1 PROJECTS \$500K AND OVER FOR 2013

2

3 SUSTAINING PORTFOLIO – UNDERGROUND SYSTEM

4

5 **Table 1: Underground Projects**

Estimate		Estimated Cost
Number	Project Title	(\$Millions)
20066	Dalmatian/Choiceland 47M13 UG Rebuild-Civil	10.0
	Replace/upgrade feeder A42W from PILC to 500kcmil	
18749	TRXLPE cable	4.2
	Cable Chamber Rebuilds for PILC Replacement/Upgrade of	
13311	A52CS, A53CS and A54CS	3.3
	UG Rehab of NY51M29 off Don Mills and Graydon Hall	
22049	Drive	2.9
	Cable Chamber Rebuilds for PILC Replacement/Upgrade of	
18506	A7B, A91B, and A93B	2.5
14133	85M7 UG rebuild on Festival & Carnival	2.1
13278	Northview Heights Civil Rebuild	2.1
	Replace/upgrade feeder A67E from PILC to 500kcmil	
18932	TRXLPE cable	2.0
	Replace/upgrade feeder A51WR from PILC to 500kcmil	
18803	TRXLPE cable	2.0
13239	Northview Heights Electrical Rebuild	2.0
	Cable Chamber Rebuilds for PILC Replacement/Upgrade of	
13326	A77E, A78E, and A79E	2.0
	Cable Chamber Rebuilds for PILC Replacement/Upgrade of	
13316	A41GD, A47GD and A48GD	2.0
	Replace/upgrade feeder A63E from PILC to 500kcmil	
18690	TRXLPE cable	1.9
	Cable Chamber Location #6294 Piece out and PILC cable	
19798	replacement	1.8
13287	55M31 Underground Lateral Replacement Ph#2	1.7
20633	Cable Chamber Rebuilds for PILC Replacement/Upgrade of	1.7

Estimate	Project Title	Estimated Cost
Number	Project Title	(\$Millions)
	A63E	
	VC of Flemingdon MS feeders SS53-F3, F4, F5, F6 and F8	
20563	Electrical	1.7
	Replace/upgrade feeder A74DX from PILC to 500kcmil	
19000	TRXLPE cable	1.7
	Cable Chamber Rebuilds for PILC Replacement/Upgrade of	
20627	A74DX	1.6
	Replace/upgrade feeder A43W from PILC to 500kcmil	
19011	TRXLPE cable	1.5
	Rebuild Cable Chambers and Duct Structures along	
21439	Millwood and Laird	1.5
22616	Ironside Crescent UG Rehab SCNAR26M21	1.5
	Replace/upgrade feeder A53B from PILC to 500kcmil	
18684	TRXLPE cable	1.5
20437	Rehab of Transformers on SCNA502M24	1.5
21868	Rebuild UG Trunk NT63M12 M8 Brimley -Civil	1.4
	Cable Chamber Rebuilds for PILC Replacement/Upgrade of	
20631	A67E	1.4
	Rebuild of NY51M4 Consumers Rd & Victoria Park Areas -	
20733	Electrical NY51M4	1.3
13284	55M31 Underground Lateral Replacement Ph#1	1.3
22718	UG Rebuild R26M34 Melford Customer Vaults	1.3
	Replace/upgrade feeder A44W from PILC to 500kcmil	
19019	TRXLPE cable	1.3
20209	Rebuild Tallpine Subd and Durnford TH 47M17- Civil	1.3
13162	Starview / Rockbank UG Rehab	1.3
13193	Arrow Rd - Lateral UG Loop Replacement	1.3
	51M22, 51M4 UG rehab off Sheppard & Victoria Park	
22492	Intersection-Electrical	1.2
	NY51M24 UG Rebuild in Subdivision by Don Mills &	
21434	Sheppard Part 2 - Civil NY51M24	1.2
13306	Replace/Upgrade cable from PILC to 500 TRXLPE on A-91-	1.2

Estimate	Project Title	Estimated Cost
Number		(\$Millions)
	В	
20059	Venture Drive UG Rebuild Electrical SCNT47M1	1.1
18648	Windsor TS Load Transfer to Bremner TS	1.1
20925	Middlefield Passmore StateCrown Electrical SCNAR26M21	1.1
	Replace/upgrade feeder A20DX from PILC to 500kcmil	
18503	TRXLPE cable	1.1
20335	Nashdene Tiffield SCNAR26M22 UG Rebuild - Civil	1.1
21933	Rebuild UG Trunk 502M21-28 Warden -Civil	1.1
12464	UG Cable Rehab on Antibes / Torresdale	1.1
12258	Lynmont /Milkwood - UG Rehab & VC	1.1
	NY51M24 UG Rebuild in Subdivision by Don Mills &	
21433	Sheppard Part 1 - Civil NY51M24	1.0
18320	Clappison 47M17 UG Rebuild- Civil	1.0
20394	McNicoll Maybrook SCNAR26M32 UG Rebuild - Electrical	0.9
	Rehab of Feeder NAE5-2M3 in McCowan and Kingston area	
20136	(Civil)	0.9
20207	Royal Rouge Trail UG Rebuild 47M17-Civil	0.9
21715	Strachan Civil Egress Phase 1	0.9
21664	Nugget Avenue UG Rebuild Electrical SCNAH9M23	0.9
	VC of Flemingdon MS feeders SS53-F3, F4, F5, F6 and F8	
20564	Civil	0.9
22212	UG Rebuild PJF2 Pastoria & Robert McIntosh SD- Civil	0.8
21589	Rebuild Orange File SD 502M22 UG-Civil	0.8
21334	51M30 UG Rehab off Leslie Street North of Bond Avenue	0.8
12490	UG DB Cable Rehab - Bombardier Supply	0.8
20990	Ironside Crescent UG Rebuild Electrical SCNAR26M21	0.8
23154	PPEast 2013 Feeder Automation Project on SCNT63M3	0.8
20312	NYSS53F7 Wynford Dr. UG Rebuild Civil Works	0.8
21869	Rebuild UG Trunk NT63M12 M8 Brimley - Electrical	0.8
	Scunthorpe - Invergordon H9M26 UG Rebuild 1 Phase -	
20529	Electrical	0.8
13307	Replace/Upgrade cable from PILC to 500 TRXLPE on A-93-	0.8

Estimate	Droject Title	Estimated Cost
Number	Project Title	(\$Millions)
	В	
21663	Nugget Avenue UG Rebuild Civil SCNAH9M23	0.7
	Replace/upgrade feeder A13K from PILC to 500kcmil	
18743	TRXLPE cable	0.7
20200	Durnford/Rylander/Tideswell 47M17 3-Ph Loop-Civil	0.7
22822	UG Rebuild Macey Denton R43M27-M23 Tie- Civil	0.7
21585	Rebuild Trunk 502M1 M22 Birchmount-Civil	0.7
21934	Rebuild UG Trunk 502M21-28 Warden -Electrical	0.7
	NY51M24 UG Rebuild in Subdivision by Don Mills &	
21401	Sheppard Part 1 - Electrical NY51M24	0.7
23156	Feeder Automation Project on SCNA502M28	0.7
22220	UG Rebuild PJF3 Wondown & Milah Securities SD -Civil	0.7
13285	UG Lateral Cable Replacement	0.7
13273	UG Lateral Cable & Transformer Rehab Finch TS	0.7
13134	Constellation Crt - UG Rebuild & Voltage Conversion	0.7
20336	Nashdene Tiffield SCNAR26M22 UG Rebuild - Electrical	0.7
	Finchdene Industrial SCNAR26M31 UG Rebuild Phase 2	
18639	(Electrical)	0.6
22570	UG Rebuild 63M6 Mid Finch Silver Star Bv- Electrical	0.6
22460	UG Rebuild 502M26 Bonis Ave- Civil	0.6
19554	Terauley Piece Outs and Leakers	0.6
12451	UG Lat Cable and Tx Rehab Cedarcroft, Patricia, etc.	0.6
	Rebuild of SCNAE5-1M25 by Brimley Rd and Skagway	
21188	Avenue Civil	0.6
	Strachan TS Feeder Transfer from A7-8T to new A11-12T	
20713	Switchgear	0.6
22475	UG Rebuild 502M26 Bonis Ave- Electrical	0.6
	51M22, 51M4 UG rehab off Sheppard & Victoria Park	
22508	Intersection-Civil	0.6
12449	UG Lateral Cable & Tx Rehab Bathurst & Rockford	0.6
21864	Rebuild UG Trunk NT63M8 M11 McCowan-Civil	0.5
18688	Replace/upgrade feeder A59H from PILC to 500kcmil	0.5

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Estimate	Drainat Title	Estimated Cost
Number	Project Title	(\$Millions)
	TRXLPE cable	
	NY51M24 UG Rebuild in Subdivision by Don Mills &	
21410	Sheppard Part 2 - Electrical NY51M24	0.5
13114	Trunk Cable Replacement - The East Mall	0.5
	Scunthorpe - Invergordon H9M26 UG Rebuild 3 Phase -	
20471	Electrical	0.5
22569	UG Rebuild 63M6 Mid Finch Silver Star Bv- Civil	0.5
	Total Cost	114.5

Portfolio:	Underground
Project Title:	Dalmatian/Choiceland 47M13 UG Rebuild-Civil
Project Number:	20066
Project Year:	2013
Estimate Cost:	\$ 9,989,77

1

3 PROJECT DESCRIPTION

4

5 **Objective:**

6 The purpose of this project is primarily to provide civil infrastructure in advance of a

7 related electrical project to replace the aged direct buried cross-linked polyethelene

8 ("XLPE") cables on feeder SCNA47M13 within the Cedar Heights and Creative 2

9 subdivisions, in order to reduce the probability of a system failure.

10

11 **Scope:**

12 In the subdivision bounded by Meadowvale Road, Ellesmere Road, Dalmation Crescent,

13 Winding Court, Choice Land Blvd and Graphic Court, new concrete-encased conduit will

14 be installed to enclose the 1/0 tree-retardant cross-linked polythelene ("XLPE") cables to

15 be installed along feeder NY51M24. In total, 2.2 kilometers of this civil infrastructure

- 16 will be installed.
- 17

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	DALMATION & CHOICELAND
STATION(S)	SHEPPARD TS
FEEDER(S)	SCNA47M13

18

2 **Project Background**

Early vintage direct buried XLPE cables have been identified as being poor performing
assets, contributing to system reliability degradation. These cables have been constantly
exposed to neutral and sheath corrosion from the surrounding soil; this has contributed to
the degradation of insulation strength.

7

The manufacturing processes employed in these early vintage XLPE cables lacked 8 9 sufficiently quality controls to (a) keep out impurities from the insulation system or (b) 10 provide reliable sealing of the insulation system to prevent moisture ingress. The steam 11 curing process employed in the manufacture of early vintage XLPE cables also resulted in 12 moisture being trapped in the insulation system. Due to these manufacturing defects, 13 these cables have experienced high rates of premature failure of insulation. 14 In addition, due to the nature of the direct buried installation, these assets are susceptible 15 to damage from external dig-ins and movement of surrounding earth. 16 17 The assets within this particular area were installed in 1987 and a series of cable, elbow 18 19 and transformer failures have occurred over the past few years. The purpose of this project is to install the concrete-encased conduits necessary to house the new tree-20 retardant XLPE cables. These new conduits will provide mechanical protection to the 21 22 cables against external dig-ins and other factors. 23

1 Historical Performance

FEEDER PERFORMANCE				
Worst Performing Feeder Rank	ting (Worst Feed	ler)	9	
Feeders Experiencing Sustained Interruptions (Worst Feeder)6				
HISTORICAL RELIABILITY PERFORMANCE				
	2008	2009	2010	
Feeder CI (Cumulative)	5,692	4,889	10,328	
Feeder CMO (<i>Cumulative</i>)	175,152	159,176	709,231	

2

3 Benefits

- Upgrades equipment on one of the worst performing feeders (9th) in the THESL
- 5 system that has a high FESI rank (6)
- Improves feeder reliability, due to replacement of direct buried infrastructure
- Reduces outage duration time due to capability of pulling cables through conduit
 during outage
- 9 Improves renewal of asset infrastructure during outage, as assets can be replaced
- 10 entirely (as opposed to direct buried cables, which can only be repaired via a splice)
- 11 Improves mechanical protection against dig-ins and external events
- 12 Improves operational flexibility and reliable supply
- Reconfigures the distribution system with the current THESL standard for operation
 and protection with 1/0 cable with standard fusing
- 15

16 IMPACT OF DEFERRAL

17 Deferral of the project will expose the feeder to increased counts of outages due to poor

- 18 performing equipment. Electrical treeing will lead to the eventual insulation breakdown
- 19 over time of the existing non-tree retardant XLPE cable. This will result in further outages
- 20 to this feeder and the customers it supplies.
- 21
- 22 Deferral of this project also may result in future customer interruptions due to the

- 1 potential failure of assets within this area. Cables installed in direct-buried configurations
- 2 are prone to accelerated deterioration therefore the direct buried cables in this area will
- 3 continue to degrade, resulting in potential insulation failure. This will lead to customer
- 4 dissatisfaction and high reactive costs.
- 5

Portfolio:	Underground
Project Title:	Replace/upgrade feeder A42W from PILC to
rioject little.	500kcmil TRXLPE cable
Project Number:	18749
Project Year:	2013
Estimate Cost:	\$ 4,242,090

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

- 5 To replace Paper Insulated Lead-Covered ("PILC") cable on the trunk of feeder A42W
- 6 with the standard 500kcmil Tree-Retardant Cross-Linked Polyethylene ("TRXLPE")

7 cable and rebuild cable chambers as required.

- 8
- 9 Scope:
- 10 This project will enable the replacement and upgrade of approximately 3600 m of varying
- size PILC cable to 500kcmil TRXLPE.

DISTRICT	Toronto
DISTRICT NEIGHBOURHOOD	WILTSHIRE
STATION(S)	WILTSHIRE TS
FEEDER(S)	A42W

12

13 JUSTIFICATION

14

15 **Project Background**

- 16 This project was initiated due to THESL's Lead Cable Replacement Program, with a
- 17 vision to ultimately improve safety and environmental conditions within cable chambers,
- due mainly to lead and Polychlorinated biphenyl (PCB) exposure. Potential procurement

1	issues associated with a lone North American manufacturer of PILC cables is also
2	prompting proactive replacement of this cable with readily available TRXLPE cable.
3	
4	A42W is also projected to be overloaded within the next ten years under first contingency
5	conditions. Upgrading the existing PILC feeder trunk to 500kcmil TRXLPE cable will
6	provide additional capacity on this feeder. This specific feeder was also chosen for
7	upgrade because it contains belted-type PILC cable, which is the oldest PILC cable
8	type in THESL's distribution system.
9	
10	Benefits
11	• Removes risk of harmful effects of lead and potential PCB oil exposure
12	• Increases capacity for projected load growth and flexibility for load transferring by
13	upgrading PILC feeder whose trunk sizes are 350kcmil, with higher ampacity
14	500kcmil TRXLPE feeders
15	• Addresses procurement issue associated with a lone North American manufacturer of
16	PILC cables
17	
18	IMPACT OF DEFERRAL
19	Issues of health and environmental risks will continue for THESL workers due mainly to
20	potential exposure to PCB's and lead. If the lone North American manufacturer stops
21	producing PILC cable, THESL will not only have a sourcing/procurement issue, but will
22	also have a very large volume of PILC cable replacement projects to execute.
23	

Portfolio:	Underground
Project Title.	Cable Chamber Rebuilds for PILC
Project Title:	Replacement/Upgrade of A52CS, A53CS and A54CS
Project Number:	13311
Project Year:	2013
Estimate Cost:	\$3,257,540

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

- 5 To inspect and rebuild cable chambers containing feeders A52CS, A52CS and A52CS.
- 6 This work is necessary for replacement of Paper Insulated Lead Covered ("PILC") cable
- 7 on the trunk of feeders A52CS, A52CS and A52CS to the standard 500kcmil Tree
- 8 Retardant Cross-link Polyethylene ("TRXLPE") cable.
- 9

10 **Scope:**

- 11 The scope of this project is to inspect 51 cable chambers and rebuild those in need of
- 12 refurbishment. The rebuilding of these cable chambers will enable the replacement and
- 13 upgrade to 500 kcmil TRXLPE the existing PILC cable that runs through them. This
- cable replacement will be completed in projects14139, 15012 and 16004.

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	CHARLES
STATION(S)	CHARLES TS
FEEDER(S)	A52CS, A53CS, A54CS

15

2

3 Project Background

- 4 This project was initiated to inspect and rebuild cable chambers due to THESL's Lead
- 5 Cable Replacement Program with a vision to ultimately improve safety and

environmental conditions within cable chambers, by eliminating lead and Polychlorinated
biphenyls (PCB) exposure.

8

9 The cable chambers need to be rebuilt as age and environmental conditions have led to deteriorated civil structures. In addition, the rebuilt cable chambers will be larger in many 10 11 cases. The additional space is necessary in cases where many feeders run through a chamber, as the TRXLPE cable and associated splices take more space than the PILC 12 13 cable that is being replaced. Cable chambers for this project have installation dates as far back as 1957, and up to eight, 3-phase 13.8 kV feeders running through them. Inspections 14 on these chambers indicate that twelve cable chambers are in very poor conditions, and 15 have undersized ducts which will need to be upgraded to contain the larger, 500kcmil 16 cable. The inspection and rebuilding of these cable chambers will enable the PILC cable 17 replacement to occur safely. 18

19

20 Benefits

- Removes risk of harmful effects of lead and potential PCB oil exposure
- Increases room for load growth and flexibility for load-transferring by upgrading
 PILC feeder whose trunk sizes are 350kcmil, with higher ampacity 500kcmil
- 24 TRXLPE cable
- Addresses procurement issue associated with a lone North American manufacturer of
 PILC cables
- 27

28 IMPACT OF DEFERRAL

29 Deteriorated civil conditions and limited space within the cable chambers will not allow

30 for PILC cable replacement. Issues of health and environmental risks will continue for

- 1 THESL workers, due mainly to potential exposure to PCBs, and lead. If the lone North
- 2 American manufacturer stops producing PILC cable, THESL will have a
- 3 sourcing/procurement issue.

Portfolio:	Underground	
Project Title:	UG Rehab of NY51M29 off Don Mills and	
	Graydon Hall Drive	
Project Number:	22049	
Project Year:	2013	
Estimate Cost:	\$ 2,857,325	

2 **PROJECT DESCRIPTION**

3

Objective: 4

The purpose of this project is to replace aged and vulnerable assets from the feeder in the 5 Don Mills Road, Graydon Hall Drive and Duncan Mills area. 6

7

Scope: 8

9 The scope of this project is to construct the civil infrastructure to replace the direct buried loop distribution south of Millergrove Dr. This project will tap into the civil infrastructure 10 to be built on a previous phase that will be constructed between Fisherville Rd and 11 Millergrove Dr. This project requires the replacement of 13 submersible transformers, 12 2,600 m of primary underground 1/0 TRXLPE cable and 1,350 m of main ducts that serve 13 aproximately 138 homes south of Millergrove Dr. This will improve the reliability and 14 15 7 improve restoration time to these customers in the event of an outage. 16 This project involves replacement of assets that have passed their useful service life in an 17 18 area bounded by Don Mills Rd, Duncan Mills Rd, Graydon Hall Dr and York Mills Rd. This project involves replacement of 3,800 m of primary cable, 38 switches and 14

20 21 transformers.

DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	DON MILLS & GRAYDON HALL
STATION(S)	LESLIE I TS
FEEDER(S)	NY51M29

3 JUSTIFICATION

4

5 **Project Background**

6 In the last four years, this feeder has experienced 15 sustained outages, 26% of them

7 attributed to faulty underground cables. The vaults are aging and as a result, tracking on

8 porcelain insulators is expected to increase the frequency of breakdowns and therefore

- 9 outages.
- 10

11 This scope package addresses electrical rehabilitation work for the replacement of

12 underground trunk and lateral cabling as well as poor performing assets in transformer

13 vaults in the area of Don Mills road between Graydon Hall Drive and York Mills Road.

14

15 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Ranking (Worst Feeder)			60
Feeders Experiencing Sustained Interruptions (Worst Feeder)			5
HISTORICAL RELIABILITY PERFORMANCE			
	2008	2009	2010
Feeder CI (Cumulative)	84	633	4,998
Feeder CMO (<i>Cumulative</i>)	6,564	45,999	124,455

16

1 Benefits

2	• Reinvigorates the distribution system by replacing the aging (40-year-old)
3	underground trunk and lateral cabling and rehabilitating transformer vaults in the area
4	off Don Mills Road between Graydon Hall Drive and York Mills Road
5	• Eliminates safety hazards to utility field staff
6	• Reduces equipment footprints and eliminates switching hazards as the switches in the
7	project domain are to be replaced with sealed type SF6 equivalents and transformers
8	replaced with current THESL standard units
9	• Improves switching due to the equipment replacement and response times after
10	outages
11	
12	IMPACT OF DEFERRAL
13	An outage on this feeder affects about 600 customers and causes a loss of up to 12MVA.
14	Deferral of this project will lead to sustained or deteriorating reliability problems on the
15	feeder and will increase the likelihood of outages in this area, as evidenced by the larger
16	number of CMO (Customer Minutes Out) during the last three years. This leads to
17	customer dissatisfaction and high reactive investment costs. It is evident that if this
18	project is deferred, faults will continue and possibly increase in frequency, due to the
19	deterioration and non-standard design of these aging assets.
20	

Portfolio:	Underground	
Drainat Titla	Cable Chamber Rebuilds for PILC	
Project Title:	Replacement/Upgrade of A7B, A91B, and A93B	
Project Number:	18506	
Project Year:	2013	
Estimate Cost:	\$2,485,816	

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 To inspect and rebuild cable chambers containing feeders A7B, A91B and A93B. This

6 work is necessary for replacement of Paper Insulated Lead Covered ("PILC") cable on the

7 trunk of feeders A7B, A91B and A93B with the standard 500kcmil Tree Retardant Cross-

8 link Polyethylene ("TRXLPE") cable.

9

10 **Scope:**

11 The scope of this project is to inspect 77 cable chambers and rebuild those in need of

12 refurbishment. The rebuilding of these cable chambers will enable the replacement and

13 upgrade to 500 kcmil TRXLPE, of the existing PILC cable that runs through them. This

cable replacement will be completed in projects 13305, 13306 and 13307.

15

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	BRIDGEMAN
STATION(S)	BRIDGEMAN TS
FEEDER(S)	A7B, A91B, A93B

16

2

3 **Project Background**

- 4 This project was initiated to inspect and rebuild cable chambers due to THESL's Lead
- 5 Cable Replacement Program with a vision to ultimately improve safety and

environmental conditions within cable chambers, by eliminating lead and Polychlorinated
biphenyls (PCB) exposure.

8

9 The cable chambers need to be rebuilt as age and environmental conditions have led to

10 deteriorated civil structures. In addition, the rebuilt cable chambers will be larger in many

- 11 cases. The additional space is necessary in cases where many feeders run through a
- 12 chamber, as the TRXLPE cable and associated splices require more space than the PILC

13 cable that is being replaced. Cable chambers for this project have installation dates dating

- back to 1952, and up to eight, 3-phase 13.8 kV feeders running through them. The
- inspection and rebuilding of these cable chambers will enable the PILC cable replacementto occur safely.
- 17

18 Benefits

- 19 Removes risk of harmful effects of lead and potential PCB oil exposure
- Increases room for load growth and flexibility for load transferring by upgrading
- PILC feeder whose trunk sizes are 350kcmil with higher ampacity 500kcmil TRXLPE
 cable
- Addresses procurement issue associated with a lone North American manufacturer of
 PILC cables
- 25

26 IMPACT OF DEFERRAL

27 Deteriorated civil conditions and limited space within the cable chambers will not allow

- for PILC cable replacement. Issues of health and environmental risks would continue for
- 29 THESL workers, due mainly to potential exposure to PCBs, and lead. Furthermore, if the
- 30 lone North American manufacturer stops producing PILC cable, THESL will have a

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- 1 sourcing/procurement issue.
- 2

Portfolio:	Underground
Project Title:	85M7 UG rebuild on Festival & Carnival
Project Number:	14133
Project Year:	2013
Estimate Cost:	\$2,102,179

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to rebuild the underground distribution on Festival Drive &

6 Carnival Court to improve reliability and faster restoration time to customers.

7

8 Scope:

9 The scope of this project is to construct the civil infrastructure to replace the non-

- 10 standard, direct-buried loop distribution in an area bounded by Steeles Av.W, Carnival
- 11 Ct, and Hidden trail. Reconfiguration of the supply points by replacing the dips on Steeles
- 12 will improve restoration to more customers in the event of an outage. The secondary
- 13 service will be replaced in ducts. This project requires replacement of 11 submersible
- 14 transformers, 1,000 m of primary cable, 4,000 m of secondary service cable, 26 tap boxes
- 15 and 5,000 m of underground ducts.
- 16

DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	WESTMINSTER-BRANSON
STATION(S)	BATHURST I TS
FEEDER(S)	NY85M7

17

2

3 Project Background

- 4 Direct Buried cables were installed in the horseshoe area in the 70's and 80's. They are
- 5 exposed to contamination because of the method of installation, and thus, premature
- 6 failure. They are also difficult to fault locate and take a lengthy amount of time for power
- 7 resoration. As part of the feeder reliability improvement initiative, THESL will replace
- 8 the direct buried distribution plant; this will also improve operational flexibility.
- 9

10 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Ranking (Worst Feeder)			179
Feeders Experiencing Sustained Interruptions Count(Worst Feeder)			5
HISTORICAL RELIABILITY PERFORMANCE			
	2008	2009	2010
Feeder CI (<i>Cumulative</i>)	2,871	1,228	3,414
Feeder CMO (<i>Cumulative</i>)	74,881	84,907	46,360

11

12 Benefits

- 13 Replaces over 30- year-old direct buried cables that are at risk of failing
- Reconfigures the distribution system with the current THESL standard for operation
 and protection
- Delivers major improvements in feeder reliability as a result of rebuilding and
- 17 optimally reconfiguring the lines for operational and reactive work
- 18 Improves customer satisfaction as a result of greater service reliability
- Reduces emergency and reactive capital and maintenance costs due to significantly
 greater reliability
- Provides greater flexibility for power distribution and mechanical protection and
 durability of the underground cabling

2 IMPACT OF DEFERRAL

- 3 Deferral of this project will lead to sustained or deteriorating reliability problems on the
- 4 feeder in question, leading to customer dissatisfaction and high reactive investment costs.
- 5 This is due to the risk of increased component failures of aging direct buried cable.
- 6 Furthermore, the configuration of the feeder has been altered by reactive replacements
- 7 that have not optimized a design for operational flexibility, such as switching
- 8 transformers and standard fusing. This will lead to more customers being affected by a
- 9 fault. The proposed re-configuration will optimize restoration operations in the case of an
- 10 outage on the feeder, thus reducing the number of customers affected.

Portfolio:	Underground
Project Title:	Northview Heights Civil Rebuild
Project Number:	13278
Project Year:	2013
Estimate Cost:	\$2,059,490

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to build civil infrastructure to replace direct buried primary

6 cable and improve reliability.

7

8 Scope:

9 The scope of work for this project is to install approximately 400 m of main duct to be

10 constructed, 2,500 m of single duct to be constructed, 20 new submersible vaults and 70

11 tap boxes.

12

DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	NORTHVIEW HEIGHTS
STATION(S)	BATHURST TS
FEEDER(S)	85M4

13

14 JUSTIFICATION

15

16 **Project Background**

17 This project is intended to improve the reliability on 85M4. The feeder has experienced

18 nine underground sustained interruptions in the Northview area since 2006, is ranked

19 (FESI-6) and is listed on THESL's April 2011WPF list. The cables in the area are direct

20 buried. THESL's records show that these assets were installed in 1986. This project

- 1 involves the replacement of XLPE direct buried cable and submersible transformers in the
- 2 area. The assets are old and have reached their end of life. Due to the condition of the
- 3 assest, reliability in the Northview area is very poor.
- 4

5 **Benefits**

- Improves feeder reliability, thereby reducing both outage duration and frequency
- Improves upon the worsening SAIFI trend over the last couple of years due to
 equipment-related outages
- 9 Reduces feeder outage by modernizing THESL'S distribution system
- 10 Replaces primary assets at their end of service life
- Customer satisfaction will be increased
- 12 Reduced customer minutes lost
- 13

14 IMPACT OF DEFERRAL

15 Customer Minutes Outage will be increased due to non switching capabilities of non-

- standard transformers in the area. If this project is deferred, the safety hazard and
- 17 reliability of the distribution system will deteriorate. Electrical tree tracking will lead to
- 18 the eventual insulation breakdown over time on the existing non-tree retardant XLPE
- 19 cable. Furthermore, the existing cables that are direct-buried will be exposed to

20 contamination and deterioration is accelerated.

Portfolio:	Underground
Drojoot Titlo.	Replace/upgrade feeder A67E from PILC to 500kcmil
Project Title:	TRXLPE cable
Project Number:	18932
Project Year:	2013
Estimate Cost:	\$ 2,036,964

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

- 5 To replace Paper Insulated Lead-Covered ("PILC") cable on the trunk of feeder A63E
- 6 with the standard 500kcmil Tree-Retardant Cross-Linked Polyethylene ("TRXLPE")
- 7 cable and rebuild cable chambers as required.
- 8
- 9 Scope:
- 10 This project will enable the replacement and upgrade of approximately 3,823 m of
- 11 varying size PILC cable to 500 kcmil TRXLPE.

DISTRICT	Toronto
DISTRICT NEIGHBOURHOOD	CARLAW
STATION(S)	CARLAW TS
FEEDER(S)	A67E

12

13 JUSTIFICATION

14

15 **Project Background**

- 16 This project was initiated due to THESL's Lead Cable Replacement Program with a
- 17 vision to ultimately improve safety and environmental conditions within cable chambers,
- 18 due mainly to lead and Polychlorinated biphenyl (PCB) exposure.

- 1 Potential procurement issues associated with a lone North American manufacturer of
- 2 PILC cables is also prompting proactive replacement of this cable with readily available
- 3 TRXLPE cable.
- 4

5 Benefits

- Removes risk of harmful effects of lead and potential PCB oil exposure
- 7 Increases capacity for projected load growth and flexibility for load transferring by
- 8 upgrading with higher ampacity 500kcmil TRXLPE feeder, PILC feeder whose
- 9 limiting trunk sizes are 350kcmil
- Addresses procurement issue associated with a lone North American manufacturer of
 PILC cables
- 12

13 IMPACT OF DEFERRAL

- 14 Issues of health and environmental risks would continue for THESL workers due mainly
- 15 to potential exposure to PCBs and lead. Additionally, if the lone North American
- 16 manufacturer stops producing PILC cable, THESL will have a sourcing/procurement
- 17 issue.

Portfolio:	Underground
Project Title:	Replace/upgrade feeder A51WR from PILC to
rioject fille:	500kcmil TRXLPE cable
Project Number:	18803
Project Year:	2013
Estimate Cost:	\$ 2,023,310

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 To replace Paper Insulated Lead-Covered ("PILC") cable on the trunk of feeder A51WR

6 with the standard 500 kcmil Tree-Retardant Cross-Linked Polyethylene ("TRXLPE")

7 cable and rebuild cable chambers as required.

- 8
- 9 Scope:

10 This project will enable the replacement and upgrade of approximately 2,200 m of

11 varying size PILC cable to 500 kcmil TRXLPE.

12

DISTRICT	Toronto
DISTRICT NEIGHBOURHOOD	WINDSOR
STATION(S)	WINDSOR TS
FEEDER(S)	A51WR

13

14 JUSTIFICATION

15

16 Project Background

17 This project was initiated due to THESL's Lead Cable Replacement Program with a

vision to ultimately improve safety and environmental conditions within cable chambers,

1	due mainly to lead and Polychlorinated biphenyl PCB exposure. Potential procurement
2	issues associated with a lone North American manufacturer of PILC cables is also
3	prompting proactive replacement of this cable with readily available TRXLPE cable.
4	
5	In addition, A51WR is projected to be overloaded within the next ten years under first
6	contingency conditions. Upgrading the existing PILC feeder trunk to 500kcmil TRXLPE
7	will provide additional capacity on this feeder. This specific feeder was also chosen for
8	upgrade because it contains belted-type PILC cable, which is the oldest PILC cable
9	type in THESL's distribution system.
10	
11	Benefits
12	• Removes risk of harmful effects of lead and potential PCB oil exposure
13	• Increases capacity for projected load growth and flexibility for load transferring by
14	upgrading with higher ampacity 500kcmil TRXLPE feeders, PILC feeder whose trunk
15	sizes are 350kcmil
16	• Addresses procurement issue associated with a lone North American manufacturer of
17	PILC cables
18	
19	IMPACT OF DEFERRAL
20	Issues of health and environmental risks will continue for THESL workers due mainly to
21	potential exposure to PCBs and lead. Moreover, the feeder is projected to be overloaded
22	within the next ten years. Additionally, if the lone North American manufacturer stops
23	producing PILC cable, THESL will have a sourcing/procurement issue.
24	

Portfolio:	Underground
Project Title:	Northview Heights Electrical Rebuild
Project Number:	13239
Project Year:	2013
Estimate Cost:	\$2,012,738

2

3 PROJECT DESCRIPTION

4

5 **Objective:**

6 The purpose of this project is to improve the reliability by replacing direct buried primary

7 cable and rebuilding the civil infrastructure.

8

9 Scope:

10 The scope of work for this project is to install 20 spans of overhead three-phase

11 conductor, 20 new poles, 30 new submersible transformers, 400 m of 3-1/0 underground

12 primary, 2,500 m of 1/0 underground primary and 12,000 m of secondary cabling. This

13 project will address roughly 300 residential homes.

14

DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	NORTHVIEW HEIGHTS
STATION(S)	BATHURST I TS
FEEDER(S)	NY85M4, NY85M24

15

16 JUSTIFICATION

17

18 **Project Background**

- 19 This project is intended to improve the reliability on 85M4. The feeder has experienced
- 20 nine underground sustained interruptions in the Northview area since 2006, is ranked

1 (FESI-5) and is listed on THESL's April 2011WPF list. The cables in the area are direct

2 buried. THESL's records show that these assets were installed in 1986. This project

3 involves the replacement of XLPE direct buried cable and submersible transformers in the

4 area. The assets are old and have reached their end of life. Due to the poor condition of

5 the assest, the reliability in Northview area is deteriorating.

6

7 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Ranking (Worst Feeder)90			90
Feeders Experiencing Sustained Interruptions Count(Worst Feeder)7			7
HISTORICAL RELIABILITY PERFORMANCE			
	2008	2009	2010
Feeder CI (<i>Cumulative</i>)	9,585	3,250	88
Feeder CMO (<i>Cumulative</i>)	328,516	87,034	8,168

8

9 Benefits

- 10 Improves feeder reliability, thereby reducing both outage duration and frequency
- II Improves upon the worsening SAIFI trend over the last couple of years due to
- 12 equipment related outages
- 13 Reduces feeder outage by modernizing THESL's distribution system
- 14 Replaces primary assets at their end of service life
- 15 Increases customer satisfaction
- 16 Reduces customer minutes lost
- 17

18 **IMPACT OF DEFERRAL:**

- 19 Customer Minutes Outage would be increased due to non switching capabilities of non-
- 20 standard transformers in the area. Outages due to overloaded transformers would increase.
- 21 If this project were to be deferred, the potential safety hazard could increase and
- reliability would be poor. Furthermore, the existing cables that are direct-buried would be

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1 exposed to contamination and the resultant accelerated deterioration.

Portfolio:	Underground	
Project Title:	Cable Chamber Rebuilds for PILC	
	Replacement/Upgrade of A77E, A78E, and A79E	
Project Number:	13326	
Project Year:	2013	
Estimate Cost:	\$1,964,204	

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 To inspect and rebuild cable chambers containing feeders A77E, A78E and A79E. This

6 work is necessary for replacement of Paper Insulated Lead Covered ("PILC") cable on the

7 trunk of feeders A77E, A78E and A79E to the standard 500 kcmil Tree Retardant Cross-

8 link Polyethylene ("TRXLPE") cable.

9

10 **Scope:**

11 The scope of this project is to inspect 46 cable chambers and rebuild those in need of

12 refurbishment. The rebuilding of these cable chambers will enable the replacement and

13 upgrade of the existing PILC cable that runs through them with 500 kcmil TRXLPE. This

cable replacement will be completed in projects 14199, 14192 and 14197.

15

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	CARLAW
STATION(S)	CARLAW TS
FEEDER(S)	A77E, A78E, A79E

16

2

Project Background 3

- This project was initiated to inspect and rebuild cable chambers due to THESL's Lead 4
- Cable Replacement Program, with a vision to ultimately improve safety and 5
- environmental conditions within cable chambers, by eliminating lead and Polychlorinated 6
- 7 biphenyls (PCB) exposure. The cable chambers need to be rebuilt as age and
- environmental conditions have led to deteriorated civil structures. The rebuilt cable 8
- chambers will be larger in many cases as the TRXLPE cable and associated splices 9
- occupy more space than the PILC cable that is being replaced. Cable chambers for this 10
- 11 project have installation dates dating back to 1964, and up to eight, 3-phase 13.8 kV
- feeders running through them. The inspection and rebuilding of these cable chambers will 12
- 13 enable the PILC cable replacement to occur safely
- 14

Benefits 15

- 16 • Removes risk of harmful effects of lead and potential PCB oil exposure
- Increases room for load growth and flexibility for load transferring by upgrading with 17 higher ampacity 500kcmil TRXLPE cable, PILC feeder whose trunk sizes are 18 350kcmil 19
- Addresses procurement issue associated with a lone North American manufacturer of 20 **PILC** cables
- 21
- 22

IMPACT OF DEFERRAL 23

- Deteriorated civil conditions and limited space within the cable chambers will not allow 24
- 25 for PILC cable replacement. Issues of health and environmental risks would continue for
- THESL workers, due mainly to potential exposure to PCBs, and lead. If the lone North 26
- American manufacturer stops producing PILC cable, THESL will have a 27
- sourcing/procurement issue. 28
- 29

Portfolio:	Underground
Project Title	Cable Chamber Rebuilds for PILC
Project Title:	Replacement/Upgrade of A41GD, A47GD and A48GD
Project Number:	13316
Project Year:	2013
Estimate Cost:	\$1,960,903

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

- 5 To inspect and rebuild cable chambers containing feeders A41GD, A47GD and A48GD.
- 6 This work is necessary for replacement of Paper Insulated Lead Covered ("PILC") cable
- 7 on the trunk of feeders A41GD, A47GD and A48GD to the standard 500kcmil Tree
- 8 Retardant Cross-link Polyethylene ("TRXLPE") cable.
- 9

10 **Scope:**

- 11 The scope of this project is to inspect 39 cable chambers and rebuild those in need of
- 12 refurbishment. The rebuilding of these cable chambers will enable the replacement and
- upgrade of the existing PILC cable that runs through them to 500 kcmil TRXLPE. This
- cable replacement will be completed in projects 14156, 14157 and 14158.
- 15

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	GEORGE AND DUKE
STATION(S)	GEORGE AND DUKE TS
FEEDER(S)	A41GD, A47GD, A48GD

16

2

3 **Project Background**

- 4 This project was initiated to inspect and rebuild cable chambers due to THESL's Lead
- 5 Cable Replacement Program, with a vision to ultimately improve safety and
- 6 environmental conditions within cable chambers, by eliminating lead and Polychlorinated
- 7 biphenyls (PCB) exposure. The cable chambers need to be rebuilt as age and
- 8 environmental conditions have led to deteriorated civil structures. In addition, the rebuilt
- 9 cable chambers will be larger in many cases as the TRXLPE cable and associated splices
- 10 occupy more space than the PILC cable that is being replaced. Cable chambers for this
- project have installation dates dating back to 1986, and up to nine, 3-phase 13.8 kV
- 12 feeders running through them. The inspection and rebuilding of these cable chambers will
- 13 enable the PILC cable replacement to occur safely.
- 14

15 Benefits

- Removes risk of harmful effects of lead and potential PCB oil exposure
- Increases room for load growth and flexibility for load transferring by upgrading with
 higher ampacity 500kcmil TRXLPE cable, PILC feeder whose trunk sizes are
 350kcmil
- Addresses procurement issue associated with a lone North American manufacturer of
 PILC cables
- 22

23 IMPACT OF DEFERRAL

- 24 Deteriorated civil conditions and limited space within the cable chambers will not allow
- 25 for PILC cable replacement. Issues of health and environmental risks would continue for
- 26 THESL workers, due mainly to potential exposure to PCBs, and lead. Additionally, if the
- 27 lone North American manufacturer stops producing PILC cable, THESL will have a
- 28 sourcing/procurement issue.
- 29
- 30

Portfolio:	Underground
Project Title:	Replace/upgrade feeder A63E from PILC to 500kcmil
	TRXLPE cable
Project Number:	18690
Project Year:	2013
Estimate Cost:	\$ 1,921,362

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 To replace Paper Insulated Lead-Covered ("PILC") cable on the trunk of feeder A63E

6 with the standard 500 kcmil Tree-Retardant Cross-Linked Polyethylene ("TRXLPE")

7 cable and rebuild cable chambers as required.

- 8
- 9 Scope:
- 10 This project will enable the replacement and upgrade of approximately 3,040 m of

11 varying size PILC cable, to 500 kcmil TRXLPE.

12

DISTRICT	Toronto
DISTRICT NEIGHBOURHOOD	CARLAW
STATION(S)	CARLAW TS
FEEDER(S)	A63E

13

14 JUSTIFICATION

15

16 **Project Background**

17 This project was initiated due to THESL's Lead Cable Replacement Program, with a

18 vision to ultimately improve safety and environmental conditions within cable chambers,

1	due mainly to lead and Polychlorinated biphenyl (PCB) exposure. Potential procurement
2	issues associated with a lone North American manufacturer of PILC cables is also
3	prompting proactive replacement of this cable with readily available TRXLPE cable.
4	Furthermore, A63E is projected to be overloaded within the next ten years under first
5	contingency conditions. Upgrading the existing PILC feeder trunk to 500kcmil TRXLPE
6	will provide additional capacity on this feeder.
7	
8	This specific feeder was also chosen for upgrade because it contains belted-type PILC
9	cable, which is the oldest PILC cable type in THESL's distribution system.
10	
11	Benefits
12	• Removes risk of harmful effects of lead and potential PCB oil exposure
13	• Increases capacity for projected load growth and flexibility for load transferring by
14	upgrading with higher ampacity 500kcmil TRXLPE feeder, PILC feeder whose
15	limiting trunk sizes are 350kcmil
16	• Addresses procurement issue associated with a lone North American manufacturer of
17	PILC cables
18	
19	IMPACT OF DEFERRAL
20	Issues of health and environmental risks would continue for THESL workers due mainly
21	to potential exposure to PCBs and lead. Additionally, the feeder is projected to be
22	overloaded within the next ten years. Moreover, if the lone North American manufacturer
23	stops producing PILC cable, THESL will have a sourcing/procurement issue.

Portfolio:	Underground	
Project Title.	Cable Chamber Location #6294 Piece out and PILC	
Project Title:	cable replacement	
Project Number:	19798	
Project Year:	2013	
Estimate Cost:	\$1,773,000	

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to piece out and remove a number of cluttered and tangled 6 cables and telecom wires within cable chamber 6294. This cable chamber is located at in 7 the vicinity of 149 Front St W. between York St and Simcoe St. This work will return the 8 cable chamber to safe and workable conditions so that new cables can be pulled and 9 installed.

10

11 **Scope:**

12 The scope of work for this project is to build a new 6x4 duct bank on the north side of

13 Front St. in order to relocate existing feeders from cable chamber 6294. The new duct

bank is to begin at cable chamber 5922 and run west approximately 275 meters to cable

15 chamber 5242.

16

Feeders A54WR, A58WR, A71WR and A72WR are to be rerouted from cable chamber6294 to the new duct bank.

19

20 The remaining feeders and telecom cables in cable chamber 6294 are then to be pieced

21 out and racked. Any spare or obsolete AILC cable is also to be removed and abandoned.

DISTRICT	TORONTO

DISTRICT NEIGHBOURHOOD	TRINTY – SPADINA
STATION(S)	WINDSOR TS
	A1WR, A2WR, A50WR, A51WR, A54WR,
FEEDER(S)	A58WR, A71WR, A72WR

2 JUSTIFICATION

3

4 **Project Background**

5 Cable chamber 6294 was rebuilt several years ago, however the existing feeders and

6 telecom cables were not properly pieced out. As a result, any projects requiring access to

7 this cable chamber are encountering work refusals by underground crews as it is cluttered

8 with tangled telecom cables and feeders. Any new feeder installations for capital projects

9 and/or customer connections are now faced with finding alternate routes using different

10 duct banks and cable chambers in order to avoid accessing cable chamber 6294. This

11 practice is inefficient and costly.

12

13 Benefits

Removes all tangled and cluttered cables within the cable chamber 6294, thereby
 improving the safety and working conditions for crews

• Allows for the installation of new feeders for capital projects and customer

17 connections

18

19 IMPACT OF DEFERRAL

20 If this project were to be deferred, any work requiring access into cable chamber 6294

21 will continue to be refused by THESL crews. This would result in engineers and

22 designers having to design and plan alternate routes in order to supply customer demand

23 which is inefficient, costly and time consuming.

Portfolio:	Underground
Project Title:	55M31 Underground Lateral Replacement Ph#2
Project Number:	13287
Project Year:	2013
Estimate Cost:	\$1,698,278

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to improve the reliability on the feeder NY55M31 by

6 replacing equipment that is non-standard or classified as at the end-of-life and is at risk of

7 contributing to future outages for the commercial and industrial customers in this area.

8

9 Scope:

10 The scope of work for this project is to replace non-standard equipment and end-of-life

11 assets in the neighburhood along Weston Road and Steeles Avenue West. This project is

12 predominately focused on improving the underground lateral infrastructure of the area by

13 addressing 22 poles, 17 transformers, 4,000 m of 1/0 TRXLPE underground conductor

- 14 and the construction of civil infrastructure.
- 15

DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	HUMBER SUMMIT
STATION(S)	FINCH II TS
FEEDER(S)	NY55M31

16

2

3 Project Background

4 Primary cable is the major cause of power outages in the underground system. Due to the

- 5 fact that underground equipment is mostly installed outdoors and operated in a harsh
- 6 environment, it endures elements of nature such as dirt, road salt, water, moisture and
- 7 condensation. The purpose of this project is to improve the reliability of 55M31 by
- 8 replacing the XLPE underground cable. Historically this feeder has experienced outages
- 9 due to the failling underground equipment. This planned replacement is necessary to
- 10 mitigate risk of additional failures that will cause loss of power supply to customers.

11

12 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Ranking (Worst Feeder)57			
Feeders Experiencing Sustained Interruptions Count(Worst Feeder)4			4
HISTORICAL RELIABILITY PERFORMANCE			
	2008	2009	2010
Feeder CI (<i>Cumulative</i>)	1,588	1,842	373
Feeder CMO (Cumulative)	18,364	50,112	16,443

13

14 Benefits

- 15 Increases reliability through the replacement of early vintage XLPE and optimally
- 16 reconfiguring the system, thereby improving customer satisfaction
- 17 Provides greater flexibility for power distribution and mechanical protection and
- 18 durability of the underground cabling
- 19 Reduces emergency and reactive capital and maintenance costs
- 20 Upgrades equipment to current THESL standards

21

Deferral of this project will lead to sustained or deteriorating reliability problems on the feeders in question due to aging and deteriorating overhead and underground plant, in turn leading to customer dissatisfaction and high reactive costs. This project affects 28 commercial and industrial customers and is primarily focused on their equipment supplying them on the feeder's lateral. An outage may not affect a great number of customers but would have a consequential impact financially for their day-to-day business.

Portfolio:	Underground	
Drainat Titles	Cable Chamber Rebuilds for PILC	
Project Title:	Replacement/Upgrade of A63E	
Project Number:	20633	
Project Year:	2013	
Estimate Cost:	\$1,685,587	

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 To inspect and rebuild cable chambers containing feeders A63E. This work is necessary

6 for replacement of Paper Insulated Lead Covered ("PILC") cable on the trunk of feeder

7 A63E to the standard 500kcmil Tree Retardant Cross-link Polyethylene ("TRXLPE")

8 cable.

9

10 **Scope:**

11 The scope of this project is to inspect 36 cable chambers and rebuild those in need of

12 refurbishment. The rebuilding of these cable chambers will enable the replacement and

13 upgrade of the existing PILC cable that runs through them to 500 kcmil TRXLPE. This

cable replacement will be completed in project X13132.

15

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	CARLAW
STATION(S)	CARLAW TS
FEEDER(S)	A63E

16

2

3 **Project Background**

- 4 This project was initiated to inspect and rebuild cable chambers due to THESL's Lead
- 5 Cable Replacement Program with a vision to ultimately improve safety and
- 6 environmental conditions within cable chambers, by eliminating lead and Polychlorinated
- 7 biphenyls (PCB) exposure. The cable chambers need to be rebuilt as age and
- 8 environmental conditions have led to deteriorated civil structures. In addition, the rebuilt
- 9 cable chambers will be larger in many cases as the TRXLPE cable and associated splices
- 10 occupy more space than the PILC cable that is being replaced. Cable chambers for this
- project have installation dates dating back to 1953, and up to nine, 3-phase 13.8 kV
- 12 feeders running through them. The inspection and rebuilding of these cable chambers will
- 13 enable the PILC cable replacement to occur safely.
- 14

15 Benefits

- Removes risk of harmful effects of lead and potential PCB oil exposure
- Increases room for load growth and flexibility for load transferring by upgrading with
 higher ampacity 500kcmil TRXLPE cable, PILC feeder whose trunk sizes are
 350kcmil
- Addresses procurement issue associated with a lone North American manufacturer of
 PILC cables
- 22

- 24 Deteriorated civil conditions and limited space within the cable chambers will not allow
- 25 for PILC cable replacement. Issues of health and environmental risks would continue for
- 26 THESL workers, due mainly to potential exposure to PCBs, and lead. Additionally, if the
- 27 lone North American manufacturer stops producing PILC cable, THESL will have a
- 28 sourcing/procurement issue.
- 29

Portfolio:	Underground	
Project Title:	VC of Flemingdon MS feeders SS53-F3, F4, F5, F6	
	and F8 Electrical	
Project Number:	20563	
Project Year:	2013	
Estimate Cost:	\$ 1,683,508	

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The objective of this project is to rebuild the existing 13.8kV primary distribution system

6 fed by the Flemingdon Park Municipal Substation by converting the outgoing feeders to

7 27.6kV system and replacing the aged, direct buried cables.

8

9 Scope:

10 The scope of this project involves conversion of existing 13.8kV feeders SS53F3,

11 SS53F4,SS53F5, SS53F6 and SS53F8 to 27.6kV supplied by Bermondsey TS. All

12 existing 13.8kV equipment will be removed and replaced with 27.6kV rated equipment as

13 per THESL's current standard. In addition, existing direct buried cables serving the area

14 will be replaced with cables installed in concrete-encased ducts. This project requires

15 installation of 3 new pad mounted switches, replacement of 3 pad mounted switches, 49

transformers, refurbishment of 49 transformer vaults and replacement of 3,350 m of

17 primary cable.

DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	DON MILLS & EGLINTON
STATION(S)	FLEMINGDON MS & BERMONDSEY TS
FEEDER(S)	SS53F3,SS53F4,SS53F5,SS53F6,SS53F8

2

3 **Project Background**

4 Switchgear in Flemingdon MS was installed in 1961 with air blast circuit breakers. The

5 overall switchgear age and the obsolence of the switching technology heighten the

6 negative impact of the risk the station imposes on the area's distribution system.

7 Furthermore, the existing substation is islanded with no opportunity for an external

8 backup in the event of a contingency. To reduce maintenance costs from the station and to

9 assure reliability of the overall distribution system, THESL proposes to modernize the

area by converting to 27.6kV pursuant to THESL current standards and practices.

11

12 Historical Performance

FEEDER PERFORMANCE				
Worst Performing Feeder Rank	king (Worst Fee	der)	193	
Feeders Experiencing Sustained Interruptions (Worst Feeder)3				
HISTORICAL RELIABILITY PERFORMANCE				
	2008	2009	2010	
Feeder CI (<i>Cumulative</i>)	654	1,123	282	
Feeder CMO (<i>Cumulative</i>)	41,279	54,729	44,588	

13

14 Benefits

15 • Modernizes the local distribution system by replacing hardware on the aging

16 distribution system

Enables the decommissioning of the Flemingdon Park Substation that operates with
 air blast circuit breaker switchgear installed in 1961. The decommissioning of the

19 substation deals with the obsolescence of the switching technology which heightens

20 the negative impact of the risk the station imposes on the area's distribution system.

• Offers the distribution area the opportunity of external backup in the event of a

22 contingency

1 IMPACT OF DEFERRAL

Deferral of this project would cause complications to the scheduled voltage conversion of other feeders from Flemingdon Park SS in the area as the substation is currently islanded and the outgoing feeders backed each other up. If this project were to be deferred, the feeders to be worked on (NYSS53F3,F4,F5, F6 and F8) would not have any backup feeder as the other feeders in the area are not at the same voltage level and would result in outages of lengthy duration. While this project is being deferred, an outage would affect about 600 customers and cause a loss of up to 14MVA.

Portfolio:	Underground	
Project Title	Replace/upgrade feeder A74DX from PILC to	
Project Title:	500kcmil TRXLPE cable	
Project Number:	19000	
Project Year:	2013	
Estimate Cost:	\$ 1,680,754	

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

- 5 To replace Paper Insulated Lead-Covered ("PILC") cable on the trunk of feeder A74DX
- 6 with the standard 500kcmil Tree-Retardant Cross-Linked Polyethylene ("TRXLPE")

7 cable and rebuild cable chambers as required.

- 8
- 9 Scope:
- 10 This project will enable the replacement and upgrade of approximately 2,135 m of

11 varying size PILC cable to 500 kcmil TRXLPE.

12

DISTRICT	Toronto
DISTRICT NEIGHBOURHOOD	DUPLEX
STATION(S)	DUPLEX TS
FEEDER(S)	A74DX

13

14 JUSTIFICATION

15

16 Project Background

- 17 This project was initiated due to THESL's Lead Cable Replacement Program, with a
- vision to ultimately improve safety and environmental conditions within cable chambers,

1	due mainly to lead and Polychlorinated biphenyl (PCB) exposure. Potential procurement
2	issues associated with a lone North American manufacturer of PILC cables is also
3	prompting proactive replacement of this cable with readily available TRXLPE cable.
4	
5	Benefits
6	• Removes risk of harmful effects of lead and potential PCB oil exposure
7	• Increases capacity for projected load growth and flexibility for load transferring by
8	upgrading with higher ampacity 500kcmil TRXLPE feeder, PILC feeder whose
9	limiting trunk sizes are 350kcmil
10	• Addresses procurement issue associated with a lone North American manufacturer of
11	PILC cables
12	
13	IMPACT OF DEFERRAL
14	Issues of health and environmental risks would continue for THESL workers due mainly
15	to potential exposure to PCBs and lead. Furthermore, if the lone North American
16	manufacturer stops producing PILC cable, THESL will have a sourcing/procurement
17	issue.
18	

Portfolio:	Underground
Project Titles	Cable Chamber Rebuilds for PILC
Project Title:	Replacement/Upgrade of A74DX
Project Number:	20627
Project Year:	2013
Estimate Cost:	\$1,640,815

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 To inspect and rebuild cable chambers containing feeders A74DX. This work is necessary

6 for replacement of Paper Insulated Lead Covered ("PILC") cable on the trunk of feeder

7 A74DX to the standard 500kcmil Tree Retardant Cross-link Polyethylene ("TRXLPE")

8 cable.

9

10 **Scope:**

11 The scope of this project is to inspect 42 cable chambers and rebuild those in need of

12 refurbishment. The rebuilding of these cable chambers will enable the replacement and

13 upgrade of the existing PILC cable that runs through them, to 500 kcmil TRXLPE. This

14 cable replacement will be completed in project X11636.

15

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	DUPLEX
STATION(S)	DUPLEX TS
FEEDER(S)	A74DX

16

2

3 **Project Background**

- 4 This project was initiated to inspect and rebuild cable chambers due to THESL's Lead
- 5 Cable Replacement Program, with a vision to ultimately improve safety and
- 6 environmental conditions within cable chambers, by eliminating lead and Polychlorinated
- 7 biphenyls (PCB) exposure. The cable chambers need to be rebuilt as age and
- 8 environmental conditions have led to deteriorated civil structures. In addition, the rebuilt
- 9 cable chambers will be larger in many cases, as the TRXLPE cable and associated splices
- 10 occupy more space than the PILC cable that is being replaced. Cable chambers for this
- project have installation dates dating back to 1963, and up to thirteen, 3-phase 13.8 kV
- 12 feeders running through them. The inspection and rebuilding of these cable chambers will
- 13 enable the PILC cable replacement to occur safely.
- 14

15 Benefits

- Removes risk of harmful effects of lead and potential PCB oil exposure
- Increases room for load growth and flexibility for load transferring by upgrading with
 higher ampacity 500kcmil TRXLPE cable, PILC feeder whose trunk sizes are
 350kcmil
- Addresses procurement issue associated with a lone North American manufacturer of
 PILC cables
- 22

- 24 Deteriorated civil conditions and limited space within the cable chambers will not allow
- 25 for PILC cable replacement. Issues of health and environmental risks would continue for
- 26 THESL workers, due mainly to potential exposure to PCBs, and lead. Additionally, if the
- 27 lone North American manufacturer stops producing PILC cable, THESL will have a
- 28 sourcing/procurement issue.
- 29

Portfolio:	Underground	
Project Title.	Replace/upgrade feeder A43W from PILC to	
Project Title:	500kcmil TRXLPE cable	
Project Number:	19011	
Project Year:	2013	
Estimate Cost:	\$ 1,535,602	

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

- 5 To replace Paper Insulated Lead-Covered ("PILC") cable on the trunk of feeder A43W
- 6 with the standard 500kcmil Tree-Retardant Cross-Linked Polyethylene ("TRXLPE")

7 cable and rebuild cable chambers as required.

- 8
- 9 Scope:
- 10 This project will enable the replacement and upgrade of approximately 3,850 m of

11 varying size PILC cable to 500 kcmil TRXLPE.

12

DISTRICT	Toronto
DISTRICT NEIGHBOURHOOD	WILTSHIRE
STATION(S)	WILTSHIRE TS
FEEDER(S)	A43W

13

14 JUSTIFICATION

15

16 Project Background

- 17 This project was initiated due to THESL's Lead Cable Replacement Program, with a
- vision to ultimately improve safety and environmental conditions within cable chambers,

1	due mainly to lead and Polychlorinated biphenyl (PCB) exposure. Potential procurement
2	issues associated with a lone North American manufacturer of PILC cables is also
3	prompting proactive replacement of this cable with readily available TRXLPE cable.
4	Moreover, this specific feeder was also chosen for upgrade because it contains belted-type
5	PILC cable, which is the oldest PILC cable type in THESL's distribution system.
6	
7	Benefits
8	• Removes risk of harmful effects of lead and potential PCB oil exposure
9	• Increases capacity for projected load growth and flexibility for load transferring by
10	upgrading with higher ampacity 500kcmil TRXLPE feeder, PILC feeder whose
11	limiting trunk sizes are 350kcmil
12	• Addresses procurement issue associated with a lone North American manufacturer of
13	PILC cables
14	
15	IMPACT OF DEFERRAL
16	Issues of health and environmental risks would continue for THESL workers due mainly
17	to potential exposure to PCBs and lead. Additionally, if the lone North American

18 manufacturer stops producing PILC cable, THESL will have a sourcing/procurement

19 issue.

	C C	
Portfolio:	ortfolio: Underground	
D	Rebuild Cable Chambers and Duct Structures along	
Project Title:	Millwood and Laird	
Project		
Number:	21439	
Project Year:	2013	
Estimate Cost:	Estimate Cost: \$1,479,000	
PROJECT DESCRIPTION Objective:		
U U	project is to inspect and rebuild cable chambers containing feeders	
from Leaside TS. This work is necessary for replacement of Paper Insulated Lead		
Covered ("PILC") cable on the trunk of Leaside TS feeders to the standard 500kcmil Tree		
Retardant Cross-link Polyethylene ("TRXLPE") cable.		
Scope:		
The second of this was	is at is to increase any new instally 20 solls show here along Willson	

11 The scope of this project is to inspect approximately 20 cable chambers along Village

12 Station Road, Millwood Road and Laird Drive and rebuild those in need of refurbishment.

13 The rebuilding of these cable chambers will enable the replacement and upgrade the

14 existing PILC cable that runs through them to 500 kcmil TRXLPE.

15

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DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	LEASIDE
STATION(S)	LEASIDE TS
FEEDER(S)	A1L, A2L, A3L, A4L, A11L, A14L, A27L, A28L

16

2

3 **Project Background**

- 4 This project was initiated to inspect and rebuild cable chambers due to THESL's Lead
- 5 Cable Replacement Program, with a vision to ultimately improve safety and
- 6 environmental conditions within cable chambers, by eliminating lead and Polychlorinated
- 7 biphenyls (PCB) exposure. The cable chambers need to be rebuilt as age and
- 8 environmental conditions have led to deteriorated civil structures. In addition, the rebuilt
- 9 cable chambers will be larger in many cases, as the TRXLPE cable and associated splices
- 10 occupy more space than the PILC cable that is being replaced. Cable chambers for this
- 11 project have installation dates back to 1963, and up to ten, 3-phase 27.6 kV feeders
- 12 running through them. The inspection and rebuilding of these cable chambers will enable
- 13 the PILC cable replacement to occur safely.
- 14

15 Benefits

- Removes risk of harmful effects of lead and potential PCB oil exposure
- Increases room for load growth and flexibility for load transferring by upgrading with
 higher ampacity 500kcmil TRXLPE cable, PILC feeder whose trunk sizes are
 350kcmil
- Addresses procurement issue associated with a lone North American manufacturer of
 PILC cables
- 22

- 24 Deteriorated civil conditions and limited space within the cable chambers will not allow
- 25 for PILC cable replacement. Issues of health and environmental risks would continue for
- 26 THESL workers, due mainly to potential exposure to PCBs, and lead. Additionally, if the
- 27 lone North American manufacturer stops producing PILC cable, THESL will have a
- 28 sourcing/procurement issue.

Portfolio:	Underground
Project Title:	Ironside Crescent UG Rehab SCNAR26M21
Project Number:	22616
Project Year:	2013
Estimate Cost:	\$ 1,470,530

PROJECT DESCRIPTION

3

4 **Objective:**

5 The purpose of this project is to rebuild old building vault electrical infrastructure and 6 replace air-insulated switches on a portion of feeder SCNAR26M21 containing aged 7 direct buried cable, which has experienced four failures and has passed its useful life 8 span. This will prevent future negative impact to customers due to equipment failure.

9

10 **Scope:**

The scope of work for this project is to replace air-insulated switchgear and existing 11 12 infrastructure in 21 building vaults in the Ironside Crescent industrial area. This portion of the feeder was identified as experiencing a significant amount of auto failures due to local 13 14 environmental conditions (dust contamination). Three air-insulated pad mount switches in this area will also be replaced with sealed SF6 type pad mount switches pursuant to 15 16 current THESL standards. This industrial area is experiencing significant growth and heavy loading so an additional pad mount switch will be required to appropriately 17 distribute the additional loading. 18

19

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	IRONSIDE
STATION(S)	MALVERN TS
FEEDER(S)	SCNAR26M21

20 JUSTIFICATION

2 **Project Background**

- 3 Feeder SCNAR26M21 has experienced four direct buried cable faults and 52 auto
- 4 reclosures in the last three years. This area is currently being rebuilt under other projects
- 5 with new cable in new concrete-encased ducts. The neighbourhood that is part of this
- 6 direct buried cable rebuild is made up of industrial and commercial customers. The
- 7 building vaults in this area were found to have dirty, aged and unreliable switchgear. This
- 8 switchgear is to be replaced with the current THESL standard SF6 types. Pad mount
- 9 switches will also be replaced with SF6 type.
- 10

11 Historical Performance

FEEDER PERFORMANCE				
Worst Performing Feeder Ranking (Worst Feeder)350				
Feeders Experiencing Sustained Interruptions (Worst Feeder)1				
HISTORICAL RELIABILITY PERFORMANCE				
	2008 2009			
Feeder CI (<i>Cumulative</i>)	4,156	2,733	23	
Feeder CMO (<i>Cumulative</i>)	43,257	159,121	12,387	

12

13 Benefits

- 14 Eliminates safety hazards to utility field-staff
- Reduces equipment footprints and eliminates switching hazards as the air-insulated
- switches in the project area are to be replaced with sealed type SF6 equivalents.
- Improves switching due to the equipment replacements, thereby improving response
- 18 times after outages
- 19 Targets achievement of better operational flexibility and more reliable supply
- 20
- 21

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- 2 Deferral may bring this project in conflict with those from other utilities or the newly
- 3 imposed city moratorium. Deferral may also result in customer dissatisfaction from
- 4 further sustained and auto-reclose outages.

Portfolio:	Underground	
Project Title:	Replace/upgrade feeder A53B from PILC to 500kcmil	
rioject litte.	TRXLPE cable	
Project Number:	18684	
Project Year:	2013	
Estimate Cost:	\$ 1,458,625	

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 To replace Paper Insulated Lead-Covered ("PILC") cable on the trunk of feeder A53B

6 with the standard 500kcmil Tree-Retardant Cross-Linked Polyethylene ("TRXLPE")

7 cable and rebuild cable chambers as required.

- 8
- 9 Scope:
- 10 This project will enable the replacement and upgrade of approximately 1,190 m of

11 varying size PILC cable to 500 kcmil TRXLPE.

12

DISTRICT	Toronto
DISTRICT NEIGHBOURHOOD	BRIDGMAN
STATION(S)	BRIDGMAN TS
FEEDER(S)	A53B

13

14 JUSTIFICATION

15

16 **Project Background**

17 This project was initiated due to THESL's Lead Cable Replacement Program, with a

vision to ultimately improve safety and environmental conditions within cable chambers,

1	due mainly to lead and Polychlorinated biphenyl (PCB) exposure. Potential procurement
2	issues associated with a lone North American manufacturer of PILC cables is also
3	prompting proactive replacement of this cable with readily available TRXLPE cable.
4	This specific feeder was also chosen for upgrade because it contains belted-type PILC
5	cable, which is the oldest PILC cable type in THESL's distribution system.
6	
7	Benefits
8	• Removes risk of harmful effects of lead and potential PCB oil exposure
9	• Increases capacity for projected load growth and flexibility for load transferring by
10	upgrading with higher ampacity 500kcmil TRXLPE feeders, PILC feeder whose trunk
11	sizes are 2/0 and 350kcmil
12	• Addresses procurement issue associated with a lone North American manufacturer of
13	PILC cables
14	
15	IMPACT OF DEFERRAL
16	Issues of health and environmental risks will continue for THESL workers due mainly to
17	potential exposure to PCBs and lead. Furthermore, if the lone North American

18 manufacturer stops producing PILC cable, THESL will have a sourcing/procurement

19 issue.

Portfolio:	Underground
Project Title:	Rehab of Transformers on SCNA502M24
Project Number:	20437
Project Year:	2013
Estimate Cost:	\$ 1,454,583

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to increase stability of this feeder by replacing aging and

6 high-risk transformers. This feeder has experienced five transformer failures in the last

7 two years.

- 8
- 9 Scope:
- 10 The scope of work for this project is replace151 submersible transformers and termination
- 11 accessories.
- 12

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	SHEPPARD & PHARMACY
STATION(S)	CAVANAUGH TS(27.6 KV)
FEEDER(S)	SCNA502M24

13

14 JUSTIFICATION

15

16 **Project Background**

17 There has been a trend of transformer failures on this feeder. THESL plans to replace 151

18 of these transformers based on their current age, condition and loading. This project will

19 improve the reliability of the feeder and the supply to customers bringing the ditribution

1 system to the THESL's standard.

2 Historical Performance

FEEDER PERFORMANCE					
Worst Performing Feeder Ranking (Worst Feeder)80					
Feeders Experiencing Sustained Interruptions (Worst Feeder)2					
HISTORICAL RELIABILITY PERFORMANCE					
	2010				
Feeder CI (<i>Cumulative</i>)	8,231	10,108	6,144		
Feeder CMO (<i>Cumulative</i>)	59,906	200,078	149,988		

3

4 Benefits

5 • Modernizes the system by replacing aged padmount and submersible transformers to

6 the latest THESL standard

• Mitigates the risk of further outages as a result of deteriorating and failing equipment

8

9 IMPACT OF DEFERRAL

10 If this project were deferred, THESL would lose the opportunity to replace aging,

11 deteriorating assets in the system and modernize the distribution to current THESL

12 standard. Moreover, THESL would also face a greater risk of sustained or increasing

13 outages as is evident by the increasing trend in CI and CMO.

Portfolio:	Underground
Project Title:	Rebuild UG Trunk NT63M12 M8 Brimley -Civil
Project Number:	21868
Project Year:	2013
Estimate Cost:	\$ 1,407,192

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The objective of this project is primarily to provide civil infrastructure to replace the old,

6 direct buried 750 kcmil (and also 350 kcmil) with 1,000 kcmil aluminum cable in

7 concrete-encased duct along Brimley Road from Steeles Avenue to Finch Avenue to

8 proactively reduce the probability of a system failure, by replacing the aged direct buried

9 cross-linked polyethelene ("XLPE") cables. This project is one phase of a multi-phase

10 program to establish a true feeder tie between NT63M12 and M8 with the upgrading of

standard size of cable on feeder mains. This part of the project deals with civil work only.

12

13 **Scope:**

14 The scope of work for this project is to design and construct the civil infrastructure for the

15 replacement of direct buried undersized cable running along Brimley Rd. THESL

16 standards will be applied in the design and construction and selection of materials. In

17 total, 3.01km of duct will be installed.

18

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	BRINMLY
STATION(S)	AGINCOURT TS
FEEDER(S)	SCNT63M12

2

3 **Project Background**

Early vintage direct buried XLPE cables have been identified as being a poor performing
asset, contributing to system reliability degradation. These cables have been constantly
exposed to neutral and sheath corrosion from the surrounding soil, thereby contributing to
the degradation of insulation strength.

8

9 The manufacturing processes employed in these early vintage XLPE cables lacked 10 sufficiently strict quality controls to (a) keep out the impurities from the insulation system 11 or (b) provide reliable sealing of the insulation system to prevent moisture ingress. The 12 steam curing process employed in the manufacture of early vintage XLPE cables also 13 resulted in moisture being trapped in the insulation system. Due to these manufacturing 14 defects, these cables have suffered from high rates of premature failure of insulation.

In addition, due to the nature of the direct buried installation, these assets are susceptible to damage from external dig-ins and movement of surrounding earth. A series of cable, elbow and transformer failures have occurred over the past few years. The purpose of this project is to install the concrete-encased conduits necessary to house the new XLPE cable. These new conduits will provide mechanical protection to the cables against external dig-ins and other factors. The work will address a stretch of undersized cable, built direct buried, connecting feeders NT63M12 and M8 running along Brimley Rd from

- 23 Steeles Ave to McNicoll Avenue and then from McNicoll Avenue to Finch Avenue.
- 24
- 25

1 Historical Performance

FEEDER PERFORMANCE					
Worst Performing Feeder Rank	Worst Performing Feeder Ranking (Worst Feeder)2				
Feeders Experiencing Sustaine	Feeders Experiencing Sustained Interruptions (Worst Feeder)9				
HISTORICAL RELIABILITY PERFORMANCE					
	2010				
Feeder CI (<i>Cumulative</i>)	7,971	16,463	1,686		
Feeder CMO (<i>Cumulative</i>)	185,746	732,101	364,363		

2

3 Benefits

- Replaces a section of undersized cable of two feeder that were direct buried
- 5 Increases the capacity of the feeder mains to normal standards
- Replaces aging direct buried cables that are at risk of failing
- Improves the reliability of the feeder through the upgrading of equipment on one of
 the worst performing feeders (2) in THESL's system that has a high FESI rank (9)
- Increases operational flexibility by establishing a true feeder tie between NT63M8
 and M12
- Increases feeder capacity through the upgrading of standard size of cable on feeder
 main
- Improves system protection through the reconfiguring of the distribution for the latest
 THESL standard for operation and protection standard fusing
- 15

- 17 Deferral of the project would expose the feeder to increased numbers of outages due to
- 18 poor performing equipment. Electrical treeing will lead to the eventual insulation
- 19 breakdown over time of the existing non-tree retardant XLPE cable. This would result in
- 20 further outages to this feeder and to its customers. Also, the installation of the cables in
- 21 direct-buried configurations accelerates deterioration.

Deferral of this project may result in future customer interruptions due to the potential
failure of assets within this area. The direct buried cables in this area will continue to
degrade, resulting in potential insulation failure. This will lead to customer dissatisfaction
and high reactive costs. Moreover, deferral may also cause this project to be in conflict
with projects from other utilities or the newly imposed city moratorium, as THESL has
communicated this project to the City and other utilities.

Portfolio:	Underground	
Drainat Titla	Cable Chamber Rebuilds for PILC	
Project Title:	Replacement/Upgrade of A67E	
Project Number:	20631	
Project Year:	2013	
Estimate Cost:	\$1,385,352	

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 To inspect and rebuild cable chambers containing feeders A67E. This work is necessary

6 for replacement of Paper Insulated Lead Covered ("PILC") cable on the trunk of feeder

7 A67E to the standard 500kcmil Tree Retardant Cross-link Polyethylene ("TRXLPE")

8 cable.

9

10 **Scope:**

11 The scope of this project is to inspect 50 cable chambers and rebuild those in need of

12 refurbishment. The rebuilding of these cable chambers will enable the replacement and

13 upgrade the existing PILC cable that runs through them, to 500 kcmil TRXLPE. This

cable replacement will be completed in project X13133.

15

DISTRICT	TORONTO	
DISTRICT NEIGHBOURHOOD	CARLAW	
STATION(S)	CARLAW TS	
FEEDER(S)	A67E	

16

2

3 **Project Background**

- 4 This project was initiated to inspect and rebuild cable chambers due to THESL's Lead
- 5 Cable Replacement Program, with a vision to ultimately improve safety and
- environmental conditions within cable chambers, by eliminating lead and Polychlorinated
 biphenyls (PCB) exposure.
- 8 The cable chambers need to be rebuilt as age and environmental conditions have led to
- 9 deteriorated civil structures. In addition, the rebuilt cable chambers will be larger in many
- 10 cases, as the TRXLPE cable and associated splices occupy more space than the PILC
- 11 cable that is being replaced. Cable chambers for this project have installation dates dating
- 12 back to 1953, and up to nine, 3-phase 13.8 kV feeders running through them. The
- 13 inspection and rebuilding of these cable chambers will enable the PILC cable replacement
- 14 to occur safely.
- 15

16 Benefits

- 17 Removes risk of harmful effects of lead and potential PCB oil exposure
- Increases room for load growth and flexibility for load transferring by upgrading with
 higher ampacity 500kcmil TRXLPE cable, PILC feeders whose trunk sizes are
 350kcmil
- Addresses procurement issue associated with a lone North American manufacturer of
 PILC cables
- 23

- 25 Deteriorated civil conditions and limited space within the cable chambers will not allow
- 26 for PILC cable replacement. Issues of health and environmental risks would continue for
- 27 THESL workers, due mainly to potential exposure to PCBs, and lead. Furthermore, if the
- 28 lone North American manufacturer stops producing PILC cable, THESL will have a
- 29 sourcing/procurement issue.

Portfolio:	Underground	
Project Title:	Rebuild of NY51M4 Consumers Rd & Victoria	
	Park Areas - Electrical NY51M4	
Project Number:	20733	
Project Year:	2013	
Estimate Cost:	\$ 1,346,580	

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The objective of this project is to replace aged and failing assets along the feeder

6 NY51M4 to proactively prevent a rise in number of outages.

7

8 Scope:

9 This project replaces aged assets (42 years old) that have reached or passed their useful

10 service life, that are connected to feeder NY51M4 in the area bounded by Victoria Park

11 Av, Finch Av, Don Mills Rd, and Consumers Rd. This requires the refurbishment of 1

12 vault, replacement of 4,400 m of primary cable, three overhead switches, six pole

13 reframes and installation of three new overhead switches.

14

DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	VICTORIA PARK & CONSUMERS
STATION(S)	LESLIE I TS
FEEDER(S)	NY51M4

15

2

3 **Project Background**

4 In the last ten years, there were 39 sustained outages on the feeder with CI=24,256 and

5 CMO=688,176. Within the last 12 months feeder NY51M4 experienced six outages. The

6 Worst Performing Feeder rank deteriorated from 19 to 16 and considering the mean time

7 (four months) between failures of the feeder equipment, more failures are expected to

8 occur. Other projects were packaged to address the issues that caused the six outages in

9 the last 12 months, handle the construction of associated concrete encased ducts, and

10 replace line-post porcelain insulators & failing poles. This project addresses vintage asset

11 areas of the feeder, which have experienced faults in the last ten years.

12

13 Historical Performance

FEEDER PERFORMANCE						
Worst Performing Feeder Ranking (Worst Feeder)			140			
Feeders Experiencing Sustained	3					
HISTORICAL RELIABILITY PERFORMANCE						
	2008	2009	2010			
Feeder CI (<i>Cumulative</i>)	1,580	829	7,039			
Feeder CMO (<i>Cumulative</i>)	28,015	9,717	93,300			

14

15 Benefits

• Reinvigorates the distribution system by replacing the aging (40 year-old) direct

- buried cables, aging switchgear and rehabilitating transformer vaults in the area
- 18 around the Consumers road and Victoria Park intersection.
- 19 Improves switching due to the equipment replacement, thereby improving response

20 times after outages

- 21
- 22

1 IMPACT OF DEFERRAL

2 Deferral of this project would cause more outages to occur in the area. Delay of this

- 3 project worsens the safety risks to utility staff and to community members as the pole
- 4 framing is in very poor condition. The direct buried cables are subject to contamination,
- 5 thus pre-mature failure. Direct buried cables are also difficult to fault locate and this leads
- 6 to large restoration times due to the difficulty to replace or repair these components,
- 7 which in turn leads to customer dissatisfaction and high reactive investment costs.

Portfolio:	Underground
Project Title:	55M31 Underground Lateral Replacement Ph#1
Project Number:	13284
Project Year:	2013
Estimate Cost:	\$1,312,770

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to improve reliability on feeder NY55M3 by replacing

6 equipment that is non-standard or classified as end-of-life and is at risk of contributing to

7 future outages for the commercial and industrial customers in this area.

8

9 Scope:

10 The scope of work for this project is to replace non-standard equipment and end-of-life

11 assets in the neighburhood along Weston Rd. and Steeles Ave. West. The scope of this

12 project is predominately focused on improving the underground lateral infrastructure of

this area by addressing 14 poles, 13 underground transformers, 3,000 m of 1/0 TRXLPE

14 underground conductor as well as the construction of civil infrastructure.

15

DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	HUMBER SUMMIT
STATION(S)	FINCH II TS
FEEDER(S)	NY55M31

16

17 JUSTIFICATION

1 Project Background

2 Primary cable is the major cause of power outages in the underground system. Due to the

- 3 fact that underground equipment is mostly installed outdoors and operated in harsh
- 4 environment, it endures elements of natrue such as dirt, road salt, water, moisture and
- 5 condensation. The purpose of this project is to improve the reliability of 55M31 by
- 6 replacing the XLPE underground cable. Historically this feeder has experienced outages
- 7 due to the failling underground equipment. This planned replacement is necessary to
- 8 mitigate the risk of additional failirues that will cause loss of power supply to customers.
- 9

10 Historical Performance

FEEDER PERFORMANCE				
Worst Performing Feeder Ranking (Worst Feeder)57				
Feeders Experiencing Sustained Interruptions Count(Worst Feeder)4				
HISTORICAL RELIABILITY PERFORMANCE				
	2008	2009	2010	
Feeder CI (Cumulative)	1588	1842	373	
Feeder CMO (<i>Cumulative</i>)	18364	50112	16443	

11

12 Benefits

- 13 Increases reliability through the replacement of early vintage XLPE and optimally
- 14 reconfiguring the system, thereby improving customer satisfaction
- 15 Provides greater flexibility for power distribution and mechanical protection and
- 16 durability of the underground cabling
- 17 Reduces emergency and reactive capital and maintenance costs
- 18 Upgrades equipment to current THESL standards

19

20 IMPACT OF DEFERRAL

21 The deferral of this project will generally lead to sustained or deteriorating reliability

1 problems on the feeders in question due to aging and deteriorating overhead and

2 underground plant. This will lead to customer dissatisfaction and high reactive costs. This

3 project affects 15 commercial and industrial customers and is primarily focused on their

4 equipment supplying them on the feeder's lateral. An outage may not affect a great

5 number of customers but due to the necessity of power, would have a consequential

6 impact financially for their day-to-day business.

Portfolio:	Underground
Project Title:	UG Rebuild R26M34 Melford Customer Vaults
Project Number:	22718
Project Year:	2013
Estimate Cost:	\$ 1,285,169

2

3 PROJECT DESCRIPTION

4

5 **Objective:**

6 The purpose of this project is to replace the old and deteriorated wall mounted primary

7 switches (with SF6 type indoor SWGR or mini-rupters as applicable) in the customer

8 vaults of Melford industrial area.

9

10 **Scope:**

11 The scope of work for this project is to replace 46 primary switches with SF6 switchgear

12 or mini-rupter arrangement in the customer vaults based on the latest THESL standard. 14

13 SF6 type switchgear will be installed in vaults with transformers of 750kVA or more. For

14 the vaults of smaller size transformers (less than 750kVA), 18 mini-rupter type switches

- 15 will be installed.
- 16

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	MELFORD DRIVE
STATION(S)	MALVERN TS
FEEDER(S)	SCNAR26M34

17

2

3 **Project Background**

- 4 The three phase distribution in the Melford industrial area was built in 1974. In 2009 the
- 5 old and failing direct buried cables were replaced by new standard cables in concrete
- 6 encased ducts. Due to recent failures of the old wall mounted primary switches in
- 7 customer vaults, THESL plans to replace the old and deteriorated wall mounted primary
- 8 switches (with SF6 type indoor SWGR or mini-rupters) in Melford industrial area
- 9 customer vaults.
- 10

11 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Rank	46		
Feeders Experiencing Sustained Interruptions (Worst Feeder)7			
HISTORICAL RELIABILITY PERFORMANCE			
	2008	2009	2010
Feeder CI (<i>Cumulative</i>)	3,592	1,183	9,101
Feeder CMO (<i>Cumulative</i>)	539,714	433,255	334,045

12

13 Benefits

- Replaces the old and deteriorated wall mounted primary switches with modern SF6
- 15 type indoor switchgear or mini-rupters in the customer vaults of Melford industrial
- 16 area
- 17 Targets achievement of better operational flexibility and more reliable supply
- Upgrades equipment on one of the worst performing feeders in THESL's system that
 has a high FESI rank (7)
- Addresses industrial/commercial distribution that has experienced high fault currents
- 21 during failure

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1 IMPACT OF DEFERRAL

2 Deferral of this project would cause more outages to occur in the area, as well as frequent

- 3 failures of the old and deteriorated wall mounted primary switches are. Outages to the
- 4 customers fed by these vault switches would have a financial impact to their day-to-day
- 5 business and lead to customer dissatisfaction.
- 6

Portfolio:	Underground	
Ductors Titles	Replace/upgrade feeder A44W from PILC to 500kcmil	
Project Title:	TRXLPE cable	
Project Number:	19019	
Project Year:	2013	
Estimate Cost:	\$ 1,277,973	

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

- 5 To replace Paper Insulated Lead-Covered ("PILC") cable on the trunk of feeder A44W
- 6 with the standard 500kcmil Tree-Retardant Cross-Linked Polyethylene ("TRXLPE")

7 cable and rebuild cable chambers as required.

- 8
- 9 Scope:
- 10 This project will enable the replacement and upgrade of approximately 3,190 m of

11 varying size PILC cable to 500 kcmil TRXLPE.

12

DISTRICT	Toronto
DISTRICT NEIGHBOURHOOD	WILTSHIRE
STATION(S)	WILTSHIRE TS
FEEDER(S)	A44W

13

14 JUSTIFICATION

15

16 Project Background

- 17 This project was initiated due to THESL's Lead Cable Replacement Program, with a
- 18 vision to ultimately improve safety and environmental conditions within cable chambers,

1	due mainly to lead and Polychlorinated biphenyl (PCB) exposure. Potential procurement
2	issues associated with a lone North American manufacturer of PILC cables is also
3	prompting proactive replacement of this cable with readily available TRXLPE cable.
4	This specific feeder was also chosen for upgrade because it contains belted-type PILC
5	cable, which is the oldest PILC cable type in THESL's distribution system.
6	
7	Benefits
8	• Removes risk of harmful effects of lead and potential PCB oil exposure
9	• Increases capacity for projected load growth and flexibility for load transferring by
10	upgrading with higher ampacity 500kcmil TRXLPE feeder, PILC feeder whose
11	limiting trunk sizes are 350kcmil
12	• Addresses procurement issue associated with a lone North American manufacturer of
13	PILC cables
14	
15	IMPACT OF DEFERRAL
16	Issues of health and environmental risks would continue for THESL workers due mainly
17	to potential exposure to PCBs and lead. Additionally, f the lone North American

18 manufacturer stops producing PILC cable, THESL will have a sourcing/procurement

19 issue.

- 1
- 2

3 PROJECT DESCRIPTION

4

5 **Objective:**

The purpose of this project is primarily to provide civil infrastructure in advance of the 6 related electrical project that will proactively reduce the probability of a system failure by 7 replacing the aged direct buried cross-linked polyethelene ("XLPE") cables on feeder 8 SCNA47M17 within the area along Vandorf Street, Tallpines Court, John Graham Court, 9 Sheppard Avenue, Raycliff Court, Shallice Court, Porthclair Court, Parsborough Court, 10 Rylander Boulevard, Tideswell Boulevard, Carlisle Crescent and Durnford Road to the 11 12 internal roads of the THESL-owned complex. 13 Scope: 14 The scope of work for this project is to install new concrete-encased conduit to enclose 15 the XLPE cables on feeder SCNA47M17 along the streets of Vandorf Street, Tallpines 16

17 Court, John Graham Court, Sheppard Avenue, Raycliff Court, Shallice Court, Porthclair

18 Court, Parsborough Court, Rylander Boulevard, Tideswell Boulevard, Carlisle Crescent

- and Durnford Road. In total, 2.4 kilometers of this civil infrastructure will be installed.
- 20

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	DURNFORD
STATION(S)	SHEPPARD TS
FEEDER(S)	SCNA47M17

3 JUSTIFICATION

4

5 **Project Background**

Early vintage direct buried XLPE cables have been identified as being poor performing
assets, contributing to system reliability degradation. These cables have been constantly
exposed to neutral and sheath corrosion from the surrounding soil, resulting degradation
of insulation strength.

10

The manufacturing processes employed in these early vintage XLPE cables lacked 11 sufficiently strict quality controls to (a) keep out the impurities from the insulation system 12 or (b) provide reliable sealing of the insulation system to prevent moisture ingress. The 13 steam curing process employed in the manufacture of early vintage XLPE cables also 14 resulted in moisture being trapped in the insulation system. Due to these manufacturing 15 defects, these cables have experienced high rates of premature failure of insulation. 16 17 18 In addition, due to the nature of the direct buried installation, these assets are susceptible to damage from external dig-ins and movement of surrounding earth. The assets within 19 this particular area were installed in 1985 and have exceeded their useful life. The 20 purpose of this project is to install the concrete-encased conduits necessary to house the 21 new XLPE cables. These new conduits will provide mechanical protection to the cables 22 against external dig-ins and other factors. 23

- 24
- 25

1 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Ranking (Worst Feeder)63			
Feeders Experiencing Sustained Interruptions (Worst Feeder)9			
HISTORICAL RELIABILITY PERFORMANCE			
	2008	2009	2010
Feeder CI (<i>Cumulative</i>)	9,360	7,260	7,740
Feeder CMO (<i>Cumulative</i>)	603,103	114,973	198,324

2

3 Benefits

• Improves feeder reliability, due to replacement of direct buried infrastructure

- Reduces outage duration time due to capability of pulling cables through conduit
 during outage
- 7 Improves renewal of asset infrastructure during outage, as assets can be replaced
- 8 entirely (as opposed to direct buried cables, which can only be repaired via a splice)
- 9 Improves mechanical protection against dig-ins and external events
- 10 Improves operational flexibility and reliable supply

11

12 IMPACT OF DEFERRAL

13 Deferral of the project would expose the feeder to increased counts of outages due to poor

- 14 performing equipment. Electrical treeing would lead to the eventual insulation
- 15 breakdown over time on the existing non-tree retardant XLPE cable. This would result in
- 16 further outages to this feeder and to its customers. Also, cables in direct-buried
- 17 configurations are prone to accelerated deterioration.

Portfolio:	Underground
Project Title:	Starview / Rockbank UG Rehab
Project Number:	13162
Project Year:	2013
Estimate Cost:	\$1,274,021

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 To install the civil infrastructure required to eliminate the existing direct buried

6 distribution system within the Rockbank / Starview area to improve reliability; replace

7 the primary direct buried UG feeder 55M21 with TRXLPE cable between primary service

8 riser poles #93 and #100 Highbury; and replace all six submersible transformers within

9 the project area.

10

11 **Scope:**

12 The scope of work for this project requires the replacement of direct buried primary (1-

13 1/C, 1/O, Al, 28kV, XLPE) with 1-1/C, 1/O, Al, 28kV, TRXLPE cable between pole #93

14 Highbury and pole #100 Highbury and provide for normally closed fuses at the dip poles

- 15 with a normally open point in the middle of the loop. Also, six submersible transformer
- 16 locations (UT61266, UT89580, UT79197, UT70394, UT45955 and UT96277) will be
- 17 replaced.
- 18 19

DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	STARVIEW-ROCKBAND
STATION(S)	FINCH II TS
FEEDER(S)	NY55M21

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1

2

3 **Project Background**

4 Early vintage XLPE cable has been identified as poor performing cable. As such, THESL

5 is proactively replacing this type of cable. This cable is installed in a non-standard

6 fashion; namely directly buried, which configuration causes pre-mature failure as a result

- 7 of contamination. Although information about the condition of the transformers is not
- 8 available, records indicate they were installed in 1979. Completion of the proposed work
- 9 will lead to improvement in system reliability by reducing feeder outage duration time
- 10 and frequency.

11

12 Historical Performance

FEEDER PERFORMANCE				
Worst Performing Feeder Rank	Worst Performing Feeder Ranking (Worst Feeder)247			
Feeders Experiencing Sustained Interruptions Count(Worst Feeder)3				
HISTORICAL RELIABILITY PERFORMANCE				
	2008 2009			
Feeder CI (Cumulative)	1297	844	1254	
Feeder CMO (<i>Cumulative</i>)	60313	45176	42972	

13

14

15 Benefits

• Modernizes the distribution plant as a result of replacement of poor performing cable

17 • Reduces the probability of more failures on the feeder with the replacement of non-

- 18 tree-retardant XLPE cable with new TRXLPE cables as per THESL standard
- 19 Reduces Customer Minutes Out due to improved restoration time achieved through
- 20 the replacement of vault transformers with switchable units
- Improves safety on the feeders as the vaults along the feeder routes will be

1 refurbished and upgraded to the latest THESL standard

2 IMPACT OF DEFERRAL

- 3 Deferral of the project will expose the feeder to increased numbers of outages due to poor
- 4 performing equipment. Electrical tree tracking will lead to the eventual insulation
- 5 breakdown of the existing non-tree retardant XLPE cable, resulting in further outages to
- 6 this feeder and its customers. Also, cables installed in direct-buried configurations are
- 7 prone to accelerated deterioration.

Portfolio:	Underground	
Project Title:	Arrow Rd - Lateral UG Loop Replacement	
Project Number:	13193	
Project Year:	2013	
Estimate Cost:	\$ 1,268,029	

3 PROJECT DESCRIPTION

4

5 **Objective:**

6 To replace direct buried XLPE primary cable loop along Deerhide Crescent, Arrow Road

7 and Pemican Court with TRXLPE cable on feeder 55M21, with current construction

8 standards using concrete-encased duct structures. Transformers that have been identified

9 as reaching end-of-life based on available asset condition data will be replaced.

10

11 **Scope:**

12 The scope of this project is predominately focused on improving the underground lateral

13 infrastructure of this area by installing 2,500 m of 3-1/0 underground primary, 1,000 m

14 concrete encased ducts and eight vault transformers.

15

DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	ARROW
STATION(S)	FINCH II TS
FEEDER(S)	NY55M21

16

2

3 Project Background

- 4 Early vintage XLPE has been identified as poor performing cable. It was introduced
- 5 during the 1970's and is showing signs of failure. As such, THESL is proactively
- 6 replacing this type of cable. This will improve system reliability and reduce feeder
- 7 outage duration time and frequency.
- 8

9 Historical Performance

FEEDER PERFORMANCE				
Worst Performing Feeder Ranki	Worst Performing Feeder Ranking (Worst Feeder)247			
Feeders Experiencing Sustained Interruptions Count(Worst Feeder)3				
HISTORICAL RELIABILITY PERFORMANCE				
	2008	2009	2010	
Feeder CI (<i>Cumulative</i>)	1,297	844	1,254	
Feeder CMO (<i>Cumulative</i>)	60,313	45,176	42,972	

10

11 Benefits

- 12 Modernizes the distribution plant as a result of replacement of poor performing cable
- 13 Reduces the probability of more failures on the feeder with the replacement of XLPE

```
14 cable with tree retardant TRXLPE cable as per THESL standard
```

- 15 Reduces Customer Minutes Out due to improved restoration time achieved through
- 16 the replacement of vault transformers with switchable units
- 17 Improves safety on the feeders as the vaults along the feeder routes will be
- refurbished and upgraded to the latest THESL standard.
- 19

20 IMPACT OF DEFERRAL

- 21 Deferral of the project will expose the feeder to increased counts of outages due to poor
- 22 performing equipment. Electrical tree tracking will lead to the eventual insulation

- 1 breakdown on the existing non-tree retardant XLPE cable. This will result in further
- 2 outages to this feeder and its customers, leading to customer dissatisfaction and high
- 3 reactive investment costs.

Portfolio:	Underground	
Project Title: 51M22, 51M4 UG rehab off Sheppard & Victoria Pa		
	Intersection-Electrical	
Project		
Number:	22492	
Project Year:	2013	
Estimate Cost:	\$ 1,235,965	
Objective:	act is to replace vulnerable assets along the feeders to prevent a rise	
0	ect is to replace vulnerable assets along the feeders to prevent a rise	
in the number of outages in the area.		
Scope:		
useful service life, cor Victoria Park Av, Patr underground switches THESL standard. Exis	replacement of aged and assets that have reached or passed their nnected to feeder NY51M4 and 51M22, in the area bonded by rick Blvd, Yorkland Rd, and Yorkland Blvd. Existing overhead and will be removed and replaced with new switches as per current sting underground direct buried cables and connected equipment of service life also will be removed and replaced per current	

DISTRICT	North York
DISTRICT NEIGHBOURHOOD	Sheppard Avenue East & Victoria Park Avenue
STATION(S)	Leslie 1 - TS
FEEDER(S)	NY51M22; NY51M4

2

3 **Project Background**

4 Feeder NY51M4 has experienced six outages within the last 12 months. The Worst

5 Performing Feeder rank deteriorated from 19 to 16 and considering the mean time (four

6 months) between failures of the feeder equipment more failures are expected to occur

7 imminently. The sub-lateral distribution off Victoria Park Avenue into the Patrick Blvd

8 and Hazelnut Crescent is currently not well configured for switching when outages occur

9 and there is a need to isolate faulted locations. As a result, the CMO counts have been

- 10 very high in this area.
- 11

12 The distribution area is being reconfigured by this scope package, to improve switching

13 by detaching the cabling that goes along Hazelnut Crescent from the feeder NY51M4 and

14 adding it to the feeder NY51M22. This would mean the two existing loops in the area will

- 15 be combined into a single large loop supplied by NY51M22 on Brian Drive.
- 16

17 Historical Performance

FEEDER PERFORMANCE				
Worst Performing Feeder Ranking	Worst Performing Feeder Ranking (Worst Feeder)112			
Feeders Experiencing Sustained Interruptions (Worst Feeder)4				
HISTORICAL RELIABILITY PERFORMANCE				
	2009	2010		
Feeder CI (Cumulative)	2784	3617	9212	
Feeder CMO (<i>Cumulative</i>)	146174	114504	199529	

18

19 Benefits

• Improves switching as this project reconfigures the sub-lateral distribution by

21 detaching the cabling that goes along Hazelnut Crescent from the feeder NY51M4

and adding it to the feeder NY51M22 enabling the two existing loops in the area to be

1	combined into a single large loop supplied by NY51M22 on Brian Drive
2	• Simplifies the distribution loops thereby reducing the need for PMH switchgear, in
3	turn reducing the overall opportunities for failure along the feeder
4	• Improves reliability as concrete encased cabling has a much lower probability of
5	failure
6	• Improves safety of utility field staff and customers in the community as electrical
7	hazards are eliminated with the upgrade and cleanup of the transformer vaults
8	• The SF6 switch replacements allow for smaller sized and safer-to-operate field
9	equipment
10	
11	IMPACT OF DEFERRAL
12	Deferral of this project would increase the likelihood of outages and as over 80% of
13	outages on this feeder in the last 12 months and in the last four years have been on

- 14 underground cabling that is being targeted in this project. While this project is being
- deferred, an outage would affect about 1,500 customers and cause a loss of up to 20MVA.

Portfolio:	Underground
Project Title:	NY51M24 UG Rebuild in Subdivision by Don
	Mills & Sheppard Part 2 - Civill NY51M24
Project Number:	21434
Project Year:	2013
Estimate Cost:	\$ 1,196,414

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to provide civil infrastructure in advance of the related

6 electrical project to reduce the probability of a system failure by replacing the aged direct

7 buried cables of feeder NY51M24 in the subdivision located southwest of the Don Mills

8 Road and Sheppard Avenue intersection.

9

10 **Scope:**

11 The scope of this project is to install concrete encased ducts in the subdivision bounded

12 by Sheppard Avenue to the north, Shaughnessy Boulevard to the West, Havenbrook

13 Boulevard to the South and Don Mills Road to the East for feeder 51M24. This is the civil

14 portion of the project to replace 6,750 m of 1/0 TRXLPE direct buried cable.

15

DISTRICT	North York
DISTRICT NEIGHBOURHOOD	Don Mills Road & Sheppard Avenue East
STATION(S)	Leslie II TS
FEEDER(S)	NY51M24

16

2

3 Project Background

4 This feeder has had seven outages in the last 12 months with cable failure as the primary

5 cause. Cable faults are being addressed in this project by replacing aged, direct buried

6 XLPE cables including #1 solid types found at various segments of the feeder.

7

8 Historical Performance

FEEDER PERFORMANCE				
Worst Performing Feeder Rank	ting (Worst Feed	ler)	65	
Feeders Experiencing Sustained Interruptions (Worst Feeder)8				
HISTORICAL RELIABILITY PERFORMANCE				
	2010			
Feeder CI (<i>Cumulative</i>)	6,265			
Feeder CMO (<i>Cumulative</i>)	129,367	211,103	324,587	

9

10 Benefits

11 • Replaces 30 year old direct buried cables that are at risk of failing

12 • Improves customer satisfaction as a result of greater service reliability

13 • Reduces emergency and reactive capital and maintenance costs due to significantly

14 greater reliability

15 • Provides greater flexibility for power distribution and mechanical protection and

16 durability of the underground cabling

17

18 IMPACT OF DEFERRAL

19 Deferral of the project would prevent completion of the construction of the concrete duct

20 banks before the new underground cabling is installed and may cause the other project

21 (underground cabling rebuild) to stall exposing the feeder to further outages due to lack of

timely replacement of the failing assets. While this project is being deferred, an outage

- 1 would affect about 400 residential customers. In addition, deferral of the project would
- 2 exposes it to the risk of encountering conflicts with the work schedules of other utilities in
- 3 the environment as well as the increased risks of encountering new moratorium
- 4 constraints imposed by the city administration.
- 5

Portfolio:	Underground		
	C	e from PILC to 500 TRXLPE on	
Project Title:	A-91-B		
Project Number:	13306		
Project Year:	2013		
Estimate Cost:	\$1,185,296		
 PROJECT DESCRIPTION Objective: To replace all Paper Insulated Lead Covered ("PILC") cable on the trunk of feeder A91B to the standard 500kcmil Tree Retardant Cross-link Polyethylene ("TRXLPE") cable 			
Scope:			
This project would enable the replacement and upgrade the existing 3,039 meters of			
varying size PILC cable to 500 kcmil TRXLPE.			
DISTRICT	TORONTO		
DISTRICT NEIGHBOU	DISTRICT NEIGHBOURHOOD BRIDGEMAN		
STATION(S)	BRIDGEMA	BRIDGEMAN TS	

1

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4

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10

11

13 JUSTIFICATION

FEEDER(S)

14

15 **Project Background**

- 16 This project was initiated due to THESL's Lead Cable Replacement Program, with a
- 17 vision to ultimately improve safety and environmental conditions within cable chambers,

A91B

1	due mainly to lead and Polychlorinated biphenyls (PCB) exposure. Potential procurement
2	issues associated with a lone North American manufacturer of PILC cables is also
3	prompting proactive replacement of this cable with readily available TRXLPE cable. This
4	specific feeder was also chosen for upgrade because calculations show that after future
5	expansion, the feeder will be overloaded under a first contingency situation. Upgrading
6	this feeder will allow additional future expansion as additional loads can be connected to
7	this feeder without overloading it.
8	
9	Benefits
10	• Removes risk of harmful effects of lead and potential PCB oil exposure
11	• Increases room for load growth and flexibility for load transferring by upgrading with
12	higher ampacity 500kcmil TRXLPE cable, PILC feeder whose trunk sizes are 2/0 or
13	350kcmil. This specific feeder will no longer be overloaded after this upgrade. Also,
14	the customer load increase on this feeder can be approved after this upgrade
15	• Addresses procurement issue associated with a lone North American manufacturer of
16	PILC cables

18 IMPACT OF DEFERRAL

Issues of health and environmental risks will continue for THESL workers, due mainly to
potential exposure to PCBs, and lead. If the lone North American manufacturer stops

- 21 producing PILC cable, THESL will have a sourcing/procurement issue. Additionally,
- 22 there is no additional room for expansion to serve customers connected to this feeder.

Portfolio:	Underground
Project Title:	Venture Drive UG Rebuild Electrical SCNT47M1
Project Number:	20059
Project Year:	2013
Estimate Cost:	\$ 1,135,981

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to rebuild a portion of Feeder SCNT47M1 out of Sheppard

6 TS to improve reliability and prevent future negative impact to customers. This project

7 will replace aging direct buried cables in this industrial/commercial area with new cables

8 in concrete encased duct.

9

10 **Scope:**

11 The scope of work for this project is to replace the existing direct buried cables with new,

12 1,000 Al. kcmil and new 3 phase Al 1/0 cable in concrete-encased duct in an area

13 bounded by Water Tower Gate, Venture Drive and Casebridge Court. This project will

require replacement of 5,000 m of primary cable and one transformer, refurbishing of 15

15 transformer vaults and installation of one new overhead switch and one new pad mounted

- 16 switch.
- 17

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	VENTURE
STATION(S)	SHEPPARD TS
FEEDER(S)	SCNT47M1

18

2

3 **Project Background**

- 4 Feeder NT47M1 is one of the worst performing feeders among THESL's 1,400 feeders.
- 5 The direct buried cable in this area was installed in 1983 and is due for replacement based

6 on life cycle information for this type of cable.

7

8 Historical Performance

FEEDER PERFORMANCE					
Worst Performing Feeder Rank	Worst Performing Feeder Ranking (Worst Feeder)55				
Feeders Experiencing Sustained	Feeders Experiencing Sustained Interruptions (Worst Feeder)3				
HISTORICAL RELIABILITY PERFORMANCE					
	2010				
Feeder CI (<i>Cumulative</i>)	11,039				
Feeder CMO (<i>Cumulative</i>)	503,619	209,555	429,752		

9

10 Benefits

- Replaces old direct buried cables (27 years) that are at risk of failing on one of the
 worst performing feeders
- 13 Rebuilds the industrial/commercial distribution system experiencing high fault
- 14 currents during failure
- 15 Reconfigures the distribution system with the latest THESL standard for operation
- and protection with TRXLPE cable in concrete encased duct and smaller loops with
 standard fuse
- 18 Targets achievement of better operational flexibility and more reliable supply
- Optimizes restoration operations in the case of an outage on the feeder, thus reducing
 the number of customers affected
- 21

22 IMPACT OF DEFERRAL

- 1 Deferral of this project would lead to sustained or deteriorating reliability problems on the
- 2 feeder in question, leading to customer dissatisfaction and high reactive investment costs.
- 3 This is due to the risk of increased component failures of aging direct buried cable.
- 4 Furthermore, the configuration of the feeder has been altered by reactive replacements
- 5 that have not optimized a design for operational flexibility, such as switching
- 6 transformers and standard fusing. This will lead to more customers being affected by a
- 7 fault.

Portfolio:	Underground
Project Title:	Windsor TS Load Transfer to Bremner TS
Project Number:	18648
Project Year:	2013
Estimate Cost:	\$1,115,308

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to transfer feeders from the existing switchgears at Windsor 6 TS to the new switchgear at Bremner TS. By accomplishing these feeder transfers, two 7 benefits are achieved. First, the newly constructed Bremner TS will now be energized and 8 put into service. Second, the space made available by transferring the existing Windsor 9 TS feeders will allow for the decommissioning and upgrading of older switchgears at 10 Windsor TS. In total, 14 feeders from three different switchgears at Windsor TS are to be 11 transferred to the new switchgear at Bremner TS.

12

13 **Scope:**

14 The scope of work for this project is to install the required cable and transition joints in

15 the new civil infrastructure (to be built in 2012) in order to transfer six feeders from

16 switchgear A17-18WR, five feeders from switchgear A13-14WR and three feeders

- 17 on switchgear A5-6WR. After these transfers are accomplished, the five remaining
- 18 feeders on switchgear A17-18WR are to be transferred to switchgear A13-14WR. This
- 19 will result in an empty switchgear that can now be taken out of service and upgraded.

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	TRINITY-SPADINA
STATION(S)	WINDSOR TS & BREMNER TS
	A3WR, A5WR, A36WR, A38WR, A40WR,
	A42WR, A44WR, A77WR, A90WR, A91WR,
FEEDER(S)	A92WR, A93WR, A94WR, A98WR, A99WR

3 JUSTIFICATION

4

5 Project Background

Windsor TS was built in 1950 and has since expanded to become one of the largest
13.8kV substations in Toronto. The station switchgear and breaker equipment are
approaching end-of-life and a new source of supply is required to facilitate maintenance
work and rebuild of the station. In addition, significant new loads are anticipated in the
coming years, along the Toronto Waterfront area. As a result, Bremner TS was planned in
order to offload Windsor TS and provide a new source of supply for future anticipated
demand.

14 Benefits

- Enables Bremner TS to begin supplying load, putting into service the transformers
 and switchgear at the station
- Offloads Windsor TS, allowing for the decommissioning and upgrade of the existing
 switchgears

19

20 IMPACT OF DEFERRAL

21 If this project were to be deferred, THESL would have invested millions of dollars and

- 22 constructed a new Transformer Station which would be not put into service immediately.
- 23 In addition, this would delay the decommissioning and upgrade of existing switchgears at

- 1 Windsor TS, thereby increasing the risk of a significant station outage due to the threat of
- 2 failed equipment.

Portfolio:	Underground
Project Title:	Middlefield Passmore StateCrown Electrical
	SCNAR26M21
Project Number:	20925
Project Year:	2013
Estimate Cost:	\$ 1,100,286

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

- 5 The purpose of this project is to rebuild a portion of feeder SCNAR26M21containing
- 6 aged direct buried cable which has passed its useful life span, in order to prevent future

7 negative impact to customers due to equipment failure.

8

9 Scope:

- 10 The scope of work for this project is to replace existing direct buried cable with new cable
- 11 installed in concrete encased ducts in an area bounded by Select Avenue, Passmore
- 12 Avenue and State Crown Blvd. This project requires the replacement of 25,000 m of
- 13 primary cable and installation of two new pad mount SF6 switches.
- 14

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	MIDDLEFIELD & PASSMORE
STATION(S)	MALVERN TS
FEEDER(S)	SCNAR26M21

15

2

3 Project Background

- 4 Feeder SCNAR26M21 has experienced 10 direct buried cable faults in the last four years.
- 5 The neighbourhood that is part of this direct buried cable rebuild is made up of
- 6 industrial/commercial customers. The direct buried cable in this area is 32 years old and is
- 7 past due for replacement based on life cycle information for this type of cable.
- 8

9 Historical Performance

FEEDER PERFORMANCE					
Worst Performing Feeder Rank	ting (Worst Fee	eder)	350		
Feeders Experiencing Sustaine	Feeders Experiencing Sustained Interruptions (Worst Feeder)				
HISTORICAL RELIABILITY PERFORMANCE					
	2010				
Feeder CI (<i>Cumulative</i>)	23				
Feeder CMO (<i>Cumulative</i>)	43257	159121	12387		

10

11 Benefits

- 12 Replaces old direct buried cables (32 years) to prevent future negative impact to
- 13 customers due to direct buried XLPE cable which has exceeded its useful lifespan and

14 is at risk of failure

- Reconfigures the distribution for the latest THESL standard for operation and
 protection
- 17 Reconfigures area to achieve better operational flexibility and more reliable supply
- 18

19 IMPACT OF DEFERRAL

20 Delays in this work could lead to an increased risk of equipment failures and outages to

- 21 customers. Deferral may bring this project in conflict with projects from other utilities or
- 22 newly imposed city moratorium as THESL has communicated this project to the city and

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1 other utilities.

Portfolio:	Underground	
Project Title:	Replace/upgrade feeder A20DX from PILC to 500kcmil	
	TRXLPE cable	
Project Number:	18503	
Project Year:	2013	
Estimate Cost:	\$ 1,085,881	

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

- 5 To replace Paper Insulated Lead-Covered ("PILC") cable on the trunk of feeder A42W
- 6 with the standard 500kcmil Tree-Retardant Cross-Linked Polyethylene ("TRXLPE")

7 cable and rebuild cable chambers as required.

- 8
- 9 Scope:
- 10 This project will enable the replacement and upgrade of approximately 770m of varying

size PILC cable to 500 kcmil TRXLPE.

12

DISTRICT	Toronto
DISTRICT NEIGHBOURHOOD	DUPLEX
STATION(S)	DUPLEX TS
FEEDER(S)	A20DX

13

14 JUSTIFICATION

15

16 Project Background

- 17 This project was initiated due to THESL's Lead Cable Replacement Program, with a
- 18 vision to ultimately improve safety and environmental conditions within cable chambers,

1	due mainly to lead and Polychlorinated biphenyl (PCB) exposure. Potential procurement
2	issues associated with a lone North American manufacturer of PILC cables is also
3	prompting proactive replacement of this cable with readily available TRXLPE cable.
4	A51WR is also projected to be overloaded within the next ten years under first
5	contingency conditions. Upgrading the existing PILC feeder trunk to 500kcmil TRXLPE
6	will provide additional capacity on this feeder.
7	
8	Benefits
9	• Removes risk of harmful effects of lead and potential PCB oil exposure
10	• Increases capacity for projected load growth and flexibility for load transferring by
11	upgrading with higher ampacity 500kcmil TRXLPE feeders, PILC feeder whose trunk
12	sizes are 350kcmil
13	• Addresses procurement issue associated with a lone North American manufacturer of
14	PILC cables
15	
16	IMPACT OF DEFERRAL
17	Issues of health and environmental risks will continue for THESL workers due mainly to
18	potential exposure to PCBs and lead. The feeder is projected to be overloaded within the

19 next ten years. Additionally, if the lone North American manufacturer stops producing

20 PILC cable, THESL will have a sourcing/procurement issue.

Portfolio:	Underground	
Project Title:	Nashdene Tiffield SCNAR26M22 UG Rebuild -	
	Civil	
Project Number:	20335	
Project Year:	2013	
Estimate Cost:	\$ 1,073,369	

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to rebuild the underground distribution system in this 6 industrial neighbourhood. This is the civil portion of a multi-phase program to replace 7 aging direct buried XLPE cable. The purpose of the civil portion is to install concrete 8 encased duct to enable replacement of aging direct buried XLPE cable and improve the 9 infrastructure of this industrial neighbourhood.

10

11 **Scope:**

12 The scope of work for this project is to design and construct civil infrastructure for the

13 rebuild of the underground distribution in the area of Nashdene Road, Tiffield Road and

14 Dynamic Drive. This will enable replacement of the existing direct buried cables with

15 cable in concrete encased ducts and distribution up to latest THESL standards. Installing

civil infrastructure for four PMHs is included in this poject. Also 2.550 km of concrete

17 encased duct is included.

18

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	NASHDENE & TIFFIELD
STATION(S)	MALVERN TS
FEEDER(S)	SCNAR26M22

2

3 Project Background

This project will rebuild a portion of Feeder NAR26M22 out of Malvern TS to prevent 4 future negative impact to customers. The direct buried cable in this neighbourhood is 32 5 years old and is past its estimated operation lifespan based on lifecycle information for 6 7 this type of cable. This feeder was part of a distribution transfer from feeder NAR26M34 and is a new feeder, thus historical feeder performance data is unavailable. Early vintage 8 9 direct buried XLPE cables have been identified as being a poor performing asset, contributing to system reliability degradation. These cables have been constantly exposed 10 11 to neutral and sheath corrosion from the surrounding soil, resulting in degradation of insulation strength. 12

13

The manufacturing processes employed in these early vintage XLPE cables lacked sufficiently strict quality controls to (a) keep out the impurities from the insulation system or (b) provide reliable sealing of the insulation system to prevent moisture ingress. The steam curing process employed in the manufacture of early vintage XLPE cables also resulted in moisture being trapped in the insulation system. Due to these manufacturing defects, these cables have experienced high rates of premature failure of insulation.

In addition, due to the nature of the direct buried installation, these assets are susceptible to damage from external dig-ins and movement of surrounding earth. The purpose of this project is to install the concrete-encased conduits necessary to house the new treeretardant XLPE cable. These new conduits will provide mechanical protection to the cables against external dig-ins and other factors.

26

27 Benefits

Replaces old direct buried cables (32 years) to prevent future negative impact to
 customers due to direct buried XLPE cable which has exceeded its useful lifespan and
 is at risk of failure

1 Reconfigures the distribution for the latest THESL standard for operation and

- 2 protection. TRXLPE cable in concrete encased duct and smaller loops with standard 3 fuse.
- 4

5 **IMPACT OF DEFERRAL**

If this project is deferred, the electrical component of this project cannot be executed 6 without the completion of this civil work - either in the same year or electrical in the 7 immediate next year. Deferral of the project will expose the feeder to increased counts of 8 outages due to poor performing equipment. Electrical treeing will lead to the eventual 9 insulation breakdown over time on the existing non-tree retardant XLPE cable. This will 10 result in further outages to this feeder and to its customers. Also, the installation of the 11 cables in direct-buried configurations accelerates deterioration. 12 13 14 The deferral of this project may result in future customer interruptions due to the potential 15 failure of assets within this area. The direct buried cables in this area will continue to 16 degrade, resulting in potential insulation failure. This will lead to customer dissatisfaction and high reactive costs. Moreover, deferral may also cause this project to be in conflict 17 with projects from other utilities or the newly imposed city moratorium, as THESL has 18 19 communicated this project to the city and other utilities.

- 20

Portfolio:	Underground
Project Title:	Rebuild UG Trunk 502M21-28 Warden -Civil
Project Number:	21933
Project Year:	2013
Estimate Cost:	\$ 1,066,157

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to replace the old direct buried 750kcmil (and also

6 350kcmil) with 1,000 kcmil aluminum cable in concrete encased duct along Warden

7 Avenue from Steeles Avenue to Hydro One right-of-way (ROW) South of McNicoll

8 Avenue. This project will establish a true feeder tie between NA502M21 and M28 with

9 the upgrading of standard size of cable on feeder mains. This project is one phase of a

10 multi-phase program to replace the underground cable on the above feeders.

11

12 **Scope:**

13 The scope of work for this project is to design and install civil infrastructure for the three

14 phase 1000 TRXLPE Al cables along Warden Avenue from switch OS90517 at Steeles-

15 Warden to switch OS87103 at Warden- Hydro One ROW. The scope of work also

16 includes the design and installation of civil infrastructure to loop in all three-phase loads-

17 GBP, CXY, WBS, DRT, QBN, LTQ, 693TV and DHE. This project includes installing

18 2.25 km of duct.

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	WARDEN
STATION(S)	CAVANAUGH TS
FEEDER(S)	SCNA502M21, SCNA502M28

2

3 **Project Background**

There is a stretch of undersized cable, built direct buried, connecting feeders NA502M21
and M28 running along Warden Avenue from Steeles Avenue to Hydro One ROW South
of McNicoll Avenue. To bring the capacity and reliability of the feeders and the system
to THESL standard, THESL plans to carry out this project and the related electrical
component in 2013 and 2014 respectively.

9

Early vintage direct buried XLPE cables have been identified as being a poor performing asset, contributing to system reliability degradation. These cables have been constantly exposed to neutral and sheath corrosion from the surrounding soil, resulting in degradation of insulation strength.

14

The manufacturing processes employed in these early vintage XLPE cables lacked sufficiently strict quality controls to (a) keep out the impurities from the insulation system or (b) provide reliable sealing of the insulation system to prevent moisture ingress. The steam curing process employed in the manufacture of early vintage XLPE cables also resulted in moisture being trapped in the insulation system. Due to these manufacturing defects, these cables have experienced high rates of premature failure of insulation.

In addition, due to the nature of the direct buried installation, these assets are susceptible to damage from external dig-ins and movement of surrounding earth. A series of cable, elbow and transformer failures have occurred over the past few years. The purpose of this project is to install the concrete-encased conduits necessary to house the new treeretardant XLPE cable. These new conduits will provide mechanical protection to the cables against external dig-ins and other factors.

1 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Ranking (Worst Feeder)			121
Feeders Experiencing Sustained Interruptions (Worst Feeder)			1
HISTORICAL RELIABILITY PERFORMANCE			
	2008	2009	2010
Feeder CI (<i>Cumulative</i>)	13,567	13,617	8,639
Feeder CMO (<i>Cumulative</i>)	827,586	356,182	401,534

2

3 **Benefits**

• Replaces direct buried cables that are at risk of failing

5 • Reconfigures the distribution system with the latest THESL standard for operation

- 6 and protection with 1/0 cable with standard fusing
- Replaces a section of undersized cable of two feeders (502M21 and M28) built direct
 buried,
- Increases operational flexibility through the establishing of a true feeder tie between
 NA502M21 and M28
- 11 Increases capacity with the upgrading of standard size of cable

12

13 IMPACT OF DEFERRAL

14 The electrical component of this project cannot be executed without the completion of

15 this civil work - either in the same year or electrical in the immediate next year. Deferral

- 16 of the project would expose the feeder to increased counts of outages due to poor
- 17 performing equipment. Electrical treeing will lead to the eventual insulation breakdown
- 18 of the existing non-tree retardant XLPE cable. This will result in further outages to this
- 19 feeder and to its customers. Also, cables installed in direct-buried configurations are

20 prone to accelerated deterioration.

- 21
- 22 Deferral of this project may result in future customer interruptions due to the potential
- 23 failure of assets within this area. The direct buried cables in this area would continue to

- 1 degrade, resulting in potential insulation failure. This would lead to customer
- 2 dissatisfaction and high reactive costs. Moreover, deferral may also cause this project to
- 3 be in conflict with projects from other utilities or the newly imposed city moratorium, as
- 4 THESL has communicated this project to the City and other utilities.
- 5
- 6

Portfolio:	Underground
Project Title:	UG Cable Rehab on Antibes / Torresdale
Project Number:	12464
Project Year:	2013
Estimate Cost:	\$1,053,543

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 To redesign the distribution system surrounding the Antibes, Torresdale, Bathurst area by

6 reconfiguring loops and replacing XLPE cable with 1/0 Al, 28kV, TRXLPE cable.

7

8 Scope:

9 The scope of work for this project entails reconfiguration of THESL plant in the Bathurst

10 and Antibes area. All underground XLPE cable that is direct buried and all transformers

11 in poor condition will be replaced to standard . Furthermore, the 3 phase and single phase

12 loops will be reconfigured so that they are distinct loops. This project requires

replacement of 1,850 m of primary cable, refurbishing of 10 transformer vaults,

14 replacement of seven transformers and installation of 620 m of concrete-encased ducts.

15

DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	BATHURST-ANTIBES
STATION(S)	FAIRCHILD I TS
FEEDER(S)	NY80M2

16

17

2

3 Project Background

4 Early vintage XLPE has been identified as poor performing cable. It was introduced

5 during the 1970's and is showing signs of failure. As such, THESL is proactively

6 replacing this type of cable. This will improve system reliability, as well as reduce feeder

7 outage duration time and frequency. This area contains assets that have passed their

8 useful service life as well as sub-standard feeder configuration that would impede the

9 timely switching capability of feeders when needed.

10

11 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Ranking (Worst Feeder)			69
Feeders Experiencing Sustained Interruptions Count(Worst Feeder)			6
HISTORICAL RELIABILITY PERFORMANCE			
	2008	2009	2010
Feeder CI (<i>Cumulative</i>)	4,228	2,050	7,978
Feeder CMO (<i>Cumulative</i>)	113,919	23,671	327,430

12

13 Benefits

Modernizes the distribution plant as a result of replacement of non-standard and poor
 performing assets

• Reduces Customer Minutes Out by separating the single and three phase loops

17 • Improves Customers Interrupted due to reconfiguration of lateral supplies to area

18

19 IMPACT OF DEFERRAL

20 Deferral of the project would expose the feeder to increased nubers of outages due to poor

- 21 performing and non-standard equipment. Also, non-standard design configuration of
- 22 THESL plant would contribute to higher risk of lengthy outages. The deferral of this
- 23 worst performing feeder project will lead to sustained or deteriorating reliability problems

- 1 on the feeders in question, leading to customer dissatisfaction and high reactive
- 2 investment costs.

Portfolio:	Underground
Project Title:	Lynmont /Milkwood - UG Rehab & VC
Project Number:	12258
Project Year:	2013
Estimate Cost:	\$1,051,997

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to improve the service reliability in the Lynmont,

6 Milkwood, Alicewood, Turnvale, Four Leaf area of Etobicoke by replacing and

7 converting the front lot direct buried electrical equipment of Albion MS MG-F3 to

9

10 **Scope:**

11 The scope of work for this project requires the replacement of 3,600 m of primary cable

12 and replacement of 30 underground transformers in order to feed customers at

13 Lynmont/Milkwood. This project also includes cabling work to upgrade from 4kV to

14 27.6k to convert approximately 330 residential customers.

15

DISTRICT	ETOBICOKE
DISTRICT NEIGHBOURHOOD	LYNMONT/MILKWOOD
STATION(S)	REXDALE TS
FEEDER(S)	ETR29M33

16

⁸ Rexdale TS R29M33.

2

3 Project Background

4 Existing equipment installed in Albion M.S. MG-F3 supplying the general area of

- 5 Lynmont / Milkwood has been problematic and causing extensive power outages in the
- 6 area. To improve service reliability, THESL proposes to rebuild the area by replacing the
- 7 direct buried distribution and upgrading the area to present day standards, including
- 8 primary distribution at 27.6kV within concrete encased conduit. This project is part of a
- 9 series of projects leading to the decommissioning of the Albion M.S.

10

11 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Ranki	ng (Worst Feed	ler)	238
Feeders Experiencing Sustained	Feeders Experiencing Sustained Interruptions Count(Worst Feeder)3		
HISTORICAL RELIABILITY PERFORMANCE			
	2008	2009	2010
Feeder CI (<i>Cumulative</i>)	3,733		
Feeder CMO (<i>Cumulative</i>)	38,478	770,554	44,796

12

13 Benefits

- Higher primary voltage lowers line losses and improves transmission efficiency.
- 15 Replaces aging 4kV infrastructure and converting to a higher voltage provides more
- 16 reliability due to new equipment
- 17 Helps remove obsolete breaker and switchgear equipment in the MS station
- 18 Increases customer satisfaction

19

20 IMPACT OF DEFERRAL

- 21 Delay or postponement of this planned capital program would lead to unplanned power
- 22 outages from failure of aged or unreliable equipment, causing an increase in customer
- 23 outage duration. Failure could cause station feeder breaker to lockout, losing power to all

- 1 customers supplied by the feeder. Due to the nature of direct buried installation, fault
- 2 locating is lengthy in most cases and repair work is very disruptive to the neighbourhood
- 3 as it involves breaking up roads and/or sidewalks. As a result, failures from direct buried
- 4 cable contribute greatly to total CI (Customer Interrupted) and CHI (Customer Hour
- 5 Interrupted) counts.
- 6

Portfolio:	Underground
Project Title:	NY51M24 UG Rebuild in Subdivision by Don
	Mills & Sheppard Part 1 - Civill NY51M24
Project Number:	21433
Project Year:	2013
Estimate Cost:	\$ 1,010,069

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is primarily to provide civil infrastructure in advance of the 6 related electrical project that will proactively reduce the probability of a system failure by 7 replacing the aged direct buried cabling of feeder NY51M24 in the subdivision located 8 southwest of the Don Mills Road and Sheppard Avenue intersection. This project is one 9 phase of a multiphase program to replace the primary cable in the Henry Farm 10 neighborhood due to the presence of cross-linked-polyethelene ("XLPE") cable.

11

12 **Scope:**

13 The scope of this project involves the following: The project boundaries are in the

14 subdivision bounded by Sheppard Avenue to the north, Shaughnessy Boulevard to the

15 East, Havenbrook Boulevard to the South and Leslie Street to the West. This project

16 involves the installation of concrete encased ducts to enclose 1/0-28kV Insulated Stranded

17 (STR) Aluminum (AL) Tree-retardant cross-linked polyethelene ("TRXLPE") 1-phase

cables along feeder 51M24.

19 Also this project involves upgrading the cable chambers and the transformer vaults to

20 current standards by replacing all existing devices, cables and any other components that

21 may prove unreliable due to age and/or conditions. This project encompasses

22 approximately 5.5km of duct.

DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	DON MILLS & SHEPPARD
STATION(S)	LESLIE II TS
FEEDER(S)	NY51M24

3 JUSTIFICATION

4

5 **Project Background**

This feeder has had seven outages in the last 12 months with cable failure as the primary 6 7 cause of power outages. Cable faults are being addressed in this project by replacing aged, direct buried cabling including #1 solid types found at various segments of the 8 9 feeder. Aged and rather unreliable switchgears are already being replaced by two projects in the area in 2011. Early vintage direct buried XLPE cables have been identified as 10 being a poor performing asset, contributing to system reliability degradation. These cables 11 have been constantly exposed to neutral and sheath corrosion from the surrounding soil, 12 resulting degradation of insulation strength. 13

14

The manufacturing processes employed in these early vintage XLPE cables lacked sufficiently strict quality controls to (a) keep out the impurities from the insulation system or (b) provide reliable sealing of the insulation system to prevent moisture ingress. The steam curing process employed in the manufacture of early vintage XLPE cables also resulted in moisture being trapped in the insulation system. Due to these manufacturing defects, these cables have experienced high rates of premature failure of insulation.

21

In addition, due to the nature of the direct buried installation, these assets are susceptible

to damage from external dig-ins and movement of surrounding earth. A series of cable,

elbow and transformer failures have occurred over the past few years. The purpose of this

25 project is to install the concrete-encased conduits necessary to house the new tree-

26 retardant XLPE cable. These new conduits will provide mechanical protection to the

27 cables against external dig-ins and other factors.

1 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Rank	king (Worst Feed	ler)	65
Feeders Experiencing Sustaine	Feeders Experiencing Sustained Interruptions (Worst Feeder)		
HISTORICAL RELIABILIT	FY PERFORM	NCE	I
	2008	2009	2010
Feeder CI (Cumulative)	5,141	4,337	6,265
Feeder CMO (<i>Cumulative</i>)	129,367	211,103	324,587

2

3 Benefits

• Replaces aging direct buried cables that are at risk of failing

- 5 Increases long term reliability of the subdivision with the construction of new
- 6 concrete encasements that will provide mechanical protection to the insulation of the
- 7 new cables and prevent puncture damages by dig-ins and deterioration due to backfill
- 8 pressure and heat
- Reconfigures the distribution system with the latest THESL standard for operation
 and protection with 1/0 cable with standard fusing
- 11 Increases access to cable for installation, repairs, and replacement of cabling in the
- 12 event of outages thereby improving response time, and reduces safety hazards to

13 utility personnel and the surrounding community

14

15 IMPACT OF DEFERRAL

The electrical component of this project cannot be executed without the completion of 16 17 this civil work. Deferral of the project would expose the feeder to increased counts of outages due to poor performing equipment. Electrical treeing will lead to the eventual 18 19 insulation breakdown of the existing non-tree retardant XLPE cable. This will result in further outages to this feeder and to its customers. Also, cables in direct-buried 20 21 configurations are prone to accelerated deterioration. The deferral of this project may 22 result in future customer interruptions due to the potential failure of assets within this 23 area. The direct buried cables in this area will continue to degrade, resulting in potential

- 1 insulation failure. This will lead to customer dissatisfaction and high reactive costs.
- 2 Moreover, deferral may also cause this project to be in conflict with projects from other
- 3 utilities or the newly imposed city moratorium, as THESL has communicated this project
- 4 to the city and other utilities.

Portfolio:	Underground
Project Title:	Clappison 47M17 UG Rebuild- Civil
Project Number:	18320
Project Year:	2013
Estimate Cost:	\$ 1,002,181

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is primarily to provide civil infrastructure in advance of the

6 related electrical project that will proactively reduce the probability of a system failure by

7 replacing the aged direct buried cross-linked polyethelene ("XLPE") cables on feeder

8 SCNA47M17 within the Centennial Park II subdivision.

9

10 **Scope:**

11 In the subdivision bounded by Conference Boulevard, Clappison Boulevard, Chapais

12 Crescent, Elkwood Drive and Shea Court, new concrete-encased conduit will be installed

13 to enclose the tree-retardant XLPE cables to be installed along feeder SCNA47M17. In

14 total, 2.7 kilometers of this civil infrastructure will be installed.

15

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	CLAPPISON
STATION(S)	SHEPPARD TS
FEEDER(S)	SCNA47M17

16

2

3 **Project Background**

Early vintage direct buried XLPE cables have been identified as being poor performing
assets, contributing to system reliability degradation. These cables have been constantly
exposed to neutral and sheath corrosion from the surrounding soil, resulting in
degradation of insulation strength.

8

9 The manufacturing processes employed in these early vintage XLPE cables lacked sufficiently strict quality controls to (a) keep out the impurities from the insulation system or (b) provide reliable sealing of the insulation system to prevent moisture ingress. The steam curing process employed in the manufacture of early vintage XLPE cables also resulted in moisture being trapped in the insulation system. Due to these manufacturing defects, these cables have experienced high rates of premature failure of insulation.

In addition, due to the nature of the direct buried installation, these assets are susceptible to damage from external dig-ins and movement of surrounding earth. The assets within this particular area were installed in 1969. Some of these assets were replaced in 1992 with new direct buried infrastructure. Feeder NA47M17 remains one of the worst performing feeders, and has had nine sustained interruptions over the past twelve month period.

22

23 The purpose of this project is to install the concrete-encased conduits necessary to house

the new tree-retardant XLPE cables. These new conduits will provide mechanical

25 protection to the cables against external dig-ins and other factors.

26

1 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Ranki	ng (Worst Feed	er)	63
Feeders Experiencing Sustained	Feeders Experiencing Sustained Interruptions (Worst Feeder)9		
HISTORICAL RELIABILITY PERFORMANCE			
	2008	2009	2010
Feeder CI (<i>Cumulative</i>) 9,360 7,260 7,740			
Feeder CMO (<i>Cumulative</i>)	603,103	114,973	198,324

2

3 Benefits

- Reconfigures the distribution for the latest THESL standard for operation and
- 5 protection with 1/0 cable with standard fusing
- Upgrades equipment on one of the worst performing feeders in THESLs' system that
 has a high FESI rank (9)

8 • Improves feeder reliability, due to replacement of direct buried infrastructure

- Reduces outage duration time due to capability of pulling cables through conduit
 during outage
- 11 Improves renewal of asset infrastructure during outage, as assets can be replaced
- 12 entirely (as opposed to direct buried cables, which can only be repaired via a splice)
- 13 Improves mechanical protection against dig-ins and external events
- 14 Improves operational flexibility and reliable supply
- 15

16 IMPACT OF DEFERRAL

17 Deferral of the project will expose the feeder to increased numbers of outages due to poor

18 performing equipment. Electrical treeing will lead to the eventual insulation breakdown

19 of the existing non-tree retardant XLPE cable. This will result in further outages to this

20 feeder and to its customers. Also, the installation of the cables in direct-buried

21 configurations accelerates deterioration.

- 1 Deferral of this project may result in future customer interruptions due to the potential
- 2 failure of assets within this area. The direct buried cables in this area will continue to
- 3 degrade, resulting in potential insulation failure. This will lead to customer dissatisfaction
- 4 and high reactive costs.

Portfolio:	Underground
Project Title:	McNicoll Maybrook SCNAR26M32 UG Rebuild –
	Electrical
Project Number:	20394
Project Year:	2013
Estimate Cost:	\$ 948,902

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to rebuild a portion of feeder SCNAR26M32 containing

6 aged direct buried XLPE cable which has passed its useful life span to prevent future

7 negative impact to customers due to equipment failure.

8

9 Scope:

10 The scope of work for this project is to replace existing direct buried cable with new cable

11 installed in concrete encased duct in an area bounded Dynamic Drive, McNicoll Avenue,

12 Newmill Gate and Middlefield Road. This project requires the replacement of 20,000 m

13 of primary cable, four air insulated pad mount switches with sealed SF6 type pad mount

14 switches and two overhead SCADA switches will be installed.

15

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	MCNICOLL & MAYBROOK
STATION(S)	MALVERN TS
FEEDER(S)	SCNAR26M32

16

2

3 **Project Background**

- 4 The neighbourhood that is part of this direct buried cable rebuild is made up of
- 5 industrial/commercial customers. The direct buried cable in this area is 32 years old and is
- 6 past due for replacement based on life cycle information for this type of cable.
- 7

8 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Rank	ing (Worst Fee	der)	247
Feeders Experiencing Sustained	Interruptions (Worst Feeder)	3
HISTORICAL RELIABILITY PERFORMANCE			
	2008	2009	2010
Feeder CI (<i>Cumulative</i>) 1,032 5 850			
Feeder CMO (<i>Cumulative</i>)	56,849	250	4,400

9

10 Benefits

• Replaces old direct buried cables (32 years) to prevent future negative impact to

12 customers due to direct buried XLPE cable which has exceeded its useful lifespan and

13 is at risk of failure.

Reconfigures the distribution system for the latest THESL standard for operation and
 protection

16

17 IMPACT OF DEFERRAL

18 Delays of this project would lead to a higher risk of equipment failure and outages to

- 19 customers, increasing customer dissatisfaction. Deferral may bring this project in conflict
- 20 with projects from other utilities or newly imposed city moratorium as THESL has
- 21 communicated this project to the City and other utilities.

Portfolio:	Underground
Project Title:	Rehab of Feeder NAE5-2M3 in McCowan and
	Kingston area (Civil)
Project Number:	20136
Project Year:	2013
Estimate Cost:	\$ 906,935

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is primarily to provide civil infrastructure in advance of the

6 related electrical project that will proactively reduce the probability of a system failure by

7 replacing the aged direct buried cross-linked polyethelene ("XLPE") cables on feeder

8 SCNAE5-2M3 within the McCowan Road and Kingston Road area.

9

10 **Scope:**

11 The scope of work for this project is to install new concrete-encased conduit to enclose

12 the tree-retardant cross-linked polythelene ("XLPE") cables on feeder SCNAE5-2M3

13 along the streets of Brimley and Danforth Roads – south of Eglinton Avenue; through

14 Barbados Boulevard, McCowan Road and further south to areas off of Kingston Road

15 between McCowan Road and Rockwood Drive, bonded by McNab Boulevard, Eglinton

16 Avenue, Brimley Street and Kingston Road. In total, 1.9 kilometers of this civil

17 infrastructure will be installed.

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	MCCOWAN & KINGSTON
STATION(S)	NAE5, UA, SC, HB
FEEDER(S)	SCNAE5-2M3

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\mathbf{r}
4

3 **Project Background**

Early vintage direct buried XLPE cables have been identified as being poor performing
assets, contributing to system reliability degradation. These cables have been constantly
exposed to neutral and sheath corrosion from the surrounding soil, resulting in
degradation of insulation strength.

8

9 The manufacturing processes employed in these early vintage XLPE cables lacked

10 sufficiently strict quality controls to (a) keep out the impurities from the insulation system

11 or (b) provide reliable sealing of the insulation system to prevent moisture ingress. The

12 steam curing process employed in the manufacture of early vintage XLPE cables also

13 resulted in moisture being trapped in the insulation system. Due to these manufacturing

14 defects, these cables have suffered from high rates of premature failure of insulation.

15

16 In addition, due to the nature of the direct buried installation, these assets are susceptible

17 to damage from external dig-ins and movement of surrounding earth. Feeder SCNAE5-

18 2M3 has had five sustained interruptions over the past twelve month period.

19

20 The purpose of this project is to install the concrete-encased conduits necessary to house

21 the new tree-retardant XLPE cable. These new conduits will provide mechanical

22 protection to the cables against external dig-ins and other factors.

23

1 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Ranking (Worst Feeder)		182	
Feeders Experiencing Sustained Interruptions (Worst Feeder)5			
HISTORICAL RELIABILITY PERFORMANCE			
	2008	2009	2010
Feeder CI (<i>Cumulative</i>)	4,391	174	297
Feeder CMO (<i>Cumulative</i>)	281,855	26,854	82,578

2

3 Benefits

- Improves feeder reliability, due to replacement of direct buried infrastructure
- Reduces outage duration time due to capability of pulling cables through conduit
 during outage
- Improves renewal of asset infrastructure during outage, as assets can be replaced
 entirely (as opposed to direct buried cables, which can only be repaired via a splice)
- 9 Improves mechanical protection against dig-ins and external events
- 10 Improves operational flexibility and reliable supply
- 11

12 IMPACT OF DEFERRAL

13 Deferral of the project will expose the feeder to increased counts of outages due to poor

14 performing equipment. Electrical treeing will lead to the eventual insulation breakdown

- 15 of the existing non-tree retardant XLPE cable. This will result in further outages to this
- 16 feeder and to its customers. Also, cables installed in direct-buried configurations are
- 17 prone to accelerated deterioration. Approximately 7.5 MVA of load, or 1,440 connected
- 18 customers, will be at risk for a future sustained outage.

Portfolio:	Underground	
Project Title:	Royal Rouge Trail UG Rebuild 47M17-Civil	
Project Number:	20207	
Project Year:	2013	
Estimate Cost:	\$ 884,853	

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to rebuild the old and failing direct-buried primary

6 distribution of Deaunville (Royal Rouge) Subdivision supplied by feeder NA47M17. This

7 project addresses the civil part only. This project is one phase in a multi-phase program to

8 remove the direct-burried primary cable on NA47M17.

9

10 **Scope:**

11 The scope of work for this project is to design and install civil infrastructure for the

12 rebuild of the area covered by NA47M17: Atrium Lane, Royal Rouge Trail, Polo Place,

13 Nature Pathway, Calibre Court, Oak Knolls Crescent, Raspberry Road and a very small

14 section of Kingston Rd. west of Sheppard Ave. It would also involve replacing the

15 existing, direct buried primary cable with cable in concrete encased ducts and distribution

16 standards to current THESL standards. This project involves installing 2.1 km of civil

17 duct.

DISTRICT	Scarborough
DISTRICT NEIGHBOURHOOD	Sheppard Avenue East & Vandorf Street
STATION(S)	Sheppard TS (27.6 kV)
FEEDER(S)	SCNA47M17

2 Project Background

3

This single-phase distribution for the Deaunville (Royal Rouge) Subdivision was built in
1985 with direct-buried cables. The distribution system has experienced a number of
cables, elbow and transformer failures over the recent past years.

7

8 To improve the reliability and bring the distribution to the latest and modern THESL

9 standards, THESL will rebuild the primary distribution plant with concrete-encased
10 cables and THESL standard transformers .

11

12 Early vintage direct buried XLPE cables have been identified as being a poor performing

asset, contributing to system reliability degradation. These cables have been constantly

14 exposed to neutral and sheath corrosion from the surrounding soil, resulting in

15 degradation of insulation strength.

16

17 The manufacturing processes employed in these early vintage XLPE cables lacked

18 sufficiently strict quality controls to (a) keep out the impurities from the insulation system

19 or (b) provide reliable sealing of the insulation system to prevent moisture ingress. The

20 steam curing process employed in the manufacture of early vintage XLPE cables also

21 resulted in moisture being trapped in the insulation system. Due to these manufacturing

22 defects, these cables have experienced high rates of premature failure of insulation.

23

In addition, due to the nature of the direct buried installation, these assets are susceptible to damage from external dig-ins and movement of surrounding earth. A series of cable, elbow and transformer failures have occurred over the past few years. The purpose of this project is to install the concrete-encased conduits necessary to house the new treeretardant XLPE cable. These new conduits will provide mechanical protection to the cables against external dig-ins and other factors.

1 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Rank	ing (Worst Feed	ler)	63
Feeders Experiencing Sustained	Feeders Experiencing Sustained Interruptions (Worst Feeder)9		
HISTORICAL RELIABILITY PERFORMANCE			
	2008	2009	2010
Feeder CI (<i>Cumulative</i>)	9,360	7,260	7,740
Feeder CMO (<i>Cumulative</i>)	603,103	114,973	198,324

2

3 Benefits

• Replaces aging direct buried cables that are at risk of failing

Upgrades equipment on one of the worst performing feeders in THESL's system that
has a high FESI rank (9)

Reconfigures the distribution system for the latest THESL standard for operation and
 protection with 1/0 cable with standard fusing

9

10 IMPACT OF DEFERRAL

The electrical component of this project cannot be executed without the completion of this civil work. Deferral of the project will expose the feeder to increased counts of outages due to poor performing equipment. Electrical treeing will lead to the eventual insulation breakdown of the existing non-tree retardant XLPE cable. This will result in further outages to this feeder and to its customers. Also, cables installed in direct-buried configurations are prone to accelerated deterioration.

17

18 The deferral of this project may result in future customer interruptions due to the potential

19 failure of assets within this area. The direct buried cables in this area will continue to

20 degrade, resulting in potential insulation failure. This will lead to customer dissatisfaction

and high reactive costs. Moreover, deferral may also cause this project to be in conflict

22 with projects from other utilities or the newly imposed city moratorium, as THESL has

23 communicated this project to the City and other utilities.

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1

Portfolio:	Underground
Project Title:	Strachan Civil Egress Phase 1
Project Number:	21715
Project Year:	2013
Estimate Cost:	\$883,000

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to build a new civil egress and civil infrastructure out of

6 Strachan TS. The civil infrastructure should have enough racking and/or space to

7 accommodate the feeders for a double duct bank configuration from Strachan TS. The

8 new civil egress would allow the feeders to exit the station on Manitoba Dr south of the

9 Gardiner Expressway.

10

11 **Scope:**

The scope of work for this project is to build a new station egress point at the west side of the north Strachan TS building. From the new egress point, two new 6x4 duct banks, for a total of 48 new ducts, are to be constructed along the north side of Manitoba Dr. The new civil infrastructure will run approximately 250 meters along Manitoba Dr and be capped on the south limit of the Metrolink/CN rail boundaries.

17

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	EXHIBITION PLACE
STATION(S)	STRACHAN TS
	A10T, A12T, A46T, A47T, A48T, A54T, A56T,
FEEDER(S)	A57T, A58T

2

3 Project Background

The area bounded by Queen St, Tecumseth St, Wellington St. and Sudbury St. are 4 serviced via Strachan TS through the feeders A10T, A12T, A46T, A47T, A48T, A56T, 5 A54T, A57T, A58T and various 4kV feeders. These feeders originate from Strachan TS 6 7 and cross the CN rail tracks through three tunnels accessible by cable chambers 5067, 5069, 5110 and 5127 along Strachan Ave. This tunnel crossing is extremely deep and the 8 cable chambers which access the tunnel are old and unsafe. These hazardous conditions 9 have resulted in crews refusing to work within these chambers to install or remove any 10 11 feeders. The new civil egress and infrastructure proposed will allow for the relocation of all feeders from the unsafe tunnel crossing so that it can be abandoned and/or rebuilt. 12 13

14 Benefits

- Creates a new route for feeders serving customers in Liberty Village, so that the
 existing route which is dangerous can be abandoned
- 17

18 IMPACT OF DEFERRAL

If this project were to be deferred, any work requiring access into the existing tunnel crossing Strachan Ave would continue to be refused by hydro crews. This will result in engineers and designers having to design and plan alternate routes in order to supply customer demand which is inefficient, costly and time consuming. The condition of the tunnel crossing is a growing reliability concern as it also prevents crews from removing or installing any cables. If any cables were to fail in the crossing, THESL customers would experience a prolonged outage.

2		
	Portfolio:	Underground
	Project Title:	Nugget Avenue UG Rebuild Electrical
		SCNAH9M23
	Project Number:	21664
	Project Year:	2013
	Estimate Cost:	\$ 874,619
3 4 5	PROJECT DESCRIPT	TION
6	Objective:	
7	The purpose of this project is to rebuild a portion of feeder SCNAH9M23 containing aged	
8	direct buried XLPE cable which has passed its useful life span to prevent future negative	
9	impact to customers due	to equipment failure.
10		
11	Scope:	
12	The scope of work for th	is project is to replace the existing direct buried cables and bring

13 the distribution system in this industrial area to the latest THESL standards in an area

14 bounded by Shorting Road, Nugget Avenue and Dovedale Court. This project requires the

replacement of 8,700 m of primary cable, three sealed SF6 type pad mount SCADA

switches and refurbishment of 12 transformer vaults.

17

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	NUGGET
STATION(S)	ELLESMERE TS
FEEDER(S)	SCNAH9M23

1 JUSTIFICATION

2

3 Project Background

- 4 The direct buried XLPE cable in this industrial/commercial neighbourhood was installed
- 5 in 1978 and has surpassed its estimated maximum useful lifespan of 25 years. The
- 6 neighbourhood will be rebuilt with new 1/0 aluminum cables in concrete encased duct
- 7 with SCADA switches for improved reliability.
- 8

9 Historical Performance

FEEDER PERFORMANCE				
Worst Performing Feeder Ranking (Worst Feeder)204				
Feeders Experiencing Sustained	Feeders Experiencing Sustained Interruptions (Worst Feeder)4			
HISTORICAL RELIABILITY PERFORMANCE				
	2008	2009	2010	
Feeder CI (<i>Cumulative</i>)	397	1,963	1,163	
Feeder CMO (<i>Cumulative</i>)	45,432	25,952	8,086	

10

11 Benefits

- 12 Replaces old direct buried cables (33 years) to prevent future negative impact to
- 13 customers due to direct buried XLPE cable which has exceeded its useful lifespan and

14 is at risk of failure

Reconfigures the distribution system with the latest THESL standard for operation
 and protection

17

18 IMPACT OF DEFERRAL

19 Delays in this work would lead to a higher risk of equipment failure and outages to

20 customers, increasing customer dissatisfaction. The assets are old and have reached their

21 end-of-life. Thus, reliability will continue to deteriorate. Deferral may bring this project in

22 conflict with projects from other utilities or newly imposed city moratorium as THESL

has communicated this project to the City and other utilities.

Portfolio:	Underground	
Project Title:	VC of Flemingdon MS feeders SS53-F3, F4, F5, F6	
	and F8 Civil	
Project Number:	20564	
Project Year:	2013	
Estimate Cost:	\$ 863,372	

1 **PROJECT DESCRIPTION**

2

3 **Objective:**

4 The object of this project is to provide the necessary civil structures when rebuilding the

5 aged, direct-burried primary distribution system fed by the Flemingdon Park Municipal

6 Substation and converting to 27.6kV system. This project is one phase of a multi-phase

7 program to remove the direct-burried primary system and convert the mentioned

8 municipal substations.

9

10 **Scope:**

11 The scope of this project involves design and construction of concrete encased duct banks

12 for the voltage coversion of feeders SS53-F3, F4, F5, F6 and F8 in an area bounded by

13 Windy Golfway, Rochedort Drive, Don Mills Road and Vicora Linkway. Existing 13.8kV

14 direct buried cable will be removed and replaced by 27.6kV TRXLPE cable installed in

15 concrete encased ducts. This involves the installation of 3.1 km of duct.

16

DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	GATEWAY
STATION(S)	FLEMINGDON MS & BERMONDSEY TS
FEEDER(S)	SS53F3, SS53F4, SS53F5, SS53F6, SS53F8

17

1 JUSTIFICATION

2

3 Project Background

Switchgear in Flemingdon MS was installed in 1961 with air blast circuit breakers. The
overall switchgear age and the obsolence of the switching technology heighten the
negative impact of the risk the station imposes on the area's distribution system.
Furthermore, the substation is islanded with no opportunity for an external backup in the
event of a contingency. To reduce maintenance costs from the station and to assure
reliability of the overall distribution system, THESL proposes to modernize the area by
converting to 27.6kV by the latest THESL standards and practices.

11

Early vintage direct buried XLPE cables have been identified as being a poor performing asset, contributing to system reliability degradation. These cables have been constantly exposed to neutral and sheath corrosion from the surrounding soil, resulting in

15 degradation of insulation strength.

16

17 The manufacturing processes employed in these early vintage XLPE cables lacked

18 sufficiently strict quality controls to (a) keep out the impurities from the insulation system

19 or (b) provide reliable sealing of the insulation system to prevent moisture ingress. The

20 steam curing process employed in the manufacture of early vintage XLPE cables also

21 resulted in moisture being trapped in the insulation system. Due to these manufacturing

22 defects, these cables have suffered from high rates of premature failure of insulation.

23

In addition, due to the nature of the direct buried installation, these assets are susceptible to damage from external dig-ins and movement of surrounding earth. A series of cable, elbow and transformer failures have occurred over the past few years. The purpose of this project is to install the concrete-encased conduits necessary to house the new treeretardant cross-linked polyethylene ("XLPE"). These new conduits will provide mechanical protection to the cables against external dig-ins and other factors.

2 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Ranking (Worst Feeder)193			193
Feeders Experiencing Sustained	Feeders Experiencing Sustained Interruptions (Worst Feeder)3		
HISTORICAL RELIABILITY PERFORMANCE			
	2008	2009	2010
Feeder CI (Cumulative)	654	1,123	282
Feeder CMO (<i>Cumulative</i>)	41,279	54,729	44,588

3

1

4 Benefits

5 • Replaces aging direct buried cables that are at risk of failing

• Increases long term reliability of the subdivision with the construction of new

7 concrete encasements that will provide mechanical protection to the insulation of the

new cables and prevent puncture damages by dig-ins and deterioration due to backfill
pressure and heat.

Reconfigures the distribution for the latest THESL standard for operation and
 protection with 1/0 cable with standard fusing

12 • Increased access to cable for installation, repairs, and replacement of cabling in the

13 event of outages thereby improving response time, and will reduce safety hazards to

- 14 utility personnel and the surrounding community.
- 15

16 IMPACT OF DEFERRAL

17 If this project is deferred, the electrical component of this project cannot be executed 18 without the completion of this civil work - either in the same year or electrical in the 19 immediate next year. Deferral of the project will expose the feeder to increased counts of 20 outages due to poor performing equipment. Electrical treeing will lead to the eventual 21 insulation breakdown over time on the existing non-tree retardant XLPE cable. This will 22 result in further outages to this feeder and to its customers. Also, the installation of the cables in direct-buried configurations accelerates deterioration. The deferral of this
project may result in future customer interruptions due to the potential failure of assets
within this area. The direct buried cables in this area will continue to degrade, resulting in
potential insulation failure. This will lead to customer dissatisfaction and high reactive
costs. Moreover, deferral may also cause this project to be in conflict with projects from
other utilities or the newly imposed city moratorium, as THESL has communicated this
project to the city and other utilities.

- 8
- 9

Portfolio:	Underground	
Project Title:	UG Rebuild PJF2 Pastoria & Robert McIntosh SD-	
	Civil	
Project Number:	22212	
Project Year:	2013	
Estimate Cost:	\$ 844,639	

5

6 **PROJECT DESCRIPTION**

7

8 **Objective:**

9 The purpose of this project is to replace the old and deteriorated 13.8kV primary cables,

10 installed direct buried in the time span of 1974 to 1975 in the area of Roydawn Court,

11 Irvine Road, Acheson Boulevard, Byford Street, and Bathgate Drive. The area covers two

12 subdivisions- Pastoria and Robert McIntosh. This part of the project deals with civil work

13 only. This project is one phase of a multi-phase program to remove direct burried primary

14 cable and convert Centenial D'arcy Magee MS.

15

16 **Scope:**

17 The scope of work is to design and install civil infrastructure for the single phase 1/0

18 aluminum cables along Roydawn Court, Irvine Road, Acheson Boulevard, Byford Street,

19 Bathgate Drive, Ivan and Clyde Road. It would also involve replacing the existing, direct

20 buried primary cable with cable in concrete encased ducts and distribution standards to

21 current THESL standards.

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	ROYDAWN COURT

STATION(S)	CENTENIAL D'ARCY MAGEE(13.8 KV)
FEEDER(S)	SCPJF2

2 JUSTIFICATION

3

4 **Project Background**

5 The distribution in the area of Roydawn Court, Irvine Road, Acheson Boulevard, Byford 6 Street, and Bathgate Drive was built between 1974 to 1975 with direct buried cables. For 7 improving the reliability and bringing the distribution to the latest and modern THESL

8 standard, THESL will rebuild the subdivisions with cables in concrete encased duct.

9

Early vintage direct buried XLPE cables have been identified as being a poor performing asset, contributing to system reliability degradation. These cables have been constantly exposed to neutral and sheath corrosion from the surrounding soil, resulting in corrosion and damage to the outer neutral conductors as well as contributing to the degradation of insulation strength.

15

The manufacturing processes employed in these early vintage XLPE cables did not have sufficiently strict quality controls to (a) keep out the impurities from the insulation system or (b) provide reliable sealing of the insulation system to prevent moisture ingress. The steam curing process employed in the manufacture of early vintage XLPE cables also resulted in moisture being trapped in the insulation system. Due to these manufacturing defects, these cables have suffered from high rates of premature failure of insulation.

In addition, due to the nature of the direct buried installation, these assets are susceptible

to damage from external dig-ins and movement of surrounding earth. A series of cable,

elbow and transformer failures have occurred over the past few years. The purpose of this

26 project is to install the concrete-encased conduits necessary to house the new tree-

27 retardant cross-linked polyethylene ("XLPE"). These new conduits will provide

- 1 mechanical protection to the cables against external dig-ins and other factors.
- 2

3 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Ranking (Worst Feeder)113			
Feeders Experiencing Sustained	Feeders Experiencing Sustained Interruptions (Worst Feeder)3		
HISTORICAL RELIABILITY PERFORMANCE			
	2008	2009	2010
Feeder CI (<i>Cumulative</i>)	2,367	2,446	3,841
Feeder CMO (<i>Cumulative</i>)	633,267	8,721	217,876

4

5 **Benefits**

- Replaces aging direct buried cables that are at risk of failing
- Reconfigures the distribution for the latest THESL standard for operation and
 protection with 1/0 cable with standard fusing
- 9 Increases long term reliability of the subdivision with the construction of new
- 10 concrete encasements that will provide mechanical protection to the insulation of the
- new cables and prevent puncture damages by dig-ins and deterioration due to backfill
 pressure and heat.
- Increased access to cable for installation, repairs, and replacement of cabling in the
 event of outages thereby improving response time, and will reduce safety hazards to
- 15 utility personnel and the surrounding community.
- 16

17 IMPACT OF DEFERRAL

If this project is deferred, the electrical component of this project cannot be executed without the completion of this civil work - either in the same year or electrical in the immediate next year. Deferral of the project will expose the feeder to increased counts of

- 21 outages due to poor performing equipment. Electrical treeing will lead to the eventual
- 22 insulation breakdown over time on the existing non-tree retardant XLPE cable. This will

result in further outages to this feeder and to its customers. Also, the installation of the 1 cables in direct-buried configurations accelerates deterioration. The deferral of this 2 project may result in future customer interruptions due to the potential failure of assets 3 within this area. The direct buried cables in this area will continue to degrade, resulting in 4 potential insulation failure. This will lead to customer dissatisfaction and high reactive 5 6 costs. Moreover, deferral may also cause this project to be in conflict with projects from other utilities or the newly imposed city moratorium, as THESL has communicated this 7 project to the city and other utilities. 8

Portfolio:	Underground
Project Title:	Rebuild Orange File SD 502M22 UG-Civil
Project Number:	21589
Project Year:	2013
Estimate Cost:	\$ 834,987

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to replace the old direct buried primary cables in Orange

6 File subdivision (in the area of Ivy Bush, Lapworh and Morbank) supplied by feeder

7 NA502M22.

8 This project is one phase of a multi-phase program to replace the direct-buried primary

9 cable on NA502M22. This part of the project deals with civil work only.

10

11 **Scope:**

12 The scope of work for this project is to design and install the civil infrastructure for

rebuild of the area covered by NA502M22: Ivy Bush Ave, Lapworh Cres and Morbank

14 Dr. It would also involve replacing the existing, direct buried primary cable with cable in

15 concrete encased ducts and distribution standards to current THESL standards. This

16 project includes installing approximately 2.4km of civil duct.

17

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	IVY BUSH
STATION(S)	CAVANAUGH TS
FEEDER(S)	SCNA502M22

18

19 JUSTIFICATION

2 **Project Background**

The distribution in the area of Orange File subdivision was built in 1980 with direct
buried cables. For improving the reliability and bringing the distribution to the latest and
modern THESL standard, THESL will rebuild the subdivisions with cables in concrete
encased duct.

7

8 Early vintage direct buried XLPE cables have been identified as being a poor performing 9 asset, contributing to system reliability degradation. These cables have been constantly 10 exposed to neutral and sheath corrosion from the surrounding soil, resulting in corrosion 11 and damage to the outer neutral conductors as well as contributing to the degradation of 12 insulation strength.

13

The manufacturing processes employed in these early vintage XLPE cables did not have sufficiently strict quality controls to (a) keep out the impurities from the insulation system or (b) provide reliable sealing of the insulation system to prevent moisture ingress. The steam curing process employed in the manufacture of early vintage XLPE cables also resulted in moisture being trapped in the insulation system. Due to these manufacturing defects, these cables have suffered from high rates of premature failure of insulation.

In addition, due to the nature of the direct buried installation, these assets are susceptible

to damage from external dig-ins and movement of surrounding earth. A series of cable,

23 elbow and transformer failures have occurred over the past few years. The purpose of this

24 project is to install the concrete-encased conduits necessary to house the new tree-

25 retardant cross-linked polyethylene ("XLPE"). These new conduits will provide

26 mechanical protection to the cables against external dig-ins and other factors.

27

28 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Rank	king (Worst Feed	ler)	18
Feeders Experiencing Sustained Interruptions (Worst Feeder) 11			11
HISTORICAL RELIABILITY PERFORMANCE			
	2008	2009	2010
Feeder CI (Cumulative)	3,705	19,233	7,957

2 Benefits

- 8 Replaces aging direct buried cables that are at risk of failing
- Upgrades equipment on one of the worst performing feeders (18th)in the THESL
 system that has a high FESI rank (11)
- Reconfigures the distribution for the latest THESL standard for operation and
 protection with 1/0 cable with standard fusing
- Increases long term reliability of the subdivision with the construction of new
- 9 concrete encasements that will provide mechanical protection to the insulation of the
- new cables and prevent puncture damages by dig-ins and deterioration due to backfill
 pressure and heat.
- 12 Increased access to cable for installation, repairs, and replacement of cabling in the
- 13 event of outages thereby improving response time, and will reduce safety hazards to
- 14 utility personnel and the surrounding community.
- 15

16 IMPACT OF DEFERRAL

17 If this project is deferred, the electrical component of this project cannot be executed

- 18 without the completion of this civil work either in the same year or electrical in the
- 19 immediate next year. Deferral of the project will expose the feeder to increased counts of
- 20 outages due to poor performing equipment. Electrical treeing will lead to the eventual
- 21 insulation breakdown over time on the existing non-tree retardant XLPE cable. This will
- result in further outages to this feeder and to its customers. Also, the installation of the

cables in direct-buried configurations accelerates deterioration. The deferral of this
project may result in future customer interruptions due to the potential failure of assets
within this area. The direct buried cables in this area will continue to degrade, resulting in
potential insulation failure. This will lead to customer dissatisfaction and high reactive
costs. Moreover, deferral may also cause this project to be in conflict with projects from
other utilities or the newly imposed city moratorium, as THESL has communicated this
project to the city and other utilities.

- 8
- 9

Portfolio:	Underground	
Project Title:	51M30 UG Rehab off Leslie Street North of Bond	
	Avenue	
Project Number:	21334	
Project Year:	2013	
Estimate Cost:	\$ 824,877	

- 1
- 2 **PROJECT DESCRIPTION**
- 3

4 **Objective:**

5 Replace the direct buried cable with 750kcmil XLPE cable between CC#MH993 -

6 Dufferin / Katherine N/W corner and Bombardier plant (CO Switchgear Enclosure

7 Loc.#CS).

8

9 Scope:

10 The scope of work for this project is to build new civil infrastructure north along Beffort

11 then west along Hanover with an approximate distance of 900m, three new cable

12 chambers will be required to accommodate the installation of 900m of 1,000kcmil

13 TRXLPE cables. Furthermore, new 3-1,000kcmil TRXLPE and 1-300 neutral will be

15

DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	BOMBARDIER PLANT
STATION(S)	BATHURST I TS
FEEDER(S)	NY85M1

16

17 JUSTIFICATION

¹⁴ installed.

1 **Project Background**

- 2 This project is intended to improve reliability of poorly performing feeders 85M1 (FESI-
- 3 8). This feeder has experienced several sustained interruptions over the past couple of
- 4 years and ranked 39th in the Worst performing feeder list. There is some outage due to
- 5 cable between the OS17936 and COS9 on this feeder in the past years.

6

1 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Rank	king (Worst Feed	ler)	169
Feeders Experiencing Sustaine	d Interruptions C	Count(Worst Feeder)	8
HISTORICAL RELIABILIT	Y PERFORMA	NCE	
	2008	2009	2010
Feeder CI (<i>Cumulative</i>)	5,596	178	341
Feeder CMO (<i>Cumulative</i>)	181,878	22,483	110,225

2

3 Benefits

- Feeder reliability will be improved, reducing both outage duration and frequency.
- 5 Reduces the probability of failure by modernizing the Toronto Hydro distribution
- 6 system
- 7 Primary assets at their end of service life will be replaced.
- 8 Customer satisfaction will be increased
- 9 Elimination of financial risk caused by damage to property and livelihood
- Improvement to grid operating conditions and will be avoided potential of second
 contingency scenarios

12

13 IMPACT OF DEFERRAL

- 14 If this project was to be deferred, safety hazards and reliability will continue to exist of
- 15 this feeder will worsen. Deferral of this project wills high impact on customers minutes
- 16 lost. Cables that are direct-buried installed are prone to contamination and thus
- 17 deterioration in increased.

18

19

Portfolio:	Underground
Project Title:	UG DB Cable Rehab - Bombardier Supply
Project Number:	12490
Project Year:	2013
Estimate Cost:	\$799,519

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

- 5 Replace the direct buried cable in the area with 750kcmil XLPE cable between
- 6 CC#MH993 Dufferin / Katherine N/W corner and Bombardier plant (CO Switchgear
- 7 Enclosure Loc.#CS).
- 8

9 Scope:

- 10 The scope of work for this project is to build new civil infrastructure north along Beffort
- 11 then west along Hanover with an approximate distance of 900.0m, three new cable
- 12 chambers will be required to accommodate the installation of 1,000kcmil TRXLPE
- 13 cables. Furthermore, new 3-1,000kcmil TRXLPE and 1-300 neutral will be installed.
- 14

DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	BOMBARDIER PLANT
STATION(S)	BATHURST I TS
FEEDER(S)	NY85M1

15

16 JUSTIFICATION

17

18 **Project Background**

19 This project is intended to improve reliability of poorly performing feeders 85M1 (FESI-

8). This feeder has experienced sevral sustained interruptions over the past couple of
 years and ranked 39th in the Worst performing feeder list. There are some outage due to
 cable between the OS17936 and COS9 on this feederin the past years.

5 This project involves the replacement of Direct Buried XLPE cable between cable

6 chamber MH#993 and Bombardier Plant (COS9) along the street Beffort Rd and Hanover

7 Rd. There is XLPE cable in duct on Beffort Rd between MH#495and MH#993.In

8 addition the cable between the OS17936 (Wilson Rd)and cable chamber MH#495 is

9 1000MCM TRXLPE cable. These cables are required to be highly reliable due to its high

10 impact in the event of a failure. Furthermore, early vintage XLPE has been identified as a

11 12

13 As such, THESL is proactively replacing this type of cable. In this way, there will be

14 improvement to system reliability, as well reduce feeder outage duration time and

15 frequency. At these locations the XLPE cable for feeder will be replaced and the cable

16 will be in duct. Our record shows these assets are old and have poor historical poor

17 reliability.

18

19 Historical Performance

poor performing cable.

20

FEEDER PERFORMANCE			
Worst Performing Feeder Rank	ing (Worst Feed	ler)	169
Feeders Experiencing Sustained	d Interruptions C	Count(Worst Feeder)	8
HISTORICAL RELIABILIT	Y PERFORM	ANCE	
	2008	2009	2010
Feeder CI (Cumulative)	5596	178	341
Feeder CMO (<i>Cumulative</i>)	181,878	22,483	110,225

21

22 Benefits

- Feeder reliability will be improved, reducing both outage duration and frequency. 1 • Reduces the probability of failure by modernizing the Toronto Hydro distribution 2 • 3 system 4 • Primary assets at their end of service life will be replaced. 5 • Customer satisfaction will be increased Elimination of financial risk caused by damage to property and livelihood 6 • Improvement to grid operating conditions and will be avoided potential of second 7 • contingency scenarios 8 9 **IMPACT OF DEFERRAL:** 10 11 If this project was to be deferred, safety hazards and reliability will continue to exist of 12 this feeder will worsen. Deferral of this project wills high impact on customers minutes 13 lost. Cables that are direct-buried installed are prone to contamination and thus 14 deterioration in increased. 15 16

Portfolio:	Underground
Project Title:	Ironside Crescent UG Rebuild Electrical
	SCNAR26M21
Project Number:	20990
Project Year:	2013
Estimate Cost:	\$ 773,208

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to rebuild a portion of feeder SCNAR26M21 containing 6 aged and failing direct buried cable. This is the electrical portion of this project

7

8 Scope:

9 The scope of work for this project is to install new 3 phase Al 1000 kcmil, 3 phase Al 1/0 10 cable and single phase Al 1/0 cable in concrete encased ducts installed in the civil portion 11 of this project E13041. These structures were installed on Ironside Crescent, Tapscott 12 Road and McNicoll Avenue. This will replace the existing direct buried cables and bring 13 distribution in this industrial area to the latest THESL standards. This will also involve 14 the installation of a new pad mount SF6 switch in suitable location to rearrange the 15 distribution of loading.

16

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	IRONSIDE
STATION(S)	MALVERN TS
FEEDER(S)	SCNAR26M21

17

18 JUSTIFICATION

2 **Project Background**

- 3 This project will rebuild a portion of feeder SCNAR26M21 out of Malvern TS to prevent
- 4 future negative impact to customers due to equipment failure. The direct buried cable in
- 5 this industrial/commercial neighbourhood is 32 years old and is past its estimated
- 6 operation lifespan based on lifecycle information for this type of cable. Feeder
- 7 SCNAR26M21 has experienced 4 direct buried cable faults in the last 3 years.
- 8

1 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Rank	ing (Worst Fee	eder)	350
Feeders Experiencing Sustained	l Interruptions	(Worst Feeder)	1
HISTORICAL RELIABILIT	Y PERFORM	ANCE	
	2008	2009	2010
Feeder CI (<i>Cumulative</i>)	4156	2733	23
Feeder CMO (<i>Cumulative</i>)	43257	159121	12387

2

3 Benefits

Replaces old direct buried cables (32 years) to prevent future negative impact to
customers due to direct buried XLPE cable which has exceeded its useful lifespan and
is at risk of failure.

- 7 Reconfigures the distribution for the latest THESL standard for operation and
- protection. TRXLPE cable in concrete encased duct and smaller loops with standard
 fuse.

10

11 IMPACT OF DEFERRAL

12 If this project was deferred, the deferral goes in tandem with civil part of the project -

13 either same year or electrical the immediate next year. Delays in this work could also lead

14 to a higher risk of equipment failure and outages to customers, increasing customer

15 dissatisfaction. Deferral may bring this project in conflict with projects from other utilities

16 or newly imposed city moratorium as THESL has communicated this project to the city

17 and other utilities.

Portfolio:	Underground
Project Title:	PPEast 2013 Feeder Automation Project on
	SCNT63M3
Project Number:	23154
Project Year:	2013
Estimate Cost:	\$ 765,611

- 4
- 5

6 **PROJECT DESCRIPTION**

- 7
- 8 **Objective:**
- 9 Feeder Automation on the Cavanaugh Feeder SCNT63M3
- 10
- 11 **Scope:**
- 12 The scope of this project involves installation and upgrade of SCADA controlled switches
- 13 on feeder SCNT63M3 to enable automation for timely power restoration in the event of
- 14 failure. This project requires the installation or upgrade of 6 SCADA-controlled switches.

15

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	SILVER SPRINGS
STATION(S)	AGINCOURT TS
FEEDER(S)	SCNT63M3

16

17 JUSTIFICATION

- 19 **Project Background**
- 20 Toronto Hydro has successfully implemented a 10 feeder automation scheme in 2010
- 21 with satisfactory performance. The same technology is planned to be implemented across

- 1 the 27.6kV looped distribution system for reliability improvement.
- 2

3 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Rank	ing (Worst Fee	der)	24
Feeders Experiencing Sustained	l Interruptions (Worst Feeder)	2
HISTORICAL RELIABILIT	Y PERFORM	ANCE	· · ·
	2008	2009	2010
Feeder CI (<i>Cumulative</i>)	225	210	4,244
Feeder CMO (<i>Cumulative</i>)	30,323	37,716	564,030

1 Benefits

2	• The project introduces two new tie points to the feeder 63M3:one from 502M25
3	through the padmount switch PS56875 at 317 Silver Springs Blvd. and a second
4	through the new pad mount switch "PSC-1" at the intersection of Dancy and Silver
5	Springs Blvd.
6	• The project installs automated switches which will allow automatic recovery of power
7	to customers in the event of an outage with minimal response time thereby reducing
8	Customer Minute Outage (CMO) counts.
9	
10	IMPACT OF DEFERRAL
10 11	IMPACT OF DEFERRAL Deferral will complicate the scheduling of related feeder automation projects on adjacent
11	Deferral will complicate the scheduling of related feeder automation projects on adjacent
11 12	Deferral will complicate the scheduling of related feeder automation projects on adjacent feeders jeopardizing the functionality of the overall feeder automation scheme. This will
11 12 13	Deferral will complicate the scheduling of related feeder automation projects on adjacent feeders jeopardizing the functionality of the overall feeder automation scheme. This will also negate the positive work Toronto Hydro has done in the past years in the area of

Portfolio:	Underground		
Project Title:	NYSS53F7 Wynford Dr. UG Rebuild Civil Works		
Project Number:	20312		
Project Year:	2013		
Estimate Cost:	\$ 758,689		

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 This purpose of this project is to provide the necessary civil structures for the replacement

6 of direct-burried cables to tree-retardant cross-link polyethelene cable (TRXLPE) on

7 NYSS53 during the conversions to 27.6kV. This project is one phase of a multi-phase

8 program to remove the direct-burried primary cable and convert 4kV loads, with the final

9 objective to decomission Flemingdon MS.

10

11 **Scope:**

12 The scope of this project involves design and construction of concrete encased duct banks

13 for the voltage conversion of feeders SS53-F7 in an area bounded by Wynford Drive, Don

14 Valley Parkway and Eglinton Avenue East. Existing 13.8kV direct buried cables will be

removed and replaced by 27.6kV TRXLPE cables installed in concrete encased ducts.

16 This project includes the installation of approximately 1.6 km civil duct.

17

DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	WYNFORD
STATION(S)	FLEMINGDON MS
FEEDER(S)	NYSS53-F7

18

19 JUSTIFICATION

1 Project Background

Flemingdon Park M.S., SS53-F7 feeder was installed in the 1960s with direct buried
cables and NX switches. Parts of the feeder are encased in concrete ducts to cater for
major road crossings and the rocky terrain.

5

Early vintage direct buried XLPE cables have been identified as being a poor performing
asset, contributing to system reliability degradation. These cables have been constantly
exposed to neutral and sheath corrosion from the surrounding soil, resulting in corrosion
and damage to the outer neutral conductors as well as contributing to the degradation of
insulation strength.

11

The manufacturing processes employed in these early vintage XLPE cables did not have 12 13 sufficiently strict quality controls to (a) keep out the impurities from the insulation system or (b) provide reliable sealing of the insulation system to prevent moisture ingress. The 14 steam curing process employed in the manufacture of early vintage XLPE cables also 15 resulted in moisture being trapped in the insulation system. Due to these manufacturing 16 17 defects, these cables have suffered from high rates of premature failure of insulation. 18 In addition, due to the nature of the direct buried installation, these assets are susceptible 19 to damage from external dig-ins and movement of surrounding earth. A series of cable, 20 elbow and transformer failures have occurred over the past few years. The purpose of this 21 project is to install the concrete-encased conduits necessary to house the new tree-22 23 retardant cross-linked polyethylene ("XLPE"). These new conduits will provide mechanical protection to the cables against external dig-ins and other factors. 24 25 **Historical Performance** 26

FEEDER PERFORMANCE

Worst Performing Feeder Ranking (Worst Feeder)	583
worst renorming receir Ranking (worst receir)	505

Feeders Experiencing Sustaine	d Interruptions	(Worst Feeder)	0	
HISTORICAL RELIABILITY PERFORMANCE				
	2008	2009	2010	
Feeder CI (Cumulative)	12	7	18	
Feeder CMO (<i>Cumulative</i>)	666	82	1,584	

2 Benefits

- 8 Replaces aging direct buried cables that are at risk of failing
- Reconfigures the distribution for the latest THESL standard for operation and
- 5 protection with 1/0 cable with standard fusing
- Increases long term reliability of the subdivision with the construction of new
 concrete encasements that will provide mechanical protection to the insulation of the
 new cables and prevent puncture damages by dig-ins and deterioration due to backfill
 pressure and heat.
- Increased access to cable for installation, repairs, and replacement of cabling in the
 event of outages thereby improving response time, and will reduce safety hazards to
- 12 utility personnel and the surrounding community.

13

14 IMPACT OF DEFERRAL

15 If this project is deferred, the electrical component of this project cannot be executed 16 without the completion of this civil work - either in the same year or electrical in the immediate next year. Deferral of the project will expose the feeder to increased counts of 17 outages due to poor performing equipment. Electrical treeing will lead to the eventual 18 19 insulation breakdown over time on the existing non-tree retardant XLPE cable. This will 20 result in further outages to this feeder and to its customers. Also, the installation of the cables in direct-buried configurations accelerates deterioration. The deferral of this 21 project may result in future customer interruptions due to the potential failure of assets 22 within this area. The direct buried cables in this area will continue to degrade, resulting in 23 potential insulation failure. This will lead to customer dissatisfaction and high reactive 24

- 1 costs. Moreover, deferral may also cause this project to be in conflict with projects from
- 2 other utilities or the newly imposed city moratorium, as THESL has communicated this
- 3 project to the city and other utilities.
- 4

Portfolio:	Underground		
Project Title:	Rebuild UG Trunk NT63M12 M8 Brimley -		
	Electrical		
Project Number:	21869		
Project Year:	2013		
Estimate Cost:	\$ 758,453		

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The objective of this project is to replace the old direct buried 750kcmil (and also

6 350kcmil) with 1000kcmil Al cable in CE duct along Brimley Rd from Steeles Ave to

7 Finch Ave. This project will establish a true feeder tie between NT63M12 and M8 with

8 the upgrading of standard size of cable on feeder mains. This part of the project deals with

9 electrical work only.

10

11 **Scope:**

12 The scope of work for this project is to install new cables in CE ducts built by the civil

13 part of the project running along Brimley Rd. The scope includes installation of four SF6

14 pad switches and four OH SCADAmate switches.

DISTRICT	Scarborough
DISTRICT NEIGHBOURHOOD	Brimley Road
STATION(S)	Agincourt TS(27.6 kV)
FEEDER(S)	SCNT63M12, SCNT63M8

15

16 JUSTIFICATION

17

18 Project Background

- 1 There is a stretch of undersized cable, built direct buried, connecting feeders NT63M12
- 2 and M8 running along Brimley Rd from Steeles Ave to McNicoll Ave and then from
- 3 MCNicoll Ave to Finch Ave.
- 4 To bring the capacity of the feeder mains and to improve the reliability of the feeders and
- 5 the system to the THESL standard, THESL proposes this project and its related civil
- 6 project.
- 7

8 Historical Performance

FEEDER PERFORMANCE				
Worst Performing Feeder Ranking (Worst Feeder)			2	
Feeders Experiencing Sustained	9			
HISTORICAL RELIABILITY PERFORMANCE				
	2008	2009	2010	
Feeder CI (<i>Cumulative</i>)	7971	16463	1686	
Feeder CMO (<i>Cumulative</i>)	185746	732101	364363	

9

10 Benefits

- 11 Replaces a section of undersized cable of two feeders built direct buried,
- 12 Establish a true feeder tie between NT63M8 and M12 with the upgrading of standard
- 13 size of cable on feeder main
- Brings the capacity of the feeder mains to normal and THESL standard
- Installs modern assets (SF6 pad switches and OH SCADAmates) to improve the
- 16 feeder reliability and operational flexibility.
- 17

18 IMPACT OF DEFERRAL

19 If this project was to be deferred, the electrical component of this project would prolong

- 20 construction in this area and resulting in customer dissatisfaction, given that civil work
- 21 had already commenced in 2013. The benefit and return of the investment will not be

- 1 achieved in time. There will be risk of overloading in contingency situation if the project
- 2 is deferred. Deferral is likely to result in poor feeder reliability and customer satisfaction.
- 3

2

3 PROJECT DESCRIPTION

4

5 **Objective:**

6 The objective of this project is to replace the old direct-buried 350kcmil primary cables in

7 the area of Scunthorpe Rd and Invergordon Ave supplied by feeder NAH9M26. The

8 distribution will be reconfigured to apply THESL standard design and construction.

9 This part of the project deals with electrical work only for the single-phase residential

10 loops.

11

12 **Scope:**

13 For improving the reliability and bringing the distribution to the latest and modern

14 THESL standards, Asset Management will replace the primary cable with a

15 reconfiguration of the distribution and rebuild the subdivisions with cables in concrete-

16 encased duct. The project will address the removal of non-standard single-phase PMHs

17 and the old and obsolete VWS interrupter switch.

18

19 The scope of work for this project is to install new cables in concrete encased ducts built

20 by the civil part of the project along Carlingwood Ct, Havenview Rd and Invergordon

21 Ave (part) and Thistlewaite Cr, Massie St, West Burton Ct, Prince William Ct, Plum

22 Brook Cr, Spring Forest Sq, Penny Brook Ln, Scunthorpe (part), Crown Acres Ct,

- 1 Kimbercroft Ct and the internal roads of the TH complex at 20 Kimbercroft Ct. This
- 2 project requires the replacement of 7,400m of primary cable, 45 transformers.
- 3

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	SCUNTHORPE & INVERGORDON
STATION(S)	ELLESMERE TS
FEEDER(S)	SCNAH9M26

5 JUSTIFICATION

- 6
- 7

1 **Project Background**

- 2 The distribution in the area was built within a time span of 1982 to 1985 with direct-
- 3 buried cables. The distribution experienced a number of cable, elbow and transformer
- 4 failures in the recent past years.
- 5

6 Historical Performance

FEEDER PERFORMANCE				
Worst Performing Feeder Ranking (Worst Feeder)			706	
Feeders Experiencing Sustained Interruptions (Worst Feeder)			0	
HISTORICAL RELIABILITY PERFORMANCE				
	2008	2009	2010	
Feeder CI (Cumulative)	120	3,980	0	
Feeder CMO (<i>Cumulative</i>)	16,920	157,921	0	

7

8 Benefits

- 9 Replaces 30 years' old failing direct buried cables for the industrial area.
- Reconfigures the distribution for the latest THESL standard for operation and
 protection.
- removes the non-standard single phase PMHs and the old and obsolete VWS
 interrupter switch.
- • Targets to achieve better operational flexibility and more reliable supply.
- 15

16 IMPACT OF DEFERRAL

- 17 Completion of a other projects connected to the same area of the feeder will be
- 18 jeopardized if this project is deferred. If this project was to be deferred, the electrical
- 19 component of this project would prolong construction in this area and resulting in
- 20 customer dissatisfaction, given that civil work had already commenced in 2013. The
- 21 benefit and return of the investment will not be achieved in time. Deferral is likely to

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- 1 result in poor feeder reliability and customer satisfaction.
- 2

Portfolio:	Underground	
Project Title:	Replace/Upgrade cable from PILC to 500 TRXLPE on	
	A-93-B	
Project Number:	13307	
Project Year:	2013	
Estimate Cost:	\$751,761	

2 **PROJECT DESCRIPTION**

3 **Objective:**

- 4 To replace all Paper Insulated Lead Covered (PILC) cable on the trunk of feeder A93B to
- 5 the standard 500kcmil Tree Retardant Cross-link Polyethylene (TRXLPE) cable
- 6 Scope:
- 7 This project would enable the replacement and upgrade the existing 1928 meters of
- 8 varying size PILC cable to 500 kcmil TRXLPE.

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	BRIDGEMAN
STATION(S)	BRIDGEMAN TS
FEEDER(S)	A93B

9

10 JUSTIFICATION

11 Project Background

- 12 This project was initiated as per the Lead Cable Replacement Program with a vision to
- 13 ultimately improve safety and environmental conditions within cable chambers, due
- 14 mainly to lead and Polychlorinated biphenyls (PCB) exposure.
- 15 Potential procurement issues associated with a lone North American manufacturer of
- 16 PILC cables is also prompting proactive replacement of this cable with readily available
- 17 TRXLPE cable.
- 18 In addition to the environmental benefits of replacing PILC cable, this specific feeder was

- also chosen for upgrade because many portions of this feeder are smaller 2/0 size of
- 2 PILC, thereby not allowing for future expansion.
- 3

4 Benefits

- 5 Removal of risk of harmful effects of lead and potential PCB oil exposure
- Increased room for load growth and flexibility for load transferring by upgrading
- 7 PILC feeder whose trunk sizes are 2/0 or 350kcmil with higher ampacity 500kcmil
- 8 TRXLPE cable. This specific feeder will have room for new loads to be connected to
- 9 it after this upgrade.
- Address procurement issue associated with a lone North American manufacturer of PILC cables
- 11

12 IMPACT OF DEFERRAL

- 13 Issues of health and environmental risks will continue for Toronto Hydro workers, due
- 14 mainly to potential exposure to PCB's, and lead. If the lone North American manufacturer
- 15 stops producing PILC cable, THESL will not only have a sourcing/procurement issue, but
- 16 will also have a very large volume of PILC cable replacement projects to execute. No
- 17 additional room for expansion for customers connected to this feeder.

18

Portfolio:	Underground
Project Title:	Nugget Avenue UG Rebuild Civil SCNAH9M23
Project Number:	21663
Project Year:	2013
Estimate Cost:	\$ 749,131

- 1 **PROJECT DESCRIPTION**
- 2

3 **Objective:**

The purpose of this project is to rebuild a portion of feeder SCNAH9M23 containing aged direct buried XLPE cable which has passed its useful life span to prevent future negative impact to customers due to equipment failure. This project is one phase of a multi-phase program to remove the direct-burried primary cable on SCNAH9M23.

8

9 Scope:

10 The scope of work for this project is to design and construct the civil infrastructure

11 (concrete encased ducts) for the replacement of direct buried cables in the following

12 areas: Shorting Road, Nugget Avenue and Dovedale Court. This will replace the existing

13 direct buried cables and bring distribution in this industrial area to the latest THESL

14 standards. This involves the installation of 1.5km of civil duct.

15

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	NUGGET
STATION(S)	ELLESMERE TS
FEEDER(S)	SCNAH9M23

16

17 JUSTIFICATION

18

19 Project Background

The direct buried XLPE cable in this industrial/commercial neighbourhood was installed in 1978 and has surpassed its estimated maximum useful lifespan of 25 years. The neighbourhood will be rebuilt with new 1/0 aluminum cables in concrete encased duct with Supervisory Control and Data Acquisition (SCADA) switches for improved reliability.

6

Early vintage direct buried XLPE cables have been identified as being a poor performing
asset, contributing to system reliability degradation. These cables have been constantly
exposed to neutral and sheath corrosion from the surrounding soil, resulting in corrosion
and damage to the outer neutral conductors as well as contributing to the degradation of
insulation strength.

12

13 The manufacturing processes employed in these early vintage XLPE cables did not have 14 sufficiently strict quality controls to (a) keep out the impurities from the insulation system or (b) provide reliable sealing of the insulation system to prevent moisture ingress. The 15 steam curing process employed in the manufacture of early vintage XLPE cables also 16 17 resulted in moisture being trapped in the insulation system. Due to these manufacturing defects, these cables have suffered from high rates of premature failure of insulation. 18 19 In addition, due to the nature of the direct buried installation, these assets are susceptible 20 to damage from external dig-ins and movement of surrounding earth. A series of cable, 21 elbow and transformer failures have occurred over the past few years. The purpose of this 22

23 project is to install the concrete-encased conduits necessary to house the new tree-

retardant cross-linked polyethylene ("XLPE"). These new conduits will provide

25 mechanical protection to the cables against external dig-ins and other factors.

26

27 Historical Performance

FEEDER PERFORMANCE

Worst Performing Feeder Ranking (Worst Feeder)			204
Feeders Experiencing Sustained Interruptions (Worst Feeder)			4
HISTORICAL RELIABILITY PERFORMANCE			
	2008	2009	2010
Feeder CI (Cumulative)	397	1,963	1,163
Feeder CMO (<i>Cumulative</i>)	45,432	25,952	8,086

2 Benefits

- 8 Replaces aging direct buried cables that are at risk of failing
- Reconfigures the distribution for the latest THESL standard for operation and
 protection with 1/0 cable with smaller loops with standard fusing
- Increases long term reliability of the subdivision with the construction of new
 concrete encasements that will provide mechanical protection to the insulation of the
 new cables and prevent puncture damages by dig-ins and deterioration due to backfill
 pressure and heat.
- Increased access to cable for installation, repairs, and replacement of cabling in the
 event of outages thereby improving response time, and will reduce safety hazards to
 utility personnel and the surrounding community.

13

14 IMPACT OF DEFERRAL

If this project is deferred, the electrical component of this project cannot be executed 15 without the completion of this civil work - either in the same year or electrical in the 16 immediate next year. Deferral of the project will expose the feeder to increased counts of 17 18 outages due to poor performing equipment. Electrical treeing will lead to the eventual insulation breakdown over time on the existing non-tree retardant XLPE cable. This will 19 result in further outages to this feeder and to its customers. Also, the installation of the 20 cables in direct-buried configurations accelerates deterioration. The deferral of this 21 22 project may result in future customer interruptions due to the potential failure of assets within this area. The direct buried cables in this area will continue to degrade, resulting in 23

- 1 potential insulation failure. This will lead to customer dissatisfaction and high reactive
- 2 costs. Moreover, deferral may also cause this project to be in conflict with projects from
- 3 other utilities or the newly imposed city moratorium, as THESL has communicated this
- 4 project to the city and other utilities.

Underground		
Replace/upgrade feeder A13K from PILC to		
500kcmil TRXLPE cable		
18743		
2013		
\$ 742,421		

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 To replace Paper Insulated Lead-Covered (PILC) cable on the trunk of feeder A13K with

6 the standard 500kcmil Tree-Retardant Cross-Linked Polyethylene (TRXLPE) cable and

7 rebuild cable chambers as required.

- 8
- 9 Scope:

10 This project will enable the replacement and upgrade of approximately 620m of varying

size PILC cable to 500 kcmil TRXLPE.

DISTRICT	Toronto
DISTRICT NEIGHBOURHOOD	GERRARD
STATION(S)	GERRARD TS
FEEDER(S)	A13K

12

13 JUSTIFICATION

14

15 **Project Background**

16 This project was initiated as per the Lead Cable Replacement Program with a vision to

- 17 ultimately improve safety and environmental conditions within cable chambers, due
- 18 mainly to lead and Polychlorinated biphenyl (PCB) exposure.

1	Potential procurement issues associated with a lone North American manufacturer of
2	PILC cables is also prompting proactive replacement of this cable with readily available
3	TRXLPE cable.
4	This specific feeder was also chosen for upgrade because it contains belted-type PILC
5	cable, which is the oldest PILC cable type in THESL's distribution system.
6	
7	Benefits
8	• Removal of risk of harmful effects of lead and potential PCB oil exposure
9	• Increase capacity for projected load growth and flexibility for load transferring by
10	upgrading PILC feeder whose trunk sizes are 2/0 and 350kcmil with higher ampacity
11	500kcmil TRXLPE feeders
12	• Address procurement issue associated with a lone North American manufacturer of PILC
13	cables
14	
15	IMPACT OF DEFERRAL
16	Issues of health and environmental risks will continue for Toronto Hydro workers due
17	mainly to potential exposure to PCB's and lead. If the lone North American manufacturer
18	stops producing PILC cable, THESL will not only have a sourcing/procurement issue, but
19	will also have a very large volume of PILC cable replacement projects to execute.

Portfolio:	Underground	
Project Title:	Durnford/Rylander/Tideswell 47M17 3-Ph Loop-	
	Civil	
Project Number:	20200	
Project Year:	2013	
Estimate Cost:	\$ 737,804	

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is primarily to provide civil infrastructure in advance of the

6 related electrical project that intends to proactively reduce the probability of a system

7 failure by replacing the aged direct buried cross-linked polyethelene ("XLPE") cables on

8 feeder SCNA47M17 within the area along the streets of Vandorf Street, Sheppard

9 Avenue, Rylander Boulevard, Tideswell Boulevard and Durnford Road.

10

11 **Scope:**

12 The scope of work for this project is to install new concrete-encased conduit to enclose

13 the tree-retardant cross-linked polythelene ("XLPE") cables on feeder SCNA47M17

14 along the streets of Vandorf Street, Sheppard Avenue, Rylander Boulevard, Tideswell

15 Boulevard and Durnford Road. In total, 1.4 kilometers of this civil infrastructure will be

16 installed. In addition, an existing air-insulated pad-mounted switch will be replaced with a

17 standard SF6-insulated pad-mounted switch.

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	DURNFORD ROAD
STATION(S)	SHEPPARD TS
FEEDER(S)	SCNA47M17

3 JUSTIFICATION

4 **Project Background**

Early vintage direct buried XLPE cables have been identified as being poor performing
assets, contributing to system reliability degradation. These cables have been constantly
exposed to neutral and sheath corrosion from the surrounding soil, resulting in corrosion
and damage to the outer neutral conductors as well as contributing to the degradation of
insulation strength.

10

11 The manufacturing processes employed in these early vintage XLPE cables did not have sufficiently strict quality controls to (a) keep out the impurities from the insulation system 12 or (b) provide reliable sealing of the insulation system to prevent moisture ingress. The 13 steam curing process employed in the manufacture of early vintage XLPE cables also 14 resulted in moisture being trapped in the insulation system. Due to these manufacturing 15 defects, these cables have suffered from high rates of premature failure of insulation. 16 17 18 In addition, due to the nature of the direct buried installation, these assets are susceptible to damage from external dig-ins and movement of surrounding earth. The assets within 19 20 this particular area were installed in 1985 and have exceeded their useful life criteria. The purpose of this project is to install the concrete-encased conduits necessary to house the 21

new tree-retardant cross-linked polyethylene ("XLPE"). These new conduits will provide

23 mechanical protection to the cables against external dig-ins and other factors.

- 24
- 25

FEEDER PERFORMANCE			
Worst Performing Feeder Rank	king (Worst Feed	ler)	63
Feeders Experiencing Sustained Interruptions (Worst Feeder)9			
HISTORICAL RELIABILITY PERFORMANCE			
	2008	2009	2010
Feeder CI (<i>Cumulative</i>)	9,360	7,260	7,740
Feeder CMO (<i>Cumulative</i>)	603,103	114,973	198,324

2

3 Benefits

- Upgrades equipment on one of the worst performing feeders (63th) in the THESL
- 5 system that has a high FESI rank (9)
- Reconfigures the distribution for the latest THESL standard for operation and
 protection with 1/0 cable with standard fusing

8 • Improved feeder reliability, due to replacement of direct buried infrastructure

- Reduced outage duration time due to capability of pulling cables through conduit
 during outage
- Improved renewal of asset infrastructure during outage, as assets can be replaced
- 12 entirely (as opposed to direct buried cables, which can only be repaired via a splice)
- 13 Improved mechanical protection against dig-ins and external events
- 14 Improved operational flexibility and reliable supply
- 15

16 IMPACT OF DEFERRAL

17 Deferral of the project will expose the feeder to increased counts of outages due to poor

- 18 performing equipment. Electrical treeing will lead to the eventual insulation breakdown
- 19 over time on the existing non-tree retardant XLPE cable. This will result in further
- 20 outages to this feeder and to its customers. Also, the installation of the cables in direct-
- 21 buried configurations accelerates deterioration.

Portfolio:	Underground	
Project Title:	UG Rebuild Macey Denton R43M27-M23 Tie-	
	Civil	
Project Number:	22822	
Project Year:	2013	
Estimate Cost:	\$ 731,149	

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The objective of this project is to establish a feeder tie and also replace the old and

6 deteriorated primary cables installed direct buried in seventies in the area of Denton and

7 Macey Ave. Feeder NAR43M27 supplies the area and NAR43M23 is the standby for the

8 area. This part of the project deals with civil work only.

9

10 **Scope:**

11 The scope of work is to design and install civil infrastructure for the rebuild of the three

12 phase distribution of the area covered by NAR43M23 in an area bounded by Denton Av,

13 Macey Av, St. Dunstan Dr and Albion Av. The project requires installation of 1,230m of

- 14 concrete encased duct and 14 poles.
- 15

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	MACEY & DENTON
STATION(S)	WARDEN TS
FEEDER(S)	SCNAR43M23, SCNAR43M27

16

17 JUSTIFICATION

1 Project Background

The three phase distribution in the area of Denton and Macey Avenue was built in 2 seventies with direct buried cables. The distribution is very old (35 years') and though 3 there was no failure in the last 3 years, the old direct buried cables are likely to fail any 4 5 time. The assets in the building vaults deteriorated and may cause flashover anytime. 6 Feeder NAR43M27 supplies the area and NAR43M23 is the standby for the lateral. For improving the reliability and bringing the distribution to the latest and modern THESL 7 standard, THESL will rebuild the three phase distribution with cables in concrete encased 8 9 duct, rebuild the vaults with new switches and also establish a feeder tie between 10 R43M23 and R43M27. 11

FEEDER PERFORMANCE				
Worst Performing Feeder Rank	ting (Worst Feed	ler)	127	
Feeders Experiencing Sustained	d Interruptions (Worst Feeder)	9	
HISTORICAL RELIABILITY PERFORMANCE				
	2008	2009	2010	
Feeder CI (<i>Cumulative</i>)	5,797	715	5,310	
Feeder CMO (<i>Cumulative</i>)	535,773	169,367	143,186	

2

3 Benefits

- 4 Establishes a feeder tie at the station
- Replaces the old and deteriorated direct buried primary cables that are at risk of
 failing.
- 7 Replaces existing PMH switch (prone to failure) with SF6 padmount switch.
- 8 Replaces and modernizes by installing SF6 SWITCHGEAR and mini-rupters on the
- 9 HV side of the transformers at the customer vaults.

10

11 IMPACT OF DEFERRAL

12 Deferral of the project will expose the feeder to increased counts of outages due to poor

13 performing equipment. Electrical treeing will lead to the eventual insulation breakdown

14 over time on the existing non-tree retardant XLPE cable. This will result in further

15 outages to this feeder and to its customers. Also, the installation of the cables in direct-

16 buried configurations accelerates deterioration. The deferral of this project may result in

- 17 future customer interruptions due to the potential failure of assets within this area. The
- 18 direct buried cables in this area will continue to degrade, resulting in potential insulation
- 19 failure. This will lead to customer dissatisfaction and high reactive costs.
- 20

	2011September 30 Page 49 of 263
Portfolio:	Underground
Project Title:	Rebuild Trunk 502M1 M22 Birchmount-Civil
Project Number:	21585
Project Year:	2013
Estimate Cost:	\$ 726,737
PROJECT DESCRIPTIO	DN
Objective:	
The objective of this projec	et is to replace the old direct buried 750kcmil with 1000kcmil
Al cable in CE duct along H	Birchmount Rd from Steeles Ave to Hydro One R.O.W South
	ject will upgrade the feeder trunk of two feeders NA502M21
and M22.	· · · · · ·
This part of the project deal	ls with civil work only.
Scope:	
The scope of work is to des	sign and install civil infrastructure for the replacement of the
old direct buried 750kcmil	cables along Birchmout Rd from Steeles Ave to Hydro One
ROW. This project would t	then require the installation of 1,800m of concrete encased
duct.	
DISTRICT	SCARBOROUGH

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	BIRCHMOUNT
STATION(S)	CAVANAUGH TS
FEEDER(S)	SCNA502M21, SCNA502M22

19 JUSTIFICATION

2 **Project Background**

- 3 There is a stretch of undersized cable, most part of which was built direct buried,
- 4 connecting feeders NA502M21 and M22 running along Birchmout Rd from Steeles Ave
- 5 to Hydro One ROW. To bring the capacity of the feeder mains and to improve the

6 reliability of the feeders and the system to the THESL standard, THESL proposes this

- 7 project and its related electrical project.
- 8

FEEDER PERFORMANCE			
Worst Performing Feeder Rank	ing (<i>Worst Feede</i>	er)	18
Feeders Experiencing Sustained	l Interruptions (W	Vorst Feeder)	11
HISTORICAL RELIABILITY PERFORMANCE			
	2008	2009	2010
Feeder CI (Cumulative) 16,772 26,332 12,771			
Feeder CMO (<i>Cumulative</i>)	1,055,089	775,181	343,121

2

3 Benefits

- Replaces a section of undersized cable of two worse feeders (NA502M21 and M22)
 built direct buried,
- Brings the capacity of the feeder mains to normal and THESL standard
- 7

8 IMPACT OF DEFERRAL

9 Deferral of the project will expose the feeder to increased counts of outages due to poor 10 performing equipment. Electrical treeing will lead to the eventual insulation breakdown 11 over time on the existing non-tree retardant XLPE cable. This will result in further outages to this feeder and to its customers. Also, the installation of the cables in direct-12 buried configurations accelerates deterioration. The deferral of this project may result in 13 future customer interruptions due to the potential failure of assets within this area. The 14 direct buried cables in this area will continue to degrade, resulting in potential insulation 15 failure. This will lead to customer dissatisfaction and high reactive costs. 16 17

Portfolio:	Underground
Project Title:	Rebuild UG Trunk 502M21-28 Warden -Electrical
Project Number:	21934
Project Year:	2013
Estimate Cost:	\$ 722,191

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The objective of this project is to replace the old direct buried 750kcmil XLPE with

6 1000kcmil Al TRXLPE cable in CE duct along Wrden Ave from Steeles Ave to Hydro

7 One ROW. This project will establish a true feeder tie between NA502M21 and 502M28

8 with the upgrading of standard size of cable on feeder mains. This part of the project deals

9 with electrical work only.

10

11 **Scope:**

12 The scope of work for this project is replace 9,000m of existing direct buried cable with

13 new 1000kcmil cables in concrete encased ducts running along Warden Ave from Steeles

- 14 Ave to Hydro One ROW.
- 15

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	WARDEN
STATION(S)	CAVANAUGH TS
FEEDER(S)	SCNA502M21, SCNA502M28

16

17 JUSTIFICATION

18

19 Project Background

- 1 There is a stretch of undersized cable, built direct buried, connecting feeders NA502M21
- 2 and 502M28 running along Warden Ave from Steeles Ave to McNicoll Ave and then
- 3 from MCNicoll Ave to Hydro One ROW. To bring the capacity of the feeder mains and
- 4 to improve the reliability of the feeders and the system to the THESL standard, Asset
- 5 Management proposes this project and its related civil project.
- 6
- 7

FEEDER PERFORMANCE			
Worst Performing Feeder Rank	ting (Worst Feed	ler)	121
Feeders Experiencing Sustaine	d Interruptions (Worst Feeder)	1
HISTORICAL RELIABILIT	Y PERFORMA	NCE	
	2008	2009	2010
Feeder CI (Cumulative)	13,567	13.617	8,639
Feeder CMO (<i>Cumulative</i>)	827,586	356,182	401,534

2

3 Benefits

- Replaces a section of undersized cable of two feeders (502M21 and M28) built direct
 buried,
- Establish a true feeder tie between NA502M21 and M28 with the upgrading of
 standard size of cable on feeder main
- 8 Brings the capacity of the feeder mains to normal and THESL standard,
- Installs modern assets (SF6 pad switches and OH SCADAmates) to improve the
 feeder reliability and operational flexibility.

11

12 IMPACT OF DEFERRAL

13 Delays in this work could lead to a higher risk of equipment failure and outages to

14 customers. Deferral may bring this project in conflict with projects from other utilities or

- 15 newly imposed city moratorium as THESL has communicated this project to the city and
- 16 other utilities. There will be risk of overloading in contingency situation if the project is
- 17 deferred. Deferral is likely to result in poor feeder reliability and customer satisfaction.

18

Portfolio:	Underground
Project Title:	NY51M24 UG Rebuild in Subdivision by Don
	Mills & Sheppard Part 1 - Electrical NY51M24
Project Number:	21401
Project Year:	2013
Estimate Cost:	\$ 716,501

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The object of this project is to proactively reduce the probability of a system failure by

6 replacing the aged direct buried cabling of feeder NY51M24 in the subdivision located

7 southwest of the Don Mills Road and Sheppard Avenue intersection.

8

9 Scope:

10 In the subdivision bounded by Sheppard Avenue to the north, Shaughnessy Boulevard to

11 the East, Havenbrook Boulevard to the South and Leslie Street to the West, replace all

12 direct buried cables on feeder 51M24 with 1/0 28kV Insulated STR AL TRXLPE 1-phase

13 cables enclosed in concrete encased ducts. In addition, submersible transformers and

14 accessories in the area will also be replaced with equipments as per current standard.

DISTRICT	North York
DISTRICT NEIGHBOURHOOD	Don Mills Road & Sheppard Avenue East
STATION(S)	Leslie II TS
FEEDER(S)	NY51M24

15

16 JUSTIFICATION

17

18 Project Background

1 This feeder has had seven outages in the last 12 months with cable failure as the primary

2 cause. Cable faults are being addressed in this project by replacing aged, direct buried

3 cabling including #1 solid types found at various segments of the feeder.

4

5 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Ranki	ng (<i>Worst Feed</i>	ler)	65
Feeders Experiencing Sustained	Interruptions (Worst Feeder)	8
HISTORICAL RELIABILITY PERFORMANCE			
	2008	2009	2010
Feeder CI (<i>Cumulative</i>)	5141	4337	6265
Feeder CMO (<i>Cumulative</i>) 129367 211103 324587			

6

7 Benefits

• This scope rejuvenates the local distribution system by replacing hardwares on the

- 9 aging distribution system in the section of the subdivision west of Shaughnessy
- 10 Boulevard.

Improves utility field-staff safety as it eliminates electrical hazards by rehabilitating
 and modernizing transformer vaults along the feeder route in the reference area.

13 • Improves response times as it upgrades riser switches from manual operation to

- 14 automatic operation.
- Improves feeder reliability by replacing failed cables which had accounted for up to
 83% of the feeder's outages in the last four years.
- Old open type switches are being replaced with sealed SF6 units will reduce
- 18 equipment footprints in the vaults and on outdoor pads.
- 19 This project improves reliability as it eliminates solid core cabling along the feeder.
- 20 IMPACT OF DEFERRAL
- 21 Deferral of this project will increase the likelihood of outages and as over 83% of outages
- on this feeder in the last 12 months and in the last 4 years had been on underground

- 1 cabling that is being focussed on in this project. While this project is being deferred, an
- 2 outage will affect about 600 residential customers. Being a mostly underground project,
- 3 deferral will increase the risk of encountering renewed moratorium constraints imposed
- 4 by the city authorities.

Portfolio:	Underground
Project Title:	Feeder Automation Project on SCNA502M28
Project Number:	23156
Project Year:	2013
Estimate Cost:	\$ 694,674

PROJECT DESCRIPTION

3

4 **Objective:**

- 5 Feeder Automation on the Cavanaugh Feeder SCNA502M28
- 6

7 Scope:

- 8 The scope of this project involves installation and upgrade of 6 SCADA controlled
- 9 switches on feeder SCNT502M28 to enable automation for timely power restoration in
- 10 the event of failure.
- 11

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	VICTORIA PARK & IANGROVE
STATION(S)	CAVANAGH TS
FEEDER(S)	SCNA502M28

12

13 JUSTIFICATION

14

15 Project Background

- 16 Toronto Hydro has successfully implemented a 10 feeder automation scheme in 2010
- 17 with satisfactory performance. The same technology is planned to be implemented across
- 18 the 27.6kV looped distribution system for reliability improvement.
- 19

FEEDER PERFORMANCE			
Worst Performing Feeder Ranking (Worst Feeder)121			
Feeders Experiencing Sustained Interruptions (Worst Feeder)1			
HISTORICAL RELIABILITY PERFORMANCE			
	2010		
Feeder CI (<i>Cumulative</i>) 500 6,518			3,825
Feeder CMO (<i>Cumulative</i>)	58,500	299,716	309,496

2

3 Benefits

The project installs automated switches which will allow automatic recovery of power
 to customers in the event of an outage with minimal response time thereby reducing
 Customer Minute Outage (CMO) counts.

7

8 IMPACT OF DEFERRAL

9 Deferral will complicate the scheduling of related feeder automation projects on adjacent

10 feeders jeopardizing the functionality of the overall feeder automation scheme This will

also negate the positive work Toronto Hydro has done in the past years in the area of

12 smart grid and feeder automation to deliver quality service and reliability to Toronto

13 Hydro customers.

4	

Portfolio:	Underground
Project Title:	UG Rebuild PJF3 Wondown & Milah Securities SD
	-Civil
Project Number:	22220
Project Year:	2013
Estimate Cost:	\$ 685,543

3 PROJECT DESCRIPTION

4

5 **Objective:**

6 The objective of this project is to replace the old and deteriorated 13.8kV primary cables,

7 installed direct buried between 1974 to 1978, in the area of Goldberry Sq, Boxhill Dr,

8 Feagan Dr and south end of Bathgate Dr (Wondown and Milah Securities Subdivisions).

9 The area is supplied by feeder PJF3. This part of the project deals with civil work only.

10

11 **Scope:**

12 The scope of work is to design and install civil infrastructure for the rebuild of area

13 covered by PJF3: Goldberry Sq, Boxhill Dr, Feagan Dr and south end of Bathgate Dr.

14 The work for this project wil then require the installation of 1,800m of concrete encased

- 15 duct.
- 16

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	GOLDBERRY
STATION(S)	CENTENIAL D'ARCY MAGEE
FEEDER(S)	SCPJF3

17

18 JUSTIFICATION

2 **Project Background**

- 3 The distribution in the area of Goldberry Sq, Boxhill Dr, Feagan Dr and south end of
- 4 Bathgate Dr. (Wondown and Milah Securities Subdivisions) was built in the time span of
- 5 1974 to 1978 with direct buried cables. The distribution experienced a few failures of
- 6 cable, elbow and transformers in the past years. For improving the reliability and bringing
- 7 the distribution to the latest and modern THESL standard, THESL will rebuild the
- 8 subdivisions with cables in concrete encased duct. Considering future conversion the
- 9 primary cable will be selected for 27.6kV rating.

10

FEEDER PERFORMANCE			
Worst Performing Feeder Rank	king (Worst Fe	eder)	277
Feeders Experiencing Sustaine	ed Interruptions	(Worst Feeder)	
HISTORICAL RELIABILIT	FY PERFORM	IANCE	
	2008	2009	2010
Feeder CI (Cumulative)	2,554		
Feeder CMO (<i>Cumulative</i>)	0	27,918	35,189

2

3 Benefits

• Replaces 40 years' old failing direct buried cables that are at risk of failing

5 • Upgrades equipment on one of the oldest 13.8kV feeder.

• Reconfigures the distribution for the latest THESL standard for operation and

7 protection with 1/0 cable with standard fusing

8

9 IMPACT OF DEFERRAL

Deferral of the project will expose the feeder to increased counts of outages due to poor
performing equipment. Electrical treeing will lead to the eventual insulation breakdown
over time on the existing non-tree retardant XLPE cable. This will result in further

13 outages to this feeder and to its customers. Also, the installation of the cables in direct-

14 buried configurations accelerates deterioration. The deferral of this project may result in

15 future customer interruptions due to the potential failure of assets within this area. The

16 direct buried cables in this area will continue to degrade, resulting in potential insulation

17 failure. This will lead to customer dissatisfaction and high reactive costs.

18

Portfolio:	Underground
Project Title:	UG Lateral Cable Replacement
Project Number:	13285
Project Year:	2013
Estimate Cost:	\$ 680,693

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

- 5 To replace direct buried lateral XLPE cable supplied from 55M10 along Finch between
- 6 Jane and Romfield to improve reliability.
- 7
- 8 Scope:
- 9 This project involves the replacement of existing direct buried cable with new cable
- 10 installed in concrete encased duct. This project requires replacement of 8 transformers,
- 11 2,600m of primary cable and 180m of concrete encased ducts.

12

DISTRICT	NORTHYORK
DISTRICT NEIGHBOURHOOD	JANE AND FINCH
STATION(S)	FINCH I TS
FEEDER(S)	NY55M10

13

14 JUSTIFICATION

15

16 **Project Background**

17 Early vintage XLPE cable has been identified as a poor performing cable. As such,

- 18 THESL is proactively replacing this type of cable. Furthermore, for the most part, this
- 19 cable replaced within this scope is #1 solid. It is a very poor performing asset. This will

- 1 lead to improvement in system reliability by reducing feeder outage duration time and
- 2 frequency.
- 3
- 4

FEEDER PERFORMANCE			
Worst Performing Feeder Rank	ting (Worst Fe	eder)	250
Feeders Experiencing Sustained	d Interruptions	Count(Worst Feeder)	1
HISTORICAL RELIABILIT	Y PERFORM	IANCE	
	2010		
Feeder CI (<i>Cumulative</i>)	5,394		
Feeder CMO (<i>Cumulative</i>)	667	65,809	147,617

2

3 Benefits

- Modernization of the distribution plant as a result of replacement of poor performing
 cable
- The project reduces the probability of more failures on the feeder with the
- 7 replacement of non-tree-retardant XLPE cable with new TRXLPE cables as per
- 8 THESL standard
- 9 Reduction of customer Minutes Out lost due to improved restoration time achieved
- 10 through the replacement of vault transformers with switchable units
- 11 Improved safety on the feeders as the vaults along the feeder routes will be
- 12 refurbished and upgraded to the latest THESL standard
- 13

14 IMPACT OF DEFERRAL

- 15 Deferral of the project will expose the feeder to increased counts of outages due to poor
- 16 performing equipment. Electrical tree tracking will lead to the eventual insulation
- 17 breakdown over time on the existing non-tree retardant XLPE cable. This will result in
- 18 further outages to this feeder and to its customers
- 19

Underground	
UG Lateral Cable & Transformer Rehab Finch TS	
13273	
2013	
\$680,217	

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is intended to improve reliability by reducing the probability

6 of outages due to underground lateral cable and equipment failures on NY55M26 along

7 Oakdale Rd., between Finch Ave. and Jody Ave.

8 All XLPE primary service lateral cables with 1/0 Al, 28kV, some of which are #1 Solid

9 type, are to be replaced with TRXLPE cable from OH riser poles to transformer

10 vaults/room/pads.

11

12 **Scope:**

13 This project involves the replacement of existing direct buried cable with new cable

14 installed in concrete encased duct. This project requires replacement of 8 transformers,

15 2,475m of primary cable, 3 transformers and 440m of concrete encased ducts.

16

DISTRICT	NORTHYORK	
DISTRICT NEIGHBOURHOOD	OAKDALE & JODY	
STATION(S)	FINCH II	
FEEDER(S)	NY55M26	

17

18 JUSTIFICATION

1 Project Background

NY55M26 is currently identified as a FESI-12 feeder, with a worst performing feeder
rank of 127. The feeder's condition has been deteriorating according to reliability data.
A vast majority of the faults were specifically caused by non-standard CSP transformers
and glass insulators within the last year.

6

7 Early vintage XLPE has been identified as a poor performing cable. As such, THESL is

8 proactively replacing this type of cable. In this way, there will be improvement to system

9 reliability, as well as reduce feeder outage duration time and frequency, and reduce

10 system losses. The existing laterals on this feeder utilize non-standard XLPE cable, some

11 of which are #1 Solid types, and will be upgraded to TRXLPE cable. Further improving

12 the FESI status of NY55M26 requires reducing the probability of failure in the

13 underground lateral cable and its associated equipment.

14

15 Historical Performance

FEEDER PERFORMANCE

T EEDER I ERFORMANCE				
Worst Performing Feeder Ranking (Worst Feeder)Feeders Experiencing Sustained Interruptions Count(Worst Feeder)			128	
			13	
HISTORICAL RELIABILITY PERFORMANCE				
	2008	2009	2010	
Feeder CI (<i>Cumulative</i>)	150	693	1,334	

16

17 Benefits

18 • Increases reliability through the replacement of early vintage XLPE and optimally

reconfiguring the system. Customer satisfaction is improved as a result of greaterservice reliability.

• Provides greater flexibility for power distribution and mechanical protection and

22 durability of the underground cabling

- Reduction in emergency and reactive capital and maintenance costs
- 2 Upgrades equipment to current THESL standards
- 3

4 IMPACT OF DEFERRAL

- 5 Deferral this worst performing feeder projects will generally lead to sustained or
- 6 deteriorating reliability problems on the feeder in question, leading to customer
- 7 dissatisfaction and high reactive investment costs. Furthermore, XLPE cable, especially
- 8 #1 Solid Type, is more prone to failure than TRXLPE and this feeder has already had 13
- 9 outages to date, in the past one year

Portfolio:	Underground	
Project Title:	Constellation Crt - UG Rebuild & Voltage Conversion	
Project Number:	13134	
Project Year:	2013	
Estimate Cost:	\$662,247	

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

- 5 The purpose of this project is to convert the existing 7 customers surrounding
- 6 Constellation Crt. from 13.8kV to 27.6kV.
- 7
- 8 Scope:
- 9 The scope of work for this project is to install 7 underground transformers in order to feed
- 10 the customers on Constellation Crt. This project also includes cabling work to upgrade
- 11 from 13.8kV to 27.6k.

12

DISTRICT	ETOBICOKE
DISTRICT NEIGHBOURHOOD	CONSTELLATION CRT
STATION(S)	RICHVIEW TS
FEEDER(S)	ET88M41

13

14 JUSTIFICATION

15

16 **Project Background**

17 Constellation MS (13.8 kV) EH-F1 experienced five outages in 2010. Analysis shows that

18 up to four of the outages were related to the condition of the underground loop servicing

19 the light industrial customers on Constellation Crt.

- 1 Field personnel have noted that CO-PT64769 is poorly maintained by the customer and
- 2 there is evidence of arcing in the transformer. In the short-term THESL will attempt to
- 3 have the customer improve the transformer and pad conditions. For this reason, THESL is
- 4 proposing a new reconfiguration of the loop and that it gets rebuilt and converted to 27.6
- 5 kV. This area will be fed from 88M41 on Carlingview Dr.

2

FEEDER PERFORMANCE					
Worst Performing Feeder Rank	454				
Feeders Experiencing Sustained	3				
HISTORICAL RELIABILITY PERFORMANCE					
	2010				
Feeder CI (Cumulative)	175	4944	505		
Feeder CMO (<i>Cumulative</i>)	880	224869	1562		

3

4 Benefits

- Higher primary voltage will have lower line losses and higher transmission efficiency.
- Increases reliability through the replacement of early vintage XLPE and optimally
 reconfiguring the system.
- Lowers the probability of failures due to the defective customer transformers
- 9 Replace aging 4.16kV infrastructure
- 10 Higher voltage will provide more reliability due to new equipment installation
- 11 Increase customer satisfaction
- 12

13 IMPACT OF DEFERRAL

14 Due to the fact that underground equipment is mostly installed outdoors and operated in

- 15 harsh environment, it endures elements of nature such as dirt, road salt, and seasonal
- 16 variation in temperature, water, moisture and condensation. Overtime, its physical
- 17 integrity degrades causing deterioration in the overall asset health condition.
- 18 Delay or postponement of this planned capital program would lead to unplanned power
- 19 outages from failure of aged or unreliable equipment, causing increased duration and
- 20 frequency of power outages to customers.
- 21

Portfolio:	Underground		
Project Title:	Nashdene Tiffield SCNAR26M22 UG Rebuild -		
	Electrical		
Project Number:	20336		
Project Year:	2013		
Estimate Cost:	\$ 660,383		

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to rebuild the underground distribution system in this

6 industrial neighbourhood. This is the electrical portion of the project, installing cable in

7 concrete encased duct to enable replacement of aging direct buried XLPE cable and

8 improve the infrastructure of this industrial neighbourhood.

9

10 **Scope:**

11 The scope of work for this project is the replacement of aging direct buried 3-350 Al

12 28kV XLPE cable with new 3-1/0 Al 28kV TRXLPE and 3-1000 Al 28kV TRXLPE

13 cable in newly installed civil infrastructure in an area bounded by Nashdene Road,

14 Tiffield Road and Dynamic Drive. This will replace 9,100m of existing direct buried

15 cables with cables in concrete encased ducts and distribution, 2 overhead switches and 3

- 16 pad mounted switches.
- 17

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	NASHDENE & TIFFIELD
STATION(S)	MALVERN TS
FEEDER(S)	SCNAR26M22

1 JUSTIFICATION

2

3 **Project Background**

- 4 This project will rebuild a portion of Feeder NAR26M22 out of Malvern TS to prevent
- 5 future negative impact to customers. The direct buried cable in this neighbourhood is 32
- 6 years old and is past its estimated operation lifespan based on lifecycle information for
- 7 this type of cable. This feeder was part of a distribution transfer from feeder
- 8 NAR26M34 and is a new feeder, thus historical feeder performance data is unavailable.
- 9

10 Benefits

- Replaces old direct buried cables (32 years) to prevent future negative impact to
- customers due to direct buried XLPE cable which has exceeded its useful lifespan and
 is at risk of failure.
- Reconfigures the distribution for the latest THESL standard for operation and
 protection. TRXLPE cable in concrete encased duct and smaller loops with standard
 fuse.
- 17

18 IMPACT OF DEFERRAL

If this project is deferred, the delays in this work could lead to a higher risk of equipment failure and outages to customers, increasing customer dissatisfaction. Deferral may bring this project in conflict with projects from other utilities or newly imposed city moratorium as THESL has communicated this project to the city and other utilities.

- 23
- 27
- 28

Portfolio:	Underground
Project Title:	Finchdene Industrial SCNAR26M31 UG Rebuild
	Phase 2 (Electrical)
Project Number:	18639
Project Year:	2013
Estimate Cost:	\$ 634,292

3 PROJECT DESCRIPTION

4

5 **Objective:**

6 The objective of this project is to rebuild the old and failing primary distributions of

7 Melford, Pullman CT, NHD Industrial Subdivisions, supplied by feeder NAR26M31.

8 This part of the project is to install the cables connecting the switching cubicles and the

9 customer vaults.

10

11 **Scope:**

12 The scope of work is to install 1/0 Al cables in concrete encased ducts in an area

13 bounded by Tapscott road, Newgale Gate, Pullman Ct, Torham Pl and Finchdene. Work

requires installation of 6 pad mounted switches and 18,000m of primary cable

15

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	FINCHDENE
STATION(S)	MALVERN TS
FEEDER(S)	SCNAR26M31

16

17 JUSTIFICATION

1 **Project Background**

- 2 This three phase distribution for Finchdene Sq., Pullman Ct., Newgale Gt., Torham Pl.
- 3 (Melford, Pullman CT, NHD Industrial Subdivisions) was built in 1976 with direct-buried
- 4 cables. The distribution system, mainly cables, experienced quite a large number of
- 5 failures over the last recent few years. To improve the reliability of supply to the area
- 6 distribution and to the customers there, Asset Management will replace the primary cables
- 7 installed in concrete encased ducts with the latest THESL standard.
- 8
- 9

FEEDER PERFORMANCE					
Worst Performing Feeder Rank	king (Worst Fe	eder)	396		
Feeders Experiencing Sustained Interruptions (Worst Feeder)			3		
HISTORICAL RELIABILITY PERFORMANCE					
	2010				
Feeder CI (Cumulative)00730					
Feeder CMO (<i>Cumulative</i>)	0	0	3,652		

2

3 Benefits

• Replaces 35 years' old and failing direct buried cables.

- 5 Upgrades equipment on one of the worst performing feeders (3rd) in the THESL
- 6 system

7 • Addresses industrial/commercial distribution that has experienced high fault currents

8 during failure

9 • Reconfigures the distribution for the latest THESL standard for operation and

10 protection. [smaller loops with 1/0 cable with standard fuse.]

11

12 IMPACT OF DEFERRAL

13 Completion of a other projects connected to the same area of the feeder will be

14 jeopardized if thie project is deferred. If this project was to be deferred, the electrical

- 15 component of this project would prolong construction in this area and resulting in
- 16 customer dissatisfaction, given that civil work had already commenced in 2013. The
- 17 benefit and return of the investment will not be achieved in time.

18

19

Portfolio:	Underground		
Project Title:	UG Rebuild 63M6 Mid Finch Silver Star Bv-		
	Electrical		
Project Number:	22570		
Project Year:	2013		
Estimate Cost:	\$ 624,275		

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The objective of this project is to replace the old and deteriorated primary cables in the

6 area of Silver Star and Kilcullen Castle Gates. The distribution feeds a number of small

7 industries and commercial units. The distribution is presently supplied by feeder

8 NT63M6.

9 This part of the project deals with electrical work only.

10

11 **Scope:**

12 The scope of work is to install 10,000m of 1/0 Al cables in CE ducts placed by the civil

13 part of the project on Silver Star Blvd and Kilcullen Castle Gate . The work involves

14 installation of 1 SF6 pad switch and refurbishing of 11 transformer vaults.

15

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	SILVER STAR
STATION(S)	AGINCOURT TS
FEEDER(S)	SCNT63M6

16

17 JUSTIFICATION

1 **Project Background**

- 2 The three phase distribution in the area of Silver Star and Kilcullen Castle Gatewas built
- 3 in 1981 with direct buried cables. The distribution experienced a number of cable failures
- 4 in the recent past years. For improving the reliability and bringing the distribution to the
- 5 latest and modern THESL standard, Asset Management will rebuild the subdivisions
- 6 (Mid- Finch) with cables in concrete encased duct.

7

FEEDER PERFORMANCE					
Worst Performing Feeder Rank	ting (Worst Feed	ler)	29		
Feeders Experiencing Sustained Interruptions (Worst Feeder)			2		
HISTORICAL RELIABILITY PERFORMANCE					
	2008	2009	2010		
Feeder CI (Cumulative) 11,613 6,990 2,325					
Feeder CMO (<i>Cumulative</i>)	170,056	33,013	188,397		

2

3 Benefits

• Replaces 32 years' old failing direct buried cables that are at risk of failing.

- 5 Upgrades equipment on one of the worst performing feeders (29th) in the THESL
- 6 system

Addresses industrial/commercial distribution that has experienced high fault currents
 during failure

9 • Reconfigures the distribution for the latest THESL standard for operation and

10 protection. [smaller loops with 1/0 cable with standard fuse.]

11

12 IMPACT OF DEFERRAL

13 Deferral of this project will generally lead to sustained or deteriorating reliability

14 problems on the feeder in question, leading to customer dissatisfaction and high reactive

15 investment costs. This is due to the reputation of aging direct buried cable (over 30 years)

- subject to failing, and the difficulty to repair faults when they occur. If deferred the risk of
- 17 failure will increase while the restoration time to these customers will remain high
- 18 causing the reactive crew to invest in non-standard cable past its useful life.

Portfolio:	Underground
Project Title:	UG Rebuild 502M26 Bonis Ave- Civil
Project Number:	22460
Project Year:	2013
Estimate Cost:	\$ 619,875

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 To purpose of the project is to replace the old and failing direct buried cable along Bonis

6 Ave to improve the reliability of the feeder NA502M26. This part of the project deals

- 7 with civil works only.
- 8

9 Scope:

10 The scope of work is to design and install civil infrastructue to rebuild the distribution of

11 the area of Bonis Ave(the three phase /transformers/loads of Bonis Ave.) covered by

12 NA502M26. This project will then require the installation of 1,250m of concrete encased

13 duct.

14

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	BONIS
STATION(S)	CAVANAUGH TS
FEEDER(S)	SCNA502M26

15

16 JUSTIFICATION

17

18 **Project Background**

19 The underground cables along Bonis Ave was installed installed direct buried between

- 1 year 1989 to 1990. In 2005 there was a flash over on SUG343 (now PS58462) which
- 2 caused loss of 3000 CI and 35832 CMO. Though the PMH was replaced but none of the
- 3 connecting cables at that time needed replacement. To avoid future failures and
- 4 interruptions, THESL is proposing to install concrete-encased ducts and replace the
- 5 cables in the area.
- 6
- 7

FEEDER PERFORMANCE				
Worst Performing Feeder Rank	674			
Feeders Experiencing Sustained Interruptions (Worst Feeder)0				
HISTORICAL RELIABILITY PERFORMANCE				
2008 2009 2010				
Feeder CI (<i>Cumulative</i>)	1			
Feeder CMO (<i>Cumulative</i>)	2,955	0	138	

2

3 Benefits

• Replaces 25 years' old direct buried cables that are at risk of failing.

5 • Replace existing old PMH with modern SF6 PMHs.

Addresses industrial/commercial distribution that has experienced high fault currents
 during failure

8 • Reconfigures the distribution for the latest THESL standard for operation and

9 protection with 1/0 cable with standard fusing

10

11 IMPACT OF DEFERRAL

12 Deferral of the project will expose the feeder to increased counts of outages due to poor

13 performing equipment. Electrical treeing will lead to the eventual insulation breakdown

14 over time on the existing non-tree retardant XLPE cable. This will result in further

15 outages to this feeder and to its customers. Also, the installation of the cables in direct-

16 buried configurations accelerates deterioration. The deferral of this project may result in

- 17 future customer interruptions due to the potential failure of assets within this area. The
- 18 direct buried cables in this area will continue to degrade, resulting in potential insulation

19 failure. This will lead to customer dissatisfaction and high reactive costs.

Portfolio:	Underground
Project Title:	Terauley Piece Outs and Leakers
Project Number:	19554
Project Year:	2013
Estimate Cost:	\$606,000

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to piece out un-racked or hanging cable as well as repair

6 any leaking PILC cable within cable chambers in and around the area surrounding

7 Terauley TS. This work will improve system reliability and prevent potential emergency

8 situations arising from unsafe manoeuvre inside cluttered and congested cable chambers.

9

10 **Scope:**

11 The scope of work for this project is to inspect all related feeders within the identified

12 cable chambers and proceed to repair any deficiencies.

13 Crews are to begin by inspecting the identified cable chambers in order to determine the

14 number of feeders to be worked on and isolated for scheduling purposes. For cables

15 requiring piece outs, crews are to shorten or add new cable in order to properly rack the

16 cable on the cable chamber walls. For leaking cables, crews can install a lead sleeve

17 replacement to repair the leak or replace the cable.

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	TRINTY – SPADINA
STATION(S)	TERAULEY TS
FEEDER(S)	VARIOUS

18

19 JUSTIFICATION

2	Project Background
3	PILC cable leaks (leakers) and the quantity of un-racked and hanging cables (piece outs)
4	have been an ongoing problem of safety and reliability over the years.
5	At present, Raychem patches are used as a temporary repair for leaking cables in order to
6	minimize interruption time and a lead sleeve replacement is done at a later date.
7	There is also growing concern now about the safety of the workers during inspection and
8	work inside the confined space of a cable chamber due to congested and cluttered cable
9	chambers.
10	The Underground Environmental Health and Safety (UGEH&S) Committee and THESL
11	have taken this issue seriously and in 2008 THESL initiated a multi-year program to clear
12	all the outstanding piece outs and leakers by 2015.
13	
14	Benefits
15	• Removes all leaking cable and cable with Raychem patches in the Terauley TS area,
16	thereby improving reliability as leaking cable is prone to failure
17	• Removes all un-racked and hanging cable within the cable chambers in the Terauley
18	TS area, thereby improving the safety and working conditions for crew
19	
20	IMPACT OF DEFERRAL
21	If this project were to be deferred, THESL is at risk of not removing all the piece outs and
22	leakers by 2015 as stated as a part of the multi-year program initiated in 2008. This would
23	prolong the amount of time that leaking cable remains in our system and also prolongs the
24	amount of time unsafe working conditions existing within certain cable chambers.
25	

Portfolio:	Underground	
Project Title:	UG Lat Cable and Tx Rehab Cedarcroft, Patricia,	
Hoject Hue.	etc.	
Project Number:	12451	
Project Year:	2013	
Estimate Cost:	\$ 605,465	

PROJECT DESCRIPTION

3 3 4

5 6

6 7 7

8 8

Objective:

To replace XLPE cable with 1/0 Al, 28kV, TRXLPE cable between riser poles and transformer vaults / pads at 12 locations on Cedarcroft, Patricia, Pleasant, Rockford & Bathurst to improve reliability and to replace poor condition transformers in order to improve reliability of a high FESI feeder.

9 9 10

10 11 **Scope:**

All XLPE primary service riser cables are to be replaced with 3-1/0 Al, 28kV, TRXLPE cable.

¹³ The locations that have been identified as requiring cable replacement are the laterals that

¹⁴ dip at Bathurst, Rockford, Cedarcroft, Patricia and Pleasant. Work requires replacement

16 of 2,400m of primary cable, installation of 135m of concrete encased duct, 6 transformers

16 and refurbishing of 10 transformer vaults.

DISTRICT	NORTHYORK
DISTRICT NEIGHBOURHOOD	PATRICIA-CEDARCROFT
STATION(S)	FAIRCHILD I TS

FEEDER(S)	NY80M2

2 JUSTIFICATION

3

4 Project Background

- 5 This feeder is worst performing feeder. Field patrol has identified assets that require
- 6 replacement to prevent unplanned power outages due to failure.
- 7

8 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Rank	ting (Worst Feed	der)	69
Feeders Experiencing Sustained Interruptions Count(Worst Feeder)6			
HISTORICAL RELIABILITY PERFORMANCE			
	2008	2009	2010
Feeder CI (<i>Cumulative</i>)	4228	2050	7978
Feeder CMO (<i>Cumulative</i>)	113919	23671	327430

9

10 Benefits

- Modernization of the distribution plant as a result of replacement of poor performing
 cable
- 13 The project reduces the probability of more failures on the feeder with the
- 14 replacement of non-tree-retardant XLPE cable with new TRXLPE cables
- 15 Reduction of customer Minutes Out lost due to improved restoration time achieved
- 16 through the replacement of vault transformers with switchable units
- 17 Improved safety on the feeders as the vaults along the feeder routes will be
- refurbished and upgraded to the latest THESL standard

19

20 IMPACT OF DEFERRAL

- 1 Deferral of the project will expose the feeder to increased counts of outages due to poor
- 2 performing equipment. Electrical tree tracking will lead to the eventual insulation
- 3 breakdown over time on the existing non-tree retardant XLPE cable. This will result in
- 4 further outages to this feeder and to its customers.
- 5

Portfolio:	Underground	
Project Title:	Rebuild of SCNAE5-1M25 by Brimley Rd and	
	Skagway Avenue Civil	
Project Number:	21188	
Project Year:	2013	
Estimate Cost:	\$ 593,600	

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is primarily to provide civil infrastructure in advance of the

6 related electrical project that intends to address a major cable failure reported in

7 December 2010, and aims to proactively reduce the probability of subsequent failures by

8 replacing the aging direct buried cross-linked polyethelene ("XLPE") cables on feeder

9 NAE5-1M25 within Skagway Avenue area.

10

11 **Scope:**

12 The scope of work for this project is to install new concrete-encased conduit to enclose

13 the tree-retardant cross-linked polythelene ("XLPE") cables on feeder NAE5-1M25 along

14 Skagway Avenue. In total, 1.4 kilometers of this civil infrastructure will be installed.

15

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	BRIMLEY & SKAGWAY
STATION(S)	LESLIE I TS
FEEDER(S)	SCNAE51M25

16

17 JUSTIFICATION

18 Project Background

Early vintage direct buried XLPE cables have been identified as being poor performing assets, contributing to system reliability degradation. These cables have been constantly exposed to neutral and sheath corrosion from the surrounding soil, resulting in corrosion and damage to the outer neutral conductors as well as contributing to the degradation of insulation strength.

6

7 The manufacturing processes employed in these early vintage XLPE cables did not have sufficiently strict quality controls to (a) keep out the impurities from the insulation system 8 9 or (b) provide reliable sealing of the insulation system to prevent moisture ingress. The 10 steam curing process employed in the manufacture of early vintage XLPE cables also 11 resulted in moisture being trapped in the insulation system. Due to these manufacturing defects, these cables have suffered from high rates of premature failure of insulation. 12 13 In addition, due to the nature of the direct buried installation, these assets are susceptible to damage from external dig-ins and movement of surrounding earth. The assets within 14 this particular area were installed between 1987 and 1988, and will have exceeded their 15 useful life criteria by 2013. Feeder NAE5-1M25 has had several outages over the past few 16 years. As direct buried cables can only be repaired through the installation of a splice, and 17 not completely replaced, any recently impacted sections of these cables have been either 18 repaired or isolated. 19

20

The purpose of this project is to install the concrete-encased conduits necessary to house the new tree-retardant cross-linked polyethylene ("XLPE"). These new conduits will provide mechanical protection to the cables against external dig-ins and other factors. These conduits will also allow for the full replacement of cables should they fail in the future, as the cables can be entirely pulled out between devices.

26

27 Historical Performance

FEEDER PERFORMANCE

Worst Performing Feeder Ranking (Worst Feeder)			339
Feeders Experiencing Sustained Interruptions (Worst Feeder)			2
HISTORICAL RELIABILITY PERFORMANCE			
	2008	2009	2010
Feeder CI (<i>Cumulative</i>)	90	10	86
Feeder CMO (<i>Cumulative</i>)	4,016	198	12,970

2 **Benefits**

Reconfigures the distribution for the latest THESL standard for operation and
 protection with 1/0 cable with standard fusing

5 • Improved feeder reliability, due to replacement of direct buried infrastructure

- Reduced outage duration time due to capability of pulling cables through conduit
 during outage
- 8 Improved renewal of asset infrastructure during outage, as assets can be replaced
- 9 entirely (as opposed to direct buried cables, which can only be repaired via a splice)
- 10 Improved mechanical protection against dig-ins and external events
- 11 Improved operational flexibility and reliable supply

12

13 IMPACT OF DEFERRAL

14 Deferral of the project will expose the feeder to increased counts of outages due to poor

- 15 performing equipment. Electrical treeing will lead to the eventual insulation breakdown
- 16 over time on the existing non-tree retardant XLPE cable. This will result in further
- 17 outages to this feeder and to the connected 5MVA of load, and 70 industrial customers.
- 18 Also, the installation of the cables in direct-buried configurations accelerates
- 19 deterioration.

Portfolio:	Underground	
Project Title:	Strachan TS Feeder Transfer from A7-8T to new A11-	
Hoject Hue.	12T Switchgear	
Project		
Number:	20713	
Project Year:	2013	
Estimate Cost:	\$589,000	

2

4

5 **Objective:**

PROJECT DESCRIPTION

6 The purpose of this project is to transfer all the feeders from the existing A7-8T

7 switchgear located in the north east area of Strachan A building to the proposed new A11-

8 12T switchgear in the south side of Strachan A building. Also to upgrade feeders to

9 increase loading capability for future load growth and connecting new customers to these

10 feeders.

11

12 **Scope:**

13 The scope of work for this project is to transfer all feeders and station service from

existing switchgear A7-8T to the new proposed switchgear A11-12T. Approximately 11

15 feeders and the station service are to be transferred in this project. 500 kcmil cable is to be

16 used for all primary feeder originating from the new switchgear cell to either the station

17 basement or the first cable chamber outside of the station.

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	EXHIBITION PLACE
STATION(S)	STRACHAN TS
FEEDER(S)	A32T, A33T, A34T, A46T, A47T, A48T, A54T,

	A56T, A57T, A58T
1	
2 3	JUSTIFICATION
3 4	Project Background
5	The existing switchgears at Strachan TS are aging and under capacity and a plan was put
6	in place to replace and upgrade each of the switchgears. Switchgear A1-2T has been
7	upgraded and switchgear A3-4T is to be replaced by early 2012 by new switchgear A9-
8	10T. Once complete, the decommissioned switchgear A3-4T is to be removed and
9	preparations will begin to install the new switchgear A11-12T in its place. Once
10	switchgear A11-12T is energized, the feeders from A7-8T are to be transferred so that
11	A7-8T can be decommissioned.
12	
13	Benefits
14	• Enables new A11-12T to begin supplying load, putting into service the switchgear at
15	the station
16	• Offloads switchgear A7-8T, allowing for the decommissioning of the existing
17	switchgear
18	
19	IMPACT OF DEFERRAL
20	If this project were to be deferred, THESL would have invested millions of dollars and
21	constructed a new switchgear which would be not put into service immediately. In
22	addition, this would delay the decommissioning and upgrade of the final switchgear A5-
23	6T at Strachan TS, thereby increasing the risk of a significant station outage due to the
24	threat of failed equipment.

Portfolio:	Underground
Project Title:	UG Rebuild 502M26 Bonis Ave- Electrical
Project Number:	22475
Project Year:	2013
Estimate Cost:	\$ 588,406

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 To purpose of the project is to replace the old and failing direct buried cable along Bonis

6 Ave to improve the reliability of the feeder NA502M26. This part of the project deals

- 7 with electrical works only.
- 8
- 9 Scope:
- 10 The scope of work is to replacement of 7,000m of existing direct buried cable with 1/0 Al

11 cables in CE ducts in Bonis Ave. area, 3 padmounted switch installation, replacement of 1

12 transformer and refurbishing 6 transformer vaults.

13

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	BONIS AVENUE
STATION(S)	CAVANAUGH TS
FEEDER(S)	SCNA502M26

14

15 JUSTIFICATION

16

17 **Project Background**

18 The underground cable along Bonis Ave was installed direct buried between years 1989

to 1990. In 2005 there was a flash over on SUG343 (now PS58462) which caused loss of

- 1 3000 CI and 35832 CMO. Though the PMH was replaced but none of the connecting
- 2 cables at that time needed replacement.
- 3

FEEDER PERFORMANCE				
Worst Performing Feeder Ranking (Worst Feeder)674				
Feeders Experiencing Sustained Interruptions (Worst Feeder)0				
HISTORICAL RELIABILITY PERFORMANCE				
	2008	2009	2010	
Feeder CI (<i>Cumulative</i>)	15	0	1	
Feeder CMO (<i>Cumulative</i>)	2,955	0	138	

5

6 Benefits

- Replaces 25 years' old direct buried cables that are at risk of failing.
- Upgrades equipment (replace existing old PMH with modern SF6 PMHs).
- 9 Addresses industrial/commercial distribution that has experienced high fault currents
- 10 during failure
- Reconfigures the distribution for the latest THESL standard for operation and
 protection with 1/0 cable with standard fusing
- 13

14 IMPACT OF DEFERRAL

- 15 Deferral of the project will expose the feeder to increased counts of outages due to poor
- 16 performing equipment. Electrical tree tracking will lead to the eventual insulation
- 17 breakdown over time on the existing non-tree retardant XLPE cable. This will result in
- 18 further outages to this feeder and to its customers.
- 19

Portfolio:	Underground
Project Title:	51M22, 51M4 UG rehab off Sheppard & Victoria
	Park Intersection-Civil
Project Number:	22508
Project Year:	2013
Estimate Cost:	\$ 554,108

3 PROJECT DESCRIPTION

4

5 **Objective:**

6 This project is to provide the necessary civil structures when direct buried cables are

7 removed from the feeders and replaced with those enclosed concrete encased ducts.

8

9 Scope:

10 Scope of this project involves design and construction of concrete encased ducts to enable

replacement of direct buried cable on feeder 51M22 and 51M4 with new cables installed

12 in concrete encased ducts in an area bounded by Victoria Park Avenue, Patrick Blvd,

13 Yorkland Road and Yorkland Blvd. This project will then require the installation of

- 14 1,720m of concrete encased duct.
- 15

DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	SHEPPARD & VICTORIA PARK
STATION(S)	LESLIE I TS
FEEDER(S)	NY51M22, NY51M4

16

1 JUSTIFICATION

2

3 **Project Background**

The sub-lateral distribution off Victoria Park Avenue into the Patrick Blvd and Hazelnut 4 5 Crescent is currently not well configured for switching when outages occur and there is need to isolate faulted locations. As a result, the CMO counts have been very high in this 6 area. The distribution area is being reconfigured by this scope package, to improve 7 switching by detaching the cabling that goes along Hazelnut Crescent from the feeder 8 9 NY51M4 and adding it to the feeder NY51M22. This would mean the two existing loops in the area will be combined into a single large loop supplied by NY51M22 on Brian 10 Drive. Cables along the feeders, selected for replacement are aged, mostly XLPE and are 11 direct buried. Direct buried medium voltage XLPE cables pose a heightened risk of 12 failure due to possibility of damage from dig-ins, and insulation deterioration therefore 13 worsening the reliability of the feeder. The aged cables will be replaced in the related 14 15 electrical project so concrete encased ducts would be constructed along the routes in 16 preparation for the replacement cables.

17

18 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Ranking (Worst Feeder)112			
Feeders Experiencing Sustained Interruptions (Worst Feeder)4			
HISTORICAL RELIABILITY PERFORMANCE			
	2008	2009	2010
Feeder CI (<i>Cumulative</i>)	2,784	3,617	9,212
Feeder CMO (<i>Cumulative</i>)	146,174	114,504	199,529

19

20 Benefits

- Provides civil infrastructure in advance for the underground distribution rebuild of in
- 22 the area of the Sheppard Avenue and Victoria Park intersection
- New civil infrastructure being built replaces the aged direct buried setup with new

1	concrete encasements that will provide mechanical protection to the insulation of the
2	new cables preventing puncture damages by dig-ins and deterioration due to backfill
3	pressure and heat.
4	• New concrete encasements will allow easier access to the installed cabling in the
5	event of outages thereby improving response time, and will reduce safety hazards to
6	utility personnel and the surrounding community.
7	
8	IMPACT OF DEFERRAL
9	Deferral of the project will prevent completion of the construction of the concrete duct
10	banks before the new underground cabling is installed and may cause the other project
11	(UG cabling rebuild) to stall exposing the feeder to further outages due to lack of timely
12	replacement of the failing assets. About 7MVA will be lost in an outage on this feeder
13	segment impacting 1500 customers. Deferral of the project exposes it to the risk of

14 encountering conflicts with the work schedules of other utilities in the environment as

15 well as the increased risks of encountering new moratorium constraints imposed by the

16 city administration.

Portfolio:	Underground
Project Title:	UG Lateral Cable & Tx Rehab Bathurst &
rioject little.	Rockford
Project Number:	12449
Project Year:	2013
Estimate Cost:	\$ 553,855

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 To replace XLPE cable with 1/0 Al, 28kV, TRXLPE cable between riser poles and

6 transformer vaults / pads at 9 locations along Bathurst St and Rockford Rd. in order to

7 improve reliability.

8 To replace poor condition transformers in order to improve reliability of a high FESI

9 feeder

10

11 **Scope:**

12 This project involves replacement of poor performing assets in an area bounded by

13 Bathurst St, Carpenter, Stonedene and Rockford. Work requires replacement of 3,000m of

14 primary cable, installation of 30m of concrete encased duct and replacement of 6

15 transformers.

16

DISTRICT	NORTHYORK
DISTRICT NEIGHBOURHOOD	BATHURST-ROCKFORD
STATION(S)	FAIRCHILD I TS
FEEDER(S)	NY80M2

17

18 JUSTIFICATION

FEEDER PERFORMANCE			
Worst Performing Feeder Ranking (Worst Feeder)69			
Feeders Experiencing Sustained Interruptions Count(Worst Feeder)6			
HISTORICAL RELIABILITY PERFORMANCE			
	2008	2009	2010
Feeder CI (<i>Cumulative</i>)	4,228	2,050	7,978
Feeder CMO (<i>Cumulative</i>)	113,919	23,671	327,430

- 2
- 3

4 Benefits

- Modernization of the distribution plant as a result of replacement of poor performing
 cable
- 7 The project reduces the probability of more failures on the feeder with the
- 8 replacement of non-tree-retardant XLPE cable with new TRXLPE cables
- 9 Reduction of customer Minutes Out lost due to improved restoration time achieved
- 10 through the replacement of vault transformers with switchable units
- 11 Improved safety on the feeders as the vaults along the feeder routes will be

12 refurbished and upgraded to the latest THESL standard

13

14 IMPACT OF DEFERRAL

- 15 Deferral of the project will expose the feeder to increased counts of outages due to poor
- 16 performing equipment. Electrical tree tracking will lead to the eventual insulation
- 17 breakdown over time on the existing non-tree retardant XLPE cable. This will result in
- 18 further outages to this feeder and to its customers.
- 19

Portfolio:	Underground
Project Title:	Rebuild UG Trunk NT63M8 M11 McCowan-Civil
Project Number:	21864
Project Year:	2013
Estimate Cost:	\$ 534,025

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to replace the old direct buried 350kcmil with 1000kcmil

6 aluminum cable in concrete encased duct along McCowan Road from McNicoll Avenue

7 to Sandhurst Circle. This project will establish a true feeder tie between NT63M8 and

8 M11 with the upgrading of standard size of cable on feeder main. This part of the project

9 deals with civil work only.

10

11 **Scope:**

12 The scope of work for the project is to design and install civil infrastructure for the

13 replacement of the old direct buried three phase 350kcmil cables along McCowan Road

- 14 from McNicoll Avenue to Sandhurst Circle.
- 15

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	MCCOWAN
STATION(S)	AGINCOURT TS
FEEDER(S)	SCNT63M8, SCNT63M11

16

17 JUSTIFICATION

18

19 Project Background

20 There is a stretch of undersized cable, built direct buried, connecting feeders NT63M8

and M11 running along McCowan Rd from McNicoll Ave to Sandhurst Circle. To bring
the capacity of the feeder mains and to improve the reliability of the feeders and the
system to the THESL standard, THESL proposes this project and its related electrical
project.

5

Early vintage direct buried XLPE cables have been identified as being a poor performing
asset, contributing to system reliability degradation. These cables have been constantly
exposed to neutral and sheath corrosion from the surrounding soil, resulting in corrosion
and damage to the outer neutral conductors as well as contributing to the degradation of
insulation strength.

11

The manufacturing processes employed in these early vintage XLPE cables did not have sufficiently strict quality controls to (a) keep out the impurities from the insulation system or (b) provide reliable sealing of the insulation system to prevent moisture ingress. The steam curing process employed in the manufacture of early vintage XLPE cables also resulted in moisture being trapped in the insulation system. Due to these manufacturing defects, these cables have suffered from high rates of premature failure of insulation.
In addition, due to the nature of the direct buried installation, these assets are susceptible

20 to damage from external dig-ins and movement of surrounding earth. A series of cable,

21 elbow and transformer failures have occurred over the past few years. The purpose of this

22 project is to install the concrete-encased conduits necessary to house the new tree-

23 retardant cross-linked polyethylene ("XLPE"). These new conduits will provide

24 mechanical protection to the cables against external dig-ins and other factors.

25

FEEDER PERFORMANCE				
Worst Performing Feeder Ranking (Worst Feeder)			62	
Feeders Experiencing Sustained Interruptions (Worst Feeder)			5	
HISTORICAL RELIABILITY PERFORMANCE				
	2008	2009	2010	
Feeder CI (<i>Cumulative</i>)	6,986	11,495	227	
Feeder CMO (<i>Cumulative</i>)	211,997	316,597	39,508	

2

3 Benefits

• Replaces aging direct buried cables that are at risk of failing

- Upgrades equipment on one of the worse performing feeders (62th) in the THESL
 system.
- Increses operational flexibility by establishing a true feeder tie between NT63M8 and
 M11
- Increases the capacity of the feeder mains and allows feeder to accommodate future
 load growth
- Reconfigures the distribution for the latest THESL standard for operation and
 protection with 1/0 cable with standard fusing
- 13 Increases long term reliability of the subdivision with the construction of new
- 14 concrete encasements that will provide mechanical protection to the insulation of the
- 15 new cables and prevent puncture damages by dig-ins and deterioration due to backfill
- 16 pressure and heat
- Increased access to cable for installation, repairs, and replacement of cabling in the
 event of outages thereby improving response time, and will reduce safety hazards to
- 19 utility personnel and the surrounding community
- 20
- 21

1 IMPACT OF DEFERRAL

If this project is deferred, the electrical component of this project cannot be executed 2 without the completion of this civil work - either in the same year or electrical in the 3 immediate next year. Deferral of the project will expose the feeder to increased counts of 4 outages due to poor performing equipment. Electrical treeing will lead to the eventual 5 insulation breakdown over time on the existing non-tree retardant XLPE cable. This will 6 result in further outages to this feeder and to its customers. Also, the installation of the 7 cables in direct-buried configurations accelerates deterioration. The deferral of this 8 9 project may result in future customer interruptions due to the potential failure of assets within this area. The direct buried cables in this area will continue to degrade, resulting in 10 potential insulation failure. This will lead to customer dissatisfaction and high reactive 11 costs. Moreover, deferral may also cause this project to be in conflict with projects from 12 other utilities or the newly imposed city moratorium, as THESL has communicated this 13 project to the city and other utilities. 14

Portfolio:	Underground
Project Title:	Replace/upgrade feeder A59H from PILC to
	500kcmil TRXLPE cable
Project Number:	18688
Project Year:	2013
Estimate Cost:	\$ 523,381

5 **PROJECT DESCRIPTION**

6

7 **Objective:**

8 To replace Paper Insulated Lead-Covered (PILC) cable on the trunk of feeder A59H with

9 the standard 500kcmil Tree-Retardant Cross-Linked Polyethylene (TRXLPE) cable and

10 rebuild cable chambers as required.

- 11
- 12 **Scope:**
- 13 This project will enable the replacement and upgrade of approximately 860m of varying
- size PILC cable to 500 kcmil TRXLPE.

DISTRICT	Toronto
DISTRICT NEIGHBOURHOOD	HIGH LEVEL
STATION(S)	HIGH LEVEL TS
FEEDER(S)	А59Н

15

16 JUSTIFICATION

17

18 **Project Background**

19 This project was initiated as per the Lead Cable Replacement Program with a vision to

20 ultimately improve safety and environmental conditions within cable chambers, due

21 mainly to lead and Polychlorinated biphenyl (PCB) exposure.

22 Potential procurement issues associated with a lone North American manufacturer of

PILC cables is also prompting proactive replacement of this cable with readily available 1 TRXLPE cable. 2 A59H is also projected to be overloaded within the next ten years under 1st contingency 3 conditions. Upgrading the existing PILC feeder trunk to 500kcmil TRXLPE will provide 4 5 additional capacity on this feeder. 6 **Benefits** 7 8 • Removal of risk of harmful effects of lead and potential PCB oil exposure 9 Increase capacity for projected load growth and flexibility for load transferring by • 10 upgrading PILC feeder whose trunk sizes are 350kcmil with higher ampacity 500kcmil TRXLPE feeders 11 Address procurement issue associated with a lone North American manufacturer of PILC 12 13 cables 14 **IMPACT OF DEFERRAL** 15 Issues of health and environmental risks will continue for Toronto Hydro workers due 16 17 mainly to potential exposure to PCB's and lead. Feeder is projected to be overloaded within the next ten years. If the lone North American manufacturer stops producing PILC 18 cable, THESL will not only have a sourcing/procurement issue, but will also have a very 19 large volume of PILC cable replacement projects to execute. 20

- 21
- 22

Portfolio:	Underground
Project Title:	NY51M24 UG Rebuild in Subdivision by Don
	Mills & Sheppard Part 2 - Electrical NY51M24
Project Number:	21410
Project Year:	2013
Estimate Cost:	\$ 523,121

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The object of this project is to proactively reduce the probability of a system failure by

6 replacing the aged direct buried cabling of feeder NY51M24 in the subdivision located

7 southwest of the Don Mills Road and Sheppard Avenue intersection.

8

9 Scope:

10 The scope of this project involves replacement of direct buried cable on feeder51M24

11 with 1/0 28kV Insulated STR AL TRXLPE 1-phase cables enclosed in concrete encased

12 ducts in the subdivision bounded by Sheppard Avenue to the north, Shaughnessy

13 Boulevard to the East, Havenbrook Boulevard to the South and Leslie Street to the West.

14 In addition, submersible transformers and cable accessories in the project area will be

15 replaced with new equipments as per current standard.

DISTRICT	North York
DISTRICT NEIGHBOURHOOD	Don Mills Road & Sheppard Avenue East
STATION(S)	Leslie II TS
FEEDER(S)	NY51M24

16

17 JUSTIFICATION

- 18
- 19 **Project Background**

1 This feeder has had seven outages in the last 12 months with primary cable failure as the

2 primary cause. Cable faults are being addressed in this project by replacing aged, direct

3 buried cabling including #1 solid types found at various segments of the feeder. Aged and

- 4 rather unreliable switchgear are already being replaced by two projects in the area in
- 5 2011.
- 6

7 Historical Performance

FEEDER PERFORMANCE					
Worst Performing Feeder Rankin	Worst Performing Feeder Ranking (Worst Feeder)65				
Feeders Experiencing Sustained	Feeders Experiencing Sustained Interruptions (Worst Feeder)8				
HISTORICAL RELIABILITY PERFORMANCE					
2008 2009 2010					
Feeder CI (<i>Cumulative</i>) 5141 4337 6265					
Feeder CMO (<i>Cumulative</i>)	129367	211103	324587		

8

9 Benefits

This scope rejuvenates the local distribution system by replacing hardware on the
 aging distribution system in the section of the subdivision east of Shaughnessy

12 Boulevard.

13 • Improves utility field-staff safety as it eliminates electrical hazards by rehabilitating

- 14 and modernizing transformer vaults along the feeder route in the reference area.
- Improves response times as it upgrades pad-mount switches from manual operation to
 automatic operation .
- Improves feeder reliability by replacing failed cables which had accounted for up to
 83% of the feeder's outages in the last four years.
- Old open type switches are being replaced with sealed SF6 units will reduce

20 equipment footprints in the vaults and on outdoor pads.

• This project improves reliability as it eliminates solid core cabling along the feeder.

23 IMPACT OF DEFERRAL

1 Deferral of this project will increase the likelihood of outages and as over 83% of

- 2 outages on this feeder in the last 12 months and in the last 4 years had been on
- 3 underground cabling that is being focussed on in this project. While this project is being
- 4 deferred, an outage will affect about 400 residential customers. Being a mostly
- 5 underground project, deferral will increase the risk of encountering renewed moratorium
- 6 constraints imposed by the city authorities.

Portfolio:	Underground
Project Title:	Trunk Cable Replacement - The East Mall
Project Number:	13114
Project Year:	2013
Estimate Cost:	\$521,992

1 **PROJECT DESCRIPTION**

2

3 **Objective:**

4 The objective of this project is to replace trunk and lateral cables of feeders ETHL- F2

5 and

6 ETHL- F4 along The East Mall and to replace the transformers within 6 vault locations
7 that have had poor Health Index scores.

8

9 Scope:

10 For feeder HL-F4, THESL plan to replace 1,160m of XLPE cable and refurbish 7 vaults

and 5 cable chambers.For feeder HL-F2, THESL plan to replace 700m of XLPE cable.

12 Cabling work, refurbishment of transformer vaults and cable chambers along the routes

13 will be refurbished as well as the replacement of 21 transformers linked by the feeders.

14 The boundaries for this project are The East Mall, Burnhamthorpe and Formula.

15

DISTRICT	ETOBICOKE
DISTRICT NEIGHBOURHOOD	THE EAST MALL
STATION(S)	BLAKETON
FEEDER(S)	ETHLF2, ETHLF4

16

17 JUSTIFICATION

18

19 Project Background

20 Station egress cables are required to be highly reliable due to its high impact in the event

- 1 of a failure. Furthermore, early vintage XLPE has historically performed poorly.
- 2 Underground lateral supplies to customers are proposed to be replaced with tree
- 3 retartdand cable. Vault transformers in this are are required to be replaced due to poor
- 4 health indeces.
- 5

6 Historical Performance

FEEDER PERFORMANCE					
Worst Performing Feeder Ranki	Worst Performing Feeder Ranking (Worst Feeder)510				
Feeders Experiencing Sustained	Feeders Experiencing Sustained Interruptions Count(Worst Feeder)0				
HISTORICAL RELIABILITY PERFORMANCE					
	2010				
Feeder CI (<i>Cumulative</i>)	264				
Feeder CMO (<i>Cumulative</i>)	0	0	39,989		

7

8 Benefits

9 • The project reduces probability of more failures on the feeder with the replacement of

10 non-tree retardant XLPE cable with new TRXLPE cables per THESL standard

- The project modernizes the local distribution system by replacing feeder assets that
 have approached end-of-life
- 13 Reduction of customer minutes lost due to improved restoration time achieved
- 14 through the replacement of vault transformers with switchable units
- 15 Improved safety on the feeders as the vaults and cable chambers along the feeder
- 16 routes will be refurbished and upgraded to the latest THESL standards

17

18 IMPACT OF DEFERRAL

19 Deferral of this project will result in outages due to the existence of end-of-life, poor

20 performing assets. Electrical water-tree tracking will lead to the eventual total insulation

21 breakdown over time on the existing non-tree retardant XLPE cabling increasing the

- 22 imminence of outages and lead to poor reliability along the routes. This area has started to
- sustain outages during 2010. It is likely that this trend will continue due to the condition

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- 1 and age of the plant in the area.
- 2

Portfolio:	Underground
Project Title:	Scunthorpe - Invergordon H9M26 UG Rebuild 3
	Phase - Electrical
Project Number:	20471
Project Year:	2013
Estimate Cost:	\$ 509,077

- 1
- 2

3 PROJECT DESCRIPTION

4

5 **Objective:**

6 The objective of this project is to replace the old direct-buried 350kcmil primary cables in

7 the area of Scunthrope Rd and Invergordon Ave supplied by feeder NAH9M26. The

8 distribution will be reconfigured to apply THESL standard design and construction. This

9 part of the project deals with electrical work only.

10

11 **Scope:**

12 The scope of work is to install new 3x1000kcmil and 3x1/0 Al cable in the new CE ducts

13 placed by the civil part of the project for the rebuild of the area of Havenview Rd,

14 Invergordon Ave. Work requires replacement of 10,000m of primary cable, 2 overhead

- switches and 2 transformers.
- 16

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	SCUNTHORPE & INVERGORDON
STATION(S)	ELLESMERE TS
FEEDER(S)	SCNAH9M26

17

18 JUSTIFICATION

1 **Project Background**

The distribution in the area was built within a time span of 1982 to 1985 with directburied cables. The distribution experienced a number of cable, elbow and transformer failures in the recent past years. For improving the reliability and bringing the distribution to the latest and modern THESL standard, Asset Management will replace the primary cable with a reconfiguration of the distribution and rebuild the subdivisions with cables in concrete encased duct. The project will address the removal of non-standard single phase PMHs and the old and obsolete VWS interrupter switch.

1 Historical Performance

FEEDER PERFORMANCE					
Worst Performing Feeder Rank	ting (Worst Fee	der)	706		
Feeders Experiencing Sustaine	Feeders Experiencing Sustained Interruptions (Worst Feeder)0				
HISTORICAL RELIABILITY PERFORMANCE					
	2008	2009	2010		
Feeder CI (<i>Cumulative</i>) 120 3,980 0					
Feeder CMO (<i>Cumulative</i>)	16920	157,921	0		

2

3 Benefits

• Replaces 30 year old direct buried cables for the industrial area.

5 • Upgrades equipment (installs 2 SCADAmate switches and one SCADA pad switch)

Reconfigures the distribution for the latest THESL standard for operation and
protection. [smaller loops with 1/0 cable with standard fuse].

• removes the non-standard single phase PMHs and the old and obsolete VWS

9 interrupter switch.

10

11 IMPACT OF DEFERRAL

12 Deferral of this project will prevent Toronto Hydro to proactivaly replace obsolete and

13 poor performing equipment that has caused power outages in the area in the past. It will

14 subject this industrial area to high risk of power failure.

Portfolio:	Underground
Project Title:	UG Rebuild 63M6 Mid Finch Silver Star Bv- Civil
Project Number:	22569
Project Year:	2013
Estimate Cost:	\$ 503,352

1

3 PROJECT DESCRIPTION

4

5 **Objective:**

6 The objective of this project is to replace the old and deteriorated primary cables in the

7 area of Silver Star and Kilcullen Castle Gates. The distribution feeds a number of small

8 industries and commercial units. The distribution is presently supplied by feeder

9 NT63M6. This part of the project deals with civil work only.

10

11 **Scope:**

12 The scope of work is to design and install civil infrastructure for the rebuild of the

13 underground assets in the industrial/commercial area covered by NT64M6: Silver Star

14 Blvd and Kilcullen Castle Gate. This project would then entail the installation of 950m of

- 15 concrete-encased ducts.
- 16

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	SILVER STAR
STATION(S)	AGINCOURT TS
FEEDER(S)	SCNT63M6

17

18 JUSTIFICATION

- 19
- 20 Project Background

The three phase distribution in the area of Silver Star and Kilcullen Castle Gatewas built
in 1981 with direct buried cables. The distribution experienced a number of cable failures
in the recent past years. For improving the reliability and bringing the distribution to the
latest and modern THESL standard, Asset Management will rebuild the subdivisions
(Mid- Finch) with cables in concrete encased duct.

1 Historical Performance

FEEDER PERFORMANCE					
Worst Performing Feeder Rank	ing (Worst Feed	ler)	29		
Feeders Experiencing Sustained	Feeders Experiencing Sustained Interruptions (Worst Feeder)2				
HISTORICAL RELIABILITY PERFORMANCE					
2008 2009 2010					
Feeder CI (<i>Cumulative</i>) 11,613 6,990 2,325					
Feeder CMO (<i>Cumulative</i>)	170,056	33,013	188,397		

2

3 Benefits

• Replaces 32 years' old failing direct buried cables that are at risk of failing.

- 5 Upgrades equipment on one of the worst performing feeders (29th) in the THESL
- 6 system
- Addresses industrial/commercial distribution that has experienced high fault currents
 during failure
- Reconfigures the distribution for the latest THESL standard for operation and
 protection.

11

12 IMPACT OF DEFERRAL

13 Deferral of the project will expose the feeder to increased counts of outages due to poor

14 performing equipment. Electrical treeing will lead to the eventual insulation breakdown

15 over time on the existing non-tree retardant XLPE cable. This will result in further

16 outages to this feeder and to its customers. Also, the installation of the cables in direct-

17 buried configurations accelerates deterioration.

18

19 The deferral of this project may result in future customer interruptions due to the potential

20 failure of assets within this area. The direct buried cables in this area will continue to

- 21 degrade, resulting in potential insulation failure. This will lead to customer dissatisfaction
- 22 and high reactive costs.

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1 PROJECTS \$500K AND OVER FOR 2013

2

SUSTAINING PORTFOLIO – OVERHEAD SYSTEM

3 4

5 **Table 1: Overhead Projects**

Estimate Number	Title	Estimated Cost (\$ Millions)
21484	Markland Woods Rear Lot Voltage Conversion Phase #1 (Civil)	4.7
22033	Rear Lot Rebuild UG R43M23 Clonmore Briar Dale (Civil)	3.8
19977	Convert 4kV Merton Feeder B5MR to 13.8kV System	3.1
19966	Convert Dupont MS 4kV B4DU to 13.8kV	3.0
21185	Thorncrest (#011) Rear Lot Voltage Conversion Phase #5 (Civil)	2.8
20662	Rear Lot #011 Civil Infrastructure Phase #1	2.7
22022	Carlaw 4kV Conversion B1E & B13E (Part of Tie B11E)	2.8
19736	Convert Wiltshire 4kV B6W to 27.6kV	2.5
19984	Convert 4kV Dupont B6DU to 13.8kV	2.4
19976	Convert Dupont B71DU to 13.8kV & Remove B51DU	2.2
18738	Millwood MS: B2MD, Merton MS:B1MR, Partial Voltage Conversion TOB2MD, TOB1MR	2.2
20565	CSP and Conductor Replacement 35M24	2.0
19748	Convert Wiltshire B1W to 13.8kV	2.0
21859	35M11 - Bathurst and Lawrence Rebuild	1.9
20919	B3HW and B5HW Conversion and Transfer to A200E	1.9
20714	Thorncrest (#011) Rear Lot Civil Infrastructure Phase #2	1.8
20721	Pole Replacement and Voltage Conversion Along Renforth	1.8
20369	Convert Junction 4kV B11J to 13.8kV	1.7
21639	Refurbish Overhead Feeder - Epsom Downs	1.6
22151	Carlaw 4kV Conversion B5E	1.6
19462	Convert 4kV Wiltshire MS B3W to 13.8kV System	1.5
22077	35M11 - Lawrence and Brucewood Cres Rebuild	1.4
21190	NY80M4 OH Rebuild (Wires, Transformers, Insulators, Poles) Phase #1	1.4
21785	Overhead Rebuild 51M8 - Leslie TS	1.4
22211	Refurbish Feeder Laterals - Bathurst TS Phase #1	1.3
20773	Churchill/Wynn OH Rehab & Voltage Conversion (SS60-F2 to 80M1)	1.3
20366	Convert Junction 4kV B10J to 13.8kV	1.3
20726	Thorncrest (#011) Rear Lot Electrical Voltage Conversion Phase #1	1.1

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Estimate Number	Title	Estimated Cost (\$ Millions)
21690	Refurbish Overhear Feeder - Falstaff	1.1
20368	Convert Junction 4kV B5J to 13.8kV	1.1
22184	Refurbish Trunk Feeder - Regent & Wilson	1.0
18669	Convert Existing 4kV Wiltshire MS B2W to 13.8kV System	1.0
20567	Voltage Conversation from 4kV to 13.8kV System TOB4CD	1.0
22203	Overhead Rehab NY53M25	1.0
20858	Convert Feeder SCKHF1	1.0
20965	CSP and OH Conductor Replacement	0.9
21113	Refurbish Overhead Feeder 85M23	0.9
21186	Thorncrest (#011) Rear Lot Voltage Conversion (Electrical) Phase #6	0.9
21721	Gosford/Milo Park Voltage Conversion & DB Cable Replacement	0.9
22040	Weston Railway Overhead Rebuild	0.9
22208	Refurbish Feeder Laterals - Feeder 85M10	0.9
21935	Load Transfer (3MVA) A200E to New 13.8kV Feeder	0.9
21193	NY80M4 OH Rebuild (Wires, Transformers, Insulators, Poles) Phase #2	0.9
20808	Rear Lot #011 Phase #2 Electrical Voltage Conversion	0.8
21999	Clayson/Bartor Trunk Feeder Reconfiguration and Rebuild	0.8
20370	FESI CSP Replacements NYSS58F1	0.8
19775	34M6 - CSP Replacement & Tree Proof Conductor Installation	0.8
22178	Feeder Rehab SCNAR43M30	0.8
21211	Thorncrest (#011) Rear Lot Voltage Conversion Phase #3 (Civil/Electrical)	0.7
20385	CSP and Insulator Replacement (YK11M5) Phase #2	0.7
20412	NY55M25 Overhead Feeder Equipment Rehab	0.7
22229	Overhead Rehab SCREF3	0.7
20774	Voltage Conversion KHF2 SCKHF2	0.7
21123	Refurbish Overhead Feeder 85M23 Phase #4	0.6
22180	Elynhill, Ellerslie, Betty Ann, and Park Home OH Rebuild Phase #2	0.6
20260	Rebuild Windfield MS Area with Voltage Conversion 51M21	0.6
19911	Rebuild Area of MS EA and GB with Voltage Conversion	0.6
21118	Refurbish Overhead Feeder 85M23 Phase #2 of 4	0.5
21122	Refurbish Overhead Feeder 85M23 Phase #3 of 4	0.5
21517	Feeder Rehab and CSP Changeout Phase #1	0.5
21213	Thorncrest (#011) Rear Lot Voltage Conversion Civil/Electrical Phase #4	0.5
21920	80M1 Carney Rd Distribution Rehab	0.5

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1		
Estimate Number	Title	Estimated Cost (\$ Millions)
21998	80M1 Clarkhill, Glenborough Park, Ancona Overhead Rebuild	0.5
19505	Convert 4kV Wiltshire MS B5w to 13.8kV System	0.5
20476	Convert Junction 4kV B9J to 13.8kV	0.5
21705	Replacement of Existing 600A Porcelain Switches	0.5
20883	Extend 47M13 on Meadowvale S Voltage Conversion - Electrical SCPJF2	0.5
	Total Cost	92.5

Portfolio:	Overhead
Project Title:	Markland Woods Rear Lot Voltage Conversion Phase #1 (Civil)
Project Number:	21484
Project Year:	2013
Estimate Cost:	\$4,694,313

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

The purpose of this project is to construct the first phase of underground civil infrastructure for
the eventual conversion of the Markland Woods subdivision from overhead, 4 kV, rear lot plant
to underground, front lot, 27.6 kV plant.

8

9 Scope:

10 The scope of work for this project consists of installing civil infrastructure that extends from 11 Burnhamthorpe Road to a new pole that will be installed and runs south along Mill Road, 12 terminating at Toledo Road. The duct bank will then extend eastward along Toledo Road to the ravine green space, Markland Drive and southward to Bloor Street West, where a new 13 14 termination pole will be installed. Accordingly, the proposed routing for the 1000 MCM CU 15 cable trunk will include five concrete foundations for vista switches and twelve transformer 16 padmount foundations. The conversion of side streets including Cosway Court, Aymarn Court, 17 and Clearside Place, and an additional 8 padmount foundations for transformers on these side 18 streets will also be included. 19 20 21

- 22
- 23

DISTRICT	ETOBICOKE
DISTRICT NEIGHBOURHOOD	MARKLAND WOODS
STATION(S)	MILL MS, NEILSON MS
	ETLFF1, ETLFF4, ETBAF4, ETLFF3,
FEEDER(S)	ETBAF1, ETLFF2

2 JUSTIFICATION

3

4 **Project Background**

5 The rear lot plant in the area of Markland Dr. is approximately 50 years old and is approaching 6 end-of-life conditions. The area has been flagged by field staff as a particularly problematic 7 region for lengthy outages and crew safety. There are many cases of direct buried cross-linked 8 polyethylene (XLPE) cable crossings that exist for the sole purpose of transitioning from the 9 backyards on one side of the street to the backyards on the other side. In addition, the 10 transformers are often on the same pole as the riser and these cables have a history of failures 11 that lead to extensive outages. As a result, THESL expects these cables to fail more frequently as 12 they age and the condition of the overhead plant is very poor in this area. 13 14 The typical rear lot safety issues in this neighbourhood are further exacerbated by the presence of non-standard switching equipment such as Positect switches (non-standard, hand-operated load-15 16 break switches) and the visibly rotting and unstable poles accompanied by overgrown vegetation.

- 17 There are several non-standard T-splices in the existing underground plant in the neighbourhood
- 18 that have the propensity to lengthen outages.
- 19

20 Historical Performance

FEEDER PERFORMANCE	
Worst Performing Feeder Ranking (Worst Feeder)	284
Feeders Experiencing Sustained Interruptions Count (Worst Feeder)	3

HISTORICAL RELIABILITY PERFORMANCE			
	2008	2009	2010
Feeder CI (<i>Cumulative</i>)	23	1, 282	152
Feeder CMO (<i>Cumulative</i>)	3,126	146,068	50,347

¹

2 **Benefits**

- 3 Improves power quality as a result of higher primary voltages that has lower line losses and
- 4 higher transmission efficiency.
- 5 Increases reliability due to converting rear-lot fed areas and in turn, improving outage
- 6 duration. Furthermore, replacing aging 4 kV infrastructure, as well as station circuit breakers
- 7 and switchgear, also contributes to improved reliability.
- Enhances customer satisfaction as a result of improved restoration time in the event of
 outages
- Eliminates maintenance and inventory costs that are associated with obsolete and
- 11 discontinued 4 kV distribution equipment
- 12 Improved life-cycle costs
- Enhances safety and improves accessibility of front-lot equipment in the event of an outage
 as opposed to restricted rear-lots
- 15

16 IMPACT OF DEFERRAL

17 If the project is to be deferred, it will result in the increasing probability of relatively high-impact

- 18 outages in these areas. This will significantly decrease reliability in the neighbourhoods and will
- 19 expose THESL crews to the safety risks inherent when restoring power in rear lot area. Finally,
- 20 customers will experience lengthy outages and complaints will gradually worsen while
- 21 maintenance and capital costs will continue to increase as a result of deferring planned work for
- 22 the eventual decommissioning of the MS.
- 23

Portfolio:	Overhead
Project Title:	Rear Lot Rebuild UG R43M23 Clonmore Briar Dale (Civil)
Project Number:	22033
Project Year:	2013
Estimate Cost:	\$ 3,802,570

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to construct the underground civil infrastructure for the conversion

6 of the rear lot area bounded by Clonmore Drive, Briar Dale Drive, Woodland Park Drive, and

7 Fallingbrook Road. It preceds the electrical portion for the eventual rear-lot to front-lot

8 conversion in the area bounded by this project.

9

10 **Scope:**

11 The scope of the project entails installing overhead primary lines from Kingston Road, along

12 Woodland Park Drive to connect with existing overhead on Briar Dale Dr. Subsequently,

13 undergound dips from both Clonmore Drive and Briar Dale Drive will be used to feed the new

14 underground distribution in concrete-encased ductbanks. The general area is bounded by

15 Clonmore Drive, Briar Dale Drive, Woodland Park Drive and Fallingbrook Road. The side

16 streets involved are Elmview, Hunt Club, Ferncroft, Winston and Churchill Dr.

17

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	CLONEMORE
STATION(S)	WARDEN TS
FEEDER(S)	SCNAR43M23

- 18
- 19

20 JUSTIFICATION

2 **Project Background**

3 The area bounded by this project is reaching the end of its servicable life and similar to other rear

4 lot areas, there is difficulty in accessing and repairing these rear-lot fed equipment. There are

5 also old and non-standard assets and feeder configurations that THESL intends to proactively

6 remove from the backyards of customer properties. The rear lot supply have become a source of

7 concern for public and personnel safety. The age of this distribution coupled with the difficulty

8 to access THESL owned equipment is the key driving force for implementing this work.

9

10 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Rankin	g (Worst Feeder)		127
Feeders Experiencing Sustained Interruptions (Worst Feeder)9			9
HISTORICAL RELIABILITY PERFORMANCE			
	2008	2009	2010
Feeder CI (<i>Cumulative</i>)	5,797	532	5,295
Feeder CMO (<i>Cumulative</i>)	535,773	78,146	141,958

11

12 Benefits

- Improved power quality as a result of higher primary voltages that has lower line losses and
 higher transmission efficiency.
- 15 Increased reliability, improving outage duration.

• Enhances customer satisfaction as a result of improved restoration time in the event of

- 17 outages
- 18 Eliminates maintenance and inventory costs that are associated with obsolete and
- 19 discontinued 4 kV distribution equipment
- 20 Improves life-cycle costs
- Enhances safety and improves accessibility of front-lot equipment in the event of an outage

- 1 as opposed to restricted rear-lots
- 2

3 IMPACT OF DEFERRAL

- 4
- 5 If the project is deferred, it will result in the increasing probability of relatively high-impact
- 6 outages in these areas. This will significantly decrease reliability in the neighbourhoods and will
- 7 expose THESL crews to the safety risks inherent when restoring power in rear lot area. Finally,
- 8 customers will experience lengthy outages and complaints will gradually worsen while
- 9 maintenance and capital costs will continue to increase as a result of deferring planned work for
- 10 the eventual decommissioning of the MS.

Portfolio:	Overhead
Project Title:	Convert 4kV Merton Feeder B5MR to 13.8kV System
Project Number:	19977
Project Year:	2013
Estimate Cost:	\$ 3,095,586

3 PROJECT DESCRIPTION

4

5 **Objective:**

The purpose of this project is to completely convert the existing 4kV feeder B5MR, originating
from Merton MS, to 13.8kV. This project is one phase of a multi-phase program beginning in
2012 to convert the entire 4kV load at Merton MS, with the final objective of decommissioning
the station.

10

11 **Scope:**

12 The scope of work for this project is to expand existing 13.8kV feeders A22L and A256DX to

13 replace B5MR. The expansion of these feeders includes approximately 5.03 circuit kilometers of

14 overhead conductor, 165 poles, 18 three-phase transformer, and 35 single-phase transformers.

15 The project area is bounded by Balliol Street in the north, Mount Pleasant Road in the east, St.

16 Clair Avenue East in the south, and Oriole Parkway in the west.

17

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	DAVISVILLE
STATION(S)	MERTON MS
FEEDER(S)	B5MR

18

- 19
- 20

21 JUSTIFICATION

2 **Project Background**

Merton MS was originally built in 1953 and has already been undergoing voltage conversion in
order to address high maintenance costs, obsolete construction standards and deteriorated plant
condition. Once the MS is decommissioned, THESL will then also have available infrastructure
to plan and install future initiatives such as Downtown Contingency.

7

8 Converting 4kV overhead will significantly improve workplace safety for crews by inherently

9 eliminating the associated hazards of multiple circuits going through a typical box construction

10 pole, as well as eliminate the hazards of working in the vicinity of shielded primary cable (cable

11 grounding and positioning below secondary cables).

12

13 Benefits

- Improves the safety of THESL crew workers and the public
- Lowers the risk of failures due to the replacement of 4kV assets past useful life with existing
 standard 13.8kV equipment
- 17 Reduces maintenance costs by removing obsolete 4kV equipment
- Increases capacity with 13.8kV feeders to accommodate residential load creep as well as load
 increase from future emerging businesses in the area
- Reduces system losses when 4kV is upgraded to 13.8kV
- Improves the aesthetics of the street
- 22

23 IMPACT OF DEFERRAL

24 If this project was to be deferred, prolonged safety concerns for field crews related to box

- 25 construction design will continue to persist. Moreover, THESL would also endure higher
- 26 maintenance costs associated with existing obsolete non-standard 4kV equipment, when
- 27 compared to standard overhead 13.8kV equipment. Furthermore, deferral of this work would
- also result in THESL losing the opportunity to complete the multi-phase program started in

- 1 previous years in order to fully decommission Merton MS and acquire valuable infrastructure for
- 2 future initiatives.

Portfolio:	Overhead
Project Title:	Convert Dupont MS 4kV B4DU to 13.8kV
Project Number:	19966
Project Year:	2013
Estimate Cost:	\$2,958,216

3 PROJECT DESCRIPTION

4

5 **Objective:**

6 The purpose of this project is to completely convert the existing 4kV feeder B4DU, originating

7 from Dupont MS, to 13.8kV. This project is one phase of a multi-phase program beginning in

8 2012 to convert the entire 4kV load at Dupont MS, with the final objective of decommissioning

9 the station.

10

11 **Scope:**

12 The scope of work for this project is to expand existing 13.8kV feeder A34W to replace B4DU.

13 The expansion of these feeders includes approximately 4.10 circuit kilometers of overhead

14 conductor, 150 poles and 45 transformer locations. The project area is bounded by Wiltshire

15 Avenue, Bathurst Avenue, St. Clair Avenue West and Dupont Steet.

16

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	DUPONT
STATION(S)	DUPONT MS
FEEDER(S)	B4DU

17

18 JUSTIFICATION

19

20 Project Background

1	Dupont MS was originally built in 1954 and has already been undergoing voltage conversion in
2	order to address high maintenance costs, obsolete construction standards and deteriorated plant
3	condition. Once the MS is decommissioned, THESL will then also have available infrastructure
4	to plan and install future initiatives such as Downtown Contingency.
5	
6	Converting 4kV overhead will significantly improve workplace safety for crews by inherently
7	eliminating the associated hazards of multiple circuits going through a typical box construction
8	pole, as well as eliminate the hazards of working in the vicinity of shielded primary cable (cable
9	grounding and positioning below secondary cables).
10	
11	Benefits
12	• Improves the safety of THESL crew workers and the public
13	• Lowers the risk of failures due to the replacement of 4kV assets past useful life with existing
14	standard 13.8kV equipment
15	• Reduces maintenance costs by removing obsolete 4kV equipment
16	• Increases capacity with 13.8kV feeders to accommodate residential load creep as well as load
17	increase from future emerging businesses in the area
18	• Reduces system losses when 4kV is upgraded to 13.8kV
19	• Improves reliability by remote monitoring and control of the system feeding this location
20	which will reduce restoration time
21	
22	IMPACT OF DEFERRAL
23	If this project were to be deferred, safety concerns and risks regarding the overhead design will
24	still persist and THESL would face the added burden of maintaining obsolete, non-standard $4kV$
25	equipment, relative to the standard 13.8kV overhead system. Moreover, deferral of this project
26	would also increase the risk of equipment-related failures, as a number of the 4kV assets are at or

- 27 approaching useful life.
- 28

Portfolio:	Overhead
Project Title:	Thorncrest (#011) Rear Lot Voltage Conversion Phase #5 (Civil)
Project Number:	21185
Project Year:	2013
Estimate Cost:	\$2,767,738

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 This project is part of a program to upgrade the 4 kV distribution system to 27.6kV, and to

6 remove the rear lot plant in the Thorncrest Village area. The purpose of this project in particular

7 is to construct the fifth phase of underground civil infrastructure to accommodate the conversion.

8

9 Scope:

10 This project entails building civil infrastructure to convert approximately 160 customers fed from

11 the rear lot to front lot underground distribution, utilizing low profile transformers. This civil

12 infrastructure is to rise and terminate on two distinct poles on Kipling Ave. The scope of the

13 work includes the installation of 16 single-phase pad foundations, 56 tap boxes, 8,000m of

14 1-duct trench, and 3900m of 4-duct. The electrical portion of a following project addresses

15 primary and secondary cabling, padmounted transformers and making secondary connection to

- 16 customers.
- 17

DISTRICT	ETOBICOKE
DISTRICT NEIGHBOURHOOD	THORNCREST
STATION(S)	RICHVIEW
FEEDER(S)	ET88M13

18

19 JUSTIFICATION

1 **Project Background**

The Thorncrest Village area is reaching the end of its servicable life and similar to other rear lot areas, there is difficulty in accessing and repairing these rear-lot fed equipment. There are also old and non-standard assets and feeder configurations that THESL intends to proactively remove from the backyards of customer properties. This rear lot supply have become a source of concern for public and personnel safety. The age of this distribution coupled with the difficulty to access THESL owned equipment is one of the key driving force for implementing this work.

8

9 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Ranking (Worst Feeder)			40
Feeders Experiencing Sustained Interruptions Count (Worst Feeder)4			
HISTORICAL RELIABILITY PERFORMANCE			
	2008	2009	2010
Feeder CI (<i>Cumulative</i>)	8,614	10,822	13,822
Feeder CMO (<i>Cumulative</i>)	37,220	92,019	27, 902

10

11 Benefits

12 • Improves power quality as a result of higher primary voltages that has lower line losses and

13 higher transmission efficiency.

14 • Increases reliability, improving outage duration.

15 • Enhances customer satisfaction and improves restoration time in the event of outages

- Eliminates maintenance and inventory costs that are associated with obsolete and
- 17 discontinued 4 kV distribution equipment
- 18 Improves life-cycle costs

• Enhances safety and improves accessibility of front-lot equipment in the event of an outage

20 as opposed to restricted rear-lots

1 IMPACT OF DEFERRAL

2

If the project is to be deferred, it will result in the increasing probability of relatively high-impact outages in these areas. This will significantly decrease reliability in the neighbourhoods and will expose THESL crews to the safety risks inherent when restoring power in rear lot area. Finally, customers will experience lengthy outages and complaints will gradually worsen while maintenance and capital costs will continue to increase as a result of deferring planned work for the eventual decommissioning of MS.

Portfolio:	Overhead
Project Title:	Rear Lot #011 Civil Infrastructure Phase #1
Project Number:	20662
Project Year:	2013
Estimate Cost:	\$2,702,756

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to build civil infrastructure to convert rear lot distribution to front

6 lot underground in the area bounded by Princess Margaret Boulevard, Rathburn Road, Islington

7 Avenue and Kipling Avenue. More specifically, this project is the first phase of civil

8 infrastructure as part of the ongoing voltage and rear-lot conversion initiatives.

9

10 **Scope:**

11 The scope of work for this project is to build civil infrastructure to convert approximately 103

12 customers fed from the rear lot to the front lot underground utilizing low profile transformers.

13 Also, civil ducts are to be built and stubbed out such that it can be continuously linked with the

14 second phase of civil construction relating to the conversion of rear lot to front lot in this area.

15 There will be approximately 10 single-phase pad foundations, 40 tap boxes, 5000m of 1-duct

- 16 trench, and 2500m of four-duct trench.
- 17

DISTRICT	ETOBICOKE
DISTRICT NEIGHBOURHOOD	PRINCESS MARGARET BOULEVARD
STATION(S)	ROSETHORNE MS
FEEDER(S)	SB-F1

18

19 JUSTIFICATION

Toronto Hydro-Electric System Limited EB-2011-0144 Exhibit D1 Tab 13 Schedule 2-2 Filed Sep 30, 2011 Page 19 of 200

1 **Project Background**

The area bounded by this project is reaching the end of its servicable life and similar to other rear lot areas, and there is difficulty in accessing and repairing these rear-lot fed equipment. There are also old and non-standard assets and feeder configurations that THESL intends to proactively remove from the backyards of customer properties. This rear lot supply have become a source of concern for public and personnel safety. The age of this distribution coupled with the difficulty to access THESL owned equipment is one of the key driving force for implementing this work.

8

9 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Ranking (Worst Feeder)			320
Feeders Experiencing Sustained Interruptions Count (Worst Feeder)2			
HISTORICAL RELIABILITY PERFORMANCE			
	2008	2009	2010
Feeder CI (Cumulative)	7	12	990
Feeder CMO (<i>Cumulative</i>)	630	637	27, 299

10

11 Benefits

12 • Improves power quality as a result of higher primary voltages that has lower line losses and

13 higher transmission efficiency.

14 • Increases reliability, improving outage duration.

15 • Enhances customer satisfaction as a result of improved restoration time in the event of

- 16 outages
- Eliminates maintenance and inventory costs that are associated with obsolete and
 discontinued 4 kV distribution equipment
- 19 Improves life-cycle costs
- Enhances safety and improves accessibility of front-lot equipment in the event of an outage
- as opposed to restricted rear-lots

2 IMPACT OF DEFERRAL

- 3 If the project is to be deferred, it will result in the increasing probability of relatively high-impact
- 4 outages in these areas. This will significantly decrease reliability in the neighbourhoods and will
- 5 expose THESL crews to the safety risks inherent when restoring power in rear lot area. Finally,
- 6 customers will experience lengthy outages and complaints will gradually worsen while
- 7 maintenance and capital costs will continue to increase as a result of deferring planned work for
- 8 the eventual decommissioning of MS.

9

Portfolio:	Overhead
Project Title:	Carlaw 4kV Conversion B1E & B13E (Part of Tie B11E)
Project Number:	22022
Project Year:	2013
Estimate Cost:	\$ 2,763,399

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to completely convert the existing 4kV feeders B1E and B13E, and

6 partially convert the existing standby feeder B11E, all originating from Carlaw MS, to 13.8kV.

7 This project is one phase of a multi-phase program that began in 2009 to convert the entire 4kV

8 load at Carlaw MS, with the final objective of decommissioning the station.

9

10 **Scope:**

11 The scope of work for this project is to install a new feeder from Carlaw TS to replace B1E and

12 B13E. The installation of the new 13.8kV feeder includes approximately 4.5 circuit kilometers of

13 overhead conductor, 155 poles, 39 single-phase transformers, and eight three-phase transformers.

14 The project area is bounded by Riverdale Avenue in the north, Prust Avenue in the east, Dundas

15 Street East in the south, and Carlaw Avenue in the west.

16

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	LESLIEVILLE
STATION(S)	CARLAW MS
FEEDER(S)	B1E, B13E, B11E

17

18 JUSTIFICATION

- 19
- 20 Project Background

1	Carlaw MS was originally built in the 1950's and has already been undergoing voltage		
2	conversion in order to address high maintenance costs, obsolete construction standards and		
3	deteriorated plant condition. Once the MS is decommissioned, THESL will then also have		
4	available space and infrastructure within the footprint of Carlaw Station to install new		
5	switchgears to allow for maintenance or capacity upgrades.		
6			
7	Converting 4kV overhead will significantly improve workplace safety for crews by inherently		
8	eliminating the associated hazards of multiple circuits going through a typical box construction		
9	pole, as well as eliminate the hazards of working in the vicinity of shielded primary cable (cable		
10	grounding and positioning below secondary cables).		
11			
12	Benefits		
13	• Improves the safety of THESL crew workers and the public		
14	• Lowers the risk of failures due to the replacement of 4kV assets past useful life with existing		
15	standard 13.8kV equipment		
16	Reduces maintenance costs by removing obsolete 4kV equipment		
17	• Increases capacity with 13.8kV feeders to accommodate residential load creep as well as load		
18	increase from future emerging businesses in the area		
19	• Reduces system losses when 4kV is upgraded to 13.8kV		
20	• Improves the aesthetics of the street		
21			
22	IMPACT OF DEFERRAL		
23	If this project was to be deferred, prolonged safety concerns for field crews related to box		
24	construction design will continue to persist. Moreover, THESL would also endure higher		
25	maintenance costs associated with existing obsolete non-standard 4kV equipment, when		
26	compared to standard overhead 13.8kV equipment. Furthermore, deferral of this work would		

also result in THESL losing the opportunity to complete the multi-phase program started in

- 1 previous years in order to fully decommission Carlaw MS and acquire valuable infrastructure for
- 2 future initiatives.

Portfolio:	Overhead
Project Title:	Convert Wiltshire 4kV B6W to 27.6kV
Project Number:	19736
Project Year:	2013
Estimate Cost:	\$2,530,000

3 PROJECT DESCRIPTION

4

5 **Objective:**

6 The purpose of this project is to completely convert the existing 4kV feeder B6W, originating

7 from Wiltshire MS, to 13.8kV. This project is one phase of a multi-phase program beginning in

8 2013 to convert the entire 4kV load at Wiltshire MS, with the final objective of decommissioning

9 the station.

10

11 **Scope:**

12 The scope of work for this project is to build two new 13.8kV feeders from Wiltshire TS to

13 replace B6W. The expansion of these feeders includes approximately 2.20 circuit kilometres of

14 overhead conductor, 80 poles and 28 transformer locations. The project area is bounded by Mc

15 Roberts Avenue, Gilbert Avenue, Rogers Road and St. Clair Avenue West.

16

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	WILTSHIRE
STATION(S)	WILTSHIRE MS
FEEDER(S)	B6W

- 17
- 18
- 19
- 20

21 JUSTIFICATION

	4	
1		
		•

2 **Project Background**

3 Wiltshire MS was originally built in 1949 and has already been undergoing voltage conversion in

- 4 order to address high maintenance costs, obsolete construction standards and deteriorated plant
- 5 condition. Once the MS is decommissioned, THESL will then also have available infrastructure

6 to plan and install future initiatives such as Downtown Contingency.

- 7
- 8 Converting 4kV overhead will significantly improve workplace safety for crews by inherently
- 9 eliminating the associated hazards of multiple circuits going through a typical box construction
- 10 pole, as well as eliminate the hazards of working in the vicinity of shielded primary cable (cable
- 11 grounding and positioning below secondary cables).
- 12

13 Benefits

- Improves the safety of THESL crew workers and the public
- Lowers the risk of failures due to the replacement of 4kV assets past useful life with existing
 standard 13.8kV equipment
- 17 Reduces maintenance costs by removing obsolete 4kV equipment
- Increases capacity with 13.8kV feeders to accommodate residential load creep as well as load
 increase from future emerging businesses in the area
- Reduces system losses when 4kV is upgraded to 13.8kV
- Improves reliability by remote monitoring and control of the system feeding this location
 which will reduce restoration time
- 23

24 IMPACT OF DEFERRAL

- 25 If this project was to be deferred, prolonged safety concerns for field crews related to box
- 26 construction design will continue to persist. Moreover, THESL would also endure higher
- 27 maintenance costs associated with existing obsolete non-standard 4kV equipment, when
- 28 compared to standard overhead 13.8kV equipment. Furthermore, deferral of this work would

- 1 also result in THESL losing the opportunity to complete the multi-phase program started in
- 2 previous years in order to fully decommission Wiltshire MS and acquire valuable infrastructure
- 3 for future initiatives.

Portfolio:	Overhead
Project Title:	Convert 4kV Dupont B6DU to 13.8kV
Project Number:	19984
Project Year:	2013
Estimate Cost:	\$ 2,433,285

3 PROJECT DESCRIPTION

4

5 **Objective:**

6 The purpose of this project is to convert the existing B6DU from Dupont MS from 4kV to

7 13.8kV. This project is one phase of a multi-phase program beginning in 2012 to convert the

8 entire 4kV load at Dupont MS, with the final objective of decommissioning Dupont MS. This

9 project is one phase of a multi-phase program beginning in 2012 to convert the entire 4kV loads

10 at Dupont MS, with the final objective of decommissioning Dupont MS.

11

12 **Scope:**

13 The scope of the project includes the replacing existing 4kV infrastructure with 13.8kV

14 infrastructure. Use the existing alignment along B6DU for the new 13.8kV feeder. This project

15 will remove 500M of underground cable and 2500M of overhead conductor, 130 poles will be

16 replaced and 37 transformers will be replaced. The boundaries for this project are Winona Drive,

- 17 Dufferin, Saint Clair West and Geary Ave.
- 18

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	ST. CLAIR & DUFFERIN
STATION(S)	DUFFERIN MS
FEEDER(S)	B6DU

- 19
- 20

21 JUSTIFICATION

2 **Project Background**

3 Dupont was originally built in 1954 and has already been undergoing voltage conversion in order

- 4 to address high maintenance costs, obsolete construction standards and deteriorated plant
- 5 condition. The existing 4kV feeders are overhead design and are difficult to maintain, as they are

from an obsolete distribution standard. There are also currently a high number of assets past their
useful life on these feeders.

8

9 Converting 4kV overhead will significantly improve workplace safety for crews by inherently

10 eliminating the associated hazards of multiple circuits going through a typical box construction

11 pole, as well as eliminate the hazards of working in the vicinity of shielded primary cable (cable

12 grounding and positioning below secondary cables). In addition, the project needs to be carried

13 out to accommodate residential "load creep" as well as load increase from future emerging

14 businesses in the area.

15

16 Benefits

- 17 Improves the safety of THESL crew workers and the public
- 18 Reduces of maintenance costs by removing obsolete 4kV equipment
- Lowers risk of failures due to the replacement of 4kV assets past useful life with existing
 standard 13.8kV equipment
- Increases capacity with 13.8kV feeders to accommodate residential load creep as well as load
 increase from future emerging businesses in the area
- Improves the aesthetics of the street
- Reduces system losses when 4kV is upgraded to 13.8kV

25

26

27

28 IMPACT OF DEFERRAL

- 1 Deferral of this project will prolong the safety concerns for field crews related to box
- 2 construction design. The risk of equipment failure will be high due to the presence of number of
- 3 assets past their useful life. Deferral of this project will also result in high maintenance costs
- 4 associated with existing obsolete non-standard 4kV equipment, when compared to standard
- 5 13.8kV equipment.

Portfolio:	Overhead
Project Title:	Convert 4kV Dupont B7DU to 13.8kV
Project Number:	19976
Project Year:	2013
Estimate Cost:	\$ 2,217,170

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to convert the existing B7DU from Dupont station from 4kV to

6 13.8kV. This project is one phase of a multi-phase program beginning in 2012 to convert the

7 entire 4kV load at Dupont MS, with the final objective of decommissioning Dupont MS.

8

9 Scope:

10 This scope includes the replacement of existing 4kV infrastructure with 13.8kV infrastructure.

11 This project will replace 2,770m of underground cable and 4,030m of overhead conductor, 145

12 poles will be replaced and 38 transformers will be replaced.

13

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	ST. CLAIR & BATHURST
STATION(S)	DUFFERIN MS
FEEDER(S)	B7DU

14

15 JUSTIFICATION

16

17 **Project Background**

18 Dupont was originally built in 1954 and has already been undergoing voltage conversion in order

- 19 to address high maintenance costs, obsolete construction standards and deteriorated plant
- 20 condition. The existing 4kV feeders are overhead design and are difficult to maintain, as they are

1	from an obsolete distribution standard. There are currently a high number of assets past their
2	useful life on these feeders. When 50% of assets in a specific asset class are expected to fail,
3	assets are considered past their useful life.
4	
5	Converting 4kV overhead will significantly improve workplace safety for crews by inherently
6	eliminating the associated hazards of multiple circuits going through a typical box construction
7	pole, as well as eliminate the hazards of working in the vicinity of shielded primary cable (cable
8	grounding and positioning below secondary cables).
9	
10	In addition, the project needs to be carried out to accommodate residential load creep as well as
11	load increase from future emerging businesses in the area.
12	
13	Benefits
14	• Improves the safety of THESL crew workers and the public
15	• Reduced maintenance costs by removing obsolete 4kV equipment
16	• Lowers risk of failures due to the replacement of 4kV assets past useful life with existing
17	standard 13.8kV equipment
18	• Increased capacity with 13.8kV feeders to accommodate residential load creep as well as
19	load increase from future emerging businesses in the area
20	• Improves in the aesthetics of the street
21	Reduced system losses
22	
23	IMPACT OF DEFERRAL
24	If this project was to be deferred, prolonged safety concerns for field crews related to box
25	construction design will continue to persist. Moreover, THESL would also endure higher
26	maintenance costs associated with existing obsolete non-standard 4kV equipment, when
27	compared to standard overhead 13.8kV equipment. Furthermore, deferral of this work would

also result in THESL losing the opportunity to complete the multi-phase program started in

- 1 previous years in order to fully decommission Dupont MS and acquire valuable infrastructure for
- 2 future initiatives.

Portfolio:	Overhead
Project Title:	Millwood MS: B2MD, Merton MS:B1MR, Partial Voltage
rioject mie:	Conversion TOB2MD, TOB1MR
Project Number:	18738
Project Year:	2013
Estimate Cost:	\$ 2,266,017

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to completely convert the existing 4kV feeders B2MD and B1MR,

6 originating from Millwood MS and Merton MS respectively, to 13.8kV. This project is one

7 phase of a multi-phase program beginning in 2012 to convert the entire 4kV load at Merton MS

8 and Millwood MS, with the final objective of decommissioning both stations.

9

10 **Scope:**

11 The scope of work for this project is to expand the existing 13.8kV feeder A21L to replace

12 B2MD and B1MR. The expansion of this feeder includes approximately 5.40 circuit kilometers

13 of overhead conductor, 136 poles, and 19 overhead transformers. The project area is bounded by

14 Manor Road East in the north, Bayview Avenue in the east, Belsize Drive in the south, and

- 15 Mount Pleasant Road in the west.
- 16

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	DAVISVILLE
STATION(S)	MERTON MS, MILLWOOD MS
FEEDER(S)	B2MD, B1MR

- 17
- 18

19 JUSTIFICATION

2 **Project Background**

Merton MS and Millwood MS were both originally built in the 1950's and have already been
undergoing voltage conversion in order to address high maintenance costs, obsolete construction
standards and deteriorated plant condition. Once either MS is decommissioned, THESL will then

6 also have available infrastructure to plan and install future initiatives such as Downtown

7 Contingency.

8

9 In addition, the existing feeders B2MD and B1MR from Millwood MS and Merton MS are of

10 overhead design, which is no longer the distribution standard. Converting 4kV overhead will

11 significantly improve workplace safety for crews by inherently eliminating the associated

12 hazards of multiple circuits going through a typical box construction pole, as well as eliminate

13 the hazards of working in the vicinity of shielded primary cable (cable grounding and positioning

14 below secondary cables).

15

16 Benefits

- 17 Improves the safety of THESL crew workers and the public
- Lowers the risk of failures due to the replacement of 4kV assets past useful life with existing
 standard 13.8kV equipment
- Reduces maintenance costs by removing obsolete 4kV equipment
- Increases capacity with 13.8kV feeders to accommodate residential load creep as well as load
 increase from future emerging businesses in the area
- Reduces system losses when 4kV is upgraded to 13.8kV
- Improves the aesthetics of the street

25

26

27

28 IMPACT OF DEFERRAL

If this project was to be deferred, prolonged safety concerns for field crews related to box construction design will continue to persist. Moreover, THESL would also endure higher maintenance costs associated with existing obsolete non-standard 4kV equipment, when compared to standard overhead 13.8kV equipment. Furthermore, deferral of this work would also result in THESL losing the opportunity to complete the multi-phase program started in previous years in order to fully decommission Merton and Millwood MS and acquire valuable infrastructure for future initiatives.

Portfolio:	Overhead
Project Title:	CSP and Conductor Replacement 35M24
Project Number:	20565
Project Year:	2013
Estimate Cost:	\$2,016,296

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to replace non-standard CSP transformers, glass insulators,

6 arrestors and rebuild feeder 35M24 overhead primary distribution with tree proof conductor in

7 order to improve reliability.

8

9 Scope:

10 The scope of work for this project is to replace 127 CSP transformers, as well as glass insulators

11 and arrestors. Also, due to end of life conditions, spot replacement of poles will be undertaken.

12 The boundaries for this project are Dufflaw Road, Culford Road, Falstaff Avenue and Lawrence

13 Avenue

14

DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	LAWRENCE AVENUE
STATION(S)	FAIRBANKS II TS
FEEDER(S)	NY35M24

15

- 16
- 17

18

19

20 JUSTIFICATION

2 **Project Background**

3 Feeder 35M24 has sustained nine interruptions during the past year. The area is primarily

- 4 comprised of non-standard poor performing assets such as CSP transformers, glass insulators,
- 5 arrestors, and switches. As obsolete equipment, such as porcelain insulators and arrestors, ages it
- 6 becomes more contaminated. As such, efforts are required to replace these assets in order to
- 7 improve reliability. Furthermore, spot pole replacement is required. Aging poles with reduced
- 8 strength not only impact reliability, but can also pose a serious public safety hazard. During the
- 9 past ten years, this feeder has sustained 40 outages due to overhead defective equipment.
- 10 Furthermore, 20 of these outages were caused by transformer failures.
- 11

12 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Ranking (Worst Feeder)		150	
Feeders Experiencing Sustained Interruptions Count (Worst Feeder)			9
HISTORICAL RELIABILITY PERFORMANCE			
	2008	2009	2010
Feeder CI (<i>Cumulative</i>)	252	3,944	3,283
Feeder CMO (<i>Cumulative</i>)	152,028	105,183	145,557

13

14 **Benefits**

- Improves feeder reliability through the installation of animal guards and would reduce faults
 resulting from foreign interference
- Modernizes the system by replacing non-standard transformers to improve restoration times
 after fault events
- Would reduce outage durations and reverse SAIDI trends that have been worsening over the
- 20 past few years
- Increases customer satisfaction due to reduced outage incidents

- Enhances safety to the public and utility personnel by replacing non-standard equipment
 such as porcelain insulators and arrestors that can fail catastrophically (i.e. cracking,
 fragmenting)
 Reduces the number of stressed assets by improving grid operating conditions
- 5

6 IMPACT OF DEFERRAL

7 If this project were to be deferred, utility personnel and approximately 2,000 customers will be

8 negatively impacted due to increased exposure to safety hazards associated with this feeder.

9 Moreover, deferral of this work would also have a significant impact of feeder reliability.

10 Customers will also continue to experience poor reliability, as the number of outage events will

11 increase. Deferral of this project would also increase the likelihood of assets failing, in

12 particular, glass insulators and lightning arrestors caused by insulation breakdown. Lastly,

13 customer satisfaction would also be negatively impacted if this project were deferred due to

14 excessive overhead related outages on this feeder.

Portfolio:	Overhead
Project Title:	Convert Wiltshire B1W to 13.8kV
Project Number:	19748
Project Year:	2013
Estimate Cost:	\$2,011,523

3 PROJECT DESCRIPTION

4

5 **Objective:**

6 The purpose of this project is to completely convert the existing 4kV feeder B1W, originating

7 from Wiltshire MS, to 13.8kV. This project is one phase of a multi-phase program beginning in

8 2013 to convert the entire 4kV load at Wiltshire MS, with the final objective of decommissioning

9 the station.

10

11 **Scope:**

12 The scope of work for this project is to build two new 13.8kV feeders from Wiltshire TS to

13 replace B1W. The expansion of these feeders includes approximately 2.16 circuit kilometres of

14 overhead conductor, 86 poles and 24 transformer locations. The project area is bounded by

15 Wiltshire Avenue, Osler Street, St. Clair Avenue West and Adrian Avenue.

16

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	WILTSHIRE
STATION(S)	WILTSHIRE MS
FEEDER(S)	B1W

- 17
- 18
- 19
- 20

21 JUSTIFICATION

	4	Ĺ
1		

2 **Project Background**

3 Wiltshire MS was originally built in 1949 and has already been undergoing voltage conversion in

- 4 order to address high maintenance costs, obsolete construction standards and deteriorated plant
- 5 condition. Once the MS is decommissioned, THESL will then also have available infrastructure

6 to plan and install future initiatives such as Downtown Contingency.

- 7
- 8 Converting 4kV overhead will significantly improve workplace safety for crews by inherently
- 9 eliminating the associated hazards of multiple circuits going through a typical box construction
- 10 pole, as well as eliminate the hazards of working in the vicinity of shielded primary cable (cable
- 11 grounding and positioning below secondary cables).
- 12

13 Benefits

- Improves the safety of THESL crew workers and the public
- Lowers the risk of failures due to the replacement of 4kV assets past useful life with existing
 standard 13.8kV equipment
- 17 Reduces maintenance costs by removing obsolete 4kV equipment
- Increases capacity with 13.8kV feeders to accommodate residential load creep as well as load
 increase from future emerging businesses in the area
- Reduces system losses when 4kV is upgraded to 13.8kV
- Improves reliability by remote monitoring and control of the system feeding this location
 which will reduce restoration time
- 23

24 IMPACT OF DEFERRAL

- 25 If this project was to be deferred, prolonged safety concerns for field crews related to box
- 26 construction design will continue to persist. Moreover, THESL would also endure higher
- 27 maintenance costs associated with existing obsolete non-standard 4kV equipment, when
- 28 compared to standard overhead 13.8kV equipment. Furthermore, deferral of this work would

- 1 also result in THESL losing the opportunity to complete the multi-phase program started in
- 2 previous years in order to fully decommission Wiltshire MS and acquire valuable infrastructure
- 3 for future initiatives.

Portfolio:	Overhead
Project Title:	35M11 - Bathurst and Lawrence Rebuild
Project Number:	21859
Project Year:	2013
Estimate Cost:	\$ 1,918,534

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to replace non-standard CSP transformers, glass insulators,

6 arrestors and rebuild end of life assets on feeder 35M11 in order to improve reliability. This

7 project is one part of four related projects to rehabilitate this feeder.

8

9 Scope:

10 The scope of work for this project is to replace 60 poles, as well as non-standard glass insulators

11 and arrestors, as well as 1,500 meters of overhead conductor. The rebuild boundaries for this

12 project is primarily along Bathurst Street near Lawrence Avenue.

13

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	BATHURST & LAWRENCE
STATION(S)	FAIRBANK TS
FEEDER(S)	NY35M11

14

15 JUSTIFICATION

16

17 **Project Background**

- 18 Failures on 35M11 are usually attributable to overhead equipment failures and contacts by
- animals. The primary overhead distribution plant on 35M11 requires short-term targeted

rehabilitation in order to address reliability concerns. Furthermore, the poles are in poor
 condition.

3

4 Feeder 35M11 has sustained four interruptions during the past year. The area is primarily 5 comprised of non-standard poor performing assets such as CSP transformers, glass insulators, 6 arrestors, and switches. As obsolete equipment, such as porcelain insulators and arrestors, ages it 7 becomes more contaminated. As such, efforts are required to replace these assets in order to 8 improve reliability. Furthermore, pole replacement is required. Aging poles with reduced 9 strength not only impact reliability, but can also pose a serious public safety hazard. During 10 2010, this feeder experienced over 2,000,000 customer minutes out and over 20,000 customer 11 interruptions. There has been a growing trend in CSP transformer failures in this project area 12 and with the non-standard equipment such as porcelain insulators, arrestors and switches.

13

14 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Ranking (Worst Feeder)91			91
Feeders Experiencing Sustained Interruptions (Worst Feeder)			4
HISTORICAL RELIABILITY PERFORMANCE			
	2008 2009 20		2010
Feeder CI (Cumulative)	10,442	10,185	23,053
Feeder CMO (<i>Cumulative</i>)	56,619	45,908	2,071,789

15

16 **Benefits**

- Improves feeder reliability through the installation of animal guards and would reduce faults
 resulting from foreign interference
- 19 Modernizes the system by replacing non-standard transformers to improve restoration times
- 20 after fault events
- Reduced outage durations and reverse SAIDI trends that have been worsening over the past

1 few years

2 • Increases customer satisfaction due to reduced outage incidents

• Enhances safety to the public and utility personnel by replacing non-standard equipment such

4 as porcelain insulators and arrestors that can fail catastrophically (i.e. cracking, fragmenting)

5 • Reduces the number of stressed assets by improving grid operating conditions

6

7 IMPACT OF DEFERRAL

8 If this project were to be deferred, utility personnel and approximately 400 customers will be

9 negatively impacted due to increased exposure to safety hazards associated with this feeder.

10 Moreover, deferral of this work would also delay necessary interventions on the feeder that have a

11 significant impact of feeder reliability, especially poles that are at risk of cracking, feathering on

12 the poletop, breakage or loss of strength. This could also result in collateral damage, in the event

13 of an outage situation.

14

Moreover, customers will also continue to experience poor reliability, as the number of outage events will increase. Deferral of this project would also increase the likelihood of assets failing, in particular, glass insulators and lightning arrestors caused by insulation breakdown. Lastly, customer satisfaction would also be negatively impacted if this project were deferred due to excessive overhead related outages on this feeder.

Portfolio:	Overhead
Project Title:	B3HW and B5HW Conversion and Transfer to A200E
Project Number:	20919
Project Year:	2013
Estimate Cost:	\$ 1,900,000

3 PROJECT DESCRIPTION

4

5 **Objective:**

The purpose of this project is to convert the remaining portions of existing 4kV feeders B3HW
and B5HW, originating from Hazelwood MS to 13.8kV. This project is one phase of a multi-

8 phase program that began in 2009 to convert the entire 4kV load at Hazelwood MS, with the

9 final objective of decommissioning the station.

10

11 **Scope:**

12 The scope of work for this project is to temporarily expand existing 13.8kV feeder A200E to

13 replace B3HW and B5HW. An additional project will then relieve feeder A200E of the

14 additional B3HW and B5HW load, and transfer it onto a new 13.8kV feeder. The expansion of

15 the existing feeder A200E includes approximately 3.40 circuit kilometers of overhead conductor,

16 127 poles, 39 single-phase transformers, and six three-phase transformers. The project area is

17 bounded by Danforth Avenue in the north, Coxwell Avenue in the east, Felsted Avenue in the

- 18 south, and Jones Avenue in the west.
- 19

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	LESLIEVILLE
STATION(S)	HAZELWOOD MS
FEEDER(S)	B3HW, B5HW

20

21 JUSTIFICATION

1	

2 **Project Background**

- 3 The transformers in service at Hazelwood MS are approaching end of life and some have been in
- 4 service for over 50 years. In order to avoid replacing the transformers at Hazelwood MS, an
- 5 initiative to decommission the entire MS and convert all feeders to 13.8kV was created.
- 6 Inspections and maintenance reports on the existing transformers at Hazelwood MS show that
- 7 they require replacement no later than 2013.
- 8
- 9 Several Hazelwood 4kV feeders have already been converted and only three remain. This project

10 to convert and decommission B3HW and B5HW is one of two projects created to convert the

11 remaining feeders and once complete Hazelwood MS can be decommissioned.

12

13 Converting 4kV overhead will significantly improve workplace safety for crews by inherently

14 eliminating the associated hazards of multiple circuits going through a typical box construction

- 15 pole, as well as eliminate the hazards of working in the vicinity of shielded primary cable (cable
- 16 grounding and positioning below secondary cables).
- 17

18 Benefits

- 19 Improves the safety of THESL crew workers and the public
- Lowers the risk of failures due to the replacement of 4kV assets past useful life with existing
- 21 standard 13.8kV equipment
- 22 Reduces maintenance costs by removing obsolete 4kV equipment
- Increases capacity with 13.8kV feeders to accommodate residential load creep as well as load
 increase from future emerging businesses in the area
- Reduces system losses when 4kV is upgraded to 13.8kV
- Improves the aesthetics of the street

27

28 IMPACT OF DEFERRAL

- 1 Prolonged safety concerns for field crews related to box construction design will continue to
- 2 persist. THESL would also endure higher maintenance costs associated with existing obsolete
- 3 non-standard 4kV equipment, when compared to standard overhead 13.8kV equipment.
- 4 In addition, deferring this project will require THESL to purchase new power transformers for
- 5 Hazelwood MS, as they have reached end of life.

Portfolio:	Overhead
Project Title:	Thorncrest (#011) Rear Lot Civil Infrastructure Phase #2
Project Number:	20714
Project Year:	2013
Estimate Cost:	\$1,853,256
	oject is to build civil infrastructure to convert rear lot distribution to front area bounded by Princess Margaret to the north and Rathburn to the south Kipling Ave.
-	this project is to install 8 single-phase pads, 30 tap boxes and 5 duct ucture will be built to convert approximately 85 customers.
DISTRICT	acture will be built to convert approximately 65 customers.

DISTRICT	ETOBICOKE
DISTRICT NEIGHBOURHOOD	PRINCESS MARGARET BOULEVARD
STATION(S)	LONGFIELD MS
FEEDER(S)	BHF2

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14 JUSTIFICATION

15

16 Project Background

17 THES intends to proactively remove the distribution system from the rear lots of customer

18 properties. These rear lot feeders have become a source of concern for public and personnel

19 safety. The age and difficulty of accessing THESL owned equipment are key drivers for

20 implementing this work. The assets bounded by this scope are over 40 years old and have

1 approached end-of-life conditions. Due to crew access limitations, outages are typically much

2 longer than normal. This area is proposed to be designed using the option of underground pad

- 3 mounted low-profile transformers with primary and secondary underground, except for areas
- 4 where 27.6kV can be maintained overhead.
- 5

6 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Ranking (Worst Feeder)			310
Feeders Experiencing Sustained Interruptions Count (Worst Feeder)			1
HISTORICAL RELIABILITY PERFORMANCE			
	2010		
Feeder CI (Cumulative)	358	0	64
Feeder CMO (<i>Cumulative</i>)	7,732	0	5,600

7

8 Benefits

- 9 Higher primary voltage will have lower line losses and higher transmission efficiency
- Replacing aging 4kV infrastructure and converting to a higher voltage will provide more
 reliability due to new equipment
- 12 Helps remove obsolete breaker and switchgear equipment in the MS station
- Converting the rear lot areas will improve reliability (particularly outage duration)
- Reduce inventory and maintenance costs related to maintaining obsolete 4 kV distribution
 equipment and stations
- Quick access to the equipment in the event of the outage

17

18 IMPACT OF DEFERRAL

- 19 The lack of access presents safety hazards to crews during emergency outage situations.
- 20 A failure to keep up with required rear lot renewal will result in the increasing probability of
- 21 relatively high-impact outages in these areas. This will significantly decrease reliability in the

- 1 neighbourhoods and will expose THESL crews to the safety risks inherent when restoring power
- 2 in rear lot areas.

Portfolio:	Overhead
Project Title:	Pole Replacement and Voltage Conversion Along Renforth
Project Number:	20721
Project Year:	2013
Estimate Cost:	\$ 1,866,123

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to partially convert 4kV customers from feeders BA-F3 and KK-F4

6 from Neilson Drive MS and Burnhamthorpe MS respectively. Also an objective is to replace

7 end-of-life poles on Renforth Drive (from Burnhamthorpe to just north of Bloor).

8

9 Scope:

10 The scope of this project includes the replacement of 30 of 35 poles along Renforth Drive. It also

11 includes the conversation of 4 kV load on feeder BA-F3 and feeder KK-F4 onto feeder 88M11.

12 The project includes the replacement of 145 poles, 100 spans of overhead primary conductor,

13 148 spans of secondary conductor and 29 transformers. Also, in order to maintain contingency

14 on the surrounding 4 kV feeders, a new tie point will be proposed between feeders KK-F4 and

15 KK-F3. The area bounded by this project is West Mall, Saturn Road, Burnhamthorpe Road and

- 16 Bloor Street.
- 17

DISTRICT	ETOBICOKE
DISTRICT NEIGHBOURHOOD	RENFORTH- BURNHAMTHORPE
STATION(S)	RICHVIEW
FEEDER(S)	ET88M11

18

19 JUSTIFICATION

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1 **Project Background**

2 Originally, Neilson Drive MS and Burnhamthorpe MS were built in the 1950's to 1960's and has

3 already been undergoing voltage conversion in order to address high maintenance costs, obsolete

4 construction standards and deteriorated plant condition. This project is intended to replace end of

- 5 life 4kV and 27.6 kV plant. In order to replace the poor performing high impact trunk portion of
- 6 the feeder along Renforth Drive, the 4kV laterals supplied by this portion is required to be
- 7 replaced as well. This feeder is one of the worst performing feeders. In addition, the project
- 8 needs to be carried out to accommodate residential load creep as well as load increase from
- 9 future emerging businesses in the area.
- 10

11 Historical Performance

FEEDER PERFORMANCE Worst Performing Feeder Ranking	g (Worst Feeder)		50
Feeders Experiencing Sustained In	*	· · ·	1
	2008	2009	2010
Feeder CI (<i>Cumulative</i>)	2008 1,726	2009 2,996	2010 12,909

12

13 Benefits

Modernizes the distribution plant as a result of replacement of end-of-life assets resulting in
 improvement to feeder reliability (both outage duration and frequency)

- Eliminates electrical and fall hazards as a result of pole replacement
- 17 Minimizes line losses by removing the 4 kV plant
- Reduces probability of further outages by upgrading sizes of transformers at overloaded sites
 and replacing poor performing transformer types
- Replaces poor performing non-standard assets.
- Reduces of maintenance costs by removing obsolete 4kV equipment

- Lowers risk of failures due to the replacement of 4kV assets past useful life with existing
- 2 standard 27.6kV equipment
- Increases capacity with 27.6kV feeders to accommodate residential load creep as well as load
 increase from future emerging businesses in the area
- 5 Improves in the aesthetics of the street
- 6

7 IMPACT OF DEFERRAL

- 8 Deferral would likely result in continued deterioration of the plant. This will result in continued
- 9 worsening reliability since the assets bounded by this project have already approached end-of-
- 10 life conditions. Moreover, THESL would also endure higher maintenance costs associated with
- 11 existing obsolete non-standard 4kV equipment, when compared to standard overhead 27.6kV

12 equipment.

Portfolio:	Overhead
Project Title:	Convert Junction 4kV B11J to 13.8kV
Project Number:	20369
Project Year:	2013
Estimate Cost:	\$1,745,107

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to completely convert the existing 4kV feeder B11J, originating
6 from Junction MS, to 13.8kV. This project is one phase of a multi-phase program beginning in

7 2012 to convert the entire 4kV load at Junction MS, with the final objective of decommissioning

8 the station.

9

10 **Scope:**

11 The scope of work for this project is to expand existing 13.8kV feeder A530DN to replace B11J.

12 The expansion of these feeders includes approximately 2.60 km of overhead conductor, 111

13 poles and 33 transformer locations. The project area is bounded by Lansdowne Avenue, Osler

14 Street, Ruskin Avenue and Davenport Avenue.

15

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	JUNCTION
STATION(S)	JUNCTION MS
FEEDER(S)	B11J

- 16
- 17
- 18
- 19

20 JUSTIFICATION

1
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2 **Project Background**

3 Junction MS was originally built in 1929 and has already been undergoing voltage conversion in

4 order to address high maintenance costs, obsolete construction standards and deteriorated plant

5 condition. Once the MS is decommissioned, THESL will then also have available infrastructure

6 to plan and install future initiatives such as Downtown Contingency.

7

8 Converting 4kV overhead will significantly improve workplace safety for crews by inherently

9 eliminating the associated hazards of multiple circuits going through a typical box construction

10 pole, as well as eliminate the hazards of working in the vicinity of shielded primary cable (cable

11 grounding and positioning below secondary cables).

12

13 Benefits

- Improves the safety of THESL crew workers and the public
- Lowers the risk of failures due to the replacement of 4kV assets past useful life with existing
 standard 13.8kV equipment
- 17 Reduces maintenance costs by removing obsolete 4kV equipment
- Increases capacity with 13.8kV feeders to accommodate residential load creep as well as load
 increase from future emerging businesses in the area
- Reduces system losses when 4kV is upgraded to 13.8kV
- Improves reliability by remote monitoring and control of the system feeding this location
 which will reduce restoration time
- 23

24 IMPACT OF DEFERRAL

25 If this project was to be deferred, prolonged safety concerns for field crews related to box

26 construction design will continue to persist. Moreover, THESL would also endure higher

27 maintenance costs associated with existing obsolete non-standard 4kV equipment, when

28 compared to standard overhead 13.8kV equipment. Furthermore, deferral of this work would

- 1 also result in THESL losing the opportunity to complete the multi-phase program started in
- 2 previous years in order to fully decommission Junction MS and acquire valuable infrastructure
- 3 for future initiatives.
- 4
- 5
- 6

Portfolio:	Overhead
Project Title:	Refurbish Overhead Feeder - Epsom Downs
Project Number:	21639
Project Year:	2013
Estimate Cost:	\$1,647,640

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The objective of this project is to rebuild / replace the aging and/or non standard primary

6 overhead distribution equipment on feeder 55M28 in order to improve reliability and replace the

7 XLPE lateral services with tree retardant cable to improve reliability. This project is one part of

8 seven related projects to rehabilitate this feeder.

9

10 **Scope:**

11 The scope of work for this project is to replace 157 poles, 1,500 meters of overhead conductor,

12 and 42 non-standard transformers. Also, poor performing assets such as non-standard glass

13 insulators and arrestors will be replaced as well. In addition, undersized primary overhead

14 conductor will be replaced to standard size. In areas where underground laterals are serviced

15 with early vintage XLPE cable, it will be replaced with standard tree retardant cable.

16 The boundaries of this project are Calais, Jane, Wilson and Richard Clark.

17

DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	EPSOM DOWNS
STATION(S)	FINCH II TS
FEEDER(S)	NY55M28

18

19 JUSTIFICATION

1 **Project Background**

2 Feeder 55M28 has sustained five interruptions during the past year. The area is primarily 3 comprised of non-standard poor performing assets such as CSP (completetely self protected) 4 transformers, glass insulators, arrestors, and switches. As obsolete equipment, such as porcelain 5 insulators and arrestors, ages it becomes more contaminated. As such, efforts are required to 6 replace these assets in order to improve reliability. Furthermore, spot pole replacement is 7 required. Aging poles with reduced strength not only impact reliability, but can also pose a 8 8 serious public safety hazard. During 2010 this feeder has experienced over 7,000 customer 9 interruptions as well as over 240,000 customer minutes out. As a result, this feeder is now ranked

- 10 86th in the worst performing feeder list.
- 11

12 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Ranking (Worst Feeder)			86
Feeders Experiencing Sustained Interruptions Count (Worst Feeder)			5
HISTORICAL RELIABILITY PERFORMANCE			
	2008	2009	2010
Feeder CI (<i>Cumulative</i>)	13,745	72	7,706
Feeder CMO (<i>Cumulative</i>)	340,712	40,572	240,636

13

14

15 Benefits

- Improves feeder reliability through the installation of animal guards and would reduce faults
- 17 resulting from foreign interference
- Modernizes the system by replacing non-standard transformers to improve restoration times
 after fault events
- Would reduce outage durations and reverse SAIDI trends that have been worsening over the
- 21 past few years

- 1 Increases customer satisfaction due to reduced outage incidents
- 2 Enhances safety to the public and utility personnel by replacing non-standard equipment
- 3 such as porcelain insulators and arrestors that can fail catastrophically (i.e. cracking,
- 4 fragmenting)
- 5 Reduces the number of stressed assets by improving grid operating conditions
- 6

7 IMPACT OF DEFERRAL

8 If this project were to be deferred, utility personnel will be negatively impacted due to increased

9 exposure to safety hazards associated with this feeder. Moreover, deferral of this work would also

10 delay necessary interventions on the feeder that have a significant impact of feeder reliability,

11 especially poles that are at risk of cracking, feathering on the pole top, breakage or loss of

12 strength. This could also result in collateral damage, in the event of an outage situation.

13

14 Deferral of this project would also increase the likelihood of assets failing, in particular, glass

15 insulators and lightning arrestors caused by insulation breakdown. Lastly, customer satisfaction

16 would also be negatively impacted if this project were deferred due to excessive overhead related

17 outages on this feeder.

Portfolio:	Overhead
Project Title:	Carlaw 4kV Conversion B5E
Project Number:	22151
Project Year:	2013
Estimate Cost:	\$ 1,610,644

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to completely convert the existing 4kV feeder B5E and partially

6 convert the existing standby feeder B11E, originating from Carlaw MS, to 13.8kV. This project

7 is one phase of a multi-phase program that began in 2009 to convert the entire 4kV load at

8 Carlaw MS, with the final objective of decommissioning the station.

- 9
- 10

11 **Scope:**

12 The scope of work for this project is to install a new feeder from Carlaw TS to replace B5E. The

13 installation of the new 13.8kV feeder includes approximately 2.50 circuit kilometers of overhead

14 conductor, 85 poles, 30 single-phase transformers, and four three-phase transformers. The

15 project area is bounded by Gerrard Street in the north, Leslie Street in the east, Queen St East in

- 16 the south, and Carlaw Avenue in the west.
- 17

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	LESLIEVILLE
STATION(S)	CARLAW MS
FEEDER(S)	B5E, B11E

18

19 JUSTIFICATION

1 **Project Background**

2 Carlaw MS was originally built in the 1950's and has already been undergoing voltage 3 conversion in order to address high maintenance costs, obsolete construction standards and 4 deteriorated plant condition. Once the MS is decommissioned, THESL will then also have 5 available space and infrastructure within the footprint of Carlaw Station to install new 6 switchgears to allow for maintenance or capacity upgrades. 7 8 Converting 4kV overhead will significantly improve workplace safety for crews by inherently 9 eliminating the associated hazards of multiple circuits going through a typical box construction 10 pole, as well as eliminate the hazards of working in the vicinity of shielded primary cable (cable 11 grounding and positioning below secondary cables). 12 13 **Benefits** 14 Improves the safety of THESL crew workers and the public • 15 Lowers the risk of failures due to the replacement of 4kV assets past useful life with existing ٠ 16 standard 13.8kV equipment 17 Reduces maintenance costs by removing obsolete 4kV equipment • 18 Increases capacity with 13.8kV feeders to accommodate residential load creep as well as load 19 increase from future emerging businesses in the area 20 Reduces system losses when 4kV is upgraded to 13.8kV • 21 Improves the aesthetics of the street • 22 23 **IMPACT OF DEFERRAL** 24 If this project was to be deferred, prolonged safety concerns for field crews related to box 25 construction design will continue to persist. Moreover, THESL would also endure higher 26 maintenance costs associated with existing obsolete non-standard 4kV equipment, when 27 compared to standard overhead 13.8kV equipment. Furthermore, deferral of this work would 28 also result in THESL losing the opportunity to complete the multi-phase program started in

- previous years in order to fully decommission Carlaw MS and acquire valuable infrastructure for 1
- 2 future initiatives.
- 3
- 4
- 5

Portfolio:	Overhead		
Project Title:	Convert Wiltshire 4kV B3W to 13.8kV		
Project Number:	19462		
Project Year:	2013		
Estimate Cost:	\$1,521,301		

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

The purpose of this project is to completely convert the existing 4kV feeder B3W, originating
from Wiltshire MS, to 13.8kV. This project is one phase of a multi-phase program beginning in
2013 to convert the entire 4kV load at Wiltshire MS, with the final objective of decommissioning
the station.

9

10 **Scope:**

11 The scope of work for this project is to build two new 13.8kV feeders from Wiltshire TS to

12 replace B3W. The expansion of these feeders includes approximately 1.40 km of overhead

13 conductor, approximately 0.70 km of underground cable and 50 poles. The project area is

14 bounded by Wiltshire Avenue, Osler Road, Davenport Avenue and Adrian Street.

15

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	WILTSHIRE
STATION(S)	WILTSHIRE MS
FEEDER(S)	B3W

16

17 JUSTIFICATION

- 19
- 20 Project Background

1	Wiltshire MS was originally built in 1949 and has already been undergoing voltage conversion in
2	order to address high maintenance costs, obsolete construction standards and deteriorated plant
3	condition. Once the MS is decommissioned, THESL will then also have available infrastructure
4	to plan and install future initiatives such as Downtown Contingency.
5	
6	Converting 4kV overhead will significantly improve workplace safety for crews by inherently
7	eliminating the associated hazards of multiple circuits going through a typical box construction
8	pole, as well as eliminate the hazards of working in the vicinity of shielded primary cable (cable
9	grounding and positioning below secondary cables).
10	
11	Benefits
12	• Improves the safety of THESL crew workers and the public
13	• Lowers the risk of failures due to the replacement of 4kV assets past useful life with existing
14	standard 13.8kV equipment
15	• Reduces maintenance costs by removing obsolete 4kV equipment
16	• Increases capacity with 13.8kV feeders to accommodate residential load creep as well as load
17	increase from future emerging businesses in the area
18	• Reduces system losses when 4kV is upgraded to 13.8kV
19	• Improves reliability by remote monitoring and control of the system feeding this location
20	which will reduce restoration time
21	
22	IMPACT OF DEFERRAL
23	If this project was to be deferred, prolonged safety concerns for field crews related to box
24	construction design will continue to persist. Moreover, THESL would also endure higher
25	maintenance costs associated with existing obsolete non-standard 4kV equipment, when
26	compared to standard overhead 13.8kV equipment. Furthermore, deferral of this work would

27 also result in THESL losing the opportunity to complete the multi-phase program started in

- 1 previous years in order to fully decommission Wiltshire MS and acquire valuable infrastructure
- 2 for future initiatives.

Portfolio:	Overhead
Project Title:	35M11 – Lawrence and Brucewood Cres Rebuild
Project Number:	22077
Project Year:	2013
Estimate Cost:	\$ 1,498,317

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to replace non-standard CSP transformers, glass insulators,

6 arrestors and rebuild end of life assets on feeder 35M11 in order to improve reliability. This

7 project is one part of four related projects to rehabilitate this feeder.

8

9 Scope:

10 The scope of work for this project is to replace 100 poles, as well as non-standard glass

11 insulators and arrestors, as well as 2,500 meters of overhead conductor. The rebuild boundaries

12 for this project is primarily along Bathurst Street near Lawrence Avenue.

13

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	LAWRENCE & BRUCEWOOD
STATION(S)	FAIRBANK TS
FEEDER(S)	NY35M11

14

15 JUSTIFICATION

16

17 **Project Background**

- 18 Failures on 35M11 are usually attributable to overhead equipment failures and contacts by
- animals. The primary overhead distribution plant on 35M11 requires short-term targeted

rehabilitation in order to address reliability concerns. Furthermore, the poles are in poor
 condition.

3

4 Feeder 35M11 has sustained four interruptions during the past year. The area is primarily 5 comprised of non-standard poor performing assets such as CSP transformers, glass insulators, 6 arrestors, and switches. As obsolete equipment, such as porcelain insulators and arrestors, ages it 7 becomes more contaminated. As such, efforts are required to replace these assets in order to 8 improve reliability. Furthermore, pole replacement is required. Aging poles with reduced 9 strength not only impact reliability, but can also pose a serious public safety hazard. During 10 2010, this feeder experienced over 2,000,000 customer minutes out and over 20,000 customer 11 interruptions. There has been a growing trend in CSP transformer failures in this project area 12 and with the non-standard equipment such as porcelain insulators, arrestors and switches.

13

14 Historical Performance

FEEDER PERFORMANCE				
Worst Performing Feeder Rankin	ng (Worst Feeder)		91	
Feeders Experiencing Sustained Interruptions (Worst Feeder)			4	
HISTORICAL RELIABILITY PERFORMANCE				
	2008	2009	2010	
Feeder CI (<i>Cumulative</i>)	10,442	10,185	23,053	
Feeder CMO (Cumulative)	56,619	45,908	2,071,789	

15

16 **Benefits**

- Improves feeder reliability through the installation of animal guards and would reduce faults
 resulting from foreign interference
- 19 Modernizes the system by replacing non-standard transformers to improve restoration times
- 20 after fault events
- Would reduce outage durations and reverse SAIDI trends that have been worsening over the

1 past few years

2 • Increases customer satisfaction due to reduced outage incidents

• Enhances safety to the public and utility personnel by replacing non-standard equipment such

4 as porcelain insulators and arrestors that can fail catastrophically (i.e. cracking, fragmenting)

5 • Reduces the number of stressed assets by improving grid operating conditions

6

7 IMPACT OF DEFERRAL

8 If this project were to be deferred, utility personnel will be negatively impacted due to Increased

9 exposure to safety hazards associated with this feeder. Moreover, deferral of this work would also

10 delay necessary interventions on the feeder that have a significant impact of feeder reliability,

11 especially poles that are at risk of cracking, feathering on the poletop, breakage or loss of strength.

12 This could also result in collateral damage, in the event of an outage situation.

13

14 Moreover, customers will also continue to experience poor reliability, as the number of outage

15 events will increase. Deferral of this project would also increase the likelihood of assets failing, in

16 particular, glass insulators and lightning arrestors caused by insulation breakdown. Lastly,

17 customer satisfaction would also be negatively impacted if this project were deferred due to

18 excessive overhead related outages on this feeder.

Portfolio:	Overhead
Project Title:	NY80M4 Overhead Rebuild (Wires, Transformers, Insulators,
	Poles) Phase 1
Project Number:	21190
Project Year:	2013
Estimate Cost:	\$ 1,417,145

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to replace non-standard CSP transformers, glass insulators,

6 arrestors and rebuild end of life assets on feeder 80M4 in order to improve reliability. This

7 project is one part of five related projects to rehabilitate this feeder.

8

9 Scope:

10 The scope of work for this project is to replace 150 end of life poles,70 CSP transformers, as

11 well as non-standard glass insulators and arrestors. In addition, approximately 500 meters of

12 overhead conductor will be, replaced as well. The rebuild streets for this projects are Abitibi

13 Avenue, Aneta Circle, Cadmus Road, Caswell Drive, Conacher Drive, Centre Avenue,

14 Greenyards Drive, Lillian Street, Lloydminister Crescent, Madawasska Avenue, Michigan Drive,

15 Montiford Drive, Nipigon Avenue, Newton Drive, Otonabee Avenue, Pamcrest Drive and

- 16 Toffoli Place.
- 17

DISTRICT	North York
DISTRICT NEIGHBOURHOOD	Yonge Street
STATION(S)	Fairchild I TS(27.6 kV)
FEEDER(S)	NY80M4

18

19 JUSTIFICATION

2 **Project Background**

3 Feeder 80M4 has sustained 11 interruptions during the past year. The area is primarily comprised 4 of non-standard poor performing assets such as CSP transformers, glass insulators, arrestors, and 5 switches. As obsolete equipment, such as porcelain insulators and arrestors, ages it becomes 6 more contaminated. As such, efforts are required to replace these assets in order to improve 7 reliability. Furthermore, spot pole replacement is required. Aging poles with reduced strength not 8 only impact reliability, but can also pose a 8 serious public safety hazard. During the past ten 9 years, this feeder has sustained 30 outages due to overhead defective equipment. Furthermore, 10 during 2010 this feeder experienced over 400,000 customer minutes out and almost 7,000 customer interruptions. This has resulted in a feeder rank of 26th in the worst performing feeder 11 12 list. 13

14 **Historical Performance**

FEEDER PERFORMANCE				
Worst Performing Feeder Ranking (Worst Feeder)			26	
Feeders Experiencing Sustained	11			
HISTORICAL RELIABILITY PERFORMANCE				
2008 2009 2010				
Feeder CI (Cumulative)	616	1,948	6,980	
Feeder CMO (<i>Cumulative</i>)	67,047	50,189	402,591	

15

16 **Benefits**

- 17 Improves feeder reliability through the installation of animal guards and would reduce faults • 18 resulting from foreign interference
- 19 Modernizes the system by replacing non-standard transformers to improve restoration times • 20 after fault events
- 21 Would reduce outage durations and reverse SAIDI trends that have been worsening over the •

1 past few years

- 2 Increases customer satisfaction due to reduced outage incidents
- Enhances safety to the public and utility personnel by replacing non-standard equipment
- 4 such as porcelain insulators and arrestors that can fail catastrophically (i.e. cracking,
- 5 fragmenting)
- 6 Reduces the number of stressed assets by improving grid operating conditions
- 7

8 IMPACT OF DEFERRAL

9 If this project were to be deferred, utility personnel will be negatively impacted due to increased
10 exposure to safety hazards associated with this feeder. Moreover, deferral of this work would also

11 delay necessary interventions on the feeder that have a significant impact of feeder reliability,

12 especially poles that are at risk of cracking, feathering on the poletop, breakage or loss of strength.

13 This could also result in collateral damage, in the event of an outage situation.

14

15 Moreover, customers will also continue to experience poor reliability, as the number of outage

16 events will increase. Deferral of this project would also increase the likelihood of assets failing, in

17 particular, glass insulators and lightning arrestors caused by insulation breakdown. Lastly,

18 customer satisfaction would also be negatively impacted if this project were deferred due to

19 excessive overhead related outages on this feeder.

Portfolio:	Overhead
Project Title:	Overhead Rebuild 51M8 – Leslie TS
Project Number:	21785
Project Year:	2013
Estimate Cost:	\$ 1,386,546

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to replace non-standard CSP transformers, glass insulators,

6 arrestors and rebuild feeder 51M8 overhead primary distribution with tree proof conductor in

7 order to improve reliability. The scope also includes installation of a SCADA switch. This cope

8 is one part of 4 related projects to rehabilitate this feeder.

9

10 **Scope:**

11 The scope of work for this project is to replace 100 poles, 33CSP transformers, as well as glass

12 insulators and arrestors. The boundaries for this project are Yonge, Leslie, Cummer, and

- 13 Sheppard..
- 14

DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	FINCH
STATION(S)	LESLIE I TS
FEEDER(S)	NY51M8

15

16 JUSTIFICATION

17

18 Project Background

- 19 Feeder 51M8 has sustained seven interruptions during the past year. The area is primarily
- 20 comprised of non-standard poor performing assets such as CSP transformers, glass insulators,

arrestors, and switches. As obsolete equipment, such as porcelain insulators and arrestors, ages it
becomes more contaminated. As such, efforts are required to replace these assets in order to
improve reliability. Furthermore, spot pole replacement is required. Aging poles with reduced
strength not only impact reliability, but can also pose a serious public safety hazard. During the
past ten years, this feeder has sustained over 20 overhead related outages. Furthermore, customer
minutes out and has more than doubled over the last three years. As a result, this feeder is ranked
91st in the worst performing feeder list.

8

9 Historical Performance

FEEDER PERFORMANCE				
Worst Performing Feeder Rankin		91		
Feeders Experiencing Sustained	st Feeder)	7		
HISTORICAL RELIABILITY PERFORMANCE				
	2008	2009	2010	
Feeder CI (<i>Cumulative</i>)	5,601	6,124	2,277	
Feeder CMO (<i>Cumulative</i>)	69,249	167,213	158,038	

10

11 Benefits

• Improves feeder reliability through the installation of animal guards and would reduce faults

13 resulting from foreign interference

- Modernizes the system by replacing non-standard transformers to improve restoration times
 after fault events
- Would reduce outage durations and reverse SAIDI trends that have been worsening over the
 past few years
- 18 Increases customer satisfaction due to reduced outage incidents
- Enhances safety to the public and utility personnel by replacing non-standard equipment
- 20 such as porcelain insulators and arrestors that can fail catastrophically (i.e. cracking,
- 21 fragmenting)

- 1 Reduces the number of stressed assets by improving grid operating conditions
- Improves restoration time in the event of an outage due to installation of remote fault
 sensing switch
- 4

5 IMPACT OF DEFERRAL

6 If this project were to be deferred, utility personnel will be negatively impacted due to increased

7 exposure to safety hazards associated with this feeder. Moreover, deferral of this work would also

8 delay necessary interventions on the feeder that have a significant impact of feeder reliability,

9 especially poles that are at risk of cracking, feathering on the poletop, breakage or loss of strength.

10 This could also result in collateral damage, in the event of an outage situation.

11

12 Moreover, customers will also continue to experience poor reliability, as the number of outage

13 events will increase. Deferral of this project would also increase the likelihood of assets failing, in

14 particular, glass insulators and lightning arrestors caused by insulation breakdown. Lastly,

15 customer satisfaction would also be negatively impacted if this project were deferred due to

16 excessive overhead related outages on this feeder.

Portfolio:	Overhead	
Project Title:	Refurbish Feeder Laterals – Bathurst TS Phase #1	
Project Number:	22211	
Project Year:	2013	
Estimate Cost:	\$1,378,602	

3 PROJECT DESCRIPTION

4

5 **Objective:**

6 The purpose of this project is to replace end of life asset and non-standard CSP transformers,

7 glass insulators, arrestors on feeder 85M10 overhead. This project is one part of two related

8 projects to rehabilitate this feeder.

9

10 **Scope:**

11 The scope of work for this project is to replace 110 poles, 37 non-standard transformers, as well

12 as non-standard glass insulators and arrestors. The rebuild boundaries for this project is Dufferin,

13 Keele, Wilson and Whitley

14

DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	DOWNSVIEW-RODING-CFB
STATION(S)	BATHURST I TS
FEEDER(S)	NY85M10

15

16 JUSTIFICATION

17

18 **Project Background**

19 Failures on 85M10 are usually attributable to overhead equipment failures. The primary

20 overhead distribution plant on85M10 requires short-term targeted rehabilitation in order to

21 address reliability concerns. Furthermore, the poles are in poor condition.

Feeder 85M10 has sustained four interruptions during the past year. The area is primarily
comprised of non-standard poor performing assets such as CSP transformers, glass insulators,

4 arrestors, and switches. As obsolete equipment, such as porcelain insulators and arrestors, ages it

5 becomes more contaminated. As such, efforts are required to replace these assets in order to

6 improve reliability. Furthermore, pole replacement is required. Aging poles with reduced

7 strength not only impact reliability, but can also pose a serious public safety hazard.

8

9 Historical Performance

FEEDER PERFORMANCE				
Worst Performing Feeder Ranking (Worst Feeder)213				
Feeders Experiencing Sustained	t (Worst Feeder)	4		
HISTORICAL RELIABILITY PERFORMANCE				
	2009	2010		
Feeder CI (<i>Cumulative</i>)	87			
Feeder CMO (<i>Cumulative</i>)	1,728,172	69,273	17,872	

10

11 Benefits

12 • Improves feeder reliability through the installation of animal guards and would reduce faults

13 resulting from foreign interference

Modernizes the system by replacing non-standard transformers to improve restoration times
 after fault events

Would reduce outage durations and reverse SAIDI trends that have been worsening over the
 past few years

- 18 Increases customer satisfaction due to reduced outage incidents
- 19 Enhances safety to the public and utility personnel by replacing non-standard equipment such
- 20 as porcelain insulators and arrestors that can fail catastrophically (i.e. cracking, fragmenting)
- Reduces the number of stressed assets by improving grid operating conditions

2 IMPACT OF DEFERRAL

3 If this project were to be deferred, utility personnel will be negatively impacted due to increased exposure to safety hazards associated with this feeder. Moreover, deferral of this work would also 4 delay necessary interventions on the feeder that have a significant impact of feeder reliability, 5 especially poles that are at risk of cracking, feathering on the poletop, breakage or loss of strength. 6 7 This could also result in collateral damage, in the event of an outage situation. 8 Moreover, customers will also continue to experience poor reliability, as the number of outage 9 10 events will increase. Deferral of this project would also increase the likelihood of assets failing, in particular, glass insulators and lightning arrestors caused by insulation breakdown. Lastly, 11

12 customer satisfaction would also be negatively impacted if this project were deferred due to

13 excessive overhead related outages on this feeder.

14

Portfolio:	Overhead
Project Title:	Churchill/Wynn OH Rehab & Voltage Conversion (SS60-F2 to 80M1))
Project Number:	20773
Project Year:	2013
Estimate Cost:	\$ 1,303,597

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to partially convert feeder NYSS60F2 from Churchill MS from

 $6 \quad 4kV \text{ to } 27.6kV.$ This project is one phase of a multi-phase program to convert the entire 4kV

7 load at Churchill MS, with the final objective of decommissioning Churchill MS. Also the intent

8 of this project is to to improve the reliability of service and rehab of the poor condition plant

9 supplied by 4kV feeder NYSS60F2 (Churchill MS).

10

11 **Scope:**

12 The scope of this project includes converting the following 4.16 kV system (Churchill MS,

13 SS60-F2) to a 27.6kV distribution system utilizing 80M1 on Wynn Road, Hosham Avenue,

14 Hounslow Avenue, Yorkview Drive, Muirkirk Road, Wallbridge Court, Fleetwell Court, and

15 Finchurst Drive. In total, approximately 120 poles, 23 single-phase pole top transformers, 3

16 single-phase banked pole top transformers, one three-phase padmounted transformer and 7,700m

- 17 of overhead primary and secondary lines will be replaced.
- 18

DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	CHURCHILL/WYNN
STATION(S)	CHURCHILL MS
FEEDER(S)	NYSS60F2

19

20 JUSTIFICATION

2 **Project Background**

3 Churchill MS was originally built in 1961 and has already been undergoing voltage conversion

4 in order to address high maintenance costs, obsolete construction standards and deteriorated

5 plant condition. The area supplied by NYSS60F2 is in poor condition. It consists of very poor

6 condition poles as well as non-standard overhead assets; namely glass insulators, glass switches,

7 conductors, pole heights, clearances, glass lightning arrestors, animal guards, and transformers.

8

9 The area is currently supplied by Churchill MS. This is a 4kV station with two feeders. Feeder

10 F3 will be converted to 27.6 kV as per project W11355. This project will continue the rehab of

11 the area by converting feeder F2. In addition, the project needs to be carried out to accommodate

12 residential load creep as well as load increase from future emerging businesses in the area.

13

14 Historical Performance

Worst Performing Feeder Rankin	108		
Feeders Experiencing Sustained	(Worst Feeder)	3	
HISTORICAL RELIABILITY PERFORMANCE			
HISTORICAL RELIABILITY	PERFORMANC	£	
HISTORICAL RELIABILITY	PERFORMANC. 2008	E 2009	2010
Feeder CI (<i>Cumulative</i>)			2010 0

15

16 Benefits

- Modernizes the distribution plant as a result of replacement of end-of-life assets
- 18 Eliminates safety hazards as a result of pole replacement
- 19 Reduces maintenance costs by removing obsolete 4kV equipment
- Lowers risk of failures due to the replacement of 4kV assets past useful life with existing
- 21 standard 13.8kV equipment

- 1 Increases capacity with 13.8kV feeders to accommodate residential load creep as well as load
- 2 increase from future emerging businesses in the area
- 3 Improves the aesthetics of the street
- Minimizes line losses by removing the 4 kV plant and higher transmission efficiency
- Reduces probability of further outages by upgrading sizes of transformers at overloaded sites
 and replacing poor performing transformer types
- 7 Helps recover obsolete breaker and switchgear equipment in MS station
- 8

9 IMPACT OF DEFERRAL

- 10 Consequences of deferral will lead to high maintenance costs of 4kV station equipment. This
- 11 difficulty and delay in obtaining spare parts will contribute to outages.
- 12
- 13

Portfolio:	Overhead
Project Title:	Convert Junction 4kV B10J to 13.8kV
Project Number:	20366
Project Year:	2013
Estimate Cost:	\$1,332,795

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to completely convert the existing 4kV feeder B10J, originating

6 from Junction MS, to 13.8kV. This project is one phase of a multi-phase program beginning in

7 2012 to convert the entire 4kV load at Junction MS, with the final objective of decommissioning

8 the station.

9

10 **Scope:**

11 The scope of work for this project is to expand existing 13.8kV feeders A257DN and A258DN

12 to replace B10J. The expansion of these feeders includes approximately 1.47 km of overhead

13 conductor, 60poles and 17 transformer locations. The project area is bounded by Dundas Street,

14 Sunnyside Avenue, Dupont Avenue and Garden Avenue.

15

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	JUNCTION
STATION(S)	JUNCTION MS, DUFFERIN TS
FEEDER(S)	B10J, A257DN, A258DN

16

17 JUSTIFICATION

18

19 Project Background

1	Junction MS was originally built in 1929 and has already been undergoing voltage conversion in
2	order to address high maintenance costs, obsolete construction standards and deteriorated plant
3	condition. Once the MS is decommissioned, THESL will then also have available infrastructure
4	to plan and install future initiatives such as Downtown Contingency.
5	
6	Converting 4kV overhead will significantly improve workplace safety for crews by inherently
7	eliminating the associated hazards of multiple circuits going through a typical box construction
8	pole, as well as eliminate the hazards of working in the vicinity of shielded primary cable (cable
9	grounding and positioning below secondary cables).
10	
11	Benefits
12	• Improves the safety of THESL crew workers and the public
13	• Lowers the risk of failures due to the replacement of 4kV assets past useful life with existing
14	standard 13.8kV equipment
15	• Reduces maintenance costs by removing obsolete 4kV equipment
16	• Increases capacity with 13.8kV feeders to accommodate residential load creep as well as load
17	increase from future emerging businesses in the area
18	• Reduces system losses when 4kV is upgraded to 13.8kV
19	• Improves reliability by remote monitoring and control of the system feeding this location
20	which will reduce restoration time
21	
22	IMPACT OF DEFERRAL
23	If this project was to be deferred, prolonged safety concerns for field crews related to box
24	construction design will continue to persist. Moreover, THESL would also endure higher
25	maintenance costs associated with existing obsolete non-standard 4kV equipment, when

- 26 compared to standard overhead 13.8kV equipment. Furthermore, deferral of this work would
- 27 also result in THESL losing the opportunity to complete the multi-phase program started in

- 1 previous years in order to fully decommission Junction MS and acquire valuable infrastructure
- 2 for future initiatives.

Portfolio:	Overhead
Project Title:	Thorncrest (#011) Rear Lot Electrical Voltage Conversion Phase #1
Project Number:	20726
Project Year:	2013
Estimate Cost:	\$1,174996

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to build electrical equipment to convert rear lot distribution to front 6 lot underground in the area bounded by Princess Margaret Boulevard, Rathburn Road, Islington 7 Avenue and Kipling Avenue. More specifically, this project is the first phase of electrical work 8 in the area bounded by this project.

9

10 **Scope:**

11 This project is executed following all civil construction in the area bounded by this project,

12 where 103 customers are fed from rear lot. TRXLPE primary risers will be installed and used as

13 a single-phase primary loop that will be connected to the red phase of 88M13. In summary, 10

14 single-phase transformers, 103 service connections in tap boxes, 5500m of secondary service

15 conductor, and 2500m of 1/0 TRXLPE 27.6kV conductor will be installed. Thereafter, all poles,

16 lines, transformers and switches in the rear lot associated with this conversion will be removed.

17

DISTRICT	ETOBICOKE
DISTRICT NEIGHBOURHOOD	PRINCESS MARGARET BLVD
STATION(S)	ROSETHORNE
FEEDER(S)	ETSBF1

18

19 JUSTIFICATION

1 **Project Background**

The area bounded by this project is reaching the end of its servicable life and similar to other rear lot areas, there is difficulty in accessing and repairing these rear-lot fed equipment. There are also old and non-standard assets and feeder configurations that THESL intends to proactively remove from the backyards of customer properties. This rear lot supply have become a source of concern for public and personnel safety. The age of this distribution coupled with the difficulty to access THESL owned equipment is one of the key driving force for implementing this work.

9

10 Historical Performance

FEEDER PERFORMANCE					
Worst Performing Feeder Ranking (Worst Feeder)320					
Feeders Experiencing Sustained	, ,	2			
HISTORICAL RELIABILITY PERFORMANCE					
2008 2009 2010					
Feeder CI (<i>Cumulative</i>) 7 12 990					
Feeder CMO (<i>Cumulative</i>)	630	637	27,299		

11

12 Benefits

- Improves power quality as a result of higher primary voltages that has lower line losses and
 higher transmission efficiency.
- Increases reliability due to converting rear-lot fed areas and in turn, improving outage
 duration.
- Enhances customer satisfaction as a result of Improves restoration time in the event of
 outages
- 19 Eliminates maintenance and inventory costs that are associated with obsolete and
- 20 discontinued 4 kV distribution equipment
- 21 Improves life-cycle costs

- Enhances safety and improves accessibility of front-lot equipment in the event of an outage
 as opposed to restricted rear-lots
- 3

4 IMPACT OF DEFERRAL

- 5 If the project is deferred, safety hazards to crews during emergency outage situations would
- 6 continue. Delayed rear lot renewal will result in the increasing probability of relatively high-
- 7 impact outages in these areas. This will significantly decrease reliability in the neighbourhoods
- 8 and will expose THESL crews to the safety risks inherent when restoring power in rear lot area.
- 9 Finally, customers will experience lengthy outages and complaints will gradually worsen while
- 10 maintenance and capital costs will continue to increase as a result of deferring planned work for
- 11 the eventual decommissioning of the MS.

Portfolio:	Overhead
Project Title:	Refurbish Overhear Feeder – Falstaff
Project Number:	21690
Project Year:	2013
Estimate Cost:	\$1,129,182

3 PROJECT DESCRIPTION

4

5 **Objective:**

6 The objective of this project is to rebuild and/or replace the aging and/or non standard primary

7 OH distribution equipment on feeder 55M28 in order to improve reliability and replace the

8 XLPE lateral services with tree retardant cable to improve reliability. This project is one part of

9 seven related projects to rehabilitate this feeder.

10

11 **Scope:**

12 The scope of work for this project is to replace 110 poles, and 20 non-standard transformers.

13 Also, poor performing assets such as non-standard glass insulators and arrestors will be replaced

14 as well. In addition, undersized primary overhead conductor will be replaced to standard size. In

15 areas where underground laterals are serviced with early vintage XLPE cable, it will be replaced

16 with standard tree retardant cable. The boundaries of this project are Bannerman Street, Jane

- 17 Street, Falstaff Avenue, and Lawnside Drive.
- 18

DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	FALSTAFF
STATION(S)	FINCH II TS
FEEDER(S)	NY55M28

19

20 JUSTIFICATION

1 **Project Background**

2 Feeder 55M28 has sustained five interruptions during the past year. The area is primarily 3 comprised of non-standard poor performing assets such as CSP transformers, glass insulators, 4 arrestors, and switches. As obsolete equipment, such as porcelain insulators and arrestors, ages it 5 becomes more contaminated. As such, efforts are required to replace these assets in order to 6 improve reliability. Furthermore, spot pole replacement is required. Aging poles with reduced 7 strength not only impact reliability, but can also pose a 8 serious public safety hazard. During 8 2010 this feeder has experienced over 7,000 customer interruptions as well as over 240,000 9 customer minutes out. As a result, this feeder is now ranked 86th in the worst performing feeder 10 list.

11

12 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Rankin	ng (Worst Feeder)		86
Feeders Experiencing Sustained Interruptions Count (Worst Feeder)		5	
HISTORICAL RELIABILITY PERFORMANCE			
	2008	2009	2010
Feeder CI (<i>Cumulative</i>)	13,745	72	7,706
Feeder CMO (<i>Cumulative</i>)	340,712	40,572	240,636

13

14

15 Benefits

- Improves feeder reliability through the installation of animal guards and would reduce faults
- 17 resulting from foreign interference
- Modernizes the system by replacing non-standard transformers to improve restoration times
 after fault events
- Would reduce outage durations and reverse SAIDI trends that have been worsening over the
- 21 past few years

- 1 Increases customer satisfaction due to reduced outage incidents
- 2 Enhances safety to the public and utility personnel by replacing non-standard equipment
- 3 such as porcelain insulators and arrestors that can fail catastrophically (i.e. cracking,
- 4 fragmenting)
- 5 Reduces the number of stressed assets by improving grid operating conditions
- 6

7 IMPACT OF DEFERRAL

8 If this project were to be deferred, utility personnel will be negatively impacted due to increased

9 exposure to safety hazards associated with this feeder. Moreover, deferral of this work would also

10 delay necessary interventions on the feeder that have a significant impact of feeder reliability,

11 especially poles that are at risk of cracking, feathering on the poletop, breakage or loss of strength.

12 This could also result in collateral damage, in the event of an outage situation.

13

14 Moreover, customers will also continue to experience poor reliability, as the number of outage

15 events will increase. Deferral of this project would also increase the likelihood of assets failing, in

16 particular, glass insulators and lightning arrestors caused by insulation breakdown. Lastly,

17 customer satisfaction would also be negatively impacted if this project were deferred due to

18 excessive overhead related outages on this feeder.

Portfolio:	Overhead
Project Title:	Convert Junction 4kV B5J to 13.8kV
Project Number:	20368
Project Year:	2013
Estimate Cost:	\$1,745,107

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to completely convert the existing 4kV feeder B5J, originating

6 from Junction MS, to 13.8kV. This project is one phase of a multi-phase program beginning in

7 2012 to convert the entire 4kV load at Junction MS, with the final objective of decommissioning

8 the station.

9

10 **Scope:**

11 The scope of work for this project is to expand existing 13.8kV feeders A251DN and A258DN

12 to replace B5J. The expansion of these feeders includes approximately 1.10 circuit kilometers of

13 overhead conductor, 50 poles and 11 transformer locations. The project area is bounded by

14 Sterling Road, Indian Road, Bloor Avenue and Grenadier Road.

15

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	JUNCTION
STATION(S)	JUNCTION MS
FEEDER(S)	B5J, A251DN, A258DN

16

17 JUSTIFICATION

18

19 Project Background

1	Junction MS was originally built in 1929 and has already been undergoing voltage conversion in
2	order to address high maintenance costs, obsolete construction standards and deteriorated plant
3	condition. Once the MS is decommissioned, THESL will then also have available infrastructure
4	to plan and install future initiatives such as Downtown Contingency.
5	
6	Converting 4kV overhead will significantly improve workplace safety for crews by inherently
7	eliminating the associated hazards of multiple circuits going through a typical box construction
8	pole, as well as eliminate the hazards of working in the vicinity of shielded primary cable (cable
9	grounding and positioning below secondary cables).
10	
11	Benefits
12	• Improves the safety of THESL crew workers and the public
13	• Lowers the risk of failures due to the replacement of 4kV assets past useful life with existing
14	standard 13.8kV equipment
15	• Reduces maintenance costs by removing obsolete 4kV equipment
16	• Increases capacity with 13.8kV feeders to accommodate residential load creep as well as load
17	increase from future emerging businesses in the area
18	• Reduces system losses when 4kV is upgraded to 13.8kV
19	• Improves reliability by remote monitoring and control of the system feeding this location
20	which will reduce restoration time
21	
22	IMPACT OF DEFERRAL
23	If this project was to be deferred, prolonged safety concerns for field crews related to box
24	construction design will continue to persist. Moreover, THESL would also endure higher
25	maintenance costs associated with existing obsolete non-standard 4kV equipment, when

- 26 compared to standard overhead 13.8kV equipment. Furthermore, deferral of this work would
- 27 also result in THESL losing the opportunity to complete the multi-phase program started in

- 1 previous years in order to fully decommission Junction MS and acquire valuable infrastructure
- 2 for future initiatives.

Portfolio:	Overhead
Project Title:	Refurbish Trunk Feeder - Regent & Wilson
Project Number:	22184
Project Year:	2013
Estimate Cost:	\$1,002,973

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The objective of this project is to rebuild and/or replace the aging and/or non standard primary 6 overhead distribution equipment on feeder 85M10 in order to improve reliability and replace the 7 XLPE lateral services with tree retardant cable to improve reliability. This project is one part of 8 three related projects to rehabilitate this feeder.

9

10 **Scope:**

11 The scope of work for this project is to replace 65 poles, and 20 non-standard transformers. Also,

12 poor performing assets such as non-standard glass insulators and arrestors will be replaced as

13 well. In addition, undersized primary overhead conductor will be replaced to standard size. In

14 areas where underground laterals are serviced with early vintage XLPE cable, it will be replaced

15 with standard tree retardant cable. The boundaries of this project are Dufferin Street , Murray

- 16 Road, and Wilson Avenue
- 17

DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	DOWNSVIEW-RODING-CFB
STATION(S)	BATHURST I TS
FEEDER(S)	NY85M10

18

19 JUSTIFICATION

1 **Project Background**

2 Feeder 85M10 has sustained four interruptions during the past year. The area is primarily 3 comprised of non-standard poor performing assets such as CSP transformers, glass insulators, 4 arrestors, and switches. As obsolete equipment, such as porcelain insulators and arrestors, ages it 5 becomes more contaminated. As such, efforts are required to replace these assets in order to 6 improve reliability. Furthermore, spot pole replacement is required. Aging poles with reduced 7 strength not only impact reliability, but can also pose serious public safety hazard. During 2008 8 this feeder has experienced almost 2,000,000 customer minutes out. Over the past ten years, this 9 feeder experienced over 50 overhead related outages of which 20 of these were transformer 10 related.

11

12 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Ranking (Worst Feeder)213		213	
Feeders Experiencing Sustained Interruptions Count (Worst Feeder)		4	
HISTORICAL RELIABILITY PERFORMANCE			
	2008	2009	2010
Feeder CI (<i>Cumulative</i>)	5,047	2,010	87
Feeder CMO (<i>Cumulative</i>)	1,728,172	69,273	17,872

13

14 Benefits

- Improves feeder reliability through the installation of animal guards and would reduce faults
 resulting from foreign interference
- Modernizes the system by replacing non-standard transformers to improve restoration times
 after fault events
- Would reduce outage durations and reverse SAIDI trends that have been worsening over the
- 20 past few years
- Increases customer satisfaction due to reduced outage incidents

- Enhances safety to the public and utility personnel by replacing non-standard equipment such
 as porcelain insulators and arrestors that can fail catastrophically (i.e. cracking, fragmenting)
- 3 Reduces the number of stressed assets by improving grid operating conditions
- 4

5 IMPACT OF DEFERRAL

6 If this project were to be deferred, utility personnel will be negatively impacted due to increased
7 exposure to safety hazards associated with this feeder. Moreover, deferral of this work would also
8 delay necessary interventions on the feeder that have a significant impact of feeder reliability,
9 especially poles that are at risk of cracking, feathering on the poletop, breakage or loss of strength.

10 This could also result in collateral damage, in the event of an outage situation.

11

12 Moreover, customers will also continue to experience poor reliability, as the number of outage

13 events will increase. Deferral of this project would also increase the likelihood of assets failing, in

14 particular, glass insulators and lightning arrestors caused by insulation breakdown. Lastly,

15 customer satisfaction would also be negatively impacted if this project were deferred due to

16 excessive overhead related outages on this feeder.

17

Portfolio:	Overhead
Project Title:	Convert Wiltshire 4kV B2W to 13.8kV
Project Number:	18669
Project Year:	2013
Estimate Cost:	\$1,080,758

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

The purpose of this project is to completely convert the existing 4kV feeder B2W, originating
from Wiltshire MS, to 13.8kV. This project is one phase of a multi-phase program beginning in
2013 to convert the entire 4kV load at Wiltshire MS, with the final objective of decommissioning
the station.

9

10 **Scope:**

11 The scope of work for this project is to build two new 13.8kV feeders from Wiltshire TS to

12 replace B2W. The expansion of these feeders includes approximately 2.00 km of overhead

13 conductor, approximately 1.00 km of underground cable and 70 poles. The project area is

14 bounded by Gillespie Avenue, St. Clair Avenue West, Old Weston Road and CPR right of way.

15

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	WILTSHIRE
STATION(S)	WILTSHIRE MS
FEEDER(S)	B2W

16

17 JUSTIFICATION

18

19 Project Background

1	Wiltshire MS was originally built in 1949 and has already been undergoing voltage conversion in
2	order to address high maintenance costs, obsolete construction standards and deteriorated plant
3	condition. Once the MS is decommissioned, THESL will then also have available infrastructure
4	to plan and install future initiatives such as Downtown Contingency.
5	
6	Converting 4kV overhead will significantly improve workplace safety for crews by inherently
7	eliminating the associated hazards of multiple circuits going through a typical box construction
8	pole, as well as eliminate the hazards of working in the vicinity of shielded primary cable (cable
9	grounding and positioning below secondary cables).
10	
11	Benefits
12	• Improves the safety of THESL crew workers and the public
13	• Lowers the risk of failures due to the replacement of 4kV assets past useful life with existing
14	standard 13.8kV equipment
15	• Reduces maintenance costs by removing obsolete 4kV equipment
16	• Increases capacity with 13.8kV feeders to accommodate residential load creep as well as load
17	increase from future emerging businesses in the area
18	• Reduces system losses when 4kV is upgraded to 13.8kV
19	• Improves reliability by remote monitoring and control of the system feeding this location
20	which will reduce restoration time
21	
22	IMPACT OF DEFERRAL
23	If this project was to be deferred, prolonged safety concerns for field crews related to box
24	construction design will continue to persist. Moreover, THESL would also endure higher
25	maintenance costs associated with existing obsolete non-standard 4kV equipment, when
26	compared to standard overhead 13.8kV equipment. Furthermore, deferral of this work would

27 also result in THESL losing the opportunity to complete the multi-phase program started in

- 1 previous years in order to fully decommission Wiltshire MS and acquire valuable infrastructure
- 2 for future initiatives.
- 3
- 4

	Portfolio:	Overhead		
	Project Title:	Voltage Con ⁻	versation from 4kV to 13.8kV System TOB4CD	
	Project Number:	20567		
	Project Year:	2013		
	Estimate Cost:	\$ 1,041,530		
1				
2	PROJECT DESCRIPTI	ION		
3				
4	Objective:			
5	The purpose of this project	The purpose of this project is to convert the existing 4kV feeder B4CD originating from College		
6	MS to 13.8kV, with the long term plan of decommissioning College MS.			
7				
8	Scope:			
9	The scope of work for this project is to expand existing 13.8kV feeder A490DN to replace			
10	B4CD. The installation of the feeder includes approximately 0.85 km of overhead conductor, 50			
11	poles, and 23 transformers. The project area is bounded by College Street in the north, Shaw			
12	Street in the east, Harrison Street in the south, and Dovercourt Road in the west.			
13				
	DISTRICT		TORONTO	
	DISTRICT NEIGHBO	URHOOD	COLLEGE	

14

15 JUSTIFICATION

STATION(S)

FEEDER(S)

16

17 **Project Background**

18 Converting 4kV overhead will significantly improve workplace safety for crews by inherently

COLLEGE MS

B4CD

- 19 eliminating the associated hazards of multiple circuits going through a typical box construction
- 20 pole, as well as eliminate the hazards of working in the vicinity of shielded primary cable (cable

- 1 grounding and positioning below secondary cables). Converting B4CD feeder to 13.8kV is part
- 2 of an overall plan to decommission College MS. Once the MS is decommissioned, THESL will
- 3 then have available infrastructure to plan and install future initiatives such as Downtown
- 4 Contingency.
- 5

6 Benefits

- 7 Improves the safety of THESL crew workers and the public
- 8 Lowers the risk of failures due to the replacement of 4kV assets past useful life with existing
- 9 standard 13.8kV equipment
- 10 Reduces maintenance costs by removing obsolete 4kV equipment
- Increases capacity with 13.8kV feeders to accommodate residential load creep as well as load
 increase from future emerging businesses in the area
- 13 Reduces system losses when 4kV is upgraded to 13.8kV
- Improves the aesthetics of the street
- 15

16 IMPACT OF DEFERRAL

- 17 If this project was to be deferred, prolonged safety concerns for field crews related to box
- 18 construction design will continue to persist. Moreover, THESL would also endure higher
- 19 maintenance costs associated with existing obsolete non-standard 4kV equipment, when
- 20 compared to standard overhead 13.8kV equipment. Lastly, if this work is deferred, there is a
- 21 higher risk of failure due to the number of assets past useful life.
- 22

Portfolio:	Overhead
Project Title:	Overhead Rehab NY53M25
Project Number:	22203
Project Year:	2013
Estimate Cost:	\$ 972,586

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The objective of this project is to rebuild / replace the aging and/or non standard primary

6 overhead distribution equipment on feeder 53M25 in order to improve reliability. This project is

7 one part of eight related projects to rehabilitate this feeder.

8

9 Scope:

10 The scope of work for this project is to replace 200 poles, Also, poor performing assets such as

11 non-standard glass insulators and arrestors will be replaced as well. In addition, undersized

12 primary overhead conductor will be replaced to standard size. The boundaries of this project are

13 Evermede Drive, Billington Crescent, Skelmore Crescent, Marbury Crescent, Lynedock Crescent

14 and Fenside Drive.

15

DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	YORK MILLS ROAD
STATION(S)	BERMONDSEY IL TS(27.6 KV)
FEEDER(S)	NY53M25

16

17 JUSTIFICATION

18

1 Feeder 53M25 has sustained nine interruptions during the past year. The area is primarily 2 comprised of non-standard poor performing assets such as CSP transformers, glass insulators, 3 arrestors, and switches. As obsolete equipment, such as porcelain insulators and arrestors, ages it 4 becomes more contaminated. As such, efforts are required to replace these assets in order to 5 improve reliability. Furthermore, spot pole replacement is required. Aging poles with reduced 6 strength not only impact reliability, but can also pose a 8 serious public safety hazard. During 7 2009 this feeder has experienced almost 20,000 customer interruptions as well as over 600,000 8 customer minutes out. As a result, this feeder is now ranked 9th in the worst performing feeder 9 list.

10

11 Historical Performance

FEEDER PERFORMANCE				
Worst Performing Feeder Ranking (Worst Feeder)			176	
Feeders Experiencing Sustained Interruptions (Worst Feeder)9				
HISTORICAL RELIABILITY	PERFORMANC	CE		
	2008	2009	2010	
Feeder CI (<i>Cumulative</i>)	260	19,054	563	
Feeder CMO (<i>Cumulative</i>)	51,265	638,856	70,033	

12

13 Benefits

Improves feeder reliability through the installation of animal guards and would reduce faults
 resulting from foreign interference

Modernizes the system by replacing non-standard transformers to improve restoration times
 after fault events

- Would reduce outage durations and reverse SAIDI trends that have been worsening over the
 past few years
- Increases customer satisfaction due to reduced outage incidents
- Enhances safety to the public and utility personnel by replacing non-standard equipment

- 1 such as porcelain insulators and arrestors that can fail catastrophically (i.e. cracking,
- 2 fragmenting)
- 3 Reduces the number of stressed assets by improving grid operating conditions
- 4

5 IMPACT OF DEFERRAL

6 If this project were to be deferred, utility personnel will be negatively impacted due to increased

7 exposure to safety hazards associated with this feeder. Moreover, deferral of this work would also

8 delay necessary interventions on the feeder that have a significant impact of feeder reliability,

9 especially poles that are at risk of cracking, feathering on the poletop, breakage or loss of strength.

10 This could also result in collateral damage, in the event of an outage situation.

11

12 Moreover, customers will also continue to experience poor reliability, as the number of outage

13 events will increase. Deferral of this project would also increase the likelihood of assets failing, in

14 particular, glass insulators and lightning arrestors caused by insulation breakdown. Lastly,

15 customer satisfaction would also be negatively impacted if this project were deferred due to

16 excessive overhead related outages on this feeder.

17

18

19

Portfolio:	Overhead
Project Title:	Overhead Rehab NY53M25
Project Number:	20858
Project Year:	2013
Estimate Cost:	\$ 954,142

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The objective of this project is convert KHF1 fed from Brimley Sheppard MS from 4kV to

6 27.6kV. This project mainly addresses the conversion of KHF1 but is one phase in a multi-phase

7 program to convert 4kV loads, with the final objective of decommissioning Brimley Sheppard

8 MS. The converted load will be transferred to feeders NT63M5 and NAE5-1M24.

9

10 **Scope:**

11 The scope of work for this project includes spot convert of overhead transformers: on Brimley

12 Rd to E5-1M24, on Midland S of Sheppard to NT63M5. Installation of CE duct along Midland

13 Avenue, Emblem Court. Installation of three-phase overhead line along Pitfield Road from

14 Brimley Road to Midland Ave. Installation of single-phase overhead lateral lines with from

15 Pitfield to Murray Ave, Garden Park Avenue, McDairmid Road, Marilake Drive (both legs),

16 Manorglen Crescent, sub-lateral from Marilake Drive to Summerglade Drive and Rosegrove

- 17 Place. Convert all the existing Pole top transformers .
- 18

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	PITFIELD ROAD
STATION(S)	BRIMLEY SHEPPARD
FEEDER(S)	SCKHF1

19

20 JUSTIFICATION

2 **Project Background**

3 Brimley Sheppard (KH) MS station was built in 1965. As a result, both transformer and 13.8kV 4 breakers are very old and have already been undergoing voltage conversion in order to address 5 high maintenance costs, obsolete construction standards and deteriorated plant condition. The 6 13.8ky distribution system is also old. There were several failures on the primary cables installed 7 direct buried. The oil circuit breakers have reached their end of life. There are PILC cables on 8 both sides (27.6 and 13.8kV) of the transformer. To reduce the maintenance cost from the station 9 and distribution equipment and to modernize the electrical distribution, THESL will convert the 10 distribution fed from this MS with the latest 27.6kV assets and with THESL standard. 11 12 This project mainly addresses the conversion of KHF1 south of Sheppard Ave. The converted 13 load will be transferred to feeders NT63M5 and NAE5-1M24. In order to convert the underground distribution of Rubic Crescent, this project needs to be completed. There are two 14 15 for the conversion of Rubic Crescent underground distribution, and these two projects are

16 dependent on the completion of this project in order to move forward. In addition, the project

17 needs to be carried out to accommodate residential load creep as well as load increase from

18 future emerging businesses in the area.

19

20 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Ranking (Worst Feeder)287			
Feeders Experiencing Sustained Interruptions (Worst Feeder)4			
HISTORICAL RELIABILITY PERFORMANCE			
2008 2009 2010			2010
Feeder CI (<i>Cumulative</i>)	1,092	50	1,450
Feeder CMO (<i>Cumulative</i>)	58,276	11,000	2,900

21

- Lowers risk of failures due to the replacement of 4kV assets past useful life with existing
- 2 standard 27.6kV equipment
- 3 Reduces of maintenance costs by removing obsolete 4kV equipment
- Modernize the electrical distribution to present THESL standard.
- 5 Targets to achieve better operational flexibility and more reliable supply.
- 6 Improves of the safety of THESL crew workers and the public
- 7 Increases capacity with 13.8kV feeders to accommodate residential load creep as well as load
- 8 increase from future emerging businesses in the area
- 9 Reduces system losses when 4kV is upgraded to 13.8kV
- 10

11 IMPACT OF DEFERRAL

- 12 Deferal of this project will delay the decommissioning of the MS where the switchgear and
- 13 breaker have become obsolete. Furthermore, deferral of this work would also result in THESL
- 14 losing the opportunity to complete the multi-phase program started in previous years in order to
- 15 fully decommission Brimley Sheppard MS. Moreover, THESL would also endure higher
- 16 maintenance costs associated with existing obsolete non-standard 4kV equipment, when
- 17 compared to standard overhead 27.6kV equipment.

18

19

Portfolio:	Overhead
Project Title:	CSP and Overhead Conductor Replacement
Project Number:	20965
Project Year:	2013
Estimate Cost:	\$904,750

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The objective of this project is to rebuild / replace the aging and/or non standard primary OH

6 distribution equipment on feeder 85M1 in order to improve reliability. This project is one part of

7 seven related projects to rehabilitate this feeder.

8

9 Scope:

10 The scope of work for this project is to replace 145 poles and 50 non standard transformers as

11 well as other non standard assets such as porcelain switches and arrestors. The rebuild

12 boundaries for this project is Codsell Avenuie, Dresden Road, Faywood Boulevard, Findlay

13 Boulevard, Gorman Park Road, Mcallister Road, Norcross Road, Reiner Road.

14

DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	CODSELL AVE.
STATION(S)	BATHURST I TS
FEEDER(S)	NY85M1

15

16 JUSTIFICATION

17

- 19 Feeder 85M1 has sustained eight interruptions during the past year. The area is primarily
- 20 comprised of non-standard poor performing assets such as CSP transformers, glass insulators,

1 arrestors, and switches. As obsolete equipment, such as porcelain insulators and arrestors, ages it

- 2 becomes more contaminated. As such, efforts are required to replace these assets in order to
- 3 improve reliability. Furthermore, pole replacement is required. Aging poles with reduced
- 4 strength not only impact reliability, but can also pose a serious public safety hazard. During the
- 5 past three years, this feeder has experienced on average over 100,000 customer minutes out.
- 6 During the past ten years, there have been over 50 overhead related outages on this feeder. Of
- 7 these outages, 13 are attributed to transformers and 8 due to arrestor failure.
- 8

9 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Ranking (Worst Feeder)169			169
Feeders Experiencing Sustained Interruptions Count (Worst Feeder)8			
HISTORICAL RELIABILITY PERFORMANCE			
2008 2009 2010			
Feeder CI (<i>Cumulative</i>)	5596	178	341
Feeder CMO (<i>Cumulative</i>)	181878	22483	110225

10

- Improves feeder reliability through the installation of animal guards and would reduce
- 13 faults resulting from foreign interference
- Modernizes the system by replacing non-standard transformers to improve restoration
 times after fault events
- Would reduce outage durations and reverse SAIDI trends that have been worsening over
 the past few years
- 18 Increases customer satisfaction due to reduced outage incidents
- Enhances safety to the public and utility personnel by replacing non-standard equipment
- 20 such as porcelain insulators and arrestors that can fail catastrophically (i.e. cracking,
- 21 fragmenting)

• Reduces the number of stressed assets by improving grid operating conditions

2

3 IMPACT OF DEFERRAL

4 If this project were to be deferred, utility personnel will be negatively impacted due to increased exposure to safety hazards associated with this feeder. Moreover, deferral of this work would also 5 6 delay necessary interventions on the feeder that have a significant impact of feeder reliability, 7 especially poles that are at risk of cracking, feathering on the poletop, breakage or loss of strength. 8 This could also result in collateral damage, in the event of an outage situation. 9 Moreover, customers will also continue to experience poor reliability, as the number of outage 10 11 events will increase. Deferral of this project would also increase the likelihood of assets failing, in 12 particular, glass insulators and lightning arrestors caused by insulation breakdown. Lastly, customer satisfaction would also be negatively impacted if this project were deferred due to 13 14 excessive overhead related outages on this feeder.

Portfolio:	Overhead
Project Title:	Refurbish Overhead Feeder 85M23
Project Number:	21113
Project Year:	2013
Estimate Cost:	\$954,382

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The objective of this project is to rebuild / replace the aging and/or non standard primary OH

6 distribution equipment on feeder 85M23 in order to improve reliability. This project is one part

7 of seven related projects to rehabilitate this feeder.

8

9 Scope:

10 The scope of work for this project is to replace 75 poles and 45 non standard transformers as well

11 as other non standard assets such as porcelain switches and arrestors. The rebuild boundaries for

12 this project is Old Orchard Grove, Kereven, Weetwood, Kelso, Bannockburn, Falkirk,

13 Haddington and Clyde.

14

DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	BATHURST ST.
STATION(S)	BATHURST II TS
FEEDER(S)	NY85M23

15

16 JUSTIFICATION

17

- 19 Feeder 85M23 has sustained 13 interruptions during the past year. The area is primarily
- 20 comprised of non-standard poor performing assets such as CSP transformers, glass insulators,

1 arrestors, and switches. As obsolete equipment, such as porcelain insulators and arrestors, ages it

- 2 becomes more contaminated. As such, efforts are required to replace these assets in order to
- 3 improve reliability. Furthermore, pole replacement is required. Aging poles with reduced
- 4 strength not only impact reliability, but can also pose a serious public safety hazard. During the
- 5 past three years, this feeder has experienced on average over 500,000 customer minutes out.
- 6 During the past ten years, there have been over 90 overhead related outages on this feeder. Of
- 7 these outages, 42 are attributed to transformers, 16 attributed to animal contacts, and 11
- 8 attributed to tree contacts.
- 9

10 Historical Performance

FEEDER PERFORMANCE					
Worst Performing Feeder Rankin	Worst Performing Feeder Ranking (Worst Feeder)80				
Feeders Experiencing Sustained	Feeders Experiencing Sustained Interruptions Count (Worst Feeder)13				
HISTORICAL RELIABILITY PERFORMANCE					
	2009	2010			
Feeder CI (<i>Cumulative</i>)	166				
Feeder CMO (<i>Cumulative</i>)	1,304,100	287,995	49,215		

11

- Improves feeder reliability through the installation of animal guards and would reduce
 faults resulting from foreign interference
- Modernizes the system by replacing non-standard transformers to improve restoration
 times after fault events
- Would reduce outage durations and reverse SAIDI trends that have been worsening over
 the past few years
- 19 Increases customer satisfaction due to reduced outage incidents
- Enhances safety to the public and utility personnel by replacing non-standard equipment such as porcelain insulators and arrestors that can fail catastrophically (i.e. cracking,

1 fragmenting)

2

uginenting)

-

• Reduces the number of stressed assets by improving grid operating conditions

3

4 IMPACT OF DEFERRAL

5 If this project were to be deferred, utility personnel will be negatively impacted due to increased

6 exposure to safety hazards associated with this feeder. Moreover, deferral of this work would also

7 delay necessary interventions on the feeder that have a significant impact of feeder reliability,

8 especially poles that are at risk of cracking, feathering on the poletop, breakage or loss of strength.

9 This could also result in collateral damage, in the event of an outage situation.

10

11 Moreover, customers will also continue to experience poor reliability, as the number of outage

12 events will increase. Deferral of this project would also increase the likelihood of assets failing, in

13 particular, glass insulators and lightning arrestors caused by insulation breakdown. Lastly,

14 customer satisfaction would also be negatively impacted if this project were deferred due to

15 excessive overhead related outages on this feeder.

16

Portfolio:	Overhead
Project Title:	Thorncrest (#011) Rear Lot Voltage Conversion (Electrical) Phase #6
Project Number:	21186
Project Year:	2013
Estimate Cost:	\$969,234

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 This project is part of a program to upgrade the 4 kV distribution system to a higher voltage and

6 removing the rear lot plant in the Thorncrest Village area. The purpose of this project in

7 particular is to execute the fifth phase of the electrical potion of this on-going conversion that is

8 bounded by Thornbury Cresecent, Kipling Avenue, Twyford Road, and Thorncrest Road.

9

10 **Scope:**

11 The scope of work for this project is to execute the electrical portion to convert approximately

12 160 customers fed from the rear lot to the front underground with low profile transformers. This

13 electrical phase entails installing primary and secondary cabling from approximately 16 single-

14 phase padmounted transformers and making secondary connection to customers via tap boxes.

15 There are 8.0 km of seconday service conductor, 4.0 km of 1/0 TRXLPE 27.6 kV conductor, and

16 all rear-lot poles, lines, transformers, and switches will be removed.

17

DISTRICT	ETOBICOKE
DISTRICT NEIGHBOURHOOD	THORNCREST RD.
STATION(S)	THORNTON MS
FEEDER(S)	ETRAF2

18

19 JUSTIFICATION

1 **Project Background**

The Thorncrest Village area is reaching the end of its servicable life and similar to other rear lot areas, there is difficulty in accessing and repairing these rear-lot fed equipment. There are also old and non-standard assets and feeder configurations that THESL intends to proactively remove from the backyards of customer properties. This rear lot supply have become a source of concern for public and personnel safety. The age of this distribution coupled with the difficulty to access THESL owned equipment is one of the key driving force for implementing this work.

8

9 Historical Performance

FEEDER PERFORMANCE					
Worst Performing Feeder Rankin	Worst Performing Feeder Ranking (Worst Feeder)215				
Feeders Experiencing Sustained	Feeders Experiencing Sustained Interruptions Count (Worst Feeder)1				
HISTORICAL RELIABILITY PERFORMANCE					
	2010				
Feeder CI (Cumulative)	16				
Feeder CMO (<i>Cumulative</i>)	58497	212743	1040		

10

11 Benefits

12 • Improves power quality as a result of higher primary voltages that has lower line losses and

13 higher transmission efficiency.

• Increases reliability, improving outage duration.

15 • Enhances customer satisfaction as a result of Improves restoration time in the event of

- 16 outages
- Eliminates maintenance and inventory costs that are associated with obsolete and
 discontinued 4 kV distribution equipment
- 19 Improves life-cycle costs
- Enhances safety and improves accessibility of front-lot equipment in the event of an outage
- as opposed to restricted rear-lots

2 IMPACT OF DEFERRAL

3 If the project is to be deferred, lack of access will continue to present safety hazards to crews

4 during emergency outage situations. Delays in rear lot renewal will result in the increasing

5 probability of relatively high-impact outages in these areas. This will significantly decrease

6 reliability in the neighbourhoods and will expose THESL crews to the safety risks inherent when

7 restoring power in rear lot area. Finally, customers will experience lengthy outages and

8 complaints will gradually worsen while maintenance and capital costs will continue to increase

9 as a result of deferring planned work for the eventual decommissioning of MS.

10

Portfolio:	Overhead
Project Title:	Gosford/Milo Park Voltage Conversion & DB Cable Replacement
Project Number:	21721
Project Year:	2013
Estimate Cost:	\$951,715

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to convert feeders SS55F3 and SS55F1 fed by Jane MS from 4kV

6 to 27.6kV. This project is one phase of a multi-phase program to convert the 4kV loads, with the

7 final objective of decommissioning Jane MS. In addition, the purpose of this project is to

8 improve reliability in the Gosford/Milo Park area by replacing poor performing assets.

9

10 **Scope:**

11 The scope of work for this project is to install 1920 m of 3/0 overhead conductor and 350 m of

12 1/0 underground primary conductor to extend the three-phase on Gosford Blvd and Milo Park.

13 This project will also be addressing the replacement of 45 poles, 11 overhead single-phase

14 transformers and three underground transformers.

15

DISTRICT	NORTH YORK	
DISTRICT NEIGHBOURHOOD	GOSFORD/MILO PARK	
STATION(S)	JANE MS	
FEEDER(S)	NYSS55F3, NYSS55F1	

16

17 JUSTIFICATION

18

1	Jane MS was built in the 1950's - 1960's and has already been undergoing voltage conversion in
2	order to address high maintenance costs, obsolete construction standards and deteriorated plant
3	condition. As a result the overhead plant in this area in the vicinity of Gosford and Milo Park is
4	approaching the end of its serviceable life. THESL has identified poor pole conditions, non-
5	standard equipment and insulators. To improve the reliability of the customers in the area, this
6	project will convert the system from 4.16 kV to 27.6 kV. Voltage upgrades sufficiently reduce
7	system losses and the overall life-cycle cost. The voltage conversion is considered to be
8	economical because the feeders are in need of a complete rebuild.
9	
10	The electrical industry is moving away from 4kV equipment, therefore spare parts for these
11	assets are very costly and difficult to attain. This will result in a further increase in outages and
12	more lengthy outages due to lack of readily available spare parts as well as Increased cost for

- 13 reactive replacements.
- 14

To improve the reliability for the customers in the area, it is proposed to replace the primary direct buried, transformers and upgrade voltage from13.8kV to 27.6kV which will also reduce distribution losses in the system. The underground primary direct buried cable feeding to T8346 and T8347 have experience of numerous faults since 2008

19

20 Historical Performance

FEEDER PERFORMANCE					
Worst Performing Feeder Rank	der)	367			
Feeders Experiencing Sustained	Count (Worst Feeder)	2,4			
HISTORICAL RELIABILITY PERFORMANCE					
	2010				
Feeder CI (<i>Cumulative</i>)	105				
Feeder CMO (<i>Cumulative</i>)	166206	39910	22611		

21

- 1 Reduces maintenance costs by removing obsolete 4kV equipment
- Lowers risk of failures due to the replacement of 4kV assets past useful life with existing
 standard 13.8kV equipment
- Increases capacity with 13.8kV feeders to accommodate residential load creep as well as load
 increase from future emerging businesses in the area
- 6 Reduces system losses when 4kV is upgraded to 13.8kV
- 7 Modernizes local distribution system by replacing hardware on the aging distribution system
- 8 Eliminates electrical and safety hazards by replacing assets in poor conditions
- Reduces the probability of outages due to electrical water-tree tracking by replacing glass
 arrestors, insulators and fuses
- 11

12 IMPACT OF DEFERRAL

- 13 Project deferral will result in continued high station maintenance costs. THESL would also
- 14 endure higher maintenance costs associated with other existing obsolete non-standard 4kV
- 15 equipment. Furthermore, deferral of this work would also result in THESL losing the opportunity
- 16 to complete the multi-phase program in order to fully decommission Jane.

Portfolio:	Overhead	
Project Title:	Weston Railway Overhead Rebuild	
Project Number:	22040	
Project Year:	2013	
Estimate Cost:	\$ 991,265	

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The objective of this project is to rebuild / replace the aging and/or non standard primary

6 overhead distribution equipment and replace the XLPE lateral services with tree retardant cable

7 to improve reliability. This project is one part of four related projects to rehabilitate this feeder.

8

9 Scope:

10 The scope of work for this project is to replace 95 poles and 31 non standard transformers as well

11 as other non standard assets such as porcelain switches and arrestors. In addition, the existing

12 3-556 kcmil trunk portion of the primary lines is to be replaced with $1 - \frac{#3}{0}$ fused primary

13 lines. The rebuild boundaries for this project is Wilson Avenue, Weston Railway, Weston Road,

14 Aura Lea Road.

15

DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	WESTON RAILWAY - OH REBUILD
STATION(S)	FINCH II TS
FEEDER(S)	NY55M21

16

17 JUSTIFICATION

18

Feeder 55M21 has sustained three interruptions during the past year. The area is primarily comprised of non-standard poor performing assets such as CSP transformers, glass insulators, arrestors, and switches. As obsolete equipment, such as porcelain insulators and arrestors, ages it becomes more contaminated. As such, efforts are required to replace these assets in order to improve reliability. Furthermore, spot pole replacement is required. Aging poles with reduced strength not only impact reliability, but can also pose a serious public safety hazard. During the past three years, this feeder has consistently experienced over 40,000 customer minutes out.

8

9 Historical Performance

FEEDER PERFORMANCE					
Worst Performing Feeder Rankin	Worst Performing Feeder Ranking (Worst Feeder)247				
Feeders Experiencing Sustained I	Feeders Experiencing Sustained Interruptions Count (Worst Feeder)3				
HISTORICAL RELIABILITY PERFORMANCE					
	2010				
Feeder CI (<i>Cumulative</i>)	1,254				
Feeder CMO (<i>Cumulative</i>)	42,972				

10

- Improves feeder reliability through the installation of animal guards and would reduce
 faults resulting from foreign interference
- Modernizes the system by replacing non-standard transformers to improve restoration
- 15 times after fault events
- Would reduce outage durations and reverse SAIDI trends that have been worsening over
 the past few years
- 18 Increases customer satisfaction due to reduced outage incidents
- 19 Enhances safety to the public and utility personnel by replacing non-standard equipment
- 20 such as porcelain insulators and arrestors that can fail catastrophically (i.e. cracking,
- 21 fragmenting)

- Reduces the number of stressed assets by improving grid operating conditions
- 2 Reduces the number of high-impact feeder exposures
- 3

4 IMPACT OF DEFERRAL

5 If this project were to be deferred, utility personnel will be negatively impacted due to increased

6 exposure to safety hazards associated with this feeder. Moreover, deferral of this work would also

- 7 delay necessary interventions on the feeder that have a significant impact of feeder reliability,
- 8 especially poles that are at risk of cracking, feathering on the poletop, breakage or loss of strength.
- 9 This could also result in collateral damage, in the event of an outage situation. Moreover,
- 10 customers will also continue to experience poor reliability, as the number of outage events will
- 11 increase. Deferral of this project would also increase the likelihood of assets failing, in particular,
- 12 glass insulators and lightning arrestors caused by insulation breakdown. Lastly, customer
- 13 satisfaction would also be negatively impacted if this project were deferred due to excessive
- 14 overhead related outages on this feeder.

Portfolio:	Overhead
Project Title:	Refurbish Feeder Laterals – Feeder 85M10
Project Number:	22208
Project Year:	2013
Estimate Cost:	\$986,870

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

The objective of this project is to rebuild and/or replace the aging and/or non standard primary
overhead distribution equipment on feeder 85M10 in order to improve reliability and replace the
XLPE lateral services with tree retardant cable to improve reliability. This project is one part of

8 three related projects to rehabilitate this feeder.

9

10 **Scope:**

11 The scope of work for this project is to replace 100 poles, and 30 non-standard transformers.

12 Also, poor performing assets such as non-standard glass insulators and arrestors will be replaced

13 as well. In addition, undersized primary overhead conductor will be replaced to standard size. In

14 areas where underground laterals are serviced with early vintage XLPE cable, it will be replaced

15 with standard tree retardant cable. The boundaries of this project are Beffort, Murray, Powell,

- 16 and Regent.
- 17

DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	DOWNSVIEW-RODING-CFB
STATION(S)	BATHURST I TS
FEEDER(S)	NY85M10

18

19 JUSTIFICATION

1 **Project Background**

2 Feeder 85M10 has sustained four interruptions during the past year. The area is primarily 3 comprised of non-standard poor performing assets such as CSP transformers, glass insulators, 4 arrestors, and switches. As obsolete equipment, such as porcelain insulators and arrestors, ages it 5 becomes more contaminated. As such, efforts are required to replace these assets in order to 6 improve reliability. Furthermore, spot pole replacement is required. Aging poles with reduced 7 strength not only impact reliability, but can also pose serious public safety hazard. During 2008 8 this feeder has experienced almost 2,000,000 customer minutes out. Over the past ten years, this 9 feeder experienced over 50 overhead related outages of which 20 of these were transformer 10 related.

11

12 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Rankir	Worst Performing Feeder Ranking (Worst Feeder)213		
Feeders Experiencing Sustained	Interruptions Count	t (Worst Feeder)	4
HISTORICAL RELIABILITY PERFORMANCE			
2008 2009 2010			
Feeder CI (<i>Cumulative</i>) 5,047 2,010			87
Feeder CMO (<i>Cumulative</i>)	1,728,172	69,273	17,872

13

- Improves feeder reliability through the installation of animal guards and would reduce faults
 resulting from foreign interference
- Modernizes the system by replacing non-standard transformers to improve restoration times
 after fault events
- Would reduce outage durations and reverse SAIDI trends that have been worsening over the
- 20 past few years
- Increases customer satisfaction due to reduced outage incidents

- Enhances safety to the public and utility personnel by replacing non-standard equipment such
 as porcelain insulators and arrestors that can fail catastrophically (i.e. cracking, fragmenting)
- 3 Reduces the number of stressed assets by improving grid operating conditions
- 4

5 IMPACT OF DEFERRAL

6 If this project were to be deferred, utility personnel will be negatively impacted due to increased
7 exposure to safety hazards associated with this feeder. Moreover, deferral of this work would also
8 delay necessary interventions on the feeder that have a significant impact of feeder reliability,
9 especially poles that are at risk of cracking, feathering on the poletop, breakage or loss of strength.

10 This could also result in collateral damage, in the event of an outage situation.

11

12 Moreover, customers will also continue to experience poor reliability, as the number of outage

13 events will increase. Deferral of this project would also increase the likelihood of assets failing, in

14 particular, glass insulators and lightning arrestors caused by insulation breakdown. Lastly,

15 customer satisfaction would also be negatively impacted if this project were deferred due to

16 excessive overhead related outages on this feeder.

17

18

19

	Portfolio: Overhead		
	Project Title:	Load Transfe	er (3MVA) A200E to New 13.8kV Feeder
	Project Number:	21935	
	Project Year:	2013	
	Estimate Cost:	\$ 995,334	
1 2	PROJECT DESCRIPTIO)N	
3			
4	Objective:		
5	The purpose of this project	is to transfer ?	3MVA of load from feeder A200E to a new feeder off
6	Carlaw TS A10-11E bus in order to relieve the overloaded feeder A200E.		
7			
8	Scope:		
9	The scope of work on this J	project is to in	stall new cabling underground on the new feeder's
10	circuit breaker on bus A10-	-11E at Carlaw	v TS and then run it along Dundas St and north on
11	Greenwood Ave to the area serviced by feeders B3HW and B5HW (now 13.8kV feeders, fed		
12	from feeder A200E). The load from those two feeders will be transferred to a new feeder. The		
13	project area is bounded by	Danforth Aver	nue in the north, Greenwood Avenue in the east,
14	Gerrard Street in the south,	, and Carlaw A	venue in the west.
15			
	DISTRICT		TORONTO
	DISTRICT NEIGHBOU	RHOOD	RIVERDALE
	STATION(S)		CARLAW MS

B3HW, B5HW

17 JUSTIFICATION

FEEDER(S)

1 THESL intends to transfer 3MVA load from feeders B3HW and B5HW to feeder A200E in 2 order to decommission Hazelwood MS. As a consequence of the load transfer, feeder A200E 3 will be loaded to approximately 9MVA will be near full capacity. The purpose of this project is 4 to relieve some of this consequent load on A200E and transfer about 3MVA to the new feeder off Carlaw TS which will allow the area serviced by A200E to have a full 1st contingency backup 5 6 in the event of an outage. 7 8 **Benefits** 9 Provides a full 1st contingency plan in the event of an outage on A200E, by reducing • 10 A200E's load to a level that can be supplied by backup feeders in the area 11 • Provides additional capacity for load growth in the area, as well as support future Overhead 12 conversion projects 13 14 **IMPACT OF DEFERRAL** 15 Deferring the load transfer from feeder A200E will leave customers supplied by this feeder in a 16 vulnerable position in the event of an outage, as the backup feeder to A200E cannot 17 accommodate an additional 9MVA of load. If the installation of the new feeder is delayed, future 18 planned box construction conversion projects will be delayed as well.

Portfolio:	Overhead
Project Title:	NY80M4 Overhead Rebuild (Wires, Transformers, Insulators,
	Poles)
Project Number:	21193
Project Year:	2013
Estimate Cost:	\$ 851,574

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to replace non-standard CSP transformers, glass insulators,

6 arrestors and rebuild end of life assets on feeder 80M4 in order to improve reliability. This

7 project is one part of five related projects to rehabilitate this feeder.

8

9 Scope:

10 The scope of work for this project includes an replacement of about 45 spans of 3/0 overhead

11 conductor, 39 and 100 poles. Work will span the areas: Cummer Avenue, Doverwood Court,

12 Drewry Avenue, Everingham Court, Fairchild Avenue, Maxome Avenue, Mullet Road,

13 Northwood Drive, Pheasant Road, Silverview Drive, Tobruk Crescent, Urbandale Avenue,

14 Wedgewood Drive and Willowdale Avenue.

15

DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	YONGE STREET
STATION(S)	FAIRCHILD I TS
FEEDER(S)	NY80M4

16

17 JUSTIFICATION

- 18
- 19 Project Background

Feeder 80M4 has sustained 11 interruptions during the past year. The area is primarily comprised 1 2 of non-standard poor performing assets such as CSP transformers, glass insulators, arrestors, and 3 switches. As obsolete equipment, such as porcelain insulators and arrestors, ages it becomes 4 more contaminated. As such, efforts are required to replace these assets in order to improve 5 reliability. Furthermore, spot pole replacement is required. Aging poles with reduced strength not 6 only impact reliability, but can also pose a 8 serious public safety hazard. During the past ten 7 years, this feeder has sustained 30 outages due to overhead defective equipment. Furthermore, 8 during 2010 this feeder experienced over 400,000 customer minutes out and almost 7,000 customer interruptions. This has resulted in a feeder rank of 26th in the worst performing feeder 9 10 list.

11

12 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Rankin	g (Worst Feeder)		26
Feeders Experiencing Sustained I	nterruptions (Wor	st Feeder)	11
HISTORICAL RELIABILITY PERFORMANCE			
2008 2009 2010			
Feeder CI (<i>Cumulative</i>)	616	1,948	6,980
Feeder CMO (<i>Cumulative</i>)	67,047	50,189	402,591

13

- Improves feeder reliability through the installation of animal guards and would reduce faults
 resulting from foreign interference
- Modernizes the system by replacing non-standard transformers to improve restoration times
 after fault events
- Would reduce outage durations and reverse SAIDI trends that have been worsening over the
- 20 past few years
- Increases customer satisfaction due to reduced outage incidents

- 1 Enhances safety to the public and utility personnel by replacing non-standard equipment
- 2 such as porcelain insulators and arrestors that can fail catastrophically (i.e. cracking,
- 3 fragmenting)
- Reduces the number of stressed assets by improving grid operating conditions
- 5

6 IMPACT OF DEFERRAL

7 If this project were to be deferred, utility personnel will be negatively impacted due to increased
8 exposure to safety hazards associated with this feeder. Moreover, deferral of this work would also

9 delay necessary interventions on the feeder that have a significant impact of feeder reliability,

10 especially poles that are at risk of cracking, feathering on the poletop, breakage or loss of strength.

11 This could also result in collateral damage, in the event of an outage situation.

12

13 Moreover, customers will also continue to experience poor reliability, as the number of outage

14 events will increase. Deferral of this project would also increase the likelihood of assets failing, in

15 particular, glass insulators and lightning arrestors caused by insulation breakdown. Lastly,

16 customer satisfaction would also be negatively impacted if this project were deferred due to

17 excessive overhead related outages on this feeder.

Portfolio:	Overhead
Project Title:	Rear Lot #011 Phase #2 Electrical Voltage Conversion
Project Number:	20808
Project Year:	2013
Estimate Cost:	\$873,815

3 PROJECT DESCRIPTION

4

5 **Objective:**

6 The purpose of this project is to build electrical equipment to convert rear lot distribution to front

7 lot underground in the area bounded by Princess Margaret Boulevard, Rathburn Road, Islington

8 Avenue and Kipling Avenue. More specifically, this project is the second phase of electrical

9 work in the area bounded by this project.

10

11 **Scope:**

12 The scope of this project entails installing TRXLPE cable primary risers for a single-phase

13 primary loop that will be connected to the white phase of 88M13. In summary, eight single-

14 phase pad foundations, 32 tap boxes, 4,300m of service cable, and 1,600m of primary cable will

15 be installed. Thereafter, all poles, lines, transformers and switches in the rear lot associated with

16 this conversion will be removed.

17

DISTRICT	ETOBICOKE
DISTRICT NEIGHBOURHOOD	PRINCESS MARGARET BLVD
STATION(S)	LONGFIELD, RAVENSBOURNE
FEEDER(S)	ETBHF2, ETABF3

18

19 JUSTIFICATION

- 20
- 21 Project Background

The area bounded by this project is reaching the end of its servicable life and similar to other rear lot areas, there is difficulty in accessing and repairing these rear-lot fed equipment. There are also old and non-standard assets and feeder configurations that THESL intends to proactively remove from the backyards of customer properties. This rear lot supply have become a source of concern for public and personnel safety. The age of this distribution coupled with the difficulty to access THESL owned equipment is one of the key driving force for implementing this work.

8 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Rankin	Worst Performing Feeder Ranking (Worst Feeder)425		
Feeders Experiencing Sustained	Interruptions Count	t (Worst Feeder)	1, 3
HISTORICAL RELIABILITY PERFORMANCE			
2008 2009 2010			
Feeder CI (<i>Cumulative</i>) 857 618 528			
Feeder CMO (<i>Cumulative</i>)	31,769	29,563	82,068

9

10 Benefits

- Improves power quality as a result of higher primary voltages that has lower line losses and
 higher transmission efficiency.
- 13 Increases reliability, improving outage duration.
- Enhances customer satisfaction as a result of Improves restoration time in the event of

15 outages

• Eliminates maintenance and inventory costs that are associated with obsolete and

- 17 discontinued 4 kV distribution equipment
- 18 Improves life-cycle costs
- Enhances safety and improves accessibility of front-lot equipment in the event of an outage
- 20 as opposed to restricted rear-lots

21 IMPACT OF DEFERRAL

- 1 If the project is to be deferred, the lack of access to crews during emergency outage situations 2 will continue. Delays in rear lot renewal will result in the increasing probability of relatively 3 high-impact outages in these areas. This will significantly decrease reliability in the 4 neighbourhoods and will expose THESL crews to the safety risks inherent when restoring power 5 in rear lot area. Finally, customers will experience lengthy outages and complaints will gradually 6 worsen while maintenance and capital costs will continue to increase as a result of deferring 7 planned work for the eventual decommissioning of MS. 8 9
- 9
- 10

Portfolio:	Overhead
Project Title:	Clayson/Bartor Trunk Feeder Reconfiguration & Refurbishment
Project Number:	21999
Project Year:	2013
Estimate Cost:	\$ 888,519

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The objective of this project is to rebuild and/or replace the aging and/or non standard primary

6 overhead distribution equipment and replace the XLPE lateral services with tree retardant cable

7 to improve reliability. This project is one part of four related projects to rehabilitate this feeder.

8

9 Scope:

10 The scope of work for this project is to install primary overhead lines at several locations along

11 feeder 55M21 as well as replacing approximately 25 end-of-life poles. Replacement of all XLPE

12 primary service laterals with TRXLPE cable from the overhead system to the transformer

13 vault/pad/sub will also be part of this scope. The boundaries of this project are Clayson Rd,

14 Bartor Rd, Huxley Rd and Highbury Rd

15

DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	CLAYSON-BARTOR
STATION(S)	FINCH II TS
FEEDER(S)	NY55M21

16

17 JUSTIFICATION

18

Feeder 55M21 has sustained three interruptions during the past year. The area is primarily comprised of non-standard poor performing assets such as CSP transformers, glass insulators, arrestors, and switches. As obsolete equipment, such as porcelain insulators and arrestors, ages it becomes more contaminated. As such, efforts are required to replace these assets in order to improve reliability. Furthermore, spot pole replacement is required. Aging poles with reduced strength not only impact reliability, but can also pose a serious public safety hazard. During the past three years, this feeder has consistently experienced over 40,000 customer minutes out.

8

9 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Rankin	ng (Worst Feeder)		247
Feeders Experiencing Sustained	Interruptions Coun	t (Worst Feeder)	3
HISTORICAL RELIABILITY PERFORMANCE			
	2010		
Feeder CI (<i>Cumulative</i>)	1,254		
Feeder CMO (<i>Cumulative</i>)	60,313	45,176	42,972

10

11

12 Benefits

- Improves feeder reliability through the installation of animal guards and would reduce
 faults resulting from foreign interference
- Modernizes the system by replacing non-standard transformers to improve restoration
 times after fault events
- Would reduce outage durations and reverse SAIDI trends that have been worsening over
 the past few years
- 19 Increases customer satisfaction due to reduced outage incidents
- Enhances safety to the public and utility personnel by replacing non-standard equipment
- 21 such as porcelain insulators and arrestors that can fail catastrophically (i.e. cracking,

1 fragmenting)

2

Reduces the number of stressed assets by improving grid operating conditions

3

4 **IMPACT OF DEFERRAL**

If this project were to be deferred, utility personnel will be negatively impacted due to increased 5

6 exposure to safety hazards associated with this feeder. Moreover, deferral of this work would also

7 delay necessary interventions on the feeder that have a significant impact of feeder reliability,

8 especially poles that are at risk of cracking, feathering on the poletop, breakage or loss of strength.

9 This could also result in collateral damage, in the event of an outage situation.

10

Moreover, customers will also continue to experience poor reliability, as the number of outage 11

events will increase. The deferral of this project would also increase the likelihood of assets 12

failing, in particular, glass insulators and lightning arrestors caused by insulation breakdown. 13

Lastly, customer satisfaction would also be negatively impacted if this project were deferred due 14

15 to excessive overhead related outages on this feeder.

Portfolio:	Overhead
Project Title:	CSP Replacements NYSS58F1
Project Number:	20370
Project Year:	2013
Estimate Cost:	\$883,352

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to replace non-standard CSP transformers, glass insulators,

6 arrestors on feeder SS58F1 in order to improve reliability.

7

8 Scope:

9 The scope of work for this project is to replace 61 non-standard CSP transformers and spot

10 replacement of poles. The boundaries for this project are Derrydowns and Grandravine.

11

DISTRICT	ETOBICOKE
DISTRICT NEIGHBOURHOOD	DERRYDOWNS RD
STATION(S)	SENTINEL MS
FEEDER(S)	NYSS58F1

12

13 JUSTIFICATION

14

15 **Project Background**

16 Feeder 58F1 has sustained four interruptions during the past year. The area is primarily

17 comprised of non-standard poor performing assets such as CSP transformers, glass insulators,

18 arrestors, and switches. As obsolete equipment, such as porcelain insulators and arrestors, ages it

19 becomes more contaminated. As such, efforts are required to replace these assets in order to

20 improve reliability. During the past ten years, this feeder has sustained 25 outages due to

- 1 overhead related causes. Over the past three years, this feeder has averaged over 80,000
- 2 customer minutes out.
- 3

4 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Rankir	ng (Worst Feeder)		186
Feeders Experiencing Sustained Interruptions Count (Worst Feeder)			4
HISTORICAL RELIABILITY PERFORMANCE			
	2009	2010	
Feeder CI (Cumulative)	1,229		
Feeder CMO (<i>Cumulative</i>)	129,111	77,715	70,535

5

6 Benefits

- Improves feeder reliability through the installation of animal guards and would reduce
 faulta regulting from foreign interference
- 8 faults resulting from foreign interference

9 • Modernizes the system by replacing non-standard transformers to improve restoration

- 10 times after fault events
- Would reduce outage durations and reverse SAIDI trends that have been worsening over
 the past few years
- 13 Increases customer satisfaction due to reduced outage incidents
- Enhances safety to the public and utility personnel by replacing non-standard equipment
- 15 such as porcelain insulators and arrestors that can fail catastrophically (i.e. cracking,
- 16 fragmenting)
- Reduces the number of stressed assets by improving grid operating conditions
- 18
- 19
- 20

21 IMPACT OF DEFERRAL

If this project were to be deferred, utility personnel will be negatively impacted due to increased
 exposure to safety hazards associated with this feeder. Moreover, deferral of this work would also
 delay necessary interventions on the feeder that have a significant impact of feeder reliability,
 especially poles that are at risk of cracking, feathering on the poletop, breakage or loss of strength.
 This could also result in collateral damage, in the event of an outage situation.

7 Moreover, customers will also continue to experience poor reliability, as the number of outage

8 events will increase. Deferral of this project would also increase the likelihood of assets failing,

9 in particular, glass insulators and lightning arrestors caused by insulation breakdown. Lastly,

10 customer satisfaction would also be negatively impacted if this project were deferred due to

11 excessive overhead related outages on this feeder.

Portfolio:	Overhead
Project Title:	CSP Replacement & Tree Proof Cable Installation
Project Number:	19775
Project Year:	2013
Estimate Cost:	\$ 800,276
PROJECT DESCRIPT	TION
Objective:	

6 The purpose of this project is to replace non-standard CSP transformers, glass insulators,

7 arrestors and rebuild feeder 34M6 overhead primary distribution with tree proof conductor in

8 order to improve reliability.

9

2

3

4

5

10 **Scope:**

11 The scope of work for this project is to replace 50 poles and 30 CSP transformers, as well as

12 glass insulators and arrestors. The boundaries for this project are Mount Pleasant Road, The

13 Donway, York Mills Road, and Eglinton Avenue.

14

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	LEASIDE
STATION(S)	LEASIDE TS
FEEDER(S)	NY34M6

15

16 JUSTIFICATION

17

18 **Project Background**

19 Feeder 34M6 has sustained three interruptions during the past year. The area is primarily

20 comprised of non-standard poor performing assets such as CSP transformers, glass insulators,

21 arrestors, and switches. As obsolete equipment, such as porcelain insulators and arrestors, ages it

1 becomes more contaminated. As such, efforts are required to replace these assets in order to

2 improve reliability. Furthermore, spot pole replacement is required. Aging poles with reduced

3 strength not only impact reliability, but can also pose a serious public safety hazard. During the

4 past ten years, this feeder has sustained 24 outages due to overhead related causes.

5

6 Historical Performance

FEEDER PERFORMANCE				
Worst Performing Feeder Rankir	Worst Performing Feeder Ranking (Worst Feeder)102			
Feeders Experiencing Sustained	Feeders Experiencing Sustained Interruptions (Worst Feeder)3			
HISTORICAL RELIABILITY PERFORMANCE				
2008 2009 2010				
Feeder CI (<i>Cumulative</i>) 661 2,721 5,291				
Feeder CMO (<i>Cumulative</i>)	49,160	222,654	118,225	

7

8 Benefits

- Improves feeder reliability through the installation of animal guards and would reduce faults
 resulting from foreign interference
- Modernizes the system by replacing non-standard transformers to improve restoration times
 after fault events
- Would reduce outage durations and reverse SAIDI trends that have been worsening over the
 past few years
- 15 Increases customer satisfaction due to reduced outage incidents
- Enhances safety to the public and utility personnel by replacing non-standard equipment such
- 17 as porcelain insulators and arrestors that can fail catastrophically (i.e. cracking, fragmenting)
- 18 Reduces the number of stressed assets by improving grid operating conditions

19

20 IMPACT OF DEFERRAL

1 If this project were to be deferred, utility personnel will be negatively impacted due to increased

2 exposure to safety hazards associated with this feeder. Moreover, deferral of this work would also

3 delay necessary interventions on the feeder that have a significant impact of feeder reliability,

4 especially poles that are at risk of cracking, feathering on the poletop, breakage or loss of strength.

5 This could also result in collateral damage, in the event of an outage situation.

6

7 Moreover, customers will also continue to experience poor reliability, as the number of outage

8 events will increase. Deferral of this project would also increase the likelihood of assets failing, in

9 particular, glass insulators and lightning arrestors caused by insulation breakdown. Lastly,

10 customer satisfaction would also be negatively impacted if this project were deferred due to

11 excessive overhead related outages on this feeder.

Portfolio:	Overhead
Project Title:	Feeder Rehab SCNAR43M30
Project Number:	22178
Project Year:	2013
Estimate Cost:	\$ 821,785

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to replace the non-standard, aged and poor condition overhead

6 distribution assets to improve the stability of this feeder. This project is one part of three related

7 projects to rehabilitate this feeder.

8

9 Scope:

10 The scope of work for this project is to replace 151 poles as well as non standard assets such as

11 glass insulators and arrestors. The boundaries for this project are Neilson Road, Kingston Road,

12 St. Clair Avenue and Sloley Road.

13

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	ST. CLAIR & MIDLAND
STATION(S)	WARDEN TS
FEEDER(S)	SCNAR43M30

14

15 JUSTIFICATION

16

17 **Project Background**

18 Feeder 43M30 has sustained five interruptions during the past year. The area is primarily

19 comprised of non-standard poor performing assets such as CSP transformers, glass insulators,

20 arrestors, and switches. As obsolete equipment, such as porcelain insulators and arrestors, ages it

- 1 becomes more contaminated. As such, efforts are required to replace these assets in order to
- 2 improve reliability. Furthermore, spot pole replacement is required. Aging poles with reduced
- 3 strength not only impact reliability, but can also pose a serious public safety hazard.
- 4

5 **Historical Performance**

FEEDER PERFORMANCE			
Worst Performing Feeder Ranki	ng (Worst Fee	der)	48
Feeders Experiencing Sustained	Interruptions (Worst Feeder)	5
HISTORICAL RELIABILITY PERFORMANCE			
	2010		
Feeder CI (Cumulative)	4,875	50	152
Feeder CMO (<i>Cumulative</i>)	19,522	6,582	21,394

6

7 **Benefits**

- 8 Improves feeder reliability through the installation of animal guards and would reduce faults
- 9 resulting from foreign interference
- Modernizes the system by replacing non-standard transformers to improve restoration times
 after fault events
- Would reduce outage durations and reverse SAIDI trends that have been worsening over the
 past few years
- 14 Increases customer satisfaction due to reduced outage incidents
- Enhances safety to the public and utility personnel by replacing non-standard equipment such
- 16 as porcelain insulators and arrestors that can fail catastrophically (i.e. cracking, fragmenting)
- Reduces the number of stressed assets by improving grid operating conditions
- 18

19 IMPACT OF DEFERRAL

20 If this project were to be deferred, utility personnel will be negatively impacted due to increased

21 exposure to safety hazards associated with this feeder. Moreover, deferral of this work would also

1 delay necessary interventions on the feeder that have a significant impact of feeder reliability,

- 2 especially poles that are at risk of cracking, feathering on the poletop, breakage or loss of strength.
- 3 This could also result in collateral damage, in the event of an outage situation.
- 4
- 5 Moreover, customers will also continue to experience poor reliability, as the number of outage
- 6 events will increase. Deferral of this project would also increase the likelihood of assets failing, in
- 7 particular, glass insulators and lightning arrestors caused by insulation breakdown. Lastly,
- 8 customer satisfaction would also be negatively impacted if this project were deferred due to
- 9 excessive overhead related outages on this feeder.

Portfolio:	Overhead
Project Title:	Thorncrest (#011) Rear Lot Voltage Conversion Phase #3 (Civil/Electrical)
Project Number:	21211
Project Year:	2013
Estimate Cost:	\$742,784

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 This project is part of a program to upgrade the 4 kV distribution system to a higher voltage and

6 removing the rear lot plant in the Thorncrest Village area. The purpose of this project in

7 particular is to extend 88M13 and convert 4 kV customers to front lot 27.6 kV.

8

9 Scope:

10 This project entails upgrading 88M13 along Rathburn Road and Islington Avenue from 1/0 to

11 556kcmil cable. It requires the extension of 88M13 along Rathburn Road to Kipling Avenue and

12 just north on Kipling for future expansion, while maintaining the 4 kV underbuild. All poles,

13 lines, transformers and switches associated with this conversion will be removed and recovered.

14 In summary, 33 new poles, 32 spans of 556kcmil overhead conductor, 32 spans of bundle

15 secondary, and 4 padmounted transformers with secondary services will be installed.

16

DISTRICT	ETOBICOKE
DISTRICT NEIGHBOURHOOD	THORNCREST
STATION(S)	RICHVIEW
FEEDER(S)	ET88M13

17

18 JUSTIFICATION

- 19
- 20 Project Background

The Thorncrest Village area is reaching the end of its servicable life and similar to other rear lot areas, there is difficulty in accessing and repairing these rear-lot fed equipment. There are also old and non-standard assets and feeder configurations that THESL intends to proactively remove from the backyards of customer properties. This rear lot supply have become a source of concern for public and personnel safety. The age of this distribution coupled with the difficulty to access THESL owned equipment is one of the key driving force for implementing this work.

7

8 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Rankin	Worst Performing Feeder Ranking (Worst Feeder)40		
Feeders Experiencing Sustained	Interruptions Count	t (Worst Feeder)	4
HISTORICAL RELIABILITY PERFORMANCE			
2008 2009 2010			
Feeder CI (<i>Cumulative</i>)	8,614	10,822	13,822
Feeder CMO (<i>Cumulative</i>)	37,220	92,019	27,902

9

10 Benefits

- Improves power quality as a result of higher primary voltages that has lower line losses and
 higher transmission efficiency.
- Increases reliability due to converting rear-lot fed areas and in turn, improving outage
 duration. Furthermore, replacing aging 4.16 kV infrastructure, as well as station circuit
 breakers and switchgear, also contributes to Improves reliability.
- Enhances customer satisfaction as a result of Improves restoration time in the event of
 outages
- Eliminates maintenance and inventory costs that are associated with obsolete and
 discontinued 4 kV distribution equipment
- Improves life-cycle costs that are attributed to the 27.6 kV distribution system as opposed to
 a 4 kV system.

- Enhances safety and improves accessibility of front-lot equipment in the event of an outage
 as opposed to restricted rear-lots
- 3

4 IMPACT OF DEFERRAL

- 5 If the project is to be deferred, the lack of access to crews during emergency outage situations
- 6 will continue. Delays in rear lot renewal will result in the increasing probability of relatively
- 7 high-impact outages in these areas. This will significantly decrease reliability in the
- 8 neighbourhoods and will expose THESL crews to the safety risks inherent when restoring power
- 9 in rear lot area. Finally, customers will experience lengthy outages and complaints will gradually
- 10 worsen while maintenance and capital costs will continue to increase as a result of deferring
- 11 planned work for the eventual decommissioning of the MS.

Portfolio:	Overhead
Project Title:	CSP and Insulator Replacement (YK11M5) Phase #2
Project Number:	20385
Project Year:	2013
Estimate Cost:	\$799,997

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to replace the non-standard, aged and poor condition overhead

6 distribution assets to improve the stability of feeder 11M5. This project is one part of two related

7 projects to rehabilitate this feeder.

8

9 Scope:

10 The scope of work for this project is to replace approximately 60 CSP transformers as well as

11 glass insulators and arrestors. Also, due to end-of-life conditions, spot replacement of poles will

12 also be undertaken. The boundaries of the project are Runymede Avenue, Waston Avenue,

13 Corbett Avenue and Annette Street.

14

DISTRICT	YORK
DISTRICT NEIGHBOURHOOD	RUNNYMEDE
STATION(S)	RUNNYMEDE TS
FEEDER(S)	YK11M5

15

16 JUSTIFICATION

17

18 Project Background

- 19 Feeder 11M5 has sustained eight interruptions during the past year. The area is primarily
- 20 comprised of non-standard poor performing assets such as CSP transformers, glass insulators,

arrestors, and switches. As obsolete equipment, such as porcelain insulators and arrestors, ages it becomes more contaminated. As such, efforts are required to replace these assets in order to improve reliability. Furthermore, spot pole replacement is required. Aging poles with reduced strength not only impact reliability, but can also pose a serious public safety hazard. Over the past three years this feeder experienced an average of over 300,000 customer minutes out and over 7,000 customer interruptions. As a result, this feeder is ranked 9th on the worst performing feeder list.

8

9 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Rankin	Worst Performing Feeder Ranking (Worst Feeder)9		
Feeders Experiencing Sustained Interruptions Count (Worst Feeder)8			8
HISTORICAL RELIABILITY PERFORMANCE			
	2010		
Feeder CI (Cumulative)	1,520	6,084	14,210
Feeder CMO (<i>Cumulative</i>)	142,160	466,604	423,523

10

11 Benefits

12 • Improves feeder reliability through the installation of animal guards and would reduce faults

13 resulting from foreign interference

- Modernizes the system by replacing non-standard transformers to improve restoration times
 after fault events
- Would reduce outage durations and reverse SAIDI trends that have been worsening over the
 past few years
- 18 Increases customer satisfaction due to reduced outage incidents
- 19 Enhances safety to the public and utility personnel by replacing non-standard equipment such
- 20 as porcelain insulators and arrestors that can fail catastrophically (i.e. cracking, fragmenting)
- Reduces the number of stressed assets by improving grid operating conditions

2 IMPACT OF DEFERRAL

3 If this project were to be deferred, utility personnel will be negatively impacted due to increased exposure to safety hazards associated with this feeder. Moreover, deferral of this work would also 4 delay necessary interventions on the feeder that have a significant impact of feeder reliability, 5 especially poles that are at risk of cracking, feathering on the poletop, breakage or loss of strength. 6 7 This could also result in collateral damage, in the event of an outage situation. 8 Moreover, customers will also continue to experience poor reliability, as the number of outage 9 10 events will increase. Deferral of this project would also increase the likelihood of assets failing, in 11 particular, glass insulators and lightning arrestors caused by insulation breakdown. Lastly,

12 customer satisfaction would also be negatively impacted if this project were deferred due to

13 excessive overhead related outages on this feeder.

Portfolio:	Portfolio: Overhead	
Project Title:	NY55M25 Overhead Feeder Equipment Rehab	
Project Number:	20412	
Project Year:	2013	
Estimate Cost:	\$ 716,308	
PROJECT DESCRIP	PTION	
Objective:		
The purpose of this pro	pject is to replace the non-standard, aged and bad condition overhead	
distribution assets to improve the stability of feeder 55M25. This project is one part of twelve		
related projects to reha	bilitate this feeder.	
Scope:		
The scope of work for this project is to install approximately 30 poles and replace 50 CSP		
transformers as well as glass insulators and arrestors. The boundaries of this scope are Oakdale		
Road, Sheppard Avenue, and Giltspur Drive.		

1 2

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DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	SHEPPARD-OAKDALE
STATION(S)	FINCH II TS
FEEDER(S)	NY55M25

15

16 JUSTIFICATION

17

18 Project Background

- 19 Feeder 55M25 has sustained eight interruptions during the past year. The area is primarily
- 20 comprised of non-standard poor performing assets such as CSP transformers, glass insulators,

arrestors, and switches. As obsolete equipment, such as porcelain insulators and arrestors, ages it
becomes more contaminated. As such, efforts are required to replace these assets in order to
improve reliability. Furthermore, spot pole replacement is required. Aging poles with reduced
strength not only impact reliability, but can also pose a serious public safety hazard. Over the
past three years this feeder experienced an average of over 120,000 customer minutes out and
over 1,500 customer interruptions.

7

8 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Rankin	ng (Worst Feeder)		100
Feeders Experiencing Sustained	Interruptions Coun	t (Worst Feeder)	8
HISTORICAL RELIABILITY PERFORMANCE			
	2010		
Feeder CI (<i>Cumulative</i>)	306		
Feeder CMO (<i>Cumulative</i>)	29,119	283,018	42,326

9

10

11 Benefits

• Improves feeder reliability through the installation of animal guards and would reduce faults

13 resulting from foreign interference

- Modernizes the system by replacing non-standard transformers to improve restoration times
 after fault events
- Would reduce outage durations and reverse SAIDI trends that have been worsening over the
 past few years
- 18 Increases customer satisfaction due to reduced outage incidents
- Enhances safety to the public and utility personnel by replacing non-standard equipment
- 20 such as porcelain insulators and arrestors that can fail catastrophically (i.e. cracking,
- 21 fragmenting)

• Reduces the number of stressed assets by improving grid operating conditions

2

3 IMPACT OF DEFERRAL

4 If this project were to be deferred, utility personnel will be negatively impacted due to increased exposure to safety hazards associated with this feeder. Moreover, deferral of this work would also 5 6 delay necessary interventions on the feeder that have a significant impact of feeder reliability, 7 especially poles that are at risk of cracking, feathering on the poletop, breakage or loss of strength. 8 This could also result in collateral damage, in the event of an outage situation. 9 Moreover, customers will also continue to experience poor reliability, as the number of outage 10 events will increase. Deferral of this project would also increase the likelihood of assets failing, in 11 12 particular, glass insulators and lightning arrestors caused by insulation breakdown. Lastly, customer satisfaction would also be negatively impacted if this project were deferred due to 13 14 excessive overhead related outages on this feeder.

Portfolio:	Overhead
Project Title:	Overhead Rehab SCREF3
Project Number:	22229
Project Year:	2013
Estimate Cost:	\$ 677,325

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to replace non-standard assets that have reached the end of their 6 serviceable life and thus, improve the stability of this feeder.

7

8 Scope:

9 The scope of this project is to address overhead outages by replacing non-standard or poor

10 condition assets and adding animal guards. This will improve the reliability of supply to

11 customers and bring the distribution to the latest standard. Work includes the replacement of

12 poles at 132 locations, 357 porcelain insulators at 191 locations, 57 animal guards and bare drop

13 wire, and the installation of ground wire U-guards at 15 locations.

14

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	SHEPPARD & BIRCHMOUNT
STATION(S)	SHEPPARD KENNEDY
FEEDER(S)	SCREF3

15

16 JUSTIFICATION

17

18 Project Background

- 19 This feeder experienced 4 outages in the past year. The recent feeder patrol on SCREF3
- 20 identified a number of areas which require attention. Feeder patrols identified poles which are in

- 1 poor condition and with non-standard porcelain insulators, animal guards, bare transformer drop
- 2 wires and aged porcelain switches that should conform to THESL's current construction
- 3 standards.
- 4

5 **Historical Performance**

FEEDER PERFORMANCE			
Worst Performing Feeder Rankin	ng (Worst Feeder)		173
Feeders Experiencing Sustained	Interruptions (Wor	rst Feeder)	4
HISTORICAL RELIABILITY PERFORMANCE			
2008 2009 2010			
Feeder CI (<i>Cumulative</i>)	1,215	823	439
Feeder CMO (<i>Cumulative</i>)	87,490	83,159	21,478

⁶

7 **Benefits**

- Improves feeder reliability through the installation of animal guards and would reduce faults
 resulting from foreign interference
- Modernizes the system by replacing non-standard transformers to improve restoration times
 after fault events
- Would reduce outage durations and reverse SAIDI trends that have been worsening over the
 past few years
- Increases customer satisfaction due to reduced outage incidents
- Enhances safety to the public and utility personnel by replacing non-standard equipment
- 16 such as porcelain insulators and arrestors that can fail catastrophically (i.e. cracking,
- 17 fragmenting)
- Reduces the number of stressed assets by improving grid operating conditions
- 19
- 20 IMPACT OF DEFERRAL \setminus

1 If this project were to be deferred, utility personnel will be negatively impacted due to increased

2 exposure to safety hazards associated with this feeder. Moreover, deferral of this work would also

3 delay necessary interventions on the feeder that have a significant impact of feeder reliability,

4 especially poles that are at risk of cracking, feathering on the poletop, breakage or loss of strength.

5 This could also result in collateral damage, in the event of an outage situation.

6

7 Moreover, customers will also continue to experience poor reliability, as the number of outage

8 events will increase. Deferral of this project would also increase the likelihood of assets failing, in

9 particular, glass insulators and lightning arrestors caused by insulation breakdown. Lastly,

10 customer satisfaction would also be negatively impacted if this project were deferred due to

11 excessive overhead related outages on this feeder.

Portfolio:	Overhead
Project Title:	Voltage Conversion KHF2 SCKHF2
Project Number:	20774
Project Year:	2013
Estimate Cost:	\$ 663,387

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The objective of this project is to convert loads of feeder KHF2 fed by Brimley Sheppard MS

6 from 13.8kV to 27.6kV. This project is one phase of a multi-phase program to convert the entire

7 13.8kV load at Brimley Sheppard MS, with the final objective of decommissioning Brimley

8 Sheppard MS.

9

10 **Scope:**

11 The scope of this project involves voltage conversion of existing 13.8kV feeder KHF2 to

12 27.6kV. Work will involve removing all existing 13.8kV primary transformers, switches and

13 replace with 27.6kV primary equipments. New primary line will need to be installed and 13.8kV

- 14 line removed.
- 15

DISTRICT	Scarborough
DISTRICT NEIGHBOURHOOD	Sheppard Avenue East & McCowan Road
STATION(S)	Brimley Sheppard(13.8 kV)
FEEDER(S)	SCKHF2

16

17 JUSTIFICATION

18

19 Project Background

Brimley Sheppard MS was originally built in 1965 and has already been undergoing voltage 1 2 conversion in order to address high maintenance costs, obsolete construction standards and 3 deteriorated plant condition. The station was built with PILC cables during the time around 4 construction of the station. Both transformer and 13.8kV breakers are very old. The 13.8kv 5 distribution system is also old. These were several failures on the primary cables installed direct 6 buried. The oil circuit breakers have reached their end of life. There are PILC cables on both 7 sides (27.6 and 13.8kV) of the transformer. 8 9 To reduce the maintenance cost from the station and distribution equipment and to modernize the 10 electrical distribution, THESL will convert the distribution fed from this MS with the latest 11 27.6kV assets and with THESL standard. 12

13 In addition, the project needs to be carried out to accommodate residential load creep as well as

- 14 load increase from future emerging businesses in the area.
- 15

16 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Rankin	ng (Worst Feeder)		472
Feeders Experiencing Sustained	Feeders Experiencing Sustained Interruptions (Worst Feeder)1		
HISTORICAL RELIABILITY PERFORMANCE			
2008 2009 2010			
Feeder CI (Cumulative)6000			
Feeder CMO (<i>Cumulative</i>)	23,100	0	0

17

18 Benefits

- 19 Improves the safety of THESL crew workers and the public
- 20 Reduction of maintenance costs
- Lower risk of failures due to the replacement of 13.8kV assets past useful life with existing

- 1 standard 27.6kV equipment
- Increases capacity with 27.6kV feeders to accommodate residential load creep as well as load
 increase from future emerging businesses in the area
- 4 Improvement in the aesthetics of the street
- 5 Reduction of system losses when 13.8kV is upgraded to 27.6kV
- Eliminates the need of maintaining station power transformer and obsolete switchgear and an
 old 13.8kv distribution.
- Modernizes the distribution by converting the old feeder to standard 27.6kV distribution
 system.
- Helps the removal of overhead lines crossing Sheppard to facilitate construction of future
 LRT corridor.
- 12

13 IMPACT OF DEFERRAL

- 14 Defferal of this project will delay the decommissioning of the MSs whose switchgear and
- 15 breaker have become obsolete. This will also delay the completion of a series of projects of
- 16 Brimley Sheppard. THESL would also endure higher maintenance costs associated with the
- 17 existing obsolete non-standard 13.8kV equipment as compared to standard overhead 27.6kV
- 18 equipment.

Portfolio:	Overhead
Project Title:	Refurbish Overhead Feeder 85M23 Phase #4
Project Number:	21123
Project Year:	2013
Estimate Cost:	\$628,452

2

3 PROJECT DESCRIPTION

4

5 **Objective:**

6 The purpose of this project is to replace the non-standard, aged and bad condition overhead

7 distribution assets to improve the stability of feeder 85M23. This project is one part of seven

8 related projects to rehabilitate this feeder.

9

10 **Scope:**

11 The scope of this project is to replace of CSP transformers at 32 locations and poles at 75

12 locations along the 6 streets (Cranbrooke, Woburn, Bedford Park, Douglas, Glenganry and

13 Avenue). Non-standard or deteriorated hardware at the pole and transformer locations including,

14 glass or porcelain insulators, porcelain arrestors, etc. are proposed to be replaced.

15

DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	BATHURST
STATION(S)	BATHURST II TS
FEEDER(S)	NY85M23

16

17 JUSTIFICATION

18

19 Project Background

1 Feeder 85M23 has sustained thirteen interruptions during the past year. The area is primarily 2 comprised of non-standard poor performing assets such as CSP transformers, glass insulators, 3 arrestors, and switches. As obsolete equipment, such as porcelain insulators and arrestors, ages it 4 becomes more contaminated. As such, efforts are required to replace these assets in order to 5 improve reliability. Furthermore, spot pole replacement is required. Aging poles with reduced 6 strength not only impact reliability, but can also pose a serious public safety hazard. Over the 7 past three years this feeder experienced an average of over 500,000 customer minutes out and 8 over 18,000 customer interruptions. Over the past ten years, this feeder has experienced 91 9 overhead related outages. Of these, 42 were attributed to transformer related causes.

- 10
- 11

12 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Rankin	g (Worst Feeder)		80
Feeders Experiencing Sustained Interruptions Count (Worst Feeder)13			13
HISTORICAL RELIABILITY PERFORMANCE			
	2010		
Feeder CI (Cumulative)	50166	4105	166
Feeder CMO (<i>Cumulative</i>)	1304100	287995	49215

13

14 **Benefits**

- Improves feeder reliability through the installation of animal guards and would reduce faults
 resulting from foreign interference
- Modernizes the system by replacing non-standard transformers to improve restoration times
 after fault events
- Would reduce outage durations and reverse SAIDI trends that have been worsening over the
- 20 past few years
- Increases customer satisfaction due to reduced outage incidents

- Enhances safety to the public and utility personnel by replacing non-standard equipment
- 2 such as porcelain insulators and arrestors that can fail catastrophically (i.e. cracking,
- 3 fragmenting)
- Reduces the number of stressed assets by improving grid operating conditions
- 5

6 IMPACT OF DEFERRAL

7 If this project were to be deferred, utility personnel will be negatively impacted due to increased
8 exposure to safety hazards associated with this feeder. Moreover, deferral of this work would also

9 delay necessary interventions on the feeder that have a significant impact of feeder reliability,

10 especially poles that are at risk of cracking, feathering on the poletop, breakage or loss of strength.

11 This could also result in collateral damage, in the event of an outage situation.

12

13 Moreover, customers will also continue to experience poor reliability, as the number of outage

14 events will increase. Deferral of this project would also increase the likelihood of assets failing, in

15 particular, glass insulators and lightning arrestors caused by insulation breakdown. Lastly,

16 customer satisfaction would also be negatively impacted if this project were deferred due to

17 excessive overhead related outages on this feeder.

Portfolio:	Overhead
Project Title:	Elynhill, Ellerslie, Betty Ann, and Park Home OH Rebuild Phase #2
Project Number:	22180
Project Year:	2013
Estimate Cost:	\$650,636

3 PROJECT DESCRIPTION

4

5 **Objective:**

6 The purpose of this project is to improve and refurbish power supply reliability by rehabilitating
7 aging distribution infrastructure on feeder NY80M1.

8

9 Scope:

10 The scope of this project requires that end-of-life and non-standard assets be replaced. Within the

11 boundaries of this project, all overhead primary conductors, end-of-life poles and CSP

12 transformers will be replaced with current standard equipment. During the rebuild of the area, it

13 is proposed to rebuild all non-standard assets as well. In summary, 65 poles and 21 transformers

14 will be replaced. The boundaries of this project are Senlac Road, Alonzo Road, Elynhill Drive

15 and Park Home Avenue.

16

DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	ELYNHILL DR.
STATION(S)	FAIRCHILD I TS
FEEDER(S)	NY80M1

17

18 JUSTIFICATION

19

20 Project Background

1 Feeder 80M1 has sustained 15 outages during the past year and is ranked 30th on the WPF list.

- 2 Most of the assets on the laterals have approached end-of-life and are non-standard. The feeder
- 3 has numerous non-standard porcelain insulators, porcelain switches and many poles are
- 4 deteriorating. Also, installation of animal guards is required. Animal contact is one of the biggest
- 5 contributors to outages in this area and thus, the installation of animal guards is required. All
- 6 existing switches and arrester brackets that are steel need replacement as per current standards,
- 7 as well as porcelain lightning arrestors.
- 8

9 Historical Performance

FEEDER PERFORMANCE				
Worst Performing Feeder Ranki	Worst Performing Feeder Ranking (Worst Feeder)30			
Feeders Experiencing Sustained	Feeders Experiencing Sustained Interruptions Count (Worst Feeder)15			
HISTORICAL RELIABILITY PERFORMANCE				
2008 2009 2010				
Feeder CI (Cumulative)	4341			
Feeder CMO (<i>Cumulative</i>)	133234	151817	140091	

10

11 Benefits

- 12 Reduces the probability of outages due to electrical water-tree tracking by replacing
- 13 porcelain arrestors, insulators and fuses
- Improves feeder reliability through the installation of animal guards and would reduce faults
 resulting from foreign interference
- Modernizes the system by replacing non-standard transformers to improve restoration times
 after fault events
- Reduces outage durations and reverse SAIDI trends that have been worsening over the past
 few years
- 20 Increases customer satisfaction due to reduced outage incidents
- Enhances safety to the public and utility personnel by replacing non-standard equipment such

- 1 as porcelain insulators and arrestors that can fail catastrophically (i.e. cracking, fragmenting)
- 2 Reduces the number of stressed assets by improving grid operating conditions
- 3

4 IMPACT OF DEFERRAL

5 If this project were to be deferred, utility personnel will be negatively impacted due to increased

6 exposure to safety hazards associated with this feeder. Moreover, deferral of this work would also

7 delay necessary interventions on the feeder that have a significant impact of feeder reliability,

8 especially poles that are at risk of cracking, feathering on the poletop, breakage or loss of strength.

9 This could also result in collateral damage, in the event of an outage situation.

10

11 Moreover, customers will also continue to experience poor reliability, as the number of outage

12 events will increase. The deferral of this project would also increase the likelihood of assets

13 failing, in particular, glass insulators and lightning arrestors caused by insulation breakdown.

14 Furthermore, the feeder will be exposed to increased outages due to animal and tree interference.

Portfolio:	Overhead
Project Title:	Rebuild Windfield MS Area with Voltage Conversion 51M21
Project Number:	20260
Project Year:	2013
Estimate Cost:	\$ 639,589

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The objective of this project is to convert 4kV feeders fed by Windfield (SS27) MS from 4kV to

6 27.6kV system. The final objective of this project is to decommission Windfield MS.

7

8 Scope:

9 This project includes building new overhead 27.6kV lines on these streets the following streets:

10 Wilket Rd, Wyengate Crt, Tudor Gate, Harrison Rd, Sulgrave Cres, Colverstone Rd, Rollscourt

11 Dr, Bachelor Pl, Bayview Avenue and York Mills Rd. Convert all primary distribution with

12 overhead using ASC 556kcmil for the three-phase feeder mains and 3/0 ACSR for fused

13 spurs/radials. Use 140k fuse for the first lateral and 100k or less (based on the connected

14 transformer/load) for the second lateral, if any. Replace all the transformers with 27.6/16 kV

15 units and keeping existing secondary as per the present THESL standards. Dismantle and remove

16 all the single and three-phase laterals, leaving only the 4kV feeder mains for now until all

17 conversions of the four MSs (SS21, SS27, SS37, SS46) are complete.

18

DISTRICT	North York
DISTRICT NEIGHBOURHOOD	Bayview Avenue & York Mills Road
STATION(S)	Windfield MS(4.16 kV)
FEEDER(S)	NYSS27F1,NYSS27F2,NYSS27F3

19

20 JUSTIFICATION

2 **Project Background**

3 Winfield MS station was originally built in mid-sixties and has already been undergoing voltage 4 conversion in order to address high maintenance costs, obsolete construction standards and 5 deteriorated plant condition. The existing 4kV feeders are overhead design and are difficult to 6 maintain, as they are an obsolete distribution standard. There are currently a high number of 7 assets past their useful life on these feeders, and needs to be addressed. Currently three MS 8 stations supply an isolated 4kV distribution. A few voltage conversion (including rear lot) 9 projects have been planned after the serious overloading in a contingency situation in early 2008. 10 To reduce the maintenance cost on the station and distribution equipment and to modernize the 11 electrical distribution, THESL proposes to convert the isolated 4kV distribution area with the 12 latest 27.6kV assets and with THESL standard.

13

In addition, the project needs to be carried out to accommodate residential load creep as well as load increase from future emerging businesses in the area. Feeder NY51M21 will supply most of

- 16 the load for this project.
- 17

18 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Rankin	Worst Performing Feeder Ranking (Worst Feeder)5		
Feeders Experiencing Sustained	Feeders Experiencing Sustained Interruptions (Worst Feeder)19		
HISTORICAL RELIABILITY PERFORMANCE			
2008 2009 2010			
Feeder CI (Cumulative) 5,939 15,060 9,953			
Feeder CMO (<i>Cumulative</i>)	117,650	2,280,363	399,449

¹⁹

20 Benefits

• Modernizes by replacing 45 year old 4kV distribution system with 27.6kV

- 1 Reduces maintenance costs by removing obsolete 4kV equipment
- Lowers risk of failures due to the replacement of 4kV assets past useful life with existing
 standard 27.6kV equipment
- Increases capacity with 27.6kV feeders to accommodate residential load creep as well as load
 increase from future emerging businesses in the area
- 6 Reduces of system losses when 4kV is upgraded to 27.6V
- 7 Reconfigures the distribution for the latest THESL standard for operation and protection
- 8 Reduces the overloading on the existing and remaining 4kV feeders
- Paves the way for decommissioning the MS station whose switchgear and breakers have
 become obsolete
- 11 Targets to achieve better operational flexibility and more reliable supply
- 12

13 IMPACT OF DEFERRAL

14 Deferral may bring this project in conflict with projects from other utilities or the newly imposed

- 15 city moratorium. Potential overloading situation will continue to exist. Defferal will delay the
- 16 decommissioning of the MS where the switchgear and breaker have become obsolete. THESL
- 17 would also endure higher maintenance costs associated with existing obsolete non-standard 4kV

18 equipment, when compared to the standard overhead 27.6kV equipment.

Portfolio:	Overhead
Project Title:	Rebuild Area of MS EA and GB with Voltage Conversion
Project Number:	19911
Project Year:	2013
Estimate Cost:	\$ 576,290

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to convert existing 4kV feeders from Comstock Faulklands (EA)
6 and Civic Sinnott (GB) station to 27.6kV system. This project is to completely is to convert the

7 loads from these two stations with the final objective to decomission the station.

8

9 Scope:

10 The scope of the project is to convert all primary distribution with overhead using ASC 556kcmil

11 for the three-phase feeder mains and 3/0 ACSR for fused spurs/radials. Use 140k fuse for the

12 first lateral and 100k or less (based on the connected transformer/load) for the second lateral, if

13 any.For the underground install 1/0 Al TRXLPE in concrete encased ducts.Replace all the

14 transformers with 27.6/16.0kV units, and keeping existing secondaries. The feeders involved are:

15 EA-F1, EA-F2, EA-F3, TJ-F1, TJ-F3, GB-F1, GB-F2, GB-F3 and WA-F2 from Comstock

16 Faulklands MS, Birchmount Ashtonbee MS, Civic Sinnott MS and Craigton Pharmacy MS. At

17 the end of the project dismantle and remove all 4kV assets from the area bounded by south side

18 of Hydro One ROW, west side of Birchmount Road.

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	EGLINTON & WARDEN
	COMSTOCK FAULKLANDS MS & CIVIC
STATION(S)	SINNOTT MS

FEEDER(S)	TJF3		
JUSTIFICATION			
Project Background			
Comstock Faulklands (EA) and C	Civic Sinnott (GB) v	vere built in 1952	and 1956 respectively
outdoor type stations. Transforme	ers and oil breakers	there are very old	d. The 4kV distribution
system supplying the area is also	old. To reduce the	maintenance cost	from the station and
distribution equipment and to mo	odernize the electric	al distribution, TI	HESL proposes to conv
the area with the latest 27.6kV as	ssets and with THES	SL standard.	
The conversion of distribution of	f the area supplied b	y Comstock Faul	klands (EA) and Civic
The conversion of distribution of Sinnott (GB) and part of Birchmo		-	
	ount Ashtonbee TJ-	F3 west of Birchr	nount Road, will allow
Sinnott (GB) and part of Birchmo	ount Ashtonbee TJ-	F3 west of Birchr	nount Road, will allow
Sinnott (GB) and part of Birchmo	ount Ashtonbee TJ-	F3 west of Birchr	nount Road, will allow
Sinnott (GB) and part of Birchmore removal of all 4kV lines south of	ount Ashtonbee TJ-	F3 west of Birchr	nount Road, will allow
Sinnott (GB) and part of Birchmo removal of all 4kV lines south of Historical Performance	ount Ashtonbee TJ-I	F3 west of Birchr	nount Road, will allow
Sinnott (GB) and part of Birchmo removal of all 4kV lines south of Historical Performance FEEDER PERFORMANCE	ount Ashtonbee TJ-J f Hydro One ROW a ing (<i>Worst Feeder</i>)	F3 west of Birchr	nount Road, will allow mount.
Sinnott (GB) and part of Birchmo removal of all 4kV lines south of Historical Performance FEEDER PERFORMANCE Worst Performing Feeder Ranki	ount Ashtonbee TJ- f Hydro One ROW a ing (<i>Worst Feeder</i>) I Interruptions (<i>Wor</i>)	F3 west of Birchr and west of Birch	nount Road, will allow mount.
Sinnott (GB) and part of Birchmo removal of all 4kV lines south of Historical Performance FEEDER PERFORMANCE Worst Performing Feeder Ranki Feeders Experiencing Sustained	ount Ashtonbee TJ- f Hydro One ROW a ing (<i>Worst Feeder</i>) I Interruptions (<i>Wor</i>)	F3 west of Birchr and west of Birch	nount Road, will allow mount.
Sinnott (GB) and part of Birchmo removal of all 4kV lines south of Historical Performance FEEDER PERFORMANCE Worst Performing Feeder Ranki Feeders Experiencing Sustained	ount Ashtonbee TJ- f Hydro One ROW a ing (<i>Worst Feeder</i>) l Interruptions (<i>Wor</i> Y PERFORMANC	F3 west of Birchr and west of Birch st Feeder)	nount Road, will allow mount. 306 1

- Lowers the risk of failures due to the replacement of approximately 55 years worth of 4kV
- 19 assets with existing standard 27.6kV equipment

- 1 Reduces maintenance costs by removing obsolete 4kV equipment
- 2 Increases capacity with 27.6kV feeders to accommodate load creep as well as load increase
- 3 from future emerging businesses in the area
- Reduces system losses when 4kV is upgraded to 27.6kV
- 5 Reconfigures the distribution for the latest THESL standard for operation and protection.
- 6

7 IMPACT OF DEFERRAL

- 8 Deferral may bring this project in conflict with projects from other utilities or the newly imposed
- 9 city moratorium. THESL would also endure higher maintenance costs associated with existing,
- 10 obsolete non-standard 4kV equipment when compared to standard overhead 27.6kV equipment.
- 11 Lastly, if this work was to be deferred, there is a higher risk of failure due to the number of assets
- 12 past useful life.

Portfolio: Overhead		
Project Title:Refurbish Overhead Feeder 85M23 Phase #2 of 4		
Project Number:	21118	
Project Year:	2013	
Estimate Cost:	\$570,313	
PROJECT DESCRIP	TION	
Objective :		
The purpose of this pro	ject is to replace the non-standard, aged and poor condition overhead	
distribution assets to improve the stability of feeder 85M23. This project is one part of seven		
related projects to rehal	bilitate this feeder.	
Scope:		
The scope of work for	this project requests the installation of 65 spans of tree-proof #3/0 ACSR	
conductors along five streets (Kelso Avenue, Clyde Avenue, Carmichael Avenue, Joicey		
Boulevard and Dunblaine Avenue). Replacement of CSP transformers at 31 locations and poles		

14 at 42 locations will also be executed as part of this project.

15

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DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	BATHURST
STATION(S)	BATHURST II TS
FEEDER(S)	NY85M23

16

17 JUSTIFICATION

18

19 Project Background

- 20 Feeder 85M23 has sustained thirteen interruptions during the past year. The area is primarily
- 21 comprised of non-standard poor performing assets such as CSP transformers, glass insulators,

arrestors, and switches. As obsolete equipment, such as porcelain insulators and arrestors, ages it
becomes more contaminated. As such, efforts are required to replace these assets in order to
improve reliability. Furthermore, spot pole replacement is required. Aging poles with reduced
strength not only impact reliability, but can also pose a serious public safety hazard. Over the
past three years this feeder experienced an average of over 500,000 customer minutes out and
over 18,000 customer interruptions. Over the past ten years, this feeder has experienced 91
overhead related outages. Of these, 42 were attributed to transformer related causes.

8

9 **Historical Performance**

FEEDER PERFORMANCE			
Worst Performing Feeder Rankin	g (Worst Feeder)		80
Feeders Experiencing Sustained I	Feeders Experiencing Sustained Interruptions Count (Worst Feeder)13		
HISTORICAL RELIABILITY	PERFORMANC	E	
	2008	2009	2010
Feeder CI (<i>Cumulative</i>) 50,166 4,105			166
Feeder CMO (<i>Cumulative</i>)	1,304,100	287,995	49,215

10

11 Benefits

- Improves feeder reliability through the installation of animal guards and would reduce
 faults resulting from foreign interference
- Modernizes the system by replacing non-standard transformers to improve restoration
 times after fault events
- Would reduce outage durations and reverse SAIDI trends that have been worsening
 over the past few years
- 18 Increases customer satisfaction due to reduced outage incidents
- Enhances safety to the public and utility personnel by replacing non-standard
- 20 equipment such as porcelain insulators and arrestors that can fail catastrophically (i.e.
- 21 cracking, fragmenting)

• Reduces the number of stressed assets by improving grid operating conditions

2

3 IMPACT OF DEFERRAL

4 If this project were to be deferred, utility personnel will be negatively impacted due to increased exposure to safety hazards associated with this feeder. Moreover, deferral of this work would also 5 6 delay necessary interventions on the feeder that have a significant impact of feeder reliability, 7 especially poles that are at risk of cracking, feathering on the poletop, breakage or loss of strength. 8 This could also result in collateral damage, in the event of an outage situation. 9 Moreover, customers will also continue to experience poor reliability, as the number of outage 10 11 events will increase. Deferral of this project would also increase the likelihood of assets failing, in 12 particular, glass insulators and lightning arrestors caused by insulation breakdown. Lastly, customer satisfaction would also be negatively impacted if this project were deferred due to 13 14 excessive overhead related outages on this feeder.

15

Portfolio:	Overhead
Project Title:	Refurbish Overhead Feeder 85M23 Phase #3 of 4
Project Number:	21122
Project Year:	2013
Estimate Cost:	\$585,731

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to replace the non-standard, aged and poor condition overhead 6 distribution assets to improve the stability of feeder 85M23. This project is one part of seven 7 related projects to rehabilitate this feeder.

8

9 Scope:

10 The scope of this project is to replace 44 spans of tree-proof # 3/0 ACSR conductors along the

11 feeder's overhead line on 4 streets (Deloraine Avenue, Ledbury Street, Grey Road and

12 Brookdale Avenue) along with replacement of CSP transformers and poles at 32 locations will

13 be done as part of this project. New telcon drop wire with a cone installed over the primary

14 bushing will be installed on the new transformers. Non-standard or deteriorated hardware at the

15 pole and transformer locations including, but not limited to poles, glass or porcelain insulators

16 and porcelain arrestors to be replaced by new units that conform to the latest THESL standards.

17

DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	BATHURST
STATION(S)	BATHURST II TS
FEEDER(S)	NY85M23

- 18
- 19

20 JUSTIFICATION

2 **Project Background**

3 Feeder 85M23 has sustained thirteen interruptions during the past year. The area is primarily 4 comprised of non-standard poor performing assets such as CSP transformers, glass insulators, 5 arrestors, and switches. As obsolete equipment, such as porcelain insulators and arrestors, ages it 6 becomes more contaminated. As such, efforts are required to replace these assets in order to 7 improve reliability. Furthermore, spot pole replacement is required. Aging poles with reduced 8 strength not only impact reliability, but can also pose a serious public safety hazard. Over the 9 past three years this feeder experienced an average of over 500,000 customer minutes out and 10 over 18,000 customer interruptions. Over the past ten years, this feeder has experienced 91 11 overhead related outages. Of these, 42 were attributed to transformer related causes.

12

13 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Rankin	ng (Worst Feeder)		80
Feeders Experiencing Sustained	Feeders Experiencing Sustained Interruptions Count (Worst Feeder)13		
HISTORICAL RELIABILITY PERFORMANCE			
	2008	2009	2010
Feeder CI (<i>Cumulative</i>) 50,166 4,105			166
Feeder CMO (<i>Cumulative</i>)	1,304,100	287,995	49,215

14

15 Benefits

- Improves feeder reliability through the installation of animal guards and would reduce
 faults resulting from foreign interference
- Modernizes the system by replacing non-standard transformers to improve restoration
 times after fault events
- Would reduce outage durations and reverse SAIDI trends that have been worsening
 over the past few years

1	•	Increases customer satisfaction due to reduced outage incidents
2	•	Enhances safety to the public and utility personnel by replacing non-standard
3		equipment such as porcelain insulators and arrestors that can fail catastrophically (i.e.
4		cracking, fragmenting)
5	•	Reduces the number of stressed assets by improving grid operating conditions
6		
7	IMPAC	Γ OF DEFERRAL
8	If this proj	ect were to be deferred, utility personnel will be negatively impacted due to increased
9	exposure t	o safety hazards associated with this feeder. Moreover, deferral of this work would also
10	delay nece	ssary interventions on the feeder that have a significant impact of feeder reliability,
11	especially	poles that are at risk of cracking, feathering on the poletop, breakage or loss of strength.
12	This could	also result in collateral damage, in the event of an outage situation.
13		
14	Moreover,	customers will also continue to experience poor reliability, as the number of outage
15	events will	l increase. Deferral of this project would also increase the likelihood of assets failing, in
16	particular,	glass insulators and lightning arrestors caused by insulation breakdown. Lastly,
17	customer s	atisfaction would also be negatively impacted if this project were deferred due to
18	excessive	overhead related outages on this feeder.
19		
20		

Portfolio:	Overhead
Project Title:	Feeder Rehab and CSP Changeout Phase #1
Project Number:	21517
Project Year:	2013
Estimate Cost:	\$574,064

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to replace non-standard CSP transformers, poles, conductors, glass
6 insulators and arrestors on 80M8.

7

8 Scope:

9 The scope of this project entails replacing CSP transformers at 14 locations and poles at 45

10 locations along the streets of Bathurst Street, Transwell Avenue, Peckford Road, Robson Place,

11 Kenton Drive, Dallas Road, Lister Drive, Pennard Court, and Dornfell Street. New drop wires

12 with cones are to be installed over the primary bushing of the new transformers. Non-standard or

13 deteriorated hardware at pole and transformer locations including, but not limited to poles, glass

14 or porcelain insulators, and porcelain arrestors are to be replaced by new units that conform to

15 the latest THESL standards. In summary, 45 poles and 15 transformers are to be replaced. All

16 redundant poles, lines, transformers and switches associated with this work are to be removed.

17

DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	BATHURST
STATION(S)	FAIRCHILD I TS
FEEDER(S)	NY80M8

- 18
- 19

20 JUSTIFICATION

2 **Project Background**

3 The Feeders Experiencing Sustained Interruptions (FESI) program, which began back in 2007,

4 examines particular feeders that have had seven interruptions or more. Interruptions are

5 measured as part of a rolling frequency, from month to month. 80M8, in particular, had 7 animal

6 contact and 5 overhead transformer outages in the past 10 years.

7

8 Feeder improvement desisions are primarily based upon asset centric replacements. Poles are

9 replaced based on health index, as well as feild crew and engineer visual inspections. Also, non-

10 standard assets such as CSP transformers, glass insulators, arrestors and switches will be

11 replaced due to their historical poor reliability. Animal guards will be installed at all transormer

12 locations in order to prevent animal contact where no guards presently exists. Also, the non-

13 standard animal guards will also be replaced due to their poor historical performance. In

14 addition, all overloaded transformers will be replaced due to increased probability of faliure

15 caused by stress on the transformers. Also, where the primary lines are in close proximity to

16 trees, tree-proof conductor will be installed in order to reduce outage probability.

17

18 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Rankin	ng (Worst Feeder)		82
Feeders Experiencing Sustained	Interruptions Coun	t (Worst Feeder)	8
HISTORICAL RELIABILITY PERFORMANCE			
	2008	2009	2010
Feeder CI (Cumulative) 4,010 4,622 4,616			
Feeder CMO (<i>Cumulative</i>)	60,163	308,615	226,098

¹⁹

20 Benefits

• Improves feeder reliability through the installation of animal guards and would reduce faults

22 resulting from foreign interference

- Modernizes the system by replacing non-standard transformers to improve restoration times
 after fault events
 Would reduce outcose durations and reverse SAIDI trands that have been worsening over the
- Would reduce outage durations and reverse SAIDI trends that have been worsening over the
 past few years
- 5 Increases customer satisfaction due to reduced outage incidents
- Enhances safety to the public and utility personnel by replacing non-standard equipment
 such as porcelain insulators and arrestors that can fail catastrophically (i.e. cracking,
- 8 fragmenting)
- 9 Reduces the number of stressed assets by improving grid operating conditions
- 10

11 IMPACT OF DEFERRAL

If this project were to be deferred, utility personnel will be negatively impacted due to increased 12 13 exposure to safety hazards associated with this feeder. Moreover, deferral of this work would also 14 delay necessary interventions on the feeder that have a significant impact of feeder reliability, 15 especially poles that are at risk of cracking, feathering on the pole tops, breakage or loss of strength. This could also result in collateral damage, in the event of an outage situation. 16 17 Moreover, customers will also continue to experience poor reliability, as the number of outage 18 19 events will increase. Deferral of this project would also increase the likelihood of assets failing, in 20 particular, glass insulators and lightning arrestors caused by insulation breakdown. Lastly,

- 21 customer satisfaction would also be negatively impacted if this project were deferred due to
- 22 excessive overhead related outages on this feeder.

Portfolio:	Overhead
Project Title:	Thorncrest (#011) Rear Lot Voltage Conversion Civil/Electrical Phase #4
Project Number:	21213
Project Year:	2013
Estimate Cost:	\$509,560

3 PROJECT DESCRIPTION

4

5 **Objective:**

6 This project is part of a program to upgrade the 4 kV distribution system to 27.6kV and

7 removing the rear lot plant in the Thorncrest Village area. The purpose of this project in

8 particular is to extend OH 88M13 at Kipling Avenue and Rathburn Road north to Princess

- 9 Margaret Boulevard.
- 10

11 **Scope:**

12 The project scope entails upgrading extending 88M13 at Rathburn Road and Kipling Avenue,

13 north to Princess Margaret Boulevard with 556kcmil while maintaing the 4 kV underbuild. All

14 customers fed from 4 kV on Kipling Avenue, between Rathburn Road and Princess Margaret

15 Boulevard will be converted to 27.6 kV. Finally, all poles, lines, transformers and switches

16 associated with this conversion will be removed and recovered. In summary, 39 new poles, 38

17 spans of 556kcmil overhead conductor, 37 spans of bundle secondary, and seven single-phase

- 18 transformers will be installed.
- 19

DISTRICT	ETOBICOKE
DISTRICT NEIGHBOURHOOD	THORNCREST RD.
STATION(S)	RICHVIEW
FEEDER(S)	ET88M13

20

21 JUSTIFICATION

2 **Project Background**

The Thorncrest Village area is reaching the end of its servicable life and similar to other rear lot areas, there is difficulty in accessing and repairing these rear-lot fed equipment. There are also old and non-standard assets and feeder configurations that THESL intends to proactively remove from the backyards of customer properties. This rear lot supply have become a source of concern for public and personnel safety. The age of this distribution coupled with the difficulty to access THESL owned equipment is one of the key driving force for implementing this work.

- 9
- 10

11 Historical Performance

FEEDER PERFORMANCE				
Worst Performing Feeder Rankin	Worst Performing Feeder Ranking (Worst Feeder)40			
Feeders Experiencing Sustained	Feeders Experiencing Sustained Interruptions Count (Worst Feeder)4			
HISTORICAL RELIABILITY PERFORMANCE				
2008 2009 2010				
Feeder CI (Cumulative) 8,614 10,822 13,822				
Feeder CMO (<i>Cumulative</i>)	37,220	92,019	27,902	

12

13 Benefits

- Improves power quality as a result of higher primary voltages that has lower line losses and
 higher transmission efficiency.
- Increases reliability due to converting rear-lot fed areas and in turn, improving outage
- 17 duration.
- Enhances customer satisfaction as a result of Improves restoration time in the event of
 outages
- Eliminates maintenance and inventory costs that are associated with obsolete and
- 21 discontinued 4 kV distribution equipment

- 1 Improves life-cycle costs
- Enhances safety and improves accessibility of front-lot equipment in the event of an outage
 as opposed to restricted rear-lots
- 4

5 IMPACT OF DEFERRAL

- 6 If the project is to be deferred, the lack of access to crews during emergency outage situations
- 7 will continue. Delays with rear lot renewal will result in the increasing probability of relatively
- 8 high-impact outages in these areas. This will significantly decrease reliability in the
- 9 neighbourhoods and will expose THESL crews to the safety risks inherent when restoring power
- 10 in rear lot area. Finally, customers will experience lengthy outages and complaints will gradually
- 11 worsen while maintenance and capital costs will continue to increase as a result of deferring
- 12 planned work for the eventual decommissioning of the MS.

Portfolio:	Overhead
Project Title:	80M1 Carney Rd Distribution Rehab
Project Number:	21920
Project Year:	2013
Estimate Cost:	\$569,706

3 PROJECT DESCRIPTION

4

5 **Objective:**

6 The purpose of this project is to improve the distribution system reliability by rehabilitating

7 aging distribution infrastructure on feeder NY80M1.

8

9 Scope:

10 The scope of this project consists of the replacement of end-of-life and non-standard assets.

11 Within the boundaries of this project, all overhead primary conductors, end-of-life poles and

12 CSP transformers will be replaced with current standard equipment. During the rebuild of the

13 area, it is proposed to rebuild all non-standard assets as well. In summary, 50 poles and 25

14 transformers will be replaced. The boundaries of this project are Carney Road, Blake Avenue,

15 and Finch Avenue.

16

DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	CARNEY RD.
STATION(S)	FAIRCHILD I TS
FEEDER(S)	NY80M1

17

18 JUSTIFICATION

19

20 Project Background

1 Feeder 80M1 has sustained 15 outages during the past year and is ranked 30th on the WPF list.

- 2 Most of the assets on the laterals have approached end-of-life and are non-standard. The feeder
- 3 has numerous non-standard porcelain insulators, porcelain switches and many poles are
- 4 deteriorating. Also, installation of animal guards is required. Animal contact is one of the biggest
- 5 contributors to outages in this area and thus, the installation of animal guards is required. All
- 6 existing switches and arrester brackets that are steel need replacement as per current standards,
- 7 as well as porcelain lightning arrestors.
- 8

9 Historical Performance

FEEDER PERFORMANCE				
Worst Performing Feeder Rankin	Worst Performing Feeder Ranking (Worst Feeder)30			
Feeders Experiencing Sustained	Feeders Experiencing Sustained Interruptions Count (Worst Feeder)15			
HISTORICAL RELIABILITY PERFORMANCE				
2008 2009 2010				
Feeder CI (Cumulative) 1,083 3,983 4,341				
Feeder CMO (<i>Cumulative</i>)	133,234	151,817	140,091	

10

11 Benefits

- 12 Reduces the probability of outages due to electrical water-tree tracking by replacing
- 13 porcelain arrestors, insulators and fuses
- Improves feeder reliability through the installation of animal guards and would reduce faults
 resulting from foreign interference
- Modernizes the system by replacing non-standard transformers to improve restoration times
 after fault events
- Reduces outage durations and reverse SAIDI trends that have been worsening over the past
 few years
- 20 Increases customer satisfaction due to reduced outage incidents
- Enhances safety to the public and utility personnel by replacing non-standard equipment such

- 1 as porcelain insulators and arrestors that can fail catastrophically (i.e. cracking, fragmenting)
- 2 Reduces the number of stressed assets by improving grid operating conditions
- 3

4 IMPACT OF DEFERRAL

5 If this project were to be deferred, utility personnel will be negatively impacted due to increased
6 exposure to safety hazards associated with this feeder. Moreover, deferral of this work would also

7 delay necessary interventions on the feeder that have a significant impact of feeder reliability,

8 especially poles that are at risk of cracking, feathering on the poletop, breakage or loss of strength.

9 This could also result in collateral damage, in the event of an outage situation.

10

11 Moreover, customers will also continue to experience poor reliability, as the number of outage

12 events will increase. The deferral of this project would also increase the likelihood of assets

13 failing, in particular, glass insulators and lightning arrestors caused by insulation breakdown.

14 Furthermore, the feeder will be exposed to increased outages due to animal and tree interference.

Portfolio:	Overhead		
Project Title:	80M1 Clarkhill Glenborough Park Ancona Overhead Rebuild		
Project Number:	21998		
Project Year:	2013		
Estimate Cost:	\$521,385		
PROJECT DESCRIP	TION		
Objective:			
	.	distribution system reliability by rehabilitating aging	
distribution infrastruct	are on feeder NY8	UM1.	
Scope:			
The scope of this proje	ct requires that end	d-of-life and non-standard assets be replaced. Within the	
boundaries of this proj	ect, all overhead p	rimary conductors, end-of-life poles and CSP	
transformers will be re-	placed with curren	t standard equipment. During the rebuild of the area, it	
is proposed to rebuild a	all non-standard as	sets as well. In summary, 75 poles and 16 transformers	
will be replaced.			
DISTRICT		NORTH YORK	
DISTRICT NEICH	RUIRHOOD	GLENBOROUGH PARK	

DISTRICT NEIGHBOURHOOD	GLENBOROUGH PARK
STATION(S)	FAIRCHILD I TS
FEEDER(S)	NY80M1

16 JUSTIFICATION

Project Background

- 19 Feeder 80M1 has sustained 15 outages during the past year and is ranked 30th on the WPF list.
- 20 Most of the assets on the laterals have approached end-of-life and are non-standard. The feeder

- 1 has numerous non-standard porcelain insulators, porcelain switches and many poles are
- 2 deteriorating. Also, installation of animal guards is required. Animal contact is one of the biggest
- 3 contributors to outages in this area and thus, the installation of animal guards is required. All
- 4 existing switches and arrester brackets that are steel need replacement as per current standards,
- 5 as well as porcelain lightning arrestors.
- 6

7 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Ranking (Worst Feeder)30			
Feeders Experiencing Sustained	Feeders Experiencing Sustained Interruptions Count (Worst Feeder)15		
HISTORICAL RELIABILITY PERFORMANCE			
2008 2009 2010			2010
Feeder CI (<i>Cumulative</i>) 1,083 3,983 4,341			
Feeder CMO (<i>Cumulative</i>)	133,234	151,817	140,091

8

9 **Benefits**

- 10 Reduces the probability of outages due to electrical water-tree tracking by replacing
- 11 porcelain arrestors, insulators and fuses
- Improves feeder reliability through the installation of animal guards and would reduce faults
 resulting from foreign interference
- Modernizes the system by replacing non-standard transformers to improve restoration times
 after fault events
- Reduces outage durations and reverse SAIDI trends that have been worsening over the past
 few years
- 18 Increases customer satisfaction due to reduced outage incidents
- Enhances safety to the public and utility personnel by replacing non-standard equipment such
- 20 as porcelain insulators and arrestors that can fail catastrophically (i.e. cracking, fragmenting)
- Reduces the number of stressed assets by improving grid operating conditions

2

3 IMPACT OF DEFERRAL

4 If this project were to be deferred, utility personnel will be negatively impacted due to increased

5 exposure to safety hazards associated with this feeder. Moreover, deferral of this work would also

6 delay necessary interventions on the feeder that have a significant impact of feeder reliability,

7 especially poles that are at risk of cracking, feathering on the poletop, breakage or loss of strength.

8 This could also result in collateral damage, in the event of an outage situation.

9

10 Moreover, customers will also continue to experience poor reliability, as the number of outage

11 events will increase. The deferral of this project would also increase the likelihood of assets

12 failing, in particular, glass insulators and lightning arrestors caused by insulation breakdown.

13 Furthermore, the feeder will be exposed to increased outages due to animal and tree interference.

Portfolio:	Overhead
Project Title:	Convert Wiltshire 4kV B5W to 13.8kV System
Project Number:	19505
Project Year:	2013
Estimate Cost:	\$550,114

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

The purpose of this project is to completely convert the existing 4kV feeder B5W, originating
from Wiltshire MS, to 13.8kV. This project is one phase of a multi-phase program beginning in
2013 to convert the entire 4kV load at Wiltshire MS, with the final objective of decommissioning
the station.

9

10 **Scope:**

11 The scope of work for this project is to build two new 13.8kV feeders from Wiltshire TS to

12 replace B5W. The expansion of these feeders includes approximately 0.52 km of overhead

13 conductor, approximately 0.40 km of underground cable and 16 poles. The project area is

14 bounded by Caledonia Park Road, St. Clair Avenue West, Wiltshire Avenue and Adian Avenue.

15

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	WILTSHIRE
STATION(S)	WILTSHIRE MS
FEEDER(S)	B5W

16

17 JUSTIFICATION

18

19 Project Background

1	Wiltshire MS was originally built in 1949 and has already been undergoing voltage conversion in		
2	order to address high maintenance costs, obsolete construction standards and deteriorated plant		
3	condition. Once the MS is decommissioned, THESL will then also have available infrastructure		
4	to plan and install future initiatives such as Downtown Contingency.		
5			
6	Converting 4kV overhead will significantly improve workplace safety for crews by inherently		
7	eliminating the associated hazards of multiple circuits going through a typical box construction		
8	pole, as well as eliminate the hazards of working in the vicinity of shielded primary cable (cable		
9	grounding and positioning below secondary cables).		
10			
11	Benefits		
12	• Improves the safety of THESL crew workers and the public		
13	• Lowers the risk of failures due to the replacement of 4kV assets past useful life with existing		
14	standard 13.8kV equipment		
15	• Reduces maintenance costs by removing obsolete 4kV equipment		
16	• Increases capacity with 13.8kV feeders to accommodate residential load creep as well as load		
17	increase from future emerging businesses in the area		
18	• Reduces system losses when 4kV is upgraded to 13.8kV		
19	• Improves reliability by remote monitoring and control of the system feeding this location		
20	which will reduce restoration time		
21			
22	IMPACT OF DEFERRAL		
23	If this project was to be deferred, prolonged safety concerns for field crews related to box		
24	construction design will continue to persist. Moreover, THESL would also endure higher		
25	maintenance costs associated with existing obsolete non-standard 4kV equipment, when		
26	compared to standard overhead 13.8kV equipment. Furthermore, deferral of this work would		

27 also result in THESL losing the opportunity to complete the multi-phase program started in

- 1 previous years in order to fully decommission Wiltshire MS and acquire valuable infrastructure
- 2 for future initiatives.
- 3
- 4

Portfolio:	Overhead
Project Title:	Convert Junction 4kV B9J to 13.8kV
Project Number:	20476
Project Year:	2013
Estimate Cost:	\$593,152

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to completely convert the existing 4kV feeder B9J, originating

6 from Junction MS, to 13.8kV. This project is one phase of a multi-phase program beginning in

7 2012 to convert the entire 4kV load at Junction MS, with the final objective of decommissioning

8 the station.

9

10 **Scope:**

11 The scope of work for this project is to expand existing 13.8kV feeder A257DN to replace B9J.

12 The expansion of these feeders includes approximately 0.95 km of overhead conductor, 37 poles

13 and 10 transformer locations. The project area is bounded by Indian Road, Parkside Avenue,

14 Bloor Street and Howard Park Avenue.

15

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	JUNCTION
STATION(S)	JUNCTION MS, DUFFERIN TS
FEEDER(S)	B9J, A257DN

16

17 JUSTIFICATION

18

19 Project Background

1	Junction MS was originally built in 1929 and has already been undergoing voltage conversion in
2	order to address high maintenance costs, obsolete construction standards and deteriorated plant
3	condition. Once the MS is decommissioned, THESL will then also have available infrastructure
4	to plan and install future initiatives such as Downtown Contingency.
5	
6	Converting 4kV overhead will significantly improve workplace safety for crews by inherently
7	eliminating the associated hazards of multiple circuits going through a typical box construction
8	pole, as well as eliminate the hazards of working in the vicinity of shielded primary cable (cable
9	grounding and positioning below secondary cables).
10	
11	Benefits
12	• Improves the safety of THESL crew workers and the public
13	• Lowers the risk of failures due to the replacement of 4kV assets past useful life with existing
14	standard 13.8kV equipment
15	• Reduces maintenance costs by removing obsolete 4kV equipment
16	• Increases capacity with 13.8kV feeders to accommodate residential load creep as well as load
17	increase from future emerging businesses in the area
18	• Reduces system losses when 4kV is upgraded to 13.8kV
19	• Improves reliability by remote monitoring and control of the system feeding this location
20	which will reduce restoration time
21	
22	IMPACT OF DEFERRAL
23	If this project was to be deferred, prolonged safety concerns for field crews related to box
24	construction design will continue to persist. Moreover, THESL would also endure higher
25	maintenance costs associated with existing obsolete non-standard 4kV equipment, when
_	

- 26 compared to standard overhead 13.8kV equipment. Furthermore, deferral of this work would
- 27 also result in THESL losing the opportunity to complete the multi-phase program started in

- 1 previous years in order to fully decommission Junction MS and acquire valuable infrastructure
- 2 for future initiatives.

Portfolio:	Overhead
Project Title:	Replacement of Existing 600A Porcelain Switches
Project Number:	21705
Project Year:	2013
Estimate Cost:	\$ 556,290

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to to replace 101 existing non-standard /defective 600A porcelain

6 disconnect switches on streets around Runnymede, Strachan and Queen areas of downtown

7 Toronto. These switches are located mainly on the 4kV system.

8

9 Scope:

10 The scope of work for this project is to refurbish the overhead lateral distribution system of the

11 4kV feeders in downtown Toronto, by replacing 101 600A porcelain disconnect switches located

12 on 4kV feeders from Eglinton, Forman, Merton, Sherbourne, Hammersmith, Carlaw, Danforth,

13 Kingsway, Rennie Park, Runnymede, Junction, Dufferin and Dupont MS as identified by the

14 feeder patrol team.

15

DISTRICT	Toronto
DISTRICT NEIGHBOURHOOD	FORMER TORONTO AREA
STATION(S)	MULTIPLE STATIONS
FEEDER(S)	4 kV FEEDERS

16

17 JUSTIFICATION

18

19 Project Background

1 The 600A porcelain disconnect switches have developed cracks due to the repeated force of 2 impact during the switch operations. The cracks may result in broken pieces of the switch that 3 may fall off the switch and hurt pedestrians walking below. In addition the operator is required to 4 hold a live conductor in the overhead bucket with a hot stick and this poses a potential hazard to 5 the crew members and the general public. A program has been developed to remove these 6 switches from our system over the next 3 years.

7

8 Benefits

- 9 Provides safe work conditions and safety for the general public
- Modernizes the distribution system by standardizing and replacing obsolete, non-compliant
 equipment
- Reduces outage durations and reverse SAIDI trends that have been worsening over the past
 few years
- Increases customer satisfaction due to reduced outage incidents
- Enhances safety to the public and utility personnel by replacing non-standard equipment such
 as porcelain insulators and arrestors that can fail catastrophically (i.e. cracking, fragmenting)
- Reduces the number of stressed assets by improving grid operating conditions
- 18

19 IMPACT OF DEFERRAL

The deferral of this project will lead to increase risk to THESL crews and the general public. The deferral of this project would allow porcelain switches to continue contributing to outages and in particular, lengthy outages that have inefficient restoration times. Also, the impact of customers is increased as a result of non-standard porcelain switches failing. The tendency of these assets to fail causes poor isolation and significantly reduces operational flexibility in restoring power.

- 27
- 28

Portfolio:	Overhead	
Project Title:	Extend 47M13 on Meadowvale S Voltage Conversion -	
	Electrical SCPJF2	
Project Number:	20883	
Project Year:	2013	
Estimate Cost:	\$ 532,284	

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The objective of this project is partially convert PJF2 fed by Centenial Magee MS from 4kV to
6 27.6kV. This project is one phase of a multi-phase program to convert the entire 4kV load at
7 Centenial D'Arcy Magee MS, with the final objective of decommissioning the station.

8

9 Scope:

10 The scope of this project involves ininstalling a 27.6kV overhead lines from Kingston Rd along 11 Meadowvale South to Lawrence Ave. Install 3x1000 TRXLPE AL cable along Lawrence to the 12 East to connect to the overhead switch and to West at Beachgrove- Lawrence intersection to tie 13 with 47M7. Connect the new PMH-10 with the new cables. Install a SCADAmate switch at 14 Beechgrove-Lawrence and Kingston-Meadowvale intersection. Reinstall two overhead switches. 15 Install a single-phase 27.6kV overhead lines (ACSR 3/0) from Meadowvale along Colonel 16 Danforth Tr to Install a 140k fused switch at Meadowvale- Colonel Danforth. Replace all the 17 existing pole top transformers on Colonel Danforth and Bonacres overhead with THESL 18 standard transformers. Dismantle 13.8kV lines on Colonel Danforth Tr. 19 20 The objective of this project is to extend NA47M13 feeder from Kingston Rd along Meadowvale

21 South to connect with the same feeder at Lawrence Ave and extend further towards West to

22 Beechgrove Dr. This is to provide operational flexibility of feeder 47M13 and also to build

- 1 27.6kV lines for voltage conversion of some of the old distribution areas built with direct buried
- 2 cables.
- 3

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	MEADOWVALE & DOLONEL DANFORTH
STATION(S)	CENTENIAL D'ARCY MAGEE MS
FEEDER(S)	SCPJF2

5 JUSTIFICATION

6

7 **Project Background**

- 8 Centenial D'Arcy Magee MS was built around the 1960's to 1970's and has already been
- 9 undergoing voltage conversion in order to address high maintenance costs, obsolete construction
- 10 standards and deteriorated plant condition. A single-phase distribution for the three subdivisions
- 11 (Bonacres Avenue and Whiteacres Avenue and Jean Dempsey Gate), was built between a time
- 12 span of 1973 to 1977 with direct buried cables. It is supplied from the overhead feeder main of
- 13 PJF2. The feeder had 4 outages and the project area had 3 outages in 2010 so far. In addition, the
- 14 project needs to be carried out to accommodate residential load creep as well as load increase
- 15 from future emerging businesses in the area.

16

17 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Ranking (Worst Feeder)			113
Feeders Experiencing Sustained Interruptions (Worst Feeder)3			
HISTORICAL RELIABILITY PERFORMANCE			
	2008	2009	2010
Feeder CI (<i>Cumulative</i>)	2,367	2,446	3,841
Feeder CMO (<i>Cumulative</i>)	633,267	8,721	217,876

2 **Benefits**

- Replaces 45 year old failing direct buried cables for the industrial area.
- Improvement of the safety of THESL crew workers and the public
- 5 Reduces maintenance costs by removing obsolete 4kV equipment
- Lowers risk of failures due to the replacement of 4kV assets past useful life with existing
 standard 27.6kV equipment
- Increases capacity with 27.6kV feeders to accommodate residential load creep as well as load
 increase from future emerging businesses in the area
- 10 Improves in the aesthetics of the street
- 11 Reduces of system losses when 4kV is upgraded to 27.6kV
- Reconfigures the distribution for the latest THESL standard for operation and protection.
 (smaller loops with 1/0 cable with standard fuse)
- Targets to achieve better operational flexibility and more reliable supply.
- 15

16 IMPACT OF DEFERRAL

- 17 THESL would endure higher maintenance costs associated with existing obsolete non-standard
- 18 4kV equipment, when compared to standard 27.6kV equipment. If this project was to be
- 19 deferred, prolonged safety concerns for field crews related to obsolete 4kV system will continue
- 20 to persist. Furthermore, deferral of this work would also result in THESL losing the opportunity
- 21 to complete the multi-phase program to fully decommission Centenial D'Arcy Magee MS.

22

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1 PROJECTS \$500K AND OVER FOR 2013

2

3 SUSTAINING PORTFOLIO – NETWORK

4

5 **Table 1: Network Projects**

Estimate	Droject Title	Estimated Cost	
Number	Project Title	(\$Millions)	
19700	4KV Network Conversion - Queen Street West Between	4.5	
	Spadina Avenue/Augusta Avenue		
22406	Network Automation - Terauley South 120/208V Network	3.5	
20821	Civil Construction - Queen Street West Between	3.1	
	Portland Street/Bathurst Street Phase #1	••••	
20619	4KV Network Conversion - High Level MS	2.9	
20010	Feeders B12H & B13H	2.0	
19502	Wellington Street/Emily Street East & West Vaults	2.2	
13302	(Loc.4790)	2.2	
20635	4KV Network Conversion - High Level MS Feeders B13H	2.1	
20035	Phase #2	2.1	
4KV Network Conversion - Queen Street West B		1.9	
20030	Augusta Avenue/Portland Street	1.5	
20401	4KV Network Conversion - High Level MS Feeders	1.7	
20401	B13H & B12H Phase #1	1.7	
18834	New Vault - Eglinton Avenue East/Holly Street (Loc.4481)	1.6	
20823	Primary & Secondary Cable Installation - Queen Street	1.6	
20025	West Between Portland Street/Bathurst Street Phase #3	1.0	
18899	Network Secondary Cable Replacement - Windsor West	1.4	
10033	Network Phase #2	1.4	
18901	Network Secondary Cable Replacement - Windsor West	1.4	
10901	Network Phase #4	1.4	
20472	Rebuild Peter Street/Adelaide Street West Vault A66WR	1.3	
20472	(Loc.4299)	1.5	
22400	Network Automation - Cecil North 120/208V Network	1.1	
18896	Network Secondary Cable Replacement - Windsor West	1.0	

Estimate Number	Project Title	Estimated Cost (\$Millions)
	Network Phase #1	
18898	Network Secondary Cable Replacement - Windsor West Network Phase #3	1.0
18838	New Vault - St. Clair Avenue/Yonge Street A55H (Loc.4541)	0.9
20510	Vault Roof Rebuild - King Street West/Jordan Street A54WR (Loc.4562)	0.9
18912	Network Replacement (Loc.4407)	0.8
20822	Equipment Installation - Queen Street West Between Portland Street/Bathurst Street Phase #2	0.8
20377	Network Replacement (Loc.4372)	0.7
20707	Network Replacement - Dundas Street/Mutual Street (Loc.4509)	0.7
20498	Network Replacement - King Street/Yonge Street	0.7
20636	4KV Network Conversion - High Level MS Feeders B13H Phase #3	0.5
Total Cost		38.3

Network
4KV Network Conversion – Queen Street West Between
Spadina Avenue/Augusta Avenue
19700
2013
\$4,500,000

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 This project is part of a series of projects to expand the secondary network along Queen

6 Street between Spadina and Bathurst and remove obsolete 4kV box construction. The

7 purpose of this project is specifically to convert the 4kV overhead plant to a secondary

8 network along Queen Street between Spadina Avenue and Augusta Avenue.

9

10 **Scope:**

11 The scope of work for this project includes the initial inspections, construction of civil

12 infrastructure, equipment installation of network units and service upgrades, coordination

13 with customers on service upgrades, automation, installation of primary and secondary

cables and removal of the 4kV overhead system and installation of street lighting poles to

- 15 THESL standard to be supplied from the underground secondary network.
- 16

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	ENTERTAINMENT DISTRICT
STATION(S)	WINDSOR TS, DEFOE MS
FEEDER(S)	A64WR, A67WR, A68WR, A69WR, B3DF

17

18

1 JUSTIFICATION

2

3 Project Background

4 Defoe MS was originally built in the 1970's and has been undergoing voltage conversion
5 in order to address high maintenance costs, obsolete construction standards and
6 deteriorated plant condition.

6 7

8 In addition, since feeder B3DF is of box construction type, by converting this 4kV feeder,

9 it will significantly improve workplace safety for crews by inherently eliminating the

10 associated hazards of multiple circuits going through a typical box pole, as well as

eliminate the hazards of working in the vicinity of shielded primary cable (cable

12 grounding and positioning below secondary cables).

13

14 The secondary network of Windsor West exists nearby and can be extended to improve

15 the long-term reliability of the area as the secondary network system is the most reliable

system for this type of load. This area is ideal for network supply because of the high

density of customers and is a small commercial and tourism area. Removing the 4kV box

construction and replacing it with secondary network will greatly improve the aestheticsat this location.

20

21 Benefits

• Improves the safety of THESL crew workers and the public

• Lowers the risk of failures due to the replacement of approximately 30 years' worth

- of 4kV assets with existing standard 13.8kV equipment
- Reduces maintenance costs by removing obsolete 4kV equipment

Increases capacity with 13.8kV feeders to accommodate residential load creep as well
 as load increase from future emerging businesses in the area

- Reduces system losses (this occurs when 4kV is upgraded to 13.8kV)
- Improves reliability by use of the most reliable system available for dispersed

1 commercial loads

- Enables automation capabilities to allow remote monitoring and control from the
- 3 Control Room for troubleshooting and addressing system problems
- Improves aesthetics of this commercial and tourism area by removing overhead wires
- 5 and placing all infrastructure underground
- 6

7 IMPACT OF DEFERRAL

- 8 If this project were to be deferred, safety concerns and risks regarding the box
- 9 construction design would persist and THESL would face the added burden of
- 10 maintaining obsolete, non-standard 4kV equipment, relative to the standard 13.8kV
- 11 overhead system. Moreover, deferral of this project would also increase the risk of
- equipment-related failures, as a number of the 4kV assets are at or approaching the end of
- 13 useful life.

Portfolio:	Network	
Project Title:	Network Automation – Terauley South 120/280 V Network	
Project Number:	22406	
Project Year:	2013	
Estimate Cost:	\$3,538,600	

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

The purpose of this project is to install network automation on an entire secondary grid network on the Terauley South network. In the process of automating this network, any concerns with the condition of vaults and network units will be addressed. Moreover, network units will be retrofitted or replaced, and vaults that pose a hazard to public and worker safety will be rebuilt. This project is an extension of a previous project THESL undertook to lay fibre to the vaults of this network.

11

12 **Scope:**

The scope of work for this project includes 27 network units that will be automated over 13 13 vaults. At least five network units will need to be replaced due to aging and/or the 14 presence of fibretop protectors. In addition, it is estimated that at least seven vaults will 15 need to be rebuilt. Work sssociated with supplying the customers of the secondary 16 network temporarily, while the vault is being rebuilt, is also included in this project. Once 17 the condition of both the network units and network vaults has been addressed, the 18 network units will be wired for network automation and commissioned with Supervisory 19 Control and Data Acquisition ("SCADA") personnel. 20

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	FINANCIAL DISTRICT
STATION(S)	TERAULEY TS
FEEDER(S)	A81A, A82A, A83A, A84A, A85A, A86A, A87A

1

3 JUSTIFICATION

4

5 **Project Background**

6 Network Automation is a grid modernization initiative to allow the Control Room

visibility and control over the network system. Network automation allows the Control

8 Room to monitor in real-time the conditions of the vault, protector and transformer.

9 Loading of the network units is made available for real-time assessment and long-term

analytics. Alarms are set on critical parameters of the system (transformer overloading,

leaking, overheating, protector cycling, and vault flooding) so as to notify operations

- 12 personnel of problematic vaults.
- 13

14 With the successful automation of a network vault at Davenport Road and Avenue Road,

15 the Control Room requested piloting small grid networks for network automation.

16 Briefly, the Control Room has had difficulty troubleshooting grid networks due to the

17 complexity of the load flow in the secondary network system. Accordingly, this

automation will allow visibility and control over the abovementioned networks.

19

20 This project is a component within the network automation initiative and covers

21 installation/retrofitting of network units for automation, rebuilding hazardous vaults, and

- 22 commissioning tests.
- 23

At least seven of the network vaults in the secondary network have been identified as

been constructed in the 1950's or early 1960's. It is estimated that these vaults need to be

1	rebuilt. Also, it has been identified that four network units contain fibretops and were
2	manufactured in 1955 to early 1973. Protectors of the fibretop vintage are the oldest
3	vintage of protectors in the system and are prone to causing catastrophic failures.
4	
5	Benefits
6	• Enables automation capabilities to allow remote monitoring and control from the
7	Control Room for troubleshooting and addressing system problems
8	• Improves safety and structure strength of vaults through the construction of new
9	vaults
10	• Eliminates the risk of catastrophic failure at the vault through the removal of fibretop
11	protectors
12	• Mitigates the risk of network units (both transformers and protectors) from failing due
13	to these assets having construction ages ranging from approximately 40 to 60 years
14	
15	IMPACT OF DEFERRAL
16	If this project were to be deferred, THESL would be unable to mitigate the public and
17	safety risks associated with the network units, if one of the fibretop units were to fail.
18	Furthermore, deferral of this work would also result in THESL losing the opportunity to

¹⁹ modernize the system through the removal of fibretop protectors, which are a known

20 legacy problem, as well as replace aging assets that are at or nearing their end of useful

21 life.

Portfolio:	Network	
Project Title:	Civil Construction – Queen Street West Between	
rioject inte.	Portland Street/Bathurst Street Phase #1	
Project Number:	20821	
Project Year:	2013	
Estimate Cost:	\$3,102,966	

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 This project is part of a series of projects to expand the secondary network along Queen

6 Street between Spadina and Bathurst and remove obsolete 4kV box construction. The

7 purpose of this project is specifically to provide the civil infrastructure for network

8 expansion along Queen Street between Portland Street and Bathurst Street. This project is

9 the first phase of four phases to expand the network on this section of Queen Street.

10

11 **Scope:**

12 The scope of work for this project includes the initial inspection of the area of concern and

13 the building of network vaults, cable chambers, and ducts. Two new network vaults will

be built along this stretch and will include approximately 24 cable chambers. The civil

15 infrascture will be used in subsequent phases.

16

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	ENTERTAINMENT DISTRICT
STATION(S)	WINDSOR TS, DEFOE MS
FEEDER(S)	A64WR, A67WR, A68WR, A69WR, B7DF

17

18 JUSTIFICATION

2 Project Background

Defoe MS was originally built in the 1970's and has already been undergoing voltage
conversion in order to address high maintenance costs, obsolete construction standards
and deteriorated plant condition.

6

In addition, since feeder B7DF is of box construction type, converting these 4kV feeders
will significantly improve workplace safety for crews by inherently eliminating the

9 associated hazards of multiple circuits going through a typical box pole, as well as

eliminate the hazards of working in the vicinity of shielded primary cable (cable

11 grounding and positioning below secondary cables).

12

The secondary network of Windsor West exists nearby and can be extended to improve the long-term reliability of the area as the secondary network system is the most reliable system for this type of load. This area is ideal for network supply because of the high density of customers and is a small commercial and tourism area. Removing the 4kV box construction and replacing it with secondary network will greatly improve the aesthetics

18 19

20 Benefits

at this location.

- Improves the safety of THESL crew workers and the public
- Lowers the risk of failures due to the replacement of approximately 30 years worth of
- 4kV assets with existing standard 13.8kV equipment
- Reduces maintenance costs by removing obsolete 4kV equipment
- Increases capacity with 13.8kV feeders to accommodate residential load creep as well
 as load increase from future emerging businesses in the area
- Reduces system losses (this occurs when 4kV is upgraded to 13.8kV)

• Improves reliability by use of the most reliable system available for dispersed

29 commercial loads

- Enables automation capabilities to allow remote monitoring and control from the
- 2 Control Room for troubleshooting and addressing system problems
- Improves aesthetics of this commercial and tourism area by removing overhead wires
- 4 and placing all infrastructure underground
- 5

6 IMPACT OF DEFERRAL

- 7 If this project were to be deferred, safety concerns and risks regarding the box
- 8 construction design would persist and THESL would face the added burden of
- 9 maintaining obsolete, non-standard 4kV equipment, relative to the standard 13.8kV
- 10 overhead system. Moreover, deferral of this project would also increase the risk of
- equipment-related failures, as a number of the 4kV assets are at or approaching end of
- 12 useful life.

Portfolio:	Network	
Project Title:	4KV Network Conversion – High Level MS Feeders	
Hoject Hue.	B12H & B13H	
Project Number:	20619	
Project Year:	2013	
Estimate Cost:	\$2,863,273	

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 This project is part of a series of projects to eventually convert all of the 4kV loads at Light Level MS. The surpose of this project is to particully convert existing P12U and

6 High Level MS. The purpose of this project is to partially convert existing B12H and

7 B13H by removing obsolete 4kV box construction, and expanding the secondary network

8 to supply the existing services. The objective of this project is specifically to provide civil

9 infrastructure for the conversion between Summerhill Gardens in the east, Yonge Street

in the west, Woodlawn Avenue in the north and Shaftesbury Avenue in the south.

11

12 **Scope:**

13 The scope of work for this project includes the initial inspection of the area of concern and

building of network vaults, cable chambers, and ducts. Two new network vaults will be

- built along this block. This civil infrascture will be used in subsequent phases.
- 16

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	SUMMERHILL
STATION(S)	HIGH LEVEL MS
FEEDER(S)	A48H, A57H, B12H, B13H

1	
2	JUSTIFICATION
3	
4	Project Background
5	High Level MS was originally built in 1910 and has already been undergoing voltage
6	conversion in order to address high maintenance costs, obsolete construction standards
7	and deteriorated plant condition.
8	
9	In addition, since feeders B12H and B13H are of box construction type, converting these
10	4kV feeders will significantly improve workplace safety for crews by inherently
11	eliminating the associated hazards of multiple circuits going through a typical box pole,
12	as well as eliminate the hazards of working in the vicinity of shielded primary cable
13	(cable grounding and positioning below secondary cables).
14	
15	The secondary network of High Level St. Clair exists nearby and can be extended to
16	improve the long-term reliability of the area as the secondary network system is the most
17	reliable system for this type of load. Removing the $4kV$ box construction and replacing it
18	with secondary network will greatly improve the aesthetics at this location.
19	
20	Benefits
21	• Improves the safety of THESL crew workers and the public
22	• Lowers the risk of failures due to the replacement of over 100 years worth of $4kV$
23	assets with existing standard 13.8kV equipment
24	Reduces maintenance costs by removing obsolete 4kV equipment
25	• Increases capacity with 13.8kV feeders to accommodate residential load creep as well
26	as load increase from future emerging businesses in the area
27	• Reduces system losses (this occurs when 4kV is upgraded to 13.8kV)
28	• Improves reliability by the use of the most reliable system available for dispersed
29	commercial loads

- Enables automation capabilities to allow remote monitoring and control from the
- 2 Control Room for troubleshooting and addressing system problems
- Improves aesthetics of this commercial and tourism area by removing overhead wires
- 4 and placing all infrastructure underground
- 5

6 IMPACT OF DEFERRAL

- 7 If this project were to be deferred, safety concerns and risks regarding the box
- 8 construction design would persist and THESL would face the added burden of
- 9 maintaining obsolete, non-standard 4kV equipment, relative to the standard 13.8kV
- 10 overhead system. Moreover, deferral of this project would also increase the risk of
- equipment-related failures, as a number of the 4kV assets are at or approaching end of
- 12 useful life.

Portfolio:	Network	
Project Title:	Wellington Street/Emily Street East & West Vaults (Loc.4790)	
Project Number:	19502	
Project Year:	2013	
Estimate Cost:	\$2,227,087	

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The objective of this project is to rebuild both east and west vaults at vault location 4790.

6 This project would also include replacing the network units due to the condition of the

7 equipment and automating the network vault.

8

9 Scope:

10 The scope of work for this project includes the vault rebuild of two vaults 4790W and

11 4790E including associated work with supplying the customers of the secondary network

12 temporarily, while the vault is being rebuilt. In addition, this project would also involve

the replacement of the existing network units with three 1500 kVA and 3000A protectors,

one for each transformer, and THESL plans to automate the network units at this

15 location. Furthermore, associated cabling work will be completed as per THESL

16 standard.

DISTRICT	TORONTO
	ENTERTAINMENT DISTRICT/FINANCIAL
DISTRICT NEIGHBOURHOOD	DISTRICT
STATION(S)	WINDSOR TS
FEEDER(S)	A51WR, A55WR, A57WR

2

3 **Project Background**

The vaults were initially built in 1971 and the network units found in the vaults were 4 generally of the same age. Specifically, for the east vault, the roof has experienced 5 considerable wear and tear. There is cracking at the top of the perimeter wall. Some 6 corrosion on the beams exists and one location, particularly, is in need of immediate 7 attention. The walls are in satisfactory condition, but have been damaged by salt spraying 8 and corrosion over the years. For the west vault, the roof also has considerable wear and 9 tear showing on top of the lid. Moreover, the rebar is exposed and the top perimeter of 10 the walls has been damaged. Large longitudinal cracks have formed in the middle of the 11 north and south walls, and accordingly have been deemed a high priority by THESL. 12 13

Given the structural and safety concerns of civil components of these vaults, further
deterioration could reduce their structural integrity and pose a safety hazard to the public.
This project would also include the replacement of Paper Insulated Lead Covered
("PILC") and Asbestos Insulated Lead Covered ("AILC") cables.

18

19 Benefits

Improves the structural strength and safety of the vault roof and walls through the
 construction of a new vault

- Mitigates the risk of collateral damage from network units (both transformers and protectors) failing due to the condition of approximately 30 year-old equipment
- Enables automation capabilities to allow remote monitoring and control from the
- 25 Control Room for troubleshooting and addressing system problems
- Addresses environmental and safety concerns through the removal of PILC and AILC
 cables
- 28

2 IMPACT OF DEFERRAL

If this project were to be deferred, safety risks associated with the vault walls and roof would continue to pose a hazard to THESL construction crews and the public. Moreover, deferral of this work would also increase the risk for collateral damage to the network equipment in the event of the vault failing, and would subsequently compromise system reliability and distribution supply to customers in the downtown core. Lastly, if this project were to be deferred, there is the added consequence of PILC and AILC cables remaining in the system.

Portfolio:	Network	
Project Title:	4KV Network Conversion – High Level MS Feeders B13H	
Hoject Hue.	Phase #2	
Project Number:	20635	
Project Year:	2013	
Estimate Cost:	\$2,121,880	

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 This project is part of a series of projects to eventually convert all of the 4kV loads at

6 High Level MS. This project will partially convert existing B12H and B13H by removing

7 obsolete 4kV box construction, and expanding the secondary network to supply the

8 existing services. As such, the purpose of this project is specifically conversion along

9 Walker Avenue west of Yonge Street.

10

11 **Scope:**

12 The scope of work for this project includes the initial inspections, civil infrastructure,

13 equipment installation of network units and service upgrades, coordination with

14 customers on service upgrades, automation, installation of primary and secondary cables,

and removal of the 4kV overhead system and installation of street lighting poles to

16 THESL standard to be supplied from the underground secondary network.

17

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	SUMMERHILL
STATION(S)	HIGH LEVEL MS
FEEDER(S)	A47H, A49H, B13H

2

3 Project Background

4 High Level MS was originally built in 1910 and has already been undergoing voltage

5 conversion in order to address high maintenance costs, obsolete construction standards

6 and deteriorated plant condition.

7

8 In addition, since feeders B12H and B13H are of box construction type, converting these

9 4kV feeders will significantly improve workplace safety for crews by inherently

10 eliminating the associated hazards of multiple circuits going through a typical box pole,

11 as well as eliminate the hazards of working in the vicinity of shielded primary cable

12 (cable grounding and positioning below secondary cables).

13

14 The secondary network of High Level St. Clair exists nearby and can be extended to

15 improve the long-term reliability of the area as the secondary network system is the most

reliable system for this type of load. Removing the 4kV box construction and replacing it

17 with secondary network will greatly improve the aesthetics at this location.

18

19 Benefits

• Improves the safety of THESL crew workers and the public

• Lowers the risk of failures due to the replacement of over 100 year-old 4kV assets

- 22 with existing standard 13.8kV equipment
- Reduces maintenance costs by removing obsolete 4kV equipment
- Increases capacity with 13.8kV feeders to accommodate residential load creep as well
- as load increase from future emerging businesses in the area
- Reduces system losses (this occurs when 4kV is upgraded to 13.8kV)

Improves reliability by use of the most reliable system available for dispersed
 commercial loads

• Enables automation capabilities to allow remote monitoring and control from the

Control Room for troubleshooting and addressing system problems 1 Improves aesthetics of this commercial and tourism area by removing overhead wires 2 • and placing all infrastructure underground 3 4 **IMPACT OF DEFERRAL** 5 If this project were to be deferred, safety concerns and risks regarding the box 6 construction design would persist and THESL would face the added burden of 7 maintaining obsolete, non-standard 4kV equipment, relative to the standard 13.8kV 8 overhead system. Moreover, deferral of this project would also increase the risk of 9 equipment-related failures, as a number of the 4kV assets are at or approaching end of 10 useful life. 11

Portfolio:	Network	
Project Title:	4KV Network Conversion – Queen Street West Between	
Troject Thie.	Augusta Avenue/Portland Street	
Project Number:	20856	
Project Year:	2013	
Estimate Cost:	\$1,937,000	

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 This project is part of a series of projects to expand the secondary network along Queen

6 Street between Spadina Avenue and Bathurst Street and remove obsolete 4kV box

7 construction. The purpose of this project is specifically to convert the 4kV overhead plant

- 8 to secondary network along Queen Street between Portland Street and Augusta Avenue.
- 9

10 **Scope:**

11 The scope of work for this project includes the initial inspections, civil infrastructure

construction, equipment installation of network units and service upgrades, coordination

13 with customers on service upgrades, automation, installation of primary and secondary

cables, and removal of the 4kV overhead system and installation of street lighting poles

- 15 to THESL standard to be supplied from the underground secondary network.
- 16

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	ENTERTAINMENT DISTRICT
STATION(S)	WINDSOR TS, DEFOE MS
FEEDER(S)	A64WR, A67WR, A68WR, A69WR, B7DF, B3DF

1	
2	JUSTIFICATION
3	
4	Project Background
5	Defoe MS was originally built in the 1970's and has already been undergoing voltage
6	conversion in order to address high maintenance costs, obsolete construction standards
7	and deteriorated plant condition.
8	
9	In addition, since feeders B7DF and B3DF are of box construction type, converting these
10	4kV feeders will significantly improve workplace safety for crews by inherently
11	eliminating the associated hazards of multiple circuits going through a typical box pole,
12	as well as eliminate the hazards of working in the vicinity of shielded primary cable
13	(cable grounding and positioning below secondary cables).
14	
15	The secondary network of Windsor West exists nearby and can be extended to improve
16	the long-term reliability of the area as the secondary network system is the most reliable
17	system for this type of load. This area is ideal for network supply because of the high
18	density of customers and is a small commercial and tourism area. Removing the 4kV box
19	construction and replacing it with secondary network will greatly improve the aesthetics
20	at this location.
21	
22	Benefits
23	• Improves the safety of THESL crew workers and the public
24	• Lowers the risk of failures due to the replacement of approximately 30 year-old 4kV
25	assets with existing standard 13.8kV equipment
26	Reduces maintenance costs by removing obsolete 4kV equipment
27	• Increases capacity with 13.8kV feeders to accommodate residential load creep as well
28	as load increase from future emerging businesses in the area
29	• Reduces system losses (this occurs when 4kV is upgraded to 13.8kV)

1	• Improves reliability by use of the most reliable system available for dispersed
2	commercial loads
3	• Enables automation capabilities to allow remote monitoring and control from the
4	Control Room for troubleshooting and addressing system problems
5	• Improves aesthetics of this commercial and tourism area by removing overhead wires
6	and placing all infrastructure underground
7	
8	IMPACT OF DEFERRAL
9	If this project were to be deferred, safety concerns and risks regarding the box
10	construction design would persist and THESL would face the added burden of
11	maintaining obsolete, non-standard 4kV equipment, relative to the standard 13.8kV
12	overhead system. Moreover, deferral of this project would also increase the risk of

equipment-related failures, as a number of the 4kV assets are at or approaching end of

14 useful life.

Portfolio:	Network	
Project Title:	4KV Network Conversion – High Level MS Feeders	
Hoject Hue.	B13H & B12H Phase #1	
Project Number:	20401	
Project Year:	2013	
Estimate Cost:	\$1,648,227	

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 This project is part of a series of projects to eventually convert all of the 4kV loads at

6 High Level MS. This project is to partially convert existing B12H and B13H by

7 removing obsolete 4kV box construction, and expanding the secondary network to supply

8 the existing services. As such, the purpose of this project is specifically to install

9 electrical infrastructure for the conversion between Summerhill Gardens in the east,

Yonge Street in the west, Woodlawn Avenue in the north and Shaftesbury Avenue in thesouth.

12

13 **Scope:**

14 The scope of work for this project includes the initial inspections, equipment installation

15 of network units and service upgrades, coordination with customers on service upgrades,

automation, installation of primary and secondary cables, and removal of the 4kV

17 overhead system and installation of street lighting poles to THESL standard to be

18 supplied from the underground secondary network.

1	
т	

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	SUMMERHILL
STATION(S)	HIGH LEVEL MS
FEEDER(S)	A48H, A57H, B12H, B13H

3 JUSTIFICATION

4

5 Project Background

6 High Level MS was originally built in 1910 and has already been undergoing voltage

7 conversion in order to address high maintenance costs, obsolete construction standards

- 8 and deteriorated plant condition.
- 9

In addition, since feeders B12H and B13H are of box construction type, converting these

- 11 4kV feeders will significantly improve workplace safety for crews by inherently
- eliminating the associated hazards of multiple circuits going through a typical box pole,
- as well as eliminate the hazards of working in the vicinity of shielded primary cable
- 14 (cable grounding and positioning below secondary cables).
- 15

16 The secondary network of High Level St. Clair exists nearby and can be extended to

¹⁷ improve the long-term reliability of the area as the secondary network system is the most

- reliable system for this type of load. Removing the 4kV box construction and replacing it
- 19 with secondary network will greatly improve the aesthetics at this location.

20

21 Benefits

- Improves the safety of THESL crew workers and the public
- Lowers the risk of failures due to the replacement of over 100 year-old 4kV assets
 with existing standard 13.8kV equipment
- Reduces maintenance costs by removing obsolete 4kV equipment

- Increases capacity with 13.8kV feeders to accommodate residential load creep as well 1 • as load increase from future emerging businesses in the area 2 Reduces system losses (this occurs when 4kV is upgraded to 13.8kV) 3 • Improves reliability by the use of the most reliable system available for dispersed 4 ٠ commercial loads 5 Enables automation capabilities to allow remote monitoring and control from the • 6 Control Room for troubleshooting and addressing system problems 7 Improves aesthetics of this commercial and tourism area by removing overhead wires 8 • and placing all infrastructure underground 9 10 **IMPACT OF DEFERRAL** 11 If this project were to be deferred, safety concerns and risks regarding the box 12 13 construction design would persist and THESL would face the added burden of
- 14 maintaining obsolete, non-standard 4kV equipment, relative to the standard 13.8kV
- 15 overhead system. Moreover, deferral of this project would also increase the risk of
- equipment-related failures, as a number of the 4kV assets are at or approaching end of
- 17 useful life.

Network
New Vault – Eglinton Avenue East/Holly Street (Loc.4481)
18834
2013
\$1,640,794

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to rebuild and to relocate the network vault as well as

6 replace network units due to their condition. This project would also involve the

7 replacement of PILC cables and would include automating the network vault.

8

9 Scope:

10 The scope of work for this project is to rebuild a network vault, including the replacement

of all associated cabling work that needs to be carried out, especially PILC cables

12 identified in the vicinity of the project area, to the current THESL standard. It would also

involve the installation of two 750kVA transformers with 3000A protectors, one for each

14 transformer, and THESL plans to automate the network units at this location.

15

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	MIDTOWN
STATION(S)	DUPLEX TS
FEEDER(S)	A53DX, A55DX

16

2

3 **Project Background**

The vault was built in 1961. A civil inspection found that the walls and roof of the vault are cracked, and that the roof has become a tripping hazard. Moreover, the customer has built a step on top of the vault. Thus, given the structural and safety concerns of civil components of this vault, further deterioration could reduce the structural integrity of the vault and pose a safety hazard to the public.

9

10 The network units found in vault 4481 were manufactured in 1979, 1998, and 2000.

11 Accordingly, this project would also include the replacement of Paper Insulated Lead

12 Covered ("PILC") and Asbestos Insulated Lead Covered ("AILC") cables.

13

14 Benefits

- Improves the structural strength and safety of the vault roof and walls through the
 construction of a new vault
- Mitigates the risk of collateral damage to network units (both transformers and
 protectors) failing due to the condition of equipment ranging from approximately 11
 to 30 years
- Enables automation capabilities to allow remote monitoring and control from the
- 21 Control Room for troubleshooting and addressing system problems
- Addresses environmental and safety concerns through the removal of PILC and AILC
 cables

24

25 IMPACT OF DEFERRAL

²⁶ If this project were to be deferred, safety risks associated with the vault walls and roof

27 would continue to pose a hazard to THESL construction crews and the public. Moreover,

deferral of this work would also increase the risk of collateral damage to the network

29 equipment in the event of the vault failing, and would subsequently compromise system

- reliability and distribution supply to customers in the downtown core. Lastly, if this
- 2 project were to be deferred, there is the added consequence of PILC and AILC cables not
- 3 being removed from the system.

Portfolio:	Network	
Project Title:	Primary & Secondary Cable Installation – Queen Street	
	West Between Portland Street/Bathurst Street Phase #3	
Project Number:	20823	
Project Year:	2013	
Estimate Cost:	\$1,570,534	

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 This project is part of a series of projects to expand the secondary network along Queen

6 Street between Spadina and Bathurst and remove obsolete 4kV box construction. The

7 purpose of this project is specifically to install primary and secondary cables along Queen

8 Street between Portland Street and Bathurst Street. This project is the third phase of four

9 phases to expand the network on this section of Queen Street.

10

11 **Scope:**

12 The scope of work for this project includes the installation of primary cables, and

13 secondary cables. The service cables will need to be installed up to the customer service

- 14 panels.
- 15

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	ENTERTAINMENT DISTRICT
STATION(S)	WINDSOR TS, DEFOE MS
FEEDER(S)	A64WR, A67WR, A68WR, A69WR, B7DF

16

2

3 **Project Background**

4 Defoe MS was originally built in the 1970's and has already been undergoing voltage
5 conversion in order to address high maintenance costs, obsolete construction standards
6 and deteriorated plant condition.

7

In addition, since feeder B7DF is of box construction type, converting this 4kV feeder will significantly improve workplace safety for crews by inherently eliminating the associated hazards of multiple circuits going through a typical box pole, as well as eliminate the hazards of working in the vicinity of shielded primary cable (cable grounding and positioning below secondary cables).

13

The secondary network of Windsor West exists nearby and can be extended to improve the long-term reliability of the area as the secondary network system is the most reliable system for this type of load. This area is ideal for network supply because of the high density of customers and is a small commercial and tourism area. Removing the 4kV box construction and replacing it with secondary network will greatly improve the aesthetics at this location.

20

21 Benefits

- Improves the safety of THESL crew workers and the public
- Lowers the risk of failures due to the replacement of approximately 30 year-old 4kV
 assets with existing standard 13.8kV equipment
- Reduces maintenance costs by removing obsolete 4kV equipment
- Increases capacity with 13.8kV feeders to accommodate residential load creep as well
 as load increase from future emerging businesses in the area
- Reduces system losses (this occurs when 4kV is upgraded to 13.8kV)
- Improves reliability by use of the most reliable system available for dispersed

1 commercial loads

- Enables automation capabilities to allow remote monitoring and control from the
- 3 Control Room for troubleshooting and addressing system problems
- Improves aesthetics of this commercial and tourism area by removing overhead wires
- 5 and placing all infrastructure underground
- 6

7 IMPACT OF DEFERRAL

- 8 If this project were to be deferred, safety concerns and risks regarding the box
- 9 construction design would persist and THESL would face the added burden of
- 10 maintaining obsolete, non-standard 4kV equipment, relative to the standard 13.8kV
- 11 overhead system. Moreover, deferral of this project would also increase the risk of
- equipment-related failures, as a number of the 4kV assets are at or approaching end of
- 13 useful life.

Portfolio:	Network	
Project Title:	Network Secondary Cable Replacement – Windsor West	
Troject Thie.	Network Phase #2	
Project Number:	18899	
Project Year: 2013		
Estimate Cost:	\$1,366,704	

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to replace Asbestos Insulated Lead Cable ("AILC") with

6 Ethylene Propylene Rubber with Hypalon Jacket ("EPRH") cables in the low voltage

7 secondary network from the Windsor West network.

8

9 Scope:

10 The scope of work for this project is bounded by Simcoe Street, John Street, Richmond

11 Street and Grange Street, and would involve replacing approximately 7,500m of network

secondary AILC cables with EPRH Cables. The total length of AILC cables on the

- 13 Windsor West network is approximately 30,300 m. AILC will also be removed from all
- 14 network vaults and customer facilities, and EPRH cables will be terminated at cable

15 chambers using current limiters and homacs. To accommodate future expansion, at least

16 one spare position should be available on each homac.

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	WINDSOR
STATION(S)	WINDSOR TS
FEEDER(S)	N/A

2

3 **Project Background**

Asbestos Insulated Lead Cable ("AILC") contains two health hazards that THESL would like to address. Asbestos may cause illness to people who are exposed to it on a day-today basis. There has been a conscious effort to remove all asbestos from the distribution system. Lead is also a health concern for THESL crews that are exposed to it on a regular basis; it can cause damage to the nervous system and has other detrimental health effects. Finally, there are no manufacturers of AILC, so in case of failure, AILC must be replaced with EPRH cable.

11

12 Alternatives

13 AILC cable could be left in place and there would be no effect on the distribution system.

14 The cable could be replaced as it fails and the replacement would occur in a larger time

15 frame.

16

17 Benefits

• Improves the health and safety of THESL crew workers and the public

19 • Standardizes network secondary cable

20

21 IMPACT OF DEFERRAL

22 If this project were to be deferred, prolonged health and safety concerns for field crews

related to AILC cable will persist. In addition, due to a lack of manufacturers of AILC

cable, it is also possible that future outages may last longer due to the lack of space in

cable chambers to install new cable.

Portfolio:	Network
Project Title:	Network Secondary Cable Replacement – Windsor West
	Phase #4
Project Number:	18901
Project Year:	2013
Estimate Cost:	\$1,366,704

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to replace Asbestos Insulated Lead Cable ("AILC") with

6 Ethylene Propylene Rubber with Hypalon Jacket ("EPRH") cables in THESL low voltage

7 secondary network from the Windsor West network.

8

9 Scope:

The scope of work for this project is bounded by Beverley Street, Brant Street, Richmond Street and Nassau Street, and would involve replacing approximately 7,500m on average of network secondary AILC cables with EPRH Cables. As such, the total length of AILC cables on the Windsor West network is approximately 30,300m.AILC will be removed from all network vaults and customer facilities, and EPRH cables will be terminated at cable chambers using current limiters and homacs. To accommodate future expansion, at least one spare position should be available on each homac.

17

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	WINDSOR
STATION(S)	WINDSOR TS
FEEDER(S)	N/A

2

3 Project Background

Asbestos Insulated Lead Cable ("AILC") contains two health hazards that THESL would like to address. Asbestos may cause illness to people who are exposed to it on a day-today basis. There has been a conscious effort to remove all asbestos in the distribution system. Lead is also a health concern for THESL crews that are exposed to it on a regular basis; it can cause damage to the nervous system and has other detrimental health effects. Finally, there are no manufacturers of AILC cable, so in case of failure, AILC must be replaced with EPRH cable.

1 Alternatives

- 2 AILC cable could be left in place and there would be no affect on the distribution system.
- 3 The cable could be replaced as it fails and the replacement would occur in a larger time
- 4 frame.
- 5

6 Benefits

- 7 Improves the health and safety of THESL crew workers and the public
- 8 Standardizes network secondary cable
- 9

10 IMPACT OF DEFERRAL

- 11 If this project were to be deferred, prolonged health and safety concerns for field crews
- related to AILC cable will persist. In addition, due to a lack of manufacturers of
- 13 AILCcable, it is also possible that future outages may last longer due to the lack of space
- in cable chambers to install new cable.

Portfolio:	Network
Project Title:	Rebuild Peter Street/Adelaide Street West Vault A66WR
	(Loc.4299)
Project Number:	20472
Project Year:	2013
Estimate Cost:	\$1,260,000

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to relocate an existing vault. In addition to this, a network

6 unit will be replaced due to its condition, and THESL plans to automate and look for

7 opportunities to ruggedize the network unit.

8

9 Scope:

10 The scope of work for this project includes building a new vault and abandoning the

11 existing vault, including associated work with supplying the customers of the secondary

network temporarily, while the vault is being rebuilt. In addition, this project also

includes the replacement of the existing network unit with one 750 kVA and 3000A

14 protector, along with building new ducts and cable chambers. Lastly, associated cabling

work will be completed as per THESL standard, and network automation will be installed
 at this location.

17

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	ENTERTAINMENT DISTRICT
STATION(S)	WINDSOR TS
FEEDER(S)	A66WR

2

3 **Project Background**

The vault was initially built in 1951. The vault roof has some moderate corrosion and the 4 vault walls are nearing the end of their useful lifecycle due to age. There is considerable 5 cracking and large spalling in the east wall. Additionally, the wall is bulging under load 6 and soil pressure. Furthermore, the existing network unit has a ventilated protector, which 7 is prone to damages from flooding and moisture in the vault. Given the structural and 8 safety concerns of civil components of this vault, further deterioration could reduce the 9 structural integrity of the vault and pose a safety hazard to the public. This project would 10 also include the replacement of Paper Insulated Lead Covered ("PILC") and Asbestos 11 Insulated Lead Covered ("AILC") cables. 12

13

14 Benefits

- Improves the structural strength and safety of the vault roof and walls through the
 construction of a new vault
- Mitigates the risk of collateral damage from network units (both transformers and protectors) failing given that the equipment is 60 years old, as well as from the
 presence of moisture and water in the vault
- Enables automation capabilities to allow remote monitoring and control from the
- 21 Control Room for troubleshooting and addressing system problems
- Addresses environmental and safety concerns through the removal of PILC and AILC
 cables

24

25 IMPACT OF DEFERRAL

²⁶ If this project were to be deferred, safety risks associated with the vault walls would

- 27 continue to pose a hazard to THESL construction crews and the public. Moreover,
- deferral of this work would also increase the risk for collateral damage to the network
- 29 equipment in the event of the vault failing, and would subsequently compromise system

- reliability and distribution supply to customers in the downtown core. Lastly, if this
- 2 project were to be deferred, there is the added consequence of PILC and AILC cables not
- 3 being removed from the system.

Portfolio:	Network
Project Title:	Network Automation – Cecil North 120/208 V Network
Project Number:	22400
Project Year:	2013
Estimate Cost:	\$1,115,400

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of the project is to install network automation on an entire secondary grid 6 network on the Cecil North network. In the process of automating this network, any 7 concerns with the condition of vaults and network units will be addressed. Network units 8 will be retrofitted or replaced, and vaults that pose a hazard to public and worker safety 9 will be rebuilt. This project is an extension of a previous project THESL undertook to lay 10 fiber to the vaults of this network.

11

12 **Scope:**

The scope of work for this project includes 10 network units that will be automated over 13 six vaults. At least two network units will need to be replaced due to aging and/or the 14 presence of fibretop protectors. In addition, it is estimated that at least two vaults will 15 need to be rebuilt. Associated work with supplying the customers of the secondary 16 network temporarily, while the vault is being rebuilt, is also included in this project. Once 17 both the condition of the network units and network vaults have been addressed, network 18 units will be wired for network automation and commissioned with Supervisory Control 19 and Data Acquisition ("SCADA") personnel. 20

1	
Т	

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	KENSINGTON MARKET/HARBORD
DISTRICT NEIGHBOURHOOD	VILLAGE/CHINATOWN
STATION(S)	CECIL TS
FEEDER(S)	A70CE, A71CE, A72CE

3 JUSTIFICATION

4

5 Project Background

6 Network Automation is a grid modernization initiative to allow the Control Room

7 visibility and control over the network system. Network automation allows the Control

8 Room to monitor in real-time the conditions of the vault, protector and transformer.

9 Loading of the network units is made available for real-time assessment and long-term

analytics. Alarms are set on critical parameters of the system (transformer overloading,

leaking, overheating, protector cycling, and vault flooding) so as to notify operations

12 personnel of problematic vaults.

13

14 With the successful automation of a network vault at Davenport Road and Avenue Road,

15 the Control Room requested piloting small grid networks for network automation.

¹⁶ Briefly, the Control Room has had difficulty troubleshooting grid networks due to the

17 complexity of the load flow in the secondary network system. Accordingly, this

automation will allow visibility and control over the above mentioned networks.

19

20 This project is a component within the network automation initiative and covers

21 installation/retrofitting of network units for automation, rebuilding hazardous vaults, and

22 commissioning tests.

1	At least two of the network vaults in the secondary network have been identified as
2	having been constructed in 1957. It is estimated that these vaults need to be rebuilt. Also
3	it has been identified that two network units contain fibretops and were manufactured in
4	1958 and 1968. Protectors of the fibretop vintage are the oldest vintage of protector in the
5	system and are prone to causing catastrophic failures.
6	
7	Benefits
8	• Enables automation capabilities to allow remote monitoring and control from the
9	Control Room for troubleshooting and addressing system problems
10	• Improves safety and structure strength of the vault through the construction of new
11	vaults
12	• Eliminates the risk of catastrophic failure at the vault through the removal of fibretop
13	protectors
14	• Mitigates the risk of network units (both transformers and protectors) from failing due
15	to assets with construction ages ranging from approximately 43 to 55 years
16	
17	IMPACT OF DEFERRAL
18	If this project were to be deferred, THESL would be unable to mitigate the public and
19	safety risks associated with the network units, if one of the fibretop units were to fail.
20	Furthermore, deferral of this work would also result in THESL losing the opportunity to
21	modernize the system through the removal of fibretop protectors, which are a known
22	legacy problem, as well as replace aging assets that are at or nearing the end of their
23	useful life.

Network
Network Secondary Cable replacement – Windsor West
Phase #1
18896
2013
\$1,029,531

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to replace Asbestos Insulated Lead Cable ("AILC") with

6 Ethylene Propylene Rubber with Hypalon Jacket ("EPRH") cables in THESL's low

voltage secondary network in the Windsor West network.

8

9 Scope:

10 The scope of work for this project is bounded by Simcoe Street, Widmer Street,

11 Richmond Street and Front Street, and would involve replacing approximately 7,500 m of

network secondary AILC cables with EPRH Cables. The total length of AILC cables on

13 the Windsor West network is approximately 30,300 m. AILC also will be removed from

all network vaults and customer facilities, and EPRH cables will be terminated at cable

15 chambers using current limiters and homacs. To accommodate future expansion, at least

16 one spare position should be available on each homac.

17

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	WINDSOR
STATION(S)	WINDSOR TS
FEEDER(S)	N/A

18 **JUSTIFICATION**

2 Project Background

Asbestos Insulated Lead Cable ("AILC") contains two health hazards that THESL would like to address. Asbestos may cause illness to people who are exposed to it on a day-today basis. There has been a conscious effort to remove all asbestos in the distribution system. Lead is also a health concern for THESL crews that are exposed to it on a regular basis; it can cause damage to the nervous system and has other detrimental health effects. Finally, there are no manufacturers of AILC cable, so in case of failure, AILC must be replaced with EPRH cable.

10

11 Alternatives

12 AILC cable could be left in place and there would be no effect on the distribution system.

13 The cable could be replaced as it fails and the replacement would occur in a larger time

14 frame.

15

16 Benefits

• Improves the health and safety of THESL crew workers and the public

• Standardizes network secondary cable

19

20 IMPACT OF DEFERRAL

21 If this project were to be deferred, prolonged health and safety concerns for field crews

related to AILC cable would persist. In addition, due to a lack of manufacturers of AILC

cable, it is also possible that future outages may last longer due to the lack of space in

cable chambers to install new cable.

Portfolio:	Network
Project Title:	Network Secondary Cable Replacement – Windsor West
Troject The.	Phase #3
Project Number:	18898
Project Year:	2013
Estimate Cost:	\$1,029,531

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to replace Asbestos Insulated Lead Cable ("AILC") with

6 Ethylene Propylene Rubber with Hypalon Jacket ("EPRH") cables in THESL low voltage

7 secondary network in the Windsor West network.

8

9 Scope:

10 The scope of work for this project is bounded by Brant Street, Widmer Street, Richmond

Street and Front Street, and would involve replacing approximately 7,500 m of network

secondary AILC cables with EPRH Cables. The total length of AILC cables on the

13 Windsor West network is approximately 30,300 m. AILC will also be removed from all

14 network vaults and customer facilities, and EPRH cables will be terminated at cable

15 chambers using current limiters and homacs. To accommodate future expansion, at least

16 one spare position should be available on each homac.

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	WINDSOR
STATION(S)	WINDSOR TS
FEEDER(S)	N/A

2

3 Project Background

Asbestos Insulated Lead Cable ("AILC") contains two health hazards that THESL would like to address. Asbestos may cause illness to people who are exposed to it on a day-today basis. There has been a conscious effort to remove all asbestos in the distribution system. Lead is also a health concern for THESL crews that are exposed to it on a regular basis; it can cause damage to the nervous system and has other detrimental health effects. Finally, there are no manufacturers of AILC cable, so in case of failure, AILC must be replaced with EPRH cable.

11

12 Alternatives

AILC cable could be left in place and there would be no effect on the distribution system.

14 The cable could be replaced as it fails and the replacement would occur in a larger time

15 frame.

16

17 Benefits

• Improves the health and safety of THESL crew workers and the public

19 • Standardizes network secondary cable

20

21 IMPACT OF DEFERRAL

22 If this project were to be deferred, prolonged health and safety concerns for field crews

related to AILC cable would persist. In addition, due to a lack of manufacturers of AILC

cable, it is also possible that future outages may last longer due to the lack of space in

cable chambers to install new cable.

Portfolio:	Network
Project Title:	New Vault – St. Clair Avenue/Yonge Street A55H (Loc.4541)
Project Number:	18838
Project Year:	2013
Estimate Cost:	\$938,517

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to relocate the existing network vault, as well as replace

6 network units due to corrosion. This project would also involve the replacement of PILC

7 cables and would include automating the network vault.

8

9 Scope:

10 The scope of work for this project is to relocate an existing network vault, and replace all

11 associated cabling work that needs to be carried out, especially PILC cables identified in

12 the vicinity of the project area to the current THESL standard. It would also involve the

installation of two 2000kVA transformers with 3000A protectors, one for each

14 transformer, and THESL plans to automate the network units at this location.

15

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	DEER PARK
STATION(S)	HIGH LEVEL MS
FEEDER(S)	А55Н, А56Н

16

2

3 **Project Background**

- 4 The vault was initially built around 1965. The vault roof is in satisfactory condition.
- 5 However, the vault walls are in poor shape due to spalling and porosity. There is no
- 6 mechanical protection for the racked cables, and the hanger is cutting into the cables.
- 7 These conditions pose a danger for stray current. Given the structural and safety concerns
- 8 of civil components of this vault, further deterioration could reduce the structural
- 9 integrity of the vault and pose a safety hazard to the public. This project would also
- 10 include the replacement of Paper Insulated Lead Covered ("PILC") and Asbestos
- 11 Insulated Lead Covered ("AILC") cables.
- 12
- 13 Moreover, the two network units in the vault were manufactured in 1988 and 2003. Based
- 14 on the inspection information, the older transformer is also showing signs of corrosion
- and has a fibretop protector. Protectors of the fibretop vintage are the oldest vintage of
- 16 protector in the system and are prone to causing catastrophic failures.
- 17

18 Benefits

- Improves the structural strength and safety of the vault roof and walls through the
 construction of a new vault
- Mitigates the risk of collateral damage from network units (both transformers and protectors) failing due to the condition of 23-year-old equipment
- Enables automation capabilities to allow remote monitoring and control from the
 Control Room for troubleshooting and addressing system problems
- Addresses environmental and safety concerns through the removal of PILC and AILC
 cables
- 27

1 IMPACT OF DEFERRAL

If this project were to be deferred, safety risks associated with the vault walls and roof would continue to pose a hazard to THESL construction crews and the public. Moreover, deferral of this work would also increase the risk for collateral damage to the network equipment in the event of the vault or fibretop protector failing, and would subsequently compromise system reliability and distribution supply to customers in the downtown core. Lastly, if this project were to be deferred, there is the added consequence of PILC and AILC cables not being removed from the system.

Portfolio:	Network
Project Title:	Vault Roof Rebuild – King Street West/Jordan Street A54WR
	(Loc.4542)
Project Number:	20510
Project Year:	2013
Estimate Cost:	\$910,000

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to rebuild the network vault roof and all associated PILC

6 cables. In addition to this, network units will be replaced and automated,

7 (i.e., transformer and protector).

8

9 Scope:

10 The scope of work for this project is to relocate and construct a network vault and all

associated cabling that needs to be carried out, especially PILC cable in the vicinity of the

12 project area, to current THESL standard. It would also involve the installation of two

13 1500 kVA transformers with 1875A protectors, one for each transformer, and THESL

14 plans to automate the network units at this location.

15

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	FINANCIAL DISTRICT
STATION(S)	WINDSOR TS
FEEDER(S)	A54WR, A58WR

16

2

3 Project Background

The vault was initially built in 1964. Over the years the roof of this vault has developed cracks. Upon a civil inspection it was found that the roof of the vault is cracked. Given the structural and safety concerns of civil components of this vault, further deterioration could reduce the structural integrity of the vault and pose a safety hazard to the public.

8

9 The two network units found in the vault were manufactured in 1960 and 1968. The

network units also have fibretop protectors. Protectors of the fibretop vintage are the

11 oldest vintage of protector in the system and are prone to causing catastrophic failures.

12 This project would also include the replacement of Paper Insulated Lead Covered

13 ("PILC") and Asbestos Insulated Lead Covered ("AILC") cables.

14

15 Benefits

- Improves the structural strength and safety of the vault roof and walls through the construction of a new vault
- Mitigates the risk of collateral damage from network units (both transformers and protectors) failing due to the condition of equipment with an average age of 47 years
- Modernizes the system through the removal of the fibretop protectors
- Enables automation capabilities to allow remote monitoring and control from the
- 22 Control Room for troubleshooting and addressing system problems
- Addresses environmental and safety concerns through the removal of PILC and AILC
 cables
- 25

26 IMPACT OF DEFERRAL

27 If this project were to be deferred, safety risks associated with the vault walls and roof

would continue to pose a hazard to THESL construction crews and the public. Moreover,

29 deferral of this work would also increase the risk for collateral damage to the network

- equipment in the event of the vault or fibretop protectors failing, and would subsequently
- 2 compromise system reliability and distribution supply to customers in the downtown
- 3 core. Lastly, if this project were to be deferred, there is the added consequence of PILC
- 4 and AILC cables not being removed from the system.

Portfolio:	Network
Project Title:	Network Replacement (Loc. 4407)
Project Number:	18912
Project Year:	2013
Estimate Cost:	\$805,747

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to replace the existing network transformer units due to

6 aging, corrosion and the presence of fibretop protectors. In addition, the project would

7 also include rebuilding the network vault.

8

9 Scope:

10 The scope of work for this project includes the replacement of the existing network unit

11 with one 750 kVA and 3000A protector. In addition, a vault rebuild will be completed,

12 which would include all work associated with supplying customers of the secondary

13 network temporarily, while the new vault is being constructed. Furthermore, associated

14 cabling work will be completed as per current THESL standard.

15

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	SUMMERHILL
STATION(S)	HIGH LEVEL MS
FEEDER(S)	А55Н, А47Н

16

2

3 Project Background

The network unit found in the vault was installed in 1969. The network unit also has a 4 fibretop protector. Protectors of the fibretop vintage are the oldest vintage of protector in 5 the system and are prone to causing catastrophic failures. The vault was initially built in 6 1957. Upon a civil inspection, the roof was found to be in poor condition and the ladder 7 and ladderway enclosure need to be rebuilt. Over the years, the walls of this vault have 8 also developed spalling, exposing the rebar of the vaults that could potentially 9 compromise the structural support of the vault. Lastly, cabling work planned for this 10 project includes the replacement of Paper Insulated Lead Covered ("PILC") and Asbestos 11 Insulated Lead Covered ("AILC") cables. 12

13

14 Benefits

- Improves the structural strength and safety of the vault roof and walls through the
 construction of a new vault
- Mitigates the risk of collateral damage from network units (both transformers and
 protectors) failing due to the condition of the 42 years old equipment
- Eliminates the risk of catastrophic failure at the vault through the removal of fibretop
 protectors
- Addresses environmental and safety concerns through the removal of PILC and AILC
 cables
- 23

24 IMPACT OF DEFERRAL

If this project were to be deferred, safety risks associated with the vault walls and roof would continue to pose a hazard to THESL construction crews and the public. Moreover, deferral of this work would also increase the risk for collateral damage to the network equipment in the event of the vault failing, and would subsequently compromise system reliability and distribution supply to customers in the downtown core. Lastly, if this

- 1 project were to be deferred, there is the added consequence of PILC and AILC cables not
- 2 being removed from the system.

Portfolio:	Network
Project Title:	Equipment Installation – Queen Street West Between
	Portland Street/Bathurst Street Phase #2
Project Number:	20822
Project Year:	2013
Estimate Cost:	\$811,189

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

This project is part of a series of projects to expand the secondary network along Queen
Street between Spadina and Bathurst and remove obsolete 4kV box construction. The

7 purpose of this project is specifically to install equipment for network expansion along

8 Queen Street between Portland Street and Bathurst Street. This project is the second

9 phase of four phases to expand the network on this section of Queen Street

10

11 **Scope:**

12 The scope of work for this project includes the installation of four network units, dry-type

transformers, and service panels. Customer service panels may need to be upgraded or

changed due to the conversion. Customers with voltage services other than 208Y/120V

15 will need special equipment and/or modifications to existing equipment. This project will

16 cover coordination with customers of these service changes. THESL plans to also

17 automate the network units at this location.

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DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	ENTERTAINMENT DISTRICT
STATION(S)	WINDSOR TS, DEFOE MS
FEEDER(S)	A64WR, A67WR, A68WR, A69WR, B7DF

4 JUSTIFICATION

5

6 **Project Background**

Defoe MS was originally built in the 1970's and has already been undergoing voltage
conversion in order to address high maintenance costs, obsolete construction standards
and deteriorated plant condition.

10

In addition, since feeder B7DF is of box construction type, converting this 4kV feeder will significantly improve workplace safety for crews by inherently eliminating the associated hazards of multiple circuits going through a typical box pole, as well as eliminate the hazards of working in the vicinity of shielded primary cable (cable grounding and positioning below secondary cables).

16

The secondary network of Windsor West exists nearby and can be extended to improve the long-term reliability of the area as the secondary network system is the most reliable system for this type of load. This area is ideal for network supply because of the high density of customers and is a small commercial and tourism area. Removing the 4kV box construction and replacing it with secondary network will greatly improve the aesthetics at this location.

- 23
- 24

25 Benefits

1	• Improves the safety of THESL crew workers and the public
2	• Lowers the risk of failures due to the replacement of approximately 30-year-old $4kV$
3	assets with existing standard 13.8kV equipment
4	• Reduces maintenance costs by removing obsolete 4kV equipment
5	• Increases capacity with 13.8kV feeders to accommodate residential load creep as well
6	as load increase from future emerging businesses in the area
7	• Reduces system losses (occurs when 4kV is upgraded to 13.8kV)
8	• Improves reliability by use of the most reliable system available for dispersed
9	commercial loads
10	• Enables automation capabilities to allow remote monitoring and control from the
11	Control Room for troubleshooting and addressing system problems
12	• Improves aesthetics of this commercial and tourism area by removing overhead wires
13	and placing all infrastructure underground
14	
15	IMPACT OF DEFERRAL
16	If this project were to be deferred, safety concerns and risks regarding the box

- 17 construction design will persist and THESL would face the added burden of maintaining
- obsolete, non-standard 4kV equipment, relative to the standard 13.8kV overhead system.
- 19 Moreover, deferral of this project would also increase the risk of equipment-related
- 20 failures, as a number of the 4kV assets are at or approaching end of useful life.

Portfolio:	Network
Project Title:	Network Replacement (Loc.4372)
Project Number:	20377
Project Year:	2013
Estimate Cost:	\$738, 284

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

- 5 The purpose of this project is to replace the existing network transformer units due to age,
- 6 as well as automate the network vault.
- 7

8 Scope:

- 9 The scope of work for this project includes replacement of the existing network units
- 10 with two 750 kVA and 3000A protectors, one for each transfomer. Furthermore,
- associated cabling work will be completed as per current THESL standard. Finally,
- 12 THESL plans to have network automation at this location.

13

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	DOWNTOWN YONGE
STATION(S)	TERAULEY TS
FEEDER(S)	A61A, A62A

14

2

3 Project Background

4 The two network units in this vault were manufactured in 1981 and cabling work planned

5 for this project would include the replacement of Paper Insulated Lead Covered ("PILC")

6 and Asbestos Insulated Lead Covered ("AILC") cables.

7

8 Benefits

- Mitigates the risk of collateral damage from network units (both transformers and
 protectors) failing due to the condition of the 30-year-old equipment
- Enables automation capabilities to allow remote monitoring and control from the
- 12 Control Room for troubleshooting and addressing system problems
- Addresses environmental and safety concerns through the removal of PILC and AILC
 cables
- 15

16 IMPACT OF DEFERRAL

- 17 If this project were to be deferred, THESL would lose the opportunity to modernize the
- 18 system, and gain greater visibility on the operation and condition of the network unit via
- automation. Additionally, if this project were to be deferred, there is the added
- 20 consequence of PILC and AILC cables not being removed from the system.

Portfolio:	Network
Project Title:	Network Replacement – Dundas Street/Mutual Street
	(Loc.4509)
Project Number:	20707
Project Year:	2013
Estimate Cost:	\$710,582

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1
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2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to replace the existing network transformer units due to

6 ageing, corrosion, leaking, and the presence of fibretop protectors. In addition, the project

7 would also include automating the network vault.

8

9 Scope:

10 The scope of work for this project includes replacement of the existing network units

11 with two 500 kVA and 1875A protectors, one for each transformer. Furthermore,

12 associated cabling work will be completed as per current THESL standard and THESL

13 plans to have network automation at this location.

14

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	DOWNTOWN YONGE
STATION(S)	TERAULEY TS
FEEDER(S)	A62A, A67A

15

2

3 **Project Background**

The two network units in this vault are 60 years old. The network units also have fibretop 4 protectors. Protectors of the fibretop vintage are the oldest vintage of protector in the 5 system and are prone to causing catastrophic failures. Based on the findings from 6 inspections conducted on the units, the transformers are leaking transformer oil and are 7 corroded at the base of the transformer, due to the existing environmental conditions of 8 the vault. The roof has been damaged by an icing agent and has some wear and tear and 9 some of the beams and their connections have been affected by water and salt corrosion. 10 In addition, cabling work planned for this project includes the replacement of Paper 11 Insulated Lead Covered ("PILC") and Asbestos Insulated Lead Covered ("AILC") 12 13 cables.

14

15 Benefits

- Improves the structural strength and safety of the vault roof and walls through the construction of a new vault
- Mitigates the risk of collateral damage to network units (both transformers and
 protectors) failing due to the condition of the 51-year-old equipment
- Eliminates the risk of catastrophic failure at the vault through the removal of fibretop
 protectors
- Enables automation capabilities to allow remote monitoring and control from the
 Control Room for troubleshooting and addressing system problems
- Addresses environmental and safety concerns through the removal of PILC and AILC
 cables
- 26

27 IMPACT OF DEFERRAL

If this project were to be deferred, safety risks associated with the vault walls and roof

29 would continue to pose a hazard to THESL construction crews and the public. Moreover,

- deferral of this work would also increase the risk for collateral damage to the network
- 2 equipment in the event of the vault failing or leaking transformer oil, and would
- 3 subsequently compromise system reliability and distribution supply to customers in the
- 4 downtown core. Lastly, if this project were to be deferred, there is the added consequence
- 5 of PILC and AILC cables not being removed from the system.

Portfolio:	Network
Project Title:	Network Replacement – King Street/Yonge Street
Project Number:	20498
Project Year:	2013
Estimate Cost:	\$661,664

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

- 5 The purpose of this project is to replace the existing network transformer units due to
- 6 aging, corrosion, leaking, and the presence of fibretop protectors. In addition, the project
- 7 would also include automating the network vault.
- 8

9 Scope:

- 10 The scope of work for this project includes the replacement of the existing network units
- 11 with two 500 kVA and 1875A protectors, one for each transformer. Furthermore,
- 12 associated cabling work will be completed as per current THESL standard and THESL
- 13 plans to have network automation at this location.
- 14

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	FINANCIAL DISTRICT
STATION(S)	GEORGE AND DUKE MS
FEEDER(S)	A77GD, A78GD

15

2

3 Project Background

4 The two network units in this vault were manufactured in 1949. The network units also

- 5 have fibretop protectors. Protectors of the fibretop vintage are the oldest vintage of
- 6 protector in the system and are prone to causing catastrophic failures. Based on the
- 7 findings from inspections conducted on the units, the transformers are leaking
- 8 transformer oil and are corroded at the base of the transformer due to the existing
- 9 environmental conditions of the vault. Cabling work planned for this project includes the
- replacement of Paper Insulated Lead Covered ("PILC") and Asbestos Insulated Lead
- 11 Covered ("AILC") cables.
- 12

13 Benefits

- Improves the structural strength and safety of the vault roof and walls through the
 construction of a new vault
- Mitigates the risk of collateral damage from network units (both transformers and
- 17 protectors) failing due to the condition of the 51-year-old equipment
- Eliminates the risk of catastrophic failure at the vault through the removal of fibretop
 protectors
- Enables automation capabilities to allow remote monitoring and control from the
- 21 Control Room for troubleshooting and addressing system problems
- Addresses environmental and safety concerns through the removal of PILC and AILC
 cables

24

25 IMPACT OF DEFERRAL

26 If this project were to be deferred, safety risks associated with the vault walls and roof

- 27 would continue to pose a hazard to THESL construction crews and the public. Moreover,
- deferral of this work would also increase the risk for collateral damage to the network
- equipment in the event of the vault failing or leaking transformer oil, and would

- subsequently compromise system reliability and distribution supply to customers in the
- 2 downtown core. Lastly, if this project were to be deferred, there is the added consequence
- 3 of PILC and AILC cables not being removed from the system.

Portfolio:	Network
Project Title:	4KV Network Conversion – High Level MS Feeders
	B13H Phase #3
Project Number:	20636
Project Year:	2013
Estimate Cost:	\$506,179

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 This project is part of a series of projects to eventually convert all of the 4kV loads at

6 High Level MS. This project is to partially convert existing B12H and B13H by

7 removing obsolete 4kV box construction, and expanding the secondary network to supply

8 the existing services. As such, the purpose of this project is specifically, conversion along

9 Alcorn Avenue west of Yonge Street.

10

11 **Scope:**

12 The scope of work for this project includes the initial inspections, civil infrastructure,

equipment installation of network units and service upgrades, coordination with

14 customers on service upgrades, automation, installation of primary and secondary cables,

and removal of the 4kV overhead system and installation of street lighting poles to

16 THESL current standard to be supplied from the underground secondary network.

17

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	SUMMERHILL
STATION(S)	HIGH LEVEL MS
FEEDER(S)	А47Н, А49Н, В13Н

18 **JUSTIFICATION**

2 **Project Background**

3 High Level MS was originally built in 1910 and has already been undergoing voltage

4 conversion in order to address high maintenance costs, obsolete construction standards

5 and deteriorated plant condition.

6

7 In addition, since feeders B12H and B13H are of box construction type, converting these

8 4kV feeders will significantly improve workplace safety for crews by inherently

9 eliminating the associated hazards of multiple circuits going through a typical box pole,

as well as eliminate the hazards of working in the vicinity of shielded primary cable

11 (cable grounding and positioning below secondary cables).

12

13 The secondary network of High Level St. Clair exists nearby and can be extended to

¹⁴ improve the long-term reliability of the area as the secondary network system is the most

- reliable system for this type of load. Removing the 4kV box construction and replacing it
- 16 with secondary network will greatly improve the aesthetics at this location.

17

18 Benefits

- 19 Improves the safety of THESL crew workers and the public
- Lowers the risk of failures due to the replacement of over 100-year-old 4kV assets
- 21 with existing standard 13.8kV equipment
- 22 Reduces maintenance costs by removing obsolete 4kV equipment
- Increases capacity with 13.8kV feeders to accommodate residential load creep as well
 as load increase from future emerging businesses in the area
- Reduces system losses (this occurs when 4kV is upgraded to 13.8kV)
- Improves reliability by use of the most reliable system available for dispersed commercial loads
- Enables automation capabilities to allow remote monitoring and control from the
- 29 Control Room for troubleshooting and addressing system problems

Improves aesthetics of this commercial and tourism area by removing overhead wires
 and placing all infrastructure underground

3

4 IMPACT OF DEFERRAL

- 5 If this project were to be deferred, safety concerns and risks regarding the box
- 6 construction design will persist and THESL would face the added burden of maintaining
- 7 obsolete, non-standard 4kV equipment, relative to the standard 13.8kV overhead system.
- 8 Moreover, deferral of this project would also increase the risk of equipment-related
- 9 failures, as a number of the 4kV assets are at or approaching end of useful life.

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1 PROJECTS \$500K AND OVER FOR 2013

2

3 SUSTAINING PORTFOLIO - STATIONS

4

5 **Table 1: Stations Projects**

Estimate Number	Project Title	Estimated Cost (\$ Millions)
20492	Replace Duplex TS A5-6DX Switchgear	5.9
22476	Replace Carlaw TS A4-5E Switchgear	5.8
21702	Commission Strachan TS A11-12T Switchgear	2.8
21348	Sonnet Upgrade OC-3 to OC-12	0.9
21581	Replace Neilson Drive MS 4KV Switchgear	0.9
21656	Replace Bermondsey TS 4 KSO Circuit Breakers	0.8
21338	Replace Greencedar Lawrence MS Switchgear & Install SCADA/RTU	0.5
21804	Replace Lawrence Golf T1 MS Switchgear	0.5
22806	Replace Etobicoke MOSCAD RTUs	0.5
	Total Cost	18.6

Portfolio:	Stations
Project Title:	Replace Duplex TS A5-6DX Switchgear
Project Number:	20492
Project Year:	2013
Estimate Cost:	\$ 5,866,980

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to replace the existing A5-6DX switchgear at Duplex TS.

6

7 Scope:

- 8 The scope of work for this project is to install, commission, and energize the new 3000A
- 9 gas-insulated switchgear ("GIS") to replace the existing A5-6DX switchgear at Duplex
- 10 TS.
- 11

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	400 DUPLEX STREET
STATION(S)	DUPLEX TS
FEEDER(S)	N/A

12

13 JUSTIFICATION

14

15 Project Background

16 Duplex TS has three switchgears all located in the same basement floor of the Duplex TS

building. The switchgears are of non arc-resistant type and this type of design has a high

risk of collateral damage and personnel safety in an eventful failure. The switchgears at

19 Duplex TS, being in the basement, have additional risk of being flooded with water that

could interfere with the performance of the switchgears and could result in prolonged
 outages to a large number of customers. Moreover, the deluge system installed on the
 first floor above the switchgear in the basement poses a high risk of water flooding and
 malfunction, while in operation.

5

The A1-2 DX switchgear at Duplex TS is the oldest of the three switchgears and is 6 approaching its end of useful life. The A1-2DX, A3-4DX and A5-6DX switchgear were 7 manufactured in 1968, 1974, and 1975, respectively. Infrared scanning showed hot spots 8 in the switchgear due to the corona effect, so the risk of collateral damage and personnel 9 safety due to an eventful failure is increasing. However, due to the existing physical 10 arrangement, access to the A1-2DX switchgear for replacement is being obstructed by the 11 A5-6DX switchgear, causing difficulties to replace A1-2DX switchgear first. Therefore, 12 13 to meet this space constraint, the A5-6DX switchgear will be replaced first with a GIS switchgear, followed by replacement of theA1-2DX switchgear replacement. Lastly, an 14 on-site investigation has confirmed that there is inadequate space for an air-insulated 15 double bus, double breaker or air-insulated breaker and half design. Therefore, to reduce 16 17 the risk of collateral damage, improve water resistancy and to fit all switchgears in the available space, all the switchgears at Duplex TS are to be replaced with the gas-insulated 18 19 switchgears ("GIS") in stages.

20

21 Alternatives

Replacing the A5-6DX switchgear with an air insulated arc-resistant switchgear was considered as an option, but due to space limitations and the risk of water flooding associated with the equipment being in the basement, this option was rejected.

25

26 Benefits

Improves reliability due to switching components being completely sealed in SF6 gas
 that has excellent insulation and arc quenching properties

• Improves personnel safety due to all live parts of the switchgear being entirely sealed

- in an earthed metal enclosure and diffusion of any faults inside the switchgear
- 2 through the high pressure SF6 gas barrier
- Reduces maintenance and operating costs due to the use of sealed components in the
 gas-insulated switchgear
- Uses less space as the gas-insulated switchgear is compact and is an attractive option
 for installation in substations with space constraints
- Increases bus capacity ratings to meet future load growth given that the rating of the
- 8 new switchgear is 72MVA compared to the existing switchgear rating of 49MVA and
- 9 would support any future load growth or load transfer requirements from
- 10 neighbouring substations during contingency events
- 11

12 IMPACT OF DEFERRAL

13 If this project were to be deferred, THESL would continue to rely on deteriorated

14 switchgear that would increase the risk of failure and worsening system reliability, given

that the switchgear is located in the basement and susceptible to water leaks and flooding.

- ¹⁶ Moreover, deferral of the A5-6DX switchgear at Duplex TS would result in the deferral
- 17 for replacing the next switchgear A1-2DX, since the A5-6DX switchgear replacement
- 18 project needs to be completed first to make the space necessary for the replacement of
- 19 switchgear A1-2DX. Lastly, deferral of this work would also increase safety risks to
- 20 THESL personnel due to the lack of the arc-resistance design feature, and would limit the
- capability to meet future load growth and transfers from adjacent station(s) in the event of
- an outage.

Portfolio:	Stations
Project Title:	Replace Carlaw TS A4-5E Switchgear
Project Number:	22476
Project Year:	2013
Estimate Cost:	\$5,760,874

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to replace the existing A4-5E switchgear at Carlaw TS.

6

7 **Scope:**

8 The scope of work for this project is to install, commission, and energize the new 3000A

9 air-insulated switchgear ("AIS") with arc-resistant switchgear to replace the existing

10 A4-5E switchgear at Carlaw TS.

11

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	369 CARLAW AVENUE
STATION(S)	CARLAW TS
FEEDER(S)	N/A

12

13 JUSTIFICATION

14

15 Project Background

16 The A4-5E switchgear at Carlaw TS was installed in 1950 and has reached its end of

useful life. According to THESL'sasset condition assessment, the A4-5E switchgear has

a Health Index of 43, indicating a poor health condition.

1	The switchgear enclosure was made of brick and mortar structures that serve as partitions
2	between the circuit breaker cells. The existing circuit breakers are of the air-blast type
3	and are obsolete. Moreover, a separate high-maintenance compressor air system is also
4	required to operate the circuit breakers. Replacement parts are no longer being
5	manufactured and all required parts need to be custom-manufactured, resulting in high
6	maintenance costs and longer service times for repairs and returns. Similarly, the air-blast
7	circuit breakers at this station also attract additional maintenance costs due to the added
8	expense of renewing and maintaining the air supply system needed for breaker operation.
9	Lastly, the switchgear is of a non-arc-resistant design and has an increased risk of
10	collateral damage and personnel injury during an eventful failure.
11	
12	The existing switchgear is to be replaced with 3000 A air-insulated, arc-resistant type C
13	switchgear with double bus, double breaker configuration in order to improve equipment
14	performance, system reliability and flexibility, and personnel safety.
15	
16	Alternatives
17	Replacing the switchgear with gas-insulated switchgear rather than with air-insulated
18	switchgear was considered as an alternative. However, due to the availability of floor
19	space, the air-insulated switchgear was chosen as it has a lower capital cost and is easier
20	to maintain.
21	
22	Benefits
23	
24	• Improves reliability due to the modern design of the enclosure that incorporates arc-
25	resistance technology to prevent adjacent equipment from collateral damage
26	• Improves operational flexibility through the new double bus, double breaker
27	
27	configuration that would reduce outage time and maintenance cost
27	configuration that would reduce outage time and maintenance costReduces the risk of failure by removing aged equipment and subsequently lowers

1	• Improves personnel safety through the arc-resistance feature that allows for proper
2	venting of air pressure that could build up inside the switchgear compartments as a
3	result of arcing while personnel are inside the station
4	• Reduces maintenance costs and decreases the amount of time required for
5	maintenance by utilizing vacuum circuit breaker technology as opposed to the air
6	compressor system for circuit breaker operations
7	• Increases bus capacity ratings to meet future load growth given that the rating of the
8	new switchgear is 72MVA compared to the existing switchgear rating of 36MVA and
9	would be support any future load growth or load transfer requirements from
10	neighbouring substations during contingency events
11	
11 12	IMPACT OF DEFERRAL
	IMPACT OF DEFERRAL
12	IMPACT OF DEFERRAL If this project were to be deferred, THESL would continue to rely on deteriorated
12 13	
12 13 14	If this project were to be deferred, THESL would continue to rely on deteriorated
12 13 14 15	If this project were to be deferred, THESL would continue to rely on deteriorated switchgear that would increase the risk of failure, worsening system reliability and high
12 13 14 15 16	If this project were to be deferred, THESL would continue to rely on deteriorated switchgear that would increase the risk of failure, worsening system reliability and high maintenance costs associated with the air compressor system required for the operation of
12 13 14 15 16 17	If this project were to be deferred, THESL would continue to rely on deteriorated switchgear that would increase the risk of failure, worsening system reliability and high maintenance costs associated with the air compressor system required for the operation of the air-blast circuit breaker. Deferral of this work would also increase safety risks to

Portfolio:	Stations	
Project Title:	Commission Strachan TS A11-12T Switchgear	
Project Number:	21702	
Project Year:	2013	
Estimate Cost:	\$2,800,472	

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to commission A11-12T switchgear at Strachan TS.

6

7 Scope:

8 The scope of work for this project is to commission the A11-12T switchgear that will

9 replace the existing A7-8T switchgear in 2013. This project is a continuation of the 2012

¹⁰ project to replace the aforementioned switchgear.

11

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	6 STRACHAN AVENUE
STATION(S)	STRACHAN TS
FEEDER(S)	N/A

12

13 JUSTIFICATION

14

15 Project Background

16 The A7-8T switchgear was installed in 1956 and has reached the end of its useful life.

According to THESL's asset condition assessment, the A7-8T switchgear has a Health

18 Index of 43, indicating a poor health condition. The existing circuit breakers are of the

19 air-blast type and are obsolete. Moreover, replacement parts are no longer being

manufactured and any required parts need to be custom manufactured, making the cost of 1 maintenance high and the repair and return to service time long. The air-blast circuit 2 breakers at this station also have additional maintenance costs due to the added expense 3 of renewing and maintaining the air supply system needed for breaker operation. The 4 switchgear is of a non-arc-resistant design and has an increased risk of collateral damage 5 and personnel injury during an eventful failure. The new air insulated switchgear ("AIS") 6 to replace A7-8T is to be purchased in 2012. This project involves the installation and 7 commissioning of the new air-insulated switchgear. 8

9

10 Alternatives

11 New air-insulated switchgear is an alternative that was considered. However, the

12 feasibility of this option is subject to investigation at detailed design stage, to determine if

the existing space is adequate to accommodate the larger dimensions of the air-insulatedswitchgear.

15

16 Benefits

- Improves reliability due to the modern design of the enclosure that incorporates arc resistance technology to prevent adjacent equipment from collateral damage
- Reduces the risk of failure by removing aged equipment and subsequently lowers
 potential system reliability and outage risks

Improves personnel safety through the arc-resistance feature that allows for proper
 venting of air pressure out of the switchgear compartment when a circuit breaker
 experiences a failure and would allow THESL personnel to work safely in the vicinity
 of the equipment at any time

- Reduces maintenance costs and decreases the amount of time required for
 maintenance by utilizing vacuum circuit breaker technology as opposed to the air
 compressor system, for circuit breaker operations
- Increases bus capacity ratings to meet future load growth given that the rating of the new switchgear is 72MVA compared to the existing switchgear rating of 40MVA and

1 would support any future load growth or load transfer requirements from

- 2 neighbouring substations during contingency events
- 3

4 IMPACT OF DEFERRAL

5 If this project were to be deferred, THESL will continue to rely on deteriorated

6 switchgear that would increase the risk of failure, worsening system reliability and high

7 maintenance costs associated with the air compressor system required for operation of the

8 air-blast circuit breaker. Moreover, deferral of the A7-8T switchgear at Strachan TS

9 would result in deferred replacement of the next switchgear A5-6T, and create a backlog

10 moving forward. Lastly, deferral of this work would also increase safety risks to THESL

- personnel due to the absence of the arc-resistance design feature, and would limit
- 12 THESL's capability to meet future load growth and transfers from adjacent station(s) in
- 13 the event of an outage.

Portfolio:	Stations
Project Title:	Sonnet Upgrade OC-3 to OC-12
Project Number:	21348
Project Year:	2013
Estimate Cost:	\$930,853

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to upgrade the SONET fibre network from OC-3 to OC-12.

6

7 Scope:

- 8 The scope of work for this project is to upgrade the existing SONET JungleMux system
- 9 from OC-3 to OC-12 to increase communication bandwidth and support automation of
- 10 the distribution system.

11

DISTRICT	N/A
DISTRICT NEIGHBOURHOOD	N/A
STATION(S)	N/A
FEEDER(S)	N/A

12

13 JUSTIFICATION

14

15 Project Background

16 Toronto Hydro uses SONET fibre optics, copper lines, radios and leased bell lines to

17 perform various types of communications. The existing SONET JungleMux system also

supports the SCADA system, as well as the security cameras that are being installed in

various substations. The security cameras that are being installed in various stations take

1	up significant bandwidth. The SONET system will also support various THESL
2	automation initiatives that are currently underway or planned for the future. The existing
3	SONET JungleMux system uses OC-3, which has a band-width of 155.52Mb/s. As such,
4	the bandwidth of the existing OC-3 is approaching its full capacity and needs to be
5	upgraded to OC-12 that has a bandwidth of 622.8Mb/s, in order to be able to
6	accommodate the various types of communications being performed, including those
7	carried out by the SCADA system to monitor and control various THESL distribution
8	equipment.
9	
10	Alternatives
11	An alternative to upgrading the SONET JungleMux, OC-3 system to OC-12 is to expand
12	the existing copper communication lines; however, this alternative was not deemed to be
13	cost-effective because fibre optic communication line is more cost effective than copper
14	communication line.
15	
16	Benefits
17	Increases the efficiency of the SONET communication system
18	• Increases the capability to support current and future automation of the distribution
19	system
20	
21	IMPACT OF DEFERRAL
22	If this project were to be deferred, the OC-3 system will eventually reach its capacity, and
23	controlling and monitoring of newly added equipment to THESL's distribution system
24	will retard data communications. This would result in inefficiencies in the transfer of data
25	to the Control Room through SCADA and a slower response when dispatching crews for
26	trouble shooting outages.

Portfolio:	Stations
Project Title:	Replace Neilson Drive 4KV MS Switchgear
Project Number:	21581
Project Year:	2013
Estimate Cost:	\$865,420

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of the project is to replace the 4kV switchgear at Neilson Drive MS.

6

7 Scope:

- 8 The scope of work for this project is to replace the existing 4kV air-insulated switchgear
- 9 with arc-resistant air-insulated switchgear at Neilson Drive MS.

10

DISTRICT	ETOBICOKE
DISTRICT NEIGHBOURHOOD	4237 BLOOR STREET WEST
STATION(S)	NEILSON DRIVE MS
FEEDER(S)	N/A

11

12 JUSTIFICATION

13

14 Project Background

15 The switchgear at Neilson Drive MS was installed in 1954 and has reached the end of its

useful life. The circuit breakers that are fitted in the switchgear are oil circuit breakers

- and they are obsolete. The maintenance of oil circuit breakers is generally labour-
- 18 intensive. There is also high risk of collateral damage during eventful failure of the oil
- 19 circuit breakers that could lead to the loss of the entire switchgear, which in turn could

result in outages to approximately 1,200 customers. Spare parts for the switchgear are no 1 longer being manufactured; any spare part required is obtained in a special order at high 2 cost, making the cost of maintenance equally high. The switchgear does not have the arc-3 resistant design and has an increased risk of collateral damage and personnel injury 4 during an eventful failure. The project involves replacement of the existing switchgear 5 with air-insulated arc-resistant type switchgear. This is in order to improve equipment 6 performance, system reliability, and personnel safety as well as achieve operating cost 7 reductions. 8

9

10 Alternatives

An alternative to switchgear replacement is to convert the area to higher voltage system and decommission the entire Neilson Drive station. Conversion to higher voltage is usually at higher cost and the long term existence of Neilson Drive MS is required to support adjacent station load during contingency. Therefore, replacement of Neilson Drive MS switchgear is the most economical and effective way to continue the power supply to customers.

17

18 Benefits

- Reduces the risk of failure by removing aged equipment and subsequently lowers
 potential system reliability and outage risks
- Reduces the risk of low probability, high impact station events as failure of the existing oil circuit breakers could result in collateral damage in the substation
- Reduces associated maintenance costs through the replacement of oil circuit breakers
 where maintenance is labour-intensive compared to the vacuum circuit breakers
- Improves personnel safety through the arc-resistance feature that allows for proper
 venting of air pressure out of the switchgear compartment when a circuit breaker
 experiences a failure and would allow THESL personnel to work safely in the vicinity
 of the equipment at any time
- Improves outage response times and lowers costs to operate the switchgear

2 IMPACT OF DEFERRAL

3 If this project were to be deferred, THESL would face an increased risk of a supply

4 outage to all or a portion of approximately 1,200 customers connected to the switchgear,

5 in the event of a lengthy outage. Moreover, deferral of this work would also increase

6 safety risks to THESL personnel due to the lack of the arc-resistance design feature, and

7 would limit the capability to meet future load growth and transfers from adjacent

8 station(s) in the event of an outage. Lastly, the costs to reactively replace the switchgear

9 would be much higher and given that the lead time to procure and deliver the switchgear

10 equipment ranges from 9-12 months; postponement of this work would result in

11 unnecessary load pressure on adjacent stations.

Portfolio:	Stations	
Project Title:	Replace Bermondsey TS 4 KSO Circuit Breakers	
Project Number:	21656	
Project Year:	2013	
Estimate Cost:	\$755,723	

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

- 5 The purpose of this project is to replace the four KSO oil circuit breakers with vacuum
- 6 circuit breakers at Bermondsey TS.
- 7
- 8 Scope:
- 9 The scope of work for this project is to replace the existing four, outdoor oil circuit
- ¹⁰ breakers with vacuum circuit breakers connected to feeders 53M1, 53M3, 53M7 and
- 11 53M11 at Bermondsey TS.

12

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	178 BERMONDSEY ROAD
STATION(S)	BERMONDSEY TS
FEEDER(S)	N/A

13

14 JUSTIFICATION

15

16 **Project Background**

- 17 The outdoor oil circuit breakers at Bermondsey TS were installed in 1960 and have
- reached their end of useful life. The maintenance of oil circuit breakers is
- 19 labour-intensive, as oil inspections and cleaning are required after every fault-clearing

1	duty, on top of periodical maintenance. As a result of the high volume of oil in the circuit
2	breakers, an eventful breaker failure can lead to significant collateral equipment damage
3	and fire. Spare parts for the KSO oil circuit breakers are no longer being manufactured;
4	any spare part required is obtained on special order at high cost, making the cost of
5	maintenance high. Due to the potentially high risk of collateral damages, failure of an oil
6	circuit breaker can cause an outage to the whole station, affecting approximately 10,800
7	customers connected to Bermondsey TS.
8	
9	Benefits
10	• Increases system reliability due to the elimination of the aging, oil-filled circuit
11	breakers
12	• Reduces the risk of low-probability high-impact station events due to the replacement
13	of the oil-filled circuit breakers with vacuum circuit breakers
14	• Lowers maintenance costs by replacing the more labour-intensive oil circuit breakers
15	with vacuum circuit breakers that require less maintenance
16	• Improves personnel safety through the arc-resistance feature that allows for proper
17	venting of air pressure out of the switchgear compartment when a circuit breaker
18	experiences a failure and would allow THESL personnel to work safely in the vicinity
19	of the equipment at any time
20	
21	IMPACT OF DEFERRAL
22	If this project were to be deferred, THESL would face an increased risk of a supply
23	outage to all or a portion of approximately 10,800 customers connected to the

- 24 Bermondsey TS in the event of an oil circuit breaker failure. This would subsequently
- result in a lengthy outage to the whole station due to collateral damage. Moreover,
- 26 deferral of this work would also increase safety risks to THESL personnel due to the oil
- 27 flammability of circuit breakers in an eventful failure.

Portfolio:	Stations	
Project Title:	Replace Greencedar Lawrence MS Switchgear &	
rioject litte.	Install SCADA/RTU	
Project Number:	21338	
Project Year:	2013	
Estimate Cost:	\$517,957	

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

- 5 The purpose of the project is to replace the switchgear and install SCADA/RTU at the
- 6 Greencedar Lawrence MS.
- 7
- 8 Scope:
- 9 The scope of work for this project is to replace the existing 4.16kV air insulated
- 10 switchgear with new arc-resistant air-insulated switchgear and install a new, remote
- 11 monitoring and control system at Greencedar Lawrence MS.

12

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	29 GREENCEDAR CIRCUIT
STATION(S)	GREENCEDAR LAWRENCE MS
FEEDER(S)	N/A

13

1 JUSTIFICATION

2

3 **Project Background**

The switchgear at Greencedar Lawrence MS was installed in 1961 and has reached the 4 end of its useful life. The circuit breakers that are fitted in the switchgear are oil circuit 5 breakers and they are obsolete. The maintenance of oil circuit breakers is generally 6 labour-intensive. There is also high risk of collateral damage associated with eventful 7 failure of the oil circuit breakers that could lead to the loss of the entire switchgear, which 8 in turn, could result in outages to approximately 900 customers. Spare parts for the 9 switchgear are no longer being manufactured; any spare part required is obtained on 10 special order at high cost, making the cost of maintenance equally high. Greencedar 11 Lawrence MS has no remote monitoring and control system. The THESL Controllers 12 13 cannot remotely obtain real time information on the status of circuit breakers nor are they able to remotely operate the circuit breakers to reconfigure power flow during outages 14 15 and/or planned work.

16

17 This project involves the replacement of the existing switchgear that has oil circuit

18 breakers with switchgear fitted with vacuum circuit breakers.

19

20 Alternatives

An alternative that was considered was to decommission the station entirely. However, this alternative requires the distribution load served by the station to be converted to a higher voltage or to be transferred to neighbouring stations. Since this alternative was not feasible, it was ruled out as an option.

25

26 Benefits

- Reduces the risk of failure by removing aged equipment
- Reduces the risk of low probability, high impact station events as failure of the
- 29 existing oil circuit breaker could result in collateral damage in the substation

Reduces associated maintenance costs through replacement of oil circuit breakers 1 • where maintenance is labour-intensive compared to the new, vacuum circuit breakers 2 Improves personnel safety through the arc-resistance feature that allows for proper 3 • venting of air pressure out of the switchgear compartment when a circuit breaker 4 experiences a failure and would allow THESL personnel to work safely in the vicinity 5 of the equipment at any time 6 Enables new, remote control and monitoring as well as increases operational 7 • flexibility as system operators would be able to manage outages and planned work 8 more effectively 9

10

11 IMPACT OF DEFERRAL

If this project were to be deferred, THESL would face an increased risk of a supply 12 outage to all or a portion of approximately 900 customers connected to the switchgear, in 13 the event of a lengthy outage. Moreover, deferral of this work would also increase safety 14 risks to THESL personnel due to the lack of the arc-resistance design feature, and would 15 limit THESL's capability to meet future load growth and transfers from adjacent 16 station(s) in the event of an outage. Lastly, the costs to reactively replace the switchgear 17 18 would be much higher and given that the lead time to procure and deliver the switchgear equipment ranges from 9-12 months, postponement of this work would result in 19 unnecessary load pressure on adjacent stations. 20

Portfolio:	Stations
Project Title:	Replace Lawrence Golf T1 MS Switchgear
Project Number:	21804
Project Year:	2013
Estimate Cost:	\$510,358

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of the project is to replace the switchgear at Lawrence Golf T1 MS.

6

7 Scope:

8 The scope of work for this project is to replace the existing 4kV air-insulated switchgear

9 with new arc-resistant air insulated switchgear and install a new remote monitoring and

10 control system at Lawrence Golf T1 MS.

11

DISTRICT	SCARBOROUGH
DISTRICT NEIGHBOURHOOD	3782 LAWRENCE AVENUE EAST
STATION(S)	LAWRENCE GOLF MS
FEEDER(S)	N/A

12

13 JUSTIFICATION

14

15 Project Background

16 The switchgear at Lawrence Golf T1 MS was installed in 1956 and has reached end of its

useful life. The switchgear is fitted with oil circuit breakers and they are obsolete. Spare

18 parts for the switchgear are no longer being manufactured; any spare part required is

¹⁹ obtained on special order at high cost, making the cost of maintenance equally high. The

maintenance of oil circuit breakers is generally labour-intensive with a corresponding
high maintenance cost. There is also high risk of collateral damage during eventful failure
of the oil circuit breakers that could lead to the loss of the entire switchgear, which in turn
could result in outage to a large number of customers. Lawrence Golf T1 MS has no
remote monitoring and control system. THESL Controllers cannot remotely obtain real
time information on the status of circuit breaker positions nor are they able to remotely
operate the station to reconfigure it to restore power.

9 Alternatives

An alternative to rebuilding the station that was considered involved decommissioning the station entirely. However, this alternative requires the distribution load served by the station to be converted to a higher voltage or to be transferred to neighbouring stations. Since this alternative would result in much higher cost, it was rejected.

14

15 Benefits

16	•	Increases system reliability due to the replacement of the aging equipment.
17	•	Reduces risk of low-probability high-impact station events as a result of the
18		elimination of the aging oil-filled circuit breakers
19	٠	Reduces operating and maintenance cost due to the replacement of the oil filled
20		circuit breakers whose maintenance is labour intensive compared to the vacuum
21		circuit breakers fitted in the new switchgear which require no maintenance.
22	٠	Increases personnel safety due to the elimination of the aging equipment, the arc-
23		resistant feature of the new switchgear and the remote controlling system that is to
24		be installed under this project
25	٠	Increases operational flexibility; the remote controlling system will enable system
26		operators to manage outages and planned work more efficiently
27		
28		

1 IMPACT OF DEFERRAL

If this project were to be deferred, THESL would face an increased risk of a supply 2 outage to all or a portion of approximately 1,300 customers connected to the MS station, 3 in the event of a lengthy outage. Moreover, deferral of this work would also increase 4 safety risks to THESL personnel due to the lack of the arc-resistant design feature, and 5 would limit THESL's capability to meet future load growth and transfers from adjacent 6 station(s) in the event of an outage. Lastly, the costs to reactively replace the switchgear 7 would be much higher and given that the lead time to procure and deliver the switchgear 8 equipment ranges from 9-12 months, postponement of this work would result in 9 unnecessary load pressure on adjacent stations. 10

Portfolio:	Stations
Project Title:	Replace Etobicoke MOSCAD RTUs
Project Number:	22806
Project Year:	2013
Estimate Cost:	\$509,042

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of the project is to replace the MOSCAD RTUs and MOSCAD DARCOM

- 6 radios.
- 7
- 8 Scope:
- 9 The scope of work for this project is to replace 14 obsolete Motorola MOSCAD RTUs

and MOSCAD DARCOM radios with new modern RTUs, as there is no longer technical

11 support from the supplier.

12

DISTRICT	ETOBICOKE
DISTRICT NEIGHBOURHOOD	N/A
STATION(S)	N/A
FEEDER(S)	N/A

13

14 JUSTIFICATION

15

16 **Project Background**

17 The Motorola supplier informed THESL that Motorola will no longer provide technical

- support for the MOSCAD RTUs and DARCOM radios that were deployed at various
- 19 locations in Etobicoke. Furthermore, Motorola will stop the production of the

1	IPGATEWAY, which is a major component used by the Master Radio Site. All spare
2	parts are from limited sources of decommissioned stations. These parts may not be
3	reliable and may be used up. In general, the MOSCAD RTUs were made in 1997 and the
4	technology is no longer effective for present operations. The MOSCAD RTU uses
5	MDLC proprietary communication protocol, whereas the new equipment will be
6	equipped with a more modern DNP communication protocol. There are 71 stations and
7	164 pole tops in Etobicoke that are equipped with the MOSCAD RTUs and DARCOM
8	radios. Accordingly, this project is one of a series of projects planned over a five-year
9	window to replace the MOSCAD RTUs and DARCOM equipment, starting in 2012.
10	
11	Alternatives
12	The status quo is not an option. Without replacements parts and technical support from
13	the supplier, THESL will lose all SCADA communication to stations, thereby reducing
14	operational effectiveness and increasing costs due to manual switching in the event of a
15	failure.
16	
17	Benefits
18	Reduces the risk of losing SCADA monitor and control functions on MOSCAD
19	RTUs
20	• Modernizes the system by replacing the MOSCAD RTUs with modern equipment
21	and therefore decreases the risks of losing control of station equipment
22	• Reduces maintenance and operational costs associated with procuring parts,
23	maintenance and troubleshooting support for the obsolete SCADA RTUs
24	• Increases operational flexibility by providing THESL Control operators with the
25	ability to remotely control the switching of the circuit breakers
26	
27	

1 IMPACT OF DEFERRAL

If both DARCOM master radios fail, all SCADA functions in Etobicoke would be lost. System controllers would not be able to administer work protection via SCADA and response crew would have to be dispatched to the substation(s) to prevent the breaker(s) from reclosing. As a result, a two-minute operation could ostensibly become a two-hour operation. Furthermore, as the MOSCAD RTUs are ageing, deferral of this project could lead to increasingly more failures and would use up Protection and Control resources for repair.

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1 PROJECTS \$500K AND OVER FOR 2013

2

3 STANDARDIZATION PORTFOLIO

4

5 **Table 1: Standardization Projects**

Estimate Number	Project Title	Estimated Cost (\$ Millions)
23590	Grounding Compliance Program	2.2
20939	FESI CSP Replacement (NY85M1)	1.5
19886	Replacement of CSP Transformers (YK35M10)	1.1
20023	Replacement of CSP Transformers (NY53M5)	1.0
23587	Porcelain Insulator Replacement Program	0.5
Total Cost		6.3

Portfolio:	Standardization	
Project Title:	Grounding Compliance Program	
Project Number:	23590	
Project Year:	2013	
Estimate Cost:	\$2,200,000	

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to rebuild the grounding system of selected submersible

6 transformer vaults and pole-mounted transformers across the system according to THESL

7 currently approved construction standards. This program is required to ensure safe and

8 proper operation of distribution system equipment, thus protecting workers and the public

9 from potentially dangerous step and touch potentials in the event of a fault.

10

11 **Scope:**

12 The scope of work for this project is to rebuild the grounding system of about 444

13 submersible transformer vaults in the former distribution service area of Scarborough and

14 689 pole-mounted transformers within the downtown core and older system designs.

15

¹⁶ For a submersible transformer vault, each location would require the following:

excavation around the vault; installing four ground rods, one at each corner; forming a

18 ground loop around the vault; and bonding the loop to the existing ground grid inside the

- vault at two points. Similarly, for a pole-mounted transformer, each location would
- 20 require the following: installation of a ground rod; upgrading any insufficient wire sizes
- and connectors; and bonding the transformer case, H2 ground connection and X2
- terminal (when used as a ground point) separately to the system neutral.

DISTRICT(S) TORONTO (SUBMERSIBLE),	
	SCARBOROUGH (POLE-MOUNTED)
DISTRICT NEIGHBOURHOOD	N/A
STATION(S)	N/A
FEEDER(S)	N/A

1

3 JUSTIFICATION

4

5 Project Background

For submersible vaults, the grounding was investigated and identified to be insufficiently
constructed as per current THESL grounding standards. Subsequently, the possible threat
of step and touch potential has initiated upgrades of the existing grounding to comply

9 with the Ontario Electrical Safety Code ("OESC") and THESL construction standards.

10

11 For pole-mounted transformers, improper grounding has been found where grounding

connections were contained within one connector, contrary to THESL currently approved

13 construction standards. Furthermore, the system ground to the ground rod has been

compromised, which has created insufficient ground path to earth. These findings have

- 15 given rise to an initiative to investigate the integrity of THESL pole-mounted transformer
- 16 grounding systems and rectify related deficiencies.
- 17

18 Benefits

• Establishes a sufficiently low resistance path to earth

• Limits system voltage in fault conditions and ensures fuses and circuit breakers

21 operate properly

22 • Increases safety of workers and the public

• Eliminates any non-conformance to THESL currently approved construction

- 2 standards and Ontario Regulation 22/04
- 3

4 IMPACT OF DEFERRAL

Compliance with grounding requirements is critical, and deferral of this work would 5 increase the risk of step and touch potentials exceeding safe levels for workers and the 6 public. Moreover, deferral of this work would also affect THESL's ability to ensure 7 proper arrester operation, and thus system protection. Proper arrester operation shunts 8 excess current to ground, thereby protecting system assets from potentially damaging 9 levels of energy. This operation also increases public safety by reducing the chances of 10 11 catastrophic failure of equipment. Lastly, deferral of this work would interfere with THESL's ability to comply with Section 4 of Ontario Regulation 22/04 requirements to 12 ensure that all metal parts of an installation not intended to be energized be effectively 13 grounded. 14

Portfolio:	Standardization
Project Title:	FESI CSP Replacement (NY85M1)
Project Number:	20939
Project Year:	2013
Estimate Cost:	\$1,520,063

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to replace CSP transformers, glass insulators and arrestors

6 along feeder NY85M1.

7

8 Scope:

9 The scope of work for this project is to replace approximately 60 CSP transformers along

10 feeder NY85M1 in the vicinity of Wilson Avenue with THESL standard transformers. It

11 would also involve replacing 35ft. poles and associated non-compliant insulators,

12 arrestors and fuse assets as identified in the field, with taller poles to meet the height

13 requirements required for the standard transformers.

14

DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	WILSON
STATION(S)	BATHURST I TS
FEEDER(S)	NY85M1

1 JUSTIFICATION

2

3 Project Background

- 4 The project is to further harmonize the system through the proactive replacement of CSP
- 5 transformers. Overall, CSP distribution transformers, fuse cutouts, as well as glass and/or
- 6 porcelain switches and arrestors are legacy assets in the system. As such, they are
- 7 contributing factors that have led to NY85M1 being one of the worst performing feeders
- 8 in the system.
- 9

10 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Ranking (Worst Feeder)			169
Feeders Experiencing Sustained Interruptions Count (Worst Feeder)			8
HISTORICAL RELIABILITY PERFORMANCE			
	2008	2009	2010
Feeder CI (<i>Cumulative</i>)	5,596	178	341
Feeder CMO (<i>Cumulative</i>)	181,878	22,483	110,225

11

14

12 Benefits

- Improves feeder reliability by reducing both outage duration and frequency,
 - resulting in greater customer satisfaction
- Improves upon the worsening SAIDI trend over the last couple of years due to
 equipment-related outages
- Reduces foreign interference and improves reliability through the installation of
 animal guards and tree-proof conductors
- Provides an opportunity to alleviate stressed assets and improve grid operating
 conditions
- Reduces emergency and reactive capital and maintenance costs by removing

- primary assets that are at or nearing the end of their service life 1 2 **IMPACT OF DEFERRAL** 3 If this project were to be deferred, THESL expects that the upward trend in CMO will 4 continue and that outage durations either will remain at their presently high levels or 5 increase, due to poor switching capability of CSP transformers. This would subsequently 6 lead to higher reactive investment costs and customer dissatisfaction. Furthermore, if this 7 work were to be deferred, THESL would lose the opportunity to address known legacy 8
- issues and modernize the distribution system in the area. 9

Portfolio:	Standardization	
Project Title:	Replacement of CSP Transformers (YK35M10)	
Project Number:	19886	
Project Year:	2013	
Estimate Cost:	\$1,054,000	

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to replace CSP transformers, glass insulators and arrestors

6 along feeder YK35M10.

7

8 Scope:

9 The scope of work for this project is to replace approximately 44 CSP transformers along

10 feeder YK35M10 in the area bounded by Oakwood Avenue, Kirknewton Road, Hopewell

Avenue and Rogers Road with the latest THESL standard transformers. It also involves

replacing 35ft. poles and associated non-compliant insulators, arrestors and fuse assets as

identified the field, with taller poles to meet the height requirements for the standard

- 14 transformers.
- 15

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	FAIRBANK
STATION(S)	FAIRBANK TS
FEEDER(S)	YK35M10

1 JUSTIFICATION

2

3 Project Background

- 4 The project is to further harmonize the system through the proactive replacement of CSP
- 5 transformers. Overall, CSP distribution transformers, fuse cutouts, as well as glass and/or
- 6 porcelain switches and arrestors are legacy assets in the system. As such, they are
- 7 contributing factors that have led to YK35M1 being one of the worst performing feeders
- 8 in the system.
- 9

10 Historical Performance

FEEDER PERFORMANCE			
Worst Performing Feeder Ranking (Worst Feeder)			71
Feeders Experiencing Sustained Interruptions Count (Worst Feeder)			10
HISTORICAL RELIABILITY PERFORMANCE			
	2008	2009	2010
Feeder CI (<i>Cumulative</i>)	12,575	12,712	3,289
Feeder CMO (<i>Cumulative</i>)	264,597	284,889	32,905

11

12 Alternatives

- 13 The alternative to proactively replacing CSP transformers is to allow them to run to
- 14 failure and replace them during the outage. However, the customer would experience a
- 15 longer than necessary outage, when compared to the work required to replace the
- 16 transformer with a standard overhead transformer.
- 17

18 Benefits

- Improves feeder reliability by reducing both outage duration and frequency resulting
- 20 in greater customer satisfaction

1	• Reduces the number of sustained interruptions experienced by the FESI-10 feeder
2	• Modernizes the system through the proactive replacement of CSP transformers and
3	associated legacy equipment identified by THESL
4	• Significantly improves service reliability and customer satisfaction as a result of
5	rebuilding the pole lines on the feeder
6	• Reduces emergency and reactive capital and maintenance costs due to significantly
7	greater reliability
8	
9	IMPACT OF DEFERRAL
10	By deferring this project, THESL would be unable to improve the reliability on this
11	feeder that has a current FESI ranking of 10 and could possibly deteriorate further. In
12	addition, THESL would continue to experience longer outages due to CSP equipment
13	failures thereby negatively impacting customers in the area. Furthermore, if this work
14	were to be deferred, THESL would lose the opportunity to address known legacy issues
15	and modernize the distribution system in the area.

Portfolio:	Standardization	
Project Title:	Replacement of CSP Transformers (NY53M5)	
Project Number:	20023	
Project Year:	2013	
Estimate Cost:	\$958,000	

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to replace CSP transformers, glass insulators and arrestors

6 along feeder NY35M5.

7

8 Scope:

9 The scope of work for this project is to replace approximately 43 CSP transformers along

10 feeder NY53M5 in the area bounded by Victoria Park Avenue, Bermondsey Road,

11 Eglinton Avenue and Northline Road with THESL standard transformers. It also involves

replacing 45 35ft. poles and associated non-compliant insulators, arrestors and fuse assets

as identified the field, with taller poles to meet the height requirements for the standard

- 14 transformers.
- 15

DISTRICT	NORTH YORK
DISTRICT NEIGHBOURHOOD	WEXFORD
STATION(S)	BERMONDSEY TS
FEEDER(S)	NY53M5

1 JUSTIFICATION

2

3 Project Background

- 4 The project is to further harmonize the system through the proactive replacement of CSP
- 5 transformers. Overall, CSP distribution transformers, fuse cutouts, as well as glass and/or
- 6 porcelain switches and arrestors are legacy assets in the system. As such, they are
- 7 contributing factors that have led to NY35M5 being one of the worst performing feeders
- 8 in the system.
- 9

10 Alternatives

- 11 The alternative to proactively replacing CSP transformers is to allow the transformers to
- run to failure and replace them during the outage. However, the customer would
- 13 experience a longer than necessary outage, when compared to the work required to

replace the transformer with a standard overhead transformer.

15

16 Benefits

- Improves feeder reliability by reducing both outage duration and frequency resulting
 in greater customer satisfaction
- Reduces the number of sustained interruptions experienced by the FESI-10 feeder
- Modernizes the system through the proactive replacement of CSP transformers and
 associated legacy equipment identified by THESL
- Significantly improves service reliability and customer satisfaction as a result of rebuilding the pole lines on the feeder
- Reduces emergency and reactive capital and maintenance costs due to significantly greater reliability
- 26

27 IMPACT OF DEFERRAL

²⁸ By deferring this project, THESL would continue to experience longer outages due to

- 1 CSP equipment failures, thereby negatively impacting customers in the area.
- 2 Furthermore, if this work were to be deferred, THESL would lose the opportunity to
- 3 address known legacy issues and modernize the distribution system in the area.

Portfolio:	Standardization	
Project Title:	Porcelain Insulators Replacement Program	
Project Number:	23587	
Project Year:	2013	
Estimate Cost:	\$520,000	

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to replace all existing porcelain insulators with polymer 6 insulators in the overhead distribution system.

7

8 Scope:

9 The scope of work for this project is to replace about 400 porcelain insulators located 10 across all of the former distribution service areas with polymer based materials. THESL 11 will focus on replacing porcelain insulators for the following: worst performing feeders, 12 other areas deemed to be under-performing such as older system configurations, and 13 congested, heavily treed areas where the potential for failure is high and there may be 14 associated public safety risks. The program is intended to supplement overhead projects 15 where porcelain hardware is being removed.

DISTRICTS	TORONTO, NORTH YORK, SCARBOROUGH,	
	ETOBICOKE, EAST YORK AND YORK	
DISTRICT NEIGHBOURHOOD	N/A	
STATION(S)	N/A	
FEEDER(S)	N/A	

1 JUSTIFICATION

2

3 Project Background

- 4 Over the previous decade, porcelain has been phased out for new installations in favour
- 5 of polymer based materials. Polymeric hardware offers several advantages over
- 6 porcelain. Unlike polymeric hardware, porcelain forms water film on the surface that
- 7 makes flashovers easier to occur, and has to be cleaned, washed and greased for
- 8 maintenance purposes. Porcelain insulators are also susceptible to explosion and
- 9 breakages due to their highly fragile properties. Moreover, hairline cracks can also
- develop in the porcelain that will lead to failure; these cracks generally cannot be seen
- 11 from the ground. Lastly, porcelain can fail catastrophically, resulting in shards of jagged
- 12 material being released into high-traffic areas. The resultant sharp-edged, damaged
- porcelain would then pose a safety hazard to workers working on or around this
- 14 equipment.
- 15

16 Benefits

- Polymer insulators are compatible with tree-proof conductors that are designed to
 eliminate outages caused by tree contact, animal contact, short term phase-to-phase
 and phase-to-ground contact
- Lower tracking and leakage current would result in lower system losses
- Polymer insulators have superior mechanical strength, flexibility and are not
 susceptible to fragmentation
- Polymer insulators pose less of a safety concern in the event of a failure
- 24

25 IMPACT OF DEFERRAL

- 26 Deferral of this work would increase public and worker safety risks as porcelain
- 27 insulators continue to deteriorate and fail at higher rates. When subjected to lightning or
- surge voltage stresses, porcelain insulators can puncture and subsequently break down

1 completely, not only causing flashover between the energized element and the supporting

- 2 structure, but may explode causing porcelain fragmentation in the process. Falling debris,
- 3 jagged shards, pole fires and environmental risks are also associated with these aging
- 4 assets. Finally, deferral of this work would also result in THESL losing this window of
- 5 opportunity to effectively modernize the distribution system.

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PROJECTS \$500K AND OVER FOR 2013

DOWNTOWN CONTINGENCY PORTFOLIO

Table 1: Downtown Contingency Project

Estimate Number	Project Title	Estimated Cost (\$ Millions)
19686	Dufferin - Wiltshire Feeder Tie A34W & A256DN	0.6
Total Cost		0.6

Portfolio:	Downtown Contingency	
Project Title:	Dufferin - Wiltshire Feeder Tie A34W & A256DN	
Project Number:	19686	
Project Year:	2013	
Estimate Cost:	\$644,902	

PROJECT DESCRIPTION

Objective:

The purpose of this project is to facilitate interconnection(s) between Dufferin and Wiltshire stations, in order to improve operational flexibility and minimize the risks associated with station failure.

Scope:

The scope of work for this project is to decommission a transformer at Dupont MS that will result in a spare feeder, A34W at cell 23B, and use this feeder to tie A256DN. This project also includes cabling work that includes some feeder upgrading and swapping to alleviate operational concerns. Moreover, this project includes setup and switching to complete this component of the construction. As such, 10 poles will be installed along with 210m of overhead conductor and 625m of underground cable.

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	DAVENPORT & WILTSHIRE
STATION(S)	DUFFERIN TS, WILTSHIRE TS
FEEDER(S)	A34W, A256 DN

JUSTIFICATION

Project Background

In the event that Dufferin TS or Bridgman TS fails to supply power from the transmission level, there are no provisions for other feeders from adjacent stations to pick up the load. Specifically, on January 15th 2009, Dufferin TS was completely shutdown due to flooding caused by the firefighting system within the station. As it was not possible to transfer the station load to other stations, a total of 34,308 customers were affected, with some remaining without electricity for up to 24 hours on the coldest winter day of the year. As such, this project is one in a series of projects to provide back up for Dufferin station in the event of a station outage.

Benefits

- Ability to restore approximately 8 MVA following station outage via alternative supply
- Provides downtown contingency pick-up of approximately 8% of the total load at Dufferin station
- Operation staff will be able to restore within 14 hours all or partial loads from adjacent feeder ties in the event of a station failure. With future feeder automation this restoration can be reduced to within 1 hour

IMPACT OF DEFERRAL

If this project were to be deferred, THESL would continue to face the risk of a station outage that has the potential to impact a large volume of customers, as indicated in the above example at Dufferin Station in 2009. Deferral of this work could also impact THESL and its ability to supply the 19MVA of connected load, which could indirectly strain these facilities and cause subsequent collateral damage, should these stations face lengthy outages.

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PROJECTS \$500K AND OVER FOR 2013

2

3 STATIONS SYSTEM ENHANCEMENTS PORTFOLIO

4

5 **Table 1: Stations System Enhancements Project**

Estimate Number	Project Title	Estimated Cost (\$ Millions)
22473	Bremner TS THESL Investments	31.9
Total Cost		31.9

Portfolio:	Stations System Enhancement
Project Title:	Bremner TS THESL Investments
Project Number:	22473
Project Year:	2013
Estimate Cost:	\$31,942,051

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

The objective of this project is to develop a new station, Bremner TS, to be located at Bremner Boulevard and Rees Street in downtown Toronto. The new station will provide the required capacity needed to facilitate staged replacements of end-of-life, air-blast switchgear at the existing Windsor TS, as well as provide additional capacity for anticipated load growth in downtown Toronto. The construction and commissioning of Bremner TS will take place over multiple project years.

11

12 **Scope:**

By the start of 2013, the Transformer Station building and the high voltage cable tunnel will be completed. The next steps for the project will be completion of the cabling work in the high voltage cable tunnel, installation of the major equipment and commissioning of the Transformer Station.

17

18 Cabling in the new high voltage cable tunnel will be run from the existing tunnel at the

19 intersection of Front Street & Lower Simcoe Street to the Transformer Station. Moreover,

- 20 within the new Transformer Station building, the 115kV switchgear, three 130MVA
- transformers, 13.8kV switchgear and all ancillary systems will be installed. All
- 22 equipment will then be interconnected and the commissioning phase will be executed.
- 23

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	SPADINA
STATION(S)	BREMNER TS
FEEDER(S)	N/A

2 JUSTIFICATION

3

4 **Project Background**

Windsor TS was built in 1950 and expanded in 1968 and has since become one of the 5 largest 13.8kV substations in Toronto. The 13.8kV air-blast switchgear, installed in 1956, 6 is approaching its end of life and needs to be supplied from a new source. In addition, a 7 new source is needed to reduce the overall loading levels at Windsor TS, as spare feeder 8 positions are neither available nor is there room for additional switchgear. The supply to 9 10 existing downtown customers also needs to be diversified to mitigate the effects of lowprobability high-impact events such as fire or flooding. In addition, a significant new load 11 of 90 MVA is anticipated in the coming years along the Toronto Waterfront area, as a 12 result of the Waterfront Revitalization and East Bay Front Developments. Therefore, new 13 14 capacity will need to be provided, ideally in the vicinity of the planned load increase to 15 serve these new customers.

16

17 Alternatives

THESL considered the following alternatives before proceeding with the decision to 18 19 build Bremner TS station: status quo, bus-to-bus load transfer and/or addition within Windsor TS. If THESL chose to remain with the status quo, THESL would need to have 20 custom-made parts replaced and air supply systems rebuilt at significant cost. 21 Subsequently, as there is no alternate supply to customers, switchgear failure at Windsor 22 TS would have a major impact on the 55 MVA of existing load in the area, which 23 includes many of the downtown business towers and the financial district. For the second 24 option, it was determined that bus-to-bus load transfer or additions within Windsor TS 25

1	cannot be supported as there is not enough bus capacity to support load growth, and it
2	was also determined that there is insufficient physical space to accommodate additional
3	capacity by way of new switchgear. The other alternative of transferring load onto
4	existing, adjacent stations was not preferred as only two stations (Strachan TS and
5	Esplanade TS) have space for the expansion required to provide the new capacity.
6	Furthermore, both of these stations are physically removed from Windsor TS and its
7	existing supply area. Thus, installation work for underground cables to pick up the
8	Windsor TS feeders from these two stations would have to cross existing supply areas
9	causing significant disruption due to construction along city streets.
10	
11	Benefits
12	• Provides the required capacity needed to facilitate staged replacements of end-of-life
13	air-blast switchgear at Windsor TS in the short-term
14	• Reduces overall loading levels at Windsor TS by diversifying customer supply and
15	mitigates the impact of low-probability high-impact events in the long-term
16	• Reduces the risk of customer outages due to equipment failures
17	• Provides capacity relief to neighboring stations by enabling distribution load transfers
18	to occur and provides increased capacity to accommodate the expected large-scale
19	customer growth in downtown Toronto
20	
21	IMPACT OF DEFERRAL
22	If this work were to be deferred, commissioning of the Bremner TS station would be
23	delayed, thereby increasing the risk of a significant station outage due to the threat of
24	failed equipment. By the end of 2012, THESL would already have committed significant

- ²⁵ funds on down payments to suppliers and contractors to initiate the work planned for
- 26 2013 and deferral of this work would effectively strand these funds. Finally, deferral of
- this work would also put the existing station at risk, as it would not be able to support the
- 28 planned load growth in the downtown core.

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1 PROJECTS \$500K AND OVER FOR 2013

2

3 SECONDARY UPGRADE PORTFOLIO

4

5 **Table 1: Secondary Upgrade Project**

Estimate Number	Project Title	Estimated Cost (\$ Millions)
23578	Contact Voltage Remediation	\$12.2
	Total Cost	\$12.2

Portfolio:	Secondary Upgrade
Project Title:	Contact Voltage Remediation
Project Number:	23578
Project Year:	2013
Estimate Cost:	\$12,200,000

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to replace all metallic and non-standard handwell units with 6 non-conductive, polymer handwell units, in order to remediate contact voltage issues.

7 Since the program is intended to replace all identified non-standard handwell units across

8 the THESL distribution system, the contact voltage remediation program will take place

9 over multiple project years.

10

11 **Scope:**

The remediation work for 2013 continues to focus on the remaining areas outside of the downtown core, mainly North York, East York, Scarborough and Etobicoke. Also for this period, handwells that are located where a city moratorium expires in 2013 will also be remediated. Thus, THESL plans to replace approximately 2,100 handwells; the subset of handwells with expiring city moratoriums is anticipated to be 61 units.

17

Within the program, the scope of work for this project will involve excavation of the entire handwell assembly from the sidewalk and installation of the new standard of nonconductive, polymer concrete handwells. Additional scope items may include the following when encountered: repair of underground cable faults and the elimination of temporary overhead supply to street lighting; replacement of secondary bus cable in the handwells with dual protection cable; replacement of existing fuses with in-line

- 1 waterproof fuses; and excavation and removal of abandoned handwells and odd-sized
- 2 metal lids with non-conductive handwells.
- 3

	NORTH YORK, EAST YORK, SCARBOROUGH,
DISTRICT(S)	ETOBICOKE
DISTRICT NEIGHBOURHOOD	N/A
STATION(S)	N/A
FEEDER(S)	N/A

5

6 **JUSTIFICATION**

7

8 **Project Background**

9 Secondary electrical plant installed in the field constantly is subjected to the elements of nature and the human environment. It endures water, salt and contamination ingress and 10 wide variations in temperature. Corrosion and degradation of components occur and, 11 eventually, the integrity of connections may deteriorate to a point where live electrical 12 13 wires may become exposed. The result can be a contact voltage hazard to the public, which was the case in February 2009 when THESL declared a Level III emergency to 14 secure all handwells and poles within the city in response to reports from the public of 15 encounters with contact voltage. As a long-term response, THESL has initiated a program 16 to replace metallic handwells with non-conductive handwells; specific secondary cables 17 and connections are also being replaced. 18

19

20 Benefits

Mitigates the risks of additional contact voltage incidents by addressing underground
 faults and connection issues

• Modernizes streetlighting connection standards

- Increases safety of the THESL secondary network through the installation of
 non-conductive polymer handwells and waterproof fusing
- Provides an opportunity to address abandoned handwells and non-standard lids
- 4

5 IMPACT OF DEFERRAL

Although contact voltage incidents are rare and typically isolated, deferral of this work 6 would place THESL at risk of exposing the public to potentially unsafe equipment 7 resulting in contact voltage incidents. As a result, THESL would face greater public 8 scrutiny and added consequences if it were found to be non-compliant with Section 8 of 9 Ontario Regulation 22/04. Moreover, the planned work for 2014 would then represent 10 approximately 100% of the total handwells to be replaced over the period of 2012 to 11 2014. As such, deferral of this work would result in undue backlog that may become 12 unsustainable due to operational or logistical concerns. 13

PROJECTS \$500K AND OVER FOR 2013

2

3 EXTERNALLY INITIATED PLANT RELOCATIONS PORTFOLIO

4

5 **Table 1: Externally Initiated Plant Relocations Projects**

Estimate Number	Project Title	Estimated Cost (\$ Millions)
23572	Dundas Street Underground Reconfiguration	3.3
23577	John Street Revitalization	1.0
Total Cost		4.3

Portfolio:	Externally Initiated Plant Relocations
Project Title:	Dundas Street Underground Reconfiguration
Project Number:	23572
Project Year:	2013
Estimate Cost:	\$3,330,000

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

5 The purpose of this project is to work with the City of Toronto to beautify Dundas Street

6 between Bathurst Street and University Avenue by relocating all overhead THESL

- 7 infrastructure underground.
- 8

9 Scope:

The scope of work for this project is to remove approximately 75 poles along with the associated transformers and switches. 1,500 metres of new concrete-encased ducts will be required along with underground vaults for transformers and switches. To move the area underground, the area will also need to be converted from 4.16kV to 13.8kV, either on a radial or network system. Lastly, over 50 separate, customer connections will be required to relocate all infrastructures from overhead to underground.

16

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	DUNDAS WEST
STATION(S)	DEFOE MS
FEEDER(S)	B9DF

17

1 JUSTIFICATION

2

3 **Project Background**

The City of Toronto is working on a watermain replacement on Dundas Street West and has requested that all THESL infrastructures from Bathurst Street to University Avenue be relocated underground. As there will be a road moratorium once the watermain is completed, the City has requested that all THESL relocations be completed in 2013.

8

9 Alternatives

There were three main options reviewed for this project: maintain the existing overhead 10 THESL infrastructure, relocate that infrastructure underground on a radial system or 11 relocate the infrastructure underground as a network system. The City has informed 12 13 THESL that it would prefer not to maintain the existing overhead infrastructure. Thus, in analyzing the two remaining alternatives, reconfiguration to a radial network would be 14 more cost-effective, while reconfiguration to a network system would have a greater 15 impact on system reliability. The final decision regarding radial versus network 16 17 undergrounding has not been determined as of the date of this submission. 18

19 Benefits

- Maintains the current load configuration
- Provides an opportunity to increase system reliability
- Modernizes the system through elimination of the 4.16 kV feeder
- Contributes towards the City's mandate of beautifying Dundas Street West
- 24

25 IMPACT OF DEFERRAL

26 If this work were to be deferred, THESL would miss the window of opportunity to

- 27 complete construction before the road moratorium is put into effect. This would force
- 28 THESL to remain with the existing overhead infrastructure until the moratorium is lifted,

- 1 which is slated to occur around 2020. THESL would also lose the option to have portions
- 2 of the costs recovered by the City under the cost sharing agreement.

Portfolio:	Externally Initiated Plant Relocations
Project Title:	John Street Revitalization
Project Number:	23577
Project Year:	2013
Estimate Cost:	\$979,020

2 **PROJECT DESCRIPTION**

3

4 **Objective:**

- 5 The purpose of this project is to accommodate the revitalization of John Street by
- 6 relocating THESL infrastructure as required by the City of Toronto.

7

- 8 Scope:
- 9 The scope of work for this project is to relocate infrastructure that is in conflict with the
- 10 City and its plans to revitalize John Street. THESL has over 1,000m of concrete-encased
- 11 duct banks, 35 cable chambers and five vaults along John Street.

12

DISTRICT	TORONTO
DISTRICT NEIGHBOURHOOD	THE GRANGE
STATION(S)	WINDSOR TS
FEEDER(S)	A65WR, A11WR, A9WR, A44WR, A99WR

13

14 JUSTIFICATION

15

16 **Project Background**

17 The City of Toronto is planning to revitalize John Street in its entirety. This will include

reconfiguration of the existing layout, rebuilding the utility infrastructure and creating the

19 City's 'red carpet' for the Pan Am Games.

2	The City does not yet have detailed plans for the revitalization and the impact on THESL	
3	infrastructure is not fully known as of the date of this submission. As such, based on past	
4	experience, this project is based on the relocation and support of approximately 30% of	
5	all THESL infrastructures in the area.	
6		
7	7 Benefits	
8	• Maintains the current customers and existing capacity supply	
9	• Provides an opportunity to modernize the system and replace existing assets with	

10 new, supporting infrastructure as required

1 IMPACT OF DEFERRAL

2 If this work were to be deferred, it would negatively impact the completion of the John

- 3 Street Revitalization, the City's 'red carpet' for the Pan Am Games in 2015. Additionally,
- 4 for the street to be reconfigured by 2015, utilities will have to be relocated in 2013 to
- 5 allow for the City's construction in 2014. Lastly, deferral of this work could also result in
- 6 THESL losing this opportunity to better coordinate with appropriate utilities and agencies
- 7 on infrastructure work and so minimize project related costs.