

REPORT ON SITE SERVICES STUDY

For

TORONTO ZOO

Prepared for:

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Prepared by:

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Project No: 850**

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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

Water: 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.

Gas: 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.

Sewers: 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.

Communication: 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.
2. 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:

Portfolio Summary Cost Report: 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.

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

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 Life Cycle Costing Assumptions

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 Mayoock and Steve Doran of the Scarborough Fire Department. The team spoke with Craig Rose of Marshall Macklin and Monaghan. 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 Appendixes 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.
2. 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.

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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.

APPENDIX 1

PORTFOLIO SUMMARY REPORT



Portfolio Summary Report

METROPOLITAN TORONTO ZOO

Building Name	Replacement	2000	2001	2002	2003	2004	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	\$266,009	\$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	\$60,756	\$62,578	\$342,204	\$396,708	\$459,893	\$533,142	\$2,027,135
Required Repairs											
Toronto Zoo	\$1,150,000.00	\$338,150									\$338,150
Required Repairs	\$1,150,000	\$338,150	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$338,150
Total		\$478,750	\$175,718	\$187,198	\$139,978	\$250,538	\$608,212	\$966,000	\$666,541	\$925,678	\$4,580,614



APPENDIX 2

DETAILED COST REPORT

REQUIRED REPAIRS

CAPITAL IMPROVEMENT

PREVENTIVE MAINTENANCE



Detailed Cost Report

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

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METROPOLITAN TORONTO ZOO

Toronto Zoo
Required Repairs

ID	Recommendation	2000	2001	2002	2003	2004	2005-2009	2010-2014	2015-2019	2020-2024	SubTotal
ELECTRICAL											
ELRR-001	Primary and Secondary Cables	\$20,000									\$20,000
ELRR-002	Flooding of Cables										\$0
ELRR-003	Main Outdoor Switchgear	\$10,000									\$10,000
ELRR-004	Outdoor Switchgear										\$0
ELRR-005	Vaults	\$3,000									\$3,000
ELRR-006	Power Cables										\$0
ELRR-007	Transformers										\$0
ELRR-008	Black & McDonald Report	\$45,000									\$45,000
ELECTRICAL Sub Total		\$78,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$78,000

WATER SYSTEM											
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	\$600									\$600
WSRR-006	Hydrant	\$400									\$400
WSRR-007	Hydrant	\$150									\$150
WSRR-008	Hydrant	\$600									\$600
WSRR-009	Hydrant	\$500									\$500
WSRR-010	Hydrant	\$2,000									\$2,000
WSRR-011	General	\$40,000									\$40,000
WATER SYSTEM Sub Total		\$147,250	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$147,250

STORM/SANITARY SEWER											
SSRR-001		\$30,000									\$30,000
SSRR-002		\$300									\$300
SSRR-003											\$0
SSRR-004											\$0
SSRR-005											\$0
SSRR-006		\$10,000									\$10,000
SSRR-007		\$2,000									\$2,000
SSRR-008	None	\$65,000									\$65,000
SSRR-009	General	\$600									\$600
STORM/SANITARY SEWER Sub Total		\$107,900	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$107,900

Detailed Cost Report

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

Toronto Zoo
Required Repairs

METROPOLITAN TORONTO ZOO

ID	Recommendation	2000	2001	2002	2003	2004	2005-2009	2010-2014	2015-2019	2020-2024	SubTotal
GAS SYSTEM											
GSRR-003	General	\$5,000									\$5,000
	Sub Total	\$5,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$5,000
Required Repairs											
	Sub Total	\$338,150	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$338,150
	Toronto Zoo	\$338,150	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$338,150
	Total	\$338,150	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$338,150

Detailed Cost Report

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METROPOLITAN TORONTO ZOO

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

Toronto Zoo
Capital Improvement

ID	Recommendation	2000	2001	2002	2003	2004	2005-2009	2010-2014	2015-2019	2020-2024	SubTotal
ELECTRICAL											
ELCA-004	Replace underground cable between North	\$50,000									\$50,000
ELCA-005	Replace Light Standards - 6% every 5 years.			\$6,365			\$7,829		\$9,628	\$11,842	\$35,664
ELCA-006	Repair Transformer Vault -20% every 10 yea							\$20,159			\$20,159
ELCA-007	Replace 30% of elec. Panels every 5 years.			\$5,305			\$6,524		\$8,024	\$9,868	\$29,720
ELCA-008	Replace transf. 4 every 2 years	\$25,000		\$26,523		\$28,138	\$61,521	\$107,057	\$82,878	\$143,875	\$474,791
ELCA-009	Replace underground power cables between		\$103,000								\$103,000
ELCA-010	Replace underground power cable between			\$39,784							\$39,784
ELCA-011	Replace underground power cables between				\$68,295						\$68,295
ELCA-012	Replace underground power cables between				\$56,275						\$56,275
ELCA-013	Replace underground power cables between						\$96,946				\$96,946
ELECTRICAL		\$76,000	\$103,000	\$77,976	\$68,295	\$84,413	\$162,519	\$127,215	\$100,330	\$165,585	\$604,534
		Sub Total									

ID	Recommendation	2000	2001	2002	2003	2004	2005-2009	2010-2014	2015-2019	2020-2024	SubTotal
WATER SYSTEM											
WWSA-002	Replace 20% of water valves every 4 years.					\$90,041		\$114,061		\$144,489	\$348,590
WWSA-003	Replace 20% Of drinking fountains every 5						\$1,391		\$1,870		\$3,261
WWSA-004	Replace 30% Of manholes in 15 years								\$37,391		\$37,391
WWSA-005	Replace pumping station in 5 years						\$34,778				\$34,778
WWSA-006	Repairs to 20% water main chamber in 15 yr								\$15,560		\$15,560
WWSA-007	Replace 100 feet of water mains every 2 yrs.			\$21,218			\$23,881	\$57,130	\$34,049	\$38,322	\$174,600
WATER SYSTEM		\$0	\$0	\$21,218	\$0	\$90,041	\$60,050	\$171,191	\$68,859	\$182,811	\$614,200
		Sub Total									

ID	Recommendation	2000	2001	2002	2003	2004	2005-2009	2010-2014	2015-2019	2020-2024	SubTotal
STORM/SANITARY SEWER											
SSCA-001	Replace pipes - 6 m every 5 yrs.						\$11,593		\$15,590		\$27,172
SSCA-002	Replace pumping station in 10 yrs.							\$107,513			\$107,513
SSCA-003	Repair 50% of manholes in 15 yrs.								\$77,898		\$77,898
SSCA-005	Replace 100% of area drains in 13 yrs							\$10,280			\$10,280
SSCA-007	Replace in 10 years.							\$107,513			\$107,513
SSCA-008	Replace 50% Of manholes in 15 yrs								\$46,739		\$46,739
SSCA-010	Replace 50% Of Catch Basins in 15 yrs								\$46,739		\$46,739
STORM/SANITARY SEWER		\$0	\$0	\$0	\$0	\$0	\$11,593	\$228,306	\$186,956	\$0	\$423,855
		Sub Total									

ID	Recommendation	2000	2001	2002	2003	2004	2005-2009	2010-2014	2015-2019	2020-2024	SubTotal
COMMUNICATION SYSTEM											
CSCA-002	Allowance for equip. technology upgrdae							\$20,159			\$20,159
CSCA-004	Underground communication cables between	\$10,000									\$10,000
CSCA-005	Underground communication cables between		\$12,360								\$12,360
CSCA-006	Underground communication cables between			\$7,957							\$7,957

Detailed Cost Report

SITE SERVICES ASSESSMENT FOR LONG TERM
 FACILITY RENEWAL PLANNING,
 TORONTO ZOO
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Toronto Zoo
 Capital Improvement

METROPOLITAN TORONTO ZOO

ID	Recommendation	2000	2001	2002	2003	2004	2005-2009	2010-2014	2015-2019	2020-2024	SubTotal
CSCA-007	Underground communication cables between				\$10,927						\$10,927
CSCA-008	Underground communication cables between					\$10,130					\$10,130
CSCA-009	Underground communication cables between						\$12,752				\$12,752
COMMUNICATION SYSTEM											
	Sub Total	\$10,000	\$12,960	\$7,957	\$10,927	\$10,130	\$12,752	\$20,159	\$0	\$0	\$84,264

GAS SYSTEM

GSCA-001	Repair Gas system valves - 20% every 2 ye			\$1,081			\$1,194	\$2,857	\$1,702	\$1,916	\$8,730
GSCA-002	Repair gas/fittings - 6 m every two year		\$3,090			\$3,377	\$3,690	\$8,437	\$10,075	\$5,748	\$34,416
GSCA-003	Repair regulators/meimeters - 20% every 5 ye						\$13,911	\$16,127	\$18,696	\$21,873	\$70,407
GAS SYSTEM											
	Sub Total	\$0	\$3,090	\$1,081	\$0	\$3,377	\$18,795	\$27,421	\$30,473	\$29,338	\$113,664
Capital Improvement											
	Sub Total	\$85,000	\$118,450	\$108,212	\$79,223	\$187,960	\$286,009	\$671,292	\$408,648	\$377,733	\$2,200,627
Toronto Zoo											
	Sub Total	\$85,000	\$118,450	\$108,212	\$79,223	\$187,960	\$286,009	\$671,292	\$408,648	\$377,733	\$2,200,627
	Total	\$85,000	\$118,450	\$108,212	\$79,223	\$187,960	\$286,009	\$671,292	\$408,648	\$377,733	\$2,200,627

Detailed Cost Report

Toronto Zoo
 Preventive Maintenance

METROPOLITAN TORONTO ZOO

ID	Recommendation	2000	2001	2002	2003	2004	2005-2009	2010-2014	2015-2019	2020-2024	SubTotal
WATER SYSTEM											
WSPM-001	Fire Hydrants -Water System	\$5,500	\$5,665	\$5,835	\$6,010	\$6,190	\$33,851	\$39,243	\$45,483	\$52,739	\$200,526
WSPM-002	Fire Hydrants	\$5,800	\$5,974	\$6,153	\$6,338	\$6,528	\$35,698	\$41,363	\$47,874	\$55,616	\$211,464
WSPM-003	Fire Hydrants	\$5,800	\$5,974	\$6,153	\$6,338	\$6,528	\$35,698	\$41,363	\$47,874	\$55,616	\$211,464
WSPM-004	General	\$4,000	\$4,120	\$4,244	\$4,371	\$4,502	\$24,619	\$28,540	\$33,088	\$38,356	\$145,837
	WATER SYSTEM	\$21,100	\$21,733	\$22,365	\$23,067	\$23,748	\$129,866	\$160,649	\$174,628	\$202,326	\$769,280
STORM/SANITARY SEWER											
SSPM-001	Catch Basins, Manholes and Drains	\$12,000	\$12,360	\$12,731	\$13,113	\$13,508	\$75,957	\$85,620	\$99,258	\$115,087	\$437,511
SSPM-002	Storm/Sanitary sewers	\$10,000	\$10,300	\$10,609	\$10,927	\$11,255	\$61,547	\$71,350	\$82,715	\$96,889	\$364,593
SSPM-003	Buried Pipes	\$1,000	\$1,030	\$1,061	\$1,093	\$1,128	\$6,155	\$7,135	\$8,271	\$9,589	\$38,459
SSPM-004	Buried Pipes	\$1,500	\$1,545	\$1,591	\$1,639	\$1,688	\$9,232	\$10,703	\$12,407	\$14,383	\$54,869
	STORM/SANITARY SEWER	\$24,500	\$25,235	\$25,982	\$26,772	\$27,576	\$160,791	\$174,808	\$202,651	\$234,926	\$893,252
GAS SYSTEM											
GSPM-001	Gas Lines and Valves	\$10,000	\$10,300	\$10,609	\$10,927	\$11,255	\$61,547	\$71,350	\$82,715	\$96,889	\$364,593
	GAS SYSTEM	\$10,000	\$10,300	\$10,609	\$10,927	\$11,255	\$61,547	\$71,350	\$82,715	\$96,889	\$364,593
	Preventive Maintenance	\$65,600	\$67,268	\$68,986	\$70,766	\$72,678	\$342,204	\$396,708	\$459,893	\$533,142	\$2,027,136
	Toronto Zoo	\$65,600	\$67,268	\$68,986	\$70,766	\$72,678	\$342,204	\$396,708	\$459,893	\$533,142	\$2,027,136
	Total	\$65,600	\$67,268	\$68,986	\$70,766	\$72,678	\$342,204	\$396,708	\$459,893	\$533,142	\$2,027,136



APPENDIX 3

RECOMMENDATION REPORT

REQUIRED REPAIRS

CAPITAL IMPROVEMENT

PREVENTIVE MAINTENANCE



ID	Location	Pty	Category	Description	Correction	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. Although 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.	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 conspicuously 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

Recommendation Report

Required Repairs Toronto Zoo

ELECTRICAL

ID	Location	Pty	Category	Description	Correction	Base Year Budget Cost
ELRR-006	General General	6	Functional	<p>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.</p>	<p>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 this, 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. This option appears to be the most viable under the circumstances and this has been recommended. The cost of this option is given in the section on Capital Improvement. It is further recommended that all occurrences of cable failure be properly documented, describing the cost of repair, nature and location of the problem and the type of repair conducted.</p>	\$0.00
ELRR-007	General General	6	Functional	<p>One transformer blow out was reported at the Lion House in 1996. One transformer blow out was reported at the African pad in 1996. Both occurrences were repaired. It was reported that repair workmen determined that these failures were the result of faulty installation by the contractor who installed the units.</p>	<p>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 reasonably 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 years. In addition, we recommend that all occurrences of transformer failures be documented, including repair cost and the nature and location of repair.</p>	\$0.00
ELRR-008	General General	2	Functional	<p>The High Voltage Maintenance Report completed by Black & McDonald dated August 1999, Reference Number 6621 contained 23 deficiencies. These deficiencies should be rectified.</p>	<p>It is recommended 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.</p>	\$45,000.00

ID	Location	Pty	Category	Description	Correction	Base Year Budget Cost
WSRR-001	General General	6	Functional	<p>It 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.</p>	<p>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 performed at a cost 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 away from the sections currently exhibiting leakage problems. In the event of a leak at the section of main between the city main and the point of intersection of the 8 inch line, the 14 inch main can be shut off and repaired while the 8 inch main continues 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/lm) \$100,000. We recommend the second option because replacing any of the section of the 14" does not guarantee that there will not be any further leakage.</p>	\$100,000.00
WSRR-002	General General	4	Life Safety	<p>Hydrant: The Hydrant near the South end of the Indo-Malayan Pavilion has a minor leak at the ground flange.</p>	<p>Service and repair the hydrant to stop the leak.</p>	\$500.00
WSRR-003	General General	4	Life Safety	<p>Hydrant: The Hydrant outside the Gorilla exhibit doors, at the inside/outside holding area leaked when fully charged.</p>	<p>Service and repair the hydrant to stop the leak.</p>	\$500.00
WSRR-004	General General	4	Life Safety	<p>Hydrant: The Hydrant near the inside/outside holding reported marginal test pressure.</p>	<p>Retain a serviceman to service this hydrant.</p>	\$2,000.00
WSRR-005	General General	4	Life Safety	<p>Hydrant: The secondary valve of the Hydrant North of the North American Pavilion (Century make), seized when in the open position.</p>	<p>Service and repair valve on hydrant.</p>	\$600.00
WSRR-006	General General	3	Functional	<p>Hydrant: Leaks were noted at the operating nut packing on the Hydrant North of the Australasia McDonald's restaurant.</p>	<p>Service and repair. Replace packing.</p>	\$400.00

ID	Location	Pty	Category	Description	Correction	Base Year Budget Cost
WSRR-007	General General	5	Life Safety	Hydrant: The left 2-1/2" port cap is missing on the Hydrant South of the Greenhouse.	Replace missing 2-1/2" port cap.	\$150.00
WSRR-008	General General	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 operble, 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	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

Recommendation Report
Required Repairs Toronto Zoo
WATER SYSTEM

ID	Location	Pty	Category	Description	Correction	Base Year Budget Cost
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WSRR-011	General General	4	Life Safety	<p>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 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 i.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 the lack of a complete looped system. As a result, the requirements of the City of Scarborough Fire Department, must be addressed.</p>	<p>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.</p>	\$40,000.00
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ID	Location	Pty	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 General	5	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 other rlocations. 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 where 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 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	5	Functional	Manholes were not clearly identified in the field.	Identify manholes in the field to match numbers on drawings. Add numbering to drawings.	\$2,000.00

Recommendation Report
Required Repairs
STORM/SANITARY SEWER

Toronto Zoo

METROPOLITAN TORONTO ZOO

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

Recommendation Report
 Required Repairs Toronto Zoo
 COMMUNICATION SYSTEM

Project Number 98920
 26-Oct-99
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 METROPOLITAN TORONTO ZOO

ID	Location	Qty	Category	Description	Correction	Base Year Budget Cost
CSRR-001	General General	0	Functional	At the time of this inspection and audit, no failure of either equipment or service cables were observed or reported.	No action required.	\$0.00

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

Recommendation Report
Required Repairs Toronto Zoo
GAS SYSTEM

Project Number 98820
 26-Oct-99
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 METROPOLITAN TORONTO ZOO

ID	Location	Pty	Category	Description	Correction	Base Year	Budget Cost
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GSRR-003	General General	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 serviceman to check all the regulators, valves and accessories and adjust these components as required.		\$5,000.00
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\$338,150.00

Recommendation Report
Capital Improvement Toronto Zoo
ELECTRICAL

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

Project Number 98820
 26-Oct-99
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METROPOLITAN TORONTO ZOO

ID	Location	Pty	Category	Description	Action	Units	Quantity	Budget Cost	Norm Life	Age	Rem. Life	First Occ	Succ Occ
ELCA-004	General General	3	Functional	Underground Service Cable	Replace underground cable between North Service to Americas	LM	4000	\$50,000	50	27	0	2000	2050
ELCA-005	General General	6	Functional	Light Standards	Replace Light Standards - 6% every 5 years.	each	33	\$6,000	30	27	2	2002	2007
ELCA-006	General General	6	Functional	Transformer Vault	Repair Transformer Vault -20% every 10 years	each	27	\$15,000	75	27	10	2010	2020
ELCA-007	General General	6	Functional	Electrical Panels	Replace 30% of elec. Panels every 5 years.	each	3	\$5,000	20	27	2	2002	2007
ELCA-008	General General	6	Functional	Transformers	Replace transf. 4 every 2 years	each	49	\$25,000	30	27	0	2000	2002
ELCA-009	General General	6	Maintenance	Underground Power Cables	Replace underground power cables between Americas & Africa Pav.	LF	4000	\$100,000	50	30	1	2001	2051
ELCA-010	General General	6	Functional	Underground power cable	Replace underground power cable between Africa and Indo Pav.	LF	1500	\$37,500	50	30	2	2002	2052
ELCA-011	General General	6	Functional	Underground power cables	Replace underground power cables between Indo Pav. To Front Entrance	LF	2500	\$62,500	50	30	3	2003	2053
ELCA-012	General General	6	Functional	Underground power cables	Replace underground power cables between Front Entrance & Australasia Pav.	LF	2000	\$50,000	50	30	4	2004	2054
ELCA-013	General General	6	Functional	Underground power cables	Replace underground power cables between Australasia to North service Pav.	LF	3000	\$75,000	50	30	5	2005	2055

ID	Location	Pty	Category	Description	Action	Units	Quantity	Budget Cost	Norm Life	Age	Rem. Life	First Occ	Succ Occ
WSCA-002	General General	6	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	6	Functional	Drinking Fountains-Water System	Replace 20%. Of drinking fountains every 5 years	each	18	\$1,200	10	20	5	2005	2010
WSCA-004	General General	6	Functional	Manholes - Water System.	Replace 30%. Of manholes in 15 years	each	5	\$24,000	50	27	15	2015	2030
WSCA-005	General General	6	Functional	Pumping Station	Replace pumping station in 5 years	each	1	\$30,000	20	27	5	2005	2025
WSCA-006	General General	6	Functional	Water Main Chamber	Repairs to 20% water main chamber in 15 yrs	each	1	\$10,000	50	27	15	2015	2035
WSCA-007	General General	6	Functional	Buried Water Pipe	Replace 100 feet of water mains every 2 yrs.	LM	12750	\$20,000	50	27	2	2002	2004

Recommendation Renort
 Capital Improvement Toronto Zoo
STORM/SANITARY SEWER

ID	Location	Pty	Category	Description	Action	Units	Quantity	Budget Cost	Norm Life	Age	Rem. Life	First Occ	Succ Occ
SSCA-001	General General	6	Functional	Pipe & Fittings	Replace pipes - 6 m every 5 yrs.	LM	19500	\$10,000	75	27	5	2005	2010
SSCA-002	General General	6	Functional	Pumping Station	Replace pumping station in 10 yrs.	Each	329	\$80,000	20	27	10	2010	2030
SSCA-003	General General	6	Functional	Manholes - Sewer System	Repair 50% of manholes in 15 yrs.	Each	329	\$50,000	50	27	15	2015	2065
SSCA-005	General General	6	Functional	General	Replace 100% of area drains in 13 yrs	Each	7	\$7,000	40	27	13	2013	2000
SSCA-007	General General	6	Functional	Pumping Station	Replace in 10 years.	each	329	\$80,000	20	27	10	2010	2020
SSCA-008	General General	6	Functional	Manholes - Storm System.	Replace 50%. Of manholes in 15 yrs	each	329	\$30,000	50	27	15	2015	2030
SSCA-010	General General	6	Functional	Catch Basins - Storm System.	Replace 50%. Of Catch Basins in 15 yrs	each	275	\$30,000	50	27	15	2015	2065

ID	Location	Pty	Category	Description	Action	Units	Quantity	Budget Cost	Norm Life	Age	Rem. Life	First Occ	Succ Occ
CSCA-002	General General	6	Functional	General	Allowance for equip. technology upgrade	LM	1	\$15,000	15	4	10	2010	2030
CSCA-003	General General	6	Functional	General	Replace undergrd cable	LM	12000	\$7,500	50	27	23	2023	2050
CSCA-004	General General	6	Functional	Underground Cables	Underground communication cables between North Service to Americas Pavilions.	LF	2000	\$10,000	50	30	0	2000	2050
CSCA-005	General General	6	Functional	Underground Communication Cables	Underground communication cables between Americas to Africa Pavilions.	LF	4000	\$12,000	50	30	1	2001	2051
CSCA-006	General General	6	Functional	Underground Communication Cables	Underground communication cables between Africa to Indo Pavilions.	LF	1500	\$7,500	50	30	2	2002	2052
CSCA-007	General General	6	Functional	Underground Communication Cables	Underground communication cables between Indo Pavilion to Front Entrance.	LF	2500	\$10,000	50	30	3	2003	2053
CSCA-008	General General	6	Functional	Underground Communication Cables	Underground communication cables between Front Entrance to Australasia Pavilions.	LF	2000	\$9,000	50	30	4	2004	2054
CSCA-009	General General	6	Functional	Underground Communication Cables	Underground communication cables between Australasia to North Service Pavilions.	LF	3000	\$11,000	50	30	5	2005	2055

ID	Location	Pty	Category	Description	Action	Units	Quantity	Budget Cost	Norm Life	Age	Rem. Life	First Occ	Succ Occ
GSCA-001	General General	6	Functional	Valves	Repair Gas system valves - 20% every 2 years	each	4	\$1,000	20	20	2	2002	2004
GSCA-002	General General	6	Functional	Gas pipes and fittings	Repair gas/fittings - 6 m every two year	LM	4150	\$3,000	75	27	1	2001	2003
GSCA-003	General General	6	Functional	Regulators and Meters	Repair regulators/meters - 20% every 5 years	each	30	\$12,000	25	20	5	2005	2005

ID	Location	Pty	Category	Description	Correction	Base Year Budget Cost
WSPM-001	General General	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	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.	\$5,800.00
WSPM-003	General General	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.	\$5,800.00
WSPM-004	General General	6	Maintenance	Manholes, valve and meter chambers. All site services including manholes, valve chambers and meters require annual cleaning and inspection.	Conduct annual inspection and cleaning of all these components on site. Allow an annual budget of \$4000.	\$4,000.00

ID	Location	Pty	Category	Description	Correction	Base Year Budget Cost
SSPM-001	General General	6	Maintenance	Catch Basins, Manholes and Area Drains. These site services components require annual cleaning to clear them of dirt and debris.	Flush these services components once every year. Allow annual budget of \$12000.	\$12,000.00
SSPM-002	General General	6	Maintenance	Manholes. These site services components require annual cleaning to clear them of dirt and debris.	Flush these services components once every year. Allow annual budget of \$10000.	\$10,000.00
SSPM-003	General General	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.	Conduct a camera survey of the storm sewer lines every 10 years. Allow an annual budget of \$ 1000.00	\$1,000.00
SSPM-004	General General	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.	Conduct a camera survey of the sanitary sewer lines every 10 years. Allow an annual budget of \$ 1500.00	\$1,500.00

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

Recommendation Report
 Preventive Maintenance Toronto Zoo
GAS SYSTEM

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 26-Oct-99
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 METROPOLITAN TORONTO ZOO

ID	Location	Pty	Category	Description	Correction	Base Year	Budget Cost
GSPM-001	General General	6	Maintenance	Gas Lines and Valves. Gas lines, meters, and valves require to be inspected periodically to check for signs of leaks, corrosion etc.	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.	\$10,000.00	

\$55,600.00



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 COST vs Adjusted Baseline

II. MULTI-YEAR ENERGY

QUARTERLY Energy Consumption

ANNUAL Energy Consumption & Cost

CITY OF TORONTO
TORONTO ZOO

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

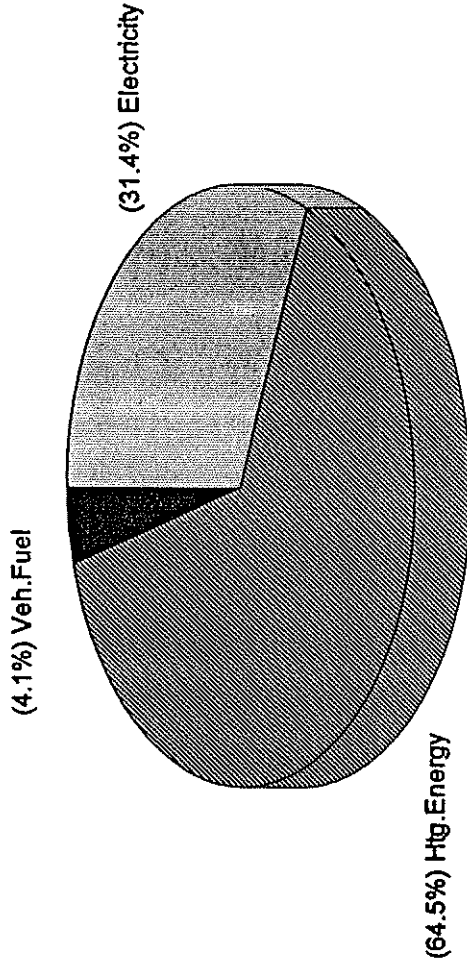
ENERGY TYPE	ENERGY CONSUMPTION				ENERGY COST			
	Name & Unit	Adj.Base 1995	Actual 1997	Energy Change	Percent Change	Adj.Base 1995	Actual 1997	Cost Change
Electricity kWh	10,206,299	10,171,317	(34,982)	-0.3%	\$732,724	\$727,829	(\$4,895)	-0.7%
Natural Gas m ³	1,802,733	2,011,432	208,699	11.6%	\$263,690	\$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 litre	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 m ³	28,849,623	30,972,943	2,123,321	7.4%	\$220,768	\$260,329	\$39,561	17.9%
Total	30,208,091	32,417,110	2,209,019	7.3%	\$1,283,842	\$1,355,396	\$71,554	5.6%

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.

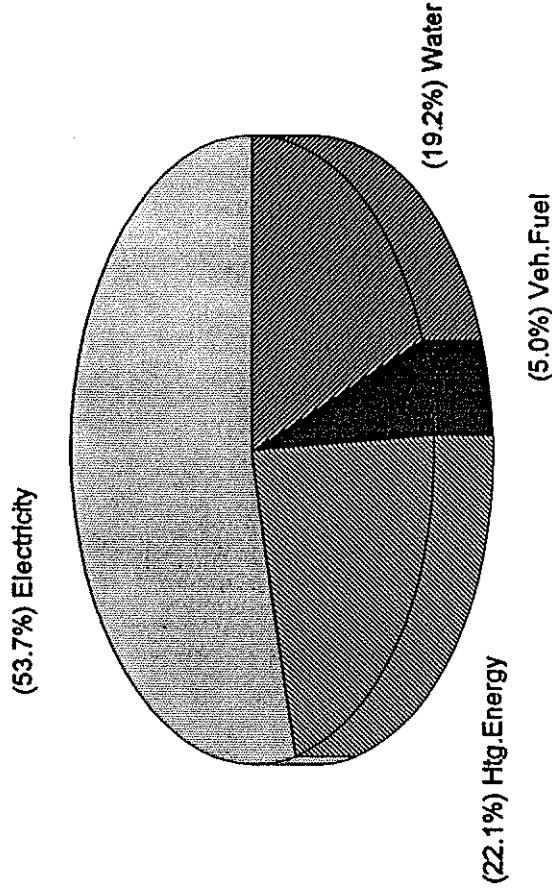
ALL FACILITIES
1997 Actual ENERGY CONSUMPTION & COST

Energy Consumption



Total 32,417.1 equivalent megawatt hours
Total 7,375 tonnes CO2

Energy Cost



Total \$1,355.4 millions

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

Prepared By: Metro Corporate & Human Resources Dept., Energy Management Office Date: 9/3/97 File: E:\energy\mcr\evf7maz.wk4, Pic-04

CITY OF TORONTO
TORONTO ZOO

MASTER METERS
1997 Actual ENERGY CONSUMPTION VS Adjusted Baseline

FACILITIES Facility ID and Name	ELECTRICITY (kWh)			NATURAL GAS (m ³)			WATER (m ³)			TOTAL (ekWh)		
	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
DR Domain Ride & Garage Bldg	188,060	152,460	-18.9%	—	—	—	—	—	—	188,060	152,460	-18.9%
FB Finch Barn	52,079	9,120	-82.5%	—	—	—	—	—	—	52,079	9,120	-82.5%
GHS Gate House	14,867	9,068	-39.0%	—	—	—	—	—	—	14,867	9,068	-39.0%
MB Main Barn	227,027	207,600	-8.6%	—	—	—	—	—	—	227,027	207,600	-8.6%
ZMM Zoo Main Meter	9,664,589	9,730,005	0.7%	1,802,733	2,011,432	11.6%	273,371	330,480	20.9%	28,307,913	30,531,631	7.9%
VH Valley Halla	25,828	19,096	-26.1%	—	—	—	—	—	—	25,828	19,096	-26.1%
ZPS Zoo Police Stable	33,849	43,968	29.9%	—	—	—	—	—	—	33,849	43,968	29.9%
Total	10,206,299	10,171,317	-0.3%	1,802,733	2,011,432	11.6%	273,371	330,480	20.9%	28,849,623	30,972,943	7.4%

MASTER METERS
1997 Actual ENERGY COST VS Adjusted Baseline

FACILITIES Facility ID and Name	ELECTRICITY COST			NATURAL GAS COST			WATER COST			TOTAL COST		
	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
DR Domain Ride & Garage Bldg	\$15,094	\$12,342	-18.2%	—	—	—	—	—	—	\$15,094	\$12,342	-18.2%
FB Finch Barn	\$4,965	\$833	-83.2%	—	—	—	—	—	—	\$4,965	\$833	-83.2%
GHS Gate House	\$1,387	\$850	-38.8%	—	—	—	—	—	—	\$1,387	\$850	-38.8%
MB Main Barn	\$18,617	\$16,130	-13.4%	—	—	—	—	—	—	\$18,617	\$16,130	-13.4%
ZMM Zoo Main Meter	\$687,572	\$692,323	0.7%	\$263,690	\$296,334	12.4%	\$220,768	\$260,329	17.9%	\$1,172,030	\$1,248,986	6.6%
VH Valley Halla	\$2,245	\$1,684	-25.0%	—	—	—	—	—	—	\$2,245	\$1,684	-25.0%
ZPS Zoo Police Stable	\$2,844	\$3,667	28.9%	—	—	—	—	—	—	\$2,844	\$3,667	28.9%
Total	\$732,724	\$727,829	-0.7%	\$263,690	\$296,334	12.4%	\$220,768	\$260,329	17.9%	\$1,217,182	\$1,284,492	5.5%

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).

CITY OF TORONTO
TORONTO ZOO

MCDONALD RESTAURANTS
1997 Actual ENERGY CONSUMPTION VS Adjusted Baseline

FACILITIES Facility ID and Name	ELECTRICITY (kWh)			NATURAL GAS (m ³)			WATER (m ³)			TOTAL (ekWh)		
	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	517,885	529,200	2.2%	82,097	73,153	-10.9%	6,979	5,008	-28.2%	1,366,905	1,285,723	-5.9%
ESB Eurasia Snack Bar	28,586	45,360	58.7%	—	—	—	899	469	-47.8%	28,586	45,360	58.7%
MGSB Main Gate Snack Bar	—	2,800	—	—	—	—	1,152	1,269	10.2%	—	2,800	—
MSB Madagascar Snack Bar	72,275	73,440	1.6%	—	—	—	928	700	-24.6%	72,275	73,440	1.6%
NAR North America Restaurant	290,282	321,200	10.7%	32,612	43,743	34.1%	7,917	7,649	-3.4%	627,548	773,579	23.3%
Total		972,000		116,896			15,095			2,180,902		
Total (excl. energy added after 1995)	909,028	969,200	6.6%	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

FACILITIES Facility ID and Name	ELECTRICITY COST			NATURAL GAS COST			WATER COST			TOTAL COST		
	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	\$37,661	\$37,911	0.7%	\$11,967	\$10,570	-11.7%	\$5,400	\$3,888	-28.0%	\$55,028	\$52,370	-4.8%
ESB Eurasia Snack Bar	\$1,839	\$3,222	75.2%	—	—	—	\$707	\$368	-48.0%	\$2,546	\$3,590	41.0%
MGSB Main Gate Snack Bar	—	\$213	—	—	—	—	\$896	\$987	10.2%	—	\$1,201	—
MSB Madagascar Snack Bar	\$5,049	\$5,169	2.4%	—	—	—	\$721	\$553	-23.3%	\$5,770	\$5,722	-0.8%
NAR North America Restaurant	\$21,021	\$22,863	8.8%	\$4,648	\$6,395	37.6%	\$6,148	\$5,899	-4.0%	\$31,817	\$35,157	10.5%
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).

CITY OF TORONTO
TORONTO ZOO

SUBMETERS
1997 Actual ENERGY CONSUMPTION VS Adjusted Baseline

FACILITIES	ELECTRICITY (kWh)			NATURAL GAS (m ³)			WATER (m ³)			TOTAL (ekWh)		
	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
AFP African Pavilion	—	1,225,207	—	434,394	487,994	12.3%	—	—	—	—	6,271,892	—
AFR Africa Rhino / Mixed Hoofstock	—	—	—	—	3,038	—	—	—	—	—	31,418	—
AMP Americas Pavilion	—	519,028	—	112,177	130,520	16.4%	—	—	—	26,898	1,868,824	—
APN Australasian Pavilion Nocturnal	—	—	—	2,601	2,355	-9.5%	—	—	—	—	24,351	-9.5%
AUP Australasian Pavilion	—	395,717	—	122,204	143,968	17.8%	—	—	—	—	1,884,589	—
BBH Baboon House	—	—	—	—	2,029	—	—	—	—	—	20,983	—
CHH Cheetah House	—	—	—	—	1,011	—	—	—	—	—	10,455	—
CL Caracal Lynx	—	—	—	—	2,207	—	—	—	—	—	22,824	—
DR Domain Ride & Garage Bldg	—	—	—	43,209	34,753	-19.6%	—	—	—	446,849	359,400	-19.6%
EH Elephants House	—	—	—	17,159	33,737	96.6%	—	—	—	177,456	348,902	96.6%
FC Family Centre	—	—	—	4,778	4,568	-4.4%	—	—	—	49,410	47,237	-4.4%
GGG Greenhouse Gift Shop	—	—	—	—	16,507	—	—	—	—	—	170,710	—
GH Giraffe House	—	—	—	9,789	10,876	11.1%	—	—	—	101,234	112,473	11.1%
GHG Gorilla Holding	—	—	—	14,984	9,219	-38.5%	—	—	—	154,958	95,340	-38.5%
GKB Groundskeeping Building	—	—	—	52,521	68,884	31.2%	—	813	—	543,151	712,374	31.2%
HPH Hippo House	—	—	—	58,434	74,902	28.2%	—	—	—	604,305	774,610	28.2%
IMP Indo-Malayan Pavilion	—	643,067	—	242,524	253,206	4.4%	—	—	—	695,691	519,293	-25.4%
IRB Indian Rhino Building	—	—	—	67,270	50,214	-25.4%	—	—	—	—	10,910	—
LH Lion House	—	—	—	—	1,055	—	—	—	—	—	81,038	—
LHH Lion House (Hyena)	—	—	—	—	7,836	—	—	—	—	—	110,863	—
MHS Mixed Hoofstock	—	—	—	—	10,720	—	—	—	—	—	185,509	—
MT Mayan Temple	—	—	—	—	17,938	—	—	—	—	—	417,119	1.6%
MW Malaysian Wood (Village Edge)	—	—	—	39,680	40,334	1.6%	—	—	—	410,364	417,119	1.6%
NSB North Services Building	—	—	—	396,110	410,429	6.3%	—	9,330	—	—	4,244,537	—
OAB Old Administrative Building	—	258,174	—	24,578	27,474	11.8%	—	—	—	—	542,298	—
OH Orangutan Holding	—	—	—	15,911	17,874	12.3%	—	—	—	164,551	184,851	12.3%
PBH Polar Bear Holding	—	—	—	—	4,696	—	—	—	—	—	48,565	—
ZSB Zoological Society Building	275,229	279,597	1.6%	7,280	4,912	-32.5%	2,225	1,459	-34.5%	350,516	330,397	-5.7%
Total	3,320,790	3,320,790	—	1,873,253	1,873,253	—	2,225	11,602	—	3,725,384	22,693,406	—
Total (excl. energy added after 1995)	275,229	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%

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).

CITY OF TORONTO
TORONTO ZOO

SUBMETERS
1997 Actual ENERGY COST VS Adjusted Baseline

FACILITIES	ELECTRICITY COST			NATURAL GAS COST			WATER COST			TOTAL COST		
	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
AFP African Pavilion	---	\$87,411	---	\$64,607	\$72,869	12.8%	---	---	---	---	\$160,280	---
AFR Africa Rhino / Mixed Hoofstock	---	---	---	---	\$439	---	---	---	---	---	\$439	---
AMP Americas Pavilion	---	\$36,876	---	\$16,748	\$19,526	16.6%	---	---	---	---	\$56,401	---
APN Australasian Pavilion Nocturnal	---	---	---	\$390	\$356	-8.6%	---	---	---	\$390	\$356	-8.6%
AUP Australasian Pavilion	---	\$28,071	---	\$18,244	\$21,676	18.8%	---	---	---	---	\$49,747	---
BBH Baboon House	---	---	---	---	\$313	---	---	---	---	---	\$313	---
CHH Cheetah House	---	---	---	---	\$146	---	---	---	---	---	\$146	---
CL Caracal Lynx	---	---	---	---	\$329	---	---	---	---	---	\$329	---
DR Domain Ride & Garage Bldg	---	---	---	\$6,496	\$5,221	-19.6%	---	---	---	\$6,496	\$5,221	-19.6%
EH Elephants House	---	---	---	\$2,552	\$5,057	98.2%	---	---	---	\$2,552	\$5,057	98.2%
FC Family Centre	---	---	---	\$713	\$684	-4.1%	---	---	---	\$713	\$684	-4.1%
GGG Greenhouse Gift Shop	---	---	---	---	\$2,481	---	---	---	---	---	\$2,481	---
GH Giraffe House	---	---	---	\$1,469	\$1,639	11.6%	---	---	---	\$1,469	\$1,639	11.6%
GHG Gorilla Holding	---	---	---	\$2,205	\$1,346	-39.0%	---	---	---	\$2,205	\$1,346	-39.0%
GKB Groundskeeping Building	---	---	---	\$7,882	\$10,297	30.6%	---	\$662	---	\$7,882	\$10,297	30.6%
HPH Hippo House	---	---	---	\$8,740	\$11,246	28.7%	---	---	---	\$8,740	\$11,246	28.7%
IMP Indo-Malayan Pavilion	---	\$45,721	---	\$36,171	\$37,955	4.9%	---	---	---	---	\$83,676	---
IRB Indian Rhino Building	---	---	---	\$10,062	\$7,539	-25.1%	---	---	---	\$10,062	\$7,539	-25.1%
LH Lion House	---	---	---	---	\$155	---	---	---	---	---	\$155	---
LHH Lion House (Hyena)	---	---	---	---	\$1,166	---	---	---	---	---	\$1,166	---
MHS Mixed Hoofstock	---	---	---	---	\$1,594	---	---	---	---	---	\$1,594	---
MT Mayan Temple	---	---	---	---	\$2,669	---	---	---	---	---	\$2,669	---
MW Malayan Wood (Village Edge)	---	---	---	\$5,915	\$6,021	1.8%	---	---	---	\$5,915	\$6,021	1.8%
NSB North Services Building	---	---	---	\$57,653	\$61,302	6.3%	---	\$7,383	---	---	\$61,302	---
OAB Old Administrative Building	---	\$18,448	---	\$3,682	\$4,114	11.7%	---	---	---	---	\$22,563	---
OH Orangutan Holding	---	---	---	\$2,358	\$2,676	13.5%	---	---	---	\$2,358	\$2,676	13.5%
PBH Polar Bear Holding	---	---	---	---	\$707	---	---	---	---	---	\$707	---
ZSB Zoological Society Building	\$19,506	\$19,935	2.2%	\$1,105	\$744	-32.7%	---	\$1,186	-34.5%	\$22,423	\$22,491	0.3%
Total		\$236,462		\$280,269				\$9,231		\$71,206	\$518,543	
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 kilowatt-hour (1 cubic metre of Natural Gas = 10.3417 ekWh).

II. MULTI-YEAR ENERGY

QUARTERLY Energy Consumption

ANNUAL Energy Consumption & Cost

CITY OF TORONTO
TORONTO ZOO

MULTI-YEAR QUARTERLY ENERGY CONSUMPTION
(Excluding McDonalds)

ENERGY TYPE		1st QTR	2nd QTR	3rd QTR	4th QTR	TOTAL	Tonnes CO2
1997 ACTUAL CONSUMPTION							
Electricity	kWh	2,690,350	2,109,088	1,929,473	2,470,406	9,199,317	2,451
Natural Gas	m ³	878,934	332,633	99,944	583,025	1,894,536	4,038
Heating Oil	Litre	6,263	1,186	—	1,780	9,229	29
Gasoline	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
Water	m ³	31,001	71,204	62,328	150,851	315,384	—
Total	ekWh	12,114,729	5,877,212	3,408,673	8,835,589	30,236,204	6,848
Tonnes of CO2		2,674	1,353	834	1,987	6,848	6,848

1996 ACTUAL CONSUMPTION							
Electricity	kWh	3,067,791	2,054,795	1,755,495	2,267,879	9,145,960	2,436
Natural Gas	m ³	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	m ³	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 CO2		2,745	1,358	729	1,853	6,684	6,684

1995 ACTUAL CONSUMPTION							
Electricity	kWh	2,780,268	2,103,835	2,004,690	2,394,446	9,283,239	2,473
Natural Gas	m ³	706,538	325,526	92,599	496,452	1,621,115	3,455
Heating Oil	Litre	15,155	5,943	—	—	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	m ³	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 CO2		2,365	1,353	810	1,768	6,296	6,296

1994 ACTUAL CONSUMPTION							
Electricity	kWh	2,635,799	1,751,056	1,552,095	2,173,911	8,112,861	2,161
Natural Gas	m ³	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 ³	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 CO2		2,207	1,115	669	1,598	5,589	5,589

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

02-26-1998

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

FACILITY ENERGY TYPE NAME	-----1995-----		-----1996-----		-----1997-----	
	USE	COST	USE	COST	USE	COST
ALL FACILITIES						
ELECTRICITY (KWH)	10,256,879	\$769,549	10,109,360	\$750,680	10,171,317	\$727,829
DEMAND (KW)	20,183		19,143		19,031	
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	\$13,070
PROPANE (L)	50,973	\$15,751	57,589	\$20,924	61,645	\$21,650
WATER (M3)	368,635	\$274,177	306,823	\$245,629	330,480	\$260,320
TOTAL (EKWH)	29,614,634	\$1,366,175	31,723,864	\$1,354,054	32,417,110	\$1,355,390

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

02-26-1998

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 ENERGY TYPE NAME	-----1995-----		-----1996-----		-----1997-----	
	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

A handwritten signature in black ink, appearing to be 'L.A. Snow', written over a horizontal line.

L.A. Snow
LAS/jn

Encl.
RSCL/1





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 B B
A BROWN OBARAZ -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.



STANDARD OIL TEST SHEET

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.

- DIELECTRIC: (Kilo Volt breakdown A. S. T. M. Standard) For safe and satisfactory operation, this should not be below 25 Kilo Volts.
ACID: Neutralization Number mg. KOH/g. New oil has a Neutralization Number of approximately .03. As this value increases, oxidation and final sludging is progressively indicated.
INTERFACIAL TENSION: (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.
COLOR: 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.

TEST RESULTS WERE AS FOLLOWS;

Table with 5 columns: SERIAL NO., NEUT NO., COLOUR, IFT, DIELECTRIC. Rows include Vault #28, #1, #26, #33, #29, #21, #20 with associated test numbers and results.

//



STANDARD OIL TEST SHEET

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.

- DIELECTRIC: (Kilo Volt breakdown A. S. T. M. Standard) For safe and satisfactory operation, this should not be below 25 Kilo Volts.
ACID: Neutralization Number mg. KOH/g. New oil has a Neutralization Number of approximately .03. As this value increases, oxidation and final sludging is progressively indicated.
INTERFACIAL TENSION: (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.
COLOUR: 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.

TEST RESULTS WERE AS FOLLOWS;

Table with 5 columns: SERIAL NO., NEUT NO., COLOUR, IFT, DIELECTRIC. Rows include Vault #22, Vault #6, Vault #34, Vault #13, and Vault #13A.

18



STANDARD OIL TEST SHEET

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.

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

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

INTERFACIAL TENSION: (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.

COLOR: 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.

TEST RESULTS WERE AS FOLLOWS;

Table with 5 columns: SERIAL NO., NEUT NO., COLOUR, IFT, DIELECTRIC. Rows include Vault #12, #35, #11, #8, #10, and N/A vaults with their respective test results.

12



STANDARD OIL TEST SHEET

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.

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

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

INTERFACIAL TENSION: (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.

COLOUR: 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.

TEST RESULTS WERE AS FOLLOWS;

Table with 5 columns: SERIAL NO., NEUT NO., COLOUR, IFT, DIELECTRIC. Rows include Vault N/A LG37991, Vault N/A 861965, Vault N/A 861965, Vault N/A #1-861941, #2-861940, #3-861943, and No #.

7

Ref. # 9951

METRO ZOO

1995

SHEET No. 1

INSPECTION & TEST REPORT FOR SERVICE ENTRANCE POLE & METALCLAD SWITCHGEAR
MAIN OUTLOOK SUBSTATION

MAIN INCOMING
Interrupter Switch Specifications: Manuf. SFC ELECTRIC Amps 600
Cat. # 34K2 K.V. 27.6

Insulation: Intact and thoroughly cleaned.

Alignment & Mechanism: Operated normally. Lubricated where necessary.

Contacts: Cleaned, conditioned and sealed against oxidation.

Interrupting Units: SATISFACTORY
 SEE GENERAL SHEET. NOTE #/
 NOT APPLICABLE

Lightning Arrester Specification Manuf. C.O.B. Type DYNAGAP
Cat. # 46615-5061 K.V. 24

Insulation: Intact and thoroughly cleaned.

Cementing: Free from deterioration.

Insulation Resistance Test: 1. 200+ 2. 200+ 3. 200+ megohms
The above values are satisfactory.

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.

Ref. # 9951

SHEET No. 2

INSPECTION & TEST REPORT FOR SERVICE ENTRANCE POLE & METALCLAD SWITCHGEAR

FEEDER TO EURASIA PAVILION

Interrupter Switch Specifications: Manuf. S?C ELECTRIC Amps 600

Cat. # 3456304-72 K.V. 27

Insulation: Intact and thoroughly cleaned.

Alignment & Mechanism: Operated normally. Lubricated where necessary.

Contacts: Cleaned, conditioned and sealed against oxidation.

Interrupting Units: SATISFACTORY
 SEE GENERAL SHEET. NOTE # 2.
 NOT APPLICABLE

Lightning Arrester Specification Manuf. C.O.B Type DYNAGAP

Cat. # 46615-2061 K.V. 24

Insulation: Intact and thoroughly cleaned.

Cementing: Free from deterioration.

Insulation Resistance Test: 1. 200⁺ 2. 200⁺ 3. 200⁺ megohms
The above values are satisfactory.

Fuse Specifications Manuf. S?C ELECTRIC

Mountings: Cat. # - K.V. - Amp - Type -

Holders: Cat. # 86644R-1 K.V. 34.5 Amp 300 Type SM-5

Refills: Cat. # B34250R4 K.V. 34.5 Amp 150 ^{ICC}Type 153.4

Resistance Test: 1. 725 2. 790 3. 755 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. 3

INSPECTION & TEST REPORT FOR SERVICE ENTRANCE POLE & METALCLAD SWITCHGEAR

FREDDO TO SERVICE BUILDING

Interrupter Switch Specifications: Manuf. SIC ELECTRIC Amps 600
Cat. # 34503K4-T2 K.V. 29

Insulation: Intact and thoroughly cleaned.

Alignment & Mechanism: Operated normally. Lubricated where necessary.

Contacts: Cleaned, conditioned and sealed against oxidation.

Interrupting Units: SATISFACTORY
 SEE GENERAL SHEET. NOTE #
 NOT APPLICABLE

Lightning Arrester Specification Manuf. G.E. Type DYNAGAP
Cat. # 26644K-1 K.V. 24

Insulation: Intact and thoroughly cleaned.

Cementing: Free from deterioration.

Insulation Resistance Test: 1. 200+ 2. 200+ 3. 200+ megohms
The above values are satisfactory.

Fuse Specifications Manuf. SIC ELECTRIC

Mountings: Cat. # - K.V. - Amp - Type -

Holders: Cat. # 86644R4 K.V. 34.5 Amp 300 Type SM-5

Refills: Cat. # 134250R-4 K.V. 34.5 Amp 150 Type JSC 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 & TEST REPORT FOR SERVICE ENTRANCE POLE & METALCLAD SWITCHGEAR

SOCIETY BUILDING

Interrupter Switch Specifications: Manuf. S & C ELECTRIC Amps 600

Cat. # 234533R4-1 K.V. 29

Insulation: Intact and thoroughly cleaned.

Alignment & Mechanism: Operated normally. Lubricated where necessary.

Contacts: Cleaned, conditioned and sealed against oxidation.

Interrupting Units: SATISFACTORY
 SEE GENERAL SHEET. NOTE #
 NOT APPLICABLE

Lightning Arrester Specification Manuf. O.B. Type LV

Cat. # 217117 K.V. 17 M.C.O.V

Insulation: Intact and thoroughly cleaned.

Cementing: Free from deterioration.

Insulation Resistance Test: 1. 200⁺ 2. 200⁺ 3. 200⁺ megohms
The above values are satisfactory.

Fuse Specifications Manuf. S & C ELECTRIC

Mountings: Cat. # - K.V. - Amp - Type -

Holders: Cat. # 86644R-2 K.V. 345 Amp 300 Type SM 5

Refills: Cat. # - K.V. 345 Amp 15 Type TCR 153-V

Resistance Test: 1. 2270 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.

TRANSFORMER INSPECTION & TEST SHEET No. 1

SOCIETY BUILDING

Manufacturer CARTE Serial No. NO7090-1

Type ONAN H.V. 27.6/16.0 L.V. 20FY 1120 Taps 4.2 1/2 %

Oil 877 K.V.A. 300

% Impedance 4.58 VECTOR WYE / WYE

Liquid Sample

Serial No.	Neut. No.	Colour	I.F.T.	Dielectric	Spec. Gravity
------------	-----------	--------	--------	------------	---------------

N.T

The above results are satisfactory.

Insulation Resistance Test

Test Voltage D.C.

H.V. to Ground 5/7 megohms 1000

L.V. to Ground 200 megohms

H.V. to L.V. 200 megohms

The above results are satisfactory.

Station Grounding System: 2.50 Ohm

TRANSFORMER INSPECTION & TEST SHEET No. 2

GENERAL CONDITIONS

Serial No. NO 7090-1

Bushings:

Insulation was intact and thoroughly cleaned.
Cementing was free from deterioration.

Gaskets:

- SATISFACTORY
 SEE GENERAL SHEET. NOTE

Paint:

- SATISFACTORY
 SEE GENERAL SHEET. NOTE

Liquid Level:

- SATISFACTORY
 SEE GENERAL SHEET. NOTE

Thermometer:

- SATISFACTORY
 SEE GENERAL SHEET. NOTE
MAXIMUM TEMPERATURE WAS 48 ° 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 C for 100% volts

Ref. # 9951

SHEET No. 5

INSPECTION & TEST REPORT FOR SERVICE ENTRANCE POLE & METALCLAD SWITCHGEAR

INDO-MALAYA PAVILION

Interrupter Switch Specifications: Manuf. SSE ELECTRIC Amps 600
CELL #1 - FEEDER TO
ENTRANCE TRANSFORMERS Cat. # 34003 K.V. 27

Insulation: Intact and thoroughly cleaned.

Alignment & Mechanism: Operated normally. Lubricated where necessary.

Contacts: Cleaned, conditioned and sealed against oxidation.

Interrupting Units: SATISFACTORY
 SEE GENERAL SHEET. NOTE #
 NOT APPLICABLE

Lightning Arrester Specification Manuf. OHIO BRIDES Type GP
Cat. # 46157 K.V. 24

Insulation: Intact and thoroughly cleaned.

Cementing: Free from deterioration.

Insulation Resistance Test: 1. 200+ 2. 200+ 3. 200+ megohms
The above values are satisfactory.

Fuse Specifications Manuf. NA

Mountings: Cat. # - K.V. - Amp - Type -

Holder: 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.

Ref. # 9951

SHEET No. 6

INSPECTION & TEST REPORT FOR SERVICE ENTRANCE POLE & METALCLAD SWITCHGEAR

FEEDER TO AFRICA PAVILION.

Interrupter Switch Specifications: Manuf. SEC ELECTRIC Amps 600
Cat. # 34002 K.V. 27

Insulation: Intact and thoroughly cleaned.
Alignment & Mechanism: Operated normally. Lubricated where necessary.
Contacts: Cleaned, conditioned and sealed against oxidation.

Interrupting Units:
 SATISFACTORY
 SEE GENERAL SHEET. NOTE #
 NOT APPLICABLE

Lightning Arrester Specification Manuf. OHIO BRASS Type G.P.
Cat. # 46159 K.V. 24

Insulation: Intact and thoroughly cleaned.
Cementing: Free from deterioration.

Insulation Resistance Test: 1. 200^f 2. 200^m 3. 200^l megohms
The above values are satisfactory.

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.

Ref. # 9951

SHEET No. 7

INSPECTION & TEST REPORT FOR SERVICE ENTRANCE POLE & METALCLAD SWITCHGEAR

FEEDER TO T2

Interrupter Switch Specifications: Manuf. S.E. ELECTRIC Amps 600
Cat. # 34563R4-T2 K.V. 27

Insulation: Intact and thoroughly cleaned.
Alignment & Mechanism: Operated normally. Lubricated where necessary.
Contacts: Cleaned, conditioned and sealed against oxidation.
Interrupting Units: SATISFACTORY
 SEE GENERAL SHEET. NOTE #
 NOT APPLICABLE

Lightning Arrester Specification Manuf. O.B. Type G.P.
Cat. # 46159 K.V. 24

Insulation: Intact and thoroughly cleaned.
Cementing: Free from deterioration.
Insulation Resistance Test: 1. 200⁺ 2. 200⁺ 3. 200⁺ megohms
The above values are satisfactory.

Fuse Specifications Manuf. SIC ELECTRIC

Mountings: Cat. # _____ K.V. _____ Amp _____ Type _____

Holders: Cat. # 86644R1 K.V. 34.5 Amp 300E Type SM-5

Refills: Cat. # 134040R4 K.V. 34.5 Amp 2S Type TCC 153.4

Resistance Test: 1. 1980 2. 1980 3. 19.5 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. 8

INSPECTION & TEST REPORT FOR SERVICE ENTRANCE POLE & METALCLAD SWITCHGEAR

Interrupter Switch Specifications: Manuf. SIC ELECTRIC Amps 600
PADLOCK FEETLOCK Cat. # 346024-T K.V. 27

Insulation: Intact and thoroughly cleaned.
Alignment & Mechanism: Operated normally. Lubricated where necessary.
Contacts: Cleaned, conditioned and sealed against oxidation.

Interrupting Units: SATISFACTORY
 SEE GENERAL SHEET. NOTE #
 NOT APPLICABLE

Lightning Arrester Specification Manuf. OHIO PIKASS Type GI
Cat. # 46615 K.V. 24

Insulation: Intact and thoroughly cleaned.
Cementing: Free from deterioration.
Insulation Resistance Test: 1. _____ 2. 1000 3. _____ megohms
The above values are satisfactory.

Fuse Specifications Manuf. SIC ELECTRIC

Mountings: Cat. # _____ K.V. _____ Amp _____ Type _____

Holders: Cat. # 86644E1 K.V. 34.5 Amp 300 Type SM-5

Refills: Cat. # 134125K4 K.V. 34.5 Amp 80 Type 153.4

Resistance Test: 1. _____ 2. 1170 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.

TRANSFORMER INSPECTION & TEST SHEET No. 1

INDO-MALAYA PAVILLION TRANSFORMER T-2

Manufacturer: WESTINGHOUSE Serial No. 795156

Ratio: 0 LWAN H.V. 27600Y/16000 L.V. 208Y/1120 Taps 4-2 1/2 % ±2

Oil: Liquid 200 K.V.A. 500/560

Impedance: 7.1 VECTOR WYE, WYE CSA

Liquid Sample

Oil No.	Neul. No.	Colour	I.F.T.	Dielectric	Spec. Gravity
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The above results are satisfactory.

Insulation Resistance Test

Test Voltage D.C.

H.V. to Ground	519	megohms	1000
L.V. to Ground	50	megohms	"
H.V. to L.V.	50	megohms	"

The above results are satisfactory.

Station Grounding System: 1.50 Ohm

TRANSFORMER INSPECTION & TEST SHEET No. 2

GENERAL CONDITIONS

Serial No. 795156

Bushings:

Insulation was intact and thoroughly cleaned.
Cementing was free from deterioration.

Gaskets:

- SATISFACTORY
- SEE GENERAL SHEET. NOTE

Paint:

- SATISFACTORY
- SEE GENERAL SHEET. NOTE

Liquid Level:

- SATISFACTORY
- SEE GENERAL SHEET. NOTE

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 271600 volts

Ref. # 9951

Sheet # 11

LOW VOLTAGE BREAKER / DISCONNECT DEVICE _____ & ENCLOSURES

Designation: INDO-MALAYA TRV. - MAIN.

SPECIFICATION:

Manufacturer : F.P.E
 Interrupt. Cap : 50KA
 Frame Size : 1600 AMP
 Elect. Operated: NA
 Manul. Operated: ✓

Serial # : TH-4142-72
 Volts : 600
 Type : SOH2
 Poles : 3
 Fixed: _____ / Draw Out: ✓

TRIPPING DEVICE:

Type: P.A.
 Longtime P/U : 1600 amps
 Shorttime P/U: 6400 amps
 Grd Fault P/U: NA amps
 Instant. P/U : NA amps
 Fused Rating & Manufacturer: _____

Coil/C.T. Rating 1600 amps
 Delay MIN T/B seconds
 Delay 15 CYCLE seconds
 Delay NA seconds

CONTACT RESISTANCE:

Phase I 32 Phase II 30 Phase III 32 microhms

INSULATION RESISTANCE:

Phase I 200+ Phase II 200+ Phase III 200+ megohms

GENERAL:

	O.K.	NOTE#		O.K.	NOTE#
1. Exterior Enclosure Condition	✓		12. Lubricated	✓	
2. Arcing Contacts	✓		13. Breaker Cleaned	✓	
3. Main Contacts	✓		14. Enclosure Cleaned	✓	
4. Exterior Breaker Condition	✓		15. Bus Connections	✓	
5. Tripping Device Condition		✓	16. Cable Connections	✓	
6. Manual Closing Operation	✓		17. Voltmeter	✓	
7. Manual Tripping Operation	✓		18. Ammeter	✓	
8. Electrical Closing Operation			19. Arc Chute Condition	✓	
9. Electrical Tripping Operation			20. Barrier Condition	✓	
10. Secondary Auxillary Contacts	✓		21. Single Phase Indicators		
11. Breaker Drawout Clusters	✓		22. Others		

The secondary equipment was serviced and left in satisfactory condition and consisted of

_____ Moulded Case Breakers
20 Fused Switches

Ref. # 9951

Sheet # 12

LOW VOLTAGE BREAKER / DISCONNECT DEVICE _____ & ENCLOSURES

Designation: INDO-MALAYA PAU - DP-ME

SPECIFICATION:

Manufacturer : F.P.E
 Interrupt. Cap : 50KA
 Frame Size : 1600AMP
 Elect. Operated: -
 Manul. Operated: ✓

Serial # : TH-4124/72
 Volts : 600
 Type : 50H-2
 Poles : 3
 Fixed: / Draw Out: _____

TRIPPING DEVICE:

Type: PA
 Longtime P/U : 1000 amps
 Shorttime P/U: NA amps
 Grd Fault P/U: NA amps
 Instant. P/U : 4000 amps
 Fused Rating & Manufacturer: _____

Coil/C.T. Rating 1000 amps
 Delay MIN T/B seconds
 Delay NA seconds
 Delay NA seconds
 _____ NA

CONTACT RESISTANCE:

Phase I 41 Phase II 42 Phase III 45 microhms

INSULATION RESISTANCE:

Phase I 200^t Phase II 200^t Phase III 200^t megohms

GENERAL:

	O.K.	NOTE#		O.K.	NOTE#
1. Exterior Enclosure Condition	✓		12. Lubricated	✓	
2. Arcing Contacts	✓		13. Breaker Cleaned	✓	
3. Main Contacts	✓		14. Enclosure Cleaned	✓	
4. Exterior Breaker Condition	✓		15. Bus Connections	✓	
5. Tripping Device Condition		✓	16. Cable Connections	✓	
6. Manual Closing Operation	✓		17. Voltmeter		
7. Manual Tripping Operation	✓		18. Ammeter		
8. Electrical Closing Operation			19. Arc Chute Condition	✓	
9. Electrical Tripping Operation			20. Barrier Condition	✓	
10. Secondary Auxillary Contacts			21. Single Phase Indicators		
11. Breaker Drawout Clusters			22. Others		

The secondary equipment was serviced and left in satisfactory condition and consisted of

- _____ Moulded Case Breakers
- _____ Fused Switches

Ref. # 9951

SHEET No. 13

INSPECTION & TEST REPORT FOR SERVICE ENTRANCE POLE & METALCLAD SWITCHGEAR

SERVICE BUILDING,

Interrupter Switch Specifications: Manuf. 330 ELECTRIC Amps 600

FEDER TO MAIN OUTDOOR SWITCHGEAR Cat. # 34063 K.V. 27

Insulation: Intact and thoroughly cleaned.

Alignment & Mechanism: Operated normally. Lubricated where necessary.

Contacts: Cleaned, conditioned and sealed against oxidation.

Interrupting Units: SATISFACTORY
 SEE GENERAL SHEET. NOTE #
 NOT APPLICABLE

Lightning Arrester Specification Manuf. OHIO BRASS Type G.P.
Cat. # 466159 K.V. 24

Insulation: Intact and thoroughly cleaned.

Cementing: Free from deterioration.

Insulation Resistance Test: 1. 200⁺ 2. 200⁺ 3. 200⁺ megohms
The above values are satisfactory.

Fuse Specifications Manuf. NA.

Mountings: Cat. # _____ K.V. _____ Amp _____ Type _____

Holder: 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.

Ref. # 9951

SHEET No. 14

INSPECTION & TEST REPORT FOR SERVICE ENTRANCE POLE & METALCLAD SWITCHGEAR

SERVICE BLDG
Interrupter Switch Specifications: Manuf. SIC ELECTRIC Amps 600
PADDOCK FELLER WEST Cat. # 34563.R4-75 K.V. 27

Insulation: Intact and thoroughly cleaned.
Alignment & Mechanism: Operated normally. Lubricated where necessary.
Contacts: Cleaned, conditioned and sealed against oxidation.

Interrupting Units: SATISFACTORY
 SEE GENERAL SHEET. NOTE #
 NOT APPLICABLE

Lightning Arrester Specification Manuf. OHIO BRASS Type G.F.
Cat. # 46159 K.V. 24

Insulation: Intact and thoroughly cleaned.
Cementing: Free from deterioration.
Insulation Resistance Test: 1. _____ 2. 200¹ 3. _____ megohms
The above values are satisfactory.

Fuse Specifications Manuf. SIC ELECTRIC

Mountings: Cat. # _____ K.V. _____ Amp _____ Type _____

Holders: Cat. # 80044K1 K.V. 34.5 Amp 300 Type SM5

Refills: Cat. # 124125.R4 K.V. 54 Amp 200 Type 1/2" d

Resistance Test: 1. _____ 2. 1160 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.

Ref. # 9151

SHEET No. 15

INSPECTION & TEST REPORT FOR SERVICE ENTRANCE POLE & METALCLAD SWITCHGEAR

SERVICE BUILDING
Interrupter Switch Specifications: Manuf. S.E. ELECTRIC Amps 600
PADLOCK FEEDER BUS
Cat. # 34303L4-T5 K.V. 29

Insulation: Intact and thoroughly cleaned.
Alignment & Mechanism: Operated normally. Lubricated where necessary.
Contacts: Cleaned, conditioned and sealed against oxidation.
Interrupting Units: SATISFACTORY
 SEE GENERAL SHEET. NOTE #
 NOT APPLICABLE

Lightning Arrester Specification Manuf. CHIC PAISON Type SP
Cat. # 43119 K.V. 20

Insulation: Intact and thoroughly cleaned.
Cementing: Free from deterioration.
Insulation Resistance Test: 1. _____ 2. 200+ 3. _____ megohms
The above values are satisfactory.

Fuse Specifications Manuf. S.E. ELECTRIC

Mountings: Cat. # _____ K.V. _____ Amp _____ Type _____

Holders: Cat. # 26644R1 K.V. 20 Amp 200 Type SP

Refills: Cat. # 24125L4 K.V. 20 Amp 20 Type SP

Resistance Test: 1. _____ 2. 963 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.

Ref. # 9951

SHEET No. 16

INSPECTION & TEST REPORT FOR SERVICE ENTRANCE POLE & METALCLAD SWITCHGEAR

Service Building
Interrupter Switch Specifications: Manuf. SEC ELECTRIC Amps 600
Foot Caster Edwards
Cat. # 24062 K.V. 27

Insulation: Intact and thoroughly cleaned.
Alignment & Mechanism: Operated normally. Lubricated where necessary.
Contacts: Cleaned, conditioned and sealed against oxidation.

Interrupting Units: SATISFACTORY
 SEE GENERAL SHEET. NOTE #
 NOT APPLICABLE

Lightning Arrester Specification Manuf. CHIO BRASS Type G1
Cat. # 46159 K.V. 27

Insulation: Intact and thoroughly cleaned.
Cementing: Free from deterioration.
Insulation Resistance Test: 1. 200⁺ 2. 200⁺ 3. 200⁺ megohms
The above values are satisfactory.

Fuse Specifications Manuf. SEC ELECTRIC

Mountings: Cat. # _____ K.V. _____ Amp _____ Type _____

Holders: Cat. # 8640K1 K.V. 34.5 Amp 300 Type same

Refills: Cat. # 13400KV K.V. 34.5 Amp 65 Type 7cc 155-1

Resistance Test: 1. 1170 2. 1185 3. 1180 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. 17

INSPECTION & TEST REPORT FOR SERVICE ENTRANCE POLE & METALCLAD SWITCHGEAR

EURASIA DIVISION

Interrupter Switch Specifications: Manuf. SIEMENS Amps 600

Cat. # 3SD5100 K.V. 25

Insulation: Intact and thoroughly cleaned.

Alignment & Mechanism: Operated normally. Lubricated where necessary.

Contacts: Cleaned, conditioned and sealed against oxidation.

Interrupting Units: SATISFACTORY
 SEE GENERAL SHEET. NOTE #
 NOT APPLICABLE

Lightning Arrester Specification Manuf. OHIO BRASS Type GP

Cat. # 40109 K.V. 24

Insulation: Intact and thoroughly cleaned.

Cementing: Free from deterioration.

Insulation Resistance Test: 1. 200+ 2. 200+ 3. 200+ megohms

The above values are satisfactory.

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.

Ref. # 947

SHEET No. 18

INSPECTION & TEST REPORT FOR SERVICE ENTRANCE POLE & METALCLAD SWITCHGEAR

Interrupter Switch Specifications: Manuf. SACELECTRIC Amps 600
Cat. # 34563-75 K.V. 27

Insulation: Intact and thoroughly cleaned.

Alignment & Mechanism: Operated normally. Lubricated where necessary. SEE GENERAL

Contacts: Cleaned, conditioned and sealed against oxidation.

Interrupting Units: SATISFACTORY
 SEE GENERAL SHEET. NOTE #
 NOT APPLICABLE

Lightning Arrester Specification Manuf. OHIO PAPER Type G1
Cat. # 46159 K.V. 24

Insulation: Intact and thoroughly cleaned.

Cementing: Free from deterioration.

Insulation Resistance Test: 1. _____ 2. 200+ 3. 200+ megohms
The above values are satisfactory.

Fuse Specifications Manuf. SACELECTRIC

Mountings: Cat. # _____ K.V. _____ Amp _____ Type _____

Holders: Cat. # 86644/1 K.V. 24 Amp 300 Type SMF

Refills: Cat. # 134125 K11 K.V. 24 Amp 200 Type 100

Resistance Test: 1. _____ 2. 1000 3. 1200 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. 19

INSPECTION & TEST REPORT FOR SERVICE ENTRANCE POLE & METALCLAD SWITCHGEAR

EURASIA TRAVEL
Interrupter Switch Specifications: Manuf. SEE GENERAL SHEET Amps 600
FEEDER TO OUTSIDE SUR. Cat. # 3401-43 K.V. 29

Insulation: Intact and thoroughly cleaned.
Alignment & Mechanism: Operated normally. Lubricated where necessary.
Contacts: Cleaned, conditioned and sealed against oxidation.
Interrupting Units: SATISFACTORY
 SEE GENERAL SHEET. NOTE #
 NOT APPLICABLE

Lightning Arrester Specification Manuf. OHIO BRASS Type GP.
Cat. # 46159 K.V. 24

Insulation: Intact and thoroughly cleaned.
Cementing: Free from deterioration.
Insulation Resistance Test: 1. 200⁺ 2. 500⁺ 3. 200⁺ megohms
The above values are satisfactory.

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.

Ref. # 9951

SHEET No. 20

INSPECTION & TEST REPORT FOR SERVICE ENTRANCE POLE & METALCLAD SWITCHGEAR

EWINGIA 140.
Interrupter Switch Specifications: Manuf. S&C ELECTRIC Amps 600
TEST TO TEST
Cat. # 3456314-72 K.V. 27

Insulation: Intact and thoroughly cleaned.
Alignment & Mechanism: Operated normally. Lubricated where necessary.
Contacts: Cleaned, conditioned and sealed against oxidation.
Interrupting Units: SATISFACTORY
 SEE GENERAL SHEET. NOTE #
 NOT APPLICABLE

Lightning Arrester Specification Manuf. NA Type _____
Cat. # _____ K.V. _____

Insulation: Intact and thoroughly cleaned.
Cementing: Free from deterioration.
Insulation Resistance Test: 1. _____ 2. _____ 3. _____ megohms
The above values are satisfactory.

Fuse Specifications Manuf. S&C ELECTRIC

Mountings: Cat. # _____ K.V. _____ Amp _____ Type _____

Holders: Cat. # 8161021 K.V. 34.5 Amp 300 Type SM-5

Refills: Cat. # 12475KV K.V. 34.5 Amp 15 Type 152-4

Resistance Test: 1. 2200 2. 2200 3. 2170 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.

TRANSFORMER INSPECTION & TEST SHEET No. 1

WASIA PAULION TRANSFORMER-1

Manufacturer: WESTINGHOUSE Serial No. 249380

Oil: LAN H.V. 27 600/11 000 L.V. 208 Y 1 120 Taps 4-2 1/2 % 1 2

Oil Liquid: 200 K.V.A. 500/500

Impedance: 5.9 VECTOR WYE / WYE CSA

Oil Sample

Oil No.	Neut. No.	Colour	I.F.T.	Dielectric	Spec. Gravity

The above results are satisfactory.

Insulation Resistance Test

Test Voltage D.C.

H.V. to Ground	<u>5/3</u> megohms	<u>100</u>
L.V. to Ground	<u>60</u> megohms	"
H.V. to L.V.	<u>60</u> megohms	"

The above results are satisfactory.

Station Grounding System: 2.50 Ohm

TRANSFORMER INSPECTION & TEST SHEET No. 2

GENERAL CONDITIONS

Serial No. 849380

Bushings:

Insulation was intact and thoroughly cleaned.
Cementing was free from deterioration.

Gaskets:

- SATISFACTORY
- SEE GENERAL SHEET. NOTE

Paint:

- SATISFACTORY
- SEE GENERAL SHEET. NOTE

Liquid Level:

- SATISFACTORY
- SEE GENERAL SHEET. NOTE

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 27000 volts

Ref. # 9951

Sheet # 23

LOW VOLTAGE BREAKER / DISCONNECT DEVICE _____ & ENCLOSURES

Designation: EUKASIA DIVISION

IDENTIFICATION:

Manufacturer : V.T.E.
 Interrupt. Cap : 50KA
 Frame Size : 1600 AMP
 Elect. Operated: —
 Manul. Operated: ✓

Serial # : 98013
 Volts : (600 / 208 / 120)
 Type : K-1600
 Poles : 3
 Fixed: _____ / Draw Out: ✓

TRIPPING DEVICE:

Type: over
 Longtime P/U : 800 amps
 Shorttime P/U: 3200 amps
 Grd Fault P/U: 4A amps
 Instant. P/U : NH amps
 Fused Rating & Manufacturer: NH

Coil/C.T. Rating 800 amps
 Delay MIN 1/A seconds
 Delay MIN 1/B seconds
 Delay — seconds

CONTACT RESISTANCE:

Phase I 20 Phase II 20 Phase III 20 microhms

INSULATION RESISTANCE:

Phase I 1000 Phase II 1000 Phase III 1000 megohms

GENERAL:

	O.K.	NOTE#		O.K.	NOTE#
1. Exterior Enclosure Condition	✓		12. Lubricated	✓	
2. Arcing Contacts	✓		13. Breaker Cleaned	✓	
3. Main Contacts	✓		14. Enclosure Cleaned	✓	
4. Exterior Breaker Condition	✓		15. Bus Connections	✓	
5. Tripping Device Condition	✓		16. Cable Connections	✓	
6. Manual Closing Operation	✓		17. Voltmeter	✓	
7. Manual Tripping Operation	✓		18. Ammeter	✓	
8. Electrical Closing Operation			19. Arc Chute Condition	✓	
9. Electrical Tripping Operation			20. Barrier Condition	✓	
10. Secondary Auxillary Contacts	✓		21. Single Phase Indicators		
11. Breaker Drawout Clusters	✓		22. Others		

The secondary equipment was serviced and left in satisfactory condition and consisted of

- _____ Moulded Case Breakers
- 2 Fused Switches

Ref. # 9951

SHEET No. 24

INSPECTION & TEST REPORT FOR SERVICE ENTRANCE POLE & METALCLAD SWITCHGEAR

AFRICA PAVILION

Interrupter Switch Specifications: Manuf. S.I. ELECTRIC Amps 600

TRANSFORMER T-6

Cat. # 3456244-T2 K.V. 22

Insulation: Intact and thoroughly cleaned.
Alignment & Mechanism: Operated normally. Lubricated where necessary.
Contacts: Cleaned, conditioned and sealed against oxidation.

Interrupting Units: SATISFACTORY
 SEE GENERAL SHEET. NOTE #
 NOT APPLICABLE

Lightning Arrester Specification Manuf. N/A Type -
Cat. # - K.V. -

Insulation: Intact and thoroughly cleaned.
Cementing: Free from deterioration.
Insulation Resistance Test: 1. _____ 2. _____ 3. _____ megohms
The above values are satisfactory.

Fuse Specifications Manuf. S.I. ELECTRIC

Mountings: Cat. # _____ K.V. _____ Amp _____ Type _____

Holders: Cat. # 2004461 K.V. 22 Amp 300 Type SP-5

Refills: Cat. # 1240024 K.V. 22 Amp 40 Type SP-10

Resistance Test: 1. 1010 2. 1025 3. 1020 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. 25

INSPECTION & TEST REPORT FOR SERVICE ENTRANCE POLE & METALCLAD SWITCHGEAR

AFRICA DIVISION

Interrupter Switch Specifications: Manuf. E/C ELECTRIC Amps 600

FEEDER TO NORTH DIVISION

Cat. # 34013 K.V. 29

Insulation: Intact and thoroughly cleaned.

Alignment & Mechanism: Operated normally. Lubricated where necessary.

Contacts: Cleaned, conditioned and sealed against oxidation.

Interrupting Units: SATISFACTORY
 SEE GENERAL SHEET. NOTE #
 NOT APPLICABLE

Lightning Arrester Specification Manuf. OHIO BRASS Type DYNA-GAR

Cat. # 46615-2061 K.V. 24

Insulation: Intact and thoroughly cleaned.

Cementing: Free from deterioration.

Insulation Resistance Test: 1. 200¹ 2. 200¹ 3. 200¹ megohms
The above values are satisfactory.

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.

Ref. # 9951

SHEET No. 26

INSPECTION & TEST REPORT FOR SERVICE ENTRANCE POLE & METALCLAD SWITCHGEAR

APRIL TRAILION
Interrupter Switch Specifications: Manuf. SIEMENS Amps 600
FEEDER TO INDO-MALAYA TRV
Cat. # 4002 K.V. 22

Insulation: Intact and thoroughly cleaned.
Alignment & Mechanism: Operated normally. Lubricated where necessary.
Contacts: Cleaned, conditioned and sealed against oxidation.

Interrupting Units: SATISFACTORY
 SEE GENERAL SHEET. NOTE #
 NOT APPLICABLE

Lightning Arrester Specification Manuf. Ohio Electric Type Dynaf-GAF
Cat. # 4005 K.V. 24

Insulation: Intact and thoroughly cleaned.
Cementing: Free from deterioration.

Insulation Resistance Test: 1. 200⁺ 2. 200⁺ 3. 200⁺ megohms
The above values are satisfactory.

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.

Ref. # 9951

SHEET No. 27

INSPECTION & TEST REPORT FOR SERVICE ENTRANCE POLE & METALCLAD SWITCHGEAR

AFRICA PAVILION

Interrupter Switch Specifications: Manuf. S/C ELECTRIC Amps 600

PANLOCK - FEEDER

Cat. # 34563477 K.V. 27

Insulation: Intact and thoroughly cleaned.

Alignment & Mechanism: Operated normally. Lubricated where necessary.

Contacts: Cleaned, conditioned and sealed against oxidation.

Interrupting Units: SATISFACTORY SEE GENERAL SHEET. NOTE # NOT APPLICABLE

Lightning Arrester Specification Manuf. _____ Type _____

Cat. # _____ K.V. _____

Insulation: Intact and thoroughly cleaned.

Cementing: Free from deterioration.

Insulation Resistance Test: 1. _____ 2. _____ 3. _____ megohms
The above values are satisfactory.

Fuse Specifications Manuf. S/C ELECTRIC

Mountings: Cat. # _____ K.V. _____ Amp _____ Type _____

Holders: Cat. # 82640E1 K.V. 34.5 Amp 300 Type SM-5

Refills: Cat. # 134125R1 K.V. 24 Amp 75 Type TRC 153-V

Resistance Test: 1. _____ 2. 1200 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.

TRANSFORMER INSPECTION & TEST SHEET No. 1

Location EXHIBIT PAVILION Transformer T-6
 Manufacturer WESTINGHOUSE Serial No. 790150
 No. 1-NAN H.V. 27500Y/11000 L.V. 208-110 Taps 4-3 1/2
 Oil Liquid 350 K.V.A. 750/1000
 Impedance 6.0 VECTOR WYE / WYE USA

Oil Sample
 Label No. Neut. No. Colour I.F.T. Dielectric Spec. Gravity

The above results are satisfactory.

Insulation Resistance Test Test Voltage D.C.

H.V. to Ground	<u>5/g</u> megohms	<u>1000</u>
L.V. to Ground	<u>100</u> megohms	<u>"</u>
H.V. to L.V.	<u>100</u> megohms	<u>"</u>

The above results are satisfactory.

Station Grounding System: 4.50 Ohm

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

Liquid Level:

- SATISFACTORY
- SEE GENERAL SHEET. NOTE

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 27600 volts

Ref. # 9951

Sheet # 30

LOW VOLTAGE BREAKER / / DISCONNECT DEVICE _____ & ENCLOSURES

Designation: AFRICA VAVILON - MAIN

SPECIFICATION:

Manufacturer :	<u>F.P.F.</u>	Serial # :	<u>TH 4126-7?</u>
Interrupt. Cap :	<u>7500</u>	Volts :	<u>600 (120/208)</u>
Frame Size :	<u>2000 AMP</u>	Type :	<u>7500</u>
Elect. Operated:	<u>✓</u>	Poles :	<u>3</u>
Manul. Operated:	<u>✓</u>	Fixed: _____ / Draw Out: <u>✓</u>	

TRIPPING DEVICE:

Type: <u>PA</u>	Coil/C.T. Rating <u>2000</u> amps
Longtime P/U : <u>2000</u> amps	Delay <u>10.7/16</u> seconds
Shorttime P/U: <u>8000</u> amps	Delay <u>15 cycle</u> seconds
Grd Fault P/U: <u>-</u> amps	Delay <u>-</u> seconds
Instant. P/U : <u>-</u> amps	
Fused Rating & Manufacturer: _____	

CONTACT RESISTANCE:

Phase I 29 Phase II 30 Phase III 27 microhms

INSULATION RESISTANCE:

Phase I 200 Phase II 200 Phase III 200 megohms

GENERAL:

O.K. | NOTE#

O.K. | NOTE#

1. Exterior Enclosure Condition	✓		12. Lubricated	✓	
2. Arcing Contacts	✓		13. Breaker Cleaned	✓	
3. Main Contacts	✓		14. Enclosure Cleaned	✓	
4. Exterior Breaker Condition	✓		15. Bus Connections	✓	
5. Tripping Device Condition		✓	16. Cable Connections	✓	
6. Manual Closing Operation	✓		17. Voltmeter	✓	
7. Manual Tripping Operation	✓		18. Ammeter	✓	
8. Electrical Closing Operation	✓		19. Arc Chute Condition	✓	
9. Electrical Tripping Operation	✓		20. Barrier Condition	✓	
10. Secondary Auxillary Contacts	✓		21. Single Phase Indicators		
11. Breaker Drawout Clusters	✓		22. Others		

The secondary equipment was serviced and left in satisfactory condition and consisted of

_____ Moulded Case Breakers
 _____ Fused Switches

LOW VOLTAGE BREAKER / DISCONNECT DEVICE _____ & ENCLOSURES

Designation: ARKICIA PAULION - MCC-A1

IDENTIFICATION:

Manufacturer : F.P.E.
 Interrupt. Cap : 50kA
 Frame Size : 1600 AMP
 Elect. Operated: -
 Manul. Operated: ✓

Serial # : TH 4125-92
 Volts : 600
 Type : FDH-2
 Poles : 3
 Fixed: / Draw Out: _____

TRIPPING DEVICE:

Type: PA
 Longtime P/U : 1000 amps
 Shorttime P/U: - amps
 Grd Fault P/U: - amps
 Instant. P/U : 4000 amps
 Fused Rating & Manufacturer: _____

Coil/C.T. Rating 1000 amps
 Delay MIN T/R seconds
 Delay - seconds
 Delay - seconds
NA

CONTACT RESISTANCE:

Phase I 35 Phase II 42 Phase III 45 microhms

ISOLATION RESISTANCE:

Phase I 200 Phase II 200 Phase III 200 megohms

GENERAL:

	O.K.	NOTE#		O.K.	NOTE#
1. Exterior Enclosure Condition	✓		12. Lubricated	✓	
2. Arcing Contacts	✓		13. Breaker Cleaned	✓	
3. Main Contacts	✓		14. Enclosure Cleaned	✓	
4. Exterior Breaker Condition	✓		15. Bus Connections	✓	
5. Tripping Device Condition		✓	16. Cable Connections	✓	
6. Manual Closing Operation	✓		17. Voltmeter		
7. Manual Tripping Operation	✓		18. Ammeter		
8. Electrical Closing Operation			19. Arc Chute Condition	✓	
9. Electrical Tripping Operation			20. Barrier Condition	✓	
10. Secondary Auxillary Contacts			21. Single Phase Indicators		
11. Breaker Drawout Clusters			22. Others		

The secondary equipment was serviced and left in satisfactory condition and consisted of

21 Moulded Case Breakers

Fused Switches

Ref. # 9901

SHEET No. 32

INSPECTION & TEST REPORT FOR SERVICE ENTRANCE POLE & METALCLAD SWITCHGEAR

NORTH AMERICA TRAILLION
 Interrupter Switch Specifications: Manuf. S/C ELECTRIC Amps 600
 FEEDER TO AREA 11110 Cat. # 3461-43 K.V. 27

Insulation: Intact and thoroughly cleaned.
 Alignment & Mechanism: Operated normally. Lubricated where necessary.
 Contacts: Cleaned, conditioned and sealed against oxidation.

Interrupting Units: SATISFACTORY
 SEE GENERAL SHEET. NOTE #
 NOT APPLICABLE

Lightning Arrester Specification Manuf. OHIO BRASS Type S.P
 Cat. # 46159 K.V. 24

Insulation: Intact and thoroughly cleaned.
 Cementing: Free from deterioration.

Insulation Resistance Test: 1. 200^T 2. 200^T 3. 200^T megohms
 The above values are satisfactory.

Fuse Specifications Manuf. _____

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.

Ref. # 9951

SHEET No. 33

INSPECTION & TEST REPORT FOR SERVICE ENTRANCE POLE & METALCLAD SWITCHGEAR

NORTH AMERICA INV.
 Interrupter Switch Specifications: Manuf. S/C ELECTRIC Amps 600
 TRANSFORMER T-5
 Cat. # 3456324-72 K.V. 27

Insulation: Intact and thoroughly cleaned.
 Alignment & Mechanism: Operated normally. Lubricated where necessary.
 Contacts: Cleaned, conditioned and sealed against oxidation.
 Interrupting Units: SATISFACTORY
 SEE GENERAL SHEET. NOTE #
 NOT APPLICABLE

Lightning Arrester Specification Manuf. NA Type _____
 Cat. # _____ K.V. _____

Insulation: Intact and thoroughly cleaned.
 Cementing: Free from deterioration.
 Insulation Resistance Test: 1. _____ 2. _____ 3. _____ megohms
 The above values are satisfactory.

Fuse Specifications Manuf. S/C ELECTRIC

Mountings: Cat. # _____ K.V. _____ Amp _____ Type _____

Holders: Cat. # 8664421 K.V. 34.5 Amp 300 Type SM 5

Refills: Cat. # 13402524 K.V. 34.5 Amp 15 Type IS-4
TCC

Resistance Test: 1. 2280 2. 2287 3. 2300 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. # 1951

SHEET No. 34

INSPECTION & TEST REPORT FOR SERVICE ENTRANCE POLE & METALCLAD SWITCHGEAR

NORTH AMERICA PAVILION
Interrupter Switch Specifications: Manuf. S/C ELECTRIC Amps 600
FEEDER TO SERVICE BLDG. Cat. # 210000 K.V. 27

Insulation: Intact and thoroughly cleaned.
Alignment & Mechanism: Operated normally. Lubricated where necessary.
Contacts: Cleaned, conditioned and sealed against oxidation.
Interrupting Units: SATISFACTORY
 SEE GENERAL SHEET. NOTE #
 NOT APPLICABLE

Lightning Arrester Specification Manuf. FULLER Type SP
Cat. # 46-109 K.V. 24

Insulation: Intact and thoroughly cleaned.
Cementing: Free from deterioration.
Insulation Resistance Test: 1. 200+ 2. 200.1 3. 200+ megohms
The above values are satisfactory.

Fuse Specifications Manuf. _____
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.

Ref. # 1-1-1

SHEET No. 35

INSPECTION & TEST REPORT FOR SERVICE ENTRANCE POLE & METALCLAD SWITCHGEAR

North American Insulation
Interrupter Switch Specifications: Manuf. S/C ELECTRIC Amps 600
PADDOCK FACTORY Cat. # 34563R4-T2 K.V. 29

Insulation: Intact and thoroughly cleaned.
Alignment & Mechanism: Operated normally. Lubricated where necessary.
Contacts: Cleaned, conditioned and sealed against oxidation.
Interrupting Units: SATISFACTORY
 SEE GENERAL SHEET. NOTE #
 NOT APPLICABLE

Lightning Arrester Specification Manuf. OHIO Type GP
Cat. # 46159 K.V. 24

Insulation: Intact and thoroughly cleaned.

Cementing: Free from deterioration.

Insulation Resistance Test: 1. _____ 2. 200 3. _____ megohms
The above values are satisfactory.

Fuse Specifications Manuf. _____

Mountings: Cat. # _____ K.V. _____ Amp _____ Type _____

HOLDERS: Cat. # 8664421 K.V. 34.5 Amp 300 Type JNS

Refills: Cat. # 26412514 K.V. 34.5 Amp 20 Type TCC 119-4

Resistance Test: 1. _____ 2. 1100 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.

TRANSFORMER INSPECTION & TEST SHEET No. 1

Name North Hill Hill
 Manufacturer WESTINGHOUSE Serial No. _____
 No. LNAN H.V. 27600Y/16000 L.V. 20871/120 Taps 4-2 1/2 %
 Liquid 200 K.V.A. 500/500
 Impedance 7.1 VECTOR WYE / WYE

Oil Sample

Oil No.	Neul. No.	Colour	I.F.T.	Dielectric	Spec. Gravity
---------	-----------	--------	--------	------------	---------------

The above results are satisfactory.

Insulation Resistance Test

Test	Resistance (megohms)	Test Voltage D.C.
H.V. to Ground	<u>5.9</u>	<u>1000</u>
L.V. to Ground	<u>100</u>	"
H.V. to L.V.	<u>100</u>	"

The above results are satisfactory.

Station Grounding System: 2.50 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

Liquid Level:

- SATISFACTORY
- SEE GENERAL SHEET. NOTE

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 22600 volts

ef. # 4951

Sheet # 38

LOW VOLTAGE BREAKER / DISCONNECT DEVICE _____ & ENCLOSURES

Designation: NORTH AMERICA PAV. MAIN

PECIFICATION:

Manufacturer	: <u>ITE</u>	Serial #	: <u>78012</u>
Interrupt. Cap	: <u>50KA</u>	Volts	: <u>600-120/208?</u>
Frame Size	: <u>1600 AMP</u>	Type	: <u>K-1000</u>
Elect. Operated:	<u>-</u>	Poles	: <u>3</u>
Manul. Operated:	<u>✓</u>	Fixed:	<u>1 Draw Out: ✓</u>

TRIPPING DEVICE:

Type:	<u>MD-4</u>	Coil/C.T. Rating	<u>1200</u> amps
Longtime P/U:	<u>1100</u> amps	Delay	<u>MIN 1/5</u> seconds
Shorttime P/U:	<u>4000</u> amps	Delay	<u>MIN 1/5</u> seconds
Grd Fault P/U:	<u>-</u> amps	Delay	<u>-</u> seconds
Instant. P/U:	<u>-</u> amps		
Fused Rating & Manufacturer:	<u>-</u>		

CONTACT RESISTANCE:

Phase I 82 Phase II 30 Phase III 80 microhms

INSULATION RESISTANCE:

Phase I 700 Phase II 700 Phase III 200 megohms

GENERAL:

GENERAL:	O.K.	NOTE#	O.K.	NOTE#
1. Exterior Enclosure Condition	✓		12. Lubricated	✓
2. Arcing Contacts	✓		13. Breaker Cleaned	✓
3. Main Contacts	✓		14. Enclosure Cleaned	✓
4. Exterior Breaker Condition	✓		15. Bus Connections	✓
5. Tripping Device Condition	✓		16. Cable Connections	✓
6. Manual Closing Operation	✓		17. Voltmeter	✓
7. Manual Tripping Operation	✓		18. Ammeter	✓
8. Electrical Closing Operation			19. Arc Chute Condition	✓
9. Electrical Tripping Operation			20. Barrier Condition	✓
10. Secondary Auxillary Contacts	✓		21. Single Phase Indicators	
11. Breaker Drawout Clusters	✓		22. Others	

The secondary equipment was serviced and left in satisfactory condition and consisted of

_____ Moulded Case Breakers
 _____ Fused Switches

Ref. # 99E1

SHEET No.39

INSPECTION & TEST REPORT FOR SERVICE ENTRANCE POLE & METALCLAD SWITCHGEAR

ENT. FACILITIES

Interrupter Switch Specifications: Manuf. 5/0211057010 Amps 600

Feeder To IND. MALVA PAV.
Cat. # 34102 K.V. 27

Insulation: Intact and thoroughly cleaned.

Alignment & Mechanism: Operated normally. Lubricated where necessary.

Contacts: Cleaned, conditioned and sealed against oxidation.

Interrupting Units: SATISFACTORY
 SEE GENERAL SHEET. NOTE #
 NOT APPLICABLE

Lightning Arrester Specification Manuf. OHIO BRUSH Type GIP
Cat. # 46197 K.V. 24

Insulation: Intact and thoroughly cleaned.

Cementing: Free from deterioration.

Insulation Resistance Test: 1. 200^t 2. 500^t 3. 200^t megohms
The above values are satisfactory.

Fuse Specifications Manuf. _____

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.

Ref. # 9951

SHEET No. 40

INSPECTION & TEST REPORT FOR SERVICE ENTRANCE POLE & METALCLAD SWITCHGEAR

ENT. FACILITIES:
Interrupter Switch Specifications: Manuf. S/C ELECTRIC Amps 600
FEEDER TO VILLAGE EDGE SOUTH
Cat. # 3456224-77 K.V. 27

Insulation: Intact and thoroughly cleaned.
Alignment & Mechanism: Operated normally. Lubricated where necessary.
Contacts: Cleaned, conditioned and sealed against oxidation.
Interrupting Units: SATISFACTORY
 SEE GENERAL SHEET. NOTE #
 NOT APPLICABLE

Lightning Arrester Specification Manuf. OHIO ELECTRIC Type SI
Cat. # 4019 K.V. 24

Insulation: Intact and thoroughly cleaned.
Cementing: Free from deterioration.
Insulation Resistance Test: 1. _____ 2. 200⁺ 3. _____ megohms
The above values are satisfactory.

Fuse Specifications Manuf. S/C ELECTRIC

Mountings: Cat. # _____ K.V. _____ Amp _____ Type _____

Holders: Cat. # 86641R1 K.V. 24.5 Amp 100 Type AMS

Refills: Cat. # 124125-RV K.V. 24.5 Amp 20 Type 153-4

Resistance Test: 1. _____ 2. 1170 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.

Ref. # 9951

SHEET No. 41

INSPECTION & TEST REPORT FOR SERVICE ENTRANCE POLE & METALCLAD SWITCHGEAR

ENT. FACILITIES

Interrupter Switch Specifications: Manuf. S/C ELECTRIC Amps 600

TRANSFORMER T-8

Cat. # 3456304-72 K.V. 27

Insulation: Intact and thoroughly cleaned.

Alignment & Mechanism: Operated normally. Lubricated where necessary.

Contacts: Cleaned, conditioned and sealed against oxidation.

Interrupting Units: SATISFACTORY
 SEE GENERAL SHEET. NOTE #
 NOT APPLICABLE

Lightning Arrester Specification Manuf. S/C Type _____
 Cat. # _____ K.V. _____

Insulation: Intact and thoroughly cleaned.

Cementing: Free from deterioration.

Insulation Resistance Test: 1. _____ 2. _____ 3. _____ megohms
 The above values are satisfactory.

Fuse Specifications Manuf. S/C ELECTRIC

Mountings: Cat. # _____ K.V. _____ Amp _____ Type _____

Holders: Cat. # 8004481 K.V. 24.5 Amp 300 Type SM 5

Refills: Cat. # 1340404 K.V. 24.5 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.

Ref. # 9931

SHEET No. 42

INSPECTION & TEST REPORT FOR SERVICE ENTRANCE POLE & METALCLAD SWITCHGEAR

EST FACILITY:

Interrupter Switch Specifications: Manuf. 3/c EVERETT Amps 100

FEEDER TO LUGANSA PAV Cat. # 3915661 K.V. 27

Insulation: Intact and thoroughly cleaned.
Alignment & Mechanism: Operated normally. Lubricated where necessary.
Contacts: Cleaned, conditioned and sealed against oxidation.

Interrupting Units: SATISFACTORY
 SEE GENERAL SHEET. NOTE #
 NOT APPLICABLE

Lightning Arrester Specification Manuf. OHIO STATE Type GI
Cat. # 41119 K.V. 24

Insulation: Intact and thoroughly cleaned.
Cementing: Free from deterioration.
Insulation Resistance Test: 1. 300 2. 300 3. 300 megohms
The above values are satisfactory.

Fuse Specifications Manuf. _____

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.

Ref. # 9951

SHEET No. 43

INSPECTION & TEST REPORT FOR SERVICE ENTRANCE POLE & METALCLAD SWITCHGEAR

ENT FACILITIES.

Interrupter Switch Specifications: Manuf. S/C ELECTRIC Amps 600

TRANSFORMER T-7

Cat. # 24624-73 K.V. 07

Insulation: Intact and thoroughly cleaned.

Alignment & Mechanism: Operated normally. Lubricated where necessary.

Contacts: Cleaned, conditioned and sealed against oxidation.

Interrupting Units: SATISFACTORY
 SEE GENERAL SHEET. NOTE #
 NOT APPLICABLE

Lightning Arrester Specification Manuf. _____ Type _____

Cat. # _____ K.V. _____

Insulation: Intact and thoroughly cleaned.

Cementing: Free from deterioration.

Insulation Resistance Test: 1. _____ 2. _____ 3. _____ megohms

The above values are satisfactory.

Fuse Specifications Manuf. S/C ELECTRIC

Mountings: Cat. # _____ K.V. _____ Amp _____ Type _____

Holders: Cat. # 8664421 K.V. 24.5 Amp 300 Type SM-5

Refills: Cat. # 1342514 K.V. 24.5 Amp 15 Type 153.4

Resistance Test: 1. 2180 2. 219.5 3. 2220 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.

TRANSFORMER INSPECTION & TEST SHEET No. 1

ENT: FACILITIES T-7

Manufacturer WESTING HOUSE Serial No. 827694

to L.N.N H.V. 23000 / 16000 L.V. 2087 / 126 Taps 4-2 1/2 %

Oil Liquid ISO K.V.A. 225 / 250

Impedance 5.9 VECTOR WYE / WYE

Liquid Sample

Oil No.	Neut. No.	Colour	I.F.T.	Dielectric	Spec. Gravity
---------	-----------	--------	--------	------------	---------------

The above results are satisfactory.

Insulation Resistance Test

Test Voltage D.C.

H.V. to Ground	<u>5/9</u> megohms	<u>1000</u>
L.V. to Ground	<u>55</u> megohms	"
H.V. to L.V.	<u>55</u> megohms	"

The above results are satisfactory.

Station Grounding System: 2.50 Ohm

TRANSFORMER INSPECTION & TEST SHEET No. 2

GENERAL CONDITIONS

Serial No. 827694

Bushings:

Insulation was intact and thoroughly cleaned.
Cementing was free from deterioration.

Gaskets:

- SATISFACTORY
- SEE GENERAL SHEET. NOTE

Paint:

- SATISFACTORY
- SEE GENERAL SHEET. NOTE

Liquid Level:

- SATISFACTORY
- SEE GENERAL SHEET. NOTE

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 3 for 27600 volts

TRANSFORMER INSPECTION & TEST SHEET No. 1

ENT. FACILITIES T-8

Manufacturer WESTING HOUSE Serial No. 750412

Model LWAW H.V. 27600 Y / 16000 L.V. 600 Y 1347 Taps 4-2 1/2

Oil Liquid 310 K.V.A. 500/560

Impedance 6.7 VECTOR wye / wye

Liquid Sample

Oil No.	Neut. No.	Colour	I.F.T.	Dielectric	Spec. Gravity
---------	-----------	--------	--------	------------	---------------

The above results are satisfactory.

Insulation Resistance Test

Test Voltage D.C.

H.V. to Ground 5/9 megohms 1000

L.V. to Ground 65 megohms

H.V. to L.V. 65 megohms

The above results are satisfactory.

Station Grounding System: 2.50 Ohm

TRANSFORMER INSPECTION & TEST SHEET No. 2

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

Liquid Level:

- SATISFACTORY
- SEE GENERAL SHEET. NOTE

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

Ref. # 9951

Sheet # 48

LOW VOLTAGE BREAKER / DISCONNECT DEVICE _____ & ENCLOSURES

Designation: ENT. FACILITIES - MAIN T.F

SPECIFICATION:

Manufacturer : WESTINGHOUSE
 Interrupt. Cap : 50KA
 Frame Size : 1600 AMP
 Elect. Operated: -
 Manul. Operated: ✓

Serial # : CP21379-02-A1
 Volts : 600
 Type : DB-50
 Poles : 3
 Fixed: _____ / Draw Out: ✓

TRIPPING DEVICE:

Type: DB
 Longtime P/U : 640 amps
 Shorttime P/U: 4000 amps
 Grd Fault P/U: - amps
 Instant. P/U : - amps
 Fused Rating & Manufacturer: _____

Coil/C.T. Rating 1000 amp s
 Delay 20 seconds
 Delay 30 CYCLE seconds
 Delay - seconds

CONTACT RESISTANCE:

Phase I 39 Phase II 42 Phase III 40 microhms

INSULATION RESISTANCE:

Phase I 200 Phase II 200 Phase III 200 megohms

GENERAL:

	O.K.	NOTE#		O.K.	NOTE#
1. Exterior Enclosure Condition	✓		12. Lubricated	✓	
2. Arcing Contacts	✓		13. Breaker Cleaned	✓	
3. Main Contacts	✓		14. Enclosure Cleaned	✓	
4. Exterior Breaker Condition	✓		15. Bus Connections	✓	
5. Tripping Device Condition	✓		16. Cable Connections	✓	
6. Manual Closing Operation	✓		17. Voltmeter	✓	
7. Manual Tripping Operation	✓		18. Ammeter	✓	
8. Electrical Closing Operation			19. Arc Chute Condition	✓	
9. Electrical Tripping Operation			20. Barrier Condition	✓	
10. Secondary Auxillary Contacts	✓		21. Single Phase Indicators		
11. Breaker Drawout Clusters	✓		22. Others		

The secondary equipment was serviced and left in satisfactory condition and consisted of

_____ Moulded Case Breakers

6 Fused Switches

9951 LOW VOLTAGE BREAKER / DISCONNECT DEVICE _____ & ENCLOSURES

Designation: ENT. FACILITIES T 8

IDENTIFICATION:

Manufacturer : WESTING HOUSE
 Interrupt. Cap : 25KA
 Frame Size : 600 A
 Elect. Operated: —
 Manul. Operated: ✓

Serial # : CP21379-01-A1
 Volts : 600
 Type : DR-25
 Poles : 3
 Fixed: _____ / Draw Out: ✓

TRIPPING DEVICE:

Type: DR
 Longtime P/U : 600 amps
 Shorttime P/U: 3000 amps
 Grd Fault P/U: — amps
 Instant. P/U : — amps
 Fused Rating & Manufacturer: _____

Coil/C.T. Rating 600 amps
 Delay 20 seconds
 Delay 6 cycle seconds
 Delay — seconds

CONTACT RESISTANCE:

Phase I 45 Phase II 51 Phase III 45 microhms

INSULATION RESISTANCE:

Phase I 200 Phase II 200 Phase III 200 megohms

GENERAL:

	O.K.	NOTE#		O.K.	NOTE#
1. Exterior Enclosure Condition	✓		12. Lubricated	✓	
2. Arcing Contacts	✓		13. Breaker Cleaned	✓	
3. Main Contacts	✓		14. Enclosure Cleaned	✓	
4. Exterior Breaker Condition	✓		15. Bus Connections	✓	
5. Tripping Device Condition	✓		16. Cable Connections	✓	
6. Manual Closing Operation	✓		17. Voltmeter	✓	
7. Manual Tripping Operation	✓		18. Ammeter	✓	
8. Electrical Closing Operation			19. Arc Chute Condition	✓	
9. Electrical Tripping Operation			20. Barrier Condition	✓	
10. Secondary Auxillary Contacts	✓		21. Single Phase Indicators		
Breaker Drawout Clusters	✓		22. Others		

The secondary equipment was serviced and left in satisfactory condition and consisted of

- _____ Moulded Case Breakers
- _____ Fused Switches



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

A handwritten signature in black ink, appearing to be 'L.A. Snow', written over a horizontal line.

L.A. Snow
LAS/jn

Encl.
RSCL/1

APPENDIX 6

LIST OF GAS-FIRED EQUIPMENT

