C	C/A
Insulation Resistance (M $\Omega$ )	>999	>999	>999	>999	>999	>999
Contact Resistance (μΩ)	58	64	52	Control of the contro		
Results Satisfactory	OK					<del></del>
T.S.						

T.S. LV\_ACB

Special Projects Group

# **Client Information**

Customer	Toronto Zoo	Date	June 18, 1999	
File Number	6621	Tested By	KH	
Location	361A Old Finch Ave., Scarborough, Ontario			
Equipment I.D.	Weston Station Transformer			

# **Padmounted Distribution Transformer**

Manufacturer	Federal Pio	neer	Year Built	1976			
Туре	ONAN		Serial #	A11808	-1		
Neutral	Solid		Liquid Type/Vol	Oil	260		Gal
Rating	225	kVA	Total Weight	4650		lb	<b>S.</b>
Impedance		%	Primary Voltage	27.6/ 16		k	Volt
Phase(s)	3	•	Secondary Voltage	208/120	)	V	olt
Frequency	60	Hz	BIL			k	Volt
Insulation Resist	ance (MΩ)		* <b>*</b>				

# Oii Analysis

	**************************************	ory Tests	Andreas of the State of the Angle of the State of the Sta
Type of Test	ASTM No.   Acceptable Limits		Test Results
			1999
Dielectric Breakdown	D877	30 kV Min.	37.4
Neutralization Number	D974	0.05 Max. Mg Koh/G	0.014
Interfacial Tension	D971	32 Dynes/ Cm Min.	27.1
Specific Gravity	D1298	0.84 - 0.91	0.853
Colour	D1500	≤3.5 Max.	0.5
Visual Condition	D1524	Clear	Clear

Observations & Comments					
Comments:	IFT of the oil is marginal.				
1	This station's switchgear was reported to be in POOR condition				
Results Satisfactory:	FAIR/ Poor				

T.S. P\_Trans\_Elect



<b>Technical</b>	Field Service	Department
T CCITITION	I SUSH DUI FELL	DCP40 +IIIVII

31 Puliman Court, Scarborough, Ontario M1X 1E4. Phone: (416)-298-9977 Fax: (416)-298-2907

# **Indo-Malaya Pavilion**



**Special Projects Group** 

# **Client Information**

Customer	Toronto Zoo	Date	June 17, 1999
File Number	6621	Tested By	KH
Location	361A Old Finch Ave., Scarborough, Ontario		
Equipment I.D.	Loop Feeder to Entrance Facilities		
Substation	Indo-Malaya Pavilion		

# High Voltage Air/Load Break Switch

A STATE OF THE STA	Namepla	ite Data		1
Manufacturer	S&C	Voltage	27	kVolts
Туре	Alduti	Current	600	Amps
Style #		B.I.L.	150	kVolts
Cat #	34063	Serial #		

Mechanical Inspections

1,40	westerness with be	VEVED
Description of Inspection	Status	Comments
Key Interlock	N/A	
Operating Mechanism	OK	
Operating Handle Grounding	N/A	
Grounding Mat	N/A	
Stationary Contact Surfaces	OK	
Moving Contact Surfaces	OK	
Arcing Contact Surfaces	OK	
Contact Alignment	OK	
Arcing Interrupter	OK	
Connector Condition	OK	
Insulator Condition	Fair	Bφ terminator skirt broken off.
Phase Barrier Condition	OK	
Support Structure Condition	OK	

**Electrical Tests** 

Estects feat 1 cots						
Test Description	$\phi A$	φB	φC	A/B	B/C	C/A
Insulation Resistance (GΩ)	438	>505	>505	>505	>505	>505
Contact Resistance (μΩ)	55	47	52			
Arc Interrupter Res.(Ω)	0.9	0.6	0.7	Markey 1	A CONTRACTOR	A 68 (48)(5)

Results Satisfactory OK/ Fair. See Deficiencies.

<sup>...</sup> 

Special Projects Group

### **Client Information**

Customer	Toronto Zoo	Date	June 17, 1999
File Number	6621	Tested By	KH
Location	361A Old Finch Ave., Scarborough, Ontario		
Equipment I.D.	Feeder to Africa Pavilion		
Substation	Indo-Malaya Pavilion		

### High Voltage Air/Load Break Switch

		Nameplate Data			
Manufacturer	S&C		Voltage	27	kVolts
Туре	Alduti		Current	600	Amps
Style #			B.I.L.	150	kVolts
Cat #	34063		Serial #		

Comments

Mechanical InspectionsDescription of InspectionStatusKey InterlockN/A

OK Operating Mechanism **Operating Handle Grounding** N/A N/A Grounding Mat OK **Stationary Contact Surfaces** OK **Moving Contact Surfaces** OK **Arcing Contact Surfaces** Contact Alignment OK OK Arcing Interrupter **Connector Condition** OK **Insulator Condition** OK

Phase Barrier Condition OK
Support Structure Condition OK

Electrical Tests						
Test Description	φA	φB	φC	A/B	B/C	C/A
Insulation Resistance (M $\Omega$ )						
Contact Resistance (μΩ)	62	56	52			
Arc Interrupter Res.(Ω)	0.6	0.7	0.5	a de avoir	er all earlie	And Pro-

T.S. HV\_ABS



**Special Projects Group** 

V. 5 - 1 - 2 - 5 - 5

### Client Information

Customer	Toronto Zoo	Date	June 17, 1999	
File Number	6621	Tested By	KH	
Location	361A Old Finch Ave., Scarborough, Ontario			
Equipment I.D.	Indo-Malaya Paddock Feeder			
Substation	Indo-Malaya Pavilion			

# High Voltage Air/Load Break Switch

Nameplate Data							
Manufacturer	S&C	Voltage	27.6	kVolts			
Туре	SM-Alduti	Current	600	Amps			
Style #		B.I.L.	150	kVolts			
Cat #	34563R4-T5	Serial #					

Mechanical Inspections

Description of Inspection	Status	Comments
Key Interlock	OK	
Operating Mechanism	OK	
Operating Handle Grounding	N/A	
Grounding Mat	N/A	
Stationary Contact Surfaces	OK	
Moving Contact Surfaces	OK	
Arcing Contact Surfaces	OK	
Contact Alignment	OK	
Arcing Interrupter	Роот	Operator is defective
Connector Condition	OK	
Insulator Condition	OK	
Phase Barrier Condition	OK	
Support Structure Condition	OK	

Electrical Tests

Test Description	φA	φB	φC	A/B	B/C	C/A
Insulation Resistance (M $\Omega$ )						
Contact Resistance (μΩ)			62	17 19 9 1	nasaya sa	
Arc Interrupter Res.(Ω)			*	Grane a	6.0	

Results Satisfactory Fair. See Deficiencies

T.S. HV\_ABS

Special Projects Group

### **Client Information**

Customer	Toronto Zoo	Date	June 17, 1999			
File Number	6621	Tested By	KH			
Location	361A Old Finch Ave., Scarborough, Ontario					
Equipment I.D.	Indo-Malaya Paddock Feeder					
Substation	Indo-Malaya Pavilion					

### **High Voltage Power Fuse**

	Fuse Holder Na	meplate Data		Sing Free
Manufacturer	S&C	Voltage	34.5	kVolt
Туре	SM-5	Current	300	Amps
Style/Cat #	86644R1	Serial #		
	Fuse Link Nar	neplate Data		
Туре	SM-5	TCC		
Style/Cat #		Amps		

**Mechanical Inspections** Description of Inspection Status Comments Operating Mechanism OK **Contact Surfaces** OK OK **Contact Penetration** OK Contact Alignment Fuse Barrel OK **Connector Condition** OK **Insulator Condition** OK **Phase Barrier Condition** OK **Support Structure Condition** OK No Spares in Cell Spare Fuses Poor

	E10	ectrical I	ests			
Test Description	<b>6</b> A	φB	φC	A/B	B/C	C/A
Insulation Resistance (M $\Omega$ )						
Contact Resistance ( $\mu\Omega$ )			1015			Maria ya sa
Results Satisfactory	Fair. Spa	are links r	equired.		<u>-</u>	
Results Satisfactory	Fair. Spa	are links r	equired.			

T.S. HV\_Fuse



**Special Projects Group** 

# **Client Information**

Customer	Toronto Zoo	Date	June 17, 1999			
File Number	6621	Tested By	KH			
Location	361A Old Finch Ave., Scarborough, Ontario					
Equipment I.D.	Indo-Malaya Transformer T2					
Substation	Indo-Malaya Pavilion					

### High Voltage Air/Load Break Switch

	Nameplate Data			
Manufacturer	S&C	Voltage	27	kVolts
Туре	SM - Alduti	Current	600	Amps
Style #		B.L.L.	150	kVolts
Cat #	34563R4-T2	Serial #		

Mechanical Inspections

Description of Inspection	Status	Comments
Key Interlock	N/A	
Operating Mechanism	OK	
Operating Handle Grounding	N/A	
Grounding Mat	N/A	
Stationary Contact Surfaces	OK	
Moving Contact Surfaces	OK	
Arcing Contact Surfaces	Fair	Surfaces pitted
Contact Alignment	OK	
Arcing Interrupter	OK	
Connector Condition	OK	
Insulator Condition	OK	
Phase Barrier Condition	OK	
Support Structure Condition	OK	
	170 1 . 11 . TEC	4

**Electrical Tests** Test Description  $\phi C$ A/B B/C C/A  $\phi B$  $\phi A$ Insulation Resistance (M $\Omega$ ) Contact Resistance (μΩ) 50 48 46 Arc Interrupter Res.(Ω) 1.0 0.5 0.8 OK **Results Satisfactory** 

TS

T.S. HV\_ABS

Special Projects Group

# **Client Information**

Customer	Toronto Zoo	Date	June 17, 1999			
File Number	6621	Tested By	KH			
Location	361A Old Finch Ave., Scarborough, Ontario					
Equipment I.D.	Indo-Malaya Transformer T2					
Substation	Indo-Malaya Pavilion					

# High Voltage Power Fuse

	F	use Hole	der Namer	late Data	<b>a</b>	Professional		
Manufacturer	S&C				Voltage	27.6	kVolt	
Туре	SM-5S				Current	300E	Amps	
Style/Cat #					Serial #			
		Fuse Lir	ık Namepl	ate Data	eriteria. T		Y41	
Туре	pe SM-5				TCC	153-4		
Style/Cat #	134040R4				Amps	25E		
	* 1 *	Mecha	nical Insp	ections			***	
Description of Inspection			Status		Cor	nments		
Operating Mechanism			OK					
Contact Surfaces			OK					
Contact Penetration	ontact Penetration							
Contact Alignment	Contact Alignment							
Fuse Barrel			OK					
Connector Condition			OK					
Insulator Condition			OK					
Phase Barrier Conditio	n		OK					
Support Structure Condition			OK					
Spare Fuses			OK	3 Spa	3 Spares in Cell			
		El	ectrical Te	sts			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
Test Description		ф4	φB	φC	A/B	B/C	C/A	
Insulation Resistance (	ΜΩ)							
Contact Resistance (μΩ	2)	3024	3055	3148	10,000,000	remark and	DOM:	

OK

Results Satisfactory T.S.

T.S. HV\_Fuse



**Special Projects Group** 

### **Client Information**

Customer	Toronto Zoo	Date	June 17, 1999			
File Number	6621	Tested By	TL			
Location	361A Old Finch Ave., Scarborough, Ontario					
Equipment I.D.	Indo-Malaya Pavilion Trans. T-2					
Substation	Indo-Malaya Pavilion					

### **Power Transformer -Electrical**

Manufacturer			Vector Group	Y-Y 795156		
Туре			LNAN Serial #.			
Neutral	Solid		Liquid Type/Vol	Askarel	220	Ga
Rating	500/ 560	kVA	Total Weight	8500		lbs.
Impedance	7.1	%	Primary Voltage	27.6/ 16		kVolt
Phase	3	φ	Secondary Voltage	208/ 120		Volt
Frequency	60	Hz	BIL	150/45		kVolt

Insulation Tests Prim. With Sec. With Prim. & Sec. Insulation Resistance Prim. Grounded To Ground @ 5k / 1k VDC Sec. Grounded 28.0 24.2  $M\Omega$ 78.4 67.8 Corrected to 20 °C. and the second of the second o

	CH-L+G	CH-G	CH-L	CL-G	CL-H+G
Cap (pF)					
Corr. 20 °C					
77. 连轮头线	the comme	29	Contract that		Bertheller
Dis. Fact.(%)					
Corr. 20 °C.					

Turns Ratio Tests Tap **Primary** Calculated X0-X1 X0-X2 X0-X3 H0-H2 Н0-Н3 Ratio H0-H1 Volts 1 2 0.746 0.746 0.754 0.746 3 27,600 4 5

Tap Position Found & Left	3 (27,600V)	
Results Satisfactory	OK	
TC		

T.S. P\_Trans\_Elect



### TECHNICAL FIELD SERVICE DEPARTMENT

Special Projects Group

#### **Client Information**

Customer	Toronto Zoo	Sample Date	June 17, 1999
File Number	6621	Sampled By	TL
Location	361A Old Finch Ave., Scarborough,	Ontario	•
Equipment I.D.	T-2		
Substation	Indo-Malaya Pavilion		

### Oli Analysis

	Transf	ormer Data		\$1.50 mg
Manufacturer	Westinghouse	Primary Volts	27.6/ 16	kVolts
Туре	LNAN	Rating	500/ 560	kVA
Serial No.	795156	Liquid Volume	220	Gals.

Laboratory Tests **Test Results** Type of Test ASTM No. Acceptable Limits 1999 30 kV 48.1 Dielectric Breakdown **D877** 0.012 **Neutralization Number** D974 0.05 Max. Mg Koh/G 32 Dynes/ Cm Min. N/A Interfacial Tension D971 Specific Gravity 0.84 - 0.91 (Oil) 1.420 D1298 0.5 Colour D1500 ≤3.5 Clear Visual Condition D1524 Clear Water Content D1533 30 ppm (<69kV) **Power Factor** D924 1.0 % Max @ 25 °C 50 ppm Max. **PCB Content** D4059 ≥0.20% Inhibitor D2668 <100 ppb Furans D5837 Hydrogen (H2) Oxygen & Argon Nitrogen (N2) Methane (CH4) Carbon Monoxide (CO) Carbon Dioxide (CO2) Ethylene (C2H4) Ethane (C2H6) Acetylene (C2 H2)

Chemical Properties OK
PCB Content PCB fluid
Dissolved Gas Content ---

Total Gas Content

T.S. Oil\_Analysis



Special Projects Group

# **Client Information**

Customer	Toronto Zoo	Date	June 17, 1999
File Number	6621	Tested By	TL
Location	361A Old Finch Ave., Scarborough, Ont	ario	
Equipment I.D.	T-2		
Substation	Indo-Malaya Pavilion		

# Power Transformer -Mechanical

Description of Inspection	Sta	itus	Comments
Breather & Silica Gel	N	/A	
Explosion Vent Gaskets	N.	/A	
Pressure Relief Device	0	K	
Conservator Tank Gaskets	N	/A	
Inspection Cover Gaskets	0	K	
Main Cover Gaskets	N	/A	Welded Top
Primary Bushing Gaskets	О	K	
Primary Bushing Porcelain	0	K	
Primary Bushing Connections	0	K	
Secondary Bushing Gaskets	О	K	
Secondary Bushing Porcelain	0	K	
Secondary Bushing Connections	OK		
Secondary Throat Gaskets	OK		
Radiator	OK		
Pressure Gauge	С	K	-0.5 lb. Vacuum
Gas Relay	N	/A	
Oil Level	C	)K	
Oil Leaks	C	)K	None Present
Tank Valves	C	)K	
Oil Temperature Gauge	C	)K	
Oil Temperature Run/Max	37	40°c	
Winding Temperature Gauge	N	/A	
Winding Temperature Run/Max			
Tap Changer			Unit Locked: Inoperable
Paint Condition	C	)K	
Pad	C	)K	
Grounding	C	)K	One-point grounding
Fan Operation	N	/ <b>A</b>	
Control Wiring	N.	[/A	

<sup>....</sup> 

T.S. P\_Trans\_Mech

Special Projects Group

### **Client Information**

Customer	Toronto Zoo	Date	June 17, 1999
File Number	6621	Tested By	TL
Location	361A Old Finch Ave., Scarbor	ough, Ontario	
Equipment I.D.	T-2 Secondary		
Substation	Indo-Malaya Pavilion		

### **Bus Duct**

1.1.	Nameplate Da	ıta .	1883	
Manufacturer	FPE	Voltage	120/208	Volts
Туре	Power Clad	Current	1600	Amps
Style	3 Phase, 4 Wire	B.I.L.		kVolts
Cat#	08-01599	Serial #		
	Mechanical Inspe	ections		<b>建筑机</b>

Mechanical Inspections Description of Inspection Status Comments Bus Insulation OK Type of Bus Insulation OK **Support Insulators** OK OK Visible Sections Only Interior Clean Visible Sections Only Interior Dry OK Bus Duct Enclosure OK Bus Duct Enclosure Ventilated N/A Bus Joints Clean & Dry OK **Bus Joints Torqued** OK Gaskets at Joints OK Grounding OK **Enclosure Paint Condition** OK **Support Structure** OK

1 × 1 × 1 × 1 × 1 × 1 × 1	E)	ectrical '	Tests	<u> </u>	+* +	<u> </u>	1.5
Test Description	$\phi A$	φB	φC	N	A/B	B/C	C/A
Insulation Resistance (M $\Omega$ )	1260	1140	1090		1980	2160	3280
Comments							
Results Satisfactory OK							
TC							

T.S

T.S. Bus\_Buct



**Special Projects Group** 

# **Client Information**

Customer	Toronto Zoo	Date	June 17, 1999
File Number	6621	Tested By	RPM
Location	361A Old Finch Ave., Scar., Ontario		
Equipment I.D.	Main Secondary C.B.		
Substation	Indo-Malaya Pavilion		

# Low Voltage Air Circuit Breaker

	Nameplate Data			
Manufacturer	FPE	Voltage	600	Volts
Туре	50H-2	Frame Rating	1600	Amps
Serial #	TH-4123.72	Int. Rating	50	kAmps
Relay Type	Carriere FB600E	Sensors Ratio	1600:1	Amps
Rating Plug.		Limiter Rating	N/A	Amps
	Relay Calibration Re	sults		

	Sett	ings	•	$\phi A$ $\phi$		B	φC	
	P/U	T.D	P/U	T.D.	P/U	T.D.	P/U	T.D.
Long Time	0.9x	7.5		5.809		5.881		5.963
Short Time	6x	0.40		0.451		0.445		0.450
Instantaneous	10x			0.055		0.065		0.064
			P/U	T.D.				
Ground Fault	0.4x	0.4		0.415				

Mechanical Inspections

Comments
Front Barrier Missing
Rack Out Only

Electrical Tests

Test Description	ØA	φB	φC	A/B	B/C	C/A
Insulation Resistance (M $\Omega$ )	>999	>999	>999	>999	>999	>999
Contact Resistance (μΩ)	14	17	22			
Results Satisfactory	OK/ Fair				<u> </u>	

T.S. LV\_ACB

Special Projects Group

### **Client Information**

Customer	Toronto Zoo	Date	June 17, 1999
File Number	6621	Tested By	RPM
Location	361A Old Finch Ave., Scar., Ontario		
Equipment I.D.	DP MB		
Substation	Indo-Malaya Pavilion		

# Low Voltage Air Circuit Breaker

	Nameplate	Data		,
Manufacturer	FPE	Voltage	600	Volts
Type	50H-2	Frame Rating	1600	Amps
Serial #	TH-4124/72	Int. Rating	50	kAmps
Relay Type	Carriere FB600E	Sensors Ratio	1600:1	Amps
Rating Plug.		Limiter Rating	N/A	Amps

**Relay Calibration Results** 

	Sett	ings	4	A	(	þ B	9	b C
	P/U	T.D	P/U	T.D.	P/U	T.D.	P/U	T.D.
Long Time	0.65x	7.5		5.945		6.204		6.110
Short Time	4x	0.25		0.282		0.300		0.284
Instantaneous	6x			0.124		0.104		0.108
			P/U	T.D.				
Ground Fault	0.4x	0.4		0.26				

**Mechanical Inspections** 

Description of Inspection	Status	Comments
Main & Arcing Contacts	OK	
Arc Chutes	OK	
Phase Barriers	Fair	Front Barriers Cracked
Bus & Grounding Stabs	OK	
Interlocks	OK	Rack Out Only
Manual Operation	Poor (as found)	Mechanism restored to operation
Electrical Operation	N/A	

**Electrical Tests** 

Test Description	$\phi A$	φB	φC	A/B	B/C	C/A
Insulation Resistance (MΩ)	>999	>999	>999	>999	>999	>999
Contact Resistance (μΩ)	32	24	28	narrit !	的的地位	

Results Satisfactory T.S. Fair as found.



31 Pullman Court, Scarborough, Ontario MIX 1E4. Phone: (416)-298-9977 Fax: (416)-298-2907

# **Cable Tests**

**Special Projects Group** 

### **Client Information**

Customer	Toronto Zoo	Date	June 14-18, 1999
File Number	6621	Tested By	RPM/ KH
Location	361A Old Finch Ave., Scarborough,	Ontario	
Equipment I.D.	Loop Feed Underground Power Cab	les	
Substation	Various		

### **Power Cable Inspection**

	Cable N	ameplate Data		
Manufacturer		Voltage	28	kVolts
Insulation Type	XLPE	Ambient Temp.		oC_
Conductor Type	Copper (CU)	Humidity		%

**Electrical Test** Insulation Resistance (M $\Omega$ ) B/C C/A Feeder Identification A/B фΑ φВ φС 7,700 4,900 34,000 Incoming Outdoor 27.6kV Feeder 68,000 725 18,100 Main Switchgear to Eurasia Pavilion 750 790 785 3,960 4,080 3,920 Main Switchgear to Service Building 805 4,180 3,700 3,760 800 680 Service Bld. to N. America Pavilion 680 710 660 3,400 3,400 3,200 N. America to Africa Pavilion 670 715 680 3,500 3,600 3,380 Africa to Indo-Malaya Pavilion 665 555 665 3,000 3,000 3,340 Ent./ Admin. to Eurasia Pavilion 396 402 2,040 2,100 2,040 386 (with Lightning Arrestors connected) 3,980 3,940 Ent./ Admin. to Indo-Malaya Pavilion 760 810 760 4,080

Results Satisfactory

1.3

T.S. Power\_Cable

**Special Projects Group** 

# **Client Information**

Customer	Toronto Zoo	Date	June 28, 1999
File Number	6693	Tested By	RPM
Location	361A Old Finch Ave., Scarborough, Ont	ario	
Equipment LD.	Loop Feed to Indo-Malaya Pavilion (test	ted after <b>¢</b> B sp	lice repair)
Substation	Africa Pavilion		

# **Cable High-Potential Test**

	Cable N	ameplate Data		
Manufacturer		Voltage	28	kVolts
Insulation Type	XLPE	Conductor Size	3/0	MCM
Conductor Type	Copper (CU)	Temp. & Hum.	28	oc
	and the second second	inical Test		。 <b>反為於</b> 其為於2.15

Test Voltage @ 25 kVdc.		Leakage Current	
Voltage Increments	φA	φB	φC
5 kV	17 -	14	13
10 kV	35	33	39
15 kV	55	47	27
20 kV	45	50	32
25 kV	64	68	46
Time at Test Voltage			
30 Seconds	46	48	27
1 Minute	43	46	25
2 Minutes	39	44	23
3 Minutes	36	43	20
4 Minutes	35	42	18
5 Minutes	34	41	17
6 Minutes			
7 Minutes	•		
8 Minutes			
9 Minutes		·	
10 Minutes			
11 Minutes			
12 Minutes			
13 Minutes			
14 Minutes			
15 Minutes			

<u> </u>						
Test Description	<b>44</b>	φB	φC	A/B	B/C	C/A
Insulation Resistance (M $\Omega$ )	675	436	1270	1210	1530	1880
Results Satisfactory	ΦC in best condition of 3 cables tested.					
T.S.						

T.S. HV\_Hypot

### Special Projects Group

# **Client Information**

Customer	Toronto Zoo	Date	June 25, 1999		
File Number	6693	Tested By	RPM		
Location	361A Old Finch Ave., Scarborough, Ontario				
Equipment I.D.	Loop Feed to North America Pavilion (tested after \$\phi B\$ splice repair)				
Substation	Africa Pavilion				

# **Cable High-Potential Test**

Cable N	ameplate Data		
Pirelli	Voltage	28	kVolts
XLPE	Conductor Size	3/0	MCM
Copper (CU)	Temp. & Hum.	28_	oC
	Pirelli XLPE Copper (CU)	Pirelli Voltage  XLPE Conductor Size  Copper (CU) Temp. & Hum.	Pirelli   Voltage   28     XLPE   Conductor Size   3/0

Test Voltage @ 25 kVdc.		Leakage Current	
Voltage Increments	φА	φB	φC
4 kV	63	87	35
8 kV	80	79	43
12 kV	141	98	57
16 kV	149	142	63
20 kV	157	124	105
Time at Test Voltage			
30 Seconds	0.8	48	8
1 Minute	0.7	46	0
2 Minutes	0.7	44	0
3 Minutes	0.8	43	0
4 Minutes	0.9	42	0
5 Minutes	0.7	41	0
6 Minutes			
7 Minutes			
8 Minutes			
9 Minutes			
10 Minutes			
11 Minutes			
12 Minutes			
13 Minutes			
14 Minutes			
15 Minutes			<u> </u>

Test Description	φA	φΒ	φС	A/B	B/C	C/A
Insulation Resistance (M $\Omega$ )						
Results Satisfactory	φC in best condition of 3 cables tested.					
T.S.						

T.S. HV\_Hypot



Technical	Field	Service	De	partment
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31 Pullman Court, Scarborough, Ontario MIX 1E4. Phone: (416)-298-9977 Fax: (416)-298-2907

# SUBMERSIBLE Distribution Transformers

### **Special Projects Group**

# Client Information

Customer	Toronto Zoo	Date	June 15, 1999		
File Number	6621	Tested By	KH/RPM		
Location	361A Old Finch Ave., Scarborough, Ontario				
Equipment I.D.	Vault #1				

# **Submersible Distribution Transformer**

Manufacturer	Westinghouse		Year Built	1973		
Туре	ONAN		Serial #	971935		
Neutral	Solid		Liquid Type/Vol	Oil	16	Ga
Rating	25	kVA	Total Weight	465		lbs.
Impedance	1.9	%	Primary Voltage	16		kVolt
Phase(s)	1	ф	Secondary Voltage	120/ 24	10	Volt
Frequency	60	Hz	BIL	125		kVol
Insulation Resist	ance (MΩ)					

Oil	An	alv	zis,
~			

Oil Analysis						
Laboratory Tests						
Type of Test	ASTM No.	Acceptable Limits	Test Results			
			1999			
Dielectric Breakdown	D877	30 kV Min.	36.5			
Neutralization Number	D974	0.05 Max. Mg Koh/G	0.014			
Interfacial Tension	D971	32 Dynes/ Cm Min.	32.9			
Specific Gravity	D1298	0.84 - 0.91	0.848			
Colour	D1500	≤3.5 Max.	0.5			
Visual Condition	D1524	Clear	Clear			

Observations & Comments					
Comments:	<ul> <li>H1B elbow burnt.</li> <li>Elbow &amp; transformer bushing insert should be replaced.</li> </ul>				
on a such distribution of	The Property of the Control of the C				
Results Satisfactory:	POOR				

T.S. P\_Trans\_Elect

Special Projects Group

### **Client Information**

Customer	Toronto Zoo	Date	June 15, 1999		
File Number	6621	Tested By	AS/TA		
Location	361A Old Finch Ave., Scarborough, Ontario				
Equipment I.D.	Vault #2				

# **Submersible Distribution Transformer**

Manufacturer	McGraw Ed	lison	Year Built			
Туре	ONAN		Serial #	336007-2		
Neutral	Solid		Liquid Type/Vol	Oil	255	Lit
Rating	100	kVA	Total Weight	522		Kg
Impedance	1.7	%	Primary Voltage	16		kVolt
Phase(s)	1	ф	Secondary Voltage	120/ 24	0	Volt
Frequency	60	Hz	BIL	125		kVolt
Insulation Resist	ance (MΩ)					

# Oil Analysis

term of the	Laborat	ory Tests	
Type of Test	ASTM No.	Acceptable Limits	Test Results
			1999
Dielectric Breakdown	D877	30 kV Min.	39.5
Neutralization Number	D974	0.05 Max. Mg Koh/G	0.007
Interfacial Tension	D971	32 Dynes/ Cm Min.	29.5
Specific Gravity	D1298	0.84 - 0.91	0.860
Colour	D1500	≤3.5 Max.	1.0
Visual Condition	D1524	Clear	Clear

Observations & Comments				
Comments:	-Red phase connection found loose at the tankIFT is borderline. Monitor for deterioration.			
Results Satisfactory:	OK/ Fair			



Special Projects Group

### **Client Information**

Customer	Toronto Zoo	Date	June 14, 1999
File Number	6621	Tested By	RPM
Location	361A Old Finch Ave., Scarborough	, Ontario	
Equipment I.D.	Vault #6		

# **Submersible Distribution Transformer**

Manufacturer	Westinghouse ONAN		turer Westinghouse Year Built		Year Built	1973		
Туре			ONAN Serial #	861979				
Neutral	Solid	Liquid Type/Vol Oil 16		16	G			
Rating	25	kVA	Total Weight	465		lbs.		
Impedance	1.9	%	Primary Voltage	16		kVo		
Phase(s)	1	ф	Secondary Voltage	120/ 240	)	Volt		
Frequency	60	Hz	BIL	125		kVo		
<b>Insulation Resist</b>	ance (MΩ)							

### Oil Analysis

ting a strain and the strain of the strain o	Laborat	ory Tests	
Type of Test	ASTM No.	Acceptable Limits	Test Results
			1999
Dielectric Breakdown	D877	30 kV Min.	35.8
Neutralization Number	D974	0.05 Max. Mg Koh/G	0.014
Interfacial Tension	D971	32 Dynes/ Cm Min.	31.8
Specific Gravity	D1298	0.84 - 0.91	0.849
Colour	D1500	≤3.5 Max.	0.5
Visual Condition	D1524	Clear	Clear

·	Observations & Comments
Comments:	
er i de la companya de la companya de la companya de la companya de la companya de la companya de la companya d	
Results Satisfactory:	OK

T.S. P\_Trans\_Elect

**Special Projects Group** 

### **Client Information**

Customer	Toronto Zoo	Date	June 14, 1999
File Number	6621	Tested By	RPM/JRK/TA
Location	361A Old Finch Ave., Scarborough, C	Ontario	
Equipment I.D.	Vault #7		

### **Submersible Distribution Transformer**

Manufacturer	Westinghouse		Year Built	1973			
Туре	ONAN		ONAN Serial #'s	Serial #'s	Red Ø: 861975 White Ø: 861980 Blue Ø: 871930		0
Neutral	Solid		Liquid Type/Vol	Oil	16	Gal	
Rating	25	kVA	Total Weight	465	465		
Impedance	1.9	%	Primary Voltage	16		kVolt	
Phase(s)	1	ф	Secondary Voltage	120/ 24	Ю	Volt	
Frequency	60	Hz	BIL	125		kVolt	
Insulation Resist	ance (MΩ)						

### Oil Analysis

Laboratory Tests Acceptable Limits Test Results Type of Test ASTM No. White Blue Red 37.7 49.4 45.1 D877 30 kV Min. Dielectric Breakdown 0.021 **Neutralization Number** D974 0.05 Max. Mg Koh/G 0.028 0.014 31.7 Interfacial Tension D971 32 Dynes/ Cm Min. 31.9 31.4 Specific Gravity 0.849 D1298 0.84 - 0.910.849 0.849 0.5 0.5 Colour 0.5 D1590 ≤3.5 Max. Visual Condition D1524 Clear Clear Clear Clear

Observations & Comments						
Comments:	Below marginal oil levels on all units.					
n in entre veganje en skriven i se						
Results Satisfactory:	Fair.					

T.S. P\_Trans\_Elect

Special Projects Group

### **Client Information**

Customer	Toronto Zoo	Date	June 16, 1999		
File Number	6621	Tested By	RPM/TL		
Location	361A Old Finch Ave., Scarborough, Ontario				
Equipment I.D.	Vault #8				

### **Submersible Distribution Transformer**

Manufacturer	Westinghouse ONAN		acturer Westinghouse Year Built		Year Built	1973			
Гуре			Serial #'s	White	: 871939 Ø: 87193 ): WO383				
Neutral	Solid	Liquid Type/Vol	Oil	27	Ga				
Rating	50	kVA	Total Weight	770		Lbs.			
Impedance	1.9	%	Primary Voltage	16		KVol			
Phase(s)	1	ф	Secondary Voltage	120/ 24	40	Volt			
Frequency	60 <b>H</b> z		BIL	125		KVol			
Insulation Resist		1	1 17111	<u> </u>		1 22 7 0			

# Oil Analysis

Laboratory Tests							
Type of Test	ASTM No.			Test Results			
			Red	White	Blue		
Dielectric Breakdown	D877	30 kV Min.	42.5	43.1	43.0		
Neutralization Number	D974	0.05 Max. Mg Koh/G	0.007	0.021	0.020		
Interfacial Tension	D971	32 Dynes/ Cm Min.	30.9	31.4	26.6		
Specific Gravity	D1298	0.84 - 0.91	0.850	0.853	0.859		
Colour	D1500	≤3.5 Max.	0.5	1.0	<0.5		
Visual Condition	D1524	Clear	Clear	Clear	Clear		

·	Observations & Comments
Comments:	-Red phase oil level is marginalBlue phase vault initially inaccessible. The water level in this vault
	does cover the transformer at timesBlue phase IFT is borderline.
	-White phase vault ground to lid is off.
Results Satisfactory:	

**Special Projects Group** 

# **Client Information**

Customer	Toronto Zoo	Date	June 16, 1999
File Number	6621	Tested By	TA
Location	361A Old Finch Ave., Scarborough, C	Ontario	
Equipment I.D.	Vault #11		

# **Submersible Distribution Transformer**

Manufacturer	Westinghouse		acturer Westinghouse Year Built	Year Built	1973			
Туре	ONAN Serial #	ONAN Seri		861953				
Neutral	Solid		Liquid Type/Vol	Oil	34	G	Gal	
Rating	75	kVA	Total Weight	1080		lbs.	,	
Impedance	20	%	Primary Voltage	16		kVo	olt	
Phase(s)	1	ф	Secondary Voltage	120/24	0	Volt	it	
Frequency	60	Hz	BIL	125	<del></del>	kVo	olt	
Insulation Resist	ance (MΩ)							

# Oil Analysis

Type of Test	ASTM No.	Acceptable Limits	Test Results
* #			1999
Dielectric Breakdown	D877	30 kV Min.	47.5
Neutralization Number	D974	0.05 Max. Mg Koh/G	0.034
Interfacial Tension	D971	32 Dynes/ Cm Min.	34.8
Specific Gravity	D1298	0.84 - 0.91	0.848
Colour	D1500	≤3.5 Max.	0.5
Visual Condition	D1524	Clear	Clear

Observations & Comments				
Comments:	No lock on lid     Both hinges broken			
The state of the s	2 Detailinges broken			
Results Satisfactory:	OK			

T.S. P\_Trans\_Elect

Special Projects Group

### Client Information

Customer	Toronto Zoo	Date	June 16, 1999
File Number	6621	Tested By	TA
Location	361A Old Finch Ave., Scarboroug	h, Ontario	•
Equipment I.D.	Vault 11A		

# **Submersible Distribution Transformer**

Carte		turer Carte Year Built	Year Built	1988		
ONAN Serial# Q143		Q1431-28				
Solid		Liquid Type/Vol	Oil	186	Lit	
75	kVA	Total Weight	451		Kg	
2.29	%	Primary Voltage	16		kVolt	
1	ф	Secondary Voltage	120/ 24	Ю	Volt	
60	Hz	BIL	125		kVolt	
	ONAN Solid 75 2.29 1	ONAN Solid 75 kVA 2.29 % 1 ф	ONAN Serial # Solid Liquid Type/Vol 75 kVA Total Weight 2.29 % Primary Voltage 1 \$\oplus \text{ Secondary Voltage}\$	ONAN         Serial #         Q1431-           Solid         Liquid Type/Vol         Oil           75         kVA         Total Weight         451           2.29         %         Primary Voltage         16           1         φ         Secondary Voltage         120/24	ONAN         Serial #         Q1431-28           Solid         Liquid Type/Vol         Oil         186           75         kVA         Total Weight         451           2.29         %         Primary Voltage         16           1         \$\phi\$ Secondary Voltage         120/240	

### Oil Analysis

	Laborat	ory l'ésite and acceptant	And the same of
Type of Test	ASTM No.	Acceptable Limits	Test Results
			1999
Dielectric Breakdown	D877	30 kV Min.	46.7
Neutralization Number	D974	0.05 Max. Mg Koh/G	0.013
Interfacial Tension	D971	32 Dynes/ Cm Min.	35.2
Specific Gravity	D1298	0.84 - 0.91	0.876
Colour	D1500	≤3.5 Max.	0.5
Visual Condition	D1524	Clear	Clear

	Observations & Comments
Comments:	No lock on vault
Results Satisfactory:	OK

T.S. P\_Trans\_Elect



**Special Projects Group** 

### **Client Information**

Customer	Toronto Zoo	Date	June 14, 1999
File Number	6621	Tested By	RPM/JRK/TA
Location	361A Old Finch Ave., Scarborough, C	Ontario	
Equipment I.D.	Vault #12		

### **Submersible Distribution Transformer**

NAN		Serial #'s	Red Ø:		
			Blue Ø:	9:861963 861987	
olid		Liquid Type/Vol	Oil	27	Gal
0	kVA	Total Weight	770		lbs.
.9	%	Primary Voltage	16		kVolt
	ф	Secondary Voltage	120/ 240	)	Volt
0	Hz	BIL	125		kVolt
	olid 0 .9 0 (ΜΩ)	0 kVA .9 % 6 0 Hz	0 kVA Total Weight .9 % Primary Voltage	0 kVA Total Weight 770 .9 % Primary Voltage 16	0 kVA Total Weight 770 .9 % Primary Voltage 16

### Oil Analysis

Laboratory Tests 。 第一章 Type of Test ASTM No. Acceptable Limits **Test Results** Red White Blue Dielectric Breakdown 30 kV Min. 38.4 42.8 37.1 **D877** 0.014 0.014 **Neutralization Number** D974 0.05 Max. Mg Koh/G 0.028 D971 30.0 30.4 **Interfacial Tension** 32 Dynes/ Cm Min. 30.1 0.850 0.851 0.849 Specific Gravity 0.84 - 0.91 D1298 0.5 0.5 0.5 Colour D1500 ≤3.5 Max. Clear Visual Condition D1524 Clear Clear Clear

	Observations & Comments
Comments:	- Oil levels marginal.
Results Satisfactory:	OK

T.S. P\_Trans\_Elect

### **Special Projects Group**

# **Client Information**

Customer	Toronto Zoo	Date	June 16, 1999		
File Number	6621	Tested By	KH		
Location	361A Old Finch Ave., Scarborough, Ontario				
Equipment I.D.	Vault #13 – Old Elephant House				

# **Submersible Distribution Transformer**

Manufacturer	Westinghouse		Year Built	1973		
Туре	ONAN		Serial #'s	White	: 861950 Ø: 861-9 : 861951	54
Neutral	Solid		Liquid Type/Vol	Oil	34	Gal
Rating	75	kVA	Total Weight	1080		lbs.
Impedance	2.0	%	Primary Voltage	16		kVolt
Phase(s)	1 6		Secondary Voltage	120/ 24	10	Volt
Frequency	60 Hz		BIL			125lt
Insulation Resist	ance (MΩ)					

# Oil Analysis

Type of Test	ASTM No.	Acceptable Limits	Test Results		S
			Red	White	Blue
Dielectric Breakdown	D877	30 kV Min.	47.4	38.7	42.7
Neutralization Number	D974	0.05 Max. Mg Koh/G	0.028	0.028	0.041
Interfacial Tension	D971	32 Dynes/ Cm Min.	32.7	32.4	30.6
Specific Gravity	D1298	0.84 - 0.91	0.484	0.847	0.853
Colour	D1500	≤3.5 Max.	0.5	0.5	1.0
Visual Condition	D1524	Clear	Clear	Clear	Clear

Observations & Comments							
Comments:	- Blue phase oil level below manufacturer's indication line.						
rije vijaja nestija, ku erijaš ir dijaj	and the state of the second of the contract of the second						
Results Satisfactory:	OK.						

T.S. P\_Trans\_Elect



**Special Projects Group** 

# **Client Information**

Customer	Toronto Zoo	Date	June 16, 1999	
File Number	6621	Tested By	TA	
Location	361A Old Finch Ave., Scarborough, Ontario			
Equipment LD.	Vault #13A			

# **Submersible Distribution Transformer**

Manufacturer	Westinghouse		Year Built	1982			
Туре	ONAN		Serial #'s	White	: LG3798 Ø: LG37 ): LG379	991	
Neutral	Solid		Liquid Type/Vol	Oil	70		Gal
Rating	25	kVA	Total Weight	Total Weight 240		lk	)\$.
Impedance	1.8	%	Primary Voltage	16		k	Volt
Phase(s)	1	ф	Secondary Voltage	120/ 240		V	'olt
Frequency	60 <b>H</b> z		BIL	125		k	Volt

# Oil Analysis

Type of Test	ASTM No.	Acceptable Limits	Test Results		
			Red	White	Blue
Dielectric Breakdown	D877	30 kV Min.	44.4	47.6	41.8
Neutralization Number	D974	0.05 Max. Mg Koh/G	0.014	0.021	0.027
Interfacial Tension	D971	32 Dynes/ Cm Min.	30.0	25.7	29.5
Specific Gravity	D1298	0.84 - 0.91	0.856	0.853	0.856
Colour	D1500	≤3.5 Max.	0.5	0.5	0.5
Visual Condition	D1524	Clear	Clear	Clear	Clear

Observations & Comments				
Comments:	<ul> <li>The oil levels of these units were noted as marginal during the inspection.</li> <li>Note the marginal White \$ IFT.</li> <li>The White phase unit subsequently failed and was replaced. (See following Oil test sheet for new unit lab results)</li> </ul>			
Results Satisfactory:				

# Black & MCDonald

# TECHNICAL FIELD SERVICE DEPARTMENT

Special Projects Group

# **Client Information**

Customer	Toronto Zoo	Sample Date	June 28, 1999		
File Number	6621	Sampled By	JRK		
Location	361A Old Finch Ave., Scarborough, Ontario				
Equipment I.D.	Vault #13A Pachyderm Centre/ White phase				
Substation	Outside Elephant Paddock (Fed from Africa Pavilion)				

# Oil Analysis

Transformer Data				
Manufacturer	Cam Tran Co.	Primary Volts	27.6/ 16	kVolts
Type	ONAN Submersible	Rating	100	kVA
Serial No.	99C0846101	Liquid Volume	194	Litres

**Laboratory Tests** 

Type of Test	ASTM No.	Acceptable Limits	Test Results
			1999
Dielectric Breakdown	D877	30 kV	42.1
Neutralization Number	D974	0.05 Max. Mg Koh/G	0.027
Interfacial Tension	D971	32 Dynes/ Cm Min.	37.7
Specific Gravity	D1298	0.84 - 0.91	0.818
Colour	D1500	≤3.5	<0.5
Visual Condition	D1524	Clear	Clear
Water Content	D1533	30 ppm (<69kV)	
Power Factor	D924	1.0 % Max @ 25 °C	0.014%
PCB Content	D4059	50 ppm Max.	
Inhibitor	D2668	≥0.20%	
Furans	D5837	<100 ppb	
Hydrogen (H2)	and the second		
Oxygen & Argon			
Nitrogen (N2)			
Methane (CH4)			
Carbon Monoxide (CO)		<b>多数数据表示</b> (1981年)	
Carbon Dioxide (CO2)			
Ethylene (C2H4)		7.77	
Ethane (C2H6)			
Acetylene (C2 H2)		STATE OF THE PERSON OF	
Total Gas Content			
	Com	monte	

	Comments
Chemical Properties	OK
PCB Content	N/A
Dissolved Gas Content	



**Special Projects Group** 

### **Client Information**

Customer	Toronto Zoo	Date	June 17, 1999
File Number	6621	Tested By	KH
Location	361A Old Finch Ave., Scarborough, Ontario		
Equipment I.D.	Vault #14		

# **Submersible Distribution Transformer**

Manufacturer	Westinghouse		Year Built	1973			
Туре	ONAN		Serial #	861970			
Neutral	Solid		Liquid Type/Vol	Oil 16		Gal	
Rating	25	kVA	Total Weight	465		lbs.	
Impedance	1.9	%	Primary Voltage	16		kVolt	
Phase(s)	1	ф	Secondary Voltage	120/ 24	Ю	Volt	
Frequency	60 <b>Hz</b>		BIL	125		kVolt	
Insulation Resist	ance (MΩ)						

# Oil Analysis

an in the matter of the property of	A SA LADORAT	ory Tests	
Type of Test	ASTM No. Acceptable Limits		Test Results
			1999
Dielectric Breakdown	D877	30 kV Min.	44.1
Neutralization Number	D974	0.05 Max. Mg Koh/G	0.028
Interfacial Tension	D971	32 Dynes/ Cm Min.	33.4
Specific Gravity	D1298	0.84 - 0.91	0.848
Colour	D1500	≤3.5 Max.	0.5
Visual Condition	D1524	Clear	Clear

	Observations & Comments
Comments:	
Results Satisfactory:	OK

T.S. P\_Trans\_Elect

Special Projects Group

### **Client Information**

Customer	Toronto Zoo	Date	June 16, 1999
File Number	6621	Tested By	KH/TL/AN
Location	361A Old Finch Ave., Scarborough, (	Ontario	
Equipment I.D.	Vault #16		

# **Submersible Distribution Transformer**

Manufacturer	Transform Westinghouse		Year Built	1973					
Туре	ONAN		ONAN Serial #'s		Serial #'s	Red Ø: 861969 White Ø: 861978 Blue Ø: 861977			
Neutral	Solid		Liquid Type/Vol	Oil	16		Gal		
Rating	25	kVA	Total Weight	465		lb	8.		
Impedance	1.9	% Primary Voltage		16		k	Volt		
Phase(s)	1	ф	Secondary Voltage	120/ 24	10	V	olt		
Frequency	60 <b>Hz</b>		BIL	125		k	Volt		
Insulation Resist	ance (MΩ)				1				

	Oil	Analysis			
i i	Lab	oratory Tests	en de la secono de la secono de la secono de la secono de la secono de la secono de la secono de la secono de La secono de la secono de la secono de la secono de la secono de la secono de la secono de la secono de la secono	r yr y \$50 tae'd an	67 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5
Type of Test	ASTM No.	Acceptable Limits		est Result	
			Red	White	Blue
Dielectric Breakdown	D877	30 kV Min.	43.9	37.9	46.2
Neutralization Number	D974	0.05 Max. Mg Koh/G	0.028	0.014	0.021
Interfacial Tension	D971	32 Dynes/ Cm Min.	31.9	32.1	32.8
Specific Gravity	D1298	0.84 - 0.91	0.849	0.849	0.849
Colour	D1500	≤3.5 Max.	0.5	0.5	0.5
Visual Condition	D1524	Clear	Clear	Clear	Clear

	Observations & Comments
Comments:	
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Results Satisfactory:	OK

T.S. P\_Trans\_Elect

### Special Projects Group

# Client Information

Customer	Toronto Zoo	Date	June 16, 1999	
File Number	6621	Tested By	KH	
Location	361A Old Finch Ave., Scarborough, Ontario			
Equipment I.D.	Vault #16			

# **Submersible Distribution Transformer**

Manufacturer	Westinghor	ıse	Year Built	1974			
Туре	ONAN		Serial #	861966			
Neutral	Solid		Liquid Type/Vol	Oil	27		Gal
Rating	50	kVA	Total Weight	770		lb	S
Impedance	1.9	%	Primary Voltage	16		k\	Volt
Phase(s)	1	•	Secondary Voltage	120/24	0	V	olt
	60	Hz	BIL	125		k	Volt
Frequency Insulation Resist		Hz					

## Oil Analysis

Section 1 Section 1	Laborat	ory l'ests 😅 🔻 🙀	
Type of Test	ASTM No.	Acceptable Limits	Test Results
-	•		1999
Dielectric Breakdown	D877	30 kV Min.	44.8
Neutralization Number	D974	0.05 Max. Mg Koh/G	0.034
Interfacial Tension	D971	32 Dynes/ Cm Min.	30.2
Specific Gravity	D1298	0.84 - 0.91	0.850
Colour	D1500	≤3.5 Max.	0.5
Visual Condition	D1524	Clear	Clear

	Observations & Comments
Comments:	IFT is borderline
Results Satisfactory:	OK

#### Special Projects Group

## Client Information

Customer	Toronto Zoo	Date	June 16, 1999
File Number	6621	Tested By	TL/RPM
Location	361A Old Finch Ave., Scarbord	ough, Ontario	
Equipment I.D.	Vault #16A		

## **Submersible Distribution Transformer**

Manufacturer	Westinghos	sue	Year Built	1973		
Туре	ONAN		Serial #	861974		
Neutral	Solid		Liquid Type/Vol	Oil	16	Ga
Rating	25	kVA	Total Weight	465		lbs.
Impedance	1.9	%	Primary Voltage	16		kVolt
Phase(s)	1	ф	Secondary Voltage	120/ 24	Ю	Volt
Frequency	60	Hz	ВП	125		kVolt
Insulation Resist	ance (MΩ)					

## Oil Analysis

Type of Test	ASTM No.	Acceptable Limits	Test Results
Type of Test	ABIMINO.	Acceptable Limits	1999
Dielectric Breakdown	D877	30 kV Min.	41.9
Neutralization Number	D974	0.05 Max. Mg Koh/G	0.028
Interfacial Tension	D971	32 Dynes/ Cm Min.	32.3
Specific Gravity	D1298	0.84 - 0.91	0.849
Colour	D1500	≤3.5 Max.	0.5
Visual Condition	D1524	Clear	Clear

	Observations & Comments
Comments:	Oil level is acceptable
groupers and take the	
Results Satisfactory:	OK

T.S. P\_Trans\_Elect

Special Projects Group

## **Client Information**

Customer	Toronto Zoo	Date	June 18, 1999		
File Number	6621	Tested By	TL/RPM		
Location	361A Old Finch Ave., Scarborough, Ontario				
Equipment I.D.	Vault #18 - Admin/Entrance Fed				

## **Submersible Distribution Transformer**

Carte		Year Built	1983			
ONAN		Serial #	L0721-1			
Solid		Liquid Type/Vol	Oil	35		Gal
75	kVA	Total Weight	889		lb	8.
2.4	%	Primary Voltage	16		k'	Volt
1	ф	Secondary Voltage	120/24	0	V	olt
60	Hz	BIL	125		k	Volt
	ONAN Solid 75 2.4 1	ONAN Solid 75 kVA 2.4 % 1 ф	ONAN         Serial #           Solid         Liquid Type/Vol           75         kVA         Total Weight           2.4         %         Primary Voltage           1         φ         Secondary Voltage	ONAN         Serial #         L0721-           Solid         Liquid Type/Vol         Oil           75         kVA         Total Weight         889           2.4         %         Primary Voltage         16           1         φ         Secondary Voltage         120/24	ONAN         Serial #         L0721-1           Solid         Liquid Type/Vol         Oil         35           75         kVA         Total Weight         889           2.4         %         Primary Voltage         16           1         φ         Secondary Voltage         120/240	ONAN         Serial #         L0721-1           Solid         Liquid Type/Vol         Oil         35           75         kVA         Total Weight         889         lb           2.4         %         Primary Voltage         16         kV           1         φ         Secondary Voltage         120/240         V

## Oil Analysis

Type of Test	ASTM No.	Acceptable Limits	Test Results
Type of Test	ASIMINO.	Acceptable Limits	1999
Dielectric Breakdown	D877	30 kV Min.	38.2
Neutralization Number	D974	0.05 Max. Mg Koh/G	0.034
Interfacial Tension	D971	32 Dynes/ Cm Min.	18.2
Specific Gravity	D1298	0.84 - 0.91	0.857
Colour	D1500	≤3.5 Max.	1.0
Visual Condition	D1524	Clear	Clear

	Observations & Comments
Comments:	IFT is marginal
COMPRESSOR AND ACTION	
Results Satisfactory:	Fair

#### **Special Projects Group**

## Client Information

Customer	Toronto Zoo	Date	June 17, 1999
File Number	6621	Tested By	TL/RPM
Location	361A Old Finch Ave., Scarborough,	Ontario	
Equipment I.D.	Vault #20 – Eurasia Fed	···	

## **Submersible Distribution Transformer**

Manufacturer	Westinghouse ONAN		ufacturer Westinghouse Year Built		1973		
Туре			pe ONAN Serial#	Serial #	861944		
Neutral	Solid		Liquid Type/Vol	Oil	38		Ga
Rating	100	kVA	Total Weight	1300		lb	8.
Impedance	1.8	%	Primary Voltage	16		k	Volt
Phase(s)	1	•	Secondary Voltage	120/ 24	0	V	olt
Frequency	60	Hz	BIL	125		k	Volt

## Oil Analysis

Type of Test	ASTM No.	Acceptable Limits	Test Results
			1999
Dielectric Breakdown	D877	30 kV Min.	43.3
Neutralization Number	D974	0.05 Max. Mg Koh/G	0.014
Interfacial Tension	D971	32 Dynes/ Cm Min.	36.1
Specific Gravity	D1298	0.84 - 0.91	0.847
Colour	D1500	≤3.5 Max.	0.5
Visual Condition	D1524	Clear	Clear

	Observations & Comments
Comments:	
Results Satisfactory:	· ·

T.S. P\_Trans\_Elect

## Special Projects Group

## **Client Information**

Customer	Toronto Zoo	Date	June 17, 1999
File Number	6621	Tested By	KH
Location	361A Old Finch Ave., Scarborough, 6	Ontario	
Equipment I.D.	Vault #21		

## **Submersible Distribution Transformer**

Manufacturer	Westinghouse		ufacturer Westinghouse Year Built		Year Built	1973		
Туре	ONAN	N Serial # 861981						
Neutral	Solid		Liquid Type/Vol	Oil	16	Gal		
Rating	25	kVA	Total Weight	465		lbs.		
Impedance	1.9	%	Primary Voltage	16		kVolt		
Phase(s)	1	ф	Secondary Voltage	120/ 24	Ю	Volt		
Frequency	60	Hz	BIL	125		kVolt		
Insulation Resist	ance (MΩ)							

Oil	An	aly	sis
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The State of the S	DETOCAL	ory Tests	
Type of Test	ASTM No.	Acceptable Limits	Test Results
,			1999
Dielectric Breakdown	D877	30 kV Min.	30.7
Neutralization Number	D974	0.05 Max. Mg Koh/G	0.014
Interfacial Tension	D971	32 Dynes/ Cm Min.	33.3
Specific Gravity	D1298	0.84 - 0.91	0.849
Colour	D1500	≤3.5 Max.	0.5
Visual Condition	D1524	Clear	Clear

Observations & Comments					
Comments:	<ul> <li>Had to pump water out of vault</li> <li>Dielectric of oil is borderline</li> </ul>				
Results Satisfactory:	OK .				

T.S. P\_Trans\_Elect

Special Projects Group

## **Client Information**

Customer	Toronto Zoo	Date	June 17, 1999
File Number	6621	Tested By	KH
Location	361A Old Finch Ave., Scarborough,	Ontario	
Equipment I.D.	Vault #22		

## **Submersible Distribution Transformer**

Westinghor	use	Year Built	1973		
ONAN	Serial # 861973		861973		
Solid		Liquid Type/Vol	Oil 16		Gal
25	kVA	Total Weight	463		lbs.
1.9	%	Primary Voltage	16		kVolt
1	•	Secondary Voltage	120/ 24	0	Volt
60	Hz	BIL	125		kVolt
	ONAN Solid 25 1.9 1	Solid  25 kVA  1.9 %  1 \$\oplus\$	ONAN Serial # Solid Liquid Type/Vol 25 kVA Total Weight 1.9 % Primary Voltage 1 \$\oplus \text{ Secondary Voltage}\$	ONAN         Serial #         861973           Solid         Liquid Type/Vol         Oil           25         kVA         Total Weight         463           1.9         %         Primary Voltage         16           1         \$\phi\$ Secondary Voltage         120/24	ONAN         Serial #         861973           Solid         Liquid Type/Vol         Oil         16           25         kVA         Total Weight         463           1.9         %         Primary Voltage         16           1         \$\phi\$ Secondary Voltage         120/240

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	Laborat 🖟 🖟	ory Tests	
Type of Test	ASTM No.	Acceptable Limits	Test Results
			1999
Dielectric Breakdown	D877	30 kV Min.	42.4
Neutralization Number	D974	0.05 Max. Mg Koh/G	0.041
Interfacial Tension	D971	32 Dynes/ Cm Min.	33.8
Specific Gravity	D1298	0.84 - 0.91	0.848
Colour	D1500	≤3.5 Max.	0.5
Visual Condition	D1524	Clear	Clear

	Observations & Comments
Comments:	Over one foot of water pumped out of vault.
Barris de California	
Results Satisfactory:	OK

T.S. P\_Trans\_Elect

Special Projects Group

## **Client Information**

Customer	Toronto Zoo	Date	June 15, 1999		
File Number	6621	Tested By	JC		
Location	361A Old Finch Ave., Scarborough, Ontario				
Equipment I.D.	Vault #23				

# **Submersible Distribution Transformer**

Manufacturer	Westinghou	ıse	Year Built		–		
Туре	ONAN		Serial #	871931			
Neutral	Solid		Liquid Type/Vol	Oil	16		Gal
Rating	25	kVA	Total Weight	465		11	)5.
Impedance	1.9	%	Primary Voltage	16		k	Volt
Phase(s)	1	ф	Secondary Voltage	120/ 240	)	V	olt
Frequency	60	Hz	BIL	125		k	Volt
Insulation Resist	ance (MΩ)						

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Laboratory Tests				
Type of Test	ASTM No.	Acceptable Limits	Test Results	
7 - 7			1999	
Dielectric Breakdown	D877	30 kV Min.	36.1	
Neutralization Number	D974	0.05 Max. Mg Koh/G	0.021	
Interfacial Tension	D971	32 Dynes/ Cm Min.	30.6	
Specific Gravity	D1298	0.84 - 0.91	0.849	
Colour	D1500	≤3.5 Max.	0.5	
Visual Condition	D1524	Clear	Clear	

	Observations & Comments
Comments:	
Company of the Section 2	
Results Satisfactory:	OK

T.S. P\_Trans\_Elect

Special Projects Group

### **Client Information**

Customer	Toronto Zoo	Date	June 17, 1999		
File Number	6621	Tested By	TL/ RPM		
Location	361A Old Finch Ave., Scarborough, Ontario				
Equipment I.D.	Vault #24 – Eurasia Fed				

## **Submersible Distribution Transformer**

Transform   Westinghouse		Year Built	1974			
ONAN		Serial #	861964			
Solid		Liquid Type/Vol	Oil	27	(	Gal
50	kVA	Total Weight	770		lbs	•
1.9	%	Primary Voltage	16		kV	olt
1	ф	Secondary Voltage	120/ 24	Ю	Vo	lt
60	Hz	BIL	125		kV	olt
	ONAN Solid 50 1.9	ONAN   Solid   50   kVA   1.9   %   1   \$\phi\$	ONAN         Serial #           Solid         Liquid Type/Vol           50         kVA         Total Weight           1.9         %         Primary Voltage           1         φ         Secondary Voltage	ONAN         Serial #         861964           Solid         Liquid Type/Vol         Oil           50         kVA         Total Weight         770           1.9         %         Primary Voltage         16           1         \$ Secondary Voltage         120/24	ONAN         Serial #         861964           Solid         Liquid Type/Vol         Oil         27           50         kVA         Total Weight         770           1.9         %         Primary Voltage         16           1         φ         Secondary Voltage         120/240	ONAN         Serial #         861964           Solid         Liquid Type/Vol         Oil         27         0           50         kVA         Total Weight         770         lbs           1.9         %         Primary Voltage         16         kV           1         φ         Secondary Voltage         120/240         Vo.

Oil Analysis							
Laboratory Tests							
Type of Test	ASTM No.	Acceptable Limits	Test Results				
			1999				
Dielectric Breakdown	D877	30 kV Min.	49.4				
Neutralization Number	D974	0.05 Max. Mg Koh/G	0.021				
Interfacial Tension	D971	32 Dynes/ Cm Min.	31.2				
Specific Gravity	D1298	0.84 - 0.91	0.850				
Colour	D1500	≤3.5 Max.	0.5				

Observations & Comments					
Comments:	<ul> <li>Slight mark/ burn on H1B elbow.</li> <li>Some secondary cables were found cut off. These ends were taped off by our personnel.</li> </ul>				
Results Satisfactory:	OK (as left)				

D1524

Clear

Clear

T.S.

Visual Condition

T.S. P\_Trans\_Elect



Special Projects Group

## **Client Information**

Customer	Toronto Zoo	Date	June 15, 1999		
File Number	6621	Tested By	KH/RPM		
Location	361A Old Finch Ave., Scarborough, Ontario				
Equipment I.D.	Vault #26				

# **Submersible Distribution Transformer**

Manufacturer	Westinghouse ONAN		Year Built	1974 861962		
Туре			ONAN Serial #			
Neutral	Solid		Liquid Type/Vol	Oil	27	Gal
Rating	50	kVA	Total Weight	770		lbs.
Impedance	1.9	%	Primary Voltage	16		kVolt
Phase(s)	1	ø	Secondary Voltage	120/ 24	Ю	Volt
Frequency	60	Hz	BIL	125		kVolt
Insulation Resist	ance (MΩ)					

## Oil Analysis

Type of Test	ASTM No. Acceptable Limits		Test Results
			1999
Dielectric Breakdown	D877	30 kV Min.	40.4
Neutralization Number	D974	0.05 Max. Mg Koh/G	0.014
Interfacial Tension	D971	32 Dynes/ Cm Min.	31.1
Specific Gravity	D1298	0.84 - 0.91	0.848
Colour	D1500	≤3.5 Max.	0.5
Visual Condition	D1524	Clear	Clear

Observations & Comments					
Comments: - Corrosion present on untaped Neutral bus/ bushing.					
	- Sand present in vault via primary cable duct.				
Results Satisfactory:	OK				

T.S. P\_Trans\_Elect

## Special Projects Group

### **Client Information**

Customer	Toronto Zoo	Date	June 15, 1999		
File Number	6621	Tested By	KH/ RPM		
Location .	361A Old Finch Ave., Scarborough, Ontario				
Equipment LD.	Vault #27				

## **Submersible Distribution Transformer**

Manufacturer	Westinghouse		Year Built	1973		
Туре	ONAN		Serial #	871926		
Neutral	Solid		Liquid Type/Vol	Oil	16	G
Rating	25	kVA	Total Weight	465		ibs.
Impedance	1.9	%	Primary Voltage	16		kVol
Phase(s)	1	•	Secondary Voltage	120/24	0	Volt
Frequency	60	Hz	BIL	125		kVol

Oil	<b>Analysis</b>
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Type of Test	ASTM No. Acceptable Limits		Test Results
			1999
Dielectric Breakdown	D877	30 kV Min.	35.8
Neutralization Number	D974	0.05 Max. Mg Koh/G	0.014
Interfacial Tension	D971	32 Dynes/ Cm Min.	32.5
Specific Gravity	D1298	0.84 - 0.91	0.848
Colour	D1500	≤3.5 Max.	0.5
Visual Condition	D1524	Clear	Clear

Observations & Comments					
Comments:	Comments:  • Elbows taped by our personnel.  • Vault lid has no securing nuts holding grate.				
CONTROL CONTROL					
Results Satisfactory:	OK				

T.S. P\_Trans\_Elect



**Special Projects Group** 

## **Client Information**

Customer	Toronto Zoo	Date	June 15, 1999			
File Number	6621	Tested By	AS/TA			
Location	361A Old Finch Ave., Scarborough, Ontario					
Equipment I.D.	Vault #28					

# **Submersible Distribution Transformer**

Manufacturer	Westinghouse		Year Built	1973		
Туре	ONAN		Serial #	871934		
Neutral	Solid		Liquid Type/Vol	Oil	16	Gal
Rating	25	kVA	Total Weight	465		lbs.
Impedance	1.9	%	Primary Voltage	16		kVolt
Phase(s)	1	ф	Secondary Voltage	120/ 24	Ю	Volt
Frequency	60	Hz	BIL	125		kVolt
Insulation Resist			1 DAL	1	•	1 2 7 0 1

# Oil Analysis

I	Laborat		property that
Type of Test	ASTM No. Acceptable Limits		Test Results
			1999
Dielectric Breakdown	D877	30 kV Min.	40.8
Neutralization Number	D974	0.05 Max. Mg Koh/G	0.014
Interfacial Tension	D971	32 Dynes/ Cm Min.	30.7
Specific Gravity	D1298	0.84 - 0.91	0.848
Colour	D1500	≤3.5 Max.	0.5
Visual Condition	D1524	Clear	Clear

	Observations & Comments
Comments:	
The second second	
Results Satisfactory:	OK

T.S. P\_Trans\_Elect

## Special Projects Group

### **Client Information**

Customer	Toronto Zoo	Date	June 16, 1999			
File Number	6621	Tested By	JC			
Location	361A Old Finch Ave., Scarborough, Ontario					
Equipment I.D.	Vault # 29					

# **Submersible Distribution Transformer**

Manufacturer	Westinghor	ıse	Year Built				
Туре	ONAN		ONAN Serial #	861972			
Neutral	Solid		Liquid Type/Vol	Oil	16		Gal
Rating	25	kVA	Total Weight	465		lb	8.
Impedance	1.9	%	Primary Voltage	16		k	Volt
Phase(s)	1	ф	Secondary Voltage	120/ 24	9	V	olt
Frequency	60	Hz	BIL	125		kVolt	
Insulation Resist	ance (MΩ)						

Oil Analysis  Laboratory Tests							
							Type of Test ASTM No. Acceptable Limits Test Results
			1999				
Dielectric Breakdown	D877	30 kV Min.	39.3				
Neutralization Number	D974	0.05 Max. Mg Koh/G	0.021				
Interfacial Tension	D971	32 Dynes/ Cm Min.	30.9				
Specific Gravity	D1298	0.84 - 0.91	0.848				
Colour	D1500	≤3.5 Max.	0.5				
Visual Condition	D1524	Clear	Clear				

	Observations & Comments
Comments:	
Results Satisfactory:	OK



**Special Projects Group** 

### **Client Information**

Customer	Toronto Zoo	Date	June 18, 1999			
File Number	6621	Tested By	KH			
Location	361A Old Finch Ave., Scarborough, Ontario					
Equipment LD.	Vault #30					

## **Submersible Distribution Transformer**

Manufacturer	Westinghouse ONAN		cturer Westinghouse Year Built		Year Built	1973				
Туре			Serial #'s	White	: 861976 Ø: 87193 5: 871933	2				
Neutral	Solid		Liquid Type/Vol	Oil	16	G				
Rating	25	kVA	Total Weight	465		lbs.				
Impedance	1.9	%	Primary Voltage	16		kVol				
Phase(s)	1	ф	Secondary Voltage	120/ 24	Ю	Volt				
Frequency	60 <b>Hz</b>		BIL	125		kVol				
Insulation Resist	ance (MΩ)									

## Oli Analysis

Laboratory Tests Acceptable Limits Test Results Type of Test ASTM No. White Blue Red 39.1 30 kV Min. 43.0 34.1 **D877** Dielectric Breakdown 0.014 0.05 Max. Mg Koh/G 0.007 0.021 **Neutralization Number** D974 33.1 29.6 31.8 32 Dynes/Cm Min. Interfacial Tension D971 0.848 0.849 0.849 Specific Gravity D1298 0.84 - 0.91 0.5 0.5 0.5 ≤3.5 Max. Colour D1500 Clear Clear Clear Clear Visual Condition D1524

	Observations & Comments
Comments:	
<b>4</b>	
Results Satisfactory:	OK

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Special Projects Group

## **Client Information**

Customer	Toronto Zoo	Date	June 16, 1999			
File Number	6621	Tested By	KH			
Location	361A Old Finch Ave., Scarborough, Ontario					
Equipment I.D.	Vault #31					

# **Submersible Distribution Transformer**

Manufacturer	Westinghouse ONAN		Year Built	1973		
Туре			Serial #'s	White	: 861940 Ø: 86194 ): 861943	
Neutral	Solid		Liquid Type/Vol	Oil	38	Ga
Rating	100	kVA	Total Weight	1300		lbs.
Impedance	1.8	%	Primary Voltage	16		kVolt
Phase(s)	1	ф	Secondary Voltage	120/ 24	10	Volt
Frequency	60 <b>Hz</b>		BIL	125		kVolt
Insulation Resist	ance (MΩ)					

## Oil Analysis

Type of Test	ASTM No.	Acceptable Limits	Test Resul		lts	
			Red	White	Blue	
Dielectric Breakdown	D877	30 kV Min.	40.2	37.0	38.1	
Neutralization Number	D974	0.05 Max. Mg Koh/G	0.021	0.007	0.007	
Interfacial Tension	D971	32 Dynes/ Cm Min.	31.6	31.1	32.3	
Specific Gravity	D1298	0.84 - 0.91	0.850	0.848	0.848	
Colour	D1500	≤3.5 Max.	0.5	0.5	0.5	
Visual Condition	D1524	Clear	Clear	Clear	Clear	

	Observations & Comments
Comments:	
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Results Satisfactory:	OK

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**Special Projects Group** 

### **Client Information**

Customer	Toronto Zoo	Date	June 14, 1999		
File Number	6621	Tested By	JRK/RPM/TA		
Location	361A Old Finch Ave., Scarborough, Ontario				
Equipment I.D.	Vault #32				

# **Submersible Distribution Transformer**

Manufacturer	Westinghouse		Year Built	1973		
Туре	ONAN		Serial #'s	White	861949 Ø: 961955 : 861952	5
Neutral	Solid		Liquid Type/Vol	Oil	34	Gı
Rating	75	kVA	Total Weight	1080		lbs.
Impedance	2	%	Primary Voltage	16		kVol
Phase(s)	1	ф	Secondary Voltage	120/ 24	Ю	Volt
Frequency	60	Hz	BIL	125		kVol
Insulation Resist	ance (MΩ)					

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Type of Test	ASTM No.	ASTM No. Acceptable Limits		Test Results			
			Red	White	Blue		
Dielectric Breakdown	D877	30 kV Min.	38.5	40.7	42.8		
Neutralization Number	D974	0.05 Max. Mg Koh/G	0.028	0.028	0.028		
Interfacial Tension	D971	32 Dynes/ Cm Min.	32.8	31.4	33.5		
Specific Gravity	D1298	0.84 - 0.91	0.848	0.847	0.847		
Colour	D1500	≤3.5 Max.	0.5	0.5	0.5		
Visual Condition	D1524	Clear	Clear	Clear	Clear		

	Observations & Comments
Comments:	Red & Blue phases' oil level marginal.
	Red φ manhole gasket should be replaced.
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Results Satisfactory:	OK/ Fair

T.S. P\_Trans\_Elect

Special Projects Group

### **Client Information**

Customer	Toronto Zoo	Date	June 17, 1999
File Number	6621	Tested By	KH
Location	361A Old Finch Ave., Scar	borough, Ontario	
Equipment I.D.	Vault #33		

# **Submersible Distribution Transformer**

Manufacturer	Westinghou	ise	Year Built	1973		
Туре	ONAN		Serial #	871937		
Neutral	Solid		Liquid Type/Vol	Oil	16	Ga
Rating	25	kVA	Total Weight	463		lbs.
Impedance	1.9	%	Primary Voltage	16		kVolt
Phase(s)	1	1 6	Secondary Voltage	120/ 24	0	Volt
Frequency	60	Hz	BIL	125		kVolt
Insulation Resist						

## Oil Analysis

Type of Test	ASTM No.	Acceptable Limits	Test Results
			1999
Dielectric Breakdown	D877	30 kV Min.	37.7
Neutralization Number	D974	0.05 Max. Mg Koh/G	0.021
Interfacial Tension	D971	32 Dynes/ Cm Min.	36.9
Specific Gravity	D1298	0.84 - 0.91	0.848
Colour	D1500	≤3.5 Max.	0.5
Visual Condition	D1524	Clear	Clear

	Observations & Comments
Comments:	Vault fills over top with water
or the same and the same state of	
Results Satisfactory:	OK

T.S. P\_Trans\_Elect



Special Projects Group

## **Client Information**

Customer	Toronto Zoo	Date	June 14, 1999		
File Number	6621	Tested By	RPM		
Location	361A Old Finch Ave., Scarborough, Ontario				
Equipment I.D.	Vault #34				

## **Submersible Distribution Transformer**

Manufacturer	Westinghouse		Year Built	1973		
Туре	ONAN		Serial #'s	White	: 861971 Ø: 87192 6: 871936	
Neutral	Solid		Liquid Type/Vol	Oil	16	Ga
Rating	25	kVA	Total Weight	465		lbs.
Impedance	1.9	%	Primary Voltage	16		kVolt
Phase(s)	1	ф	Secondary Voltage	120/ 24	10	Volt
Frequency	60	Hz	BIL	125		kVolt
Frequency Insulation Resist		Hz	BIL	125	····	

## Oil Analysis

Laboratory Tests						
Type of Test	ASIMINO.	ASTM No.   Acceptable Limits		Test Results		
			Red	White	Blue	
Dielectric Breakdown	D877	30 kV Min.	37.7	48.9	42.2	
Neutralization Number	D974	0.05 Max. Mg Koh/G	0.028	0.014	0.014	
Interfacial Tension	D971	32 Dynes/ Cm Min.	32.2	32.3	33.0	
Specific Gravity	D1298	0.84 - 0.91	0.849	0.848	0.848	
Colour	D1500	≤3.5 Max.	0.5	0.5	0.5	
Visual Condition	D1524	Clear	Clear	Clear	Clear	

	Observations & Comments
Comments:	<ul> <li>Blue &amp; White phases' oil levels are marginal. Blue is lower.</li> <li>Signs of "corona" on White φ elbow. Water apparently dropping from above.</li> <li>Red φ vault ground broken off grate. This has been repaired by our personnel.</li> </ul>
Results Satisfactory:	FAIR

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## **Client Information**

Customer	Toronto Zoo	Date	June 14, 1999		
File Number	6621	Tested By	RPM/JRK		
Location	361A Old Finch Ave., Scarborough, Ontario				
Equipment I.D.	Vault #35				

		Transform	ner Nameplate Data			States for a
Manufacturer	Westingho	use	Year Built	1973		
Туре	ONAN		Serial #'s	Red Ø: 971929 White Ø: 871928 Blue Ø: 871925		
Neutral	Solid		Liquid Type/Vol	Oil	16	Gal
Rating	25	kVA	Total Weight	465		lbs.
Impedance	1.9	%	Primary Voltage	16		kVolt
Phase(s)	1	ф	Secondary Voltage	120/ 240	)	Volt
Frequency	60	Hz	BIL	125		kVolt

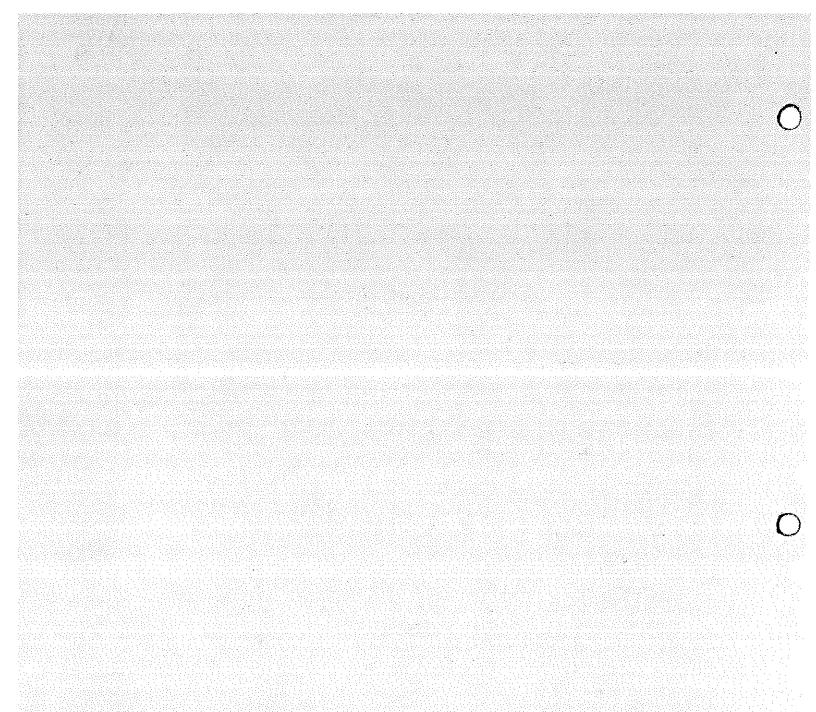
Oil Analysis								
	Lab	oratory Tests			t Blairi			
Type of Test ASTM No. Acceptable Limits				Test Results				
			Red	White	Blue			
Dielectric Breakdown	D877	30 kV Min.	41.8	42.8	38.0			
Neutralization Number	D974	0.05 Max. Mg Koh/G	0.021	0.021	0.021			
Interfacial Tension	D971	32 Dynes/ Cm Min.	32.4	32.7	31.7			
Specific Gravity	D1298	0.84 - 0.91	0.848	0.848	0.848			
Colour	D1500	≤3.5 Max.	0.5	0.5	0.5			
Oisual Condition	D1524	Clear	Clear	Clear	Clear			

	Observations & Comments
Comments:	• Red Ø – oil level is low
	Blue Ø – oil is marginal
	and the state of t
Results Satisfactory:	Fair

T.S. P\_Trans\_Elect

# **APPENDIX 20**

BLACK & McDONALD – SUBMERSIBLE TRANSFORMER FAILURE/REPLACEMENT REPORT DATED AUGUST 1999, REFERENCE NO. 6637





#### Technical Field Service Division

31 Pullman Court, Scarborough, Ontario MIX 1E4. Phone: (416)-298-9977 Fax: (416)-298-2907

June 8, 1999

Metro Toronto Zoo 361A Old Finch Ave. Scarborough, Ontario M1B 5K7

Attention:

Mr. Dean Evans

Maintenance/ Facilities Supervisor

Subject:

Submersible Transformer Failure / Replacement Report

Our Reference:

6638

#### Dear Sir:

Further to the power interruption that occurred on May 18<sup>th</sup>, please find the results of our investigation enclosed herein.

#### Initial Observations & Action:

- A single phase feed 27.6kV S&C fuse was found to have operated in the Eurasia Pavilion substation. The affected feed supplied three (3) submersible transformer vaults.
- The blown link was replaced and tested.
- The associated lightning arrestor was also tested at 5kVDC and found to be acceptable for continued use.
- The feed was re-energised and the new fuse did not operate.
- The 3 individual submersible vaults were subsequently inspected.
- The transformer adjacent to the "Bird Barn" was found to not be supplying power.
- After confirming that voltage was indeed present at the cable termination point to the transformer, the feed was isolated and the transformer tested.

#### **Transformer Test Results:**

- Insulation resistance ("Megger") testing of the transformer 240V secondary winding resulted in a less than acceptable reading 

  3.5MΩ. Industry standards require a minimum value of 100MΩ for this type of unit.
- Dissipation factor readings measured beyond the readable scale of the test set.
- High capacitance readings on the secondary winding confirmed this as the point of failure.
- Sampling of the transformer oil immediately gave evidence of internal failure by the oil's black/yellow colour (due to carbonisation).
- The dielectric breakdown of the oil was laboratory tested at 18.6kV a clear failure by any accepted standard.

#### Technical Field Service Division

31 Paliman Court, Scarborough, Ontario M1X 1E4. Phone: (416)-298-9977 Fax: (416)-298-2907

#### Remedial Action Taken:

- As a result of the clear failure of the existing submersible transformer, it was removed from service.
- A new, compatible unit was sourced, supplied, tested, and installed.
- The failed transformer was removed from site and is being evaluated for repair or replacement.
- The old unit has been confirmed as being PCB-free.

I trust that this report will meet your requirements. We thank you for this service opportunity and invite any questions you may have. If there are any further concerns, please do not hesitate to contact the undersigned or Fred Tanguay (Tech. Service Manager) at any time.

Regards,

**BLACK & McDONALD LIMITED** 

R.P. (Rodger) Morgan

Utility Technical Field Services



**Special Projects Group** 

#### **Client Information**

Customer	Metro Toronto Zoo	Date	May 18, 1999
File Number	6638	Tested By	R. Morgan
Location	Scarborough, Ontario	.,	
Equipment I.D.	Submersible Transformer (Old Unit)		
Substation	Bird Barn Submersible Vault		

#### **Power Transformer -Electrical**

	, See Jan	Na	meplate Data			
Manufacturer	Westingh	ouse	Vector Group	240/ 120 Centre Tapped		
Туре	ONAN		Serial #.	861942		
Neutral	Solid Gro	ound	Liquid Type/Vol	Oil	38	Gal
Rating	100	kVA	Total Weight	1,300		lbs.
Impedance	1.8	%	Primary Voltage	16		kVolt
Phase	1	ф	Secondary Voltage	240/12	20	Volt
Frequency	60	Hz	BIL	125	•	kVolt

Insulation Tests Prim. With Insulation Resistance Sec. With Prim. & Sec. @ 5k / 500 VDC Sec. Grounded Prim. Grounded To Ground 87,000 65,500  $M\Omega$ 3.46 Corrected to 20 °C.

	CH-L+G	CH-G	CH-L	CL-G	CL-H+G
Cap (pF)	122	117	4	3000	3000
Corr. 20 °C					
		N Charles		ers organización	t <b>e</b> geografia
Dis. Fact.(%)	11.22	13.00		>39.99	>39.99

Corr. 20 °C.

Тар	Primary Volts	Calculated Ratio	<u>X0-X2</u> H1-H2	<u>X0-X3</u> H2-H3	<u>X0-X1</u> H3-H1
1					
2					
3					
4					
5					
					,

Tap Position Found & Left Results Satisfactory NO

T.S. P\_Trans\_Elect

The second