

INTERROGATORY RESPONSE - OEB-85

2-Staff-30

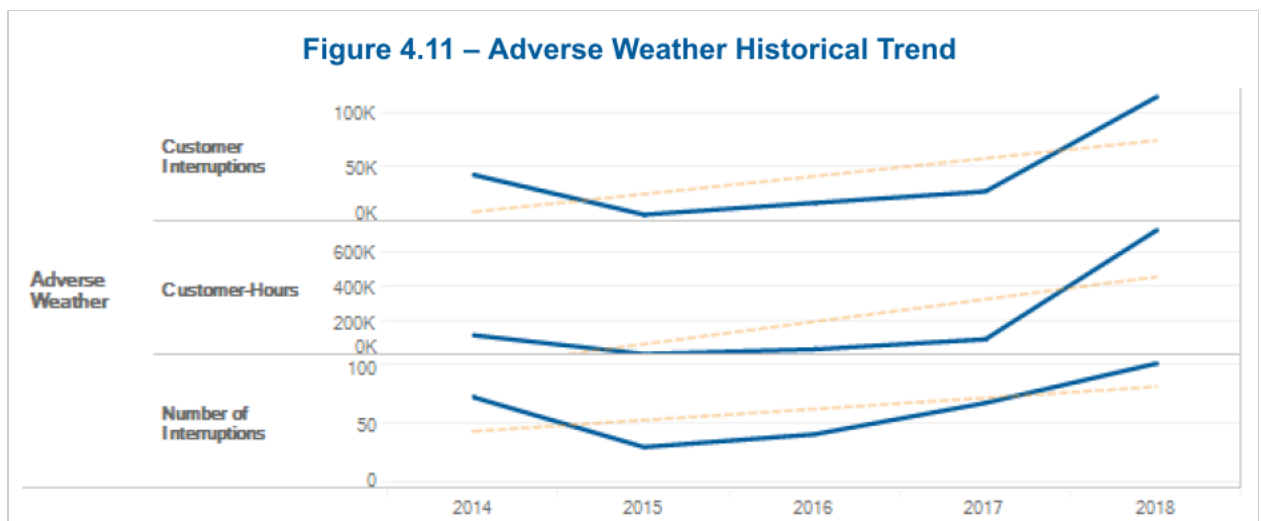
EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / page 81 of 374

SUBJECT AREA: Distribution System Plan

Preamble:

Regarding its historical reliability, Hydro Ottawa provided the following graph:



Question(s):

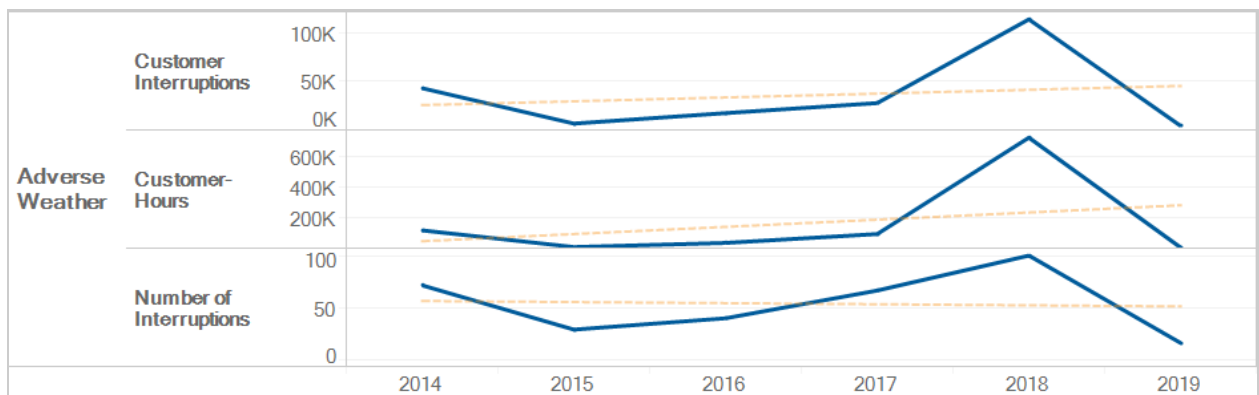
- Please provide an updated graph which also includes 2019 results.
- Does a one-year outlier (i.e. 2018) create a statistically meaningful trend?
- Please confirm that the 2014 – 2017 trend is decreasing?

- d) Are any of the capital expenditures forecast in the present filing intended to improve Hydro Ottawa system performance in the face of increasing levels of extreme weather?
- If yes, please identify, quantify the expenditures.
 - If yes, how will Hydro Ottawa measure if the expenditures are having the anticipated impact upon performance?

RESPONSE:

- a) Figure A shows the Adverse Weather Historical Trend and has been updated for 2019 results.

Figure A – 2014-2019 Adverse Weather Historical Trend



- b) The graph in Figure 4.11 is not utilized by Hydro Ottawa to derive statistical inferences. The purpose of the graph is to depict trends over a five-year period.
- c) See Figure B below for 2014-2017 trends. The trend for the years 2014-2017 is decreasing for Customer Interruptions and Customer Hours. The trend is flat for Number of Interruptions caused by Adverse Weather.

Figure B – 2014-2017 Adverse Weather Historical Trend



d) At this time, Hydro Ottawa's capital expenditure forecast does not explicitly include programs whose primary driver is to improve climate performance. In response to increasing levels of extreme weather, Hydro Ottawa retained Stantec to undertake a Climate Vulnerability Risk Assessment ("CVRA") in 2019 to assess potential areas of vulnerability to extreme weather events. A summary of the methodology, findings, and expenditures incorporated in the Distribution System Plan can be found on pages 278-281 of Exhibit 2-4-3.

INTERROGATORY RESPONSE - OEB-86

2-Staff-31

EXHIBIT REFERENCE:

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Exhibit 2 / Tab 4 / Schedule 3 / page 91 of 374

SUBJECT AREA: Distribution System Plan

Preamble:

Regarding defective equipment contributing to SAIFI, Hydro Ottawa stated:

Table 4.11 – Defective Equipment SAIFI per 100 Customers

Asset – SAIFI x 100	Target	2014	2015	2016	2017	2018
Overhead System Assets	10.13	12.73	7.89	6.70	13.69	9.58
Station System Assets	1.77	0.33	2.28	1.88	0.20	3.65
Underground System Assets	11.17	13.28	14.89	9.26	5.09	13.26

Regarding the impact of historical performance on the DSP, Hydro Ottawa stated:

Based on historical performance of Asset Performance, Hydro Ottawa has made the following changes:

- Increased frequency of customer interruption due to cable failure is driving increased investment in the cable renewal program.
- Recent Oil Spilled trends are showing more leaking residential underground transformers, which have increased the cost of remediation. This emphasizes the importance of active inspection and replacement of underground transformers to mitigate this environmental impact.

1 Question(s):

2

3 a) Please reconcile this statement with the historically decreasing trend in the defective
4 underground equipment contribution to SAIFI shown in Table 4.11.

5

6 b) Regarding oil spilled from underground transformers, is this an equipment "type fault"?

7 i) If yes, are there any practical mitigations other than replacement?

8

9 **RESPONSE:**

10

11 a) The statement "Increased frequency of customer interruption due to cable failure is
12 driving increased investment in the cable renewal program" refers to historical data
13 specific to cable faults shown on page 131 of Attachment 2-4-3(E): Material Investments.
14 This data shows an increase in the number of average cable faults over the historical
15 period.

16

17 b) Yes, oil spilled from underground transformers is an equipment "type fault".

18 i) Hydro Ottawa has yet to determine any practical mitigation practice other than
19 replacement.

INTERROGATORY RESPONSE - OEB-87

2-Staff-32

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / page 93 of 374

SUBJECT AREA: Distribution System Plan

Preamble:

Regarding its smart meters, Hydro Ottawa stated:

Due to an early adoption of the provincial smart meter initiative, Hydro Ottawa's smart meters have very limited last gasp functionality. In 2006, the self-reporting technology offered limited functionality.

Question(s):

a) What is the remaining service life of the existing smart meter fleet?

b) Will Hydro Ottawa be faced with the need to replace a significant portion of its smart meters in the near future?

i) If yes, in which years will that occur and what is the forecast cost each year?

RESPONSE:

a) Interpreting service life to mean financial life, as at December 31, 2019, the 2006 smart meter fleet has 18 months of remaining life.

- 1 b) Hydro Ottawa does not anticipate the need to replace a significant portion of its smart
- 2 meters in the near future. Hydro Ottawa has forecasted approximately \$1.4M annual
- 3 additions for the years 2021-2025.

INTERROGATORY RESPONSE - OEB-88

2-Staff-33

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / page 135 of 374

SUBJECT AREA: Distribution System Plan

Preamble:

Regarding modernization of its distribution system, Hydro Ottawa stated:

When station transformers are identified for replacement, the new units will have reverse flow capabilities to eliminate potential restrictions to connecting ERFs.

Question(s):

a) What is the cost differential between reverse flow and uni-direction transformers?

b) Is Hydro Ottawa's current standard practice to use reverse flow transformers for every new station installation?

i) If no, what circumstances result in decision to install reverse flow transformers.

c) Can existing uni-directional transformers be modified or retrofitted to provided service in reverse-flow applications?

i) If yes, what is the typical project scope and cost of upgrading a representative transformer size and voltage class?

1

2 **RESPONSE:**

3

4 a) There is no difference in cost between reverse flow and uni-directional transformers. The
5 functional difference between a reverse flow and uni-directional transformer is that a
6 reverse flow transformer must have a tap changer controller capable of handling reverse
7 power flow while ensuring that voltage regulation functions correctly. Newer transformers
8 are inherently capable of reverse power flow, so including reverse flow in the transformer
9 specifications has minimal impact from a procurement standpoint.

10

11 b) Yes, Hydro Ottawa purchases transformers that are inherently capable of reverse power
12 flow for every new station installation.

13

14 c) Currently, there is no need to retrofit to existing embedded generation-connected
15 transformers as Hydro Ottawa has sufficient capacity based on present demand.
16 Reverse flow would only occur when the connected embedded generation output is
17 larger than the load on the particular station transformer. If demand were to increase, or
18 if a transformer needed to be replaced, Hydro Ottawa would conduct an assessment
19 based on the age of the transformer and economics at that time.

INTERROGATORY RESPONSE - OEB-89

2-Staff-34

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / page 142 of 374

SUBJECT AREA: Distribution System Plan

Preamble:

Regarding its station transformers, Hydro Ottawa stated:

The health index of a transformer is determined through various criteria such as visual inspections, power factor tests, load history, infrared scanning, oil analysis (dissolved gas analysis and degree of polymerization), as well as additional criteria for on-load tap changers if applicable. The resultant health index is a condition rating from Very Good to Very Poor.

Question(s):

- a) Does Hydro Ottawa's station transformer health index use age as a calculation input?
- b) Does Hydro Ottawa determine station transformer replacement needs based upon the health index, asset age, or both?
 - i) If age is used in the decision, please provide an example of when age factors override health index factors in the determination to replace an asset?
- c) Has Hydro Ottawa assessed a probability of failure based upon asset health index?

1

2 **RESPONSE:**

3

4 a) No, Hydro Ottawa's station transformer health index does not use age as a calculation
5 input.

6

7 b) Hydro Ottawa determines station transformer replacement needs based on both health
8 index and age.

9 i) Age is used to determine probability of failure whereas the health index indicates
10 the health condition of the asset. The health index is used to assess the
11 probability of failure.

12

13 c) Yes, Hydro Ottawa has assessed the probability of failure based upon the asset health
14 index.

INTERROGATORY RESPONSE - OEB-90

2-Staff-35

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / page 146 of 374

SUBJECT AREA: Distribution System Plan

Preamble:

Regarding its station switchgear and breaker, Hydro Ottawa stated:

The expected service life of oil breakers is 55 years, and the average age is 54. The expected service life of gas (SF6) breakers is 51 years, and the average age is 24. The expected service life of vacuum breakers is 46 years, and the average age is seven. There are 532 breakers that have reached their expected service life, and 49 that are within 10 years of their expected service life.

Question(s):

a) Is the expected service life figure for this asset class derived using equipment supplier estimates?

i) If not, how is it determined?

b) Is Hydro Ottawa's own fleet empirical data incorporated to determine service life?

c) Please confirm that the average age is based upon Hydro Ottawa's fleet numbers.

d) Please explain why there is a significant difference between the expected service life (46 years) and the average age for vacuum breakers (7 years).

1

2 **RESPONSE:**

3

4 a) No, the expected service life figure for this asset class is not derived using equipment
5 supplier estimates.

6 i) The expected service life for this asset class was derived based on the age at
7 which the probability of failure on a failure curve developed using industry data is
8 approximately 1.5% or greater.

9

10 b) Hydro Ottawa's own fleet empirical data is not incorporated to determine service life.
11 Hydro Ottawa uses the statistical probability of failure based on industry data.

12

13 c) Hydro Ottawa confirms that the average age is based upon the utility's fleet numbers.

14

15 d) The difference between the expected service life and average age of vacuum breakers
16 is due to Hydro Ottawa's adoption of vacuum technology into its breaker standards
17 within the past 10 years.

INTERROGATORY RESPONSE - OEB-91

2-Staff-36

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / page 151 of 374

SUBJECT AREA: Distribution System Plan

Preamble:

Regarding its station batteries, Hydro Ottawa stated:

There are no batteries that are past their expected service life and six batteries that are within 10 years of their expected service life.

Question(s):

a) Are there any condition assessments being done for the batteries, or are they simply being replaced whenever they reach the end of their expected service lives?

RESPONSE:

a) Hydro Ottawa performs annual station batteries testing to assess condition, as outlined on page 197 of Exhibit 2-4-3: Distribution System Plan, and initiates corrective actions. Due to the importance of batteries for operations, they are scheduled for replacement once they have reached their expected life or replaced in conjunction with other station projects.

INTERROGATORY RESPONSE - OEB-92

2-Staff-37

EXHIBIT REFERENCE:

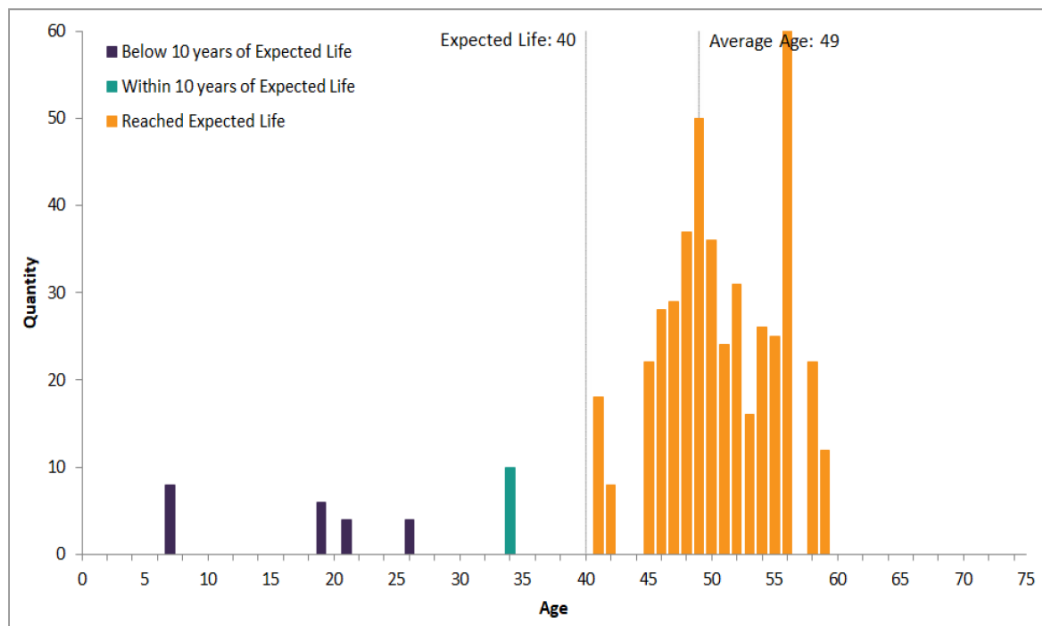
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SUBJECT AREA: Distribution System Plan

Preamble:

Regarding its protection and control equipment, Hydro Ottawa provided the following figure:

Figure 6.18 – Station Electromechanical Relay Demographics



Question(s):

a) Are health index measurements performed for electromechanical relays?

b) Please explain why the majority of station electromechanical relays have remained in service well beyond their expected lives.

- 1 _____
- 2 **RESPONSE:**
- 3
- 4 a) Health index measurements are not performed for electromechanical relays, as
- 5 replacement projects are driven by the health index of associated switchgear.
- 6
- 7 b) The majority of station electromechanical relays have remained in service well beyond
- 8 their expected lives due to the fact that mechanical relays are highly repairable. Hydro
- 9 Ottawa takes a proactive approach to the breaker and relay maintenance practices, with
- 10 maintenance intervals for electromechanical relays every five years. Hydro Ottawa
- 11 keeps an inventory of spare parts and replenishes that stock through the
- 12 decommissioning of other assets.

INTERROGATORY RESPONSE - OEB-93

2-Staff-38

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / pp. 165-166 of 374

SUBJECT AREA: Distribution System Plan

Preamble:

Regarding the condition of its overhead transformers, Hydro Ottawa provided the following figures:

Figure 6.27 – Overhead Transformer Age Demographic³

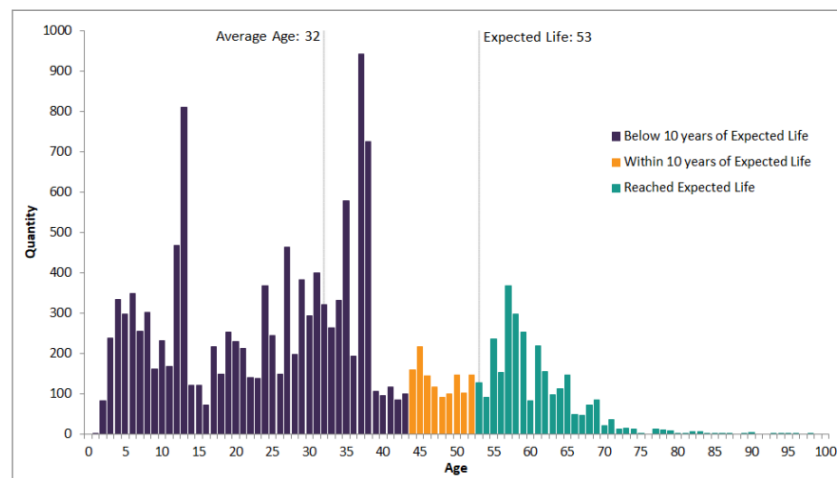
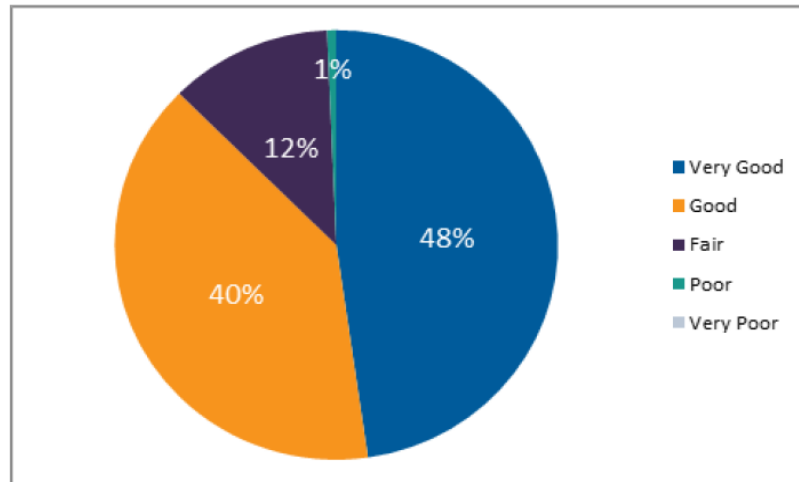


Figure 6.28 – Overhead Transformer Condition Demographic



1

2 Question(s):

3

4 a) Please explain why condition assessment for the overhead transformer fleet (Figure
5 6.28) is materially better than what appears to be implied by the age demographic chart
6 (Figure 6.27)?

7

8 b) What percentage of oil spills (referenced Table 4.13) relate to equipment represented in
9 Figure 6.28?

10

11 **RESPONSE:**

12

13 a) The condition assessment for the overhead transformer fleet is materially better than
14 what is implied by the age demographic chart because the demographic chart illustrates
15 the increased risk due to potential failures of an aging demographic, and is not
16 representative of the actual condition.

17

18 b) The percentage of oil spills referenced in Table 4.13 is 0% for overhead transformers.

INTERROGATORY RESPONSE - OEB-94

2-Staff-39

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / page 169-170 of 374

SUBJECT AREA: Distribution System Plan

Preamble:

Regarding the condition of its overhead switches, Hydro Ottawa provided the following figures:

Figure 6.30 – Overhead Switch Age Demographics⁵

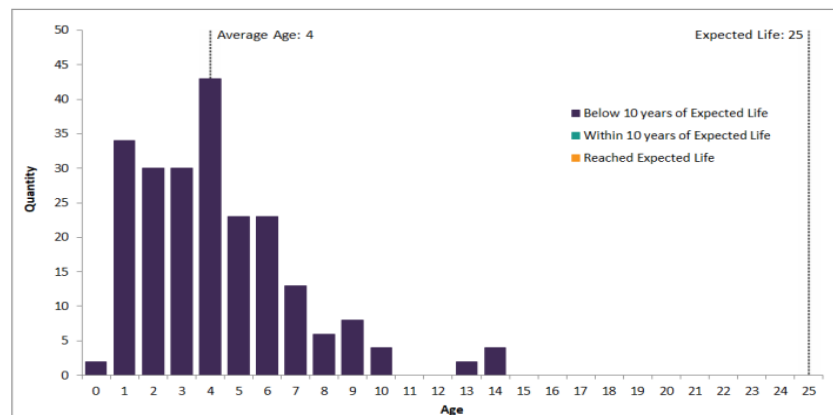
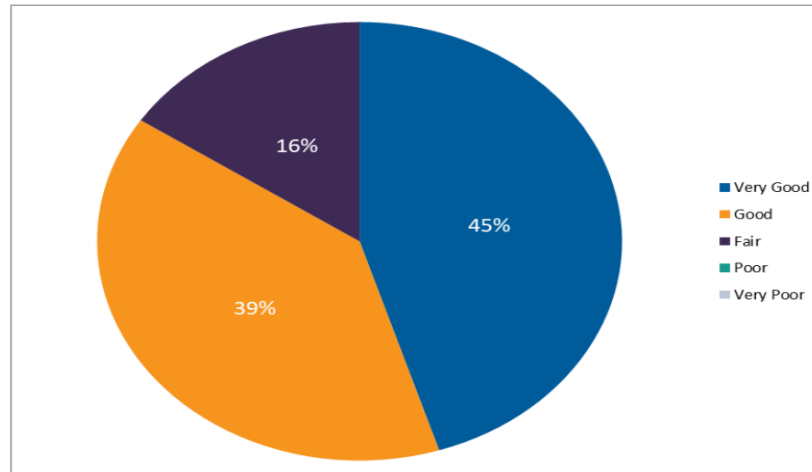


Figure 6.31 – Overhead Switch Condition Demographics



1

2 Question(s):

3

4 a) Why are such a significant proportion of overhead switches in Good or Fair condition
5 (rather than Very Good) despite the relatively young age demographic grouping of the
6 assets? Is there a type fault or a maintenance issue preventing most of them from being
7 classified as Very Good?

8

9 **RESPONSE:**

10

11 a) There is not a type fault or a maintenance issue preventing most of the overhead
12 switches from being classified as Very Good. The source data of Figure 6.31 includes
13 only 51 of the 222 switches represented in Figure 6.30, as the remainder did not have
14 sufficient data available to calculate a valid Health Index. Of the 51 switches with a valid
15 Health Index, all switches aged 10 years or less ranked as Very Good, and the rest (with
16 ages between 11 and 41 years with an average of 22 years) ranked as Good or Fair.

INTERROGATORY RESPONSE - OEB-95

2-Staff-40

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / pp. 173-174 of 374

SUBJECT AREA: Distribution System Plan

Preamble:

Regarding the condition of its PILC cables, Hydro Ottawa provided the following figures:

Figure 6.33 – Distribution Cable PILC Age Demographics⁷

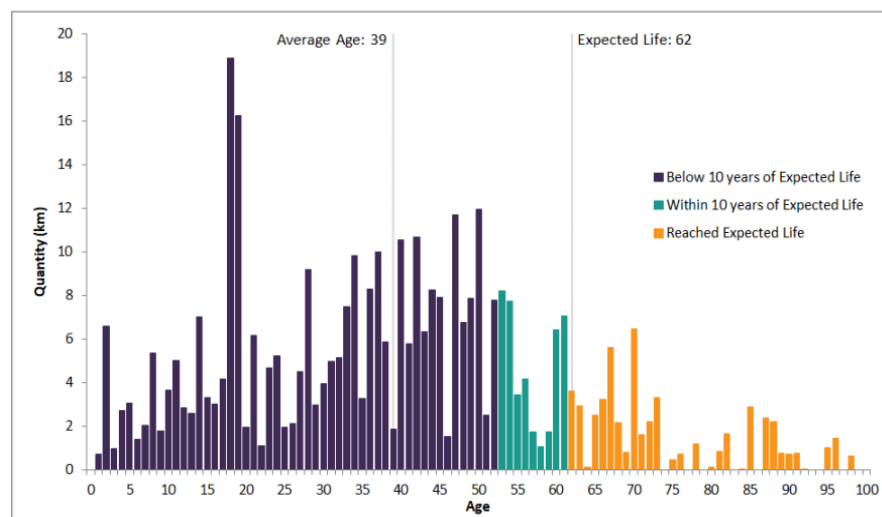
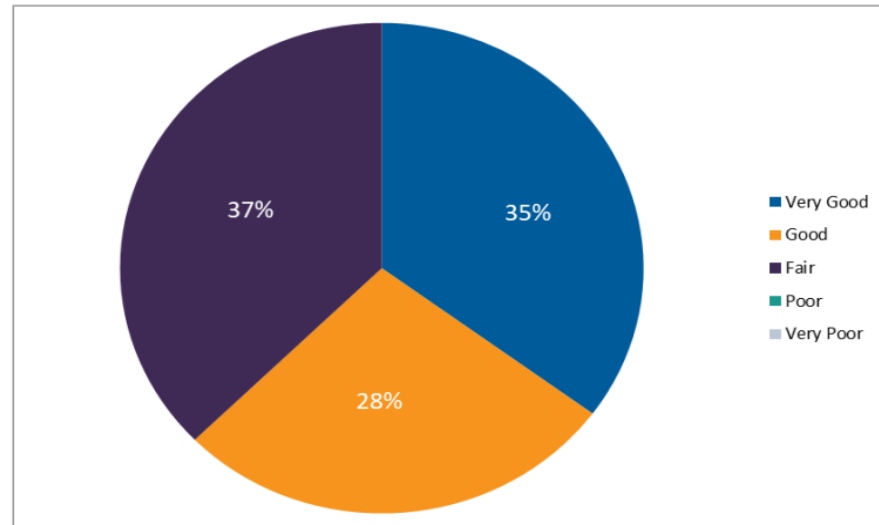


Figure 6.34 – Distribution Cable (PILC) Condition Demographics



1

2 Question(s):

3

4 a) If the health index is based partly or largely upon age, why are no cables rated as poor
5 or very poor?

6

7 **RESPONSE:**

8

9 a) Hydro Ottawa's PILC Cable Health Index is more heavily weighted on failure rate than
10 on age. The score for cable age carries a weight of 4 and the score for failure rate
11 carries a weight of 5. The failure rate of PILC cables is low enough to offset the impact of
12 the age, leading to all cables having a Health Index score higher than the threshold of
13 poor or very poor.

INTERROGATORY RESPONSE - OEB-96

2-Staff-41

EXHIBIT REFERENCE:

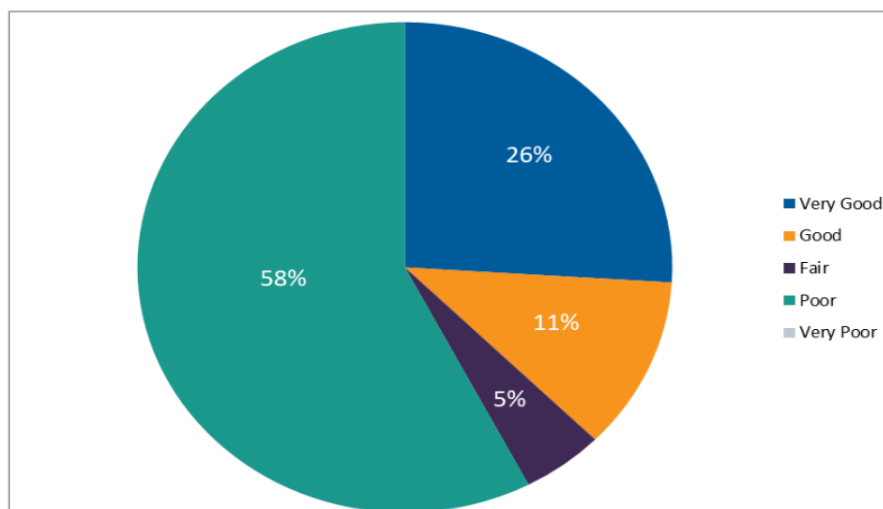
Exhibit 2 / Tab 4 / Schedule 3 / page 177 of 374

SUBJECT AREA: Distribution System Plan

Preamble:

Regarding its polymer distribution cables, Hydro Ottawa provided the following figure:

Figure 6.37 – Distribution Polymer Cable Condition Demographics



Question(s):

a) Why does the polymer cable fleet demonstrate significantly worse health index demographics than the PILC cables shown in Figure 6.34?

- 1 _____
- 2 **RESPONSE:**
- 3
- 4 a) Historical data shows that the difference can be attributed to relative service life. XLPE
- 5 has a demonstrated service life of 25 years, whereas PILC has historically shown a
- 6 longer service life of 62 years. The portion of Hydro Ottawa's Health Index calculation
- 7 attributed to cable age is dependent on the cable's service life, and the score is lowest
- 8 once the cable has exceeded it.

INTERROGATORY RESPONSE - OEB-97

2-Staff-42

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / page 194 of 374

SUBJECT AREA: Distribution System Plan

Preamble:

Regarding its asset replacement and refurbishment policies, Hydro Ottawa stated:

Refurbishment is expected to renew the asset and extend the expected service life.

Question(s):

a) Does Hydro Ottawa adjust the expected service lives of assets that are refurbished (i.e. as reflected in improved health index scores), to account for the anticipated extended period of useful service?

RESPONSE:

a) Yes, Hydro Ottawa adjusts the expected service lives of assets that are refurbished to account for the anticipated extended period of useful service.

INTERROGATORY RESPONSE - OEB-98

2-Staff-43

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / page 196 of 374

SUBJECT AREA: Distribution System Plan

Preamble:

Regarding its station transformers, Hydro Ottawa stated:

Various monitoring technologies have been added to station transformers due the consequences associated with a failure. These include online dissolved gas analysis ("ODGA"), winding and oil temperature, tap changer status, cooling fan status, and loading information. Warnings and alarms from these monitoring units allow Hydro Ottawa to identify the need for corrective actions with real-time data.

Question(s):

- a) Please explain the calibration methodology for alarm settings.
- b) How frequently does Hydro Ottawa confirm the calibration settings?
- c) Has Hydro Ottawa noticed (or does Hydro Ottawa anticipate) operational efficiencies based on the new monitoring technologies? Please explain why or why not.

1

2 **RESPONSE:**

3

4 a) Alarm settings are calibrated upon commissioning of new equipment and the specific
5 methodology may depend on the type of equipment. For example, thermowell sensors
6 are calibrated by heating them to a specific temperature and confirming the alarm point.

7

8 b) Calibration settings frequency are not re-confirmed after commissioning, but they may
9 be confirmed during troubleshooting as issues arise.

10

11 c) Yes, Hydro Ottawa has noticed operational efficiencies based on the new technologies.
12 These efficiencies have been most beneficial to improve system operations and asset
13 management decision-making. For example, System Operators use live transformer
14 information to make informed operational decisions and do not require field visits from
15 technicians to confirm information. Gas monitor alarms have been used to identify and
16 isolate faulting transformers, preventing potential catastrophic failures.

INTERROGATORY RESPONSE - OEB-99

2-Staff-44

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / page 197 of 374

SUBJECT AREA: Distribution System Plan

Preamble:

Regarding station switchgear and breakers, Hydro Ottawa stated:

Every 10 years, detailed preventative maintenance is performed on the entire switchgear assembly. Switchgear maintenance includes detailed internal visual inspections, insulation resistance tests, and ensuring that there are no structural deficiencies, such as cracks, leaks or warped metal in the switchgear.

Question(s):

a) Have switchgear and breaker maintenance schedules been changed or refined as a result of Hydro Ottawa's evolving asset management program? Please explain.

RESPONSE:

a) Yes, switchgear and breaker maintenance schedules have been refined as a result of Hydro Ottawa's evolving asset management program. By leveraging collaborative interest groups, Hydro Ottawa has refined maintenance frequencies by aligning to an industry-wide benchmarking survey conducted by the Centre for Energy Advancement through Technological Innovation ("CEATI").

INTERROGATORY RESPONSE - OEB-100

2-Staff-45

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / pp. 203-204 of 374

SUBJECT AREA: Distribution System Plan

Preamble:

Regarding the capacity of its existing stations, Hydro Ottawa provided the following table and commentary:

Table 7.1 – Stations Exceeding Planning Capacity

	Station	2018 System Peak Day Load (MVA)	Planning Capacity (MVA)	Planning Factor
1	Fallowfield MTS	50	25	201%
2	Merivale MTS	16	10	160%
3	Rideau Heights DS	18	12.5	143%
4	Marchwood MTS	43	33	129%
5	Manordale MTS	13	10	128%
6	Centrepointhe MTS	17	14	119%
7	Vaughan UG	8	6.7	116%
8	Jockvale DS	14	12.5	115%
9	Hawthorne TS	123	110	111%
10	Bayshore DS	14	12.5	111%
11	Stafford Road DS	15	14	109%
12	King Edward TK	85	80	107%
13	Church AA	5	5	105%
14	Leitrim MS	25	25	102%
15	Kanata MTS	61	60.5	101%

Merivale and Rideau Heights Stations in the Nepean Core 8kV area continue to be above their planning capacity limits. A project to increase capacity at Merivale station is currently in progress and expected to be energized by the end of 2019, enabling a decrease of load at Rideau Heights station.

Hawthorne Station was a new addition to the list in 2018. Hydro One Networks Inc. ("HONI") is currently replacing the transformers and increasing capacity at this station. The project was set to be completed by Q4 2019.

Question(s):

a) Please provide any differences between the information shown in this table and the same information as it existed at the time of Hydro Ottawa's last rebasing application.

b) Is the number of stations operating above planning capacity unusually high compared with Hydro Ottawa's historical experience?

i) If yes, how long has Hydro Ottawa had a similar number of stations operating above planning capacity?

c) What are the nameplate capacities for the stations shown in Table 7.1?

d) Were the Merivale and Hawthorne projects completed?

i) If yes, please update the table correspondingly.

RESPONSE:

a) Please see Table A below, which was originally included in Hydro Ottawa's previous rebasing application.¹

¹ Hydro Ottawa Limited, *2016-2020 Custom Incentive Rate-Setting Distribution Rate Application*, EB-2015-0004 (April 29, 2015), Exhibit B-1-2, Table 2.2.9.

Table A – Stations Exceeding Planning Capacity (per EB-2015-0004)

	Station	2013 System Peak Day Load (MVA)	Planning Capacity (MVA)	Planning Factor (%)
1	Bridlewood MS 28kV	48.9	25	196%
2	Rideau Heights DS	19.6	12.5	157%
3	Merivale MTS	15.6	10	156%
4	Borden Farms DS	12.3	8.0	154%
5	Longfields DS	20.1	15	134%
6	Marchwood MTS	43.7	33	132%
7	Startop DS	15.4	12	128%
8	Alexander DS	15.5	12.5	124%
9	Limebank MTS	39.0	33	118%
10	Bayshore DS	11.6	10	116%
11	CentrepoinTE MTS	15.9	14	114%
12	Stafford Road DS	15.5	14	111%
13	Fallowfield MTS	27.0	25	108%
14	Manordale MTS	10.1	10	101%

Six stations are no longer above planning capacity since the last rebase: Bridlewood MS 28kV, Borden Farms DS, Longfields DS, Startop DS, Alexander DS, and Limebank MTS.

Seven new stations are above planning capacity as of 2018: Vaughan UG, Jockvale DS, Hawthorne TS, King Edward TK, Church AA, Leitrim MS, and Kanata MTS.

- b) The number of stations operating above planning capacity is not considered to be unusually high relative to historical experience. Please refer to Table 4.14 in Exhibit 2-4-3: Distribution System Plan for the count of stations exceeding their planning capacity for 2014-2018. Values from the previous rebasing application (Exhibit B-1-2, Table 1.3.8) are shown below in Table B.

Table B – Stations Exceeding Planning Capacity (2010-2013)

KPI	Target	2010	2011	2012	2013
SEPC %	≤5%	26%	24%	20%	15%
Count		20	22	18	14

c) Table C below shows the nameplate capacities of the stations shown in Table 7.1.

Table C – Nameplate Capacities for Stations Shown in Table 7.1

	Station	Station Planning Capacity (MVA)	Station Nameplate Capacity (MVA)
1	Fallowfield MTS	25	53.8
2	Merivale MTS	10	20*
3	Rideau Heights DS	12.5	26.5
4	Marchwood MTS	33	66
5	Manordale MTS	10	24
6	CentrepoinTE MTS	14	39
7	Vaughan UG	6.7	14.2
8	Jockvale DS	12.5	26.5
9	Hawthorne TS	110	220*
10	Bayshore DS	12.5	27.5
11	Stafford Road DS	14	28
12	King Edward TK	80	171
13	Church AA	5	12.5
14	Leitrim MS	25	58
15	Kanata MTS	60.5	121

*The nameplate capacities for Merivale MTS and Hawthorne TS have changed due to completion of projects at both substations. The current nameplate station rating at Merivale MTS is 50MVA and Hawthorne TS is 317MVA.

d) The Merivale MTS Renewal and Hawthorne TS projects were both completed in December 2019. Table D below provides updated values for Merivale MTS and Hawthorne TS.

1

Table D – Stations Exceeding Planning Capacity (Updated)

	Station	2018 System Peak Day Load (MVA)	Planning Capacity (MVA)	Planning Factor
1	Fallowfield MTS	50	25	201%
2	Merivale MTS	16	25	64%
3	Rideau Heights DS	18	12.5	143%
4	Marchwood MTS	43	33	129%
5	Manordale MTS	13	10	128%
6	Centreponte MTS	17	14	119%
7	Vaughan UG	8	6.7	116%
8	Jockvale DS	14	12.5	115%
9	Hawthorne TS	123	158.5	78%
10	Bayshore DS	14	12.5	111%
11	Stafford Road DS	15	14	109%
12	King Edward TK	85	80	107%
13	Church AA	5	5	105%
14	Leitrim MS	25	25	102%
15	Kanata MTS	61	60.5	101%

2

INTERROGATORY RESPONSE - OEB-101

2-Staff-46

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / page 205 of 374

SUBJECT AREA: Distribution System Plan

Preamble:

Regarding its existing feeder capacity, Hydro Ottawa provided the following table:

Table 7.2 – Feeders Exceeding Planning Capacity

	Station	Feeder	2018 System Peak Day Load (MVA)	Planning Capacity (MVA)	Planning Factor (%)
1	Russell TB	TB2JP (TB13)	8.7	5.8	149%
2	Fallowfield MTS	FAL02	22.9	16.3	141%
3	Jockvale DS	145F1	5.9	4.3	137%
4	Limebank MS	LMBF7	21.5	16.7	129%
5	Kanata MTS	624F1	16.4	13.1	125%
6	Startop MS	6F10	5.3	4.3	123%
7	Uplands MS	Q4801F8	18.0	14.8	122%
8	Ellwood MTS	ELW11	7.0	5.8	121%
9	Kanata MTS	624F5	15.0	13.1	114%
10	Kanata MTS	624F2	15.0	13.1	114%
11	Barrhaven DS	140F3	4.9	4.3	114%
12	Slater TS	630	6.6	5.8	113%
13	Rideau Heights DS	180F3	4.9	4.3	113%
14	Parkwood Hills DS	190F5	4.8	4.3	112%
15	Marchwood MS	MWDF4	14.4	13.1	109%
16	Albion TA	2206	11.8	10.7	109%
17	Riverdale TR	509	6.1	5.8	105%
18	Riverdale TR	TR2FB	6.1	5.8	105%
19	Janet King DS 28kV	JKGF4	16.8	16.3	103%
20	Rideau Heights DS	180F1	4.5	4.3	103%
21	Stafford Road DS	200F6	4.4	4.3	103%
22	Woodroffe TW	TW18	5.9	5.8	101%

Question(s):

- a) Please provide any differences between the information shown in this table and the same information as it existed at the time of Hydro Ottawa's last rebasing application.

- 1 b) Does Hydro Ottawa consider this to be a high number of feeders operating above
2 capacity?
3 i) If yes, how long has Hydro Ottawa had a similar number of feeders operating
4 above capacity?
5
6 c) What is the operational rated capacity of the feeders shown in Figure 7.2?

7 _____
8 **RESPONSE:**

- 9
10 a) Please see Table A below, which was originally included as Table 2.2.11 in Exhibit B-1-2:
11 Distribution System Plan in Hydro Ottawa's previous rebasing application.¹ The values
12 were originally presented in amps (A), and have been converted to MVA below for ease
13 of comparison.

14 ¹ Hydro Ottawa Limited, *2016-2020 Custom Incentive Rate-Setting Distribution Rate Application*, EB-2015-0004 (April
15 29, 2015).

Table A – Feeders Exceeding Planning Capacity

	Station	Feeder	2013 System Peak Day Load (MVA)	Planning Capacity (MVA)	Planning Factor (%)
1	King Edward TK	404	5.2	1.9	269%
2	Rideau Heights DS	180F3	6.8	4.3	157%
3	Startop DS	6F10	5.6	4.3	130%
4	Bridlewood MTS 28kV	BRDF3	19.1	14.8	129%
5	Russell TB	5304	7.5	5.8	128%
6	Russell TB	TB2JP (TB13)	7.2	5.8	123%
7	Parkwood Hills DS	190F5	5.1	4.3	119%
8	Stafford Road DS	200F6	4.9	4.3	114%
9	Limebank MTS	7F2	16.4	14.8	111%
10	Jockvale DS	145F1	4.8	4.3	110%
11	Uplands MTS	Q4801F8	16.3	14.8	110%
12	Kanata MTS	624F5	17.5	16.3	108%
13	Overbrook TO	TO1UT	6.2	5.8	107%
14	Kanata MTS	624F1	17.3	16.3	106%
15	Albion TA	2209	6.1	5.8	105%
16	Woodroffe TW	TW2UC	6.0	5.8	104%
17	Overbrook TO	1801	6.0	5.8	103%
18	Lisgar TL	TL7TS (TL19)	6.0	5.8	102%
19	Hinchey TH	TH2UL	5.9	5.8	101%
20	Carling TM	306	5.8	5.8	100%
21	Bilberry TS	77M2	14.8	13.8	100%
22	Carling TM	307	5.8	5.8	100%

The following 13 feeders are no longer above planning capacity, since the filing of Hydro Ottawa's last rebasing application: 404, BRDF3, 5304, 7F2, TO1UT, 2209, TW2UC, 1801, TL7TS (TL19), TH2UL, 306, 77M2, and 307.

The following 13 new feeders are above planning rating as of 2018: FAL02, LMBF7, ELW11, 624F2, 140F3, 630, MWDF4, 2206, 509, TR2FB, JKGf4, 180F1, and TW18.

1 b) The number of feeders operating above planning capacity is not considered to be
2 unusually high relative to historical experience. Please refer to Table 4.19 in Exhibit
3 2-4-3: Distribution System Plan for the count of feeders exceeding their planning
4 capacity for 2014-2018. The 2010-2013 count of feeders exceeding their planning
5 capacity is shown in Table B below, which originally appeared as Table 1.3.8 in Exhibit
6 B-1-2 of Hydro Ottawa's 2016-2020 rate application.

7

8

Table B – 2010-2013 Feeders Exceeding Planning Capacity

KPI	Target	2010	2011	2012	2013
FEPC %	≤10%	3.5%	3.4%	3.3%	3.2%
Count		28	27	26	22

9

10 c) Hydro Ottawa is interpreting this question as referencing Table 7.2. Please see Table C
11 below for the rated capacity of the feeders shown in Table 7.2 in Exhibit 2-4-3:
12 Distribution System Plan.

1

Table C – Rated Capacity of Feeders Exceeding Planning Capacity

	Station	Feeder	Planning Capacity (MVA)	Rated Capacity (MVA)
1	Russell TB	TB2JP (TB13)	5.8	13.7
2	Fallowfield MTS	FAL02	16.3	32.7
3	Jockvale DS	145F1	4.3	7.2
4	Limebank MS	LMBF7	16.7	33.5
5	Kanata MTS	624F1	13.1	26.3
6	Startop MS	6F10	4.3	7.2
7	Uplands MS	Q4801F8	14.8	32.7
8	Ellwood MTS	ELW11	5.8	13.7
9	Kanata MTS	624F5	13.1	26.3
10	Kanata MTS	624F2	13.1	26.3
11	Barrhaven DS	140F3	4.3	7.2
12	Slater TS	630	5.8	11.4
13	Rideau Heights DS	180F3	4.3	7.2
14	Parkwood Hills DS	190F5	4.3	7.2
15	Marchwood MS	MWDF4	13.1	26.3
16	Albion TA	2206	10.7	13.7
17	Riverdale TR	509	5.8	11.4
18	Riverdale TR	TR2FB	5.8	11.4
19	Janet King DS 28kV	JKGF4	16.3	32.7
20	Rideau Heights DS	180F1	4.3	7.2
21	Stafford Road DS	200F6	4.3	7.2
22	Woodroffe TW	TW18	5.8	11.4

2

INTERROGATORY RESPONSE - OEB-102

2-Staff-47

EXHIBIT REFERENCE:

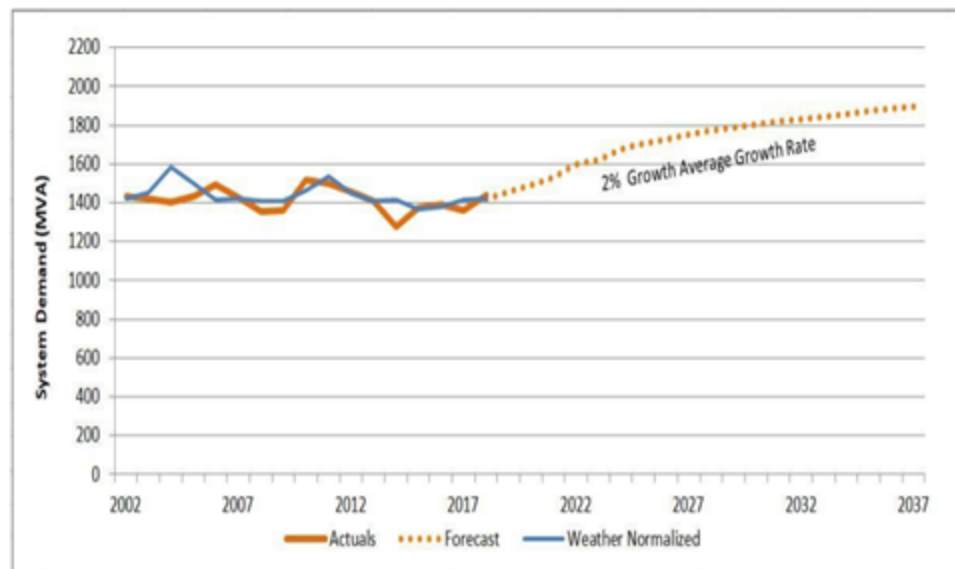
Exhibit 2 / Tab 4 / Schedule 3 / page 215 of 374

SUBJECT AREA: Distribution System Plan

Preamble:

Regarding its system load forecast, Hydro Ottawa provided the following figure:

Figure 7.5 – System Load Forecast



Question(s):

- a) Is the 2% average growth forecast primarily driven by the number of new customers or the expected usage per customer?
 - i) If primarily driven by the number of new customers, how does the forecast number of new customers over the test period compare to the number of actual

- 1 new customers that were connected during the historic period (e.g. 2014 –
2 2018)?
- 3 ii) What was the 2014 – 2018 new customer forecast at the time of Hydro Ottawa’s
4 last rebasing application?
- 5 iii) If primarily driven by the forecast usage per customer, how does the usage per
6 customer forecast over the test period compare to the actual per customer usage
7 over the historic period (e.g. 2014 – 2018)?
- 8 iv) What was the forecast change in usage per customer over the 2014 – 2018
9 period at the time of Hydro Ottawa’s last rebasing application?
- 10
- 11 b) How does the actual 2002 – 2018 load shown in Figure 7.5 support an expected 2%
12 load growth trend? Please explain what has changed.
- 13
- 14 c) Please explain the downward inflection of the growth projection (around 2025). What is
15 expected to change at that time to cause the downward inflection?
- 16

17 **RESPONSE:**

18

- 19 a) The 2% average growth rate is primarily driven by the additional demand contribution
20 forecasted for new residential, commercial, and industrial customer connections.
- 21 i) The 2% average growth rate is primarily driven by demand of forecasted
22 customer connections.
- 23 ii) The 2% average growth rate is primarily driven by demand of forecasted
24 customer connections.
- 25 iii) Demand per customer cannot be applied to the overall demand forecast since
26 the demand forecast depends on the level of detail available for each growth
27 pocket at the time the forecast is developed. Hydro Ottawa relies on load
28 summaries submitted by developers for short-term forecast estimates, per unit
29 demand estimates for the medium-term, and historical demand density estimates
30 for long-term demand forecasting. Further details pertaining to how Hydro Ottawa

- 1 identifies areas of potential future load growth can be found in section 5.1.4,
2 page 100 of Exhibit 2-4-3: Distribution System Plan.
- 3 iv) A 2014-2018 system-wide demand forecast was not submitted as part of Hydro
4 Ottawa's last rebasing application.
- 5
- 6 b) The actual 2002-2018 load shown in Figure 7.5 represents system-wide coincident peak
7 demand. Higher growth is anticipated in the Ottawa region as compared to previous
8 years. Page 215 of Exhibit 2-4-3: Distribution System Plan highlights major sources of
9 growth forecasted in the Ottawa region.
- 10
- 11 c) The downward inflection of the growth projection (around 2025) represents the lack of
12 detailed development plans beyond 2025. Site plans, zoning amendments, and
13 community design plans submitted to the City of Ottawa and shared with Hydro Ottawa
14 provide detailed growth projections for approximately five years. Fewer projects are
15 planned more than five years in advance. Hydro Ottawa relies on official plans submitted
16 by the City of Ottawa to estimate growth trends beyond five years.

INTERROGATORY RESPONSE - OEB-103

2-Staff-48

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / pp. 255-257 of 374

SUBJECT AREA: Distribution System Plan

Preamble:

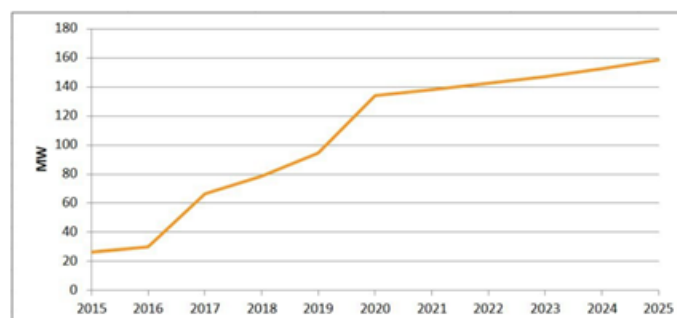
Regarding energy resource facilities, Hydro Ottawa stated and provided the following:

Interest in generation projects within Hydro Ottawa's service area has fluctuated over the historical years driven by external factors. Removing connections larger than 1 MW results in a historical increasing trend in connected capacity for 2016-2019, as shown in Figure 7.39 below. This increasing trend is expected to continue. Thus, an ERF annual growth rate of 11% has been applied to the forecast for the next five years.

Table 7.9 – Forecasted ERF Connections

Type	Number of Applications	Total Nameplate Capacity (kW)
Solar PV	21	5,223
Natural Gas	5	6,098
Hydro-Electric	2	42,880
Battery	2	6,110
Biogas	1	5,700
Wind	0	0
Co-Generation	0	0
Diesel	0	0
TOTAL	31	66,011

Figure 7.40 – Forecasted ERF Capacity



1 Question(s):

2

3 a) Please identify all capital investments that are primarily or largely intended to
4 accommodate the 11% Energy Resource Facility (ERF) growth forecast?

5

6 b) What capital reduction would be possible if ERF growth is half that shown in Figure
7 7.40?

8

9 c) To which years does Table 7.9 correspond?

10

11 d) What is prompting the growth from 2020 to 2025 in Figure 7.40 of approximately 25
12 MW?

13 e) Does the ERF growth forecast during the test period assume any government financial
14 support or government off-taker arrangements?

15

16 f) Do Table 7.9 and Figure 7.40 account for the impact of the recent cancellation of the
17 Ontario FIT program? If not, please update.

18

19 **RESPONSE:**

20

21 a) In Hydro Ottawa's 2021-2025 Expenditure Plan, there are no projects that are primarily
22 or largely intended to accommodate the expected Energy Resource Facility ("ERF")
23 growth, as stated in section 8.1.5 of Exhibit 2-4-3: Distribution System Plan.

24

25 b) There would be no capital reduction if ERF was half that shown in Figure 7.40.

26

27 c) Table 7.9 corresponds to the years 2019-2021.

28

29 d) The ERF growth forecast for 2021-2025 was developed by applying the historical growth
30 rate shown in Figure 7.39 of Exhibit 2-4-3: Distribution System Plan.

- 1 e) The ERF growth forecast during the test period does not assume any government
2 financial support or government off-taker arrangements. It was done solely based on
3 historical connections since any government financial support at this time is unknown for
4 the forecasted period.
5
- 6 f) Table 7.9 and Figure 7.40 do not account for the impact of the recent cancellation of the
7 Ontario Feed-in-Tariff ("FIT") Program. Removing all FIT connections from Figure 40 will
8 not result in a reasonable forecast since the FIT and microFIT programs were recently
9 cancelled and there is not enough data to develop a forecast without those programs in
10 place.

INTERROGATORY RESPONSE - OEB-104

2-Staff-49

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / page 272 of 374

SUBJECT AREA: Distribution System Plan

Preamble:

Regarding its expenditure drivers, Hydro Ottawa provided the following table:

Table 8.6 – Expenditures by Driver (\$'000s)

Investment Category	Driver	2016-2020 Avg	2016-2020 Total	2021-2025 Avg	2021-2025 Total
SA - System Access	Third Party Requirements	\$8,156	\$40,781	\$7,581	\$37,905
	Customer Service Request	\$31,839	\$159,194	\$32,197	\$160,987
	Mandated Service Obligation	\$1,539	\$7,693	\$953	\$4,767
SR - System Renewal	Failure	\$10,051	\$50,254	\$9,819	\$49,095
	Failure Risk	\$29,574	\$147,869	\$28,734	\$143,670
	High Performance Risk	\$529	\$2,644	\$0	\$0
	Substandard Performance	\$90	\$450	\$0	\$0
	Functional Obsolescence	\$383	\$1,913	\$2,929	\$14,644
SS - System Service	Capacity Constraint	\$14,643	\$73,216	\$16,342	\$81,712
	Reliability	\$6,545	\$32,725	\$5,840	\$29,199
	System Efficiency	\$5,323	\$26,616	\$4,179	\$20,895
GP - General Plant	Business Operations Efficiency	\$8,926	\$44,630	\$7,535	\$37,676
	Non-System Physical Plant	\$17,570	\$87,849	\$413	\$2,066
	System Capital Investment Support	\$11,575	\$57,877	\$8,688	\$43,438
	System Maintenance Support	\$565	\$2,824	\$469	\$2,343
GRAND TOTAL		\$147,307	\$736,536	\$125,680	\$628,398

Question(s):

- a) What are the primary drivers of the significant increase in functional obsolescence spending in 2021-2025, and which assets are most impacted?
- b) Why is the System Renewal failure average lower in the forecast period than the historical period?

1

2 **RESPONSE:**

3

4 a) The primary driver of the significant increase in functional obsolescence spending in
5 2021-2025 is the Metering Renewal Program, as meters are the most impacted assets
6 under this driver.

7

8 b) Spending under the failure driver in System Renewal was lower by \$232K. This was due
9 to higher than normal spending in 2018 as a result of three major storms. The addition of
10 the Damage to Plant project to the System Renewal Investment Category lessened the
11 difference between the historical and forecast period by \$1M.

INTERROGATORY RESPONSE - OEB-105

2-Staff-50

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / page 281 of 374

SUBJECT AREA: Distribution System Plan

Preamble:

Regarding climate adaptation, Hydro Ottawa stated:

Renewal of aged, and decayed overhead infrastructure to withstand climatic forces from storm events is key to resilience over the long term for the system. Most notably, Pole Renewal programs support the development of this resilience. Hydro Ottawa will augment the impact of these renewal investments over the 2021-2025 period through the development of new anti-cascade standards and risk based application guides to further mitigate damage in high risk installations when damage does occur.

Question(s):

a) Please describe the proposed new anti-cascade standards and the associated changes in line design practices.

b) Do the proposed practices deviate from relevant industry standards typically utilized by Ontario distributors?

i) If yes, please describe the differences.

c) Has Hydro Ottawa budgeted costs related to the implementation of new anti-cascade standards for 2021-2025?

i) If so, please specify the budget.

1 ii) If so, what's the incremental per-unit cost (i.e. cost per km of new line
2 construction) associated with implementing the additional anti-cascade
3 functionality as a ratio of the historical per-unit costs?
4 _____

5 **RESPONSE:**

6
7 a) New anti-cascading strategies and standards for hardening of pole line systems to
8 protect against wind and ice accumulation events are currently a work in development.

9 This development includes a review of:

- 10 ○ Break and stress points in distribution lines;
- 11 ○ Anchoring; and
- 12 ○ Type of pole and their appropriate application.

13
14 b) The proposed practices are not expected to deviate from relevant industry standards
15 typically utilized by Ontario distributors. Hydro Ottawa will continue to meet and exceed
16 industry standards, and consult on best practices.

17
18 c) No, Hydro Ottawa has not budgeted costs related to the implementation of new
19 anti-cascade standards for 2021-2025. A cost-benefit review will be completed for any
20 strategy prior to implementation.

INTERROGATORY RESPONSE - OEB-106

2-Staff-51

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / pp. 288-289 of 374

SUBJECT AREA: Distribution System Plan

Preamble:

Regarding technology based opportunities, Hydro Ottawa stated:

Over the next five years, Hydro Ottawa will continue implementing grid technologies to improve the reliability and efficiency of the distribution system. Annual automation installations will continue to improve system reliability and operational performance. Continued investment in the communication infrastructure will be essential to support current automation plans while maintaining the flexibility to integrate the technologies of tomorrow.

...

Another follow up to the SCADA project is the integration of the existing Outage Management System ("OMS")

...

In 2020, Hydro Ottawa will upgrade Copperleaf C55, an industry-leading and established Asset Investment Planning tool.

1 Question(s):

2

3 a) How will benefits be assessed and quantified for:

4 i) Annual automation installations?

5 ii) Communication infrastructure?

6 iii) OMS?

7 iv) Copperleaf C55?

8

9 **RESPONSE:**

10

11 a) Details on how benefits will be assessed and quantified for these programs are provided
12 in the applicable Material Investment Plans as follows:

13 i) Annual automation installations: Attachment 2-4-3(E): Material Investments,
14 section 2.3 Distribution Enhancements, starting on page 322.

15 ii) Communications infrastructure: Attachment 2-4-3(E): Material Investments,
16 section 2.4.3.2 Field Area Network, starting on page 431.

17 iii) Outage Management System: Attachment 2-4-3(E): Material Investments,
18 section 2.4.1.1 Outage Management System Replacement, starting on page 381.

19 iv) Copperleaf C55: Attachment 2-4-3(E): Material Investments, section 3.2.1
20 Enterprise Solutions Enhancements, starting on page 477. The C55 tool is
21 utilized to improve the capital asset planning process within Hydro Ottawa. The
22 planned upgrade will help to maintain this tool on the latest version so that
23 existing benefits can continue to be realized. These benefits include:

24 1) Hydro Ottawa's continued adherence to the ISO 55000 program for asset
25 management;

26 2) Improvement in staff efficiency through automated workflows for
27 investment decision-making and record-keeping;

28 3) Improved visibility of planned programs and spending across the asset
29 management organization; and

30 4) Continued ability to prioritize capital asset spending in one accessible
31 tool.

INTERROGATORY RESPONSE - OEB-107

2-Staff-52

EXHIBIT REFERENCE:

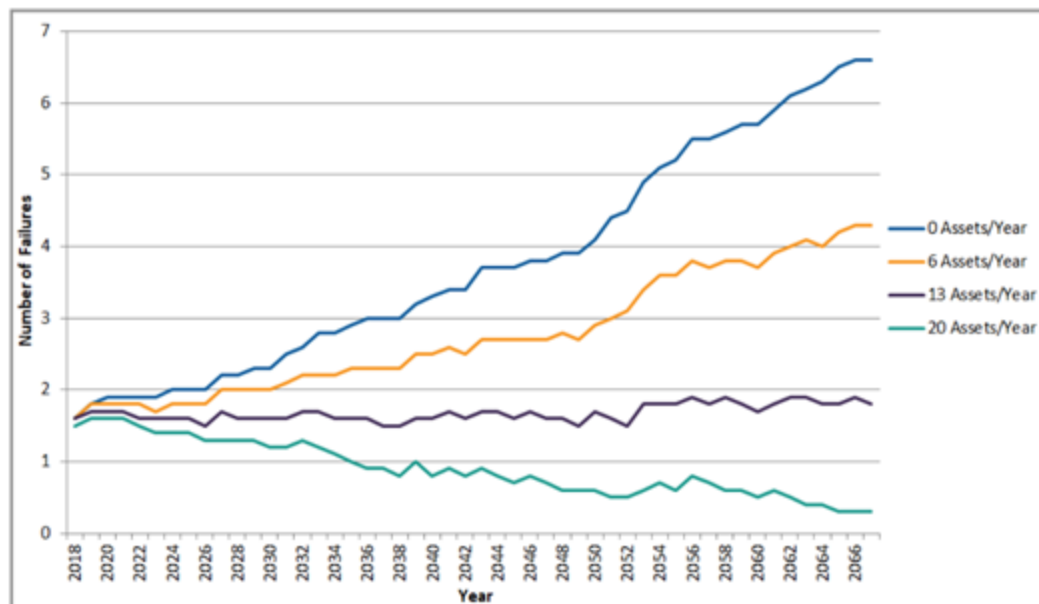
Exhibit 2 / Tab 4 / Schedule 3 / Attachment E / pg. 27 of 534

SUBJECT AREA: Distribution System Plan

Preamble:

Station Breaker Failure Rate

Figure 1.13 - Station Breaker Failure Rate per Planned Replacement Level



Question(s):

- a) Please provide the calculations and assumptions used to develop failure rate curves shown in Figure 1.13 and explain the relationship between the shown failure rate results, the Health Index values shown in Figure 1.10 and the SAIFI results shown in Fig 1.11.

1

2 **RESPONSE:**

3

4 a) The calculations in Figure 1.13 apply the probability of failure curves to Hydro Ottawa's
5 current breaker age demographics in order to forecast potential future rate of failure. The
6 replacement scenarios assume that the oldest breaker is replaced first.

7

8 Figure 1.10 illustrates the current state of the health of Hydro Ottawa's breakers
9 according to health index calculations. This information is used to prioritize the
10 replacement projects needed to keep pace with the investment scenario presented in
11 Figure 1.13.

12

13 The SAIFI results shown in Figure 1.11 represent the historical customer impact of
14 outages caused by failed breakers in the 2014-2018 period. Forecasted failure rates
15 presented in Figure 1.13 are not directly linked to their impact to SAIFI, as breaker
16 failures are often identified during maintenance activities before they cause reliability
17 issues.

INTERROGATORY RESPONSE - OEB-108

2-Staff-53

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / Attachment E / pg. 75 of 534

SUBJECT AREA: Distribution System Plan

Preamble:

Discussing Failure / Reliability of Poles, Hydro Ottawa states:

The goal of the pole renewal program is to minimize the impact failed poles have on reliability, and by extension SAIFI and SAIDI (by replacing the pole before it fails), and to mitigate safety impacts associated with failed poles while undertaking renewal in a cost efficient planned manner. Further, given that many of Hydro Ottawa's poles mechanically support assets containing oil, including overhead transformers, the proactive replacement of poles will also reduce the risk of oil released to the environment due to unforeseen pole failures.

Figure 1.32 - Hydro Ottawa Pole Failure SAIFI

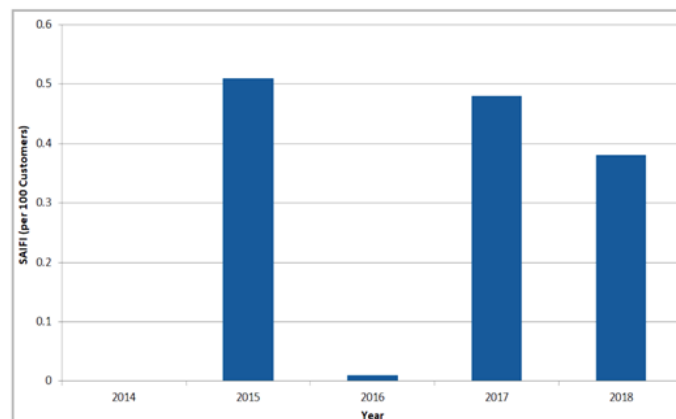


Table 1.32 – Historical SAIFI (per 100 Customers) for Failed Poles

	2014	2015	2016	2017	2018
Poles	0.00	0.05	0.01	0.48	0.38

1 Question(s):

2

3 a) What are the reasons for the significant inter-annual variability of the SAIFI impacts of
4 pole failures?

5

6 b) Is the 2015 SAIFI value (0.05) shown in Table 1.32 correct?

7

8 c) What is the typical trigger causing failure of poles assessed as being in poor and very
9 poor condition? Do they typically fail in severe weather, due to some other external
10 trigger (such as tree falls), or are spontaneous pole failures common? Please provide
11 supporting data.

12 d) Has Hydro Ottawa tracked the condition of poles that have failed in severe weather
13 events to confirm that poles in poor and very poor condition poles have a higher failure
14 probability than good and very good condition poles in such conditions?

15 i) If yes, please provide supporting data.

16 ii) If no, why not?

17

18 e) Hydro Ottawa indicates that poles supporting oil-filled devices have higher failure
19 consequence than poles that do not support such devices. Has Hydro Ottawa prioritized
20 its pole replacements to first replace all poles supporting oil-filled devices that are in very
21 poor and poor condition?

22 i) If not, why not.

23

24 f) If poles that don't support oil-filled devices have a lower failure consequence, is Hydro
25 Ottawa able to defer replacement of such poles that are in very poor condition until all
26 the very poor and poor condition poles supporting oil-filled devices have been replaced?

27 i) If not, why not?

RESPONSE:

a) The significant inter-annual variability of the SAIFI impacts of pole failures is caused by variability in the number of customers experiencing outages caused by the pole failures. For example, 2015 experienced ten outages resulting in a SAIFI impact of 0.51 (0.051 per event), whereas 2016 had four outages resulting in a SAIFI impact of 0.01 (0.0025 per event). The number of customers affected depends on where the fault occurred on the system, what protective device operated, and how many downstream customers are connected beyond this device.

b) No, the value for 2015 in Table 1.32 on page 75 of Attachment 2-4-3(E): Material Investments should read “0.51” and not “0.05”.

c) Hydro Ottawa does not track the condition of a pole upon failure and causing an outage. The causes of pole failures that resulted in an outage are listed in the table below with Vehicles (i.e. vehicle contact) being the most common followed by Electrical Flashovers. Through Hydro Ottawa’s inspection and maintenance programs, many poles are identified to be in poor and very poor condition (typically due to internal rot at the base of the pole) and are prioritized for replacement to minimize outages due to external forces such as wind and freezing rain.

Table A – Pole Failure Causes

Cause	# of Outages (2014-2019)
Vehicles	59
Electrical Flashovers	37
Mechanical Failure	24
Other	10
Extreme Wind	7
Freezing Rain	5
Lightning	3
Tree Contacts	1

- 1 d) Hydro Ottawa does not track the condition of poles that have failed during severe
2 weather events. The pole's condition was likely a smaller contributing factor compared to
3 the weather conditions. See Table A above for the number of failed pole outages caused
4 by Adverse Weather (Extreme Wind, Freezing Rain, and Lightning).
5
- 6 e) Yes, Hydro Ottawa evaluates poles supporting oil-filled devices to have a higher failure
7 consequence than poles that do not support such devices. Planned projects are typically
8 done in groupings of poles to maximize efficiency in resources, and are evaluated based
9 on the total risk of all the poles in scope with the number of poles with oil-filled
10 equipment adding to that consequence. Poles identified in very poor condition are
11 replaced on a one-off basis with poles supporting oil-filled equipment being prioritized.
12
- 13 f) As per the response in part (e) above, prioritizing pole replacement projects considers a
14 number of risk factors, with the projects with the higher risk being completed first.

INTERROGATORY RESPONSE - OEB-109

2-Staff-54

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / Attachment E / pg. 94 of 534

SUBJECT AREA: Distribution System Plan

Preamble:

Table 1.42 - Historical, Approved, and Projected Expenditure for Planned Overhead Switch Renewal (\$'000s)

	Historical			Bridge		Test				
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Total Expenditure	\$441.9	\$268.2	\$14.5	\$326.2	\$0.0	\$0.0	\$750.9	\$750.9	\$796.9	\$0.0
Units Replaced	249	136	92	58	0	0	375	375	398	0

Question(s):

- a) Is the proposed significant increased spending on overhead switch replacements in 2022, 2023 and 2024 solely attributable to the porcelain-insulated switch replacement initiative?
- b) Please provide the expected change in system reliability performance that is expected to be achieved by implementing this replacement program, and provide the assumptions and calculations used to derive the change.

RESPONSE:

- a) Yes, the proposed increased spending on overhead switch renewal for the Test Years 2022, 2023, and 2024 are driven by porcelain-insulated switch replacement projects.

- 1 b) Once the program is completed, it is expected to mitigate more than two outages per
2 year lasting on average 1.5 hours and impacting approximately 350 residential and small
3 commercial customers each. Historical outage data was used to determine the average
4 rate of insulation-related outages on an annual basis. This assumes that the program is
5 100% completed and that there are no failures with the replacement switches. Please
6 see Attachment OEB-109(A): 2012-2019 Porcelain Annual Outage Details for a
7 summary of historical outages.

INTERROGATORY RESPONSE - OEB-110

2-Staff-55

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / Attachment E / pp. 133 & 134 of 534

SUBJECT AREA: Distribution System Plan

Preamble:

Figure 1.50 – Expected number of faults on PILC cable versus Annual Rates of Replacement

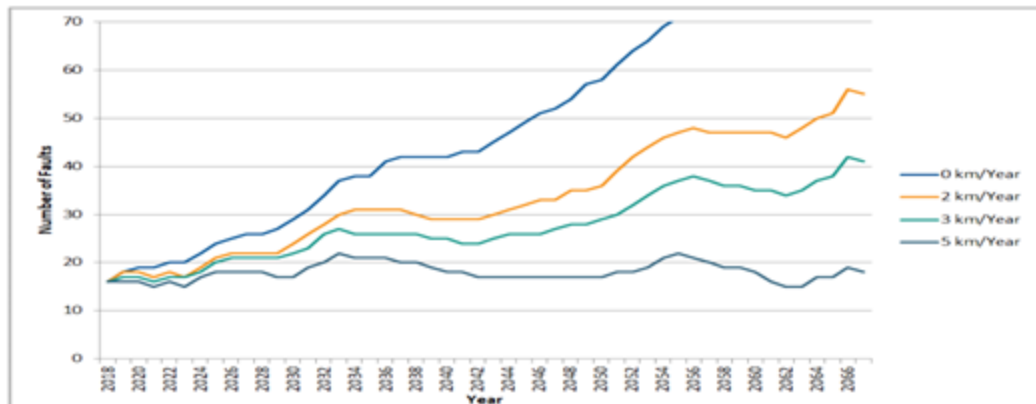
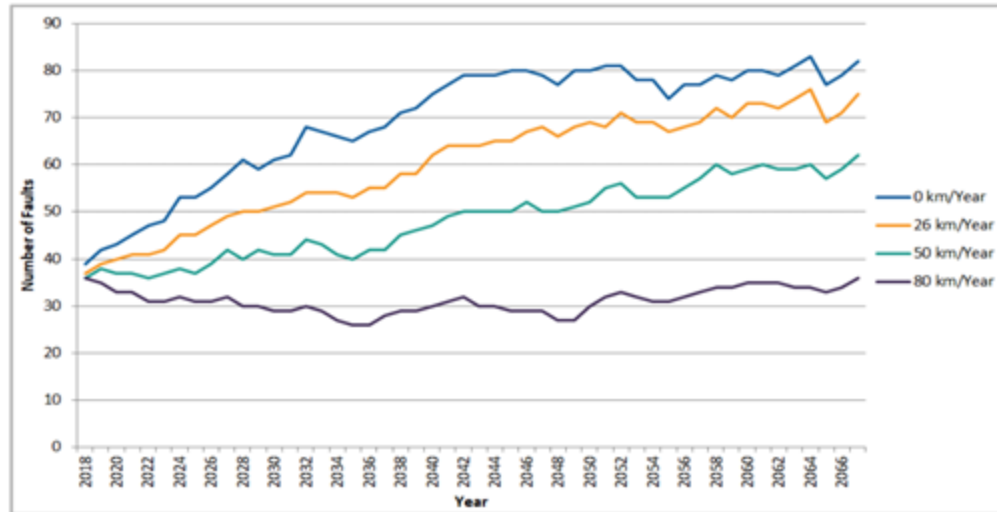


Figure 1.51 – Expected number of faults on XLPE/TRXLPE cable versus Annual Rates of Replacement



1

2 Question(s):

3

4 a) Please provide the assumptions and calculations used to derive the curves shown in
5 Figures 1.50 & 1.51.

6

7 b) What is the reason for extending the failure forecast for 50 years?

8

9 c) Please quantify the expected reliability impact for deferring the planned PILC
10 replacements beyond the test period.

11

12 **RESPONSE:**

13

14 a) The assumptions made in creating Figure 1.50 and Figure 1.51 were as follows:

15 i) The asset information queried from Hydro Ottawa's Geographic Information
16 System ("GIS") is accurate;

17 ii) Technical and condition data on the assets under review is accurate;

- 1 iii) The probability of failure curves used to determine the rates of failure are
2 accurate, representative, and applicable to the assets included in the scope of
3 the analysis; and
4 iv) In each year of the forecast, a set quantity of the oldest cables are replaced.

5
6 Both Figure 1.50 and Figure 1.51 were calculated by first querying the ages of the
7 cables under review from the utility's GIS system. Cable segments that do not have a
8 recorded age had one assigned based on the overall age demographics. Next, the
9 expected number of failures for each cable is determined by applying a probability of
10 failure. This process is repeated for each year forecasted by incrementing the age of the
11 assets under review each time. The number of failures are totalled for each year and
12 plotted.

- 13
14 b) The reason for extending the failure forecast for 50 years for XLPE/TRXLPE cable was
15 to determine the number of unexpected underground polymer failures that could be
16 expected over the asset's expected life of 45 years. The same period was selected for
17 PILC cable to enable an easier comparison to be made between the two cable types.
18
19 c) Given that each failure of PILC does not necessarily result in an outage and can be
20 identified through maintenance, it is difficult to forecast the number of outages and the
21 impact to reliability caused by PILC failures. Historical impact on SAIFI is shown on page
22 131 of Attachment 2-4-3(E): Material Investments. The expected reliability impact for
23 deferring the planned PILC replacements beyond the test period would increase the
24 number of failures, as represented in Figure 1.50 on page 133 of Attachment 2-4-3(E):
25 Material Investments on the series labelled as "0km/Year" replaced annually. From the
26 data, not replacing cable would lead to an increase of an estimated nine additional
27 failures per year and would in turn increase the probability of customers experiencing
28 outages.

INTERROGATORY RESPONSE - OEB-111

2-Staff-56

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / Attachment I / Stantec Hydro Ottawa Climate Adaptation Plan pg. 33 of 70

SUBJECT AREA: Distribution System Plan

Preamble:

Table 12 on pg. 33 lists recommended climate change adaptation recommendations.

Question(s):

a) Please identify which of the Stantec recommendations Hydro Ottawa intends to implement, which it will not be implementing and explain why in each case.

b) Please identify any capital expenditures or incremental operating costs associated with the recommendations that will be implemented.

RESPONSE:

a) Hydro Ottawa intends to implement all of Stantec's recommendations, the timelines for which are still under review.

b) There are currently no quantified capital expenditures or incremental operating costs associated with the recommendations that will be implemented. Many of Hydro Ottawa's current programs will have direct impact on adaptation measures, such as the renewal of overhead infrastructure and increased operational capabilities. Current recommendations from Stantec involve policy creation/update, initiating reviews and

- 1 analysis, and performing cost/benefit of climate adaptation actions. Future climate
- 2 adaptation actions and strategies could require capital expenditures or incremental
- 3 operating costs.

INTERROGATORY RESPONSE - OEB-112

2-Staff-57

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / Attachment M / Metsco Review of Hydro Ottawa's Asset Condition Assessment Framework pg. 6 of 13

SUBJECT AREA: Distribution System Plan

Preamble:

Table 6 – Summary of Major Event Days (2016-2018)

Date of Major Event	Primary Cause of Interruption	Description	Number of Interruptions	Number of Customer Interruptions	Number of Customer Hours of Interruption
September 21, 2018	Loss of Supply	Tornadoes	39	216,001	6,808,300
May 4, 2018	Adverse Weather	High Winds	41	63,869	244,733
April 16, 2018	Adverse Weather	Freezing Rain	63	55,101	257,931
September 27, 2017	Tree Contact	High Winds	40	11,391	94,006
January 4, 2017	Tree Contact	Freezing Rain and Heavy Snow	38	19,130	38,115
July 1, 2016	Adverse Weather	Thunderstorm, Lightning and Tree Contact	16	12,297	41,791

Table 6 shows that the MEDs on Sept 27, 2018, January 4 2017 and July 1, 2016 all featured Tree Contact as either the Primary Cause of Interruption or in the Description of the event, although high winds and freezing rain and heavy snow are given in the description in both 2017 events.

1 Question(s):

2

3 a) Do these results indicate that Hydro Ottawa could improve its resilience to some major
4 weather events by improving its brushing and tree management processes?

5 i) If no, please explain why not.

6

7 **RESPONSE:**

8

9 a) Hydro Ottawa has taken steps to improve its resilience to major weather events by
10 improving its brushing and tree management processes. Previous storm hardening
11 efforts started a three-year process in 2016 to increase cut back distance for fast
12 growing trees, trimming line to sky to mitigate falling branches, and working with
13 customers to perform smart tree removals within the fall arc of lines. Hydro Ottawa
14 continues to improve its resilience to adverse weather events through climate adaptation
15 measures, as outlined on page 278 of Exhibit 2-4-3: Distribution System Plan, which
16 includes augmentations to its vegetation management practices.

INTERROGATORY RESPONSE - OEB-113

2-Staff-58

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 9/Attachment A/pp.1-4 of 21

Exhibit 2/Tab 4/Schedule 3/page 269 of 374

SUBJECT AREA: Capital Expenditure Plan

Preamble:

An average forecast of capital expenditures of \$95 million per year was developed in the initial budgeting process. The proposed capital expenditures average at \$100.8 million per year for 2021-2025.

Question(s):

a) Please explain how the initial average capital expenditures of \$95 million was developed.

b) Please explain key drivers for the change from the original average budget of \$95 million to the proposed budget of \$100.8 million per year.

c) Please specify the inflation rates that were used for each year over the 2020-2025 period during the initial budgeting process.

RESPONSE:

a) The initial capital expenditure target of \$95M per year was calculated based on the historical average of 2016-2019 capital expenditures, excluding Connection Cost

- 1 Recovery Agreements (“CCRAs”) with Hydro One Networks (“HONI”) and the Facilities
2 Renewal Program.
3
- 4 b) Please refer to the updated version of Table 2 in UPDATED Exhibit 2-4-1: Capital
5 Expenditures Summary, which identifies total capital expenditures without Cambrian
6 MTS as \$94.8M, which is within the original target of \$95M. The costs for Cambrian MTS
7 are inclusive of the sizable CCRA payments to HONI of \$16.0M in 2021. Projects of this
8 magnitude are not undertaken on a regular basis and are considered
9 once-in-a-generation projects.
10
- 11 c) There were no inflationary rates applied for the 2020-2025 period during the initial
12 budgeting process. As outlined in part (a) of this response above, the \$95M target was
13 based on 2016-2019 dollars. Although there will be increased costs in labour and
14 outside service (inflationary increases), the goal will be to offset these increases by
15 savings in productivity and continuous improvement initiatives. Hydro Ottawa is
16 committed to achieving year-over-year productivity savings. For details, please see
17 Exhibit 1-1-13: Productivity and Continuous Improvement Initiatives.

INTERROGATORY RESPONSE - OEB-114

2-Staff-59

EXHIBIT REFERENCE:

Exhibit 2/Tab 4/Schedule 3/Attachment E/pp. 344-373 of 534

Exhibit 1/Tab 1/Schedule 5/page 8 of 19

SUBJECT AREA: Capital Expenditure Plan

Question(s):

a) Please provide a copy of the Smart Energy Roadmap document that was prepared by the Smart Energy Steering Committee.

b) Please clarify whether Table 5 (Updated Exhibit 1/Tab 1/Schedule 5/page 12 of 27) provides the complete list of projects/programs within the Smart Energy Roadmap for the 2021-2025 rate period. If no, please provide the complete list.

c) Please provide the historical rate funded expenditures on each project/program listed in Table 5 (Updated Exhibit 1/Tab 1/Schedule 5/page 12 of 27) by year for the 2016-2020 period.

RESPONSE:

a) Please see Attachment OEB-114(A): Smart Energy Roadmap for Hydro Ottawa. This roadmap was prepared by the Smart Energy Steering Committee in mid-2018 and represents a snapshot in time of the then-current view of innovation projects. This roadmap has since been evolved and updated into the program plans, as articulated within this Application.

- 1 b) Yes, Table 5 in UPDATED Exhibit 1-1-5: Application Summary provides the complete list
2 of projects within the Smart Energy Roadmap for the 2021-2025 rate period.
3
4 c) Table A provides the historical rate-funded expenditures in each program listed in Table
5 5 of UPDATED Exhibit 1-1-5: Application Summary by year for the 2016-2020 period.
6
7

Table A – Historical Rate-Funded Smart Grid Expenditures ('000s)

Budget Program & Project	Historical Spending					
	2016	2017	2018	2019	2020 ¹	Total
Stations Enhancements ● None	\$0	\$0	\$0	\$0	\$0	\$0
Distribution Enhancements ● Other Distribution Enhancement Projects	\$915	\$1,252	\$1,270	\$1,333	\$2,395	\$7,166
SCADA Upgrades ● SCADA Upgrade	\$612	\$759	\$1,282	\$251	\$462	\$3,366
RTU Upgrades	\$0	\$0	\$0	\$0	\$0	\$0
Communications Infrastructure ● Optical Telecommunications Network	\$655	\$5,338	\$6,735	\$5,572	\$1,540	\$19,840
Remote Disconnected Smart Meter	\$357	\$890	\$1,013	\$939	\$1,031	\$4,229

8

9 ¹ 2020 figures are forecast, not actuals.

A decorative graphic at the bottom of the page. It features a dark blue background with a large, stylized white arrow pointing right, composed of a grid of dots. The arrow is overlaid on a series of overlapping, semi-transparent blue geometric shapes that create a sense of depth and movement.

HYDRO OTTAWA SMART ENERGY ROADMAP

CONTENTS

Introduction	1
Smart Energy Strategy	2
Development and Implementation	4
The Smart Energy Roadmap	8
Initiative Briefs	11-50
Appendix A: The Steering Committee	51

INTRODUCTION

The Smart Energy Roadmap, is the integrated “whole of company” plan to achieve Hydro Ottawa’s Smart Energy vision. This vision is articulated in the company’s *Strategic Direction 2016-2020*, which also offers the following definition of “smart energy”: “an energy system that makes effective use of available technologies to maximize consumer, community and environmental benefit. It is sustainable, customer-centric, reliable, cost-effective, secure, and constantly evolving. It is responsive to evolving needs and opportunities, and focused on tangible benefit.”

This roadmap is a major deliverable from the Smart Energy Steering Committee, a cross-functional committee that provides leadership, oversight, coordination and direction of Hydro Ottawa’s Smart Energy Initiatives.

The application of technology in an effort to develop a smarter grid is not new to Hydro Ottawa. The first Hydro Ottawa Smart Grid Plan was released in 2009 in support of the *Green Energy and Green Economy Act*. Subsequently, Hydro Ottawa’s smart grid plan has been documented within the Grid Transformation Action Plan (GTAP) first released in 2012, and updated in 2014. Since 2014, Hydro Ottawa has continued to execute pilot deployments of new technology, studies, and core investments under the label of “Smart Grid” initiatives. While these initiatives have provided a net benefit to Hydro Ottawa and its customers, there remain significant opportunities for further collaboration and alignment in the selection and execution of future projects. As a result of this need for formal governance to support Hydro Ottawa’s delivery on its smart grid plans and initiatives, a Smart Energy Steering Committee was formed.

The Smart Energy Roadmap builds on this strong organizational history of technological innovation to support our customers’ needs, but reaches further, as necessitated by our rapidly changing industry. This roadmap is designed to support the need to find new ways of doing business for both the regulated distribution company and the unregulated energy services company. This whole of company approach is seen as the most effective way of generating shareholder value and ensuring that all opportunities are considered regardless of the any potential regulatory constraints. Furthermore, by focusing the Smart Energy initiatives into a single unified roadmap, decisions around technology and process investments can be effectively prioritized. This prioritization will be based on several factors including; innovation, reliability, sustainability, revenue growth, efficiency, and customer benefit. Finally, and perhaps one of the most important benefits of having a Smart Energy Steering Committee with a clear mandate, is to foster a culture of innovation within Hydro Ottawa that enables rapid decision making and the ability to grow our business in response to the ever changing technology landscape and our customer’s needs.

SMART ENERGY STRATEGY

SMART ENERGY VISION STATEMENT

The Smart Energy vision for Hydro Ottawa is to be **THE LEADING PARTNER IN A SMART ENERGY FUTURE DELIVERING 100% RELIABLE AND INNOVATIVE SERVICES & SOLUTIONS.**

The Smart energy vision will be realized through a roadmap of projects and programs, which are aligned with the Key Pillars of the Smart Energy Strategy and desired strategic outcomes.

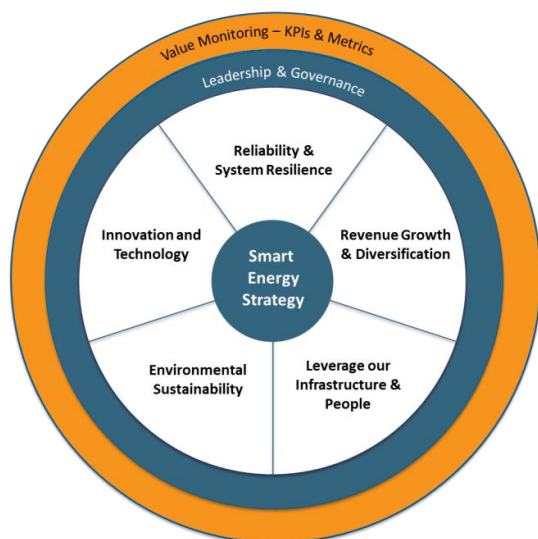
SMART ENERGY STRATEGIC OUTCOMES

100% RELIABLE SERVICE - Develop enhanced grid reliability, and service offerings to enable provision of 100% reliable electrical service guarantee.

CUSTOMER ENERGY SOLUTIONS - Position Hydro Ottawa as the provider of proactive and innovative energy solutions which are driven by our customers' needs, preferences, and objectives.

EXPANDING CURRENT BUSINESSES - Expand current value and revenue streams building on our core areas of strength in the provisioning of electricity and related services.

KEY PILLARS OF THE SMART ENERGY STRATEGY



INNOVATION AND TECHNOLOGY – Leverage technology to align with both current and future markets, positioning Hydro Ottawa to be Best in Class.

RELIABILITY AND SYSTEM RESILIENCE – Moving closer to 100% reliability, by improving customer service continuity measures.

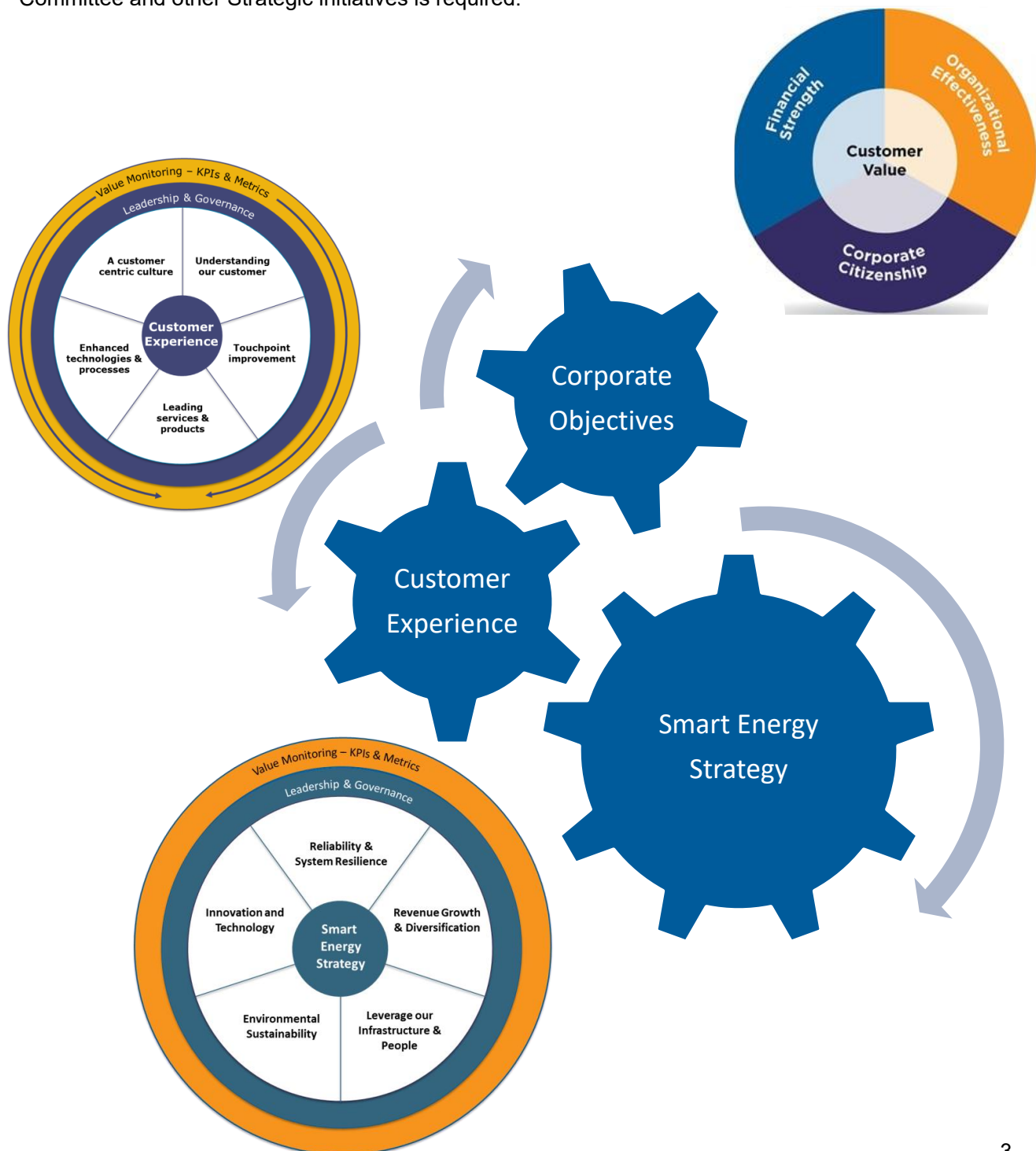
ENVIRONMENTAL SUSTAINABILITY – Reducing environmental impact, supporting Hydro Ottawa and our customers transition to a net zero carbon future.

REVENUE GROWTH AND DIVERSIFICATION – Expand current value and revenue streams, while increasing efficiency.

LEVERAGE OUR INFRASTRUCTURE AND PEOPLE – Seek opportunities which leverage our existing knowledge, key competencies, and physical infrastructure.

ALIGNMENT WITH OTHER INITIATIVES

The smart energy steering committee is one of the initiatives through which Hydro Ottawa will achieve its overall corporate strategic objectives. To deliver on the corporate objective of Customer Value, alignment between the Smart Energy Steering Committee, the Customer Experience Steering Committee and other Strategic initiatives is required.



ROADMAP DEVELOPMENT AND IMPLEMENTATION

In determining those initiatives and opportunities that will support achieving our Smart Energy Strategic Outcomes, the Smart Energy Steering Committee took three broad approaches:

1. Review of existing roadmaps and plans, including past smart grid plans, to identify existing initiatives, proposed or underway, which align or support the Smart Energy vision and Strategic Outcomes.
2. Perform an environmental scan reviewing new, emerging, and existing opportunities for our group of companies, which align with the Smart Energy vision and Strategic Outcomes.
3. Review of the existing operations of the distribution system and visioning of future operations that align with the Smart Energy Future, so as to identify initiatives that will support the evolution of our distribution operations.

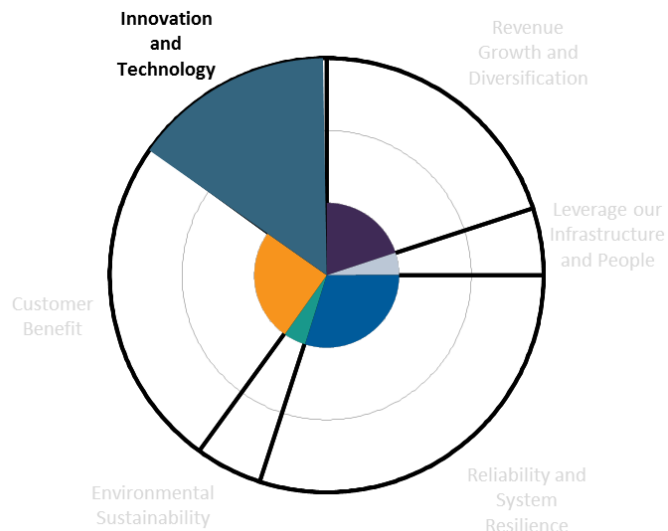
The resulting initiatives that form the Roadmap were assessed through their alignment with the Smart Energy Key Pillars and support of the Customer Experience Steering Committee's strategic imperatives.

SCORING AND PRIORITIZATION

The following sections describe each of the individual scoring categories, how they are evaluated and their contribution to the overall score.

The project scoring charts which are designed such that the reader should be able to easily identify the impact of a particular initiative based on the fill of the chart area. To this end, each of the six scoring categories has been given a sector of the chart that is proportional to the impact the category has on the overall score (i.e. proportional to the weighting factor). To judge the overall impact an initiative has, the reader can simply evaluate how full the chart is. The greater the area that is filled, the higher the impact the initiative has and therefore the higher the priority it is given.

INNOVATION AND TECHNOLOGY



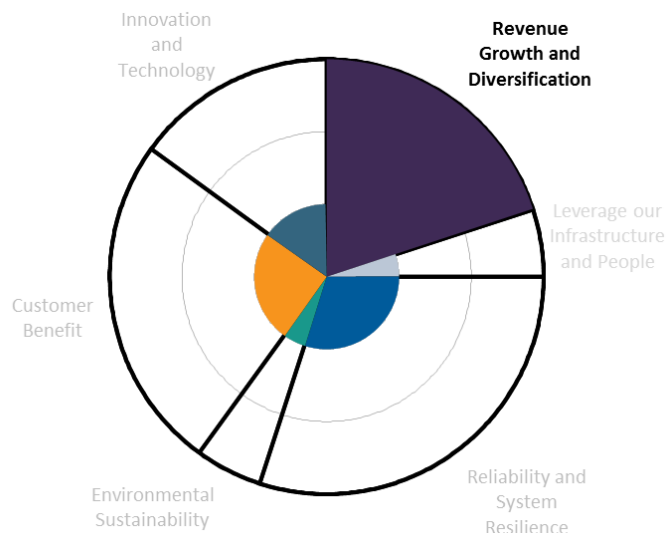
This is an estimated measure of how the initiative would align with Innovation and Technology.

Scoring:

Aligns with Existing and Future Markets = 3 points
 Aligns with Future Markets = 2 points
 Aligns only with Existing Market = 1 points
 N/A = 0 points

Weighting: 15%

REVENUE GROWTH AND DIVERSIFICATION



This is a qualitative measure of the overall impact the initiative would have to either the Capital or OM&A budgets. Estimated only, as this evaluation would be done prior to a full business case.

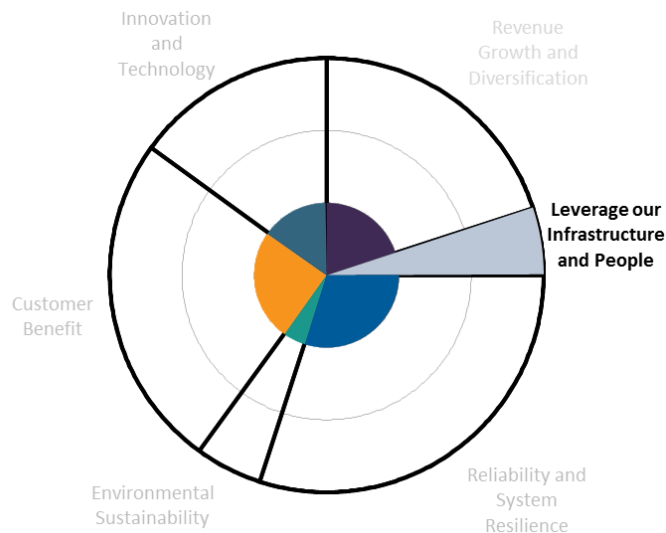
Scoring:

Certain Financial Benefit* = 3 points
 Likely Financial Benefit = 2 points
 Potential Financial Benefit = 1 point
 No Financial Benefit = 0 points

*Materiality threshold is approximately \$1 Million

Weighting: 20%

LEVERAGE OUR INFRASTRUCTURE AND PEOPLE



This is an estimated measure the initiative would have on leveraging either our assets or our people

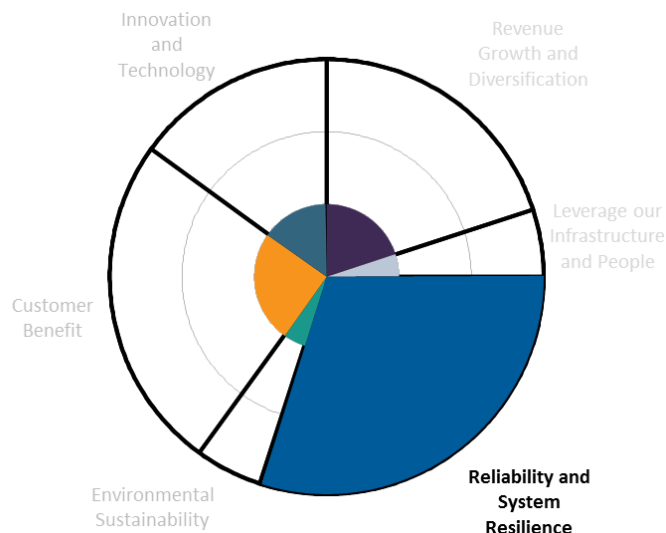
Scoring:

Leverages Existing = 3 points
Dovetails with Existing Plans* = 2 points
Leverages Potential or Future Possibility = 1 points
N/A = 0 points

*More points for alignment to our plans for the future

Weighting: 5%

RELIABILITY AND SYSTEM RESILIENCE



This is an estimated measure the initiative would have to HOL's Reliability Metrics.

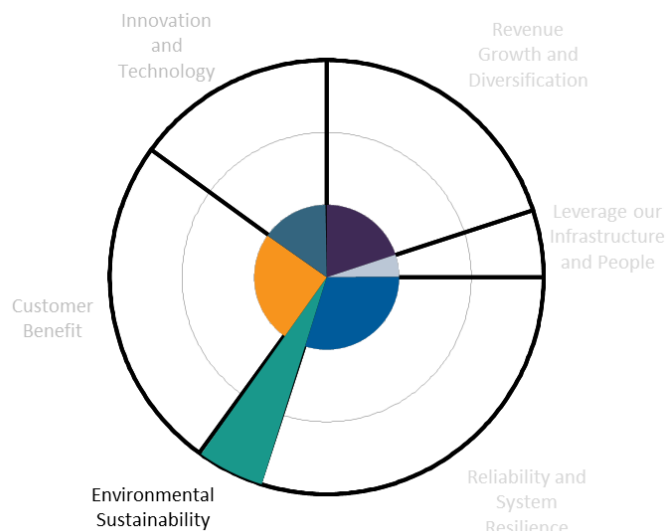
Measured as a reduction in the 'number of interruption hours' or the 'number of customers interrupted'

Scoring:

>30k = 3 points
>20k = 2 points
>10k = 1 points
<10k = 0 points

Weighting: 30%

ENVIRONMENTAL SUSTAINABILITY



This is an estimated measure on the overall impact the initiative would have on the Environment. While this is somewhat subjective, the idea is to bin the impact based on our ability to quantify it.

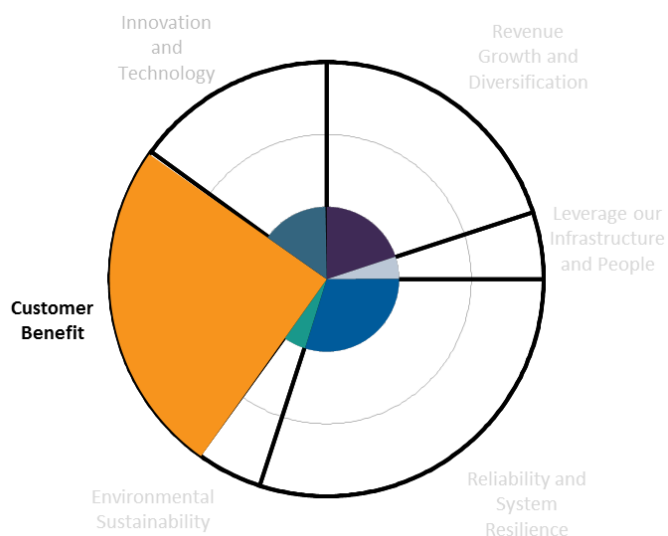
Scoring:

Direct Quantifiable Impact= 3 points (i.e. 1st Order Effect)
Indirect Quantifiable Impact = 2 points (i.e. 2nd Order Effect)
Non-Quantifiable Impact = 1 points (i.e. 3rd Order Effect)
N/A = 0 points

Weighting: 5%

CUSTOMER BENEFIT

SUPPORT OF CUSTOMER EXPERIENCE STRATEGIC IMPERATIVES



This is an estimated measure of how the initiative would impact the Customer Experience Steering Committee - Customer Centric Strategic Imperatives

1. Supports a Customer Centric Culture
2. Helps understand the customer
3. Improves the Touchpoint
4. Provides a Leading Service or Product
5. Enhances technologies & Processes

Scoring:

≥ 3 of 5 = 3 points
2 of 5 = 2 points
1 of 5 = 1 points
None = 0 points

Weighting: 25%

ROADMAP IMPLEMENTATION

Electricity distribution in Ontario, Canada, and the world is undergoing great change. The Smart Energy Roadmap must be able respond to this reality, and be flexible and adaptive over the term of the plan. The Smart Energy Steering Committee will undertake quarterly reviews of the Roadmap and progress on its initiatives, ensuring the Roadmap is executed and remains relevant to our rapidly changing operating environment.

Implementation of the Roadmap will likewise remain responsive to shifts in the regulatory framework governing the provincial electricity sector and in the OEB's oversight of Hydro Ottawa's regulated business. The sector's regulatory and policy landscape has evolved substantially in recent years, and there are strong prospects for change to remain a constant over the expected term of this Roadmap. What's more, formal adoption of this Roadmap is set to occur around the half-way mark of the 2016-2020 rate plan for the company's electricity distribution business. With the next five-year distribution rate plan scheduled to cover the 2021-2025 period, the Smart Energy Steering Committee acknowledges the potential need to adjust later phases of Roadmap implementation, where appropriate, based upon the outcome of Hydro Ottawa's next rate application proceeding.

As a "whole of company" Roadmap, its roadmap will call upon support from the "whole of company". Large portions of the current roadmap, rests within CEDO and CITO divisions. Projects will be dispatched and assigned to the appropriate Business unit(s) and progress to our goals will be tracked through the steering committee.

THE SMART ENERGY ROADMAP

The Roadmap is laid out on the subsequent two pages, followed by two-page briefs on each initiative included in the Roadmap.

The Roadmap initiatives are split in two categories: (i) active initiatives, where plans are laid out; and (ii) opportunities, which are initiatives that require the right partner, opportunity or circumstance to occur for Hydro Ottawa to take action. While immediate actions on these initiatives are not planned, they have been included in the Roadmap to ensure they are tracked and changes which make these initiatives viable to action are capitalized upon.

Smart Energy Roadmap

Initiative	Leader(s)	Executive Sponsors	Comments/Notes	Status	2018	2019	2020	2021	2022	2023
Telecommunication Master Plan A robust communication infrastructure to support, Hydro Ottawa and our customer smart energy applications.	Dir. IT Programs & Mgr. Grid Technology	CITO & CEDO	Q4 2020 - Phase 1 fibre installation complete 2025 - Phase 2 Core Field Area network complete	▲						
Enabling Transactive Marketplace (GREAT-DR) Preparing for the shifted role of the utility moving to provide, integrated energy solutions, supporting customer transaction, in community and Across the grid.		CITO & CEDO	GREAT-DR 1.0 - Smart Grid fund project Completed for Q4 2020 Behind The Meter Initiatives in 2021+	●						
Enhanced Mobile Workforce Management Extend workforce management for all HOL distribution field activities.	Dir. Enterprise Apps	CEDO & CITO	Mobile Workforce Management solution implemented for event response Q4 2020	●						
Self-Healing Grid Distribution system can automatically Isolate faults and restore power.	Mgr. Grid Technology, Mgr. Assets, Mgr. System Office	CEDO & CITO	Q1 2020 - Deployment of Auto Restore and Auto-Generated switching order, on key portions of the distribution system.	▲						
Outage Intelligence Automatically locate, and identify root cause distribution system faults	Mgr. Grid Technology & Mgr. System Office	CEDO & CITO	Target Outcome - Automatically Locate Root Cause, and identify and locate nested faults in 2021	NA						
Outage Analytics and Leveraging Existing Data Deliver custom reporting, and analytics at our staffs finger tips.	Dir. Enterprise Apps & Mgr.Assets	CEDO & CITO	Target, Auto Share Reports & enhanced reliability reporting in September 2019	NA						
Storage for Reliability Deploy Storage to enable 100% reliability for our customers.	Mgr. Distribution Standards & Mgr. Grid Technology	CITO, CEDO & CCO	E-Camion Target: A Market evaluation and a go/no-go decision on a viable business plan by Q4-2019	●						
Outage Notification Automatic notification of customer power outage.	Mgr. Grid Technology	CEDO & CITO	Target - Outage Notification available Mid 2020	▲						
EV Enabling Charging Infrastructure Deployment of private charging infrastructure (Commercial & Residential)		CITO, CEDO, & CCO	Target - HOL Business Model(s) for involvement in Charging Infrastructure by Q2 2020	●						
Smart Assessment and Repair Damage assess tools to support and streamline grid event response.	Mgr. Grid Technology & Mgr. System Office	CEDO & CITO	Target Damage Assess tool with Integrate Parts Pick-Lists and JDE?/GIS Integration in 2019	●						
Analytic Field Assistant (KITT) Process assistant (AI) to help in triage and prioritization distribution system response.	TBD	CEDO & CITO	Target - AI assistant to support field activities (2023)	NA						

Initiative	Leader(s)	Executive Sponsors	Comments/Notes	Status	2018	2019	2020	2021	2022	2023
Smart System Planning System information available at our finger tips, to support decisions that align to the real condition of our system.	Mgr. Assets & Mgr. System Office	CEDO & CITO	Target Rate - application Road map Q2-2019 Deployment 2021-2025	NA						
Dynamic Grid Distribution system can dynamically respond to operating environment.	Mgr. Assets	CEDO & CITO	Target - Dynamic Grid functionality operations in 2022	NA						
Electrification of transportation B2B enabling of Commercial vehicles and charging infrastructure.	TBD	CCO, CEDO & CITO	HOHI Electrification business cases	NA						
Outage Prediction Machine learning and artificial intelligence to identify and prevent incipient faults.	Dir. Enterprise Apps & Dir. Engineering	CCO, CEDO & CITO	Target - Pilot outage prediction for outage prevention by 2023	NA						
Asset Lifecycle Information All information associated with Asset available in a single source.	Mgr. Assets & Mgr. Distribution Standards	CEDO & CITO	Integrated access to all asset maintenance data 2021	NA						
Smarty Pants Wearable Technology to support field operations.		CEDO	Pilot deployment 2021	NA						
Opportunities										
Microgrids - Campus Hydro Ottawa to provide integrated energy solution to campus and community partners that meet the customer(s) supply security and/or environmental criteria.	TBD	CCO, CEDO & CITO								
Electrify HOL Fleet Build Reputation as a trusted advisor in the shift to electrified transportation by converting HOL fleet.	TBD	CEDO								
Storage for Capacity Management Hydro Ottawa to participate in the deployment of local storage, to manage solar generation, manage customer loads such as EV charging	TBD	CEDO								

TELECOMMUNICATIONS MASTER PLAN

SUMMARY

Deploy an advanced telecommunications network to connect all offices, substations, and field equipment with a high bandwidth, private, and secure connection. This includes the purchase and installation of both Fibre optic cables as well as Optical Telecommunications Network equipment. Once the core optical network is near complete, the execution will focus on the acquisition and deployment of a field area network.

TARGET:

Q2 2019 – Completion of the Nokia Equipment Installation and configuration

Q4 2019 – Completion of the Fibre Optic Network Build-Out

Q4 2020 – Completion of the Core Field Area Network Deployment

OWNERSHIP

EXECUTIVE SPONSOR(S): CITO, CEDO

LEADER(S): Dir. IT Programs & Mgr. Grid Technology

STAKEHOLDER GROUPS: IT, DEAM

STATUS

At this time, Hydro Ottawa is deploying the Fibre Optic Network and the Nokia Optical Telecommunications Network Equipment. The field area (wireless) network is currently in the design and evaluation phase prior to the execution of purchase agreement.

NEXT STEPS

1. Complete the installation of the Fibre Cable throughout the HOL Service Territory
2. Complete the installation and testing of the Nokia OTN equipment
3. Complete the evaluation and design of the Field Area Network

ALIGNMENT TO STRATEGIC OUTCOMES

The Telecommunications Master Plan is fundamentally about improving our capabilities to leverage the information and equipment that resides in our substations and remote sites. By developing a consolidated network infrastructure, HOL could efficiently collect and monetize data and field equipment capabilities. Any excess capacity on the network could be leveraged for future business opportunities.

100% RELIABLE SERVICE - Develop enhanced grid reliability, and service offerings to enable provision of 100% reliable electrical service guarantee.	✓
CUSTOMER ENERGY SOLUTIONS - Position Hydro Ottawa as the provider of proactive and innovative energy solutions which are driven by our customers' needs, preferences, and objectives.	
EXPANDING CURRENT BUSINESSES - Expand current value and revenue streams building on our core areas of strength in the provision of electricity and related services.	✓

ALIGNMENT SMART ENERGY KEY PILLARS/SCORING

INNOVATION AND TECHNOLOGY –

Score 3 – The TMP represents a technology that is aligned with both the current and future energy markets.

RELIABILITY AND SYSTEM

RESILIENCE – Score 1 – While Telecom solutions could improve our ability to quickly configure equipment, it is not seen as having a large scale direct impact across the Hydro Ottawa system.

ENVIRONMENTAL

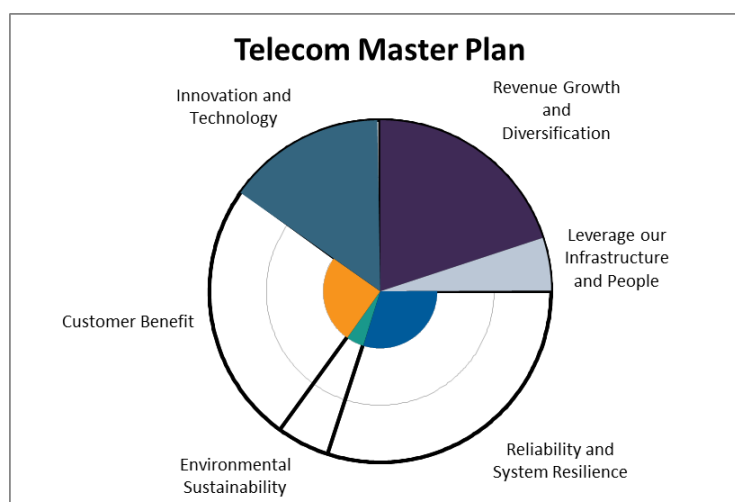
SUSTAINABILITY – Score 1 –

Telecommunications could have a non-quantifiable impact on GHG emissions through expansion of our automated device deployment.

REVENUE GROWTH AND DIVERSIFICATION – Score 3 – The telecommunications network presents a significant revenue growth opportunity for the organization.

CUSTOMER BENEFIT – Score 1 – While telecommunications improves the performance of this utility, the customer will not be directly impacted by its existence.

LEVERAGE OUR INFRASTRUCTURE AND PEOPLE – Score 3 – The telecommunications network will provide significant benefit for our current business and enhance our alignment to future markets.



THE GREAT-DR

SUMMARY

The Grid Edge Active Transactional Demand Response (“GREAT-DR”) project is an Ontario Ministry of Energy, Smart Grid Fund III supported project led by Hydro Ottawa Ltd. This project will see the development of a field proven reference standard design that defines the autonomous negotiation between behind-the-meter loads and sources, and the Grid. This will allow for managing Transactive Energy and Demand Response within the Grid’s dynamic electricity supply and infrastructure capacity. Upon conclusion of the trial, HOL will produce an open source, royalty free reference standard, with drawings and commercialization reports. This project will involve field trials of up to 30 participating customer homes, divided amongst approximately five distribution transformers.

TARGET:

Q2 2019 – Completion of the GREAT-DR 1.0 Project Scope

Q2 2021 – Completion of the GREAT-DR 2.0 Project Scope (Contingent on Funding)

OWNERSHIP

EXECUTIVE SPONSOR(S): CITO & CEDO

LEADER(S): Raed Abdullah

STAKEHOLDER GROUPS: IT, DEAM

STATUS

At this time, Hydro Ottawa has executed contribution agreements with the funding and technology partners and is currently finalizing the customer site selection process. In parallel, hardware and software development is in progress and field installation has begun in certain locations.

NEXT STEPS

Milestone	Key Milestone	Forecasted Completion
3	Complete Pre-Trial w Energy Sources	MAY-18
4	Complete Equipment Manufacturing & Field Install	JUL-18
5	Final Report	OCT-18
6	Commercialization Report	OCT-19

ALIGNMENT TO STRATEGIC OUTCOMES

Customer Value - Potential creation of a new customer-centric service offering including sustainable energy generation, storage, EV charging, and Home Energy Management Integration.

Financial Strength – Provides an alternative to Grid defection by giving the customer the tools and the hardware to fully participate in the electricity market through HOL equipment.

Organizational Effectiveness – Allowing for the full monetization of our Distribution Assets through the use of technology

100% RELIABLE SERVICE - Develop enhanced grid reliability, and service offerings to enable provision of 100% reliable electrical service guarantee.	
CUSTOMER ENERGY SOLUTIONS - Position Hydro Ottawa as the provider of proactive and innovative energy solutions which are driven by our customers' needs, preferences, and objectives.	✓
EXPANDING CURRENT BUSINESSES - Expand current value and revenue streams building on our core areas of strength in the provision of electricity and related services.	✓

ALIGNMENT SMART ENERGY KEY PILLARS/SCORING

INNOVATION AND TECHNOLOGY –

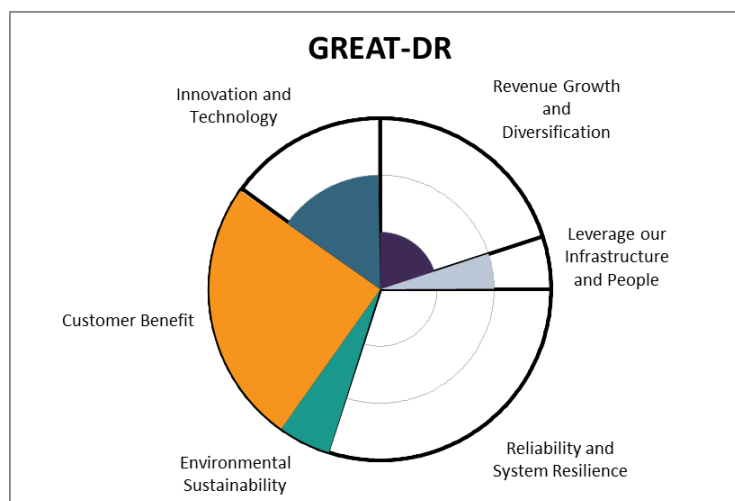
Score 2 – The GREAT-DR technology is primarily aligned with the future energy markets.

RELIABILITY AND SYSTEM

RESILIENCE – Score 0 – When integrated with storage, there could be customer reliability impact; it is not seen as having a large scale direct impact across the Hydro Ottawa system.

ENVIRONMENTAL

SUSTAINABILITY – Score 3 – The GREAT-DR is seen as enabling renewables and Demand Response.



REVENUE GROWTH AND DIVERSIFICATION – Score 1 – The GREAT-DR is seen as a long term project that could have potential benefit to the organization.

CUSTOMER BENEFIT – Score 3 – The GREAT-DR is a very customer centric solution that could significantly impact the customer experience with the utility.

LEVERAGE OUR INFRASTRUCTURE AND PEOPLE – Score 2 – The GREAT-DR is in alignment with future markets.

ENHANCED MOBILE WORKFORCE MANAGEMENT

SUMMARY

Extend mobile workforce management solution, to fully leverage for all Hydro Ottawa field activities, and expand for use to assist in the dispatch of crews during system events. Have system which allow for support of the follow up. Futures integrate with DMS to Auto-Dispatch crews for switching and/or repair.

TARGET:

Q4 2020 - Mobile workforce management solution implemented, for expanded support of all day to day planned field work. With integration for use in Event response, (auto-dispatch of switching orders, optimization of response based resources available and auto generation of follow-up field activities).

OWNERSHIP

EXECUTIVE SPONSOR(S): CEDO & CITO





LEADER(S): Dir. Enterprise Apps

STAKEHOLDER GROUPS: IT, Scheduling, Operations.

STATUS

Currently Oracle will be stopping support of our current MWM solution, project for replacement of this tool is being kicked off in 2018.

NEXT STEPS

	Project/Task	Duration	Responsible	Status	2018	2019	2020	2021
Deploy new Workforce Management	Requirement Definition and Vendor Demonstration	1 mo.	Scheduling, IT	Started				
	Continued Implementation of new MWM for Planned Work	1 yr.	Scheduling, IT	Planned				
Auto Dispatch	Auto-Dispatch, auto Follow-up Technology Deployment	1 yr.	TBC	Concept				
Target Auto OTOs, and Auto Follow-up in 2020								

ALIGNMENT TO STRATEGIC OUTCOMES

Current use of the Oracle Mobile workforce management (MWM) tool has provided measurable productivity and customer service gains. Further benefits can be gained through further integration of field activities. Integration of the MWM tools into event and outage response will optimize our ability to respond reducing outage duration– and creating seamless follow-up activities to ensure steps are taken to prevent knock-on outages.

100% RELIABLE SERVICE - Develop enhanced grid reliability, and service offerings to enable provision of 100% reliable electrical service guarantee.	✓
CUSTOMER ENERGY SOLUTIONS - Position Hydro Ottawa as the provider of proactive and innovative energy solutions which are driven by our customers' needs, preferences, and objectives.	
EXPANDING CURRENT BUSINESSES - Expand current value and revenue streams building on our core areas of strength in the provision of electricity and related services.	✓

ALIGNMENT SMART ENERGY KEY PILLARS/SCORING

INNOVATION AND TECHNOLOGY –

Score 1 – Enhanced MWM is focused on conducting the business of today as effectively as is feasible.

RELIABILITY AND SYSTEM

RESILIENCE – Score 2 – Implementation of Enhance MWM for events with integration with DMS – should have the ability to optimize our response to outages reducing interruption duration.

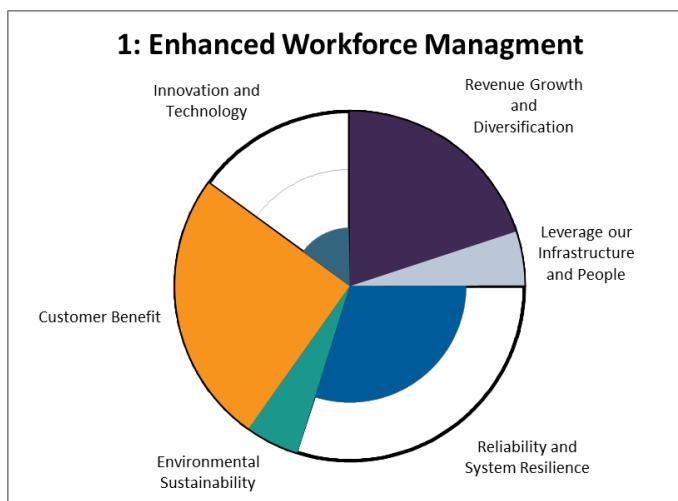
ENVIRONMENTAL SUSTAINABILITY –

Score 3 - Enhanced MWM will optimize staff routing, reducing environmental impact of our operations.

REVENUE GROWTH AND DIVERSIFICATION – Score 3 – Enhanced MWM will enable additional resources being run through allowing productivity gains seen in the first phase of deployment extended.

CUSTOMER BENEFIT – Score 3 – Supports a number of the Customer Centric Strategic Imperatives: Supports a customer Centric Culture, Improves the Touchpoint, Enhances technologies and processes.

LEVERAGE OUR INFRASTRUCTURE AND PEOPLE – Score 1 - Builds on productivity and efficiencies in our existing business.



SELF HEALING GRID

SUMMARY

Deploy tools and technics to enable Fault Isolation and Restoration with and without operator intervention.

TARGET:

Q1 2020 - Deployment of Self-Healing Grid on key portions of the distribution system.

OWNERSHIP

EXECUTIVE SPONSOR(S): CEDO & CITO

LEADER(S): Mgr. Grid Technology, Mgr. Assets, Mgr. System Office

STAKEHOLDER GROUPS: IT, Scheduling, System Operations, Asset Planning.

STATUS

Work is currently underway to implement distributed automation is in the East 44kV loop.

With implementation of the OSI SCADA and DMS, this can enable expansion of our core system control software to support auto-restoration through FLISR.

NEXT STEPS

Project/Task		Duration	Responsible	Status	2018	2019	2020	2021	2022
Software - FLISR/DMS	New SCADA & DMS	Ongoing	IT/OT, Sys. Ops	Started					
	CYME/GIS Model refresh - review and address gaps in the system engineering model	12 mo.	OT, Sys Ops, Records	Planned					
	OSI Power Flow Module	6 mo.	IT/OT, Sys. Ops	Planned					
	FLISR Module	6 mo.	IT/OT, Sys. Ops	Planned					
Other Automation	East 44kV Loop automation	Ongoing	Assets, OT Sys. Ops.	Ongoing					
Device / Control	Strategic Device Rollout - Install devices and sensors in the field	Ongoing	Assets, Reliability Council, Sys Ops	Ongoing					
Target Deploy Auto-Restore FLISR and Auto-Generated OTO for Manual Switching Q1 2021									

ALIGNMENT TO STRATEGIC OUTCOMES

The Self-Healing grid, will move to quickly restore as many customers as possible following distribution system faults – moving toward the 100% reliable service goal

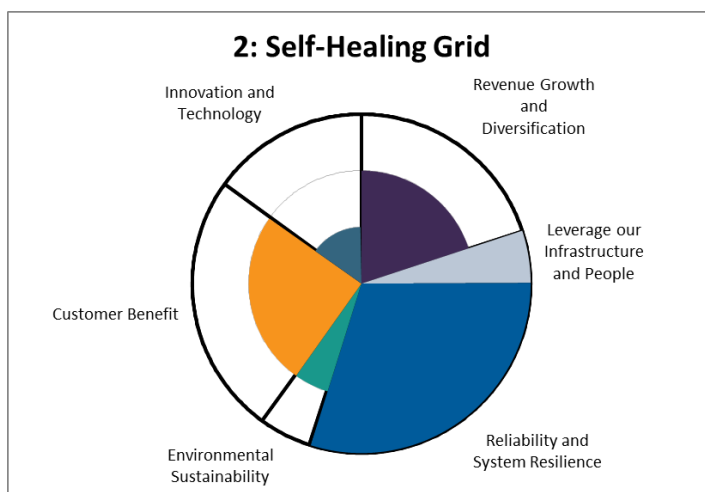
100% RELIABLE SERVICE - Develop enhanced grid reliability, and service offerings to enable provision of 100% reliable electrical service guarantee.	✓
CUSTOMER ENERGY SOLUTIONS - Position Hydro Ottawa as the provider of proactive and innovative energy solutions which are driven by our customers' needs, preferences, and objectives.	
EXPANDING CURRENT BUSINESSES - Expand current value and revenue streams building on our core areas of strength in the provision of electricity and related services.	

ALIGNMENT SMART ENERGY KEY PILLARS/SCORING

INNOVATION AND TECHNOLOGY – Score 1 – Focused on enhancing the core LDC business of today as effectively as is feasible.

RELIABILITY AND SYSTEM RESILIENCE – Score 3 – expected to result in significant reduction in customer hours of interruption.

ENVIRONMENTAL SUSTAINABILITY – Score 2 – Will have an indirect but quantifiable reduction in truck rolls for switching operations.



REVENUE GROWTH AND DIVERSIFICATION – Score 2 – Will likely reduce response costs through reduction of on-call usage in the long term.

CUSTOMER BENEFIT – Score 2 – Supports a number of the Customer Centric Strategic Imperatives: Supports a customer Centric Culture, providing a leading service/product.

LEVERAGE OUR INFRASTRUCTURE AND PEOPLE – Score 3 – Enhances current organizational skills and plans.

OUTAGE INTELLIGENCE

SUMMARY

Building systems and tools which are able to automatically locate system damage, and identify root cause of an outage on the distribution system. Including diagnosing likelihood of safety issues, and identify/locate Nested Outages.

TARGET:

Q1 2021 – Have pilot system implemented on portion of the distribution system

OWNERSHIP

EXECUTIVE SPONSOR(S): CEDO & CITO

LEADER(S): Mgr. Grid Technology & Mgr. System Office

STAKEHOLDER GROUPS: IT, DEAM, DOP.

STATUS

Refinement and planning around initiative will be in 2019.

NEXT STEPS

Project/Task	Duration	Responsible	Status	2018	2019	2020	2021	2022
Refine Roadmap & Development	Research existing solutions and/or solutions that can be developed	1 mo.	Outage Data Team (NRCan Funding)	Concept				
Implementation Plan	Stand up Project Team if required (develop roadmap and Business case)	1 yr.	TBD	Concept				
Implementation	Implementation Phase	1 yr.?	TBD	Concept				
Target Outcome - Automatically Locate Root Cause, and identify and locate nested faults in 2021								

ALIGNMENT TO STRATEGIC OUTCOMES

Current use of analytics for outage intelligence will enable deeper understanding and faster response to system outages, bringing us closer to the 100% reliability goal. With increased intelligence will offer insights into our customers - it may allow for opportunities to expand our businesses in the future.

100% RELIABLE SERVICE - Develop enhanced grid reliability, and service offerings to enable provision of 100% reliable electrical service guarantee.	✓
CUSTOMER ENERGY SOLUTIONS - Position Hydro Ottawa as the provider of proactive and innovative energy solutions which are driven by our customers' needs, preferences, and objectives.	
EXPANDING CURRENT BUSINESSES - Expand current value and revenue streams building on our core areas of strength in the provision of electricity and related services.	

ALIGNMENT SMART ENERGY KEY PILLARS/SCORING

INNOVATION AND TECHNOLOGY – Score 1 – Outage intelligence is focused on the distribution business.

RELIABILITY AND SYSTEM RESILIENCE – Score 3 – Implementation of this type of predictive tool set has the potential to significantly increase the response to outages, reducing outage duration. Further has the potential to offer insights that may be used to prevent outages from occurring altogether.

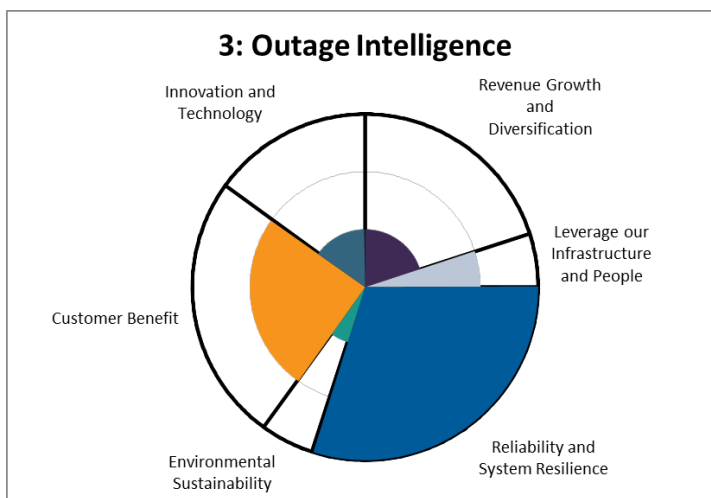
ENVIRONMENTAL SUSTAINABILITY

– Score 1 – Increased intelligence may have an indirect impact on truckrolls. Environmental impact is Low/ Not quantifiable

REVENUE GROWTH AND DIVERSIFICATION – Score 1 – Use of outage intelligence would reduce time and effort in the field required to address and assess events.

CUSTOMER BENEFIT – Score 2 – Supports a customer Centric Culture, and providing a leading service/product.

LEVERAGE OUR INFRASTRUCTURE AND PEOPLE – Score 2 - Builds on our organizations existing skills and competencies.



OUTAGE ANALYTICS AND LEVERAGING EXISTING DATA

SUMMARY

Deliver custom reporting and analytics at our staff's finger tips - enabling new and deeper insights into the operation of the distribution system enabling improved efficiency and reliability.

TARGET:

Q4 2019 – Enhanced Reliability reporting and automatic generation of reports.

OWNERSHIP

EXECUTIVE SPONSOR(S): CEDO & CITO

LEADER(S): Mgr. System Office, Dir. Enterprise Apps & Mgr.Assets

STAKEHOLDER GROUPS: IT, DEAM, DOP

STATUS

At this time, outage and reliability information is stored in several different locations/databases. This information is processed by individual departments in order to extract information for their own reporting or decision making purposes. The individualized nature of this work results in some duplication of effort, incomplete dissemination of information, and a lack of overall understanding of outage events.

NEXT STEPS

Project/Task	Duration	Responsible	Status	2018	2019	2020	2021
Outage Analytics and Leveraging Existing Data	Project Planning: Leverage Existing Outage Data	3 mo.	Outage Data Team	Started			
	Past-Outage Analytics	6 mo.		Concept			
	Single Integrated Data Repository	1 yr.		Concept			
Target, Auto Share Reports & enhanced reliability reporting in September 2019							

ALIGNMENT TO STRATEGIC OUTCOMES

Hydro Ottawa has many repositories, databases, and raw sources of data that feed into various tools and business applications. Having a complete understanding of this data is seen as a key opportunity for Hydro Ottawa to improve its operations and asset management strategies. By centralizing and focusing effort on extracting value from our existing data, Hydro Ottawa could enhance its reliability and improve its performance in serving customers.

100% RELIABLE SERVICE - Develop enhanced grid reliability, and service offerings to enable provision of 100% reliable electrical service guarantee.	✓
CUSTOMER ENERGY SOLUTIONS - Position Hydro Ottawa as the provider of proactive and innovative energy solutions which are driven by our customers' needs, preferences, and objectives.	✓
EXPANDING CURRENT BUSINESSES - Expand current value and revenue streams building on our core areas of strength in the provision of electricity and related services.	

ALIGNMENT SMART ENERGY KEY PILLARS/SCORING

INNOVATION AND TECHNOLOGY –

Score 1 – Enhanced analytics is focused on conducting the business of today as effectively as is feasible.

RELIABILITY AND SYSTEM

RESILIENCE – Score 2 – Implementation of Outage and Data analytics will have an indirect benefit to our system reliability by better targeting of our investments.

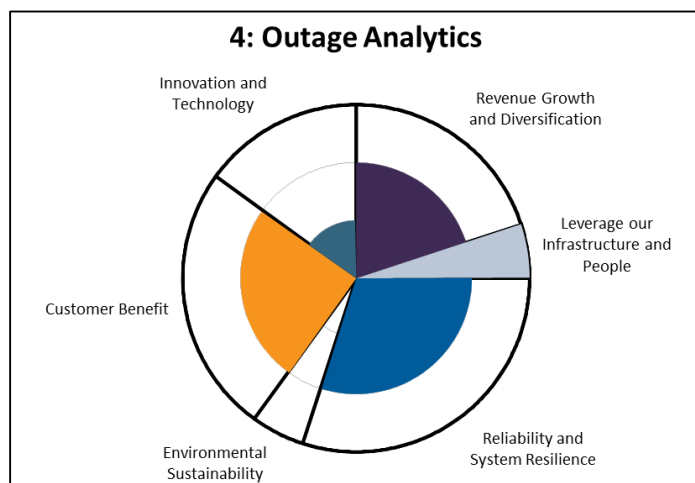
ENVIRONMENTAL SUSTAINABILITY –

Score 0 – Outage and Data Analytics is not seen as having an effect on our organizations environmental impact.

REVENUE GROWTH AND DIVERSIFICATION – Score 3 – Full Outage and Data Analytics will allow for the better targeting of investments and will therefore result in improved financial performance.

CUSTOMER BENEFIT – Score 2 – Supports a number of the Customer Centric Strategic Imperatives: Supports a customer Centric Culture, Provides a Leading Service/Product.

LEVERAGE OUR INFRASTRUCTURE AND PEOPLE – Score 1 – Focuses primarily on the business of today.



STORAGE FOR RELIABILITY

SUMMARY

Deploy storage to enable 100% reliability for our customers. This includes In-Home or Community Scale storage solutions and/or mobile generation/storage capacity to help customers through both planned and unplanned outages.

TARGET:

Q4 2019 – A market evaluation and a go/no-go decision on a viable business plan

OWNERSHIP

EXECUTIVE SPONSOR(S): CITO, CEDO & CCO

LEADER(S): Mgr. Grid Technology & Mgr. Distribution Standards

STAKEHOLDER GROUPS: IT, DEAM, DOP, CCO

STATUS

At this time, Hydro Ottawa is seeing very limited deployment of storage solutions in its service territory. These deployments have been mainly through subsidized projects or early technology adoptions. However, as Ontario and Canadian electricity policies are continuing to shift, coupled with the rapid advancement in storage technology, it is expected that energy storage could present significant disruption to our business.

NEXT STEPS

Project/Task	Duration	Responsible	Status	2018	2019	2020	2021	2022
Storage for reliability Market Viability Study - Opportunities and to use storage to enable a 100% reliability offer, and ancillary services.	3 mo.	Telfer School	Concept					
Project or Pilot of Storage: In-home, community level of temporary connection.	tbd	tbd	Concept					
Target: A Market evaluation and a go/no-go decision on a viable business plan by Q4-2019								

ALIGNMENT TO STRATEGIC OUTCOMES

Energy storage represents a significant opportunity for Hydro Ottawa to offer a customer centric energy solution while also delivering (or enabling) a 100% reliability guarantee. While the current state of the technology and business case may not immediately support a wide spread roll out of storage solutions, it is clear that the storage could quickly become a widespread choice if the economics were to allow it.

100% RELIABLE SERVICE - Develop enhanced grid reliability, and service offerings to enable provision of 100% reliable electrical service guarantee.	✓
CUSTOMER ENERGY SOLUTIONS - Position Hydro Ottawa as the provider of proactive and innovative energy solutions which are driven by our customers' needs, preferences, and objectives.	✓
EXPANDING CURRENT BUSINESSES - Expand current value and revenue streams building on our core areas of strength in the provision of electricity and related services.	

ALIGNMENT SMART ENERGY KEY PILLARS/SCORING

INNOVATION AND TECHNOLOGY – Score 3 – Energy Storage represents a technology that is aligned with both the current and future energy markets.

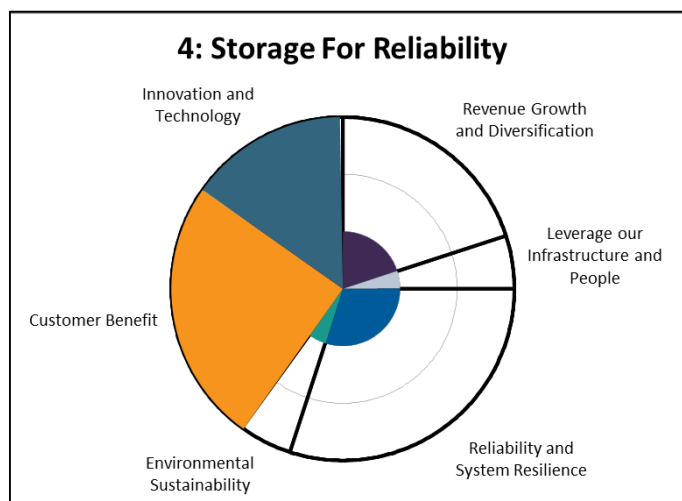
RELIABILITY AND SYSTEM RESILIENCE – Score 1 – While Storage solutions could provide a 100% reliability to individuals, it is not seen as having a large scale impact across the Hydro Ottawa system.

ENVIRONMENTAL SUSTAINABILITY – Score 1 – Energy storage could have a non-quantifiable impact on GHG emissions through peak shaving.

REVENUE GROWTH AND DIVERSIFICATION – Score 1 – Storage presents a potential revenue growth opportunity as either a non-wires solution or as a service.

CUSTOMER BENEFIT – Score 3 – Storage supports many of the Customer Centric Strategic Imperatives and is seen as a very customer centric offering.

LEVERAGE OUR INFRASTRUCTURE AND PEOPLE – Score 1 – Focuses primarily on the future state of the industry.



OUTAGE NOTIFICATION

SUMMARY

Deploy system or technology to provide automatic localized notification of loss of power and restoration. Allowing our operators and systems to start triage of an event before our customers can call us.

TARGET:

Q3 2020 – Have automatic outage notification available.

OWNERSHIP

EXECUTIVE SPONSOR(S): CEDO & CITO

LEADER(S): Mgr. Grid Technology & Laurie Heuff

STAKEHOLDER GROUPS: IT, DEAM, DOP

STATUS

Parallel planning investigation is currently underway – Considering use of metering infrastructure and alternative technology to provide local outage notification at the transformer or premise level.

NEXT STEPS

Project/Task		Duration	Responsible	Status	2018	2019	2020	2021
Telecom Master Plan	Field Area Network - Telecom Master Plan infrastructure build	Ongoing	OT	Started				
Smart Meter Stream	Meter Infrastructure Roadmap	12 mo.	Metering	Started				
	Smart Meter Deployment: Phase 1	18 mo.	Metering	Planning				
	MAS-ADMS Integration (OMS and/or DMS)	8 mo.	IT/OT	Concept				
Sensor Technology Stream	Sensor Technology Roadmap (Go/NO-GO)	2 mo.	Sensor Tech. Team	Initiating				
	Create Project Team if required (roadmap & Business case)	5 mo.	Sensor Tech. Team	Concept				
	Sensor Deployment Project	12 mo.	Assets	Concept				
Target - Outage Notification available Mid 2020								

ALIGNMENT TO STRATEGIC OUTCOMES

Outage local automatic loss of service notification will improve response to outages; provide greater insight bringing us closer to our 100% reliability goal. This increased intelligence will help position Hydro Ottawa as a provider of innovative solutions.

100% RELIABLE SERVICE - Develop enhanced grid reliability, and service offerings to enable provision of 100% reliable electrical service guarantee.	✓
CUSTOMER ENERGY SOLUTIONS - Position Hydro Ottawa as the provider of proactive and innovative energy solutions which are driven by our customers' needs, preferences, and objectives.	✓
EXPANDING CURRENT BUSINESSES - Expand current value and revenue streams building on our core areas of strength in the provision of electricity and related services.	

ALIGNMENT SMART ENERGY KEY PILLARS/SCORING

INNOVATION AND TECHNOLOGY –

Score 1 – Aligns with the business of today

RELIABILITY AND SYSTEM

RESILIENCE – Score 2 – Earlier, notification and improved visibility to area impacted will have measured improvement on reliability.

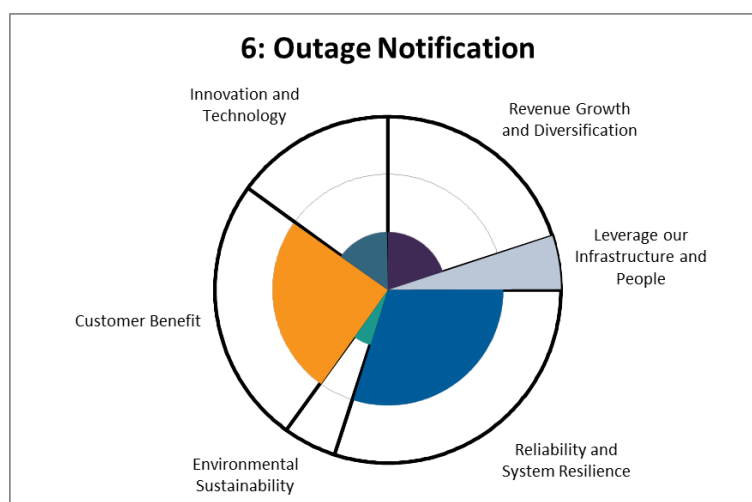
ENVIRONMENTAL

SUSTAINABILITY – Score 1 – Will have indirect impact of reducing truck rolls, to assess outages.

REVENUE GROWTH AND DIVERSIFICATION – Score 1 – Potential future savings due to regulatory changes.

CUSTOMER BENEFIT – Score 2 – Support customer centric culture, and provides a leading service/product.

LEVERAGE OUR INFRASTRUCTURE AND PEOPLE – Score 3 – Builds on existing organizational plans and skills



EV ENABLING CHARGING INFRASTRUCTURE (COMMERCIAL & RESIDENTIAL)

SUMMARY

Build framework for Hydro Ottawa to play a leading role in the transformation of personal transportation through the deployment of charging infrastructure

TARGET:

TBD – HOHI Business Model(s) for involvement in Charging Infrastructure.

OWNERSHIP

EXECUTIVE SPONSOR(S): CEDO, CITO, & CCO

LEADER(S):

STAKEHOLDER GROUPS: IT/OT, DEAM, CUSTOMER SERVICE

STATUS

HOL is pursuing development and pilot deployment of novel manifold charging system through two NRCan funding applications (EVSEM & eTaxi).

Hydro Ottawa pilot charger installation project in partnership with FLO is underway.

NEXT STEPS

Initiative	Project/Task	Duration	Responsible	Status	2018	2019	2020	2021
EV Enabling Charging Infrastructure - Hydro to play a leading role in the transformation of personal transportation through the deployment of charging infrastructure	NRCan Pilot Project: EVSEM & eTaxi	3 yrs.	Grid Tech	Planning				
	HOL/FLO residential Pilot	1 yr	Customer Service	Started				
	HOL Multi-unit residential pilot	18 mo.	CDM/DEAM	Planned				
	Engage and Support HOL EV strategy			Ongoing				
	Target - HOHI Business Model(s) for involvement in Charging Infrastructure							

ALIGNMENT TO STRATEGIC OUTCOMES

Residential and Commercial Electric vehicle charging infrastructure, offers energy solutions to address customers need, and expands our current business lines.

100% RELIABLE SERVICE - Develop enhanced grid reliability, and service offerings to enable provision of 100% reliable electrical service guarantee.	
CUSTOMER ENERGY SOLUTIONS - Position Hydro Ottawa as the provider of proactive and innovative energy solutions which are driven by our customers' needs, preferences, and objectives.	✓
EXPANDING CURRENT BUSINESSES - Expand current value and revenue streams building on our core areas of strength in the provision of electricity and related services.	✓

ALIGNMENT SMART ENERGY KEY PILLARS/SCORING

INNOVATION AND TECHNOLOGY – Score 3 – Aligns to current and emerging market opportunities.

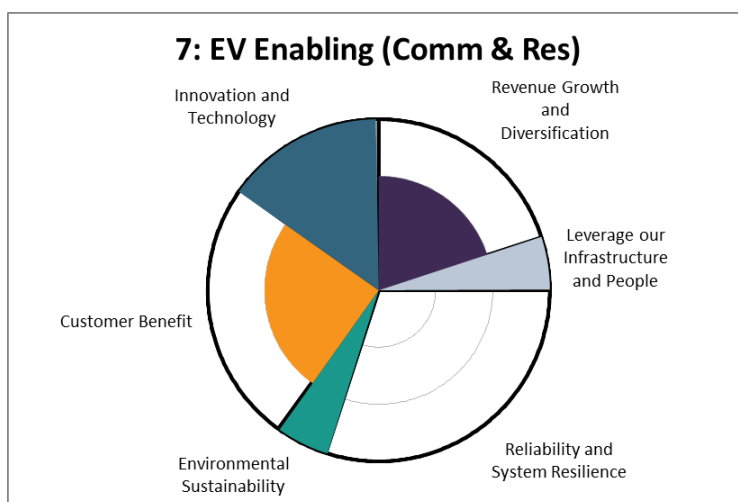
RELIABILITY AND SYSTEM RESILIENCE – Score 0 – No short term reliability impact.

ENVIRONMENTAL SUSTAINABILITY – Score 3 – Supports electrification of transportation, providing clear and quantifiable environmental impact.

REVENUE GROWTH AND DIVERSIFICATION – Score 2 – New Revenue and support of existing revenue streams.

CUSTOMER BENEFIT – Score 2 – Improves a touchpoint and provides a leading service/product

LEVERAGE OUR INFRASTRUCTURE AND PEOPLE – Score 3 – Builds on existing skill set and infrastructure



SMART ASSESSMENT AND REPAIR

SUMMARY

Expanded Damage Assess tools to support and streamline event response, through both the assessment process and the communication of the findings.

TARGET:

Q4 2019 – Integrated damage assessment tool in place and being used, with JDE/GIS integration

OWNERSHIP

EXECUTIVE SPONSOR(S): CEDO & CITO

LEADER(S): Mgr. Grid Technology & Mgr. System Office

STAKEHOLDER GROUPS: IT/OT, DOP

STATUS

Damage assessment tool has been rolled out and staff are being trained.

NEXT STEPS

Project/Task	Duration	Responsible	Status	2018	2019	2020
Implement Damage Assess Process	1 yr.	OT/DOP	Started			
Damage Assess Improved Damage Assess tools (refined forms & pick lists)	1 yr.		Planning			
Target Damage Assess tool with Integrate Parts Pick-Lists and JDE/GIS Integration in 2019						

ALIGNMENT TO STRATEGIC OUTCOMES

Roll out of smart assessment and repair will support the 100% Reliable service goal.

100% RELIABLE SERVICE - Develop enhanced grid reliability, and service offerings to enable provision of 100% reliable electrical service guarantee.	✓
CUSTOMER ENERGY SOLUTIONS - Position Hydro Ottawa as the provider of proactive and innovative energy solutions which are driven by our customers' needs, preferences, and objectives.	
EXPANDING CURRENT BUSINESSES - Expand current value and revenue streams building on our core areas of strength in the provision of electricity and related services.	

ALIGNMENT SMART ENERGY KEY PILLARS/SCORING

INNOVATION AND TECHNOLOGY – Score 1– Aligns with Business of today.

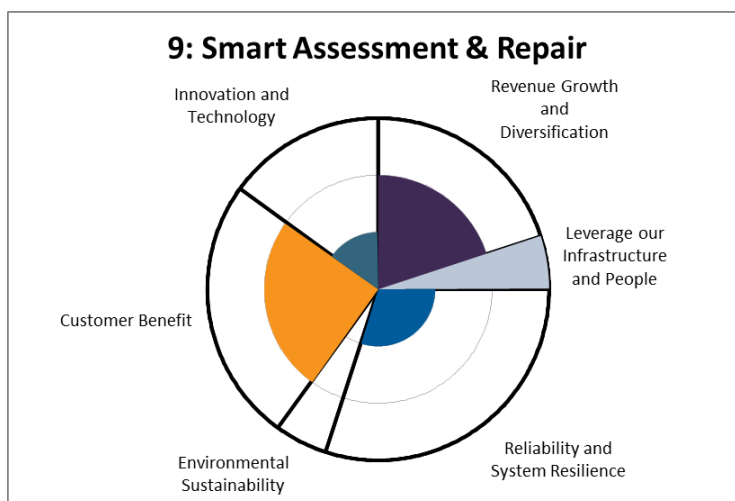
RELIABILITY AND SYSTEM RESILIENCE – Score 1 – May improve repair and triage of system damage, however reliability impact may not be quantifiable or significant.

ENVIRONMENTAL SUSTAINABILITY – Score 0 – No environmental impact.

REVENUE GROWTH AND DIVERSIFICATION – Score 2 – Will stream line response to distribution events - reducing operating costs.

CUSTOMER BENEFIT – Score 2 – Customer-Centric and provides a leading product

LEVERAGE OUR INFRASTRUCTURE AND PEOPLE – Score 3 – Will use existing skills and systems.



ANALYTIC FIELD ASSISTANT (KITT)

SUMMARY

Develop process assistant (AI) to help in triage and prioritization, between repair and make safe, during events on the distribution system.

TARGET:

2023 - AI assistant to support triage and prioritization of field activities.

OWNERSHIP

EXECUTIVE SPONSOR(S): CEDO & CITO

LEADER(S): TBD

STAKEHOLDER GROUPS: IT/OT, DOP, DEAM

STATUS

Concept has been identified.

NEXT STEPS

Project/Task	Duration	Responsible	Status	2019	2020	2021	2022	2023
Analytic Field Process assistant (AI Engine)	Develop Technology Roadmap	6 mo.	tbd	Concept				
	Business Case	2 mo.	tbd	Concept				
	Deploy	16 mo.	tbd	Concept				
Target - AI assistant to support field activities (2023)								

ALIGNMENT TO STRATEGIC OUTCOMES

Roll out of analytic field assistant will support the 100% Reliable service goal.

100% RELIABLE SERVICE - Develop enhanced grid reliability, and service offerings to enable provision of 100% reliable electrical service guarantee.	✓
CUSTOMER ENERGY SOLUTIONS - Position Hydro Ottawa as the provider of proactive and innovative energy solutions which are driven by our customers' needs, preferences, and objectives.	
EXPANDING CURRENT BUSINESSES - Expand current value and revenue streams building on our core areas of strength in the provision of electricity and related services.	

ALIGNMENT SMART ENERGY KEY PILLARS/SCORING

INNOVATION AND TECHNOLOGY – Score 1– Aligns with Business of today.

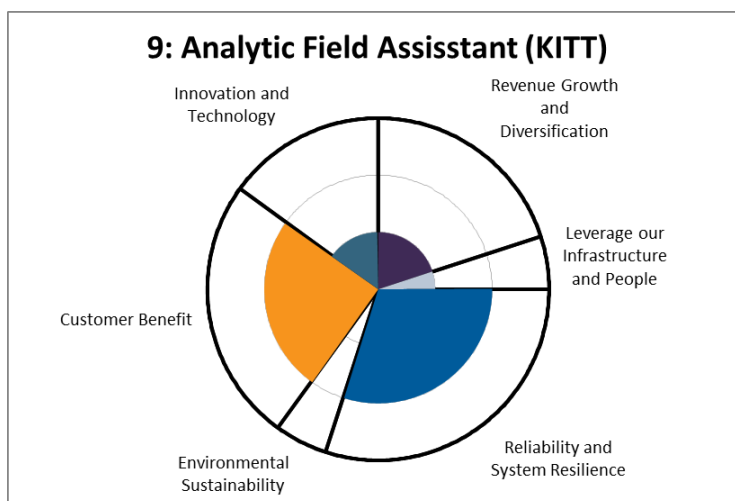
RELIABILITY AND SYSTEM RESILIENCE – Score 2 – Would be used to assist in directing staff to focus of restore rather than repair – this should reduce customer hours of outage.

ENVIRONMENTAL SUSTAINABILITY – Score 0 – No environmental impact.

REVENUE GROWTH AND DIVERSIFICATION – Score 1 – Would optimize, and prioritize response. Savings may be realized by optimizing repair approach and timing. However repeat visits may escalate costs

CUSTOMER BENEFIT – Score 2 – Customer-Centric and provides a leading product

LEVERAGE OUR INFRASTRUCTURE AND PEOPLE – Score 1 – Would leverage future tools that may be available



SMART SYSTEM PLANNING

SUMMARY

From same day planning to long term planning – having system information available at our finger tips to support decisions that align with the real condition of the distribution system. Leveraging and expanding existing tools from OTN, smart sensors, back-office systems to engineering analysis suites, to move from data to actionable insights.

TARGET:

Q2 2019 - Roadmap for smart system planning ready for 2021-2025 Rate Application.

OWNERSHIP

EXECUTIVE SPONSOR(S): CEDO & CITO

LEADER(S): Mgr.Assets & Mgr. System Office

STAKEHOLDER GROUPS: DEAM, DOP, IT/OT

STATUS

Concept in place

NEXT STEPS

Project/Task	Duration	Responsible	Status	2018	2019	2020	2021	2022
Visioning - Team to identify information use cases	2 mo.	Task Force	Concept					
Build Roadmap - establish business case(s), information sources and prioritize the implementation.	3 mo.	Task Force						
Target - Roadmap for Rate application Q2 - 2019								
Deployment								

ALIGNMENT TO STRATEGIC OUTCOMES

Availability of real time system insights will support proactive decision to avoid outages, support move to 100% reliability. System information may provide opportunity to better understand our customers, and better respond to their concerns.

100% RELIABLE SERVICE - Develop enhanced grid reliability, and service offerings to enable provision of 100% reliable electrical service guarantee.	✓
CUSTOMER ENERGY SOLUTIONS - Position Hydro Ottawa as the provider of proactive and innovative energy solutions which are driven by our customers' needs, preferences, and objectives.	✓
EXPANDING CURRENT BUSINESSES - Expand current value and revenue streams building on our core areas of strength in the provision of electricity and related services.	

ALIGNMENT SMART ENERGY KEY PILLARS/SCORING

INNOVATION AND TECHNOLOGY –
Score 1– Aligns with Business of today.

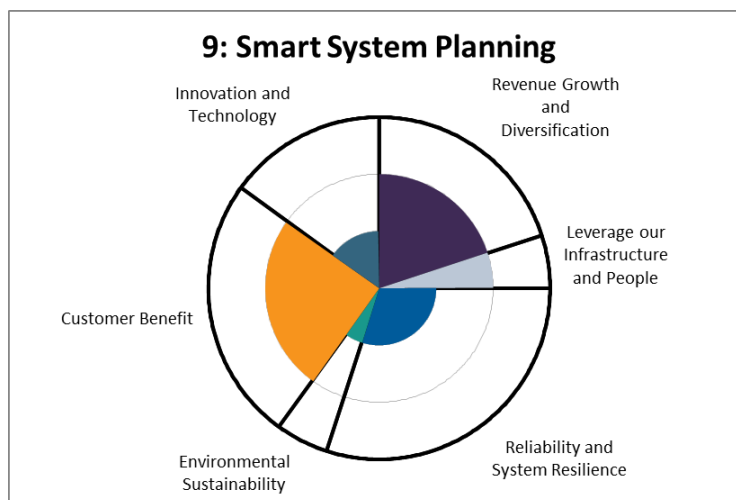
RELIABILITY AND SYSTEM RESILIENCE – Score 1 – Through targeted investments, may avoid some outages.

ENVIRONMENTAL SUSTAINABILITY – Score 1 – Optimization of asset life will avoid unnecessary maintenance activities.

REVENUE GROWTH AND DIVERSIFICATION – Score 2 – Improved investment prioritization provide some productivity improvements.

CUSTOMER BENEFIT – Score 2 – May help better understand customer more, and protect brand.

LEVERAGE OUR INFRASTRUCTURE AND PEOPLE – Score 2 – Builds on planned infrastructure.



DYNAMIC GRID

SUMMARY

Distribution system can dynamically respond to changing operating conditions or upcoming events, includes tools for dynamic protection settings, system reconfiguration for loss optimization, systems in place to enable DER and Island Support

TARGET:

2022 – Dynamic Grid functionality operational.

OWNERSHIP

EXECUTIVE SPONSOR(S): CEDO & CITO

LEADER(S): Mgr. Assets

STAKEHOLDER GROUPS: DEAM, DOP, IT/OT

STATUS

Foundational technologies, to support dynamic grid operation currently underway with initiatives such as Telecom Master plan, SCADA/DMS and others. Dynamic Grid concept will need to be operationally defined for implementation.

NEXT STEPS

Project/Task	Duration	Responsible	Status	2018	2019	2020	2021	2022
Identify/Prioritize Dynamic Grid Applications		Protection and Control Committee	Idea					
Build Roadmap - business case(s), identify implementation plans and identify linkages with other roadmaps/initiatives.		tbd						
Implement Projects								
Target - Dynamic Grid functionality operations in 2022								

ALIGNMENT TO STRATEGIC OUTCOMES

Dynamic grid will enhance capacity for customer DER connections, providing opportunity for increased customer generation ride through. Will support 100% Reliability solution through enabling behind the meter backup capability, as well as, aligning protection philosophy based on operating circumstance to offer some distribution system reliability improvements.

100% RELIABLE SERVICE - Develop enhanced grid reliability, and service offerings to enable provision of 100% reliable electrical service guarantee.	✓
CUSTOMER ENERGY SOLUTIONS - Position Hydro Ottawa as the provider of proactive and innovative energy solutions which are driven by our customers' needs, preferences, and objectives.	✓
EXPANDING CURRENT BUSINESSES - Expand current value and revenue streams building on our core areas of strength in the provision of electricity and related services.	

ALIGNMENT SMART ENERGY KEY PILLARS/SCORING

INNOVATION AND TECHNOLOGY – Score 3– Aligns with Business of today, and builds for customer DER connection capacity in the future.

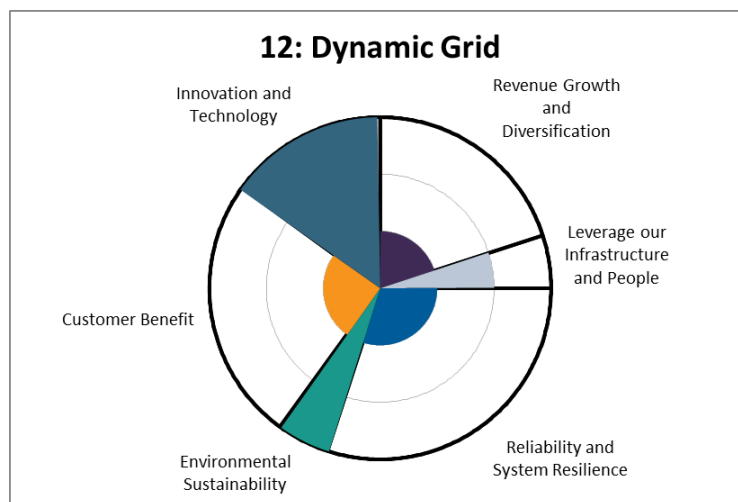
RELIABILITY AND SYSTEM RESILIENCE – Score 1 – Matching protection philosophy to the operating circumstance, will contribute to reduced customer interruptions.

ENVIRONMENTAL SUSTAINABILITY – Score 3 – Will contribute in reduction in system losses, and support integration of renewable generation.

REVENUE GROWTH AND DIVERSIFICATION – Score 1 – Will reduce truck rolls

CUSTOMER BENEFIT – Score 1 – Support Customer energy Needs/resource.

LEVERAGE OUR INFRASTRUCTURE AND PEOPLE – Score 2 – Builds on Planned systems.



ELECTRIFICATION OF TRANSPORTATION

SUMMARY

Hydro Ottawa to play a leading role in the transformation of transportation through B2B enabling roll out of commercial electric vehicles and related charging infrastructure.

TARGET:

Q4 2019 - HOHI business cases/playbook for transportation electrification in place.

OWNERSHIP

EXECUTIVE SPONSOR(S): CCO, CEDO & CITO

LEADER(S): TBD

STAKEHOLDER GROUPS: TBC

STATUS

Concepts identified and initial conversations with City of Ottawa regarding electrification of Buses.

NEXT STEPS

Project/Task	Duration	Responsible	Status	2018	2019	2020	2021
EV Commercial Vehicles (forklift, airport support vehicles...) - study business case(s)	3 mo.	EV ++ Team					
HOL to own, operate, and maintain the Charging Infrastructure for OC transpo buses (Outrix)	3 mo.	EV ++ Team					
Target - HOHI electrification business cases (2019)							

ALIGNMENT TO STRATEGIC OUTCOMES

Electrification of commercial and public transportation vehicles, offers an opportunity for Hydro Ottawa to expand its current business. Provide an opportunity to build new energy solutions that meet our customer's needs.

100% RELIABLE SERVICE - Develop enhanced grid reliability, and service offerings to enable provision of 100% reliable electrical service guarantee.	
CUSTOMER ENERGY SOLUTIONS - Position Hydro Ottawa as the provider of proactive and innovative energy solutions which are driven by our customers' needs, preferences, and objectives.	✓
EXPANDING CURRENT BUSINESSES - Expand current value and revenue streams building on our core areas of strength in the provision of electricity and related services.	✓

ALIGNMENT SMART ENERGY KEY PILLARS/SCORING

INNOVATION AND TECHNOLOGY – Score 3– Aligns with today and builds to emerging market.

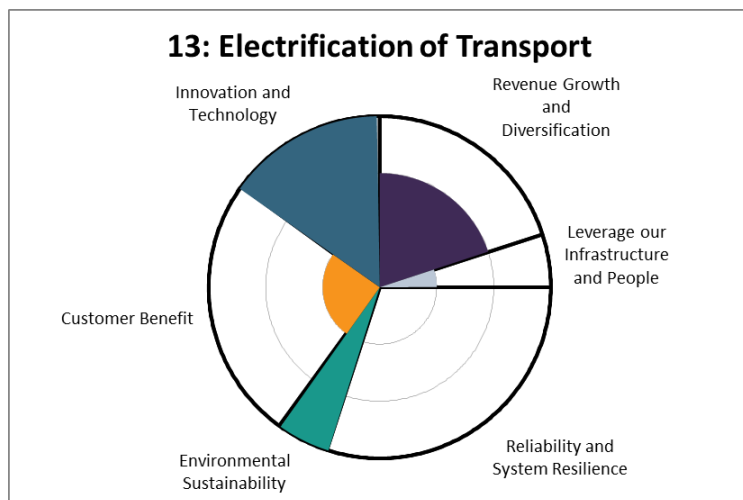
RELIABILITY AND SYSTEM RESILIENCE – Score 0 – None

ENVIRONMENTAL SUSTAINABILITY – Score 3 – Quantifiable environmental from electrification of transportation.

REVENUE GROWTH AND DIVERSIFICATION – Score 2 – Would offer new revenue from new market participation, and support existing revenues.

CUSTOMER BENEFIT – Score 1 – Customer-Centric.

LEVERAGE OUR INFRASTRUCTURE AND PEOPLE – Score 1 – Expanding potential future skill



OUTAGE PREDICTION

SUMMARY

Leverage machine learning and artificial intelligence to mine system data for new insights and correlations, building tools which identify incipient faults in order to prevent them.

TARGET:

Pilot deployment of predictive outage prevention operational by 2023

OWNERSHIP

EXECUTIVE SPONSOR(S): CCO, CEDO & CITO

LEADER(S): Dir. Enterprise Apps & Dir. Engineering

STAKEHOLDER GROUPS: CEDO, CITO & CCO

STATUS

Concept identified.

NEXT STEPS

Project/Task		Duration	Responsible	Status	2019	2020	2021	2022	2023
Outage Prediction	Project Planning: Predictive Outage Analytics Roadmap	1 yr.	Outage Data Team	Concept					
	Outage Analytics Implementation Project	5 yrs.?		Concept					
Pilot implementation operational for 2023									

ALIGNMENT TO STRATEGIC OUTCOMES

Successful prevention of outages would continue to bring us towards the goal of 100% Reliable service.

100% RELIABLE SERVICE - Develop enhanced grid reliability, and service offerings to enable provision of 100% reliable electrical service guarantee.	✓
CUSTOMER ENERGY SOLUTIONS - Position Hydro Ottawa as the provider of proactive and innovative energy solutions which are driven by our customers' needs, preferences, and objectives.	
EXPANDING CURRENT BUSINESSES - Expand current value and revenue streams building on our core areas of strength in the provision of electricity and related services.	

ALIGNMENT SMART ENERGY KEY PILLARS/SCORING

INNOVATION AND TECHNOLOGY –
Score 1– Aligns with Business of today.

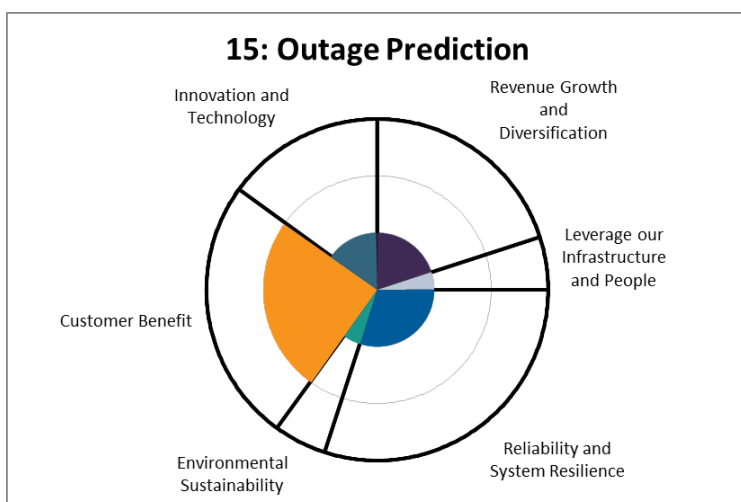
RELIABILITY AND SYSTEM RESILIENCE – Score 1 – Would be expected to impact reliability - extent beyond what analytics would support is uncertain 25% reduction in adverse weather, and defective equipment duration)

ENVIRONMENTAL SUSTAINABILITY
– Score 1 - Truck Rolls

REVENUE GROWTH AND DIVERSIFICATION – Score 1 – Saves by moving from reactive to planned replacement, reduced costs will follow

CUSTOMER BENEFIT – Score 2 – Customer-Centric and provides a leading product

LEVERAGE OUR INFRASTRUCTURE AND PEOPLE – Score 1 – Aligns with future plans.



ASSET LIFECYCLE INFORMATION

SUMMARY

All information associated with Asset lifecycle are available in a single or linked repositories.

TARGET:

Integrated access to all asset data by 2021

OWNERSHIP

EXECUTIVE SPONSOR(S): CEDO & CITO

LEADER(S): Mgr.Assets & Mgr. Distribution Standards

STAKEHOLDER GROUPS: CEDO, CITO & CCO

STATUS

Links with several other initiatives, and will need to be integrated.

NEXT STEPS

Project/Task	Duration	Responsible	Status	2018	2019	2020	2021	2022
RFI - Go to industry to determine available solutions/repositories.		Tiger Team						
Develop roadmap, Business case and integrate existing roadmaps								
Implement								
Integrated access to all asset maintenance data 2021								

ALIGNMENT TO STRATEGIC OUTCOMES

Supports cost effective and efficient operation of distribution system.

100% RELIABLE SERVICE - Develop enhanced grid reliability, and service offerings to enable provision of 100% reliable electrical service guarantee.	
CUSTOMER ENERGY SOLUTIONS - Position Hydro Ottawa as the provider of proactive and innovative energy solutions which are driven by our customers' needs, preferences, and objectives.	
EXPANDING CURRENT BUSINESSES - Expand current value and revenue streams building on our core areas of strength in the provision of electricity and related services.	✓

ALIGNMENT SMART ENERGY KEY PILLARS/SCORING

INNOVATION AND TECHNOLOGY –

Score 1– Aligns with Business of today.

RELIABILITY AND SYSTEM

RESILIENCE – Score 1 – Limited reliability impact.

ENVIRONMENTAL

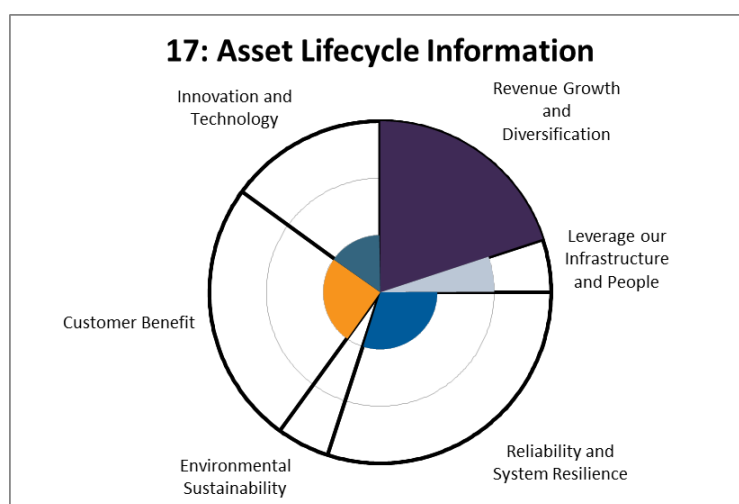
SUSTAINABILITY – Score 0 – No impact.

REVENUE GROWTH AND

DIVERSIFICATION – Score 3 – Would offer significant operational efficiencies through optimization of spending.

CUSTOMER BENEFIT – Score 1 – Improve customer touchpoint.

LEVERAGE OUR INFRASTRUCTURE AND PEOPLE – Score 2 – Dovetails with current plans



SMARTY PANTS

SUMMARY

Wearable technology to support field operations – providing staff safe real-time access to data, records, manuals, subject matter experts, and mentorship as they work.

TARGET:

Selected target implementations in place for 2021

OWNERSHIP

EXECUTIVE SPONSOR(S): CEDO

LEADER(S): Joseph Muglia

STAKEHOLDER GROUPS: CEDO, CITO & CCO

STATUS

Several vendor demonstrations have occurred.

NEXT STEPS

Project/Task		Duration	Responsible	Status	2018	2019	2020	2021
Remote camera support	Requirement definition and vendor selection	1 mo.	Operations/Metering/ Safety	Concept				
	Develop roadmap and Business case	3 mo.						
	Pilot Deployment	tbd						
	Targeted deployment							

ALIGNMENT TO STRATEGIC OUTCOMES

Support reliability and customer solutions - by information available in the field by supporting to ensure optimal solutions are implemented in a timely manner.

100% RELIABLE SERVICE - Develop enhanced grid reliability, and service offerings to enable provision of 100% reliable electrical service guarantee.	✓
CUSTOMER ENERGY SOLUTIONS - Position Hydro Ottawa as the provider of proactive and innovative energy solutions which are driven by our customers' needs, preferences, and objectives.	✓
EXPANDING CURRENT BUSINESSES - Expand current value and revenue streams building on our core areas of strength in the provision of electricity and related services.	

ALIGNMENT SMART ENERGY KEY PILLARS/SCORING

INNOVATION AND TECHNOLOGY – Score 1 – Aligns with Business of today.

RELIABILITY AND SYSTEM RESILIENCE – Score 0 – No direct quantifiable reliability impact

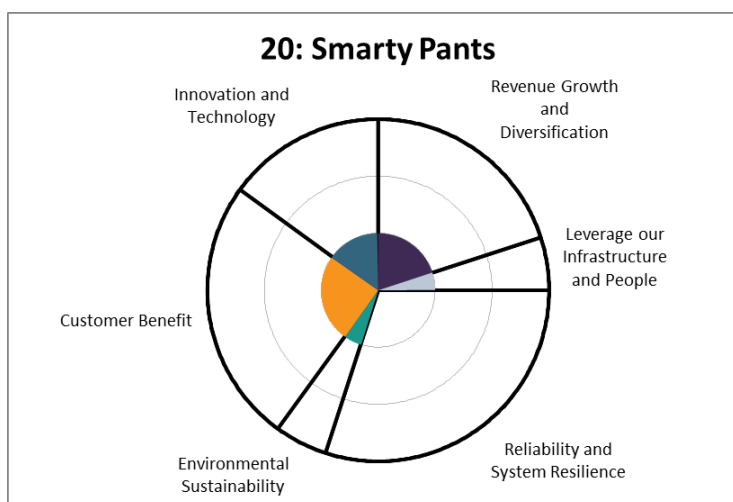
ENVIRONMENTAL

SUSTAINABILITY – Score 1 – Could reduce truck rolls/repeat visits.

REVENUE GROWTH AND DIVERSIFICATION – Score 1 – Avoided rework.

CUSTOMER BENEFIT – Score 1 – Improve customer touchpoint.

LEVERAGE OUR INFRASTRUCTURE AND PEOPLE – Score 1 – Would leverage future tools that may be available



MICROGRIDS CAMPUS

SUMMARY

Hydro Ottawa to provide integrated energy solution to campus and community partners integrated solution that meet the customer(s) supply security and/or environmental criteria.

TARGET:

N/A

OWNERSHIP

EXECUTIVE SPONSOR(S): CCO, CEDO & CITO

LEADER(S): TBD

STAKEHOLDER GROUPS: TBD

STATUS

NA

NEXT STEPS

Track and monitor for opportunities and partners.

ALIGNMENT TO STRATEGIC OUTCOMES

Enables customer increase in local/renewable generation – supporting local customer supply security requirements.

100% RELIABLE SERVICE - Develop enhanced grid reliability, and service offerings to enable provision of 100% reliable electrical service guarantee.	✓
CUSTOMER ENERGY SOLUTIONS - Position Hydro Ottawa as the provider of proactive and innovative energy solutions which are driven by our customers' needs, preferences, and objectives.	✓
EXPANDING CURRENT BUSINESSES - Expand current value and revenue streams building on our core areas of strength in the provision of electricity and related services.	

ALIGNMENT SMART ENERGY KEY PILLARS/SCORING

INNOVATION AND TECHNOLOGY –

Score 2– Aligns with Business of tomorrow.

RELIABILITY AND SYSTEM

RESILIENCE – Score 0 – Will have direct supply security impact but to only a limited few customers.

ENVIRONMENTAL

SUSTAINABILITY – Score 3 – Will have direct quantifiable environmental impact.

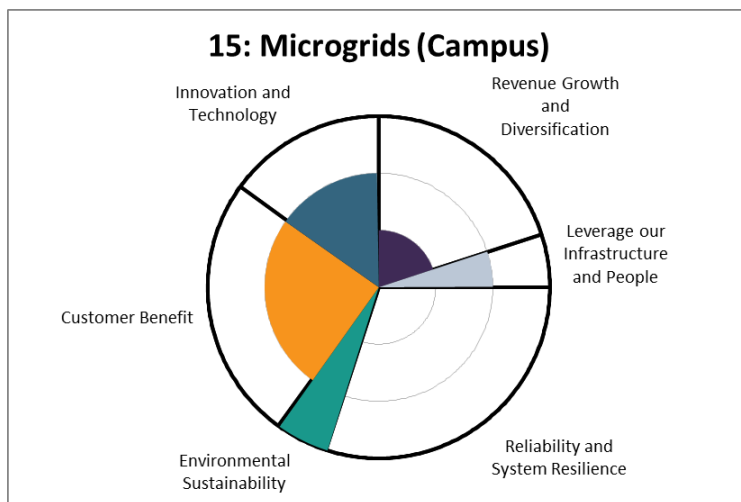
REVENUE GROWTH AND

DIVERSIFICATION – Score 1 –

Provides new potential revenue stream, and opportunity.

CUSTOMER BENEFIT – Score 2 – Improve customer touchpoint.

LEVERAGE OUR INFRASTRUCTURE AND PEOPLE – Score 2 – Lines up with existing plans.



ELECTRIFY HOL FLEET

SUMMARY

Build Reputation as a trusted advisor in the shift to electrified transportation by converting HOL fleet.

TARGET:

N/A

OWNERSHIP

EXECUTIVE SPONSOR(S): CEDO

LEADER(S): TBD

STAKEHOLDER GROUPS: TBD

STATUS

NA

NEXT STEPS

Track and monitor for opportunities and partners.

ALIGNMENT TO STRATEGIC OUTCOMES

Position HOL as a trusted advisor – for EVs; walking the talk.

100% RELIABLE SERVICE - Develop enhanced grid reliability, and service offerings to enable provision of 100% reliable electrical service guarantee.	
CUSTOMER ENERGY SOLUTIONS - Position Hydro Ottawa as the provider of proactive and innovative energy solutions which are driven by our customers' needs, preferences, and objectives.	✓
EXPANDING CURRENT BUSINESSES - Expand current value and revenue streams building on our core areas of strength in the provision of electricity and related services.	

ALIGNMENT SMART ENERGY KEY PILLARS/SCORING

INNOVATION AND TECHNOLOGY –

Score 3– Aligns with Business of today and tomorrow.

RELIABILITY AND SYSTEM

RESILIENCE – Score 0 – No direct quantifiable reliability impact

ENVIRONMENTAL

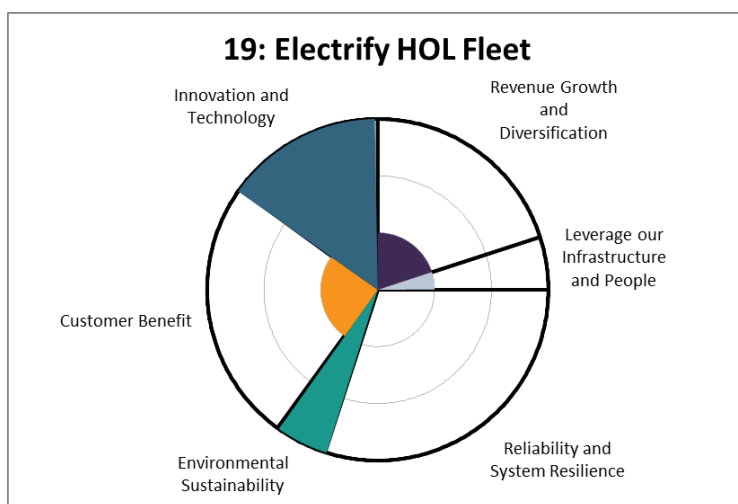
SUSTAINABILITY – Score 3 – Would improve environmental sustainability

REVENUE GROWTH AND

DIVERSIFICATION – Score 1 – Would support other transportation electrification opportunities, and offer operational savings.

CUSTOMER BENEFIT – Score 1 – Improve customer touchpoint.

LEVERAGE OUR INFRASTRUCTURE AND PEOPLE – Score 1 – Aligns with the current organizational capacity.



STORAGE FOR CAPACITY MANAGEMENT

SUMMARY

Hydro Ottawa to participate in the deployment of local storage for system capacity to manage generation, and customer loads.

TARGET:

N/A

OWNERSHIP

EXECUTIVE SPONSOR(S): CEDO

LEADER(S): TBD

STAKEHOLDER GROUPS: TBD

STATUS

Local Achievable Potential investigation underway with IESO which may identify, system opportunities.

NEXT STEPS

Track and monitor for opportunities and partners.

ALIGNMENT TO STRATEGIC OUTCOMES

Support reliability and customer solutions - by information available in the field – do it right the first time.

100% RELIABLE SERVICE - Develop enhanced grid reliability, and service offerings to enable provision of 100% reliable electrical service guarantee.	
CUSTOMER ENERGY SOLUTIONS - Position Hydro Ottawa as the provider of proactive and innovative energy solutions which are driven by our customers' needs, preferences, and objectives.	✓
EXPANDING CURRENT BUSINESSES - Expand current value and revenue streams building on our core areas of strength in the provision of electricity and related services.	✓

ALIGNMENT SMART ENERGY KEY PILLARS/SCORING

INNOVATION AND TECHNOLOGY –

Score 2– Aligns with Future Markets.

RELIABILITY AND SYSTEM

RESILIENCE – Score 1 – Limited reliability impact.

ENVIRONMENTAL SUSTAINABILITY

– Score 2 – Would offer, lower impact solutions to capacity constraints.

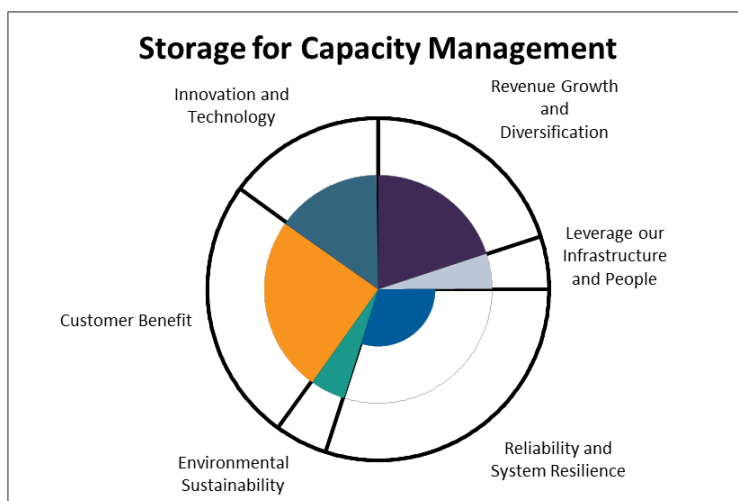
REVENUE GROWTH AND

DIVERSIFICATION – Score 2 – Likely Financial impact

CUSTOMER BENEFIT – Score 2 –

Improve customer touchpoint, Offers a leading service or Product.

LEVERAGE OUR INFRASTRUCTURE AND PEOPLE – Score 2 – Dovetails with Existing Plans



APPENDIX A

THE SMART ENERGY STEERING COMMITTEE

The Smart Energy Steering Committee is a cross-functional committee that provides leadership, oversight, coordination and direction of Hydro Ottawa's Smart Energy Initiatives. A major deliverable from this Steering Committee is a single integrated "whole of company" Smart Energy roadmap consisting of initiatives prioritization and timing.

The Smart Energy Steering Committee has the following responsibilities:

- a) Lead and Advise Hydro Ottawa's Smart Energy future
- b) Develop the foundational elements of the Smart Energy program.
- c) Report the status and progress of the Smart Energy program to the EMT
- d) Create, maintain, and annually update the multi-year prioritized roadmap of Smart Energy initiatives
- e) Ensure initiatives follow a defined "In-Take" and gating process
- f) Leadership role with the responsibility to monitor, manage and report on the entire portfolio of initiatives.
- g) Coordination of funding for Smart Energy initiatives and associated prioritizations
- h) Identify, create, and support Smart Energy working groups as required
- i) Foster collaboration with, and support efforts within the other steering committees of Hydro Ottawa.

MEMBERSHIP

Co-Chair: Supervisor, Smart Grid Technologies	
Co-Chair: Manager, Distribution Policies & Standards	
Chief Electricity Distribution Officer	CEDO
Chief Customer Officer	CCO
Chief Information and Technology Officer	CITO
Director, Distribution Engineering & Asset Management	Dir. Engineering
Director, Distribution Operations	
Manager, Asset Planning	
Manager, Metering Systems	
Manager, System Operations	
Manager, Regulatory Policy and Research	
Manager, Grid Technology	
Distribution Engineer	
Manager Enterprise Architecture	
Supervisor, Engineering Services, CDM	

INTERROGATORY RESPONSE - OEB-115

2-Staff-60

EXHIBIT REFERENCE:

EB-2015-0004/Decision on Settlement and PO NO. 11/pp. 2-5

EB-2015-0004/Settlement Proposal (Refiled)/pp.18-19

Exhibit 2/Tab 1/Schedule 1/Attachment A

SUBJECT AREA: Facilities Renewal Program

Preamble:

In the decision on Hydro Ottawa's 2016-2020 Custom IR application, the OEB found that Hydro Ottawa has demonstrated the need for the new facilities. However, the OEB did not find sufficient evidence to determine the prudence of the \$73 million cost estimate for the new buildings and the prudence of the \$19 million cost for the 41 acres of land. Therefore, the OEB accepted a Y-factor treatment of up to \$66 million for the new facilities and land. The \$66 million was determined as the sum of the operations building budget of \$22 million, 70% of the administration building budget of \$41 million (\$29 million) and land cost of \$15 million. Any amounts above \$66 million, \$15 million for land and \$51 million for facilities, are subject to a prudence review. The total project cost for the new facilities is \$99,543,840.

Question(s):

- a) Please provide a breakdown (in the table below) of the construction and land cost for each facility compared to the cost projections proposed in the 2016-2020 Custom IR proceeding.

1 **Table 2-Staff-60-1: Comparison of Actual Cost to Costs filed in the 2016-2020**
2 **Custom IR (\$'000s)**

	Construction ¹			Land		
	Actual	Per EB-2015-0004	Variance (\$)	Actual	Per EB-2015-0004	Variance (\$)
East Campus						
EC-1 Administrative Office						
EC-2 East Operations Centre						
EC-3 PILC Storage						
Sub-total						
South Campus						
SC-1 South Operations Centre and Warehouse						
Total						

3

4 b) Please provide a breakdown of the total project cost of \$99.5 million by year.

5

6 c) Regarding land area requirement, the OEB found in the 2015 decision that "The total
7 cost of \$19 million includes 9 acres of excess land value at \$4 million. The benefit to
8 customers associated with the \$4 million cost of excess land has also not been
9 explained".² Please explain the benefit to customers associated with the \$4 million cost
10 of excess land compared to the original land estimate of 32 acres for \$15 million.

11

12 d) Please explain why the 9 acres of excess land is necessary compared to the original
13 land estimate of 32 acres.

14

15 e) Please explain whether the size of the EC-1 Administrative Office (127,132 square feet)
16 provides any additional office space that can accommodate future staff growth. If so,

17 ¹ Including interest and overhead.

18 ² EB-2015-0004, Decision on Settlement and Procedural Order No.11, November 23, 2015, page 3.

1 please provide an estimate of the additional space available in the building. If not, why
2 not.

3

4 f) OEB staff notes that on a cost/sq. ft. basis, the actual cost for EC-1 Administrative Office
5 increased from the projected \$265/sq. ft.³ to \$372/sq. ft. (40% increase), please discuss
6 why the OEB should accept the actual spending on EC-1 as prudent considering the
7 actual cost is 40% higher than the projected cost.

8

9 **RESPONSE:**

10

11 a) Please see Table A below for a breakdown of the construction and land cost for each
12 facility compared to the cost projections proposed in the 2016-2020 Custom IR
13 application.

14 ³ Calculated as (\$41 million/155,000 sq. ft.). Data from EB-2015-0004, Exh B Rate Base Part 2 Distribution System
15 Plan page 341, and response to SEC IR#11 Attachment B page 5.

1 **Table A – Comparison of Final Costs to 2016-2020 Custom IR Application (\$'000s)**

	Construction + Interest & OH				Land			
	Actual	Per EB-2015- 0004 ⁴	Var (\$)	Var (%)	Actual	Per EB-2015- 0004 ⁵	Var (\$)	Var (%)
East Campus								
EC-1 Administrative Office	\$47,312	\$45,161	\$2,151	5%				
EC-2 East Operations Centre	\$9,683	\$9,243	\$440	5%				
EC-3 PILC Storage	\$2,525	\$2,410	\$115	5%				
	\$59,519	\$56,813	\$2,706	5%	\$12,694	\$12,716	(\$22)	0%
South Campus								
SC-1 South Operations Centre and Warehouse	\$20,530	\$16,020	\$4,510	28%	\$6,800	\$6,798	\$2	0%
TOTAL	\$80,049	\$72,833	\$7,216	10%	\$19,495	\$19,514	(\$19)	0%

2

3 b) Please refer to Table B below for a breakdown of the total project cost of \$99.5 million by
4 year.

5

6 **Table B – Total Cost of New Administration and Operations Facilities by Year (\$'000s)**

2011	2012	2013	2014	2015 ⁶	2016	2017	2018	2019	Total Cost
\$302	\$7,586	\$12,909	\$468	(\$513)	\$3,547	\$17,589	\$42,615	\$15,041	\$99,544

7

8 c) The original land estimate (32 acres) was based on an estimate of the footprint required
9 to support the construction of the proposed facilities. It is difficult, and unreasonable to
10 expect, to find the exact size parcel of land required in the desired location at the
11 appropriate price. After a thorough search, land that met Hydro Ottawa's requirements
12 was purchased at 2711 Hunt Club Road (East Campus) and 201 Diblee Road (South

13 ⁴ The 2016-2020 Custom IR application did not contain a separate cost breakdown for each East Campus facility.
14 For purposes of this response, the East Campus cost estimate of \$56.8M has been allocated to each facility based
15 on their percentage of the total East Campus actual cost of \$59.5M.

16 ⁵ The 2016-2020 Custom IR application did not contain a separate breakdown of land cost for each East Campus
17 facility.

18 ⁶ In 2015, there was a change in Project Manager which resulted in a write-off of certain project development costs
19 that would have no future benefit to customers. This led to a credit balance in Construction-in-Progress for 2015.

1 Campus). These parcels of land, while larger than the original land estimate, are fully
2 utilized and benefit Hydro Ottawa customers. Table C outlines how the 9 acres of
3 incremental land is being used.

4

5

Table C – Usage of 9 Acres of Incremental Land

Location	Acres
East Campus	
Solar Array	2.52
Surplus Fill Storage	1.95
South Campus	
Solar Array	4.20
Land-locked Greenspace	0.75
TOTAL	9.42

6

7

8

9

10 There are several benefits to customers associated with this land utilization. The solar
11 arrays provide electricity to the on-site buildings, reducing consumption from the grid,
12 thereby lowering OM&A costs associated with the monthly electricity bill. The East
13 Campus Surplus Fill Storage is being used to store fill that would have otherwise had to
14 be removed from the site at an additional cost of \$700K. Project costs would have thus
15 been higher had this fill not been stored on-site. The land-locked greenspace provides a
16 protective visual and safety barrier from the highway and the neighbouring property.

14

15 d) Please refer to the response provided in part (c) above.

16

17 e) There is currently minimal unused space in the EC-1 Administrative Office. However, the
18 office configuration is designed to be flexible should there be a need to accommodate
19 additional staff. This would be accomplished through flexible office configuration and
20 workstation furniture designs and by reallocating perimeter passageway space. It is
21 expected that such reconfiguration of office space could accommodate approximately
22 10% staff growth.

1
2 f) With respect to the \$265/sq.ft referenced in the question, the associated footnote “3”
3 refers to this value being calculated as \$41 million/155,000 sq. ft. The same footnote
4 also refers to the \$41 million being found at page 5 of the response to SECIR#11,
5 Attachment B (*note that the correct reference should be page 3*) of Hydro Ottawa’s
6 previous Custom IR application. The presentation referenced was provided in response
7 to an interrogatory and is dated November 17, 2014. The \$41 million was a preliminary
8 out-of-date estimate, did not include the contingencies included on page 3 nor interest or
9 overhead costs, and was made prior to the filing of the application on April 29, 2015. As
10 Hydro Ottawa did not request the \$41 million in funding (nor project a cost of
11 \$265/sq.ft.), it is not meaningful to make a comparison using this number. Hydro Ottawa
12 submitted an application (EB-2015-0004) which requested an East Campus building
13 expenditure of \$56.813 million (pages 339 and 341 of Exhibit B-1-2: Distribution System
14 Plan referenced in footnote “3”). This estimate did not separately identify the
15 administration building cost from the operations buildings. The actual cost for the East
16 Campus buildings is \$59.519 million, which is 5% higher than the \$56.813 million
17 submitted in the 2016-2020 application. The general increase in costs can primarily be
18 attributed to inflation of construction costs, unforeseen costs related to land remediation,
19 development charges, and municipal requirements from the City of Ottawa, as well as
20 technological security and operational improvements. Project costs were closely
21 managed and prudent decisions made to manage spending close to the level projected
22 over four years ago and prior to detailed design work and a competitive procurement
23 process.

INTERROGATORY RESPONSE - OEB-116

2-Staff-61

EXHIBIT REFERENCE:

Exhibit 2/Tab 1/Schedule 1/Attachment A/pp. 43-44 of 73

EB-2015-0004/Settlement Proposal/Refiled December 7, 2015/page 15 of 60

SUBJECT AREA: Facilities Renewal Program

Preamble:

The settlement agreement from the 2016-2020 Custom IR stated that value of the old facilities replaced by new facilities will be removed from rate base within the same calendar year of the new Administrative building going into service, or upon the sale of the old facilities, if that is earlier.

Hydro Ottawa noted that the Merivale Road, Albion Road Property A and Property C have been removed from rate base effective September 30, 2019. However, in order to help control project costs, it was decided by the Executive Management Team to retain the Bank Street facility for training centre and fleet management purposes instead of building new facilities for these functions. Albion Road B property is also being retained as there is a transformer station on that site.

Question(s):

- a) Please provide the net book value of the Bank Street facility as of December 31, 2019.
- b) Please provide the remaining service life of the Bank Street facility.
- c) Please explain how the decision of retaining the Bank Street facility provides benefits to ratepayers.

1

2 **RESPONSE:**

3

4 a) The net book value of the Bank Street facility as of December 31, 2019 is \$9.4M.

5

6 b) The weighted average remaining service life of the Bank Street facility is 20 years.

7

8 c) The Bank Street facility includes both the training and fleet services, which were initially
9 planned to be accommodated at the new facilities. However, in order to control overall
10 project costs and in turn benefit the ratepayers, it was decided by the Executive
11 Management Team and the Strategic Initiatives Oversight Committee of the Board of
12 Directors to retain the Bank Street facility for training centre and fleet servicing purposes
13 instead of building new facilities for these functions. This decision resulted in overall
14 lower costs for the functionality provided. Please refer to part (d) of the response to
15 interrogatory SEC-30 for additional information regarding the functionality of the Bank
16 Street facility.

INTERROGATORY RESPONSE - OEB-117

2-Staff-62

EXHIBIT REFERENCE:

Exhibit 2/Tab 1/Schedule 1/Attachment A/pp. 17-18 of 73

SUBJECT AREA: Facilities Renewal Program

Hydro Ottawa noted that the \$92.3 million filed in the 2016-2020 Custom IR application was based on a Class D cost estimate (April 29, 2015). A more thorough Class C estimate of \$124.7 million was developed on January 20, 2016. On May 18, 2016, the value engineering and revised design validation was completed and a detailed Class B estimate was prepared.

Question(s):

- a) Please provide a copy for the detailed Class D, Class C, and Class B cost estimates
- b) Please clarify whether there was a Class A cost estimate prepared. If so, please provide a copy. If not, why not.
- c) Please provide the detailed building sizes breakdown that each cost estimate was based on in the table below.

1 **Table 2-Staff-62-1: Building Sizes at Each Stage of the Cost Estimate (Square Feet)**

	Class A (if applicable)	Class B	Class C	Class D
East Campus				
EC-1 Administrative Office				
EC-2 East Operations Centre				
EC-3 PILC Storage				
Sub-total				
South Campus				
SC-1 South Operations Centre and Warehouse				
Total				

2

3

4 **RESPONSE:**

5

6 a) Please refer to Attachment OEB-117(A): Class B Estimate and Attachment OEB-117(B):
7 Class C Estimate. Minor items have been redacted for physical security reasons. A
8 detailed Class D estimate was not prepared. The cost estimate provided for new
9 facilities in Hydro Ottawa's previous rebasing application¹ was based on general industry
10 parametric standards.

11

12 b) A Class A estimate was not prepared. Hydro Ottawa used a Design-Build model with
13 respect to construction of the new facilities. This is different from the traditional
14 Design-Bid-Build model of project management whereby the client takes the design to
15 95%+ and then does a pre-tender (Class A) estimate. In a Design-Build model, the intent

16 ¹ Hydro Ottawa Limited, 2016-2020 Custom Incentive Rate-Setting Distribution Rate Application, EB-2015-0004 (April
17 29, 2015).

1 is to transfer the design and construction risk of <90% design to the Design Builder. The
2 Design Builder would then subsequently prepare a Class A estimate as the basis of its
3 pricing proposal. Hydro Ottawa prepared a Class B estimate with appropriate allowances
4 and contingencies. However, as the desire was to have bidders commit to a fixed price
5 contract, it was not necessary to prepare a Class A estimate, as that would be the
6 successful proponent's responsibility. With this approach, Hydro Ottawa successfully
7 procured a fixed price contract and shifted the risk of any cost overruns to the contractor.

8

9 c) Please refer to Table A below for detailed building sizes upon which each cost estimate
10 was based.

11

12

Table A – Building Size Estimates by Class (Sq. ft)

	Class B	Class C
East Campus		
EC-1 Administrative Office	120,825	152,740
EC-2 East Operations Centre	57,727	81,090
EC-3 PILC Storage	10,361	10,254
EC-3 Training Centre	Not Applicable	15,799
Sub-total	188,913	259,883
South Campus		
SC-1 South Operations Centre and Warehouse	94,255	101,594
SC-2 Fleet Services	Not Applicable	19,807
Sub-total	94,255	121,401
TOTAL	283,168	381,283

13



Facilities Renewal Program

QUANTITY SURVEY REPORT

Prepared By:

Francis Lo, MSc., MRICS, PQS, PMP, LEED Green Assoc.



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STATEMENT OF PROBABLE COSTS

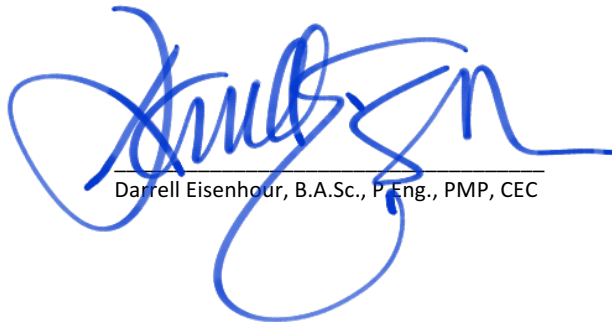
VerTerra has no control over the cost of labour and materials, the contractor's method of determining prices, or competitive bidding and market fluctuation of resources and their impacts. The opinion of probable cost of construction is made on the basis of experience, qualifications, historical database and best judgement of the cost consultants familiar with the construction industry in the Ottawa area. VerTerra cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from this cost estimate.

VerTerra has prepared this estimate in accordance with generally accepted principles and practices.

Prepared by:



Francis Lo, MSc., MRICS, PQS, PMP, LEED Green Assoc.



Darrell Eisenhour, B.A.Sc., P. Eng., PMP, CEC

PREAMBLE

The purpose of this cost estimate is to provide a realistic allocation of direct and indirect construction costs for the East Campus located at 3475 Hawthorne Road and the South Campus located at 201 Dibblee Road.

The East Campus consists of three buildings: a 5-level Administration Headquarters (EC1), a single-storey Garage and Material Management Building (EC2) and a single-storey PILC Building.

The South Campus is made up of a single-storey Ops Centre (SC1) and a Storage Shed (SC2).

METHODOLOGY

From the documentation and information provided, quantities of all major elements were assessed or measured from the drawings and outline specifications where possible and priced at rates considered competitive for a project of this type under a fixed price sub-contract in Ottawa, Ontario.

Pricing shown reflects probable construction costs obtainable in the Ottawa area on the effective date of this report. This estimate is a determination of fair market value for the construction of this project. It is not a prediction of low bid. Pricing assumes competitive bidding for every trade.

A significant portion of the Mechanical and Electrical estimates may be in the form of allowances as the M&E drawings are not as completed as those of other disciplines.

Level of Precision

The degree of precision is to be considered Medium.

EXCLUSIONS AND COMMENTS

This Class B Estimate does not provide for the following:

- Land acquisition costs and impost charges
- Development fees
- Legal fees
- Financing or funding costs
- Costs for management of contracts
- Professional fees and expenses
- Building permits
- Winter conditions
- Overtime or restrictive working hours
- Phased construction premiums
- Surveying
- Preventative maintenance costs
- Equipment maintenance or service contracts

- Harmonized Sales Tax
- Where different materials have been noted in the performance specifications for a specific application, the most stringent means and methods have been selected
- Furniture and furnishings
- Lockers
- Solar Photovoltaic system
- Escalation allowance
- Construction contingency

COST CONSIDERATIONS

- 1.1 The estimated costs are based on the assumption that competitive bidding with a minimum of 3 trade contractors will take place within the next 3 to 6 months. The procurement method being used is the design-build contract.
- 1.2 The General Requirements for the General Contractor include supervision and labour, access to site, site accommodations, site protection, temporary utilities, clean up, equipment, and other miscellaneous project requirements provided by the Design-Build Contractor.
- 1.3 The costs for 50% performance and 50% L & M bonds are also included in the General Requirements. These are the traditional bonding requirements commonly requested by owners. The actual final bonding costs will vary depending on the selected contractor's performance history.
- 1.4 The Design-Build Contractor's overhead and profit are included in Fee. The actual amount will vary depending on the competitiveness in the market during the tender period.
- 1.5 Based on the fact that the anticipated tender period is within the next 3 to 6 months, an allowance for escalation of costs will not be needed.
- 1.6 A 2.0% risk allowance as contingency to cover unforeseen items during the implementation period.
- 1.7 The unit prices used in this Estimate include Labour, Material, Equipment and sub-contractors' overhead and profits.
- 1.8 This Estimate is our opinion of probable cost of construction based on our experience, qualifications, historical database and expert judgement of our cost consultants and therefore we have no control over the market fluctuations of labour resources and their impacts.
- 1.9 It is recommended that the Owner and the design team carefully review this cost report to ensure that the design intent is captured. It is especially important at this early stage as this report is based on very limited amount of design data.
- 1.10 It is recommended that a monitoring and control mechanism is in place during the implementation phases to mitigate any risk of cost overrun.
- 1.11 Metric (SI) measurement units are used in this report. All Imperial units are for information only. In the event of any apparent discrepancy between Metric and Imperial calculations, the Metric (SI) units shall prevail.

1.12 Later dated reports shall govern over earlier reports of the same type.

CASH ALLOWANCES

The following cash allowances are not included in the hard cost estimate:

1. Exterior Pylon & Building Signage, Interior Way-Finding and or specialty signage	\$ 280,600.00
2. Security Systems	800,000.00
3. IT Cabling	500,000.00
4. Kitchen Equipment & Servery: including cost of Kitchen Design Consultant	350,000.00
5. AV Systems	500,000.00
6. Ground Mount Solar Systems, including cut/fill and leveling of land areas	2,550,000.00
7. Supply Only of Exterior Lamp Poles (awaiting HOL feedback)	710,000.00
	<hr/> \$ 4,980,600.00

GROSS FLOOR AREA SUMMARY

East Campus

Building	GFA (m ²)	GFA (SF)*
EC1	11,225.0	120,825
EC2	5,363.0	57,727
EC3	962.6	10,361
TOTAL	17,550.6	188,913

South Campus

Building	GFA (m ²)	GFA (SF)*
SC1	8,408.0	90,503
SC2	348.6	3,752
TOTAL	8,756.6	94,255

*imperial measurement conversions are for information only and therefore are not to be considered accurate

DOCUMENT LIST

CONSULTANT	TITLE	DATE
EC1 – Admin HQ		
HOK	General – Issued for Client Review – 4 pages	29/04/2016
RV Anderson	Civil – Issued for Client Review – 2 pages	15/04/2016
HOK	Landscape – Issued for Client Review – 5 pages	29/04/2016
HOK	Architectural – Issued for Client Review – 17 pages	29/04/2016
Cunliffe	Structural – Issued for Review – 16 pages	29/04/2016
Morrison Hershfield	Mechanical – Issued for Review - 15 pages	29/04/2016
Morrison Hershfield	Electrical – issued for Review - 7 pages	29/04/2016
EC2 – Garage and Material Management		
HOK	General – Issued for Client Review – 1 page	15/04/2016
RV Anderson	Civil – Issued for Client Review – 1 page	15/04/2016
HOK	Landscape – Issued for Client Review – 4 pages	28/01/2016
HOK	Architectural – Issued for Client Review – 7 pages	15/04/2016
Cunliffe	Structural – Issued for Review – 9 pages	15/04/2016
Morrison Hershfield	Mechanical – Issued for Review - 4 pages	14/04/2016
Morrison Hershfield	Electrical – issued for Review - 3 pages	15/04/2016
EC3 – PILC Building		
HOK	General – Issued for Client Review – 1 page	15/04/2016
RV Anderson	Civil – Issued for Client Review – 1 page	15/04/2016
HOK	Landscape – Issued for Client Review – 4 pages	28/01/2016
HOK	Architectural – Issued for Client Review – 6 pages	15/04/2016
Cunliffe	Structural – Issued for Review – 3 pages	15/04/2016
Morrison Hershfield	Mechanical – Issued for Review - 4 pages	15/04/2016
Morrison Hershfield	Electrical – issued for Review - 1 page	29/04/2016
HOK	Exemplar Project – East Campus - Outline Specifications – 111 pages	15/04/2016
HOK	East Campus Final Room Data Sheets – 404 pages	6/04/2016
Paterson Group	Geotechnical Investigation Report	30/11/2015
SC1 – OPS Centre		
HOK	General – Issued for Client Review – 2 pages	14/04/2016
RV Anderson	Civil – Issued for Client Review – 1 page	15/04/2016
HOK	Landscape – Issued for Client Review – 4 pages	28/01/2016
HOK	Architectural – Issued for Client Review – 13 pages	14/04/2016
Cunliffe	Structural – Issued for Review – 11 pages	15/04/2016
Morrison Hershfield	Mechanical – Issued for Review - 4 pages	14/04/2016
Morrison Hershfield	Electrical – issued for Review - 3 pages	29/04/2016
HOK	Exemplar Project – South Campus - Outline Specifications – 107 pages	15/04/2016
HOK	South Campus Final Room Data Sheets – 105 pages	6/04/2016
Paterson Group	Geotechnical Investigation Report	27/01/2016

COST ESTIMATE SUMMARY

Cost Distribution:

EAST CAMPUS

	EC1	EC2	EC3	TOTAL
New Construction	19,539,343	6,620,015	1,132,486	
Site Work	4,199,376	1,056,929	367,554	
TOTAL – INCLUDING SITE	\$23,738,719	\$ 7,676,944	\$ 1,500,040	\$32,915,703
General Requirements	3,948,195	1,228,311	240,006	
Fees	830,607	267,158	52,201	
TOTAL – EXCLUDING CONTINGENCIES	\$28,517,521	\$ 9,172,413	\$ 1,792,248	\$39,482,182
Risk Allowance	570,350	183,448	35,845	
Escalation Allowance	0	0	0	
Construction Allowance	0	0	0	
TOTAL – INCLUDING CONTINGENCIES	\$29,087,871	\$ 9,355,861	\$ 1,828,092	\$40,271,825

SOUTH CAMPUS

	SC1	SC2	TOTAL
New Construction	11,335,027	281,532	
Site Work	3,535,291	4,516	
TOTAL – INCLUDING SITE	\$14,870,318	\$ 286,048	\$15,156,366
General Requirements	2,379,251	45,768	
Fees	517,487	9,954	
TOTAL – EXCLUDING CONTINGENCIES	\$17,767,056	\$ 341,770	\$18,108,826
Risk Allowance	355,341	6,835	
Escalation Allowance	0	0	
Construction Allowance	0	0	
TOTAL – INCLUDING CONTINGENCIES	\$18,122,397	\$ 348,605	\$18,471,002

ELEMENTAL COST SUMMARIES AND TAKE-OFF SHEETS

EC1 - Admin HO

ELEMENTAL COST SUMMARY

Project: EC1 - HQ Admin		Prepared by: F. Lo		Project No.		
GFA: 11,225.00 m ²		Architect: HOK		Date: 2016-05-18		
Element/Sub-Element	Amount	Cost per m ² Gross	Element Total	Cost per m ² Gross	Cost per SF Gross	% of Cost by Element
A SHELL						
A1 Sub-Structural			1,230,970	109.66	10.19	4.2%
A11 Foundation	856,570	76.31				
A12 Excavation	374,400	33.35				
A2 Structure			4,032,628	359.25	33.39	13.9%
A21 Lowest Floor Construction	214,817	19.14				
A22 Upper Floor Construction	3,817,811	340.12				
A3 Exterior Enclosure			2,577,580	229.63	21.34	8.9%
A31 Walls Below Grade	0	0.00				
A32 Walls Above Grade	780,963	69.57				
A33 Windows and Entrances	1,367,759	121.85				
A34 Roof Covering	428,858	38.21				
A35 Projection	0	0.00				
B INTERIORS						
B1 Partitions & Doors			2,003,243	178.46	16.59	6.9%
B11 Partitions	1,748,743	155.79				
B12 Doors	254,500	22.67				
B2 Finishes			1,612,809	143.68	13.36	5.5%
B21 Floor Finishes	853,779	76.06				
B22 Ceiling Finishes	493,031	43.92				
B23 Wall Finishes	265,999	23.70				
B3 Fittings & Equipment			769,716	68.57	6.37	2.6%
B31 Fittings & Fixtures	381,676	34.00				
B32 Equipment	11,000	0.98				
B33 Conveying Systems	377,040	33.59				
C SERVICES						
C1 Mechanical			4,432,395	394.87	36.70	15.2%
C11 Plumbing & Drainage	984,888	87.74				
C12 Fire Protection	404,752	36.06				
C13 HVAC	2,762,130	246.07				
C14 Controls	280,625	25.00				

EC1 - Admin HO

C2 Electrical			2,880,002	256.57	23.85	9.9%
C21 Service & Distribution	1,852,557	165.04				
C22 Lighting, Devices & Heating	676,097	60.23				
C23 Systems & Ancillaries	351,348	31.30				
NET BUILDING COST - EXCLUDING SITE			19,539,343	1,740.70	161.80	67%
D SITE & ANCILLARY WORK						
D1 Site Work			4,199,376	374.11	34.77	14.4%
D11 Site Development	3,070,838	273.57				
D12 Mechanical Site Services	342,738	30.53				
D13 Electrical Site Services	785,800	70.00				
D2 Ancillary Work			0	0.00		0.0%
D21 Demolition	0					
D22 Alterations	0					
NET BUILDING COST - INCLUDING SITE			23,738,719	2,114.81	196.57	82%
Z GENERAL REQUIREMENTS & ALLOWANCES						
Z1 General Requirements & Fee			4,778,802	425.73	39.57	16.4%
Z11 General Requirements	3,948,195	351.73				
Z12 Fee	830,607	74.00				
Z2 Allowances			570,350	50.81	4.72	2.0%
Z21 Risk Allowance	570,350	50.81				
Z22 Escalation Allowance	0	0.00				
TOTAL HARD CONSTRUCTION ESTIMATE - EXCLUDING CONTINGENCIES			\$ 29,087,871	2,591.35	240.87	100%

EC2 - Garage and Material Management

ELEMENTAL COST SUMMARY

Project: EC2 - Garage and Mat.		Prepared by: F. Lo		Project No.		
GFA: 5,363.00 m²		Architect: HOK		Date: 2016-05-18		
Element/Sub-Element	Amount	Cost per m² Gross	Element Total	Cost per m² Gross	Cost per SF Gross	% of Cost by Element
A SHELL						
A1 Sub-Structural			1,372,046	255.84	23.78	14.7%
A11 Foundation	696,416	129.86				
A12 Excavation	675,630	125.98				
A2 Structure			2,187,583	407.90	37.91	23.4%
A21 Lowest Floor Construction	537,849	100.29				
A22 Upper Floor Construction	1,649,734	307.61				
A3 Exterior Enclosure			636,527	118.69	11.03	6.8%
A31 Walls Below Grade	0	0.00				
A32 Walls Above Grade	194,086	36.19				
A33 Windows and Entrances	140,200	26.14				
A34 Roof Covering	302,241	56.36				
A35 Projection	0	0.00				
B INTERIORS						
B1 Partitions & Doors			343,311	64.01	5.95	3.7%
B11 Partitions	294,861	54.98				
B12 Doors	48,450	9.03				
B2 Finishes			345,122	64.35	5.98	3.7%
B21 Floor Finishes	190,501	35.52				
B22 Ceiling Finishes	88,146	16.44				
B23 Wall Finishes	66,476	12.40				
B3 Fittings & Equipment			62,367	11.63	1.08	0.7%
B31 Fittings & Fixtures	62,367	11.63				
B32 Equipment	0	0.00				
B33 Conveying Systems	0	0.00				
C SERVICES						
C1 Mechanical			749,081	139.68	12.98	8.0%
C11 Plumbing & Drainage	235,609	43.93				
C12 Fire Protection	170,274	31.75				
C13 HVAC	317,118	59.13				
C14 Controls	26,080	4.86				

EC2 - Garage and Material Management

C2 Electrical			923,979	172.29	16.01	9.9%
C21 Service & Distribution	578,114	107.80				
C22 Lighting, Devices & Heating	218,353	40.71				
C23 Systems & Ancillaries	127,512	23.78				
NET BUILDING COST - EXCLUDING SITE			6,620,015	1,234.39	114.74	71%
D SITE & ANCILLARY WORK						
D1 Site Work			1,056,929	197.08	18.32	11.3%
D11 Site Development	938,503	175.00				
D12 Mechanical Site Services	57,706	10.76				
D13 Electrical Site Services	60,720	11.32				
D2 Ancillary Work			0	0.00		0.0%
D21 Demolition	0					
D22 Alterations	0					
NET BUILDING COST - INCLUDING SITE			7,676,944	1,431.46	133.06	82%
Z GENERAL REQUIREMENTS & ALLOWANCES						
Z1 General Requirements & Fee			1,495,469	278.85	25.92	16.0%
Z11 General Requirements	1,228,311	229.03				
Z12 Fee	267,158	49.81				
Z2 Allowances			183,448	34.21	3.18	2.0%
Z21 Risk Allowance	183,448	34.21				
Z22 Escalation Allowance	0	0.00				
TOTAL HARD CONSTRUCTION ESTIMATE - EXCLUDING CONTINGENCIES			\$ 9,355,861	1,744.52	162.15	100%

EC3 - PILC BUILDING

ELEMENTAL COST SUMMARY

Project: EC3 - PILC Building		Prepared by: F. Lo		Project No.		
GFA: 962.60 m ²		Architect: HOK		Date: 2016-05-18		
Element/Sub-Element	Amount	Cost per m ² Gross	Element Total	Cost per m ² Gross	Cost per SF Gross	% of Cost by Element
A SHELL						
A1 Sub-Structural			255,639	265.57	24.69	14.0%
A11 Foundation	144,093	149.69				
A12 Excavation	111,546	115.88				
A2 Structure			514,835	534.84	49.71	28.2%
A21 Lowest Floor Construction	124,982	129.84				
A22 Upper Floor Construction	389,853	405.00				
A3 Exterior Enclosure			47,950	49.81	4.63	2.6%
A31 Walls Below Grade	0	0.00				
A32 Walls Above Grade	0	0.00				
A33 Windows and Entrances	41,810	43.43				
A34 Roof Covering	6,140	6.38				
A35 Projection	0	0.00				
B INTERIORS						
B1 Partitions & Doors			3,266	3.39	0.32	0.2%
B11 Partitions	2,516	2.61				
B12 Doors	750	0.78				
B2 Finishes			22,953	23.84	2.22	1.3%
B21 Floor Finishes	0	0.00				
B22 Ceiling Finishes	22,953	23.84				
B23 Wall Finishes	0	0.00				
B3 Fittings & Equipment			110,600	114.90	10.68	6.1%
B31 Fittings & Fixtures	0	0.00				
B32 Equipment	110,600	114.90				
B33 Conveying Systems	0	0.00				
C SERVICES						
C1 Mechanical			72,403	75.22	6.99	4.0%
C11 Plumbing & Drainage	15,750	16.36				
C12 Fire Protection	26,964	28.01				

EC3 - PILC BUILDING

C13 HVAC	29,689	30.84				
C14 Controls	0	0.00				
C2 Electrical			104,840	108.91	10.12	5.7%
C21 Service & Distribution	37,800	39.27				
C22 Lighting, Devices & Heating	33,090	34.38				
C23 Systems & Ancillaries	33,951	35.27				
NET BUILDING COST - EXCLUDING SITE			1,132,486	1,176.49	109.36	62%
D SITE & ANCILLARY WORK						
D1 Site Work			367,554	381.83	35.49	20.1%
D11 Site Development	304,597	316.43				
D12 Mechanical Site Services	10,358	10.76				
D13 Electrical Site Services	52,600	54.64				
D2 Ancillary Work			0	0.00		0.0%
D21 Demolition	0					
D22 Alterations	0					
NET BUILDING COST - INCLUDING SITE			1,500,040	1,558.32	144.85	82%
Z GENERAL REQUIREMENTS & ALLOWANCES						
Z1 General Requirements & Fee			292,208	303.56	28.22	16.0%
Z11 General Requirements	240,006	249.33				
Z12 Fee	52,201	54.23				
Z2 Allowances			35,845	37.24	3.46	2.0%
Z21 Risk Allowance	35,845	37.24				
Z22 Escalation Allowance	0	0.00				
TOTAL HARD CONSTRUCTION ESTIMATE - EXCLUDING CONTINGENCIES			\$ 1,828,092	1,899.12	176.52	100%

TAKE-OFF

EC1 - Admin HO

18 May 2016

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
A. SHELL						
A1 SUBSTRUCTURE						
A11 Foundations						\$ 856,570.27
<u>A111 Standard Foundations</u>						<u>\$ 856,570.27</u>
.1 Concrete Strip Footing WF1 - (1000 x 500)		22.35	m³	\$ 750.59		\$ 16,775.73
a Trench excavation			m³	\$ 16.00	\$ -	
b Hand Trim		44.70	m2	\$ 19.75	\$ 882.83	
c Compacted backfill		248.90	m³	\$ 8.00	\$ 1,991.20	
d Formwork - 4 uses		44.70	m2	\$ 80.00	\$ 3,576.00	
e Re-bar (60Kg/m3 assumed)		1.34	TN	\$ 2,755.00	\$ 3,694.46	
f Concrete - 25 Mpa		22.35	m3	\$ 220.00	\$ 4,917.00	
g Place concrete - pumped		22.35	m3	\$ 51.00	\$ 1,139.85	
h Keyway		44.70	m	\$ 4.35	\$ 194.45	
i Screed finish		44.70	m2	\$ 8.50	\$ 379.95	
.2 Concrete Strip Footing WF2 - (800 x 400)		27.39	m³	\$ 793.21		\$ 21,727.65
a Trench excavation			m³	\$ 16.00	\$ -	
b Hand Trim		68.48	m2	\$ 19.75	\$ 1,352.48	
c Compacted backfill		248.90	m³	\$ 8.00	\$ 1,991.20	
d Formwork - 4 uses		68.48	m2	\$ 80.00	\$ 5,478.40	
e Re-bar (60Kg/m3 assumed)		1.64	TN	\$ 2,755.00	\$ 4,527.90	
f Concrete - 25 Mpa		27.39	m3	\$ 220.00	\$ 6,026.24	
g Place concrete - pumped		27.39	m3	\$ 51.00	\$ 1,396.99	
h Keyway		85.60	m	\$ 4.35	\$ 372.36	
i Screed finish		68.48	m2	\$ 8.50	\$ 582.08	
.3 Concrete Pad Footings	51	605.66	m³	\$ 597.60		\$ 361,943.14
a Bulk excavation			m³	\$ 16.00	\$ -	
b Hand Trim		745.65	m2	\$ 15.00	\$ 11,184.75	
c Compact backfill			m³	\$ 10.00	\$ -	
d Formwork		779.07	m2	\$ 70.00	\$ 54,534.90	
e Re-bar (75Kg/m3)		45.42	TN	\$ 2,755.00	\$ 125,144.50	
f Concrete - 25 Mpa		605.66	m³	\$ 220.00	\$ 133,245.20	
g Place concrete - pumped		605.66	m³	\$ 44.00	\$ 26,649.04	
h Float finish		745.65	m2	\$ 15.00	\$ 11,184.75	
.4 Elevator Pit Foundation		1	allow	\$ 15,000.00	\$ 15,000.00	\$ 15,000.00
.5 Concrete Foundation Walls - 300		243.9	m³	\$ 1,206.54		\$ 294,227.96
Formwork		1,854.3	m²	\$ 82.00	\$ 152,048.50	
Re-Bar (92Kg/m3)		22.4	TN	\$ 2,378.00	\$ 53,350.72	
Concrete - 25 MPa		243.9	m³	\$ 280.62	\$ 68,431.99	
Concrete Finish includes breaking ties and patch voids		927.1	m²	\$ 22.00	\$ 20,396.75	
.6 Grade Beams		148.26	m³	\$ 810.00		\$ 120,091.00
a Hand Trim		123.60	m2	\$ 8.00	\$ 988.80	
b Fromwork		247.10	m2	\$ 98.00	\$ 24,215.80	
c Re-bar (150Kg/m3 - assumed)		22.24	TN	\$ 2,400.00	\$ 53,373.60	
d Concrete		148.26	m3	\$ 280.00	\$ 41,512.80	
.7 Perimeter drainage		235	m	\$ 30.00	\$ 7,044.00	
.8 Perimeter Rigid Insulation 50 mm		469.60	m²	\$ 28.00	\$ 13,148.80	
.9 Allowance for reinforcing dowels		2.40	TN	\$ 2,755.00	\$ 6,612.00	

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Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
<u>A112 Special Foundations</u>						\$ -
Assume none required.						
A12 Excavation						\$ 374,400.00
.1 Excavation and Backfill		3,120	m ²	\$ 120.00	\$ 374,400.00	
A2 STRUCTURE						
A21 Lowest Floor Construction						\$ 214,816.94
.1 Slab on Grade - 125 thick Unreinforced		324.5	m ³	\$ 645.23		\$ 209,385.44
Fine grade 3 passes with grader and roller		2,596.1	m ²	\$ 3.00	\$ 7,788.30	
300 mm Granular A sub base		778.8	m ³	\$ 60.00	\$ 46,729.80	
Extruded polystyrene XPS Insulation - 50 mm		285.0	m ²	\$ 28.00	\$ 7,980.00	
perimeter only						
Vapour Barrier		2,596.1	m ²	\$ 3.05	\$ 7,918.11	
Concrete (25 MPa) - direct chute		324.5	m ³	\$ 260.00	\$ 84,373.25	
Saw cut and control joints		2,596.1	m ²	\$ 4.00	\$ 10,384.40	
Cure with spray membrane curing compound		2,596.1	m ²	\$ 3.03	\$ 7,866.18	
Finishing floor, monolithic steel trowel		2,596.1	m ²	\$ 14.00	\$ 36,345.40	
.3 Slab thickening below masonry block walls		63.9	m	\$ 85.00	\$ 5,431.50	
A22 Upper Floor Construction						\$ 3,817,811.45
<u>A221 Upper Floor Construction</u>						\$ 3,132,635.45
.1 Round Tied Columns - 600mm (Lower Level)	22	31.92	m ³	\$ 1,832.75		\$ 58,494.17
Forms in place - round fiber tube, 750 dia. 1 use		112.88	m	\$ 120.00	\$ 13,545.60	
Re-bar in place, column ties (300Kg/m3)		9.57	TN	\$ 3,370.00	\$ 32,267.22	
Concrete (35 MPa)		31.92	m ³	\$ 244.00	\$ 7,787.54	
Placing concrete, vibrating, pumped		31.92	m ³	\$ 50.00	\$ 1,595.81	
Finish, burlap rub w/grout		212.77	m ²	\$ 15.50	\$ 3,298.00	
.2 Round Tied Columns - 600mm (Main Level)	38	39.75	m ³	\$ 1,621.85		\$ 64,474.53
Forms in place - round fiber tube, 600 dia. 1 use		140.60	m	\$ 120.00	\$ 16,872.00	
Re-bar in place, column ties (230Kg/m3)		9.14	TN	\$ 3,370.00	\$ 30,813.18	
Concrete (35 MPa)		39.75	m ³	\$ 244.00	\$ 9,699.93	
Placing concrete, vibrating, pumped		39.75	m ³	\$ 75.00	\$ 2,981.54	
Finish, burlap rub w/grout		265.03	m ²	\$ 15.50	\$ 4,107.89	
.3 Round Tied Columns - 600mm (Level 2)	33	34.52	m ³	\$ 1,487.05		\$ 51,337.34
Forms in place - round fiber tube, 600 dia. 1 use		122.10	m	\$ 120.00	\$ 14,652.00	
Re-bar in place, column ties (190Kg/m3)		6.56	TN	\$ 3,370.00	\$ 22,105.10	
Concrete (35 MPa)		34.52	m ³	\$ 244.00	\$ 8,423.62	
Placing concrete, vibrating, pumped		34.52	m ³	\$ 75.00	\$ 2,589.23	
Finish, burlap rub w/grout		230.15	m ²	\$ 15.50	\$ 3,567.38	
.4 Round Tied Columns - 600mm (Level 3)	33	34.52	m ³	\$ 1,375.84		\$ 47,498.03
Forms in place - round fiber tube, 600 dia. 1 use		122.10	m	\$ 120.00	\$ 14,652.00	
Re-bar in place, column ties (157Kg/m3)		5.42	TN	\$ 3,370.00	\$ 18,265.80	
Concrete (35 MPa)		34.52	m ³	\$ 244.00	\$ 8,423.62	
Placing concrete, vibrating, pumped		34.52	m ³	\$ 75.00	\$ 2,589.23	
Finish, burlap rub w/grout		230.15	m ²	\$ 15.50	\$ 3,567.38	
.5 Square Tied Columns - 750 x 750	14	41.26	m ³	\$ 2,252.67		\$ 92,943.62
Forms in place - plywood, 4 uses		220.05	m ²	\$ 130.00	\$ 28,606.50	

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Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
Chamger strip, wood 20mm wide		293.40	m	\$ 18.00	\$ 5,281.20	
Re-bar in place, column ties (300Kg/m3)		12.38	TN	\$ 3,370.00	\$ 41,713.23	
Concrete (35 MPa)		41.26	m³	\$ 244.00	\$ 10,067.29	
Placing concrete, vibrating, pumped		41.26	m³	\$ 75.00	\$ 3,094.45	
Finish, break ties, patch voids, burlap rub w/grout		220.05	m²	\$ 19.00	\$ 4,180.95	
.6 Square Tied Columns - 600 x 600	6	10.51	m³	\$ 2,523.33		\$ 26,525.28
Forms in place - plywood, 4 uses		70.08	m²	\$ 130.00	\$ 9,110.40	
Chamger strip, wood 20mm wide		116.80	m	\$ 18.00	\$ 2,102.40	
Re-bar in place, column ties (300Kg/m3)		3.15	TN	\$ 3,370.00	\$ 10,627.63	
Concrete (35 MPa)		10.51	m³	\$ 244.00	\$ 2,564.93	
Placing concrete, vibrating, pumped		10.51	m³	\$ 75.00	\$ 788.40	
Finish, break ties, patch voids, burlap rub w/grout		70.08	m²	\$ 19.00	\$ 1,331.52	
.7 Cast in place Flat Slab (250mm) with Drop Panels		2,125.02	m³	\$ 1,045.02		\$ 2,220,691.04
Forms in place, elevated slabs, 4 uses		8,500.10	m²	\$ 115.00	\$ 977,511.50	
Re-bar (90Kg/m3)		191.25	TN	\$ 2,410.00	\$ 460,916.84	
Concrete ready mix (30 MPa)		2,125.02	m³	\$ 235.00	\$ 499,379.70	
Place and vibrate - Pumped		2,125.02	m³	\$ 65.00	\$ 138,126.30	
Finish floor, monolithic steel trowel finish		8,500.10	m²	\$ 14.00	\$ 119,001.40	
Cure with spray membrane curing compound		8,500.10	m²	\$ 3.03	\$ 25,755.30	
.8 Cast in place Flat Slab (350mm) with Drop Panels		101.97	m³	\$ 942.27		\$ 96,083.59
Forms in place, elevated slabs, 4 uses		291.30	m²	\$ 115.00	\$ 33,499.50	
Re-bar (110Kg/m3)		11.22	TN	\$ 2,410.00	\$ 27,032.25	
Concrete ready mix (30 MPa)		101.97	m³	\$ 235.00	\$ 23,962.95	
Place and vibrate - Pumped		101.97	m³	\$ 65.00	\$ 6,628.05	
Finish floor, monolithic steel trowel finish		291.30	m²	\$ 14.00	\$ 4,078.20	
Cure with spray membrane curing compound		291.30	m²	\$ 3.03	\$ 882.64	
.8 Cast in place Flat Slab (400mm) with Drop Panels		217.81	m³	\$ 895.16		\$ 194,974.77
Forms in place, elevated slabs, 4 uses		544.50	m²	\$ 115.00	\$ 62,617.50	
Re-bar (110Kg/m3)		23.96	TN	\$ 2,410.00	\$ 57,741.43	
Concrete ready mix (30 MPa)		217.81	m³	\$ 235.00	\$ 51,185.35	
Place and vibrate - Pumped		217.81	m³	\$ 65.00	\$ 14,157.65	
Finish floor, monolithic steel trowel finish		544.50	m²	\$ 14.00	\$ 7,623.00	
Cure with spray membrane curing compound		544.50	m²	\$ 3.03	\$ 1,649.84	
.9 Concrete Beam 200 x 1800		105.2	m³	\$ 2,182.80		\$ 229,613.10
a Formwork		1,051.9	m2	\$ 140.00	\$ 147,268.80	
b Re-bar (122Kg/m3)		12.8	TN	\$ 2,400.00	\$ 30,800.22	
c Concrete - 25 MPa		105.2	m3	\$ 290.00	\$ 30,505.68	
d Finish		1,051.9	m2	\$ 20.00	\$ 21,038.40	
.10 Superplasticizer premium		1	allow	\$ 50,000.00	\$ 50,000.00	
<u>A222 Stair Construction</u>						\$ 88,000.00
.1 Stairs C.I.P. concrete with landing		16	Flight	\$ 5,500.00	\$ 88,000.00	
12 risers, with nosing , with steel pipe railings						
<u>A223 Roof Construction</u>						\$ 597,176.00
.1 Structural steel roof construcion		1,447.9	m²	\$ 285.75		\$ 413,740.00
base plates and anchor bolts		27	No.	\$ 360.00	\$ 9,720.00	
structural steel columns (10Kg/m2)		14.5	TN	\$ 4,000.00	\$ 57,916.00	
structural steel beams (35Kg/m2)		50.7	TN	\$ 4,000.00	\$ 202,706.00	
open web steel joists - 550 Deep (13Kg/m2)		14.1	TN	\$ 4,000.00	\$ 56,524.00	
bridging and bracing (5Kg/m2)		7.2	TN	\$ 4,000.00	\$ 28,958.00	
38mm metal deck - 20 ga		1,447.9	m²	\$ 40.00	\$ 57,916.00	

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Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.2 Structural steel roof constructon - High Deck		373.4	m²	\$ 347.71		\$ 129,836.00
base plates and anchor bolts		8	No.	\$ 360.00	\$ 2,880.00	
structural steel columns (12Kg/m2)		4.5	TN	\$ 4,000.00	\$ 17,923.20	
structural steel beams (30Kg/m2)		11.2	TN	\$ 4,000.00	\$ 44,808.00	
open web steel joists - 1300 Deep (26Kg/m2)		9.7	TN	\$ 4,000.00	\$ 38,833.60	
bridging and bracing (7Kg/m2)		2.6	TN	\$ 4,000.00	\$ 10,455.20	
38mm metal deck - .91 thick		373.4	m²	\$ 40.00	\$ 14,936.00	
.3 Allownace for roof openings framing		1	LS	\$ 3,000.00	\$ 3,000.00	
.4 Structural reinforcement for mechanical equipment		1	LS	\$ 10,000.00	\$ 10,000.00	
.5 Premium for seismic protection design		1	LS	\$ 10,000.00	\$ 10,000.00	
.6 Roof Safety Anchors c/w cable system		12	ea	\$ 2,550.00	\$ 30,600.00	
A3 EXTERIOR ENCLOSURE						
A31 Walls Below Grade						\$ -
A311 Structural Walls Below Grade						
A32 Walls Above Grade						\$ 780,963.08
A321 Walls Above Grade						\$ 780,963.08
.1 Composite Panel Wall Assembly		97.20	m²	\$ 751.30		\$ 73,026.36
50mm Compostie Metal Panel w/ Z-Girts		97.20	m²	\$ 646.00	\$ 62,791.20	
127 Mineral Wool Insulation		97.20	m²	\$ 14.54	\$ 1,413.29	
Membrane Air/Vapour Barrier		97.20	m²	\$ 2.50	\$ 243.00	
16mm Glass Matt Gypsum Sheathing		97.20	m²	\$ 23.50	\$ 2,284.20	
152 Wind Bearing Metal Stud Wall Framing		97.20	m²	\$ 29.70	\$ 2,886.84	
50mm Mineral Wool Insulation		97.20	m²	\$ 8.50	\$ 826.20	
16mm Gypsum Board		97.20	m²	\$ 18.50	\$ 1,798.20	
Paint Finish		97.20	m²	\$ 8.06	\$ 783.43	
.2 Masonry Wall Assembly		1,786.00	m²	\$ 250.76		\$ 447,857.36
90mm Architectural Block Veneer		1,786.00	m²	\$ 160.00	\$ 285,760.00	
25mm Air Space		1,786.00				
Membrane Air/Vapour Barrier		1,786.00	m²	\$ 2.50	\$ 4,465.00	
16mm Glass Matt Bypsum Sheathing		1,786.00	m²	\$ 23.50	\$ 41,971.00	
152 Wind Bearing Metal Stud Wall Framing		1,786.00	m²	\$ 29.70	\$ 53,044.20	
50mm Mineral Wool Insulation		1,786.00	m²	\$ 8.50	\$ 15,181.00	
16mm Gypsum Board		1,786.00	m²	\$ 18.50	\$ 33,041.00	
Paint Finish		1,786.00	m²	\$ 8.06	\$ 14,395.16	
.3 MP1 Wall Assembly		1,139.20	m²	\$ 228.30		\$ 260,079.36
35mm Prefinished Horizontal Siding		1,139.20	m²	\$ 78.00	\$ 88,857.60	
Z-Girts w PVC Thermal Break		1,139.20	m²	\$ 45.00	\$ 51,264.00	
127 Mineral Wool Insulation		1,139.20	m²	\$ 14.54	\$ 16,563.97	
Membrane Air/Vapour Barrier		1,139.20	m²	\$ 2.50	\$ 2,848.00	
16mm Glass Matt Gypsum Sheathing		1,139.20	m²	\$ 23.50	\$ 26,771.20	
152 Wind Bearing Metal Stud Wall Framing		1,139.20	m²	\$ 29.70	\$ 33,834.24	
50mm Mineral Wool Insulation		1,139.20	m²	\$ 8.50	\$ 9,683.20	
16mm Gypsum Board		1,139.20	m²	\$ 18.50	\$ 21,075.20	
Paint Finish		1,139.20	m²	\$ 8.06	\$ 9,181.95	
A33 Windows and Entrance						\$ 1,367,758.50

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Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
<u>A331 Windows and Louvres</u>						\$ 1,288,158.50
.1 Glazing - DGL1 Curtain Wall System		869.20	m²	\$ 820.00	\$ 712,744.00	
.2 Glazing - DGL2 Curtain Wall System (Heat Strengthened)		260.40	m²	\$ 980.00	\$ 255,192.00	
.3 Spandrel Glass Wall Panel		111.50	m²	\$ 920.00	\$ 102,580.00	
.4 Punch Windows		361.70	m²	\$ 450.00	\$ 162,765.00	
.5 Louvres		135.5	m²	\$ 405.00	\$ 54,877.50	
<u>A333 Doors</u>						\$ 79,600.00
.1 Pressed steel frames and hollow metal doors Include Hardware and Painting						
Single	4	Ea	\$ 1,900.00	\$ 7,600.00		
Double	2	Pair	\$ 3,100.00	\$ 6,200.00		
.2 Entrance units - Glazed , Stainless Steel	4	Ea	\$ 9,500.00	\$ 38,000.00		
.4 Overhead doors (3048 x 3658)	2	Ea	\$ 7,500.00	\$ 15,000.00		
.5 Barrier free door operators - assumed	4	Ea	\$ 3,200.00	\$ 12,800.00		
A34 Roof Covering						\$ 428,858.26
<u>A341 Roofing</u>						\$ 428,858.26
.1 SBS Modified Bituminous Roofing		2,545.30	m²	\$ 150.00	\$ 381,795.00	
.2 Tapered insulation to attain roof slopes (5%)		127.27	m²	\$ 19.00	\$ 2,418.04	
.3 Flashing		300.22	m²	\$ 126.00	\$ 37,827.72	
.4 Pre-finish metal soffit		25.00	m²	\$ 152.70	\$ 3,817.50	
.5 Roof Hatch	1	Ea	\$ 3,000.00	\$ 3,000.00		
A35 Projection						\$ -
.1 Parapets - part of Wall Assemblies			m²		\$ -	
B. INTERIORS						
B1 PARTITIONS & DOORS						
B11 Partitions						\$ 1,748,742.63
<u>B111 Fixed Partitions</u>						\$ 727,423.26
						\$ -
.1 A3 Wall Type		5,955.08	m²	\$ 65.01		\$ 387,139.75
16mm Gypsum	5,955.08	m²	\$ 18.50	\$ 110,168.98		
92 metal stud (20ga) @ 400 oc	5,955.08	m²	\$ 19.51	\$ 116,183.61		
Acoustic Batt	5,955.08	m²	\$ 8.50	\$ 50,618.18		
16mm Gypsum	5,955.08	m²	\$ 18.50	\$ 110,168.98		
.2 A3 Fire Rated Wall Type		496.28	m²	\$ 70.01		\$ 34,744.56
16mm Gypsum Type X	496.28	m²	\$ 21.00	\$ 10,421.88		
92 metal stud (20ga) @ 400 oc	496.28	m²	\$ 19.51	\$ 9,682.42		

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Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
Acoustic Batt		496.28	m²	\$ 8.50	\$ 4,218.38	
16mm Gypsum Type X		496.28	m²	\$ 21.00	\$ 10,421.88	
.3 B3 Wall Type		10.22	m²	\$ 65.01		\$ 664.40
16mm Gypsum		10.22	m²	\$ 18.50	\$ 189.07	
92 metal stud (20ga) @ 400 oc		10.22	m²	\$ 19.51	\$ 199.39	
Acoustic Batt		10.22	m²	\$ 8.50	\$ 86.87	
16mm Gypsum		10.22	m²	\$ 18.50	\$ 189.07	
.4 L3 Wall Type		213.12	m²	\$ 93.02		\$ 19,824.42
16mm Gypsum		213.12	m²	\$ 18.50	\$ 3,942.72	
92 metal stud (20ga) @ 400 oc		213.12	m²	\$ 19.51	\$ 4,157.97	
Acoustic Batt		213.12	m²	\$ 8.50	\$ 1,811.52	
Sapce			m²	\$ -	\$ -	
Acoustic Batt		213.12	m²	\$ 8.50	\$ 1,811.52	
92 metal stud (20ga) @ 400 oc		213.12	m²	\$ 19.51	\$ 4,157.97	
16mm Gypsum		213.12	m²	\$ 18.50	\$ 3,942.72	
.5 H0 Furred Wall		1,361.30	m²	\$ 38.50		\$ 52,410.05
16mm Gypsum		1,361.30	m²	\$ 18.50	\$ 25,184.05	
Furring Channel		1,361.30	m²	\$ 20.00	\$ 27,226.00	
.6 H2 Furred Wall		561.66	m²	\$ 34.99		\$ 19,652.48
16mm Gypsum		561.66	m²	\$ 18.50	\$ 10,390.71	
64 metal stud @ 400 oc		561.66	m²	\$ 16.49	\$ 9,261.77	
E3 Furred Wall		330.28	m²	\$ 38.01		\$ 12,553.94
16mm Gypsum		330.28	m²	\$ 18.50	\$ 6,110.18	
92 metal stud (20ga) @ 400 oc		330.28	m²	\$ 19.51	\$ 6,443.76	
.7 Glazed Partitions		46.31	m²	\$ 275.00	\$ 12,735.25	
.8 Shaft Walls		1	allow	\$ 10,000.00	\$ 10,000.00	
.9 Lightweight Concrete Block Wall - 190 mm, jointed and pointed		697.80	m²	\$ 167.40	\$ 116,811.72	
.10 Lightweight Concrete Block Wall Fire Rated - 190 mm, jointed and pointed		342.06	m²	\$ 178.00	\$ 60,886.68	
<u>B112 Movable Partitions</u>						\$ -
<u>B113 Structural Partitions</u>						\$ 1,021,319.37
.1 Concrete shear walls		866.4	m³	\$ 1,178.84		\$ 1,021,319.37
Formwork, 4 uses		4,897.2	m²	\$ 95.00	\$ 465,230.20	
Re-Bar (92Kg/m3)		79.7	TN	\$ 2,375.00	\$ 189,304.03	
Concrete Ready Mix - 35 MPa		866.4	m³	\$ 244.00	\$ 211,396.72	
Placing concrete, pumped		866.4	m³	\$ 55.00	\$ 47,650.90	
Concrete Finish, breaking ties and patching voids		4,897.2	m²	\$ 22.00	\$ 107,737.52	
B12 Doors						\$ 254,500.00
.1 Pressed Steel Frames and Hollow Metal Doors c/w hardware include painting						
Single		94	Ea	\$ 750.00	\$ 70,500.00	
Double		27	Ea	\$ 1,300.00	\$ 35,100.00	
Single with sidelite		90	Ea	\$ 1,050.00	\$ 94,500.00	

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Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.2 Access Doors/Panels - Allowance		16	Ea	\$ 200.00	\$ 3,200.00	
.3 Barrier free automatic door openers - assume		16	ea	\$ 3,200.00	\$ 51,200.00	
B2 FINISHES						
B21 Floor Finishes						\$ 853,779.10
.2 Porcelain Tile Floor		1,181	m²	\$ 123.00	\$ 145,312.20	
.3 Carpet Tiles		6,303	m²	\$ 55.00	\$ 346,659.50	
.4 Vinyl Composite Tiles		320	m²	\$ 35.00	\$ 11,207.00	
Resilient Flooring		103	m²	\$ 50.00	\$ 5,145.00	
.5 Anti Static Floor Tiles		64	m²	\$ 129.00	\$ 8,230.20	
.6 Concrete Floor / Sealer		1,058	m²	\$ 20.00	\$ 21,162.00	
.7 Rubber gym floor		264	m²	\$ 150.00	\$ 39,525.00	
Access Floor System, steel panels w/ carpet tile finish		683	m²	\$ 290.00	\$ 198,070.00	
Epoxy Paint		65	m²	\$ 86.00	\$ 5,607.20	
.8 Base						
i 108mm Rubber Base		4,220	m	\$ 10.50	\$ 44,310.00	
ii Porcelain Tile Base		921	m	\$ 31.00	\$ 28,551.00	
B22 Ceiling Finishes						\$ 493,030.80
.1 Gypsum Board Ceiling include Painting		1,191.10	m²	\$ 86.00	\$ 102,434.60	
.2 Acoustical Suspended Ceiling		6,007.70	m²	\$ 40.00	\$ 240,308.00	
.3 Acoustic Panels		53.60	m²	\$ 68.00	\$ 3,644.80	
.4 Exposed Ceiling - Painted		2,885.90	m²	\$ 10.80	\$ 31,167.72	
.5 Drywall Bulkhead		175.86	m²	\$ 88.00	\$ 15,475.68	
.6 Executive Premium		1	LS	\$ 50,000.00	\$ 50,000.00	
.7 Miscellaneous gypsum bulkhead & reveals - allowance		1	LS	\$ 50,000.00	\$ 50,000.00	
B23 Wall Finishes						\$ 265,999.00
.1 Paint Finish		13,565.0	m²	\$ 8.60	\$ 116,659.00	
.2 Porcelain Wall Tiles in washrooms		1,105.0	m²	\$ 108.00	\$ 119,340.00	
.3 Allowance for special wall finishes in executive areas		1	LS	\$ 30,000.00	\$ 30,000.00	
B3 Fittings & Equipment						
B31 Fittings and Fixtures						\$ 381,675.90
<u>B311 Metals</u>						\$ 77,000.00

TAKE-OFF

EC1 - Admin HO

18 May 2016

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.1 Service ladders		1	Ea	\$ 2,000.00	\$ 2,000.00	
.2 Miscellenous metal - Allowance		1	LS	\$ 75,000.00	\$ 75,000.00	
<u>B312 Millwork</u>						\$ 105,166.40
.1 Typical kitchen upper and lower cabinet c/w countertop		24.40	m	\$ 1,400.00	\$ 34,160.00	
.2 Cabinets and work countertops		32.10	m	\$ 984.00	\$ 31,586.40	
.3 Kitchenette bar counters		27.30	m	\$ 600.00	\$ 16,380.00	
.4 Washroom vanity and counter		28.80	m	\$ 800.00	\$ 23,040.00	
<u>B313 Specialties</u>						\$ 114,959.50
.1 Toilet Compartment - Metal Ceiling Hung		27	ea	\$ 1,037.00	\$ 27,999.00	
.2 Hadicapped Toilet Compartment		12	ea	\$ 1,685.00	\$ 20,220.00	
.3 Urinal Screen		14	ea	\$ 485.00	\$ 6,790.00	
.4 Toilet and Bath Accessories						
i Hand dryer		13	ea	\$ 450.00	\$ 5,850.00	
ii Paper towel dispenser		24	ea	\$ 150.00	\$ 3,600.00	
iii Toilet paper dispenser		49	ea	\$ 50.00	\$ 2,450.00	
iv Soap dispenser		42	ea	\$ 75.00	\$ 3,150.00	
v Waste receptacle - wall mounted semi-recessed		24	ea	\$ 500.00	\$ 12,000.00	
vi Sanitary disposal		37	ea	\$ 200.00	\$ 7,400.00	
vii Coat hooks		49	ea	\$ 22.00	\$ 1,078.00	
viii Grab bars		12	pr	\$ 450.00	\$ 5,400.00	
ix Shower Curtain		9	ea	\$ 120.00	\$ 1,080.00	
x Tilted mirror		9	ea	\$ 250.00	\$ 2,250.00	
.5 Unframed Mirror in washrooms above vanities		36.85	m²	\$ 250.00	\$ 9,212.50	
.6 Recessed floor grille		12	m²	\$ 540.00	\$ 6,480.00	
<u>B314 Furnishings</u>						\$ 84,550.00
.1 Window treatment - Allowance		1,491.00	m²	\$ 50.00	\$ 74,550.00	
Premium Allowance for Blackout Blinds					\$ 10,000.00	
B32 Equipment						\$ 11,000.00
.1 Kitchen equipment (covered in Cash Allowance)			Allow		\$ -	
.2 3,500 cfm ecology unit (in HVAC Package)		1	Allow		\$ -	
.3 3,500 cfm kitchen exhaust fan, 6m welded and fire blanket wrapped 300x760 duct with cleanouts (See HVAC)		1	Allow		\$ -	
.4 Kitchen exhaust fire protection system (See HVAC)		1	Allow		\$ -	
.5 Kitchen exhaust hood with grease extractor (See HVAC)		1	Allow		\$ -	
.6 Dock Levelers - Allowance		1	ea	\$ 11,000.00	\$ 11,000.00	

TAKE-OFF

EC1 - Admin HO

18 May 2016

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
B33 Conveying Systems						\$ 377,040.00
.1 Low-rise Electric Traction Passenger Elevator i single door from one side - 5 stops		2	ea	\$ 188,520.00	\$ 377,040.00	
C. SERVICES						
C1 Mechanical						
C11 Plumbing and Drainage						\$ 984,888.34
<u>C111 Plumbing Fixtures</u>						\$ 258,442.84
.1 Water closets. Vitreous china, wall mounted fixtures with electronic flush valve. Water conservation type.		49.0	ea	\$ 2,336.90	\$ 114,508.10	
.2 Urinals. Vitreous china, wall hung type with electronic flush valve. Water conservation type.		19.0	ea	\$ 1,353.91	\$ 25,724.29	
.3 Lavatories. Vitreous china, above counter mounted type with electronic 4in center set faucets. Barrier free to be of same type per accessibility requirements.		33.0	ea	\$ 1,357.90	\$ 44,810.70	
.4 Service sinks. Standard, wall hung, in universal W/R's and like areas.		9.0	ea	\$ 1,620.00	\$ 14,580.00	
.5 Service sinks. Standard, stainless steel, counter-top double in kitchenettes.		10.0	ea	\$ 1,695.00	\$ 16,950.00	
.6 Custodial sinks. Stainless Steel, deep, floor mounted with braced hose faucet and trim.		4.0	ea	\$ 1,850.00	\$ 7,400.00	
.7 Drinking fountains. Assume barrier free recessed wall mounted, re Fridgerated, stainless steel, single bubbler. Also assume 1 per level.		5.0	ea	\$ 1,725.00	\$ 8,625.00	
.8 Showers, pre-formed, c/w trim, rough-in, receptor, thermostatic mixing valve.		6.0	ea	\$ 1,027.50	\$ 6,165.00	
.9 Shower, barrier free w/ fixed and handheld head, control valves, grab bar and seat.		2.0	ea	\$ 8,850.00	\$ 17,700.00	
.10 Shower, pre-formed, c/w trim, rough-in, receptor, thermostatic mixing valve (CEO Office).		1.0	ea	\$ 1,979.75	\$ 1,979.75	
<u>C112 Domestic Water</u>						\$ 219,500.00
.1 Domestic water service shall enter the building to serve domestic water and fire protection. Incoming service c/w backflow prevention and metering. Domestic hot water generated by gas fired cond boilers (included in HVAC). Thermal insulation included.		1.0	allow	\$ 190,000.00	\$ 190,000.00	
.2 Domestic water booster pumps and tanks.		1.0	allow	\$ 27,500.00	\$ 27,500.00	
.3 Washing maching hook-ups.		8.0	allow	\$ 250.00	\$ 2,000.00	

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Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
C113 Sanitary Waste & Vent						\$ 150,000.00
.1 Sanitary system assume U/G to be PVC, while above grade piping shall be cast iron/copper DWV. Drains below the service entry shall be collected in sump pits c/w duplex submersible pumps (Assume 3 for this building). Thermal insulation included.		1.0	allow	\$ 150,000.00	\$ 150,000.00	
C114 Storm						\$ 168,403.20
.1 Main entrance roof drain, assume 2" control flow drain.		1.0	ea	\$ 1,346.00	\$ 1,346.00	
.2 Level 3 canopy roof drains, assume 3" control flow drains.		7.0	ea	\$ 2,630.40	\$ 18,412.80	
.3 Level 4 roof drains, assume 4" control flow drains.		8.0	ea	\$ 3,580.55	\$ 28,644.40	
.4 Allowance, storm mains, cast iron above grade, sump pits (if required) c/w duplex submersible pumps, thermal insulation included, PVC jacketed in exposed areas.		1.0	allow	\$ 120,000.00	\$ 120,000.00	
C115 Natural Gas						\$ 65,000.00
.1 Incoming gas service c/w gas meter. Distribution of natural gas to Level 4 to feed gas fired HVAC equipment. Piping to be schd 40 black malleable. Piping 50mm and smaller to be screwed, 65mm and over to be welded.		1.0	allow	\$ 65,000.00	\$ 65,000.00	
C116 Fuel Oil						\$ 80,475.00
.1 Double wall fuel storage tank, control center 450 kW generator, assume 1000 gal tank.		1.0	ea	\$ 5,800.00	\$ 5,800.00	
.2 Double wall fuel storage tank, 800 kW generator, assume 2000 gal tank.		1.0	ea	\$ 9,675.00	\$ 9,675.00	
.2 FO transfer pumps, filters, piping and accessories.		1	allow	\$ 65,000.00	\$ 65,000.00	
C117 Misc Works and General Accounts						\$ 43,067.30
.1 Clean-up, HASSSP, rentals, small tools, fire stopping, permits, inspections, bonding and insurance, site trailer.		1.0	allow	\$ 43,067.30	\$ 43,067.30	
C12 Fire Protection						\$ 404,751.72
C121 Sprinklers						\$ 404,751.72
.1 Combined wet pipe sprinkler/standpipe system including pumping equipment.		117,288	ft2	\$ 3.27	\$ 383,531.37	
.2 Assume a pre-action sprinkler system [REDACTED]		4,613.12	ft2	\$ 4.60	\$ 21,220.35	
.3 Extinguishers, and all misc works included in the rates						

TAKE-OFF

EC1 - Admin HO

18 May 2016

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
above.						
C13 Heating, Ventilation & Air Conditioning						\$ 2,762,130.00
<u>C131 Liquid Heat Transfer (Heating)</u>						\$ 316,000.00
.1 Gas fired, high efficiency condensing boilers		2	ea	\$ 65,000.00	\$ 130,000.00	
.2 Venting and accessories.		1	allow	\$ 36,000.00	\$ 36,000.00	
.3 Heating water pumping (primary/secondary), assume verticle in-line.		1	allow	\$ 30,000.00	\$ 30,000.00	
.3 Allowance - perimeter Hydronic Heating.		1	allow	\$ 120,000.00	\$ 120,000.00	
<u>C132 Liquid Heat Transfer (Cooling)</u>						\$ 770,000.00
.1 Chiller(s), valving, VFD's and headers.		1	allow	\$ 250,000.00	\$ 250,000.00	
.2 Geothermal piping and distribution system.		1	allow	\$ 260,000.00	\$ 260,000.00	
.3 Chilled/Condenser distribution piping inc insulation		1	allow	\$ 260,000.00	\$ 260,000.00	
<u>C133 Air Distribution</u>						\$ 1,335,000.00
.1 Typical Floors - PH roof mounted VAV AHU system, heating/cooling coils, DDC controls, includes dist ductwork (20 cfm/person minimum).		1	allow	\$ 1,100,000.00	\$ 1,100,000.00	
.2 CRAC units, Data Hall, including remote condenser and interconnecting piping.		2	ea	\$ 86,000.00	\$ 172,000.00	
.3 Elevator machine room, telephone & comms rooms cooling.		1	allow	\$ 25,000.00	\$ 25,000.00	
.4 Comerical kitchen make-up air unit and distribution ductwork, grilles and diffusers (Lower Level commercial kitchen).		1	allow	\$ 38,000.00	\$ 38,000.00	
<u>C134 Exhaust Systems</u>						\$ 209,600.00
.1 Misc systems - ventilation, stairwell and washroom exhaust.		1	allow	\$ 65,000.00	\$ 65,000.00	
.2 Generator exhaust muffler and venting (labour only).		1	allow	\$ 12,600.00	\$ 12,600.00	
.3 Commercial kitchen range hood c/w fire protection system.		1	ea	\$ 70,000.00	\$ 70,000.00	
.4 Commercial grease duct, firewrap insulation and NFPA exhaust fan extraction system.		1	allow	\$ 62,000.00	\$ 62,000.00	
<u>C136 Misc Works and General Accounts</u>						\$ 131,530.00
.1 Clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, fire stopping.		1	allow	\$ 131,530.00	\$ 131,530.00	
C14 EMCS Controls						\$ 280,625.00

TAKE-OFF

EC1 - Admin HO

18 May 2016

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
<u>C141 Controls and Automation</u>						\$ 280,625.00
.1 Assume EMCS Interfacing with building AHU's, DHWT's, pumps, heating and cooling systems, energy management.		11,225.00	m2	\$ 25.00	\$ 280,625.00	
C2 Electrical						
C21 Service & Distribution						\$ 1,852,557.00
<u>C211 Equipment</u>						\$ 240,000.00
.1 Switchboard - Assume 600A, 600/347V, 3ph, 4W. Main breaker digital metering, ammeter, voltmeter, selector switch.		1	ea	\$ 240,000.00	\$ 240,000.00	
.2 Incoming service by HOL.					\$ -	
<u>C212 Emergency Power</u>						\$ 527,840.00
.1 Emergency generator - including battery, charger, muffler and distribution, 450kW control center.		1	ea	\$ 116,100.00	\$ 116,100.00	
.2 Emergency generator - including battery, charger, muffler and distribution, 800kW Admin Building.		1	ea	\$ 219,440.00	\$ 219,440.00	
.3 800A Automatic Transfer Switch.		2	ea	\$ 13,200.00	\$ 26,400.00	
.4 400A Automatic Transfer Switch.		2	ea	\$ 7,950.00	\$ 15,900.00	
.5 Disconnects, wiring, accessories.		1	allow	\$ 150,000.00	\$ 150,000.00	
<u>C213 Distribution</u>						\$ 575,000.00
.1 Lighting panels, power panels, transformers, digital metering.		1	allow	\$ 575,000.00	\$ 575,000.00	
<u>C214 Feeders</u>						\$ 150,000.00
.1 Main feeders.		1	allow	\$ 150,000.00	\$ 150,000.00	
<u>C215 Motor Controls & Wiring</u>						\$ 196,500.00
.1 Main MCC's for mechanical equipment including starters. Any VFD's required are in mechanical pricing. All power wiring to mechanical equipment included.		1	allow	\$ 196,500.00	\$ 196,500.00	
<u>C216 Grounding & Lightning Protection</u>						\$ 75,000.00
.1 Electrical grounding & lightning protection.		1	allow	\$ 75,000.00	\$ 75,000.00	
<u>C216 Misc Works and General Accounts</u>						\$ 88,217.00
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer, fire stopping		1	allow	\$ 88,217.00	\$ 88,217.00	

TAKE-OFF

EC1 - Admin HO

18 May 2016

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
C22 Lighting, Devices and Heating						\$ 676,096.84
<u>C221 Lighting</u>						\$ 468,901.75
.1 Assume energy efficient, recessed, mounted on grid ceiling suspension system, electronic ballasts, acrylic prismatic diffusers.		11,225.00	m2	\$ 27.43	\$ 307,901.75	
.2 Allowance - specialty lighting (pots, LED's in common areas).		1	allow	\$ 86,000.00	\$ 86,000.00	
.3 Exit and emergency lighting.		1	allow	\$ 75,000.00	\$ 75,000.00	
<u>C222 Branch Devices & Wiring</u>						\$ 150,000.00
.1 All conduit systems concealed all finished areas.		1	allow	\$ 150,000.00	\$ 150,000.00	
<u>C223 Heating</u>						\$ 25,000.00
.1 Supplementary units inside vestibules & mech rms.		1	allow	\$ 25,000.00	\$ 25,000.00	
<u>C224 Misc Works and General Accounts</u>						\$ 32,195.09
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer, fire stopping		1	allow	\$ 32,195.09	\$ 32,195.09	
C23 Systems & Ancillaries						\$ 351,348.11
<u>C231 Fire Alarm</u>						\$ 334,617.25
.1 Addressable 2-stage FA system c/w remote annunciator panels, manual pull stations, signal speakers throughout		11,225.00	m2	\$ 29.81	\$ 334,617.25	
<u>C232 Security System</u>						\$ -
.1 Cash allowance.			m2		\$ -	
<u>C233 Communications</u>						\$ -
.1 Cash allowance.			m2		\$ -	
<u>C234 Public Address & AV</u>						\$ -
.1 Cash allowance.			m2		\$ -	
<u>C235 Miscellaneous</u>						\$ -
.1 No requirement.		0	allow	\$ -	\$ -	
<u>C236 General Requirements</u>						\$ 16,730.86
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer,		1	allow	\$ 16,730.86	\$ 16,730.86	
D. SITE & ANCILLARY WORK						
D1 SITE WORK						

TAKE-OFF

EC1 - Admin HO

18 May 2016

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
D11 Site Development						\$ 3,070,837.70
<u>D111 Preparation</u>						\$ 98,000.00
.1 Site preparation		1	LS	\$ 98,000.00	\$ 98,000.00	
<u>D112 Hard Surfaces</u>						\$ 1,650,646.50
.1 Parking Lot (HO Employee Parking)		438	car	\$ 1,600.00	\$ 700,800.00	
.2 Contractor and Visitor Parking		15	car	\$ 1,600.00	\$ 24,000.00	
.3 Visitor Parking		32	car	\$ 1,600.00	\$ 51,200.00	
.4 Handicap Parking		9	car	\$ 2,300.00	\$ 20,700.00	
.5 Concrete Pavement - 125 thick with mesh		1,247	m²	\$ 84.00	\$ 104,748.00	
.6 Concrete curb		1,106	m	\$ 44.00	\$ 48,664.00	
.7 Heavy Duty Asphalt		9,235	m²	\$ 59.00	\$ 544,847.30	
.8 Light Duty Asphalt		1,911	m²	\$ 42.00	\$ 80,274.60	
.9 Concrete Sidewalk - 100 thick		342	m²	\$ 55.00	\$ 18,782.50	
.10 Concrete slab at building entrance		229	m²	\$ 98.00	\$ 22,412.60	
.11 Heated Entrance Pad		94	m²	\$ 145.00	\$ 13,586.50	
.12 Unit Pavers		150	m²	\$ 138.00	\$ 20,631.00	
<u>D113 Improvements</u>						\$ 1,163,509.20
.1 Flagpoles - Aluminum 11m (35') high include concrete base		1	ea	\$ 5,460.00	\$ 5,460.00	
.2 Chain Link Fence 2.4m high		995	m	\$ 197.00	\$ 196,054.40	
.3 Architectural Fence 1.83m high		442	m	\$ 150.00	\$ 66,345.00	
.4 Electric gate		2	ea	\$ 58,000.00	\$ 116,000.00	
.5 Traffic Arms		2	set	\$ 4,400.00	\$ 8,800.00	
.6 HOL Sign (covered by Cash Allowance)		1	m		\$ -	
.7 Second exit with guardrails		1	ea	\$ 300,000.00	\$ 300,000.00	
.8 Traffic light at intersection		1	ea	\$ 400,000.00	\$ 400,000.00	
.9 Waste Bin Enclosures		24	m	\$ 246.00	\$ 5,977.80	
.10 Retaining Wall		64	m	\$ 1,020.00	\$ 64,872.00	
<u>D114 Landscaping</u>						\$ 158,682.00
.1 Tree and Shrub allowance		1	LS	\$ 120,000.00	\$ 120,000.00	
.2 No Mow Mix		6,447	m²	\$ 6.00	\$ 38,682.00	

TAKE-OFF

EC1 - Admin HO

18 May 2016

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
D12 Mechanical Site Services						\$ 342,738.00
.1 Watermain Pipes - assume 200		435	m	\$ 130.00	\$ 56,576.00	
Firehydrant		2	ea	\$ 4,440.00	\$ 8,880.00	
150 Sanitary		458	m	\$ 105.00	\$ 48,132.00	
Sanitary pump station		1	ea	\$ 30,000.00	\$ 30,000.00	
375 STM - HDPE		865	m	\$ 150.00	\$ 129,750.00	
SAN manhole		4	ea	\$ 1,900.00	\$ 7,600.00	
CB		9	ea	\$ 1,800.00	\$ 16,200.00	
CB/MH		12	ea	\$ 3,800.00	\$ 45,600.00	
D13 Electrical Site Services						\$ 785,800.00
.1 4 x 150mm PVC ducts concrete encased duct bank for primary M.V. cables and padmount transformer base with grounding		1	allow	\$ 200,000.00	\$ 200,000.00	
.2 Secondary power cable - 8 x 100mm PVC duct bank		120	m	\$ 280.00	\$ 33,600.00	
.3 Power and Comms duct bank to signage		60	m	\$ 250.00	\$ 15,000.00	
.4 Fiber Optic duct bank to telecom vault		60	m	\$ 120.00	\$ 7,200.00	
.5 On site Servicing cost		1	LS	\$ 300,000.00	\$ 300,000.00	
.6 Solar panel ductbank distribution		1	LS	\$ 50,000.00	\$ 50,000.00	
.7 Lighting - parking lots and building		1	LS	\$ 180,000.00	\$ 180,000.00	
Z. GENERAL REQUIREMENTS & ALLOWANCES						
Z1 GENERAL REQUIREMENTS & FEE						
Z11 General Requirements						\$ 3,948,194.98
Z111 Design Fees (6%)			LS	\$ 1,424,323.12		
Z112 Design Honorarium			LS	\$ 150,000.00		
Z113 General Conditions (10.0%)			LS	\$ 2,373,871.86		
Z12 Fee						\$ 830,607.41
.1 G.C. Overhead and Profit (3.0%)			LS	\$ 830,607.41		
Z2 ALLOWANCES						
Z21 Risk Allowance (2%)			LS	\$ 570,350.42		\$ 570,350.42
Z22 Escalation Allowance			LS	\$ -		\$ -

TAKE-OFF

EC1 - Admin HO

18 May 2016

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
TOTAL						\$ 29,087,871.46

TAKE-OFF

EC2 - Garage and Material Management

18 May 16

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
A. SHELL						
A1 SUBSTRUCTURE						
A11 Foundations						\$ 696,416.12
<u>A111 Standard Foundations</u>						\$ 696,416.12
.1 Garage: Poured concrete conventional strip and pad footings, piers, tie beams and foundation walls based on a building footprint of 3,460 m ² bear on engineered fill		3,460.0	m ²	\$ 110.00	\$ 380,600.00	
.2 Material Management: Poured concrete conventional strip and pad footings concrete piers and foundation walls based on a building footprint of 1,903 m ² bear on engineered fill		1,903.0	m ²	\$ 145.00	\$ 275,935.00	
.3 Perimeter drainage		343	m	\$ 30.00	\$ 10,278.00	
.4 Perimeter Rigid Insulation 50 mm		565.29	m ²	\$ 28.00	\$ 15,828.12	
.5 Allowance for reinforcing dowels		5.00	TN	\$ 2,755.00	\$ 13,775.00	
<u>A112 Special Foundations</u>						\$ -
Assume none required.						
A12 Excavation						\$ 675,630.00
.1 Excavation and Backfill		7,507	m ²	\$ 90.00	\$ 675,630.00	
A2 STRUCTURE						
A21 Lowest Floor Construction						\$ 537,848.56
.1 Slab on Grade - 175 thick in Garage		65.8	m ³	\$ 596.74		\$ 39,255.24
Fine grade 3 passes with grader and roller		375.9	m ²	\$ 3.00	\$ 1,127.70	
300 mm Granular A sub base		112.8	m ³	\$ 60.00	\$ 6,766.20	
Vapour Barrier		375.9	m ²	\$ 3.05	\$ 1,146.50	
152 x 152 Mesh Re-inforcement		375.9	m ²	\$ 10.00	\$ 3,759.00	
Concrete (35 MPa) - direct chute		65.8	m ³	\$ 282.00	\$ 18,550.67	
Saw cut and control joints		375.9	m ²	\$ 4.00	\$ 1,503.60	
Cure with spray membrane curing compound		375.9	m ²	\$ 3.03	\$ 1,138.98	
Finishing floor, monolithic steel trowel		375.9	m ²	\$ 14.00	\$ 5,262.60	
.2 Slab on Grade - 175 thick - Sloped (in Garage)		533.0	m ³	\$ 661.89		\$ 352,771.85
Fine grade 3 passes with grader and roller		3,045.6	m ²	\$ 6.00	\$ 18,273.60	
300 mm Granular A sub base		913.7	m ³	\$ 60.00	\$ 54,820.80	
Vapour Barrier		3,045.6	m ²	\$ 3.05	\$ 9,289.08	
152 x 152 Mesh Re-inforcement		3,045.6	m ²	\$ 10.00	\$ 30,456.00	
Concrete (35 MPa) - direct chute		533.0	m ³	\$ 330.00	\$ 175,883.40	
Saw cut and control joints		3,045.6	m ²	\$ 4.00	\$ 12,182.40	
Cure with spray membrane curing compound		3,045.6	m ²	\$ 3.03	\$ 9,228.17	
Finishing floor, monolithic steel trowel		3,045.6	m ²	\$ 14.00	\$ 42,638.40	
.3 Slab on Grade - 125 thick Unreinforced (in Material Management)		224.2	m ³	\$ 620.64		\$ 139,131.97
Fine grade 3 passes with grader and roller		1,793.4	m ²	\$ 3.00	\$ 5,380.20	
300 mm Granular A sub base		538.0	m ³	\$ 60.00	\$ 32,281.20	
Vapour Barrier		1,793.4	m ²	\$ 3.05	\$ 5,469.87	
Concrete (25 MPa) - direct chute		224.2	m ³	\$ 260.00	\$ 58,285.50	
Saw cut and control joints		1,793.4	m ²	\$ 4.00	\$ 7,173.60	

TAKE-OFF

EC2 - Garage and Material Management

18 May 16

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
Cure with spray membrane curing compound		1,793.4	m²	\$ 3.03	\$ 5,434.00	
Finishing floor, monolithic steel trowel		1,793.4	m²	\$ 14.00	\$ 25,107.60	
.4 Slab thickening below masonry block walls		78.7	m	\$ 85.00	\$ 6,689.50	
A22 Upper Floor Construction						\$ 1,649,734.00
<u>A221 Upper Floor Construction</u>						\$ -
<u>A222 Stair Construction</u>						\$ -
<u>A223 Roof Construction</u>						\$ 1,649,734.00
.1 Structural steel roof construction - Mat. Management Roof		1,903.0	m²	\$ 180.08		\$ 342,694.00
base plates and anchor bolts		11	No.	\$ 360.00	\$ 3,960.00	
structural steel columns (1.5Kg/m2)		2.9	TN	\$ 4,000.00	\$ 11,418.00	
structural steel beams (6Kg/m2)		11.4	TN	\$ 4,000.00	\$ 45,672.00	
open web steel joists - 750 Deep (18Kg/m2)		34.3	TN	\$ 4,000.00	\$ 137,016.00	
bridging, girt and bracing (4Kg/m2)		7.6	TN	\$ 4,000.00	\$ 30,448.00	
38mm metal deck - 1.21 thick		1,903.0	m²	\$ 60.00	\$ 114,180.00	
.2 Roof Safety Anchors c/w cable system		6	ea	\$ 2,550.00	\$ 15,300.00	
.3 Pre-Engineered Building - Garage		3,460.0	m²	\$ 369.00	\$ 1,276,740.00	
12 m to T/O Steel Structure						
c/w pre-fab insulated metal wall panel assembly						
203mm Z-Girts w PVC Thermal Break						
Pre-fab insulated roof panel assembly						
.4 Allowance for roof openings framing		1	LS	\$ 3,000.00	\$ 3,000.00	
.5 Structural reinforcement for mechanical equipment		1	LS	\$ 12,000.00	\$ 12,000.00	
A3 EXTERIOR ENCLOSURE						
A31 Walls Below Grade						\$ -
A311 Structural Walls Below Grade						
A32 Walls Above Grade						\$ 194,085.73
A321 Walls Above Grade						\$ 194,085.73
.1 MP1A Wall Assembly (Material Management)		357.10	m²	\$ 298.34		\$ 106,537.21
35mm Prefinished Horizontal Siding		357.10	m²	\$ 68.90	\$ 24,604.19	
Z-Girts w PVC Thermal Break		357.10	m²	\$ 45.00	\$ 16,069.50	
127 Mineral Wool Insulation		357.10	m²	\$ 14.54	\$ 5,192.23	
Membrane Air/Vapour Barrier		357.10	m²	\$ 2.50	\$ 892.75	
190mm Lightweight Concrete Block		357.10	m²	\$ 167.40	\$ 59,778.54	
.2 MP1B Wall Assembly (Material Management)		127.00	m²	\$ 341.40		\$ 43,357.80
35mm Prefinished Horizontal Siding		127.00	m²	\$ 68.90	\$ 8,750.30	
Z-Girts w PVC Thermal Break		127.00	m²	\$ 45.00	\$ 5,715.00	
127 Mineral Wool Insulation		127.00	m²	\$ 14.54	\$ 1,846.58	
Membrane Air/Vapour Barrier		127.00	m²	\$ 2.50	\$ 317.50	
190mm Lightweight Concrete Block		127.00	m²	\$ 167.40	\$ 21,259.80	
Furring and Drywall		127.00	m²	\$ 35.00	\$ 4,445.00	
Paint Finish		127.00	m²	\$ 8.06	\$ 1,023.62	
.3 MP1 Wall Assembly (Office)		201.60	m²	\$ 219.20		\$ 44,190.72
35mm Prefinished Horizontal Siding		201.60	m²	\$ 68.90	\$ 13,890.24	

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EC2 - Garage and Material Management

18 May 16

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
Z-Girts w PVC Thermal Break		201.60	m ²	\$ 45.00	\$ 9,072.00	
127 Mineral Wool Insulation		201.60	m ²	\$ 14.54	\$ 2,931.26	
Membrane Air/Vapour Barrier		201.60	m ²	\$ 2.50	\$ 504.00	
16mm Glass Matt Gypsum Sheathing		201.60	m ²	\$ 23.50	\$ 4,737.60	
152 Wind Bearing Metal Stud Wall Framing		201.60	m ²	\$ 29.70	\$ 5,987.52	
50mm Mineral Wool Insulation		201.60	m ²	\$ 8.50	\$ 1,713.60	
16mm Gypsum Board		201.60	m ²	\$ 18.50	\$ 3,729.60	
Paint Finish		201.60	m ²	\$ 8.06	\$ 1,624.90	
A33 Windows and Entrance						\$ 140,200.00
<u>A331 Windows and Louvres</u>						\$ 55,400.00
.1 Glazing - Exterior Windows		97.80	m ²	\$ 500.00	\$ 48,900.00	
.2 Louvres for mechanical rooms - allowance		10.0	m ²	\$ 650.00	\$ 6,500.00	
<u>A333 Doors</u>						\$ 84,800.00
.1 Pressed steel frames and hollow metal doors Include Hardware and Painting						
Single		8	Ea	\$ 1,900.00	\$ 15,200.00	
Double		1	Pair	\$ 3,100.00	\$ 3,100.00	
.2 Entrance glazed unit with sidelites		4	ea	\$ 3,900.00	\$ 15,600.00	
.3 Overhead doors (6,096 x 4,876) - Garage		2	Ea	\$ 18,500.00	\$ 37,000.00	
.4 Overhead doors (3,048 x 3,658) - Material Management		1	Ea	\$ 7,500.00	\$ 7,500.00	
.6 Barrier free door operators - assumed		2	Ea	\$ 3,200.00	\$ 6,400.00	
A34 Roof Covering						\$ 302,241.39
<u>A341 Roofing</u>						\$ 302,241.39
.1 SBS Modified Bituminous Roofing (Material Management)		1,818.30	m ²	\$ 150.00	\$ 272,745.00	
.2 Tapered insulation to attain roof slopes - (5%) allowance		90.92	m ²	\$ 19.00	\$ 1,727.39	
.3 Scupper		6.00	ea	\$ 560.00	\$ 3,360.00	
.4 Flashing		174.00	m ²	\$ 96.00	\$ 16,704.00	
.5 Roof Hatches		1	Ea	\$ 3,000.00	\$ 3,000.00	
.6 Pre-finished Aluminum Gutter		94	m	\$ 50.00	\$ 4,705.00	
.7 Pre-eng building roof covering included in Upper Floor Construction						
<u>A342 Skylights and Roof Glazing</u>						\$ -
None						
A35 Projection						\$ -
None						
B. INTERIORS						
B1 PARTITIONS & DOORS						
B11 Partitions						\$ 294,860.51

TAKE-OFF

EC2 - Garage and Material Management

18 May 16

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
B111 Fixed Partitions						\$ 268,220.51
.1 L3 Wall Type		29.52	m²	\$ 93.02		\$ 2,745.95
16mm Gypsum		29.52	m²	\$ 18.50	\$ 546.12	
92 metal stud (20ga) @ 400 oc		29.52	m²	\$ 19.51	\$ 575.94	
Acoustic Batt		29.52	m²	\$ 8.50	\$ 250.92	
Sapce			m²	\$ -	\$ -	
Acoustic Batt		29.52	m²	\$ 8.50	\$ 250.92	
92 metal stud (20ga) @ 400 oc		29.52	m²	\$ 19.51	\$ 575.94	
16mm Gypsum		29.52	m²	\$ 18.50	\$ 546.12	
.2 A6 Wall Type		699.61	m²	\$ 70.85		\$ 49,567.37
16mm Gypsum		699.61	m²	\$ 18.50	\$ 12,942.79	
150 metal stud (20ga) @ 400 oc		699.61	m²	\$ 25.35	\$ 17,735.11	
Acoustic Batt		699.61	m²	\$ 8.50	\$ 5,946.69	
16mm Gypsum		699.61	m²	\$ 18.50	\$ 12,942.79	
.3 A6 Wall Type - Fire Rated		44.24	m²	\$ 75.85		\$ 3,355.60
16mm Gypsum Type X		44.24	m²	\$ 21.00	\$ 929.04	
150 metal stud (20ga) @ 400 oc		44.24	m²	\$ 25.35	\$ 1,121.48	
Acoustic Batt		44.24	m²	\$ 8.50	\$ 376.04	
16mm Gypsum Type X		44.24	m²	\$ 21.00	\$ 929.04	
.4 B3 Wall Type		81.15	m²	\$ 65.01		\$ 5,275.56
16mm Gypsum		81.15	m²	\$ 18.50	\$ 1,501.28	
92 metal stud (20ga) @ 400 oc		81.15	m²	\$ 19.51	\$ 1,583.24	
Acoustic Batt		81.15	m²	\$ 8.50	\$ 689.78	
16mm Gypsum		81.15	m²	\$ 18.50	\$ 1,501.28	
.5 H2 Furred Wall		207.94	m²	\$ 34.99		\$ 7,275.82
16mm Gypsum		207.94	m²	\$ 18.50	\$ 3,846.89	
64 metal stud @ 400 oc		207.94	m²	\$ 16.49	\$ 3,428.93	
.6 H0 Furred Wall		62.14	m²	\$ 38.50		\$ 2,392.39
16mm Gypsum		62.14	m²	\$ 18.50	\$ 1,149.59	
Furring Channel		62.14	m²	\$ 20.00	\$ 1,242.80	
.7 E3 Furred Wall		21.65	m²	\$ 38.01		\$ 822.92
16mm Gypsum		21.65	m²	\$ 18.50	\$ 400.53	
92 metal stud (20ga) @ 400 oc		21.65	m²	\$ 19.51	\$ 422.39	
.8 Lightweight Concrete Block Wall - 190 mm, jointed and pointed		736.31	m²	\$ 167.40	\$ 123,258.29	
.9 Lightweight Concrete Block Wall Fire Rated - 190 mm, jointed and pointed		365.50	m²	\$ 178.00	\$ 65,059.00	
.10 Lightweight Concrete Block Wall - 290 mm, jointed and pointed		35.83	m²	\$ 220.00	\$ 7,882.60	
.11 Chain link fence - Warehouse		3.90	m	\$ 150.00	\$ 585.00	
B112 Movable Partitions						\$ 26,640.00
.1 movable partitions c/w structural steel support		22.20	m2	\$ 1,200.00	\$ 26,640.00	
B113 Structural Partitions						\$ -
B12 Doors						\$ 48,450.00
.1 Pressed Steel Frames and Hollow Metal Doors c/w hardware include painting						
Single		12	Ea	\$ 750.00	\$ 9,000.00	
Double		3	Ea	\$ 1,300.00	\$ 3,900.00	
Single with sidelite		7	Ea	\$ 1,050.00	\$ 7,350.00	

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EC2 - Garage and Material Management

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Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
Double with sidelite		2	Ea	\$ 1,900.00	\$ 3,800.00	
.2 Kitting Bay Sliding Doors		10	ea	\$ 1,500.00	\$ 15,000.00	
.3 Sliding Door - Double		1	ea	\$ 3,000.00	\$ 3,000.00	
.4 Barrier free automatic door openers - assume		2	ea	\$ 3,200.00	\$ 6,400.00	
B2 FINISHES						
B21 Floor Finishes						\$ 190,500.50
.1 Porcelain Tile Floor		303	m²	\$ 123.00	\$ 37,244.40	
.2 Carpet Tiles		583	m²	\$ 55.00	\$ 32,065.00	
.3 Vinyl Composite Tiles		17	m²	\$ 35.00	\$ 581.00	
.4 Anti Static Tiles		14	m²	\$ 129.00	\$ 1,793.10	
.5 Sealed Concrete		3,854	m²	\$ 20.00	\$ 77,080.00	
.6 Epoxy Floor		333	m²	\$ 86.00	\$ 28,638.00	
.7 Base						
i 108mm Rubber Base		536	m	\$ 10.50	\$ 5,628.00	
ii Porcelain Tile Base		241	m	\$ 31.00	\$ 7,471.00	
B22 Ceiling Finishes						\$ 88,145.60
.1 Gypsum Board Ceiling include Painting in washrooms		166.40	m²	\$ 75.50	\$ 12,563.20	
.2 Acoustical Suspended Ceiling		753.40	m²	\$ 40.00	\$ 30,136.00	
.3 Exposed Ceiling - Painted		4,208.00	m²	\$ 10.80	\$ 45,446.40	
B23 Wall Finishes						\$ 66,476.00
.1 Paint Finish		4,000.00	m²	\$ 8.60	\$ 34,400.00	
.2 Porcelain Wall Tiles in washrooms and showers		297.00	m²	\$ 108.00	\$ 32,076.00	
B3 Fittings & Equipment						
B31 Fittings and Fixtures						\$ 62,367.00
<u>B311 Metals</u>						\$ 22,580.00
.1 Service ladders		1	Ea	\$ 3,500.00	\$ 3,500.00	
.2 Metal guardrails in Garage		24.0	m	\$ 170.00	\$ 4,080.00	
.3 Miscellaneous metal - Allowance		1	LS	\$ 15,000.00	\$ 15,000.00	
<u>B312 Millwork</u>						\$ 12,960.00
.1 Typical kitchen upper and lower cabinet c/w countertop		3.60	m	\$ 1,400.00	\$ 5,040.00	
.2 Washroom vanity and counter		9.90	m	\$ 800.00	\$ 7,920.00	
<u>B313 Specialties</u>						\$ 21,937.00

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EC2 - Garage and Material Management

18 May 16

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.1 Toilet Compartment - Metal Ceiling Hung		4	ea	\$ 1,037.00	\$ 4,148.00	
.2 Hadicapped Toilet Compartment		2	ea	\$ 1,685.00	\$ 3,370.00	
.3 Urinal Screen		5	ea	\$ 485.00	\$ 2,425.00	
.4 Toilet and Bath Accessories						
i Hand dryer		3	ea	\$ 450.00	\$ 1,350.00	
ii Paper towel dispenser - assumed		3	ea	\$ 150.00	\$ 450.00	
iii Toilet paper dispenser		7	ea	\$ 50.00	\$ 350.00	
iv Soap dispenser		8	ea	\$ 75.00	\$ 600.00	
v Waste receptacle - wall mounted semi-recessed - assumed		3	ea	\$ 500.00	\$ 1,500.00	
vi Sanitary disposal		3	ea	\$ 200.00	\$ 600.00	
vii Tilted mirror		1	ea	\$ 250.00	\$ 250.00	
viii Shower Curtain		12	ea	\$ 120.00	\$ 1,440.00	
.5 Unframed Mirror in washrooms above vanities		11.88	m²	\$ 250.00	\$ 2,970.00	
.6 Entrance Floor Mats - Recessed		4.60	m²	\$ 540.00	\$ 2,484.00	
<u>B314 Furnishings</u>						\$ 4,890.00
.1 Window treatment - Allowance		97.80	m²	\$ 50.00	\$ 4,890.00	
B32 Equipment						\$ -
B33 Conveying Systems						
C. SERVICES						
C1 Mechanical						
C11 Plumbing and Drainage						\$ 235,609.23
<u>C111 Plumbing Fixtures</u>						\$ 73,966.74
.1 Water closets. Vitreous china, wall mounted fixtures with electronic flush valve. Water conservation type.		7.0	ea	\$ 2,336.90	\$ 16,358.30	
.2 Urinals. Vitreous china, wall hung type with electronic flush valve. Water conservation type.		4.0	ea	\$ 1,353.91	\$ 5,415.64	
.3 Lavatories. Vitreous china, above counter mounted type with electronic 4in center set faucets. Barrier free to be of same type per accessibility requirements.		7.0	ea	\$ 1,357.90	\$ 9,505.30	
.4 Service sinks. Standard, wall-hung, in universal W/R.		1.0	ea	\$ 1,620.00	\$ 1,620.00	
.5 Service sinks. Standard, stainless steel, counter-top double in kitchenettes.		1.0	ea	\$ 1,695.00	\$ 1,695.00	
.5 Custodial sinks. Stainless Steel, deep, floor mounted with braced hose faucet and trim.		1.0	ea	\$ 1,850.00	\$ 1,850.00	
.6 Drinking fountains. Assume barrier free recessed wall mounted, refrigerated, stainless steel, single bubbler.		1.0	allow	\$ 1,725.00	\$ 1,725.00	

TAKE-OFF

EC2 - Garage and Material Management

18 May 16

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.8 Showers, pre-formed, c/w trim, rough-in, receptor, thermostatic mixing valve.		9.0	ea	\$ 1,027.50	\$ 9,247.50	
.9 Shower, barrier free w/ fixed and handheld head,		3.0	ea	\$ 8,850.00	\$ 26,550.00	
<u>C112 Domestic Water</u>						\$ 26,500.00
.1 Domestic water service shall enter the building to serve domestic water and fire protection. Incoming service c/w backflow prevention and metering. Domestic hot water generated by gas fired cond boilers (included in HVAC). Thermal insulation included.		1.0	allow	\$ 24,000.00	\$ 24,000.00	
.2 Domestic water booster pumps and tanks.		1.0	allow	\$ 2,500.00	\$ 2,500.00	
<u>C113 Sanitary Waste & Vent</u>						\$ 101,883.00
.1 Sanitary system assume U/G to be PVC, while above grade piping shall be cast iron/copper DWV. Drains below the service entry shall be collected in sump pits c/w duplex submersible pumps (Assume 3 for this building). Thermal insulation included.		1.00	allow	\$ 13,183.00	\$ 13,183.00	
.2 Drain, trench, polyester polymer for cement concrete encasement, 300mm internal width, with grate		177.40	m	\$ 500.00	\$ 88,700.00	
<u>C114 Storm</u>						\$ 14,540.00
.1 Storm system shall include control flow type roof drains. U/G storm collection in PVC. Cast iron above grade. Weeping tile collected into sumps, then transferred to sump pits c/w duplex submersible pumps. Thermal insulation included. PVC Jacketed in exposed areas.		1.0	allow	\$ 14,540.00	\$ 14,540.00	
<u>C115 Natural Gas</u>						\$ 7,500.00
.1 Incoming gas service c/w gas meter. Distribution of natural gas to centralized mechanical PH to feed gas fired HVAC equipment. Piping to be schd 40 black malleable. Piping 50mm and smaller to be screwed, 65mm and over to be welded.		1.0	allow	\$ 7,500.00	\$ 7,500.00	
<u>C116 Fuel Oil</u>						\$ -
.1 Assume no requirement - all emergency power from EC1.		-	allow	\$ -	\$ -	
<u>C117 Misc Works and General Accounts</u>						\$ 11,219.49
.1 Clean-up, HASSSP, rentals, small tools, fire stopping, permits, inspections, bonding and insurance, site trailer.		1.0	allow	\$ 11,219.49	\$ 11,219.49	
C12 Fire Protection						\$ 170,273.55
<u>C121 Sprinklers</u>						\$ 170,273.55
.1 Combined wet pipe sprinkler/standpipe system including pumping equipment, material management and admin areas.		16,000.00	SF	\$ 3.27	\$ 52,320.00	
.2 Dry pipe system, Garage area.		37,092.31	SF	\$ 3.18	\$ 117,953.55	

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EC2 - Garage and Material Management

18 May 16

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.3 Extinguishers, and all misc works included in the rates above.						
C13 Heating, Ventilation & Air Conditioning						\$ 317,118.00
<u>C131 Liquid Heat Transfer (Heating)</u>						\$ 13,650.00
.1 Gas fired, high efficiency hot water heaters		2	allow	\$ 4,400.00	\$ 8,800.00	
.2 Venting and accessories.		1	allow	\$ 3,600.00	\$ 3,600.00	
.3 Heating water pumping (primary/secondary), assume verticle in-line.		1	allow	\$ 1,250.00	\$ 1,250.00	
<u>C132 Liquid Heat Transfer (Cooling)</u>						\$ -
.1 Assume no requirement.		0	allow	\$ -	\$ -	
<u>C133 Air Distribution</u>						\$ 284,950.00
.1 RTU EC2-1, 35,000 cfm Garage service, gas fired burner, two stage high eff elec cooling, supply/return fans on VFD.		1	ea	\$ 99,500.00	\$ 99,500.00	
.2 RTU EC2-2, 10,500 cfm Admin area service, gas fired burner, two stage high eff elec cooling, supply/return fans on VFD.		1	ea	\$ 35,000.00	\$ 35,000.00	
.3 RTU EC2-3, 10,500 cfm mat mngmt service, gas fired burner, two stage high eff elec cooling, supply/return fans on VFD.		1	ea	\$ 35,000.00	\$ 35,000.00	
.4 Distribution Ductwork for RTU's.		1	allow	\$ 90,000.00	\$ 90,000.00	
.5 Perimeter wall/window ceiling mounted fan powered boxes c/w hot water heating coils.		1	allow	\$ 17,250.00	\$ 17,250.00	
.6 Gas fired unit heaters.		8	ea	\$ 1,025.00	\$ 8,200.00	
<u>C134 Exhaust Systems</u>						\$ 12,300.00
.1 Misc systems - ventilation & washroom exhaust.		1	allow	\$ 12,300.00	\$ 12,300.00	
<u>C136 Misc Works and General Accounts</u>						\$ 6,218.00
.1 Clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, fire stopping.		1	allow	\$ 6,218.00	\$ 6,218.00	
C14 EMCS Controls						\$ 26,080.00
<u>C141 Controls and Automation</u>						\$ 26,080.00
.1 Assume EMCS Interfacing with building AHU's, DHWT's, pumps, heating and cooling systems, energy management - localised primarily to the admin area.		8,000.00	ft2	\$ 3.26	\$ 26,080.00	
C2 Electrical						
C21 Service & Distribution						\$ 578,114.25
<u>C211 Equipment</u>						\$ 45,900.00

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EC2 - Garage and Material Management

18 May 16

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.1 Switchboard - Assume 600A, 600/347V, 3ph, 4W. Main breaker digital metering, ammeter, voltmeter, selector switch.		1	ea	\$ 45,900.00	\$ 45,900.00	
.2 Incoming service by HOL.					\$ -	
<u>C212 Emergency Power</u>						\$ 235,000.00
.1 Emergency generator - including battery, charger, muffler and distribution.		1	allow	\$ 165,000.00	\$ 165,000.00	
.2 600A Automatic Transfer Switch.		2	allow	\$ 35,000.00	\$ 70,000.00	
<u>C213 Distribution</u>						\$ 165,000.00
.1 Lighting panels, power panels, transformers, digital metering.		1	allow	\$ 165,000.00	\$ 165,000.00	
<u>C214 Feeders</u>						\$ 37,960.00
.1 Main feeders.		1	allow	\$ 37,960.00	\$ 37,960.00	
<u>C215 Motor Controls & Wiring</u>						\$ 43,225.00
.1 Main MCC's for mechanical equipment including starters. Any VFD's required are in mechanical pricing. All power wiring to mechanical equipment included.		1	allow	\$ 43,225.00	\$ 43,225.00	
<u>C216 Grounding & Lightning Protection</u>						\$ 23,500.00
.1 Electrical grounding & lightning protection.		1	allow	\$ 23,500.00	\$ 23,500.00	
<u>C216 Misc Works and General Accounts</u>						\$ 27,529.25
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer, fire stopping		1	allow	\$ 27,529.25	\$ 27,529.25	
C22 Lighting, Devices and Heating						\$ 218,353.00
<u>C221 Lighting</u>						\$ 165,455.24
.1 Assume energy efficient, recessed, mounted on grid ceiling suspension system, electronic ballasts, acrylic prismatic diffusers.		16,000.00	ft2	\$ 3.63	\$ 58,080.00	
.2 High bay lighting, Garage.		37092.31	ft2	\$ 2.44	\$ 90,505.24	
.3 Allowance - specialty lighting (pots, LED's in common areas).		1	allow	\$ 9,370.00	\$ 9,370.00	
.4 Exit and emergency lighting.		1	allow	\$ 7,500.00	\$ 7,500.00	
<u>C222 Branch Devices & Wiring</u>						\$ 35,000.00
.1 All conduit systems concealed all finished areas.		1	allow	\$ 35,000.00	\$ 35,000.00	
<u>C223 Heating</u>						\$ 7,500.00
.1 Supplementary units inside vestibules & mech rms.		1	allow	\$ 7,500.00	\$ 7,500.00	
<u>C224 Misc Works and General Accounts</u>						\$ 10,397.76

TAKE-OFF

EC2 - Garage and Material Management

18 May 16

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer, fire stopping		1	allow	\$ 10,397.76	\$ 10,397.76	
C23 Systems & Ancillaries						\$ 127,512.00
<u>C231 Fire Alarm</u>						\$ 121,440.00
.1 Addressable 2-stage FA system c/w remote annunciator panels, manual pull stations, signal speakers throughout		16,000.00	ft2	\$ 7.59	\$ 121,440.00	
<u>C232 Security System</u>						\$ -
.1 Cash allowance.			m2		\$ -	
<u>C233 Communications</u>						\$ -
.1 Cash allowance.			m2		\$ -	
<u>C234 Public Address & AV</u>						\$ -
.1 Cash allowance.			m2		\$ -	
<u>C235 Miscellaneous</u>						\$ -
.1 No requirement.		0	allow	\$ -	\$ -	
<u>C236 General Requirements</u>						\$ 6,072.00
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer,		1	allow	\$ 6,072.00	\$ 6,072.00	
D. SITE & ANCILLARY WORK						
D1 SITE WORK						
D11 Site Development						\$ 938,502.76
<u>D111 Preparation</u>						\$ 737,093.16
.1 Site preparation		1	LS	\$ 24,000.00	\$ 24,000.00	
.2 Dynamic compaction and placing a 1m thick engineered fill granular pad consisting of OPSS Granular B Type II material c/w geogrid liner		8,286	m²	\$ 86.06	\$ 713,093.16	
<u>D112 Hard Surfaces</u>						\$ 195,373.60
.1 EC2 Employee and Visitor Parking		48	car	\$ 1,600.00	\$ 76,800.00	
.2 Concrete Pavement - 125 thick with mesh		1,147	m²	\$ 84.00	\$ 96,322.80	
.3 Generator pad		44	m²	\$ 77.00	\$ 3,418.80	
.5 Concrete curb		428	m	\$ 44.00	\$ 18,832.00	
<u>D113 Improvements</u>						\$ -
Refer to EC1 Take-Off						
<u>D114 Landscaping</u>						\$ 6,036.00
.1 No Mow Mix		1,006	m²	\$ 6.00	\$ 6,036.00	

TAKE-OFF

EC2 - Garage and Material Management

18 May 16

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
D12 Mechanical Site Services						\$ 57,705.88
.1 Underslab passive ventilation system c/w a series of 150mm perforated , corrugated PVC pipes, a 10-mil poly liner and layers of clean sand, with 4 outlet pipes extending to roof level		5,363.00	m2	\$ 10.76	\$ 57,705.88	
D13 Electrical Site Services						\$ 60,720.00
.1 Lighting		1	LS	\$ 30,000.00	\$ 30,000.00	
.2 Secondary power cable ductbank		100	m	\$ 150.00	\$ 15,000.00	
.3 Communication ductbank		110	m	\$ 120.00	\$ 13,200.00	
.4 Power ductbank to parking lot		21	m	\$ 120.00	\$ 2,520.00	
Z. GENERAL REQUIREMENTS & ALLOWANCES						
Z1 GENERAL REQUIREMENTS & FEE						
Z11 General Requirements						\$ 1,228,311.05
Z111 Design Fees (6%)			LS		\$ 460,616.64	
Z112 General Conditions (10.0%)			LS		\$ 767,694.41	
Z12 Fee						\$ 267,157.65
.1 G.C. Overhead and Profit (3.0%)					\$ 267,157.65	
Z2 ALLOWANCES						
Z21 Risk Allowance (2%)					\$ 183,448.26	\$ 183,448.26
Z22 Escalation Allowance					\$ -	\$ -
TOTAL						\$ 9,355,861.02

TAKE-OFF

EC3 - PILC Building

18 May 2016

Description	No.	Dimensions			Quantity	Unit	Unit Price	Cost	TOTAL
		L	W	H					
A. SHELL									
A1 SUBSTRUCTURE									
A11 Foundations									\$ 144,093.00
<u>A111 Standard Foundations</u>									\$ 144,093.00
.1 Poured concrete conventional strip and pad footings, piers, tie beams and foundation walls based on a building footprint of 962.6 m² bear on engineered fill					962.6	m²	\$ 130.00	\$ 125,138.00	
.2 Perimeter drainage					162	m	\$ 30.00	\$ 4,860.00	
.3 Perimeter Rigid Insulation 50 mm		162		2.5	405.00	m²	\$ 28.00	\$ 11,340.00	
.4 Allowance for reinforcing dowels					1.00	TN	\$ 2,755.00	\$ 2,755.00	
<u>A112 Special Foundations</u>									\$ -
Assume none required.									
A12 Excavation									\$ 111,546.00
.10 Excavation and Backfill					1,239	m²	\$ 90.00	\$ 111,546.00	
A2 STRUCTURE									
A21 Lowest Floor Construction									\$ 124,981.61
.1 Slab on Grade - 200 thick		929.6		0.2	185.9	m³	\$ 562.23		\$ 104,530.41
Fine grade 3 passes with grader and roller					929.6	m²	\$ 3.00	\$ 2,788.80	
300 mm Granular A sub base		929.6		0.3	278.9	m³	\$ 60.00	\$ 16,732.80	
Extruded polystyrene XPS Insulation -50mm - perimeter					188.0	m²	\$ 28.00	\$ 5,264.00	
Vapour Barrier					929.6	m²	\$ 3.05	\$ 2,835.28	
15M @400 EW (assume 10kg/m2)					1.9	tn	\$ 2,652.00	\$ 4,930.60	
Concrete (35 MPa) - direct chute					185.9	m³	\$ 282.00	\$ 52,429.44	
Saw cut and control joints					929.6	m²	\$ 4.00	\$ 3,718.40	
Cure with spray membrane curing compound					929.6	m²	\$ 3.03	\$ 2,816.69	
Finishing floor, monolithic steel trowel					929.6	m²	\$ 14.00	\$ 13,014.40	
Concrete sealer					929.6	m²	\$ 22.00	\$ 20,451.20	
A22 Upper Floor Construction									\$ 389,853.00
<u>A221 Upper Floor Construction</u>									\$ 389,853.00
Pre-engineered steel building, clear span rigid frame 0.5mmthick coloured roofing and siding, 7.9m eave height Re-inforced for Crane					962.6	m²	\$ 405.00	\$ 389,853.00	
<u>A222 Stair Construction</u>									\$ -
<u>A223 Roof Construction</u>									\$ -
A3 EXTERIOR ENCLOSURE									
A31 Walls Below Grade									\$ -
A311 Structural Walls Below Grade									
A32 Walls Above Grade									\$ -
A321 Walls Above Grade									\$ -

TAKE-OFF

EC3 - PILC Building

18 May 2016

Description	No.	Dimensions			Quantity	Unit	Unit Price	Cost	TOTAL
		L	W	H					
A33 Windows and Entrance									\$ 41,810.00
<u>A331 Windows and Louvres</u>									\$ 6,110.00
.1 Louvres - allowance					9.4	m²	\$ 650.00	\$ 6,110.00	
<u>A333 Doors</u>									\$ 35,700.00
.1 Pressed steel frames and hollow metal doors Include Hardware and Painting					3	Ea	\$ 1,900.00	\$ 5,700.00	
Single					-	Pair	\$ 3,100.00	\$ -	
Double									
.2 Overhead doors (6096 x 4877)					2	Ea	\$ 15,000.00	\$ 30,000.00	
A34 Roof Covering									\$ 6,140.00
<u>A341 Roofing</u>									\$ 6,140.00
.1 Pre-finished Aluminum Gutter					123	m	\$ 50.00	\$ 6,140.00	
A35 Projection									\$ -
B. INTERIORS									
B1 PARTITIONS & DOORS									
B11 Partitions									\$ 2,516.02
<u>B111 Fixed Partitions</u>									\$ 2,516.02
.1 Lightweight Concrete Block Wall - 190 mm, jointed and pointed					15.03	m²	\$ 167.40	\$ 2,516.02	
<u>B112 Movable Partitions</u>									\$ -
<u>B113 Structural Partitions</u>									\$ -
B12 Doors									\$ 750.00
.1 Pressed Steel Frames and Hollow Metal Doors c/w hardware include painting					1	Ea	\$ 750.00	\$ 750.00	
Single									
B2 FINISHES									
B21 Floor Finishes									\$ -
B22 Ceiling Finishes									\$ 22,952.80
Exposed Ceiling - Painted					962.00	m²	\$ 10.80	\$ 10,389.60	
Gypsum Board Ceiling include Painting					166.40	m²	\$ 75.50	\$ 12,563.20	
B23 Wall Finishes									\$ -
B3 Fittings & Equipment									
B31 Fittings and Fixtures									\$ -

TAKE-OFF

EC3 - PILC Building

18 May 2016

Description	No.	Dimensions			Quantity	Unit	Unit Price	Cost	TOTAL
		L	W	H					
<u>B311 Metals</u>									\$ -
<u>B312 Millwork</u>									\$ -
<u>B313 Specialties</u>									\$ -
<u>B314 Furnishings</u>									\$ -
B32 Equipment									\$ 110,600.00
.1 Overhead Bridge Crane, under hung hoist, electric operating, 2 girder, Assume 7-ton, 13m span					1	ea	\$ 110,600.00	\$ 110,600.00	
B33 Conveying Systems									
C. SERVICES									
C1 Mechanical									
C11 Plumbing and Drainage									\$ 15,750.00
<u>C111 Plumbing Fixtures</u>									\$ -
.1 No requirement.						ea		\$ -	
<u>C112 Domestic Water</u>									\$ -
.1 No requirement.						allow		\$ -	
<u>C113 Sanitary Waste & Vent</u>									\$ -
.1 No requirement.						allow		\$ -	
<u>C114 Storm</u>									\$ -
.1 Assume no mechanical requirement, sloped roof construction with guttering.					1	allow	\$ -	\$ -	
<u>C115 Natural Gas</u>									\$ 15,000.00
.1 Incoming gas service c/w gas meter. Distribution of natural gas to centralized mechanical PH to feed gas fired HVAC equipment. Piping to be schd 40 black malleable. Piping 50mm and smaller to be screwed, 65mm and over to be welded.					1	allow	\$ 15,000.00	\$ 15,000.00	
<u>C116 Fuel Oil</u>									\$ -
.1 No requirement.						allow		\$ -	
<u>C117 Misc Works and General Accounts</u>									\$ 750.00
.1 Clean-up, HASSSP, rentals, small tools, fire stopping, permits, inspections, bonding and insurance, site trailer.					1.0	allow	\$ 750.00	\$ 750.00	
C12 Fire Protection									\$ 26,964.00
<u>C121 Sprinklers</u>									\$ 26,964.00
.1 Sprinkler system					963.00	m2	\$ 28.00	\$ 26,964.00	

TAKE-OFF

EC3 - PILC Building

18 May 2016

Description	No.	Dimensions			Quantity	Unit	Unit Price	Cost	TOTAL
		L	W	H					
C13 Heating, Ventilation & Air Conditioning									\$ 29,688.75
<u>C131 Liquid Heat Transfer (Heating)</u>									\$ -
.1 No requirement.					allow		\$ -		
<u>C132 Liquid Heat Transfer (Cooling)</u>									\$ -
.1 No requirement.					allow		\$ -		
<u>C133 Air Distribution</u>									\$ 22,275.00
.1 Gas fired unit heater. gas fired burner, two stage high eff elec cooling, supply/return fans on VFD.					11 ea	\$ 2,025.00	\$ 22,275.00		
<u>C134 Exhaust Systems</u>									\$ 6,000.00
.1 Exhaust fan c/w backdraft damper.					3 ea	\$ 2,000.00	\$ 6,000.00		
<u>C136 Misc Works and General Accounts</u>									\$ 1,413.75
.1 Clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, fire stopping.					1 allow	\$ 1,413.75	\$ 1,413.75		
C14 EMCS Controls									\$ -
<u>C141 Controls and Automation</u>									\$ -
.1 No requirement.					m2		\$ -		
C2 Electrical									
C21 Service & Distribution									\$ 37,800.00
<u>C211 Equipment</u>									\$ 25,000.00
.1 Assume power fed from EC1					1 ea	\$ 25,000.00	\$ 25,000.00		
.2 Incoming service by HOL.							\$ -		
<u>C212 Emergency Power</u>									\$ -
.1 Assume no requirement.					0 allow	\$ -	\$ -		
<u>C213 Distribution</u>									\$ 7,500.00
.1 Lighting panels, power panels, transformers, digital metering.					1 allow	\$ 7,500.00	\$ 7,500.00		
<u>C214 Feeders</u>									\$ -
.1 Main feeders.					allow		\$ -		
<u>C215 Motor Controls & Wiring</u>									\$ -
.1 Assume no MCC required.					1 allow	\$ -	\$ -		
<u>C216 Grounding & Lightning Protection</u>									\$ 3,500.00
.1 Electrical grounding & lightning protection.					1 allow	\$ 3,500.00	\$ 3,500.00		
<u>C216 Misc Works and General Accounts</u>									\$ 1,800.00
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer,					1 allow	\$ 1,800.00	\$ 1,800.00		

TAKE-OFF

EC3 - PILC Building

18 May 2016

Description	No.	Dimensions			Quantity	Unit	Unit Price	Cost	TOTAL
		L	W	H					
fire stopping									
C22 Lighting, Devices and Heating									\$ 33,089.64
<u>C221 Lighting</u>									\$ 27,013.94
.1 High Bay lighting.				~	10,763.91	ft2	\$ 2.44	\$ 26,263.94	
.2 Exit and emergency lighting.					1	allow	\$ 750.00	\$ 750.00	
<u>C222 Branch Devices & Wiring</u>									\$ 4,500.00
.1 All conduit systems concealed all finished areas.					1	allow	\$ 4,500.00	\$ 4,500.00	
<u>C223 Heating</u>									\$ -
.1 No requirement.						allow		\$ -	
<u>C224 Misc Works and General Accounts</u>									\$ 1,575.70
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer, fire stopping					1	allow	\$ 1,575.70	\$ 1,575.70	
C23 Systems & Ancillaries									\$ 33,950.70
<u>C231 Fire Alarm</u>									\$ 17,334.00
.1 Single stage addressable. No voice communication					963.00	m2	\$ 18.00	\$ 17,334.00	
<u>C232 Security System</u>									\$ -
.1 Cash allowance.						m2		\$ -	
<u>C233 Communications</u>									\$ 15,000.00
.1 Fibre optic for alarm, phone, wireless connection					1.00	allow	\$ 15,000.00	\$ 15,000.00	
<u>C234 Public Address & AV</u>									\$ -
.1 Cash allowance.						m2		\$ -	
<u>C235 Miscellaneous</u>									\$ -
.1 No requirement.					0	allow	\$ -	\$ -	
<u>C236 General Requirements</u>									\$ 1,616.70
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer,					1	allow	\$ 1,616.70	\$ 1,616.70	
D. SITE & ANCILLARY WORK									
D1 SITE WORK									
D11 Site Development									\$ 304,596.56
<u>D111 Preparation</u>									\$ 126,662.76
.1 Site preparation					1	LS	\$ 20,000.00	\$ 20,000.00	
.2 Dynamic compaction and placing a 1m thick engineered fill granular pad consisting of OPSS Granular B Type II material c/w geogrid liner					1,239	m2	\$ 86.06	\$ 106,662.76	
<u>D112 Hard Surfaces</u>									\$ -

TAKE-OFF

EC3 - PILC Building

18 May 2016

Description	No.	Dimensions			Quantity	Unit	Unit Price	Cost	TOTAL
		L	W	H					
<u>D113 Improvements</u>									\$ 177,933.80
.1 Gravel Yard					8,088	m2	\$ 22.00	\$ 177,933.80	
<u>D114 Landscaping</u>									\$ -
D12 Mechanical Site Services									\$ 10,357.58
.1 Underslab passive ventilation system c/w a series of 150mm perforated , corrugated PVC pipes, a 10-mil poly liner and layers of clean sand, with 4 outlet pipes extending to roof level					962.60	m2	\$ 10.76	\$ 10,357.58	
.2 Utilites - Refer to EC1 Take-Off					1	LS	\$ -	\$ -	
.3 Storm water management - Refer to EC1 Take-off					1	LS	\$ -	\$ -	
D13 Electrical Site Services									\$ 52,600.00
.1 Lighting					1	LS	\$ 10,000.00	\$ 10,000.00	
.2 Power duct bank from EC2					140	m	\$ 150.00	\$ 21,000.00	
.3 Communication Duct Bank					180	m	\$ 120.00	\$ 21,600.00	
Z. GENERAL REQUIREMENTS & ALLOWANCES									
Z1 GENERAL REQUIREMENTS & FEE									
Z11 General Requirements									\$ 240,006.34
Z111 Design Fees (6%)						LS		\$ 90,002.38	
Z112 General Conditions (10.0%)						LS		\$ 150,003.97	
Z12 Fee									\$ 52,201.38
.1 G.C. Overhead and Profit (3%)								\$ 52,201.38	
Z2 ALLOWANCES									
Z21 Risk Allowance (2%)						LS		\$ 35,844.95	\$ 35,844.95
Z22 Escalation Allowance						LS		\$ -	\$ -
TOTAL									\$ 1,828,092.33

SUMMARY

SC - OPS CENTRE

ELEMENTAL COST SUMMARY

Project: SC - OPS Building		Prepared by: F. Lo		Project No.		
GFA: 8,408.00 m²		Architect: HOK		Date: 2016-05-04		
Element/Sub-Element	Amount	Cost per m² Gross	Element Total	Cost per m² Gross	Cost per SF Gross	% of Cost by Element
A SHELL						
A1 Sub-Structural			1,614,462	192.02	17.85	8.9%
A11 Foundation	1,132,244	134.66				
A12 Excavation	482,218	57.35				
A2 Structure			3,517,882	418.40	38.89	19.4%
A21 Lowest Floor Construction	927,756	110.34				
A22 Upper Floor Construction	2,590,126	308.05				
A3 Exterior Enclosure			674,148	80.18	7.45	3.7%
A31 Walls Below Grade	0	0.00				
A32 Walls Above Grade	97,484	11.59				
A33 Windows and Entrances	165,350	19.67				
A34 Roof Covering	411,314	48.92				
A35 Projection	0	0.00				
B INTERIORS						
B1 Partitions & Doors			732,227	87.09	8.09	4.0%
B11 Partitions	662,627	78.81				
B12 Doors	69,600	8.28				
B2 Finishes			576,358	68.55	6.37	3.2%
B21 Floor Finishes	363,320	43.21				
B22 Ceiling Finishes	144,212	17.15				
B23 Wall Finishes	68,826	8.19				
B3 Fittings & Equipment			180,084	21.42	1.99	1.0%
B31 Fittings & Fixtures	57,084	6.79				
B32 Equipment	123,000	14.63				
B33 Conveying Systems	0	0.00				
C SERVICES						
C1 Mechanical			2,191,691	260.67	24.23	12.1%
C11 Plumbing & Drainage	522,073	62.09				
C12 Fire Protection	338,674	40.28				
C13 HVAC	1,174,340	139.67				
C14 Controls	156,604	18.63				

SUMMARY

SC - OPS CENTRE

C2 Electrical			1,848,173	219.81	20.43	10.2%
C21 Service & Distribution	1,162,050	138.21				
C22 Lighting, Devices & Heating	484,735	57.65				
C23 Systems & Ancillaries	201,388	23.95				
NET BUILDING COST - EXCLUDING SITE			11,335,027	1,348.12	125.31	63%
D SITE & ANCILLARY WORK						
D1 Site Work			3,535,291	420.47	39.08	19.5%
D11 Site Development	1,963,209	233.49				
D12 Mechanical Site Services	1,110,934	132.13				
D13 Electrical Site Services	461,148	54.85				
D2 Ancillary Work			0	0.00		0.0%
D21 Demolition	0					
D22 Alterations	0					
NET BUILDING COST - INCLUDING SITE			14,870,318	1,768.59	164.39	82%
Z GENERAL REQUIREMENTS & ALLOWANCES						
Z1 General Requirements & Fee			2,896,738	344.52	32.02	16.0%
Z11 General Requirements	2,379,251	282.97				
Z12 Fee	517,487	61.55				
Z2 Allowances			355,341	42.26	3.93	2.0%
Z21 Risk Allowance	355,341	42.26				
Z22 Escalation Allowance	0	0.00				
TOTAL HARD CONSTRUCTION ESTIMATE - EXCLUDING CONTINGENCIES			\$ 18,122,397	2,155.38	200.34	100%

SC2 - STORAGE SHED

ELEMENTAL COST SUMMARY

Project: SC2 STORAGE SHED		Prepared by: F. Lo		Project No.		
GFA: 348.56 m ²		Architect: HOK		Date: 2016-05-04		
Element/Sub-Element	Amount	Cost per m ² Gross	Element Total	Cost per m ² Gross	Cost per SF Gross	% of Cost by Element
A SHELL						
A1 Sub-Structural			0	0.00	0.00	0.0%
A11 Foundation	0	0.00				
A12 Excavation	0	0.00				
A2 Structure			214,071	614.16	57.09	61.4%
A21 Lowest Floor Construction	44,871	128.73				
A22 Upper Floor Construction	169,200	485.43				
A3 Exterior Enclosure			35,850	102.85	9.56	10.3%
A31 Walls Below Grade	0	0.00				
A32 Walls Above Grade	0	0.00				
A33 Windows and Entrances	35,850	102.85				
A34 Roof Covering	0	0.00				
A35 Projection	0	0.00				
B INTERIORS						
B1 Partitions & Doors			0	0.00	0.00	0.0%
B11 Partitions	0	0.00				
B12 Doors	0	0.00				
B2 Finishes			0	0.00	0.00	0.0%
B21 Floor Finishes	0	0.00				
B22 Ceiling Finishes	0	0.00				
B23 Wall Finishes	0	0.00				
B3 Fittings & Equipment			0	0.00	0.00	0.0%
B31 Fittings & Fixtures	0	0.00				
B32 Equipment	0	0.00				
B33 Conveying Systems	0	0.00				
C SERVICES						
C1 Mechanical			11,715	33.61	3.12	3.4%
C11 Plumbing & Drainage	0	0.00				
C12 Fire Protection	7,482	21.47				
C13 HVAC	4,233	12.14				

SC2 - STORAGE SHED

4 May 2016

C14 Controls	0	0.00				
C2 Electrical			19,896	57.08	5.31	5.7%
C21 Service & Distribution	13,477	38.66				
C22 Lighting, Devices & Heating	6,419	18.42				
C23 Systems & Ancillaries	0	0.00				
NET BUILDING COST - EXCLUDING SITE			281,532	807.70	75.08	81%
D SITE & ANCILLARY WORK						
D1 Site Work			4,516	12.96	1.20	1.3%
D11 Site Development	0	0.00				
D12 Mechanical Site Services	0	0.00				
D13 Electrical Site Services	4,516	12.96				
D2 Ancillary Work			0	0.00		0.0%
D21 Demolition	0					
D22 Alterations	0					
NET BUILDING COST - INCLUDING SITE			286,048	820.66	76.28	82%
Z GENERAL REQUIREMENTS & ALLOWANCES						
Z1 General Requirements & Fee			55,722	159.86	14.86	16.0%
Z11 General Requirements	45,768	131.30				
Z12 Fee	9,954	28.56				
Z2 Allowances			6,835	19.61	1.82	2.0%
Z21 Risk Allowance	6,835	19.61				
Z22 Escalation Allowance	0	0.00				
TOTAL HARD CONSTRUCTION ESTIMATE - EXCLUDING CONTINGENCIES			\$ 348,605	1,000.13	92.96	100%

TAKE-OFF

SC - OPS CENTRE

4 May 16

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
A. SHELL						
A1 SUBSTRUCTURE						
A11 Foundations						\$ 1,132,244.40
<u>A111 Standard Foundations</u>						\$ 1,132,244.40
.1 Garage: Poured concrete conventional strip and pad footings, piers, tie beams and foundation walls based on a building footprint of 3,378.3 m ² bear on engineered fill		3,378.3	m ²	\$ 110.00	\$ 371,613.00	
.2 Office: Poured concrete conventional strip and pad footings concrete piers and foundation walls based on a building footprint of 2,645.5 m ² bear on engineered fill		2,645.5	m ²	\$ 145.00	\$ 383,597.50	
.3 Warehouse/Tranformers/Metering/Storage Poured concrete conventional strip and pad footings, piers, tie beams and foundation walls based on a building footprint of 2,743.8 m ² bear on engineered fill		2,743.8	m ²	\$ 120.00	\$ 329,256.00	
.4 Perimeter drainage		392	m	\$ 30.00	\$ 11,760.00	
.5 Perimeter Rigid Insulation 50 mm		646.80	m ²	\$ 28.00	\$ 18,110.40	
.6 Allowance for reinforcing dowels		6.50	TN	\$ 2,755.00	\$ 17,907.50	
<u>A112 Special Foundations</u>						\$ -
Assume none required.						
A12 Excavation						\$ 482,218.00
.10 Excavation and Backfill		8,768	m ²	\$ 55.00	\$ 482,218.00	
A2 STRUCTURE						
A21 Lowest Floor Construction						\$ 927,755.57
.1 Slab on Grade - 175 thick in Garage		143.4	m ³	\$ 596.74		\$ 85,601.27
Fine grade 3 passes with grader and roller		819.7	m ²	\$ 3.00	\$ 2,459.10	
300 mm Granular A sub base		245.9	m ³	\$ 60.00	\$ 14,754.60	
Vapour Barrier		819.7	m ²	\$ 3.05	\$ 2,500.09	
152 x 152 Mesh Re-inforcement		819.7	m ²	\$ 10.00	\$ 8,197.00	
Concrete (35 MPa) - direct chute		143.4	m ³	\$ 282.00	\$ 40,452.20	
Saw cut and control joints		819.7	m ²	\$ 4.00	\$ 3,278.80	
Cure with spray membrane curing compound		819.7	m ²	\$ 3.03	\$ 2,483.69	
Finishing floor, monolithic steel trowel		819.7	m ²	\$ 14.00	\$ 11,475.80	
.2 Slab on Grade - 175 thick - Sloped (in Garage)		434.8	m ³	\$ 661.89		\$ 287,814.38
Fine grade 3 passes with grader and roller		2,484.8	m ²	\$ 6.00	\$ 14,908.80	
300 mm Granular A sub base		745.4	m ³	\$ 60.00	\$ 44,726.40	
Vapour Barrier		2,484.8	m ²	\$ 3.05	\$ 7,578.64	
152 x 152 Mesh Re-inforcement		2,484.8	m ²	\$ 10.00	\$ 24,848.00	
Concrete (35 MPa) - direct chute		434.8	m ³	\$ 330.00	\$ 143,497.20	
Saw cut and control joints		2,484.8	m ²	\$ 4.00	\$ 9,939.20	

TAKE-OFF

SC - OPS CENTRE

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Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
Cure with spray membrane curing compound		2,484.8	m ²	\$ 3.03	\$ 7,528.94	
Finishing floor, monolithic steel trowel		2,484.8	m ²	\$ 14.00	\$ 34,787.20	
.3 Slab on Grade - 125 thick Unreinforced (in Office)		330.7	m ³	\$ 620.64		\$ 205,237.89
Fine grade 3 passes with grader and roller		2,645.5	m ²	\$ 3.00	\$ 7,936.50	
300 mm Granular A sub base		793.7	m ³	\$ 60.00	\$ 47,619.00	
Vapour Barrier		2,645.5	m ²	\$ 3.05	\$ 8,068.78	
Concrete (25 MPa) - direct chute		330.7	m ³	\$ 260.00	\$ 85,978.75	
Saw cut and control joints		2,645.5	m ²	\$ 4.00	\$ 10,582.00	
Cure with spray membrane curing compound		2,645.5	m ²	\$ 3.03	\$ 8,015.87	
Finishing floor, monolithic steel trowel		2,645.5	m ²	\$ 14.00	\$ 37,037.00	
.4 Slab on Grade - 175 thick (in Warehouse/Transformer/Metering/Storage)		470.8	m ³	\$ 711.03		\$ 334,754.03
Fine grade 3 passes with grader and roller		2,690.3	m ²	\$ 3.00	\$ 8,070.90	
300 mm Granular A sub base		807.1	m ³	\$ 60.00	\$ 48,425.40	
Vapour Barrier		2,690.3	m ²	\$ 3.05	\$ 8,205.42	
152 x 152 Mesh Re-inforcement		2,690.3	m ²	\$ 10.00	\$ 26,903.00	
Concrete (35 MPa) - direct chute		470.8	m ³	\$ 282.00	\$ 132,766.31	
Saw cut and control joints		2,690.3	m ²	\$ 4.00	\$ 10,761.20	
Cure with spray membrane curing compound		2,690.3	m ²	\$ 3.03	\$ 8,151.61	
Finishing floor, monolithic steel trowel		2,690.3	m ²	\$ 14.00	\$ 37,664.20	
Concrete Floor Sealer		2,690.3	m ²	\$ 20.00	\$ 53,806.00	
.5 Slab thickening below masonry block walls		168.8	m	\$ 85.00	\$ 14,348.00	
A22 Upper Floor Construction						\$ 2,590,126.16
<u>A221 Upper Floor Construction</u>						\$ -
<u>A222 Stair Construction</u>						\$ -
<u>A223 Roof Construction</u>						\$ 2,590,126.16
.1 Structural steel roof construction - Office Roof		2,664.0	m ²	\$ 175.51		\$ 467,551.68
base plates and anchor bolts		14	No.	\$ 360.00	\$ 5,040.00	
structural steel columns (6Kg/m2)		16.0	TN	\$ 4,000.00	\$ 63,936.00	
structural steel beams (7Kg/m2)		18.6	TN	\$ 4,000.00	\$ 74,592.00	
open web steel joists - 750 Deep (18Kg/m2)		29.9	TN	\$ 4,000.00	\$ 119,628.00	
open web steel joists - 650 Deep (14Kg/m2)		12.1	TN	\$ 4,000.00	\$ 48,580.00	
open web steel joists - 550 Deep (13Kg/m2)		0.5	TN	\$ 4,000.00	\$ 2,126.80	
open web steel joists - 450 Deep (12.2Kg/m2)		0.8	TN	\$ 4,000.00	\$ 3,298.88	
open web steel joists - 350 Deep (11Kg/m2)		0.3	TN	\$ 4,000.00	\$ 1,166.00	
bridging and bracing (4Kg/m2)		10.7	TN	\$ 4,000.00	\$ 42,624.00	
38mm metal deck - .91 thick		2,664.0	m ²	\$ 40.00	\$ 106,560.00	
.2 Roof Safety Anchors c/w cable system		8	ea	\$ 2,550.00	\$ 20,400.00	
.3 Pre-Engineered Building - Garage		3,378.3	m ²	\$ 326.00	\$ 1,101,325.80	
11.2 m to T/O Steel Structure						
c/w pre-fab insulated metal wall panel assembly						
203mm Z-Girts w PVC Thermal Break						
Pre-fab insulated roof panel assembly						
.4 Pre-Engineered Building - Warehouse		2,743.8	m ²	\$ 348.60	\$ 956,488.68	
12.8 m to T/O Steel Structure						
c/w pre-fab insulated metal wall panel assembly						
203mm Z-Girts w PVC Thermal Break						
Pre-fab insulated roof panel assembly						
.5 Columns for Crane Rail Support		3.9	TN	\$ 4,000.00	\$ 15,720.00	

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SC - OPS CENTRE

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Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
Beam for Crane Rail Support		2.7	TN	\$ 4,000.00	\$ 10,640.00	
.6 Allowance for roof openings framing		1	LS	\$ 3,000.00	\$ 3,000.00	
.7 Structural reinforcement for mechanical equipment		1	LS	\$ 15,000.00	\$ 15,000.00	
A3 EXTERIOR ENCLOSURE						
A31 Walls Below Grade						\$ -
A311 Structural Walls Below Grade						
A32 Walls Above Grade						\$ 97,484.28
A321 Walls Above Grade						\$ 97,484.28
.1 MP1A Wall Assembly (Office)		238.00	m ²	\$ 298.34		\$ 71,004.92
35mm Prefinished Horizontal Siding		238.00	m ²	\$ 68.90	\$ 16,398.20	
Z-Girts w PVC Thermal Break		238.00	m ²	\$ 45.00	\$ 10,710.00	
127 Mineral Wool Insulation		238.00	m ²	\$ 14.54	\$ 3,460.52	
Membrane Air/Vapour Barrier		238.00	m ²	\$ 2.50	\$ 595.00	
190mm Lightweight Concrete Block		238.00	m ²	\$ 167.40	\$ 39,841.20	
.2 MP1 Wall Assembly (Office)		120.80	m ²	\$ 219.20		\$ 26,479.36
35mm Prefinished Horizontal Siding		120.80	m ²	\$ 68.90	\$ 8,323.12	
Z-Girts w PVC Thermal Break		120.80	m ²	\$ 45.00	\$ 5,436.00	
127 Mineral Wool Insulation		120.80	m ²	\$ 14.54	\$ 1,756.43	
Membrane Air/Vapour Barrier		120.80	m ²	\$ 2.50	\$ 302.00	
16mm Glass Matt Gypsum Sheathing		120.80	m ²	\$ 23.50	\$ 2,838.80	
152 Wind Bearing Metal Stud Wall Framing		120.80	m ²	\$ 29.70	\$ 3,587.76	
50mm Mineral Wool Insulation		120.80	m ²	\$ 8.50	\$ 1,026.80	
16mm Gypsum Board		120.80	m ²	\$ 18.50	\$ 2,234.80	
Paint Finish		120.80	m ²	\$ 8.06	\$ 973.65	
A33 Windows and Entrance						\$ 165,350.00
<u>A331 Windows and Louvres</u>						\$ 27,050.00
.1 Glazing - Exterior Windows		34.60	m ²	\$ 500.00	\$ 17,300.00	
.2 Louvres for mechanical rooms - allowance		15.0	m ²	\$ 650.00	\$ 9,750.00	
<u>A333 Doors</u>						\$ 138,300.00
.1 Pressed steel frames and hollow metal doors Include Hardware and Painting						
Single	11	Ea	\$ 1,900.00	\$ 20,900.00		
Double	-	Pair	\$ 3,100.00	\$ -		
.2 Entrance glazed unit with sidelites and transome		2	ea	\$ 4,500.00	\$ 9,000.00	
.3 Overhead doors (6,096 x 4,876) - Garage		2	Ea	\$ 18,500.00	\$ 37,000.00	
.4 Overhead doors (3,658 x 4,876) - Warehouse		5	Ea	\$ 11,500.00	\$ 57,500.00	
.5 Overhead doors (3,048 x 3,658) - Office		1	Ea	\$ 7,500.00	\$ 7,500.00	
.6 Barrier free door operators - assumed		2	Ea	\$ 3,200.00	\$ 6,400.00	

TAKE-OFF

SC - OPS CENTRE

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Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
A34 Roof Covering						\$ 411,314.08
<u>A341 Roofing</u>						\$ 411,314.08
.1 SBS Modified Bituminous Roofing (Office)		2,668.50	m ²	\$ 150.00	\$ 400,275.00	
.2 Tapered insulation to attain roof slopes - (5%) allowance		133.43	m ²	\$ 19.00	\$ 2,535.08	
.3 Scupper		4.00	ea	\$ 560.00	\$ 2,240.00	
.4 Flashing		34.00	m ²	\$ 96.00	\$ 3,264.00	
.5 Roof Hatches		1	Ea	\$ 3,000.00	\$ 3,000.00	
.6 Pre-eng building roof covering included in Upper Floor Construction						
<u>A342 Skylights and Roof Glazing</u>						\$ -
None						
A35 Projection						\$ -
None						
B. INTERIORS						
B1 PARTITIONS & DOORS						
B11 Partitions						\$ 662,627.47
<u>B111 Fixed Partitions</u>						\$ 639,287.47
.1 L3 Wall Type		246.76	m ²	\$ 93.02		\$ 22,953.62
16mm Gypsum		246.76	m ²	\$ 18.50	\$ 4,565.06	
92 metal stud (20ga) @ 400 oc		246.76	m ²	\$ 19.51	\$ 4,814.29	
Acoustic Batt		246.76	m ²	\$ 8.50	\$ 2,097.46	
Sapce			m ²	\$ -	\$ -	
Acoustic Batt		246.76	m ²	\$ 8.50	\$ 2,097.46	
92 metal stud (20ga) @ 400 oc		246.76	m ²	\$ 19.51	\$ 4,814.29	
16mm Gypsum		246.76	m ²	\$ 18.50	\$ 4,565.06	
.2 A3 Wall Type		865.53	m ²	\$ 65.01		\$ 56,268.11
16mm Gypsum		865.53	m ²	\$ 18.50	\$ 16,012.31	
92 metal stud (20ga) @ 400 oc		865.53	m ²	\$ 19.51	\$ 16,886.49	
Acoustic Batt		865.53	m ²	\$ 8.50	\$ 7,357.01	
16mm Gypsum		865.53	m ²	\$ 18.50	\$ 16,012.31	
.3 A3 Fire Rated Wall Type		136.29	m ²	\$ 70.01		\$ 9,541.66
16mm Gypsum Type X		136.29	m ²	\$ 21.00	\$ 2,862.09	
92 metal stud (20ga) @ 400 oc		136.29	m ²	\$ 19.51	\$ 2,659.02	
Acoustic Batt		136.29	m ²	\$ 8.50	\$ 1,158.47	
16mm Gypsum Type X		136.29	m ²	\$ 21.00	\$ 2,862.09	
.4 A6 Wall Type		152.59	m ²	\$ 70.85		\$ 10,811.00
16mm Gypsum		152.59	m ²	\$ 18.50	\$ 2,822.92	
150 metal stud (20ga) @ 400 oc		152.59	m ²	\$ 25.35	\$ 3,868.16	
Acoustic Batt		152.59	m ²	\$ 8.50	\$ 1,297.02	
16mm Gypsum		152.59	m ²	\$ 18.50	\$ 2,822.92	
.5 A6 Wall Type - Fire Rated		15.00	m ²	\$ 75.85		\$ 1,137.75
16mm Gypsum Type X		15.00	m ²	\$ 21.00	\$ 315.00	

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SC - OPS CENTRE

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Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
150 metal stud (20ga) @ 400 oc		15.00	m ²	\$ 25.35	\$ 380.25	
Acoustic Batt		15.00	m ²	\$ 8.50	\$ 127.50	
16mm Gypsum Type X		15.00	m ²	\$ 21.00	\$ 315.00	
.6 B3 Wall Type		57.92	m ²	\$ 65.01		\$ 3,765.38
16mm Gypsum		57.92	m ²	\$ 18.50	\$ 1,071.52	
92 metal stud (20ga) @ 400 oc		57.92	m ²	\$ 19.51	\$ 1,130.02	
Acoustic Batt		57.92	m ²	\$ 8.50	\$ 492.32	
16mm Gypsum		57.92	m ²	\$ 18.50	\$ 1,071.52	
.7 E2 Furred Wall		442.50	m ²	\$ 34.99		\$ 15,483.08
16mm Gypsum		442.50	m ²	\$ 18.50	\$ 8,186.25	
64 metal stud @ 400 oc		442.50	m ²	\$ 16.49	\$ 7,296.83	
.8 Lightweight Concrete Block Wall - 190 mm, jointed and pointed (Office)		898.80	m ²	\$ 167.40	\$ 150,459.12	
.9 Lightweight Concrete Block Wall Fire Rated - 190 mm, jointed and pointed (Office)		858.31	m ²	\$ 178.00	\$ 152,779.18	
.10 Lightweight Concrete Block Wall - 190 mm, jointed and pointed (Warehouse)		1,257.16	m ²	\$ 167.40	\$ 210,448.58	
.11 Chain link fence - Warehouse		37.60	m	\$ 150.00	\$ 5,640.00	
<u>B112 Movable Partitions</u>						\$ 23,340.00
.1 movable partitions c/w structural steel support		19.45	m2	\$ 1,200.00	\$ 23,340.00	
<u>B113 Structural Partitions</u>						\$ -
B12 Doors						\$ 69,600.00
.1 Pressed Steel Frames and Hollow Metal Doors c/w hardware include painting						
Single		24	Ea	\$ 750.00	\$ 18,000.00	
Double		7	Ea	\$ 1,300.00	\$ 9,100.00	
Single with sidelite		10	Ea	\$ 1,050.00	\$ 10,500.00	
.2 Kitting Bay Sliding Doors		11	Ea	\$ 1,500.00	\$ 16,500.00	
.3 Rated Pressed Steel Frames and Hollow Metal Doors c/w hardware include painting						
Single		3	Ea	\$ 900.00	\$ 2,700.00	
Double		4	Ea	\$ 1,600.00	\$ 6,400.00	
.4 Barrier free automatic door openers - assume		2	ea	\$ 3,200.00	\$ 6,400.00	
B2 FINISHES						
B21 Floor Finishes						\$ 363,320.40
.1 Porcelain Tile Floor		256	m ²	\$ 123.00	\$ 31,451.10	
.2 Carpet Tiles		503	m ²	\$ 55.00	\$ 27,670.50	
.3 Vinyl Composite Tiles		354	m ²	\$ 35.00	\$ 12,393.50	
.4 Anti Static Tiles		168	m ²	\$ 129.00	\$ 21,710.70	
.5 Sealed Concrete		5,755	m ²	\$ 20.00	\$ 115,096.00	

TAKE-OFF

SC - OPS CENTRE

4 May 16

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.6 Epoxy Floor		1,477	m ²	\$ 86.00	\$ 127,030.60	
.7 Rubber Gym Floor		37	m ²	\$ 150.00	\$ 5,580.00	
.8 Base						
i 108mm Rubber Base		956	m	\$ 10.50	\$ 10,038.00	
ii Porcelain Tile Base		209	m	\$ 31.00	\$ 6,479.00	
iii Carpet Base		309	m	\$ 19.00	\$ 5,871.00	
B22 Ceiling Finishes						\$ 144,212.00
.1 Gypsum Board Ceiling include Painting in washrooms		200.00	m ²	\$ 75.50	\$ 15,100.00	
.2 Acoustical Suspended Ceiling		1,607.80	m ²	\$ 40.00	\$ 64,312.00	
.3 Exposed Ceiling - Painted (Office)		6,000.00	m ²	\$ 10.80	\$ 64,800.00	
B23 Wall Finishes						\$ 68,826.00
.1 Paint Finish		6,810.00	m ²	\$ 8.60	\$ 58,566.00	
.2 Porcelain Wall Tiles in washrooms and showers		95.00	m ²	\$ 108.00	\$ 10,260.00	
B3 Fittings & Equipment						
B31 Fittings and Fixtures						\$ 57,084.00
<u>B311 Metals</u>						\$ 27,648.00
.1 Service ladders		1	Ea	\$ 3,500.00	\$ 3,500.00	
.2 Metal guardrails in Garage		24.4	m	\$ 170.00	\$ 4,148.00	
.3 Miscellenous metal - Allowance		1	LS	\$ 20,000.00	\$ 20,000.00	
<u>B312 Millwork</u>						\$ 12,280.00
.1 Typical kitchen upper and lower cabinet c/w countertop		4.20	m	\$ 1,400.00	\$ 5,880.00	
.2 Washroom vanity and counter		8.00	m	\$ 800.00	\$ 6,400.00	
<u>B313 Specialties</u>						\$ 15,426.00
.1 Toilet Compartment - Metal Ceiling Hung		3	ea	\$ 1,037.00	\$ 3,111.00	
.2 Hadicapped Toilet Compartment		2	ea	\$ 1,685.00	\$ 3,370.00	
.3 Urinal Screen		2	ea	\$ 485.00	\$ 970.00	
.4 Toilet and Bath Accessories						
i Hand dryer		3	ea	\$ 450.00	\$ 1,350.00	
ii Paper towel dispenser - assumed		3	ea	\$ 150.00	\$ 450.00	
iii Toilet paper dispenser		6	ea	\$ 50.00	\$ 300.00	
iv Soap dispenser		7	ea	\$ 75.00	\$ 525.00	
v Waste receptacle - wall mounted semi-recessed - assumed		3	ea	\$ 500.00	\$ 1,500.00	
vi Sanitary disposal		2	ea	\$ 200.00	\$ 400.00	
vii Tilted mirror		1	ea	\$ 250.00	\$ 250.00	
viii Shower Curtain		10	ea	\$ 120.00	\$ 1,200.00	

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SC - OPS CENTRE

4 May 16

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.5 Unframed Mirror in washrooms above vanities		8.00	m²	\$ 250.00	\$ 2,000.00	
B314 Furnishings						\$ 1,730.00
.1 Window treatment - Allowance		34.60	m²	\$ 50.00	\$ 1,730.00	
B32 Equipment						\$ 123,000.00
.1 Overhead Bridge Crane, under hung hoist, electric operating, single girder, 10-ton, 10m span		1	ea	\$ 101,000.00	\$ 101,000.00	
.2 Dock Levelers		2	ea	\$ 11,000.00	\$ 22,000.00	
B33 Conveying Systems						
C. SERVICES						
C1 Mechanical						
C11 Plumbing and Drainage						\$ 522,072.73
Refer to individual M & E take-off sheets for designated areas						
C12 Fire Protection						\$ 338,674.24
Refer to individual M & E take-off sheets for designated areas						
C13 Heating, Ventilation & Air Conditioning						\$ 1,174,340.00
Refer to individual M & E take-off sheets for designated areas						
C14 EMCS Controls						\$ 156,604.40
Refer to individual M & E take-off sheets for designated areas						
C2 Electrical						
C21 Service & Distribution						\$ 1,162,050.00
Refer to individual M & E take-off sheets for designated areas						
C22 Lighting, Devices and Heating						\$ 484,734.98
Refer to individual M & E take-off sheets for designated areas						
C23 Systems & Ancillaries						\$ 201,388.42
Refer to individual M & E take-off sheets for designated areas						
D. SITE & ANCILLARY WORK						

TAKE-OFF

SC - OPS CENTRE

4 May 16

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
D1 SITE WORK						
D11 Site Development						\$ 1,963,209.02
<u>D111 Preparation</u>						\$ 190,000.00
.1 Site preparation (16.7 acres)		1	LS	\$ 190,000.00	\$ 190,000.00	
.2 Engineered fill		1	LS		\$ -	
<u>D112 Hard Surfaces</u>						\$ 733,592.12
.1 OPS Employee and Visitor Parking		100	car	\$ 1,600.00	\$ 160,000.00	
.2 Heavy Duty Asphalt		6,561	m2	\$ 59.00	\$ 387,081.30	
.3 Gravel Service Road (3m wide)		196	m	\$ 86.00	\$ 16,896.42	
.4 Concrete Pavement - 125 thick with mesh		1,442	m²	\$ 84.00	\$ 121,144.80	
.5 Concrete curb		872	m	\$ 44.00	\$ 38,381.20	
.6 Concrete ramps at Warehouse Loading Bay		120	m²	\$ 84.00	\$ 10,088.40	
<u>D113 Improvements</u>						\$ 837,492.90
.1 Flagpoles - Aluminum 11m (35') high include concrete base		-	ea	\$ 5,460.00	\$ -	
.2 Chain Link Fence 2.4m high		1,130	m	\$ 197.00	\$ 222,669.10	
.3 Electric gate		2	ea	\$ 58,000.00	\$ 116,000.00	
.4 HOL Sign - carried in cash allowance		1	m		\$ -	
.5 Gravel Yard		12,140	m2	\$ 22.00	\$ 267,080.00	
.6 Warehouse Loading dock retaining walls		31	m	\$ 1,034.00	\$ 31,743.80	
.7 North bound right turn taper at Moodie		1	allow	\$ 200,000.00	\$ 200,000.00	
<u>D114 Landscaping</u>						\$ 202,124.00
.1 Plant allowance		1	LS	\$ 70,000.00	\$ 70,000.00	
.2 No Mow Mix		5,354	m²	\$ 6.00	\$ 32,124.00	
.3 Tree conservation		1	LS	\$ 100,000.00	\$ 100,000.00	
D12 Mechanical Site Services						\$ 1,110,933.98
.1 Septic tank and bed		1	ea	\$ 160,000.00	\$ 160,000.00	
.2 Pump house - pre-eng building enclosure, equipment and water tanks		1	allow	\$ 260,000.00	\$ 260,000.00	
.3 Fire fighting tanks and fire pump		1	allow	\$ 90,000.00	\$ 90,000.00	
.4 Water supply well, drilled 240m, 200mm dia.		1	allow	\$ 140,000.00	\$ 140,000.00	
.5 150 Water pipe, include trench and backfill		508	m	\$ 88.00	\$ 44,721.60	

TAKE-OFF

SC - OPS CENTRE

4 May 16

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.6 Fire hydrant		1	ea	\$ 3,500.00	\$ 3,500.00	
.7 Storm water management pond		1	allow	\$ 350,000.00	\$ 350,000.00	
.8 2m wide ditch		754	m	\$ 65.00	\$ 48,990.50	
.9 500mm culvert		14	m	\$ 180.00	\$ 2,430.00	
.10 catch basin		1		\$ 1,400.00	\$ 1,400.00	
.11 250mm HEPE Storm pipe		82	m	\$ 120.78	\$ 9,891.88	
D13 Electrical Site Services						\$ 461,148.00
.1 Lighting		1	LS	\$ 125,000.00	\$ 125,000.00	
.2 On site hydro service		1	allow	\$ 100,000.00	\$ 100,000.00	
.3 4 x 100mm PVC ducts concrete encased duct bank for primary M.V. cables and padmount transformer base with grounding		1	allow	\$ 100,000.00	\$ 100,000.00	
.4 Communication ductbank		260	m	\$ 120.00	\$ 31,200.00	
.5 Power ductbank		358	m	\$ 120.00	\$ 42,948.00	
.6 Premium for solar panel ductbank		1	allow	\$ 50,000.00	\$ 50,000.00	
.7 Power supply for well pumps, pumphouse and fire pump		1	allow	\$ 12,000.00	\$ 12,000.00	
Z. GENERAL REQUIREMENTS & ALLOWANCES						
Z1 GENERAL REQUIREMENTS & FEE						
Z11 General Requirements						\$ 2,379,250.90
Z111 Design Fees (6%)			LS		\$ 892,219.09	
Z112 General Conditions (10.0%)			LS		\$ 1,487,031.81	
Z12 Fee						\$ 517,487.07
.1 G.C. Overhead and Profit (3.0%)					\$ 517,487.07	
Z2 ALLOWANCES						
Z21 Risk Allowance (2%)					\$ 355,341.12	\$ 355,341.12
Z22 Escalation Allowance					\$ -	\$ -
TOTAL						\$ 18,122,397.23

TAKE-OFF

SC2 - STORAGE SHED

4 May 2016

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
A. SHELL						
A1 SUBSTRUCTURE						
A11 Foundations						\$ -
<u>A111 Standard Foundations</u>						\$ -
.1 Poured concrete conventional strip and spread footings based on a building footprint of 962.6 m ² include excavation to footings and backfill			m ²		\$ -	
.2 Perimeter drainage			m	\$ 30.00	\$ -	
.3 Perimeter Rigid Insulation 50 mm			m ²	\$ 28.00	\$ -	
.4 Allowance for reinforcing dowels			TN	\$ 2,755.00	\$ -	
<u>A112 Special Foundations</u>						\$ -
Assume none required.						
A12 Excavation						\$ -
.10 Allowance for additional excavation and backfill			Allow		\$ -	
A2 STRUCTURE						
A21 Lowest Floor Construction						\$ 44,871.29
.1 Slab on Grade - 150 thick		52.4	m ³	\$ 856.16		\$ 44,871.29
Fine grade 3 passes with grader and roller		349.4	m ²	\$ 3.00	\$ 1,048.20	
300 mm Granular A sub base		104.8	m ³	\$ 60.00	\$ 6,289.20	
Extruded polystyrene XPS Insulation -50mm - perimeter		188.0	m ²	\$ 28.00	\$ 5,264.00	
Vapour Barrier		349.4	m ²	\$ 3.05	\$ 1,065.67	
15M @400 EW (assume 10kg/m3)		0.5	tn	\$ 2,652.00	\$ 1,389.91	
Concrete (35 MPa) - direct chute		52.4	m ³	\$ 282.00	\$ 14,779.62	
Saw cut and control joints		349.4	m ²	\$ 4.00	\$ 1,397.60	
Cure with spray membrane curing compound		349.4	m ²	\$ 3.03	\$ 1,058.68	
Finishing floor, monolithic steel trowel		349.4	m ²	\$ 14.00	\$ 4,891.60	
Concrete sealer		349.4	m ²	\$ 22.00	\$ 7,686.80	
A22 Upper Floor Construction						\$ 169,200.00
<u>A221 Upper Floor Construction</u>						\$ 169,200.00
Pre-engineered steel building, clear span rigid frame 0.5mmthick coloured roofing and siding, 6m eave height		360.0	m ²	\$ 470.00	\$ 169,200.00	
<u>A222 Stair Construction</u>						\$ -
<u>A223 Roof Construction</u>						\$ -
A3 EXTERIOR ENCLOSURE						
A31 Walls Below Grade						\$ -
A311 Structural Walls Below Grade						

TAKE-OFF

SC2 - STORAGE SHED

4 May 2016

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
A32 Walls Above Grade						\$ -
A321 Walls Above Grade						\$ -
A33 Windows and Entrance						\$ 35,850.00
<u>A331 Windows and Louvres</u>						\$ 1,950.00
.1 Louvres - allowance		3.0	m ²	\$ 650.00	\$ 1,950.00	
<u>A333 Doors</u>						\$ 33,900.00
.1 Pressed steel frames and hollow metal doors Include Hardware and Painting						
Single		1	Ea	\$ 1,900.00	\$ 1,900.00	
Double		-	Pair	\$ 3,100.00	\$ -	
.2 Overhead doors (6200 x 5200)		2	Ea	\$ 16,000.00	\$ 32,000.00	
A34 Roof Covering						\$ -
<u>A341 Roofing</u>						\$ -
A35 Projection						\$ -
B. INTERIORS						
B1 PARTITIONS & DOORS						
B11 Partitions						\$ -
<u>B111 Fixed Partitions</u>						\$ -
<u>B112 Movable Partitions</u>						\$ -
<u>B113 Structural Partitions</u>						\$ -
B12 Doors						\$ -
B2 FINISHES						
B21 Floor Finishes						\$ -
B22 Ceiling Finishes						\$ -

TAKE-OFF

SC2 - STORAGE SHED

4 May 2016

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
B23 Wall Finishes						\$ -
B3 Fittings & Equipment						
B31 Fittings and Fixtures						\$ -
<u>B311 Metals</u>						\$ -
<u>B312 Millwork</u>						\$ -
<u>B313 Specialties</u>						\$ -
<u>B314 Furnishings</u>						\$ -
B32 Equipment						\$ -
.1 Overhead Bridge Crane, under hung hoist, electric operating, 2 girder, Assume 7-ton, 13m span		-	ea	\$ 110,600.00	\$ -	
B33 Conveying Systems						
C. SERVICES						
C1 Mechanical						
C11 Plumbing and Drainage						\$ -
<u>C111 Plumbing Fixtures</u>						\$ -
.1 No requirement.			ea		\$ -	
<u>C112 Domestic Water</u>						\$ -
.1 No requirement.			allow		\$ -	
<u>C113 Sanitary Waste & Vent</u>						\$ -
.1 No requirement.			allow		\$ -	
<u>C114 Storm</u>						\$ -
.1 Storm system shall include control flow type roof drains. U/G storm collection in PVC. Cast iron above grade. Weeping tile collected into sumps, then transferred to sump pits c/w duplex submersible pumps. Thermal insulation included. PVC Jacketed in exposed areas.			allow		\$ -	
<u>C115 Natural Gas</u>						\$ -
.1 Incoming gas service c/w gas meter. Distribution of natural gas to centralized mechanical PH to feed gas fired HVAC equipment. Piping to be schd 40 black malleable. Piping 50mm			allow		\$ -	

TAKE-OFF

SC2 - STORAGE SHED

4 May 2016

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
and smaller to be screwed, 65mm and over to be welded.						
<u>C116 Fuel Oil</u>						\$ -
.1 No requirement.			allow		\$ -	
<u>C117 Misc Works and General Accounts</u>						\$ -
.1 Clean-up, HASSSP, rentals, small tools, fire stopping, permits, inspections, bonding and insurance, site trailer.		1.0	allow	\$ -	\$ -	
C12 Fire Protection						\$ 7,482.00
<u>C121 Sprinklers</u>						\$ 7,482.00
.1 Dry pipe sprinkler system.		348.00	m2	\$ 21.50	\$ 7,482.00	
C13 Heating, Ventilation & Air Conditioning						\$ 4,233.00
<u>C131 Liquid Heat Transfer (Heating)</u>						\$ -
.1 No requirement.			allow		\$ -	
<u>C132 Liquid Heat Transfer (Cooling)</u>						\$ -
.1 No requirement.			allow		\$ -	
<u>C133 Air Distribution</u>						\$ 2,400.00
.1 Gas fired unit heater c/w controls set to 5 degC.		2	ea	\$ 1,200.00	\$ 2,400.00	
<u>C134 Exhaust Systems</u>						\$ 1,750.00
.1 Dual exhaust fan / louver combination.		1	allow	\$ 1,750.00	\$ 1,750.00	
<u>C136 Misc Works and General Accounts</u>						\$ 83.00
.1 Clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, fire stopping.		1	allow	\$ 83.00	\$ 83.00	
C14 EMCS Controls						\$ -
<u>C141 Controls and Automation</u>						\$ -
.1 No requirement.			m2		\$ -	
C2 Electrical						
C21 Service & Distribution						\$ 13,476.75
<u>C211 Equipment</u>						\$ 12,335.00
.1 Power fed from Warehouse bldg.		1	ea	\$ 10,000.00	\$ 10,000.00	
.2 100A breaker (normal power)		1	ea	\$ 375.00	\$ 375.00	
.3 30A breaker (emergency power)		1	ea	\$ 210.00	\$ 210.00	
.4 Panelboard & misc distribution.		1	allow	\$ 1,750.00	\$ 1,750.00	

TAKE-OFF

SC2 - STORAGE SHED

4 May 2016

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
<u>C212 Emergency Power</u>						\$ -
.1 Assume no requirement.		0	allow	\$ -	\$ -	
<u>C213 Distribution</u>						\$ -
.1 Included under equipment		1	allow		\$ -	
<u>C214 Feeders</u>						\$ -
.1 Main feeders.			allow		\$ -	
<u>C215 Motor Controls & Wiring</u>						\$ -
.1 Assume no MCC required.		1	allow	\$ -	\$ -	
<u>C216 Grounding & Lightning Protection</u>						\$ 500.00
.1 Electrical grounding & lightning protection.		1	allow	\$ 500.00	\$ 500.00	
<u>C216 Misc Works and General Accounts</u>						\$ 641.75
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer, fire stopping		1	allow	\$ 641.75	\$ 641.75	
C22 Lighting, Devices and Heating						\$ 6,418.90
<u>C221 Lighting</u>						\$ 3,753.24
.1 High Bay lighting.		348.00	m2	\$ 8.63	\$ 3,003.24	
.2 Exit and emergency lighting.		1	allow	\$ 750.00	\$ 750.00	
<u>C222 Branch Devices & Wiring</u>						\$ 2,360.00
.1 All conduit systems concealed all finished areas.		1	allow	\$ 2,360.00	\$ 2,360.00	
<u>C223 Heating</u>						\$ -
.1 No requirement.			allow		\$ -	
<u>C224 Misc Works and General Accounts</u>						\$ 305.66
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer, fire stopping		1	allow	\$ 305.66	\$ 305.66	
C23 Systems & Ancillaries						\$ -
<u>C231 Fire Alarm</u>						\$ -
.1 Single stage addressable. No voice communication		-	m2		\$ -	
<u>C232 Security System</u>						\$ -
.1 Cash allowance.			m2		\$ -	
<u>C233 Communications</u>						\$ -

TAKE-OFF

SC2 - STORAGE SHED

4 May 2016

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.1 Fibre optic for alarm, phone, wireless connection		-	allow		\$ -	
<u>C234 Public Address & AV</u>						\$ -
.1 Cash allowance.			m2		\$ -	
<u>C235 Miscellaneous</u>						\$ -
.1 No requirement.		0	allow	\$ -	\$ -	
<u>C236 General Requirements</u>						\$ -
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer,		1	allow	\$ -	\$ -	
D. SITE & ANCILLARY WORK						
D1 SITE WORK						
D11 Site Development						\$ -
<u>D111 Preparation</u>						\$ -
.1 Site preparation - stripping, cut and fill			LS		\$ -	
<u>D112 Hard Surfaces</u>						\$ -
.1			m2		\$ -	
<u>D113 Improvements</u>						\$ -
.1			m2		\$ -	
<u>D114 Landscaping</u>						\$ -
.1		1	LS		\$ -	
D12 Mechanical Site Services						\$ -
.1			m2		\$ -	
D13 Electrical Site Services						\$ 4,516.00
.1 Lighting		1	LS	\$ 1,000.00	\$ 1,000.00	
.2 Ductbank from Warehouse		29	m	\$ 120.00	\$ 3,516.00	
Z. GENERAL REQUIREMENTS & ALLOWANCES						
Z1 GENERAL REQUIREMENTS & FEE						
Z11 General Requirements						\$ 45,767.67
Z111 Design Fees (6%)			LS		\$ 17,162.88	
Z112 General Conditions (10.0%)			LS		\$ 28,604.79	
Z12 Fee						\$ 9,954.47

TAKE-OFF

SC2 - STORAGE SHED

4 May 2016

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.1 G.C. Overhead and Profit (3%)					\$ 9,954.47	
Z2 ALLOWANCES						
Z21 Risk Allowance (2%)			LS		\$ 6,835.40	\$ 6,835.40
Z22 Escalation Allowance			LS		\$ -	\$ -
TOTAL						\$ 348,605.48

HYDRO OTTAWA LIMITED - EAST CAMPUS HQ

R-2

		GFA	BUILDING		SITE WORK	GENERAL CONDITIONS AND FEES	CONTINGENCY ALLOWANCES	TOTAL	
		m²	\$	\$ / SF	\$	\$	\$	\$	\$ / SF
EC1A	Admin HO	12,650.7	20,736,636	152.36	4,239,348	5,602,264	1,528,912	32,107,161	235.91
		1,539.3	4,705,487	284.14	110,600	1,049,907	293,300	6,159,293	371.93
EC2	OPS Building	7,533.5	11,522,444	142.17	1,956,245	2,938,354	820,852	17,237,896	212.69
EC3	Training Building	1,467.8	2,849,979	180.48	834,858	803,295	224,407	4,712,539	298.43
EC4	PILC Building	952.6	1,222,689	119.30	625,953	403,004	112,582	2,364,228	230.69
			\$ 41,037,235		\$ 7,767,004	\$ 10,796,824	\$ 2,980,053	\$ 62,581,116	

SEPARATE PRICE

EC2	Canopy	\$ 292,000	\$ 46,720	\$ 16,936	\$ 355,656
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Inclusions and Exclusions

	Included	Excluded
Millwork	✓	
Furniture		✓
Lockers		✓
Commercial kitchen equipment	*	
Underslab ventilation systems	✓	
Site improvement and landscaping	✓	
Solar photovoltaic system		✓
Design fees	✓	
Other consultants' fees		✓
Development charges		✓
Design Allowance	✓	
Escalation allowance	✓	
Contingency allowance		✓
HST		✓

* included kitchen hood, exhaust system, fire suppression system and ecology unit in the kitchen. Kitchen and cooking equipment are included in "Cash Allowance"

CASH ALLOWANCE

1.	Signage - Exterior and way-finding	\$ 280,600
2.	Security	\$ 800,000
3.	IT/Cabling	\$ 2,800,000
4.	Kitchen equipment	\$ 350,000
5.	Audio / Visual Equipment	\$ 500,000
6.	Communication tower base	\$ 80,000
		\$ 4,810,600

EC1A - Admin HO

R-2

ELEMENTAL COST SUMMARY

Project: EC1A - HQ Admin		Prepared by: F. Lo		Project No.		
GFA: 12,650.70 m ²		Architect: HOK		Date: 2016-01-19		
Element/Sub-Element	Amount	Cost per m ² Gross	Element Total	Cost per m ² Gross	Cost per SF Gross	% of Cost by Element
A SHELL						
A1 Sub-Structural			1,084,905	85.76	7.97	3.4%
A11 Foundation	634,905	50.19				
A12 Excavation	450,000	35.57				
A2 Structure			4,647,562	367.38	34.15	14.5%
A21 Lowest Floor Construction	245,205	19.38				
A22 Upper Floor Construction	4,402,357	347.99				
A3 Exterior Enclosure			3,718,507	293.94	27.32	11.6%
A31 Walls Below Grade	0	0.00				
A32 Walls Above Grade	1,775,823	140.37				
A33 Windows and Entrances	1,306,710	103.29				
A34 Roof Covering	564,127	44.59				
A35 Projection	71,847	5.68				
B INTERIORS						
B1 Partitions & Doors			2,199,542	173.87	16.16	6.9%
B11 Partitions	1,976,692	156.25				
B12 Doors	222,850	17.62				
B2 Finishes			1,836,211	145.15	13.49	5.7%
B21 Floor Finishes	811,400	64.14				
B22 Ceiling Finishes	701,338	55.44				
B23 Wall Finishes	323,473	25.57				
B3 Fittings & Equipment			960,264	75.91	7.06	3.0%
B31 Fittings & Fixtures	404,224	31.95				
B32 Equipment	179,000	14.15				
B33 Conveying Systems	377,040	29.80				
C SERVICES						
C1 Mechanical			3,619,987	286.15	26.60	11.3%
C11 Plumbing & Drainage	579,145	45.78				
C12 Fire Protection	547,492	43.28				
C13 HVAC	1,797,600	142.09				
C14 Controls	695,750	55.00				
C2 Electrical			2,669,658	211.03	19.62	8.3%
C21 Service & Distribution	1,533,525	121.22				
C22 Lighting, Devices & Heating	740,182	58.51				
C23 Systems & Ancillaries	395,951	31.30				

EC1A - Admin HO

R-2

NET BUILDING COST - EXCLUDING SITE			20,736,636	1,639.17	152.36	65%
D SITE & ANCILLARY WORK						
D1 Site Work			4,239,348	335.11	31.15	13.2%
D11 Site Development	2,486,488	196.55				
D12 Mechanical Site Services	310,000	24.50				
D13 Electrical Site Services	1,442,860	114.05				
D2 Ancillary Work			0	0.00		0.0%
D21 Demolition	0					
D22 Alterations	0					
NET BUILDING COST - INCLUDING SITE			24,975,984	1,974.28	183.51	78%
Z GENERAL REQUIREMENTS & ALLOWANCES						
Z1 General Requirements & Fee			5,602,264	442.84	41.16	17.4%
Z11 General Requirements	4,146,157	327.74				
Z12 Fee	1,456,107	115.10				
Z2 Allowances			1,528,912	120.86	11.23	4.8%
Z21 Design Allowance	1,070,239	84.60				
Z22 Escalation Allowance	458,674	36.26				
TOTAL HARD CONSTRUCTION ESTIMATE - EXCLUDING CONTINGENCIES			\$ 32,107,161	2,537.98	235.91	100%

ELEMENTAL COST SUMMARY

Project: [REDACTED]		Project No. [REDACTED]				
GFA: 1,539.30 m ²		Architect: HOK		Date: 2016-01-19		
Element/Sub-Element	Amount	Cost per m ² Gross	Element Total	Cost per m ² Gross	Cost per SF Gross	% of Cost by Element
A SHELL						
A1 Sub-Structural			432,707	281.11	26.13	7.0%
A11 Foundation	332,707	216.14				
A12 Excavation	100,000	64.96				
A2 Structure			631,801	410.45	38.15	10.3%
A21 Lowest Floor Construction	126,331	82.07				
A22 Upper Floor Construction	505,470	328.38				
A3 Exterior Enclosure			557,990	362.50	33.69	9.1%
A31 Walls Below Grade	0	0.00				
A32 Walls Above Grade	204,380	132.77				
A33 Windows and Entrances	81,034	52.64				
A34 Roof Covering	251,336	163.28				
A35 Projection	21,240	13.80				
B INTERIORS						
B1 Partitions & Doors			130,493	84.77	7.88	2.1%
B11 Partitions	103,243	67.07				
B12 Doors	27,250	17.70				
B2 Finishes			346,816	225.31	20.94	5.6%
B21 Floor Finishes	242,430	157.49				
B22 Ceiling Finishes	60,518	39.31				
B23 Wall Finishes	43,869	28.50				
B3 Fittings & Equipment			67,581	43.90	4.08	1.1%
B31 Fittings & Fixtures	67,581	43.90				
B32 Equipment	0	0.00				
B33 Conveying Systems	0	0.00				
C SERVICES						
C1 Mechanical			1,154,954	750.31	69.74	18.8%
C11 Plumbing & Drainage	206,850	134.38				
C12 Fire Protection	63,304	41.12				
C13 HVAC	800,100	519.78				
C14 Controls	84,700	55.03				
C2 Electrical			1,383,145	898.55	83.52	22.5%
C21 Service & Distribution	965,580	627.29				
C22 Lighting, Devices & Heating	369,362	239.95				
C23 Systems & Ancillaries	48,203	31.31				

NET BUILDING COST - EXCLUDING SITE			4,705,487	3,056.90	284.14	76%
D SITE & ANCILLARY WORK						
D1 Site Work			110,600	71.85	6.68	1.8%
D11 Site Development	99,200	64.44				
D12 Mechanical Site Services	0	0.00				
D13 Electrical Site Services	11,400	7.41				
D2 Ancillary Work			0	0.00		0.0%
D21 Demolition	0					
D22 Alterations	0					
NET BUILDING COST - INCLUDING SITE			4,816,087	3,128.75	290.82	78%
Z GENERAL REQUIREMENTS & ALLOWANCES						
Z1 General Requirements & Fee			1,049,907	682.07	63.40	17.0%
Z11 General Requirements	770,574	500.60				
Z12 Fee	279,333	181.47				
Z2 Allowances			293,300	190.54	17.71	4.8%
Z21 Design Allowance	205,310	133.38				
Z22 Escalation Allowance	87,990	57.16				
TOTAL HARD CONSTRUCTION ESTIMATE - EXCLUDING CONTINGENCIES			\$ 6,159,293	4,001.36	371.93	100%

EC2 - OPS BUILDING

R-2

ELEMENTAL COST SUMMARY

Project: EC2 - OPS Building		Prepared by: F. Lo		Project No.		
GFA: 7,533.50 m ²		Architect: HOK		Date: 2016-01-19		
Element/Sub-Element	Amount	Cost per m ² Gross	Element Total	Cost per m ² Gross	Cost per SF Gross	% of Cost by Element
A SHELL						
A1 Sub-Structural			2,066,053	274.25	25.49	12.0%
A11 Foundation	1,602,053	212.66				
A12 Excavation	464,000	61.59				
A2 Structure			4,218,774	560.00	52.05	24.5%
A21 Lowest Floor Construction	864,853	114.80				
A22 Upper Floor Construction	3,353,920	445.20				
A3 Exterior Enclosure			2,087,896	277.15	25.76	12.1%
A31 Walls Below Grade	0	0.00				
A32 Walls Above Grade	747,690	99.25				
A33 Windows and Entrances	123,900	16.45				
A34 Roof Covering	1,167,106	154.92				
A35 Projection	49,200	6.53				
B INTERIORS						
B1 Partitions & Doors			590,815	78.42	7.29	3.4%
B11 Partitions	539,015	71.55				
B12 Doors	51,800	6.88				
B2 Finishes			246,622	32.74	3.04	1.4%
B21 Floor Finishes	99,749	13.24				
B22 Ceiling Finishes	73,773	9.79				
B23 Wall Finishes	73,100	9.70				
B3 Fittings & Equipment			89,599	11.89	1.11	0.5%
B31 Fittings & Fixtures	89,599	11.89				
B32 Equipment	0	0.00				
B33 Conveying Systems	0	0.00				
C SERVICES						
C1 Mechanical			1,314,890	174.54	16.22	7.6%
C11 Plumbing & Drainage	365,372	48.50				
C12 Fire Protection	326,028	43.28				
C13 HVAC	322,170	42.76				
C14 Controls	301,320	40.00				
C2 Electrical			907,797	120.50	11.20	5.3%
C21 Service & Distribution	496,925	65.96				
C22 Lighting, Devices & Heating	240,278	31.89				
C23 Systems & Ancillaries	170,594	22.64				

EC2 - OPS BUILDING

R-2

NET BUILDING COST - EXCLUDING SITE						
			11,522,444	1,529.49	142.17	67%
D SITE & ANCILLARY WORK						
D1 Site Work			1,956,245	259.67	24.14	11.3%
D11 Site Development	1,224,600	162.55				
D12 Mechanical Site Services	676,645	89.82				
D13 Electrical Site Services	55,000	7.30				
D2 Ancillary Work			0	0.00		0.0%
D21 Demolition	0					
D22 Alterations	0					
NET BUILDING COST - INCLUDING SITE						
			13,478,689	1,789.17	166.30	78%
Z GENERAL REQUIREMENTS & ALLOWANCES						
Z1 General Requirements & Fee			2,938,354	390.04	36.25	17.0%
Z11 General Requirements	2,156,590	286.27				
Z12 Fee	781,764	103.77				
Z2 Allowances			820,852	108.96	10.13	4.8%
Z21 Design Allowance	574,597	76.27				
Z22 Escalation Allowance	246,256	32.69				
TOTAL HARD CONSTRUCTION ESTIMATE - EXCLUDING CONTINGENCIES			\$ 17,237,896	2,288.17	212.69	100%

EC3 - Training Centre

R-2

ELEMENTAL COST SUMMARY

Project: EC3 - Training Centre		Prepared by: F. Lo		Project No.		
GFA: 1,467.80 m ²		Architect: HOK		Date: 2016-01-19		
Element/Sub-Element	Amount	Cost per m ² Gross	Element Total	Cost per m ² Gross	Cost per SF Gross	% of Cost by Element
A SHELL						
A1 Sub-Structural			426,439	290.53	27.00	9.0%
A11 Foundation	335,939	228.87				
A12 Excavation	90,500	61.66				
A2 Structure			561,709	382.69	35.57	11.9%
A21 Lowest Floor Construction	130,652	89.01				
A22 Upper Floor Construction	431,057	293.68				
A3 Exterior Enclosure			523,026	356.33	33.12	11.1%
A31 Walls Below Grade	0	0.00				
A32 Walls Above Grade	204,512	139.33				
A33 Windows and Entrances	49,870	33.98				
A34 Roof Covering	234,644	159.86				
A35 Projection	34,000	23.16				
B INTERIORS						
B1 Partitions & Doors			191,778	130.66	12.14	4.1%
B11 Partitions	146,478	99.79				
B12 Doors	45,300	30.86				
B2 Finishes			193,943	132.13	12.28	4.1%
B21 Floor Finishes	60,728	41.37				
B22 Ceiling Finishes	66,175	45.08				
B23 Wall Finishes	67,040	45.67				
B3 Fittings & Equipment			36,082	24.58	2.28	0.8%
B31 Fittings & Fixtures	36,082	24.58				
B32 Equipment	0	0.00				
B33 Conveying Systems	0	0.00				
C SERVICES						
C1 Mechanical			640,391	436.29	40.55	13.6%
C11 Plumbing & Drainage	71,133	48.46				
C12 Fire Protection	63,081	42.98				
C13 HVAC	425,493	289.88				
C14 Controls	80,685	54.97				
C2 Electrical			276,612	188.45	17.52	5.9%
C21 Service & Distribution	160,325	109.23				
C22 Lighting, Devices & Heating	77,779	52.99				

EC3 - Training Centre

R-2

C23 Systems & Ancillaries	38,509	26.24				
NET BUILDING COST - EXCLUDING SITE			2,849,979	1,941.67	180.48	60%
D SITE & ANCILLARY WORK						
D1 Site Work			834,858	568.78	52.87	17.7%
D11 Site Development	594,238	404.85				
D12 Mechanical Site Services	210,620	143.49				
D13 Electrical Site Services	30,000	20.44				
D2 Ancillary Work			0	0.00		0.0%
D21 Demolition	0					
D22 Alterations	0					
NET BUILDING COST - INCLUDING SITE			3,684,837	2,510.45	233.35	78%
Z GENERAL REQUIREMENTS & ALLOWANCES						
Z1 General Requirements & Fee			803,295	547.28	50.87	17.0%
Z11 General Requirements	589,574	401.67				
Z12 Fee	213,721	145.61				
Z2 Allowances			224,407	152.89	14.21	4.8%
Z21 Design Allowance	157,085	107.02				
Z22 Escalation Allowance	67,322	45.87				
TOTAL HARD CONSTRUCTION ESTIMATE - EXCLUDING CONTINGENCIES			\$ 4,712,539	3,210.61	298.43	100%

EC4 - PILC BUILDING

R-1

ELEMENTAL COST SUMMARY

Project: EC4 - PILC Building		Prepared by: F. Lo		Project No.		
GFA: 962.60 m ²		Architect: HOK		Date: 2016-01-18		
Element/Sub-Element	Amount	Cost per m ² Gross	Element Total	Cost per m ² Gross	Cost per SF Gross	% of Cost by Element
A SHELL						
A1 Sub-Structural			272,685	283.28	26.33	11.5%
A11 Foundation	210,685	218.87				
A12 Excavation	62,000	64.41				
A2 Structure			581,653	604.25	56.17	24.6%
A21 Lowest Floor Construction	129,231	134.25				
A22 Upper Floor Construction	452,422	470.00				
A3 Exterior Enclosure			45,216	46.97	4.37	1.9%
A31 Walls Below Grade	0	0.00				
A32 Walls Above Grade	0	0.00				
A33 Windows and Entrances	45,216	46.97				
A34 Roof Covering	0	0.00				
A35 Projection	0	0.00				
B INTERIORS						
B1 Partitions & Doors			0	0.00	0.00	0.0%
B11 Partitions	0	0.00				
B12 Doors	0	0.00				
B2 Finishes			0	0.00	0.00	0.0%
B21 Floor Finishes	0	0.00				
B22 Ceiling Finishes	0	0.00				
B23 Wall Finishes	0	0.00				
B3 Fittings & Equipment			110,600	114.90	10.68	4.7%
B31 Fittings & Fixtures	0	0.00				
B32 Equipment	110,600	114.90				
B33 Conveying Systems	0	0.00				
C SERVICES						
C1 Mechanical			131,439	136.55	12.69	5.6%
C11 Plumbing & Drainage	7,350	7.64				
C12 Fire Protection	26,964	28.01				
C13 HVAC	97,125	100.90				
C14 Controls	0	0.00				
C2 Electrical			81,096	84.25	7.83	3.4%
C21 Service & Distribution	35,700	37.09				

EC4 - PILC BUILDING

R-1

C22 Lighting, Devices & Heating	11,445	11.89				
C23 Systems & Ancillaries	33,951	35.27				
NET BUILDING COST - EXCLUDING SITE			1,222,689	1,270.19	118.07	52%
D SITE & ANCILLARY WORK						
D1 Site Work			625,953	650.27	60.44	26.5%
D11 Site Development	488,384	507.36				
D12 Mechanical Site Services	112,569	116.94				
D13 Electrical Site Services	25,000	25.97				
D2 Ancillary Work			0	0.00	0.00	0.0%
D21 Demolition	0					
D22 Alterations	0					
NET BUILDING COST - INCLUDING SITE			1,848,642	1,920.47	178.51	78%
Z GENERAL REQUIREMENTS & ALLOWANCES						
Z1 General Requirements & Fee			403,004	418.66	38.91	17.0%
Z11 General Requirements	295,783	307.27				
Z12 Fee	107,221	111.39				
Z2 Allowances			112,582	116.96	10.87	4.8%
Z21 Design Allowance	78,808	81.87				
Z22 Escalation Allowance	33,775	35.09				
TOTAL HARD CONSTRUCTION ESTIMATE - EXCLUDING CONTINGENCIES			\$ 2,364,228	2,456.09	228.29	100%

TAKE-OFF

EC1A - Admin HO

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
A. SHELL						
A1 SUBSTRUCTURE						
A11 Foundations						\$ 634,904.87
<u>A111 Standard Foundations</u>						\$ 634,904.87
.1 Concrete Strip Footing - (800 x 300)		40.39	m³	\$ 917.89		\$ 37,075.35
a Trench excavation		302.94	m³	\$ 16.00	\$ 4,847.04	
b Hand Trim		134.64	m2	\$ 19.75	\$ 2,659.14	
c Compacted backfill		248.90	m³	\$ 8.00	\$ 1,991.20	
d Formwork - 4 uses		100.98	m2	\$ 80.00	\$ 8,078.40	
e Re-bar (60Kg/m3 assumed)		2.42	TN	\$ 2,755.00	\$ 6,676.80	
f Concrete - 25 Mpa		40.39	m3	\$ 220.00	\$ 8,886.24	
g Place concrete - pumped		40.39	m3	\$ 51.00	\$ 2,059.99	
h Keyway		168.30	m	\$ 4.35	\$ 732.11	
i Screed finish		134.64	m2	\$ 8.50	\$ 1,144.44	
.2 Concrete Pad Footings	51	454.42	m³	\$ 636.38		\$ 289,185.21
a Bulk excavation		1,850.00	m³	\$ 16.00	\$ 29,600.00	
b Hand Trim		572.60	m2	\$ 15.00	\$ 8,589.00	
c Compact backfill		1,238.00	m³	\$ 10.00	\$ 12,380.00	
d Formwork		499.21	m2	\$ 70.00	\$ 34,944.70	
e Re-bar (60Kg/m3)		27.27	TN	\$ 2,755.00	\$ 75,115.63	
f Concrete - 25 Mpa		454.42	m³	\$ 220.00	\$ 99,972.40	
g Place concrete - pumped		454.42	m³	\$ 44.00	\$ 19,994.48	
h Float finish		572.60	m2	\$ 15.00	\$ 8,589.00	
.3 Shear Wall Footings		113.10	m³	\$ 630.26		\$ 71,282.02
a Bulk excavation		600.00	m³	\$ 16.00	\$ 9,600.00	
b Hand Trim		282.80	m2	\$ 15.00	\$ 4,242.00	
c Compact backfill		487.00	m³	\$ 10.00	\$ 4,870.00	
d Formwork		85.80	m2	\$ 70.00	\$ 6,006.00	
e Re-bar (40Kg/m3)		4.52	TN	\$ 2,755.00	\$ 12,463.62	
f Concrete - 25 Mpa		113.10	m³	\$ 220.00	\$ 24,882.00	
g Place concrete - pumped		113.10	m³	\$ 44.00	\$ 4,976.40	
h Float finish		282.80	m2	\$ 15.00	\$ 4,242.00	
.4 Elevator Pit Footings		43.20	m³	\$ 495.17		\$ 21,391.44
a Bulk excavation		92.00	m³	\$ 16.00	\$ 1,472.00	
b Hand Trim		43.20	m2	\$ 15.00	\$ 648.00	
c Compact backfill		40.00	m³	\$ 10.00	\$ 400.00	
d Formwork		29.40	m2	\$ 70.00	\$ 2,058.00	
e Re-bar (40Kg/m3)		1.73	TN	\$ 2,755.00	\$ 4,760.64	
f Concrete - 25 Mpa		43.20	m³	\$ 220.00	\$ 9,504.00	
g Place concrete - pumped		43.20	m³	\$ 44.00	\$ 1,900.80	
h Float finish		43.20	m2	\$ 15.00	\$ 648.00	
.5 Concrete Foundation Walls - 300		170.8	m³	\$ 1,119.40		\$ 191,164.85
Formwork		1,138.5	m²	\$ 82.00	\$ 93,357.00	
Re-Bar (92Kg/m3)		15.7	TN	\$ 2,378.00	\$ 37,361.47	
Concrete - 25 MPa		170.8	m³	\$ 280.62	\$ 47,922.88	
Concrete Finish includes breaking ties and patch voids		569.3	m²	\$ 22.00	\$ 12,523.50	
.6 Perimeter drainage		250	m	\$ 30.00	\$ 7,500.00	
.7 Perimeter Rigid Insulation 50 mm		500.00	m²	\$ 28.00	\$ 14,000.00	
.8 Allowance for reinforcing dowels		1.20	TN	\$ 2,755.00	\$ 3,306.00	
<u>A112 Special Foundations</u>						\$ -
Assume none required.						
A12 Excavation						\$ 450,000.00

TAKE-OFF

EC1A - Admin HO

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.10 Allowance for additional excavation and backfill		1	Allow	\$ 450,000.00	\$ 450,000.00	
A2 STRUCTURE						
A21 Lowest Floor Construction						\$ 245,205.45
.1 Slab on Grade - 125 thick Unreinforced		342.1	m³	\$ 652.56		\$ 223,240.94
Fine grade 3 passes with grader and roller		2,736.8	m²	\$ 3.00	\$ 8,210.40	
300 mm Granular A sub base		821.0	m³	\$ 60.00	\$ 49,262.40	
Extruded polystyrene XPS Insulation - 50 mm perimeter only		390.0	m²	\$ 28.00	\$ 10,920.00	
Vapour Barrier		2,736.8	m²	\$ 3.05	\$ 8,347.24	
Concrete (25 MPa) - direct chute		342.1	m³	\$ 260.00	\$ 88,946.00	
Saw cut and control joints		2,736.8	m²	\$ 4.00	\$ 10,947.20	
Cure with spray membrane curing compound		2,736.8	m²	\$ 3.03	\$ 8,292.50	
Finishing floor, monolithic steel trowel		2,736.8	m²	\$ 14.00	\$ 38,315.20	
.2 Slab on Grade - 150 thick		27.4	m³	\$ 627.20		\$ 17,179.01
Fine grade 3 passes with grader and roller		182.6	m²	\$ 3.00	\$ 547.80	
300 mm Granular A sub base		54.8	m³	\$ 60.00	\$ 3,286.80	
Vapour Barrier		182.6	m²	\$ 3.05	\$ 556.93	
152 x 152 Mesh Re-inforcement		182.6	m²	\$ 10.00	\$ 1,826.00	
Concrete (25 MPa) - direct chute		27.4	m³	\$ 260.00	\$ 7,121.40	
Saw cut and control joints		182.6	m²	\$ 4.00	\$ 730.40	
Cure with spray membrane curing compound		182.6	m²	\$ 3.03	\$ 553.28	
Finishing floor, monolithic steel trowel		182.6	m²	\$ 14.00	\$ 2,556.40	
.3 Slab thickening below masonry block walls		56.3	m	\$ 85.00	\$ 4,785.50	
A22 Upper Floor Construction						\$ 4,402,356.89
A221 Upper Floor Construction						\$ 3,353,929.37
.1 Round Tied Columns - 750mm (Ground & 2nd Floor)	12	22.93	m³	\$ 1,177.38		\$ 26,995.89
Forms in place - round fiber tube, 750 dia. 1 use		51.90	m	\$ 120.00	\$ 6,228.00	
Re-bar in place, column ties (157Kg/m3)		3.60	TN	\$ 3,370.00	\$ 12,131.38	
Concrete (35 MPa)		22.93	m³	\$ 244.00	\$ 5,594.62	
Placing concrete, vibrating, pumped		22.93	m³	\$ 50.00	\$ 1,146.44	
Finish, burlap rub w/grout		122.29	m²	\$ 15.50	\$ 1,895.45	
.2 Round Tied Columns - 600mm (Ground Floor)	38	51.04	m³	\$ 1,305.10		\$ 66,606.17
Forms in place - round fiber tube, 600 dia. 1 use		180.50	m	\$ 100.00	\$ 18,050.00	
Re-bar in place, column ties (157Kg/m3)		8.01	TN	\$ 3,370.00	\$ 27,002.26	
Concrete (35 MPa)		51.04	m³	\$ 244.00	\$ 12,452.61	
Placing concrete, vibrating, pumped		51.04	m³	\$ 75.00	\$ 3,827.65	
Finish, burlap rub w/grout		340.24	m²	\$ 15.50	\$ 5,273.65	
.3 Round Tied Columns - 600mm	96	105.86	m³	\$ 1,257.92		\$ 133,162.61
Forms in place - round fiber tube, 600 dia. 1 use		374.40	m	\$ 100.00	\$ 37,440.00	
Re-bar in place, column ties (143Kg/m3)		15.14	TN	\$ 3,370.00	\$ 51,014.68	
Concrete (35 MPa)		105.86	m³	\$ 244.00	\$ 25,829.68	
Placing concrete, vibrating, pumped		105.86	m³	\$ 75.00	\$ 7,939.45	
Finish, burlap rub w/grout		705.73	m²	\$ 15.50	\$ 10,938.80	
.4 Rectangle Tied Columns - 600 x 400	20	20.35	m³	\$ 2,199.50		\$ 44,764.22
Forms in place - plywood, 4 uses		169.60	m²	\$ 110.00	\$ 18,656.00	
Chamger strip, wood 20mm wide		339.20	m	\$ 18.00	\$ 6,105.60	
Re-bar in place, column ties (150Kg/m3)		3.05	TN	\$ 3,370.00	\$ 10,287.94	
Concrete (35 MPa)		20.35	m³	\$ 244.00	\$ 4,965.89	
Placing concrete, vibrating, pumped		20.35	m³	\$ 75.00	\$ 1,526.40	
Finish, break ties, patch voids, burlap rub w/grout		169.60	m²	\$ 19.00	\$ 3,222.40	
.5 Cast in place Flat Slab (250mm) with Drop Panels		2,428.02	m³	\$ 970.73		\$ 2,356,962.24
Forms in place, elevated slabs, 4 uses		9,029.90	m²	\$ 105.00	\$ 948,139.50	
Re-bar (90Kg/m3)		218.52	TN	\$ 2,410.00	\$ 526,637.54	
Concrete ready mix (30 MPa)		2,428.02	m³	\$ 235.00	\$ 570,584.70	

TAKE-OFF

EC1A - Admin HO

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
Place and vibrate - Pumped		2,428.02	m³	\$ 65.00	\$ 157,821.30	
Finish floor, monolithic steel trowel finish		9,029.90	m²	\$ 14.00	\$ 126,418.60	
Cure with spray membrane curing compound		9,029.90	m²	\$ 3.03	\$ 27,360.60	
.6 Cast in place Flat Slab (450mm) with Drop Panels (Penthouse)		508.73	m³	\$ 836.28		\$ 425,438.24
Forms in place, elevated slabs, 4 uses		1,130.50	m²	\$ 105.00	\$ 118,702.50	
Re-bar (110Kg/m3)		55.96	TN	\$ 2,410.00	\$ 134,864.32	
Concrete ready mix (30 MPa)		508.73	m³	\$ 235.00	\$ 119,551.55	
Place and vibrate - Pumped		508.73	m³	\$ 65.00	\$ 33,067.45	
Finish floor, monolithic steel trowel finish		1,130.50	m²	\$ 14.00	\$ 15,827.00	
Cure with spray membrane curing compound		1,130.50	m²	\$ 3.03	\$ 3,425.42	
.7 Superplasticizer premium		1.00	allow	\$ 50,000.00	\$ 50,000.00	
.8 Premium for seismic protection design		1	LS	\$ 250,000.00	\$ 250,000.00	
<u>A222 Stair Construction</u>						\$ 110,000.00
.1 Stairs C.I.P. concrete with landing		20	Flight	\$ 5,500.00	\$ 110,000.00	
12 risers, with nosing , with steel pipe railings						
<u>A223 Roof Construction</u>						\$ 938,427.52
.1 Round Tied Columns - 600mm	29	31.98	m³	\$ 1,214.11		\$ 38,825.24
Forms in place - round fiber tube, 600 dia. 1 use		113.10	m	\$ 100.00	\$ 11,310.00	
Re-bar in place, column ties (130Kg/m3)		4.16	TN	\$ 3,370.00	\$ 14,009.71	
Concrete (35 MPa)		31.98	m³	\$ 244.00	\$ 7,802.72	
Placing concrete, vibrating, pumped		31.98	m³	\$ 75.00	\$ 2,398.38	
Finish, burlap rub w/grout		213.19	m²	\$ 15.50	\$ 3,304.43	
.2 Cast in place Flat Slab (375mm) with Drop Panels		740.71	m³	\$ 829.29		\$ 614,266.29
Forms in place, elevated slabs, 4 uses		1,896.20	m²	\$ 105.00	\$ 199,101.00	
Re-bar (90Kg/m3)		66.66	TN	\$ 2,410.00	\$ 160,660.00	
Concrete ready mix (30 MPa)		740.71	m³	\$ 235.00	\$ 174,066.85	
Place and vibrate - Pumped		740.71	m³	\$ 65.00	\$ 48,146.15	
Finish floor, monolithic steel trowel finish		1,896.20	m²	\$ 14.00	\$ 26,546.80	
Cure with spray membrane curing compound		1,896.20	m²	\$ 3.03	\$ 5,745.49	
.3 Structural steel roof construction		701.4	m²	\$ 250.27		\$ 175,536.00
base plates and anchor bolts		20	No.	\$ 360.00	\$ 7,200.00	
structural steel columns (10Kg/m2)		7.0	TN	\$ 4,000.00	\$ 28,056.00	
structural steel beams (35Kg/m2)		24.5	TN	\$ 4,000.00	\$ 98,196.00	
bridging and bracing (5Kg/m2)		3.5	TN	\$ 4,000.00	\$ 14,028.00	
38mm metal deck - 20 ga		701.4	m²	\$ 40.00	\$ 28,056.00	
.4 Allowance for roof openings framing		1	LS	\$ 4,000.00	\$ 4,000.00	
.3 Structural reinforcement for mechanical equipment		1	LS	\$ 15,000.00	\$ 15,000.00	
.4 Premium for seismic protection design		1	LS	\$ 50,000.00	\$ 50,000.00	
.5 Roof Safety Anchors c/w cable system		16	ea	\$ 2,550.00	\$ 40,800.00	
A3 EXTERIOR ENCLOSURE						
A31 Walls Below Grade						\$ -
A311 Structural Walls Below Grade						
A32 Walls Above Grade						\$ 1,775,822.92
A321 Walls Above Grade						\$ 1,775,822.92
.1 Composite Panel Wall Assembly		2,003.10	m²	\$ 754.30		\$ 1,510,938.33
50mm Composite Metal Panel w/ Z-Girts		2,003.10	m²	\$ 646.00	\$ 1,294,002.60	

TAKE-OFF

EC1A - Admin HO

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
127 Mineral Wool Insulation		2,003.10	m ²	\$ 14.54	\$ 29,125.07	
Membrane Air/Vapour Barrier		2,003.10	m ²	\$ 2.50	\$ 5,007.75	
16mm Glass Matt Gypsum Sheathing		2,003.10	m ²	\$ 23.50	\$ 47,072.85	
152 Wind Bearing Metal Stud Wall Framing		2,003.10	m ²	\$ 29.70	\$ 59,492.07	
50mm Mineral Wool Insulation		2,003.10	m ²	\$ 8.50	\$ 17,026.35	
16mm Gypsum Board		2,003.10	m ²	\$ 21.50	\$ 43,066.65	
Paint Finish		2,003.10	m ²	\$ 8.06	\$ 16,144.99	
.2 Masonry Wall Assembly		526.50	m ²	\$ 253.76		\$ 133,604.64
90mm Architectural Block Veneer		526.50	m ²	\$ 160.00	\$ 84,240.00	
25mm Air Space						
Membrane Air/Vapour Barrier		526.50	m ²	\$ 2.50	\$ 1,316.25	
16mm Glass Matt Gypsum Sheathing		526.50	m ²	\$ 23.50	\$ 12,372.75	
152 Wind Bearing Metal Stud Wall Framing		526.50	m ²	\$ 29.70	\$ 15,637.05	
50mm Mineral Wool Insulation		526.50	m ²	\$ 8.50	\$ 4,475.25	
16mm Gypsum Board		526.50	m ²	\$ 21.50	\$ 11,319.75	
Paint Finish		526.50	m ²	\$ 8.06	\$ 4,243.59	
.3 Metal Siding Assembly		753.40	m ²	\$ 174.25		\$ 131,279.95
Steel Siding, galvanized on steel frame, 0.80mm thick		753.40	m ²	\$ 89.45	\$ 67,391.63	
127 Mineral Wool Insulation		753.40	m ²	\$ 14.54	\$ 10,954.44	
Membrane Air/Vapour Barrier		753.40	m ²	\$ 2.50	\$ 1,883.50	
16mm Glass Matt Gypsum Sheathing			m ²	\$ 23.50	\$ -	
152 Wind Bearing Metal Stud Wall Framing		753.40	m ²	\$ 29.70	\$ 22,375.98	
50mm Mineral Wool Insulation		753.40	m ²	\$ 8.50	\$ 6,403.90	
16mm Gypsum Board		753.40	m ²	\$ 21.50	\$ 16,198.10	
Paint Finish		753.40	m ²	\$ 8.06	\$ 6,072.40	
A33 Windows and Entrance						\$ 1,306,709.60
A331 Windows and Louvres						\$ 1,089,855.60
.1 Glazing - Curtain Wall System		1,593.17	m ²	\$ 680.00	\$ 1,083,355.60	
.2 Louvres for mechanical rooms - allowance		10.0	m ²	\$ 650.00	\$ 6,500.00	
A333 Doors						\$ 216,854.00
.1 Pressed steel frames and hollow metal doors						
Include Hardware and Painting						
Single		9	Ea	\$ 1,900.00	\$ 17,100.00	
Double		6	Pair	\$ 3,100.00	\$ 18,600.00	
.2 Revolving Doors, Stainless Steel		2	Ea	\$ 64,580.00	\$ 129,160.00	
.3 Glazed Double Doors		2	Pair	\$ 10,497.00	\$ 20,994.00	
.4 Overhead doors (3,300 x 3,600)		2	Ea	\$ 7,500.00	\$ 15,000.00	
.5 Barrier free door operators - assumed		5	Ea	\$ 3,200.00	\$ 16,000.00	
A34 Roof Covering						\$ 564,126.73
A341 Roofing						\$ 564,126.73
.1 SBS Modified Bituminous Roofing		3,119.00	m ²	\$ 150.00	\$ 467,850.00	
.2 Tapered insulation to attain roof slopes (5%)		155.95	m ²	\$ 19.00	\$ 2,963.05	
.3 Flashing		240.33	m ²	\$ 96.00	\$ 23,071.68	
.4 Pre-finish metal soffit		460.00	m ²	\$ 152.70	\$ 70,242.00	

TAKE-OFF

EC1A - Admin HO

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
A35 Projection						\$ 71,847.36
.1 Parapets		148.2	m ²	\$ 484.80	\$ 71,847.36	
B. INTERIORS						
B1 PARTITIONS & DOORS						
B11 Partitions						\$ 1,976,692.30
<u>B111 Fixed Partitions</u>						\$ 860,012.39
.1 Drywall Metal Stud partitions slab to slab w/ Roxul AFB		7,276.00	m ²	\$ 86.00	\$ 625,736.00	
.2 Concrete Block Wall - 190 mm, jointed and pointed		267.23	m ²	\$ 193.00	\$ 51,575.39	
.3 Furred out walls		3,727.00	m ²	\$ 43.00	\$ 160,261.00	
.4 Shaft Walls		255	m ²	\$ 88.00	\$ 22,440.00	
<u>B112 Movable Partitions</u>						\$ -
<u>B113 Structural Partitions</u>						\$ 1,116,679.91
.1 Concrete shear walls		860.1	m ³	\$ 1,298.30		\$ 1,116,679.91
Formwork, 4 uses		5,739.9	m ²	\$ 95.00	\$ 545,294.30	
Re-Bar (92Kg/m3)		79.1	TN	\$ 2,375.00	\$ 187,934.04	
Concrete Ready Mix - 35 MPa		860.1	m ³	\$ 244.00	\$ 209,866.84	
Placing concrete, pumped		860.1	m ³	\$ 55.00	\$ 47,306.05	
Concrete Finish, breaking ties and patching voids		5,739.9	m ²	\$ 22.00	\$ 126,278.68	
B12 Doors						\$ 222,850.00
.1 Pressed Steel Frames and Hollow Metal Doors c/w hardware include painting						
Single		154	Ea	\$ 750.00	\$ 115,500.00	
Double		6	Ea	\$ 1,300.00	\$ 7,800.00	
Single with sidelite		43	Ea	\$ 1,050.00	\$ 45,150.00	
.2 Access Doors/Panels - Allowance		16	Ea	\$ 200.00	\$ 3,200.00	
.3 Barrier free automatic door openers - assume		16	ea	\$ 3,200.00	\$ 51,200.00	
B2 FINISHES						
B21 Floor Finishes						\$ 811,399.50
Assume porcelain tiles in washrooms, carpet tiles in admin areas. Remaining to be VCT						
.1 Stone Floor in Foyer		156	m ²	\$ 544.00	\$ 84,972.80	
.2 Porcelain Tile Floor		463	m ²	\$ 123.00	\$ 56,998.20	
.3 Carpet Tiles		9,571	m ²	\$ 55.00	\$ 526,388.50	
.4 Vinyl Composite Tiles		635	m ²	\$ 35.00	\$ 22,225.00	
.5 Anti Static Floor Tiles		84	m ²	\$ 129.00	\$ 10,836.00	
.6 Concrete Floor / Sealer		977	m ²	\$ 20.00	\$ 19,544.00	

TAKE-OFF

EC1A - Admin HO

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.7 Rubber gym floor		246	m ²	\$ 150.00	\$ 36,900.00	
.8 Base						
i 108mm Rubber Base		474	m	\$ 10.50	\$ 4,977.00	
ii Porcelain Tile Base		446	m	\$ 31.00	\$ 13,826.00	
iii Carpet Base		1,828	m	\$ 19.00	\$ 34,732.00	
B22 Ceiling Finishes						\$ 701,337.80
.1 Gypsum Board Ceiling include Painting in washrooms		778.30	m ²	\$ 86.00	\$ 66,933.80	
.2 Acoustical Suspended Ceiling		10,360.10	m ²	\$ 40.00	\$ 414,404.00	
.3 Executive Premium					\$ 100,000.00	
.4 Miscellaneous gypsum bulkhead & reveals - allowance		1	LS	\$ 120,000.00	\$ 120,000.00	
B23 Wall Finishes						\$ 323,473.20
.1 Paint Finish		17,322.00	m ²	\$ 8.60	\$ 148,969.20	
.2 Porcelain Wall Tiles in washrooms		1,338.00	m ²	\$ 108.00	\$ 144,504.00	
.3 Allowance for special wall finishes		1	LS	\$ 30,000.00	\$ 30,000.00	
B3 Fittings & Equipment						
B31 Fittings and Fixtures						\$ 404,223.80
<u>B311 Metals</u>						\$ 104,000.00
.1 Service ladders		2	Ea	\$ 2,000.00	\$ 4,000.00	
.2 Miscellaneous metal - Allowance		1	LS	\$ 100,000.00	\$ 100,000.00	
<u>B312 Millwork</u>						\$ 113,396.80
.1 Typical kitchen upper and lower cabinet c/w countertop		26.90	m	\$ 1,400.00	\$ 37,660.00	
.2 Cabinets and work countertops		27.70	m	\$ 984.00	\$ 27,256.80	
.3 Kitchenette bar counters		39.20	m	\$ 600.00	\$ 23,520.00	
.4 Washroom vanity and counter		31.20	m	\$ 800.00	\$ 24,960.00	
<u>B313 Specialties</u>						\$ 107,177.00
.1 Toilet Compartment - Metal Ceiling Hung		16	ea	\$ 1,037.00	\$ 16,592.00	
.2 Hadicapped Toilet Compartment		12	ea	\$ 1,685.00	\$ 20,220.00	
.3 Urinal Screen		4	ea	\$ 485.00	\$ 1,940.00	
.4 Toilet and Bath Accessories						
i Hand dryer		19	ea	\$ 450.00	\$ 8,550.00	
ii Paper towel dispenser - assumed		19	ea	\$ 150.00	\$ 2,850.00	
iii Toilet paper dispenser		35	ea	\$ 50.00	\$ 1,750.00	
iv Soap dispenser		37	ea	\$ 75.00	\$ 2,775.00	
v Waste receptacle - wall mounted semi-recessed - assumed		19	ea	\$ 500.00	\$ 9,500.00	
vi Sanitary disposal		22	ea	\$ 200.00	\$ 4,400.00	
vii Grab bars		8	pr	\$ 450.00	\$ 3,600.00	
viii Tilted mirror		8	ea	\$ 250.00	\$ 2,000.00	

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EC1A - Admin HO

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.5 Unframed Mirror in washrooms above vanities		50.00	m ²	\$ 500.00	\$ 25,000.00	
.6 Recessed floor grille		2	ea	\$ 4,000.00	\$ 8,000.00	
<u>B314 Furnishings</u>						\$ 79,650.00
.1 Window treatment - Allowance		1,593.00	m ²	\$ 50.00	\$ 79,650.00	
B32 Equipment						\$ 179,000.00
.1 Kitchen equipment (covered in Cash Allowance)			Allow		\$ -	
.2 3,500 cfm ecology unit		1	Allow	\$ 38,000.00	\$ 38,000.00	
.3 3,500 cfm kitchen exhaust fan, 6m welded and fire blanket wrapped 300x760 duct with cleanouts		1	Allow	\$ 30,000.00	\$ 30,000.00	
.4 Kitchen exhaust fire protection system		1	Allow	\$ 40,000.00	\$ 40,000.00	
.5 Kitchen exhaust hood with grease extractor		1	Allow	\$ 60,000.00	\$ 60,000.00	
.6 Dock Levelers		1	ea	\$ 11,000.00	\$ 11,000.00	
B33 Conveying Systems						\$ 377,040.00
.1 Low-rise Electric Traction Passenger Elevator i single door from one side - 5 stops		2	ea	\$ 188,520.00	\$ 377,040.00	
C. SERVICES						
C1 Mechanical						
C11 Plumbing and Drainage						\$ 579,145.23
<u>C111 Plumbing Fixtures</u>						\$ 166,566.89
.1 Water closets. Vitreous china, wall mounted fixtures with electronic flush valve. Water conservation type.		34.0	ea	\$ 2,336.90	\$ 79,454.60	
.2 Urinals. Vitreous china, wall hung type with electronic flush valve. Water conservation type.		9.0	ea	\$ 1,353.91	\$ 12,185.19	
.3 Lavatories. Vitreous china, above counter mounted type with electronic 4in center set faucets. Barrier free to be of same type per accessibility requirements.		29.0	ea	\$ 1,357.90	\$ 39,379.10	
.4 Service sinks. Assume standard, stainless steel, counter-top single and double (where appropriate), in shared kitchenette areas.		5.0	ea	\$ 1,429.60	\$ 7,148.00	
.5 Custodial sinks. Stainless Steel, deep, floor mounted with braced hose faucet and trim.		4.0	ea	\$ 1,850.00	\$ 7,400.00	
.6 Drinking fountains. Assume barrier free recessed wall mounted, re Fridgerated, stainless steel, single bubbler.		6.0	allow	\$ 3,500.00	\$ 21,000.00	
<u>C112 Domestic Water</u>						\$ 120,000.00
.1 Domestic water service shall enter the building to serve domestic water and fire protection. Incoming service c/w backflow prevention and metering. Domestic hot		1.0	allow	\$ 95,000.00	\$ 95,000.00	

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EC1A - Admin HO

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
water generated by gas fired cond boilers (included in HVAC). Thermal insulation included.						
.2 Domestic water booster pumps and tanks.		1.0	allow	\$ 25,000.00	\$ 25,000.00	
C113 Sanitary Waste & Vent						\$ 120,000.00
.1 Sanitary system assume U/G to be PVC, while above grade piping shall be cast iron/copper DWV. Drains below the service entry shall be collected in sump pits c/w duplex submersible pumps (Assume 3 for this building). Thermal insulation included.		1.00	allow	\$ 120,000.00	\$ 120,000.00	
C114 Storm						\$ 100,000.00
.1 Storm system shall include control flow type roof drains. U/G storm collection in PVC. Cast iron above grade. Weeping tile collected into sumps, then transferred to sump pits c/w duplex submersible pumps. Thermal insulation included. PVC Jacketed in exposed areas.		1.0	allow	\$ 100,000.00	\$ 100,000.00	
C115 Natural Gas						\$ 45,000.00
.1 Incoming gas service c/w gas meter. Distribution of natural gas to centralized mechanical PH to feed gas fired HVAC equipment. Piping to be schd 40 black malleable. Piping 50mm and smaller to be screwed, 65mm and over to be welded.		1.0	allow	\$ 45,000.00	\$ 45,000.00	
C116 Fuel Oil						\$ -
.1						
C117 Misc Works and General Accounts						\$ 27,578.34
.1 Clean-up, HASSSP, rentals, small tools, fire stopping, permits, inspections, bonding and insurance, site trailer.		1.0	allow	\$ 27,578.34	\$ 27,578.34	
C12 Fire Protection						\$ 547,492.00
C121 Sprinklers						\$ 547,492.00
.1 Combined wet pipe sprinkler/standpipe system including pumping equipment.		12,650.00	m2	\$ 43.28	\$ 547,492.00	
.2 Extinguishers, and all misc works included in the rates above.						
C13 Heating, Ventilation & Air Conditioning						\$ 1,797,600.00
C131 Liquid Heat Transfer (Heating)						\$ 350,000.00
.1 Gas fired, high efficiency condensing boilers		2	allow	\$ 75,000.00	\$ 150,000.00	
.2 Venting and accessories.		1	allow	\$ 65,000.00	\$ 65,000.00	
.3 Heating water pumping (primary/secondary), assume verticle in-line.		1	allow	\$ 55,000.00	\$ 55,000.00	
.4 Perimeter wall and window fin tube radiation.		1	allow	\$ 80,000.00	\$ 80,000.00	
C132 Liquid Heat Transfer (Cooling)						\$ 437,000.00

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EC1A - Admin HO

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.1 Chiller(s), valving, VFD's and headers.		2	allow	\$ 96,000.00	\$ 192,000.00	
.2 Colling towers		2	allow	\$ 60,000.00	\$ 120,000.00	
.3 Chilled/Condenser distribution piping inc insulation		1	allow	\$ 125,000.00	\$ 125,000.00	
<u>C133 Air Distribution</u>						\$ 850,000.00
.1 Typical Floors 2 AHU units at approx 60,000cfm, VAV with supply fan, return fan, mix box/economizer, cooling coil , heating coil One AHU as above, 12,000cfm One energy recovery unit (heat wheel) approx 18,000 cfm with 2 ducts to each AHU (6 ducts), inlet duct and plenum, exhaust duct and plenum		1	allow	\$ 675,000.00	\$ 675,000.00	
.2 Lobby System - PH roof mounted VAV AHU system, heating/cooling coils, DDC controls, includes dist ductwork.		1	allow	\$ 150,000.00	\$ 150,000.00	
.3 Elevator machine room, telephone & comms rooms cooling.		1	allow	\$ 25,000.00	\$ 25,000.00	
<u>C134 Exhaust Systems</u>						\$ 75,000.00
.1 Misc systems - ventilation, stairwell and washroom exhaust.		1	allow	\$ 75,000.00	\$ 75,000.00	
<u>C136 Misc Works and General Accounts</u>						\$ 85,600.00
.1 Clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, fire stopping.		1	allow	\$ 85,600.00	\$ 85,600.00	
C14 EMCS Controls						\$ 695,750.00
<u>C141 Controls and Automation</u>						\$ 695,750.00
.1 Assume EMCS Interfacing with building AHU's, DHWT's, pumps, heating and cooling systems, energy management.		12,650.00	m2	\$ 55.00	\$ 695,750.00	
C2 Electrical						
C21 Service & Distribution						\$ 1,533,525.00
<u>C211 Equipment</u>						\$ 245,000.00
.1 Switchboard - Assume 2000A, 600/347V, 3ph, 4W. Main breaker digital metering, ammeter, voltmeter, selector switch.		1	ea	\$ 245,000.00	\$ 245,000.00	
.2 Incoming service by HOL.					\$ -	
<u>C212 Emergency Power</u>						\$ 570,000.00
.1 Emergency generator - including battery, charger, muffler and distribution.		1	allow	\$ 500,000.00	\$ 500,000.00	
.2 1000A Automatic Transfer Switch.		1	allow	\$ 70,000.00	\$ 70,000.00	
<u>C213 Distribution</u>						\$ 224,000.00
.1 Lighting panels, power panels, transformers, digital metering.		1	allow	\$ 189,000.00	\$ 189,000.00	

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EC1A - Admin HO

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.2 Automatic transfer switch		1	allow	\$ 35,000.00	\$ 35,000.00	
<u>C214 Feeders</u>						\$ 150,000.00
.1 Main feeders.		1	allow	\$ 150,000.00	\$ 150,000.00	
<u>C215 Motor Controls & Wiring</u>						\$ 196,500.00
.1 Main MCC's for mechanical equipment including starters. Any VFD's required are in mechanical pricing. All power wiring to mechanical equipment included.		1	allow	\$ 196,500.00	\$ 196,500.00	
<u>C216 Grounding & Lightning Protection</u>						\$ 75,000.00
.1 Electrical grounding & lightning protection.		1	allow	\$ 75,000.00	\$ 75,000.00	
<u>C216 Misc Works and General Accounts</u>						\$ 73,025.00
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer, fire stopping		1	allow	\$ 73,025.00	\$ 73,025.00	
C22 Lighting, Devices and Heating						\$ 740,181.75
<u>C221 Lighting</u>						\$ 521,935.00
.1 Assume energy efficient, recessed, mounted on grid ceiling suspension system, electronic ballasts, acrylic prismatic diffusers.		12,650.00	m2	\$ 30.00	\$ 379,500.00	
.2 Allowance - specialty lighting (pots, LED's in common areas).		1	allow	\$ 75,575.00	\$ 75,575.00	
.3 Executive Area premium					\$ 50,000.00	
.4 Exit and emergency lighting.		1	allow	\$ 66,860.00	\$ 66,860.00	
<u>C222 Branch Devices & Wiring</u>						\$ 153,000.00
.1 All conduit systems concealed all finished areas.		1	allow	\$ 153,000.00	\$ 153,000.00	
<u>C223 Heating</u>						\$ 30,000.00
.1 Supplementary units inside vestibules & mech rms.		1	allow	\$ 30,000.00	\$ 30,000.00	
<u>C224 Misc Works and General Accounts</u>						\$ 35,246.75
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer, fire stopping		1	allow	\$ 35,246.75	\$ 35,246.75	
C23 Systems & Ancillaries						\$ 395,951.33
<u>C231 Fire Alarm</u>						\$ 377,096.50
.1 Addressable 2-stage FA system c/w remote annunciator panels, manual pull stations, signal speakers throughout		12,650.00	m2	\$ 29.81	\$ 377,096.50	
<u>C232 Security System</u>						\$ -
.1 Cash allowance.			m2	\$ 9.50	\$ -	
<u>C233 Communications</u>						\$ -

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EC1A - Admin HO

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Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.1 Cash allowance.			m2	\$ 42.00	\$ -	
<u>C234 Public Address & AV</u>						\$ -
.1 Cash allowance.			m2	\$ 30.00	\$ -	
<u>C235 Miscellaneous</u>						\$ -
.1 No requirement.		0	allow	\$ -	\$ -	
<u>C236 General Requirements</u>						\$ 18,854.83
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer,		1	allow	\$ 18,854.83	\$ 18,854.83	
D. SITE & ANCILLARY WORK						
D1 SITE WORK						
D11 Site Development						\$ 2,486,488.00
<u>D111 Preparation</u>						\$ 107,600.00
.1 Site preparation		1	LS	\$ 107,600.00	\$ 107,600.00	
<u>D112 Hard Surfaces</u>						\$ 991,828.00
.1 Parking Lot (HO Employee Parking)		425	car	\$ 1,600.00	\$ 680,000.00	
.2 Reserved & Contractor and Visitor Parking		25	car	\$ 1,600.00	\$ 40,000.00	
.3 Roadway		260	m	\$ 820.00	\$ 213,200.00	
.4 Walkway		1	LS	\$ 58,628.00	\$ 58,628.00	
<u>D113 Improvements</u>						\$ 1,111,060.00
.1 Flagpoles - Aluminum 11m (35') high include concrete base		1	ea	\$ 5,460.00	\$ 5,460.00	
.2 Chain Link Fence 2.4m high		1,410	m	\$ 190.00	\$ 267,900.00	
.3 Architectural Fence 1.83m high		438	m	\$ 150.00	\$ 65,700.00	
.4 Electric gate		1	ea	\$ 58,000.00	\$ 58,000.00	
.5 HOL Sign		1	m	\$ 14,000.00	\$ 14,000.00	
.6 Second exit with guardrails		1	ea	\$ 300,000.00	\$ 300,000.00	
.7 Traffic light at intersection		1	ea	\$ 400,000.00	\$ 400,000.00	
<u>D114 Landscaping</u>						\$ 276,000.00
.1 Landscaping allowance		1	LS	\$ 276,000.00	\$ 276,000.00	
D12 Mechanical Site Services						\$ 310,000.00
.1 Utilites		1	LS	\$ 210,000.00	\$ 210,000.00	
.2 Storm water management		1	Allow	\$ 100,000.00	\$ 100,000.00	
D13 Electrical Site Services						\$ 1,442,860.00
.1 New service to site		1	LS	\$ 420,000.00	\$ 420,000.00	

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EC1A - Admin HO

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.2 On site Servicing cost		1	LS	\$ 400,000.00	\$ 400,000.00	
.3 Duct bank for primary voltage cable		1	LS	\$ 280,000.00	\$ 280,000.00	
.4 Solar panel ductbank distribution		1	LS	\$ 150,000.00	\$ 150,000.00	
.5 Lighting		1	LS	\$ 192,860.00	\$ 192,860.00	
Z. GENERAL REQUIREMENTS & ALLOWANCES						
Z1 GENERAL REQUIREMENTS & FEE						
Z11 General Requirements						\$ 4,146,157.40
Z111 Design Fees (6%)			LS		\$ 1,498,559.02	
Z112 Design Honorarium			LS		\$ 150,000.00	
Z113 General Conditions (10.0%)			LS		\$ 2,497,598.37	
Z12 Fee						\$ 1,456,107.06
.1 G.C. Overhead and Profit (5.0%)			LS		\$ 1,456,107.06	
Z2 ALLOWANCES						
Z21 Design Allowance (3.5%)			LS		\$ 1,070,238.69	\$ 1,070,238.69
Z22 Escalation Allowance (1.5%)			LS		\$ 458,673.72	\$ 458,673.72
TOTAL						\$ 32,107,160.59

TAKE-OFF

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
A. SHELL						
A1 SUBSTRUCTURE						
A11 Foundations						\$ 332,707.00
<u>A111 Standard Foundations</u>						\$ 332,707.00
.1 Poured concrete conventional strip and spread footings based on a building footprint of 1,539 m ² include excavation to footings and backfill		1,539.3	m ²	\$ 205.00	\$ 315,556.50	
.2 Perimeter drainage		177	m	\$ 30.00	\$ 5,310.00	
.3 Perimeter Rigid Insulation 50 mm		354.00	m ²	\$ 28.00	\$ 9,912.00	
.4 Allowance for reinforcing dowels		0.70	TN	\$ 2,755.00	\$ 1,928.50	
<u>A112 Special Foundations</u>						\$ -
Assume none required.						
A12 Excavation						\$ 100,000.00
.10 Allowance for additional excavation and backfill for stepped slab on grade and lower floor elevation		1	Allow	\$ 100,000.00	\$ 100,000.00	
A2 STRUCTURE						
A21 Lowest Floor Construction						\$ 126,330.89
.1 Slab on Grade - 125 thick Unreinforced		192.4	m ³	\$ 656.56		\$ 126,330.89
Fine grade 3 passes with grader and roller		1,539.3	m ²	\$ 3.00	\$ 4,617.90	
300 mm Granular A sub base		461.8	m ³	\$ 60.00	\$ 27,707.40	
Extruded polystyrene XPS Insulation - 50mm - perimeter		216.0	m ²	\$ 32.00	\$ 6,912.00	
Vapour Barrier		1,539.3	m ²	\$ 3.05	\$ 4,694.87	
Concrete (25 MPa) - direct chute		192.4	m ³	\$ 260.00	\$ 50,027.25	
Saw cut and control joints		1,539.3	m ²	\$ 4.00	\$ 6,157.20	
Cure with spray membrane curing compound		1,539.3	m ²	\$ 3.03	\$ 4,664.08	
Finishing floor, monolithic steel trowel		1,539.3	m ²	\$ 14.00	\$ 21,550.20	
A22 Upper Floor Construction						\$ 505,470.00
<u>A221 Upper Floor Construction</u>						\$ -
<u>A222 Stair Construction</u>						\$ -
<u>A223 Roof Construction</u>						\$ 505,470.00
.1 Structural steel roof construction		1,209.8	m ²	\$ 289.52		\$ 350,264.00
base plates and anchor bolts		32	No.	\$ 360.00	\$ 11,520.00	
structural steel columns (10Kg/m2)		12.1	TN	\$ 4,000.00	\$ 48,392.00	
structural steel beams (30Kg/m2)		36.3	TN	\$ 4,000.00	\$ 145,176.00	
open web steel joists - 500 to 600 Deep (15Kg/m2)		18.1	TN	\$ 4,000.00	\$ 72,588.00	
bridging and bracing (5Kg/m2)		6.0	TN	\$ 4,000.00	\$ 24,196.00	
38mm metal deck - .91 thick		1,209.8	m ²	\$ 40.00	\$ 48,392.00	
.2 Structural steel roof construction - High Deck		329.5	m ²	\$ 321.11		\$ 105,806.00
base plates and anchor bolts		12	No.	\$ 360.00	\$ 4,320.00	
structural steel columns (12Kg/m2)		4.0	TN	\$ 4,000.00	\$ 15,816.00	
structural steel beams (30Kg/m2)		9.9	TN	\$ 4,000.00	\$ 39,540.00	
open web steel joists - 750 Deep (20Kg/m2)		6.6	TN	\$ 4,000.00	\$ 26,360.00	
bridging and bracing (5Kg/m2)		1.6	TN	\$ 4,000.00	\$ 6,590.00	

TAKE-OFF

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
38mm metal deck - .91 thick		329.5	m ²	\$ 40.00	\$ 13,180.00	
.4 Allowance for roof openings framing		1	LS	\$ 2,000.00	\$ 2,000.00	
.3 Structural reinforcement for mechanical equipment		1	LS	\$ 7,000.00	\$ 7,000.00	
.4 Premium for seismic protection design		1	LS	\$ 20,000.00	\$ 20,000.00	
.5 Roof Safety Anchors c/w cable system		8	ea	\$ 2,550.00	\$ 20,400.00	
A3 EXTERIOR ENCLOSURE						
A31 Walls Below Grade						\$ -
A311 Structural Walls Below Grade						
A32 Walls Above Grade						\$ 204,379.73
A321 Walls Above Grade						\$ 204,379.73
.2 Masonry Wall Assembly		690.80	m ²	\$ 253.76		\$ 175,297.41
90mm Architectural Block Veneer		690.80	m ²	\$ 160.00	\$ 110,528.00	
25mm Air Space						
Membrane Air/Vapour Barrier		690.80	m ²	\$ 2.50	\$ 1,727.00	
16mm Glass Matt Bypsum Sheathing		690.80	m ²	\$ 23.50	\$ 16,233.80	
152 Wind Bearing Metal Stud Wall Framing		690.80	m ²	\$ 29.70	\$ 20,516.76	
50mm Mineral Wool Insulation		690.80	m ²	\$ 8.50	\$ 5,871.80	
16mm Gypsum Board		690.80	m ²	\$ 21.50	\$ 14,852.20	
Paint Finish		690.80	m ²	\$ 8.06	\$ 5,567.85	
.3 Metal siding Assembly		166.90	m ²	\$ 174.25		\$ 29,082.33
Steel Siding, galvanized on steel frame, 0.80mm thick		166.90	m ²	\$ 89.45	\$ 14,929.21	
127 Mineral Wool Insulation		166.90	m ²	\$ 14.54	\$ 2,426.73	
Membrane Air/Vapour Barrier		166.90	m ²	\$ 2.50	\$ 417.25	
16mm Glass Matt Gypsum Sheathing			m ²	\$ 23.50	\$ -	
152 Wind Bearing Metal Stud Wall Framing		166.90	m ²	\$ 29.70	\$ 4,956.93	
50mm Mineral Wool Insulation		166.90	m ²	\$ 8.50	\$ 1,418.65	
16mm Gypsum Board		166.90	m ²	\$ 21.50	\$ 3,588.35	
Paint Finish		166.90	m ²	\$ 8.06	\$ 1,345.21	
A33 Windows and Entrance						\$ 81,034.00
<u>A331 Windows and Louvres</u>						\$ 58,934.00
.1 Glazing - Curtain Wall System		83.80	m ²	\$ 680.00	\$ 56,984.00	
.2 Louvres for mechanical rooms - allowance		3.0	m ²	\$ 650.00	\$ 1,950.00	
<u>A333 Doors</u>						\$ 22,100.00
.1 Pressed steel frames and hollow metal doors Include Hardware and Painting						
Single		5	Ea	\$ 1,900.00	\$ 9,500.00	
Double		2	Pair	\$ 3,100.00	\$ 6,200.00	
.2 Barrier free door operators - assumed		2	Ea	\$ 3,200.00	\$ 6,400.00	
A34 Roof Covering						\$ 251,336.25
<u>A341 Roofing</u>						\$ 251,336.25
.1 SBS Modified Bituminous Roofing		1,539.00	m ²	\$ 150.00	\$ 230,850.00	

TAKE-OFF

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.2 Tapered insulation to attain roof slopes (25%)		384.75	m²	\$ 19.00	\$ 7,310.25	
.3 Flashing		106.00	m²	\$ 96.00	\$ 10,176.00	
.4 Roof Hatches		1	Ea	\$ 3,000.00	\$ 3,000.00	
A35 Projection						\$ 21,240.00
.1 Parapets		106.2	m²	\$ 200.00	\$ 21,240.00	
B. INTERIORS						
B1 PARTITIONS & DOORS						
B11 Partitions						\$ 103,243.00
<u>B111 Fixed Partitions</u>						\$ 103,243.00
.1 Drywall Metal Stud partitions slab to slab w/ Roxul AFB		1,200.50	m²	\$ 86.00	\$ 103,243.00	
<u>B112 Movable Partitions</u>						\$ -
<u>B113 Structural Partitions</u>						\$ -
B12 Doors						\$ 27,250.00
.1 Pressed Steel Frames and Hollow Metal Doors c/w hardware include painting						
Single		21	Ea	\$ 750.00	\$ 15,750.00	
Double		4	Ea	\$ 1,300.00	\$ 5,200.00	
Single with sidelite		6	Ea	\$ 1,050.00	\$ 6,300.00	
.3 Barrier free automatic door openers - assume		-	ea	\$ 3,200.00	\$ -	
B2 FINISHES						
B21 Floor Finishes						\$ 242,429.70
Assume porcelain tiles in washrooms, carpet tiles in admin areas. Remaining to be VCT						
.2 Porcelain Tile Floor		94	m²	\$ 123.00	\$ 11,611.20	
.3 Carpet Tiles		346	m²	\$ 55.00	\$ 19,046.50	
.4 Vinyl Composite Tiles		11	m²	\$ 35.00	\$ 392.00	
.5 Access Floor System, steel panels w/ carpet tile finish		694	m²	\$ 290.00	\$ 201,231.00	
.8 Base						
i 108mm Rubber Base		130	m	\$ 10.50	\$ 1,365.00	
ii Porcelain Tile Base		86	m	\$ 31.00	\$ 2,666.00	
iii Carpet Base		322	m	\$ 19.00	\$ 6,118.00	
B22 Ceiling Finishes						\$ 60,517.50
.1 Gypsum Board Ceiling include Painting in washrooms		53.00	m²	\$ 75.50	\$ 4,001.50	
.2 Acoustical Suspended Ceiling		1,412.90	m²	\$ 40.00	\$ 56,516.00	

TAKE-OFF

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
B23 Wall Finishes						\$ 43,868.60
.1 Paint Finish		2,401.00	m²	\$ 8.60	\$ 20,648.60	
.2 Porcelain Wall Tiles in washrooms		215.00	m²	\$ 108.00	\$ 23,220.00	
B3 Fittings & Equipment						
B31 Fittings and Fixtures						\$ 67,581.00
<u>B311 Metals</u>						\$ 5,000.00
.1 Service ladders		1	Ea	\$ 2,000.00	\$ 2,000.00	
.2 Miscellaneous metal - Allowance		1	LS	\$ 3,000.00	\$ 3,000.00	
<u>B312 Millwork</u>						\$ 17,692.00
.1 Typical kitchen upper and lower cabinet c/w countertop		7.90	m	\$ 1,400.00	\$ 11,060.00	
.2 Cabinets and work countertops		3.00	m	\$ 984.00	\$ 2,952.00	
.3 Kitchenette bar counters		-	m	\$ 600.00	\$ -	
.4 Washroom vanity and counter		4.60	m	\$ 800.00	\$ 3,680.00	
<u>B313 Specialties</u>						\$ 20,699.00
.1 Toilet Compartment - Metal Ceiling Hung		2	ea	\$ 1,037.00	\$ 2,074.00	
.2 Hadicapped Toilet Compartment		4	ea	\$ 1,685.00	\$ 6,740.00	
.3 Urinal Screen		1	ea	\$ 485.00	\$ 485.00	
.4 Toilet and Bath Accessories						
i Hand dryer		4	ea	\$ 450.00	\$ 1,800.00	
ii Paper towel dispenser - assumed		4	ea	\$ 150.00	\$ 600.00	
iii Toilet paper dispenser		6	ea	\$ 50.00	\$ 300.00	
iv Soap dispenser		4	ea	\$ 75.00	\$ 300.00	
v Waste receptacle - wall mounted semi-recessed - assumed		4	ea	\$ 500.00	\$ 2,000.00	
vi Sanitary disposal		4	ea	\$ 200.00	\$ 800.00	
viii Tilted mirror		4	ea	\$ 250.00	\$ 1,000.00	
.5 Unframed Mirror in washrooms above vanities		9.20	m²	\$ 500.00	\$ 4,600.00	
<u>B314 Furnishings</u>						\$ 24,190.00
.1 Window treatment - Allowance		83.80	m²	\$ 50.00	\$ 4,190.00	
.2 Premium Allowance for Blackout Blinds					\$ 20,000.00	
B32 Equipment						
B33 Conveying Systems						
C. SERVICES						
C1 Mechanical						
C11 Plumbing and Drainage						\$ 206,850.44

TAKE-OFF

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
<u>C111 Plumbing Fixtures</u>						\$ 27,000.42
.1 Water closets. Vitreous china, wall mounted fixtures with electronic flush valve. Water conservation type.		6.0	ea	\$ 2,336.90	\$ 14,021.40	
.2 Urinals. Vitreous china, wall hung type with electronic flush valve. Water conservation type.		2.0	ea	\$ 1,353.91	\$ 2,707.82	
.3 Lavatories. Vitreous china, above counter mounted type with electronic 4in center set faucets. Barrier free to be of same type per accessibility requirements.		4.0	ea	\$ 1,357.90	\$ 5,431.60	
.4 Service sinks. Assume standard, stainless steel, counter-top single and double (where appropriate), in shared kitchenette areas.		1.0	ea	\$ 1,429.60	\$ 1,429.60	
.5 Custodial sinks. Stainless Steel, deep, floor mounted with braced hose faucet and trim.		1.0	ea	\$ 1,850.00	\$ 1,850.00	
.6 Drinking fountains. Assume barrier free recessed wall mounted, re Fridgerated, stainless steel, single bubbler.		1.0	ea	\$ 1,560.00	\$ 1,560.00	
<u>C112 Domestic Water</u>						\$ 25,000.00
.1 Domestic water service shall enter the building to serve domestic water and fire protection from the Admin/Office building.		1.0	allow	\$ 25,000.00	\$ 25,000.00	
<u>C113 Sanitary Waste & Vent</u>						\$ 60,000.00
.1 Sanitary system assume U/G to be PVC, while above grade piping shall be cast iron/copper DWV. Thermal insulation included.		1.00	allow	\$ 60,000.00	\$ 60,000.00	
<u>C114 Storm</u>						\$ 60,000.00
.1 Storm system shall include control flow type roof drains. U/G storm collection in PVC. Cast iron above grade. Thermal insulation included. PVC Jacketed in exposed areas.		1.0	allow	\$ 60,000.00	\$ 60,000.00	
<u>C115 Natural Gas</u>						\$ 25,000.00
.1 Incoming gas service c/w gas meter. Distribution of natural gas to centralized mechanical PH to feed gas fired HVAC equipment. Piping to be schd 40 black malleable. Piping 50mm and smaller to be screwed, 65mm and over to be welded.		1.0	allow	\$ 25,000.00	\$ 25,000.00	
<u>C116 Fuel Oil</u>						\$ -
.1 Included in Admin/Office estimate.			allow		\$ -	
<u>C117 Misc Works and General Accounts</u>						\$ 9,850.02
.1 Clean-up, HASSSP, rentals, small tools, fire stopping, permits, inspections, bonding and insurance, site trailer.		1.0	allow	\$ 9,850.02	\$ 9,850.02	
C12 Fire Protection						\$ 63,303.58
<u>C121 Sprinklers</u>						\$ 63,303.58

TAKE-OFF

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.1 Combined wet pipe sprinkler/standpipe system including pumping equipment from the Admin/Office facility.		845.30	m2	\$ 43.28	\$ 36,584.58	
.2 Dry pipe system in the Operations Center.		694.00	m2	\$ 38.50	\$ 26,719.00	
C13 Heating, Ventilation & Air Conditioning						\$ 800,100.00
<u>C131 Liquid Heat Transfer (Heating)</u>						\$ 55,000.00
.1 Use base building boilers		1	allow		\$ -	
.2 Heating water pumping (primary/secondary), assume verticle in-line.		1	allow	\$ 25,000.00	\$ 25,000.00	
.3 Perimeter wall and window fin tube radiation.		1	allow	\$ 30,000.00	\$ 30,000.00	
<u>C132 Liquid Heat Transfer (Cooling)</u>						\$ 85,000.00
.1 Base buildig chillers		1	allow	\$ -	\$ -	
.2 Chilled/Condenser distribution piping inc insulation		1	allow	\$ 85,000.00	\$ 85,000.00	
<u>C133 Air Distribution</u>						\$ 607,000.00
.1 Main/Office areas - PH roof mounted VAV AHU system, heating/cooling coils, DDC controls, includes dist ductwork (20 cfm/person minimum).		1	allow	\$ 180,000.00	\$ 180,000.00	
.2 Operations Center - CRAC, back-up UPS cooling		1	allow	\$ 427,000.00	\$ 427,000.00	
<u>C134 Exhaust Systems</u>						\$ 15,000.00
.1 Misc systems - ventilation and washroom exhaust		1	allow	\$ 15,000.00	\$ 15,000.00	
<u>C136 Misc Works and General Accounts</u>						\$ 38,100.00
.1 Clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, fire stopping.		1	allow	\$ 38,100.00	\$ 38,100.00	
C14 EMCS Controls						\$ 84,700.00
<u>C141 Controls and Automation</u>						\$ 84,700.00
.1 Assume EMCS Interfacing with building AHU's, heating and cooling systems, energy management.		1,540.00	m2	\$ 55.00	\$ 84,700.00	
C2 Electrical						
C21 Service & Distribution						\$ 965,580.00
<u>C211 Equipment</u>						\$ 189,000.00
.1 Switchboard - Assume 600A, 600/347V, 3ph, 4W. Main breaker digital metering, ammeter, voltmeter, selector switch.		1	ea	\$ 189,000.00	\$ 189,000.00	
.2 Incoming service by HOL.					\$ -	
<u>C212 Emergency Power</u>						\$ 165,000.00
.1 Emergency generator - including battery, charger, muffler and distribution.		1	allow	\$ 165,000.00	\$ 165,000.00	

TAKE-OFF

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.2 600A Automatic Transfer Switch.		1	allow	\$ 35,000.00	\$ 35,000.00	
<u>C213 Distribution</u>						\$ 265,000.00
.1 Lighting panels, power panels, transformers, digital metering.		1	allow	\$ 265,000.00	\$ 265,000.00	
<u>C214 Feeders</u>						\$ 175,000.00
.1 Main feeders.		1	allow	\$ 175,000.00	\$ 175,000.00	
<u>C215 Motor Controls & Wiring</u>						\$ 89,600.00
.1 Main MCC's for mechanical equipment including starters. Any VFD's required are in mechanical pricing. All power wiring to mechanical equipment included.		1	allow	\$ 89,600.00	\$ 89,600.00	
<u>C216 Grounding & Lightning Protection</u>						\$ 36,000.00
.1 Electrical grounding & lightning protection.		1	allow	\$ 36,000.00	\$ 36,000.00	
<u>C216 Misc Works and General Accounts</u>						\$ 45,980.00
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer, fire stopping		1	allow	\$ 45,980.00	\$ 45,980.00	
C22 Lighting, Devices and Heating						\$ 369,362.28
<u>C221 Lighting</u>						\$ 139,273.60
.1 Assume energy efficient, recessed, mounted on grid ceiling suspension system, electronic ballasts, acrylic prismatic diffusers.		1,540.00	m2	\$ 37.84	\$ 58,273.60	
.2 Allowance - specialty lighting (pots, LED's in common areas).		1	allow	\$ 56,000.00	\$ 56,000.00	
.3 Exit and emergency lighting.		1	allow	\$ 25,000.00	\$ 25,000.00	
<u>C222 Branch Devices & Wiring</u>						\$ 205,000.00
.1 All conduit systems concealed all finished areas.		1	allow	\$ 205,000.00	\$ 205,000.00	
<u>C223 Heating</u>						\$ 7,500.00
.1 Supplementary units inside vestibules & mech rms.		1	allow	\$ 7,500.00	\$ 7,500.00	
<u>C224 Misc Works and General Accounts</u>						\$ 17,588.68
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer, fire stopping		1	allow	\$ 17,588.68	\$ 17,588.68	
C23 Systems & Ancillaries						\$ 48,202.77
<u>C231 Fire Alarm</u>						\$ 45,907.40
.1 Addressable 2-stage FA system c/w remote annunciator panels, manual pull stations, signal speakers throughout		1,540.00	m2	\$ 29.81	\$ 45,907.40	
<u>C232 Security System</u>						\$ -
.1 Cash allowance.			m2	\$ 9.50	\$ -	

TAKE-OFF

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
<u>C233 Communications</u>						\$ -
.1 Cash allowance.			m2	\$ 42.00	\$ -	
<u>C234 Public Address & AV</u>						\$ -
.1 Cash allowance.			m2	\$ 30.00	\$ -	
<u>C235 Miscellaneous</u>						\$ -
.1 No requirement.		0	allow	\$ -	\$ -	
<u>C236 General Requirements</u>						\$ 2,295.37
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer,		1	allow	\$ 2,295.37	\$ 2,295.37	
D. SITE & ANCILLARY WORK						
D1 SITE WORK						
D11 Site Development						\$ 99,200.00
<u>D111 Preparation</u>						\$ 35,000.00
.1 Site preparation		1	LS	\$ 35,000.00	\$ 35,000.00	
<u>D112 Hard Surfaces</u>						\$ 34,200.00
.1 Visitor, Reserved & Contractor Parking		12	car	\$ 1,600.00	\$ 19,200.00	
.2 Walkway		1	LS	\$ 15,000.00	\$ 15,000.00	
<u>D113 Improvements</u>						\$ -
Included in EC1A Admin Building			ea		\$ -	
<u>D114 Landscaping</u>						\$ 30,000.00
.1 Landscaping allowance		1	LS	\$ 30,000.00	\$ 30,000.00	
D12 Mechanical Site Services						\$ -
Included in EC1A Admin Building						
D13 Electrical Site Services						\$ 11,400.00
.1 Lighting		3	Pole	\$ 3,800.00	\$ 11,400.00	
Z. GENERAL REQUIREMENTS & ALLOWANCES						
Z1 GENERAL REQUIREMENTS & FEE						
Z11 General Requirements						\$ 770,573.88
Z111 Design Fees (6%)			LS		\$ 288,965.21	
Z112 General Conditions (10.0%)			LS		\$ 481,608.68	
Z12 Fee						\$ 279,333.03
.1 G.C. Overhead and Profit (5.0%)			LS		\$ 279,333.03	

TAKE-OFF

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
Z2 ALLOWANCES						
Z21 Design Allowance (3.5%)			LS		\$ 205,309.78	\$ 205,309.78
Z22 Escalation Allowance (1.5%)			LS		\$ 87,989.90	\$ 87,989.90
TOTAL						\$ 6,159,293.35

TAKE-OFF

EC2 - OPS Building

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
A. SHELL						
A1 SUBSTRUCTURE						
A11 Foundations						\$ 1,602,052.50
<u>A111 Standard Foundations</u>						\$ 1,602,052.50
.1 Poured concrete conventional strip and spread footings based on a building footprint of 7,533.5 m ² include excavation to footings and backfill		7,533.5	m ²	\$ 205.00	\$ 1,544,367.50	
.2 Perimeter drainage		412	m	\$ 30.00	\$ 12,346.50	
.3 Perimeter Rigid Insulation 50 mm		1,028.88	m ²	\$ 28.00	\$ 28,808.50	
.4 Allowance for reinforcing dowels		6.00	TN	\$ 2,755.00	\$ 16,530.00	
<u>A112 Special Foundations</u>						\$ -
Assume none required.						
A12 Excavation						\$ 464,000.00
.10 Allowance for additional excavation and backfill		1	Allow	\$ 464,000.00	\$ 464,000.00	
A2 STRUCTURE						
A21 Lowest Floor Construction						\$ 864,853.24
.1 Slab on Grade - 150 thick		360.8	m ³	\$ 821.49		\$ 296,401.85
Fine grade 3 passes with grader and roller		2,405.4	m ²	\$ 3.00	\$ 7,216.20	
300 mm Granular A sub base		721.6	m ³	\$ 60.00	\$ 43,297.20	
Extruded polystyrene XPS Insulation - 50mm - perimeter		502.0	m ²	\$ 28.00	\$ 14,056.00	
Vapour Barrier		2,405.4	m ²	\$ 3.05	\$ 7,336.47	
152 x 152 Mesh Re-inforcement		2,405.4	m ²	\$ 10.00	\$ 24,054.00	
Concrete (35 MPa) - direct chute		360.8	m ³	\$ 282.00	\$ 101,748.42	
Saw cut and control joints		2,405.4	m ²	\$ 4.00	\$ 9,621.60	
Cure with spray membrane curing compound		2,405.4	m ²	\$ 3.03	\$ 7,288.36	
Finishing floor, monolithic steel trowel		2,405.4	m ²	\$ 14.00	\$ 33,675.60	
Concrete Floor Sealer		2,405.4	m ²	\$ 20.00	\$ 48,108.00	
.2 Slab on Grade - 125 thick		189.4	m ³	\$ 700.64		\$ 132,709.97
Fine grade 3 passes with grader and roller		1,515.3	m ²	\$ 3.00	\$ 4,545.90	
300 mm Granular A sub base		454.6	m ³	\$ 60.00	\$ 27,275.40	
Vapour Barrier		1,515.3	m ²	\$ 3.05	\$ 4,621.67	
152 x 152 Mesh Re-inforcement		1,515.3	m ²	\$ 10.00	\$ 15,153.00	
Concrete (25 MPa) - direct chute		189.4	m ³	\$ 260.00	\$ 49,247.25	
Saw cut and control joints		1,515.3	m ²	\$ 4.00	\$ 6,061.20	
Cure with spray membrane curing compound		1,515.3	m ²	\$ 3.03	\$ 4,591.36	
Finishing floor, monolithic steel trowel		1,515.3	m ²	\$ 14.00	\$ 21,214.20	
.3 Slab on Grade - 175 thick		612.8	m ³	\$ 711.03		\$ 435,741.42
Fine grade 3 passes with grader and roller		3,501.9	m ²	\$ 3.00	\$ 10,505.70	
300 mm Granular A sub base		1,050.6	m ³	\$ 60.00	\$ 63,034.20	
Vapour Barrier		3,501.9	m ²	\$ 3.05	\$ 10,680.80	
152 x 152 Mesh Re-inforcement		3,501.9	m ²	\$ 10.00	\$ 35,019.00	
Concrete (35 MPa) - direct chute		612.8	m ³	\$ 282.00	\$ 172,818.77	
Saw cut and control joints		3,501.9	m ²	\$ 4.00	\$ 14,007.60	
Cure with spray membrane curing compound		3,501.9	m ²	\$ 3.03	\$ 10,610.76	
Finishing floor, monolithic steel trowel		3,501.9	m ²	\$ 14.00	\$ 49,026.60	
Concrete Floor Sealer		3,501.9	m ²	\$ 20.00	\$ 70,038.00	
A22 Upper Floor Construction						\$ 3,353,920.40

TAKE-OFF

EC2 - OPS Building

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
<u>A221 Upper Floor Construction</u>						\$ -
<u>A222 Stair Construction</u>						\$ -
<u>A223 Roof Construction</u>						\$ 3,353,920.40
.1 Structural steel roof construction - High Roof		4,887.6	m ²	\$ 497.24		\$ 2,430,314.40
base plates and anchor bolts		44	No.	\$ 360.00	\$ 15,840.00	
structural steel columns (20Kg/m2)		97.8	TN	\$ 4,000.00	\$ 391,008.00	
structural steel beams (40Kg/m2)		195.5	TN	\$ 4,000.00	\$ 782,016.00	
open web steel joists - 2050 Deep (32Kg/m2)		156.4	TN	\$ 4,000.00	\$ 625,612.80	
bridging and bracing (15Kg/m2)		73.3	TN	\$ 4,000.00	\$ 293,256.00	
76mm metal deck - 1.21 thick (18ga)		4,887.6	m ²	\$ 66.00	\$ 322,581.60	
.2 Structural steel roof construction - Mid Roof		982.3	m ²	\$ 326.60		\$ 320,816.00
base plates and anchor bolts		18	No.	\$ 360.00	\$ 6,480.00	
structural steel columns (12Kg/m2)		11.8	TN	\$ 4,000.00	\$ 47,150.40	
structural steel beams (30Kg/m2)		29.5	TN	\$ 4,000.00	\$ 117,876.00	
open web steel joists - 600 to 750 Deep (18Kg/m2)		17.7	TN	\$ 4,000.00	\$ 70,725.60	
bridging and bracing (10Kg/m2)		9.8	TN	\$ 4,000.00	\$ 39,292.00	
38mm metal deck - .91 thick		982.3	m ²	\$ 40.00	\$ 39,292.00	
.3 Structural steel roof construction - Low Roof		1,523.1	m ²	\$ 306.15		\$ 466,290.00
base plates and anchor bolts		26	No.	\$ 360.00	\$ 9,360.00	
structural steel columns (12Kg/m2)		18.3	TN	\$ 4,000.00	\$ 73,108.80	
structural steel beams (25Kg/m2)		38.1	TN	\$ 4,000.00	\$ 152,310.00	
open web steel joists - 700 Deep (18Kg/m2)		27.4	TN	\$ 4,000.00	\$ 109,663.20	
bridging and bracing (10Kg/m2)		15.2	TN	\$ 4,000.00	\$ 60,924.00	
38mm metal deck - .91 thick		1,523.1	m ²	\$ 40.00	\$ 60,924.00	
.4 Allowance for roof openings framing		1	LS	\$ 5,000.00	\$ 5,000.00	
.3 Structural reinforcement for mechanical equipment		1	LS	\$ 20,000.00	\$ 20,000.00	
.4 Premium for seismic protection design		1	LS	\$ 35,000.00	\$ 35,000.00	
.5 Roof Safety Anchors c/w cable system		30	ea	\$ 2,550.00	\$ 76,500.00	
A3 EXTERIOR ENCLOSURE						
A31 Walls Below Grade						\$ -
A311 Structural Walls Below Grade						
A32 Walls Above Grade						\$ 747,689.66
A321 Walls Above Grade						\$ 747,689.66
.2 Masonry Wall Assembly		328.40	m ²	\$ 263.76		\$ 86,618.78
90mm Architectural Block Veneer		328.40	m ²	\$ 170.00	\$ 55,828.00	
25mm Air Space		328.40				
Membrane Air/Vapour Barrier		328.40	m ²	\$ 2.50	\$ 821.00	
16mm Glass Matt Bypsum Sheathing		328.40	m ²	\$ 23.50	\$ 7,717.40	
152 Wind Bearing Metal Stud Wall Framing		328.40	m ²	\$ 29.70	\$ 9,753.48	
50mm Mineral Wool Insulation		328.40	m ²	\$ 8.50	\$ 2,791.40	
16mm Gypsum Board		328.40	m ²	\$ 21.50	\$ 7,060.60	
Paint Finish		328.40	m ²	\$ 8.06	\$ 2,646.90	
.3 Metal Siding Assembly		2,823.40	m ²	\$ 234.14		\$ 661,070.88
Steel Siding, galvanized on steel frame, 0.80mm thick		2,823.40	m ²	\$ 89.45	\$ 252,553.13	
127 Mineral Wool Insulation		2,823.40	m ²	\$ 14.54	\$ 41,052.24	
Membrane Air/Vapour Barrier		2,823.40	m ²	\$ 2.50	\$ 7,058.50	
16mm Glass Matt Gypsum Sheathing		-	m ²	\$ 23.50	\$ -	

TAKE-OFF

EC2 - OPS Building

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
152 Wind Bearing Metal Stud Wall Framing		2,823.40	m ²	\$ 29.70	\$ 83,854.98	
50mm Mineral Wool Insulation		2,823.40	m ²	\$ 8.50	\$ 23,998.90	
Steel Siding, galvanized on steel frame, 0.80mm thick		2,823.40	m ²	\$ 89.45	\$ 252,553.13	
A33 Windows and Entrance						\$ 123,900.00
<u>A331 Windows and Louvres</u>						\$ 32,700.00
.1 Glazing - Window System		65.50	m ²	\$ 400.00	\$ 26,200.00	
.2 Louvres for mechanical rooms - allowance		10.0	m ²	\$ 650.00	\$ 6,500.00	
<u>A333 Doors</u>						\$ 91,200.00
.1 Pressed steel frames and hollow metal doors Include Hardware and Painting						
Single	14	Ea	\$ 1,900.00	\$ 26,600.00		
Double	2	Pair	\$ 3,100.00	\$ 6,200.00		
.2 Overhead doors (3,600 x 2,700)	2	Ea	\$ 6,200.00	\$ 12,400.00		
.3 Overhead doors (6,100 x 5,100)	2	Ea	\$ 19,800.00	\$ 39,600.00		
.4 Barrier free door operators - assumed	2	Ea	\$ 3,200.00	\$ 6,400.00		
A34 Roof Covering						\$ 1,167,106.35
<u>A341 Roofing</u>						\$ 1,167,106.35
.1 SBS Modified Bituminous Roofing	7,533.00	m ²	\$ 150.00	\$ 1,129,950.00		
.2 Tapered insulation to attain roof slopes (5%)	376.65	m ²	\$ 19.00	\$ 7,156.35		
.3 Flashing	250.00	m ²	\$ 96.00	\$ 24,000.00		
.4 Roof Hatches	2	Ea	\$ 3,000.00	\$ 6,000.00		
A35 Projection						\$ 49,200.00
.1 Parapets	246.0	m ²	\$ 200.00	\$ 49,200.00		
B. INTERIORS						
B1 PARTITIONS & DOORS						
B11 Partitions						\$ 539,014.51
<u>B111 Fixed Partitions</u>						\$ 499,774.51
.1 Drywall Metal Stud partitions slab to slab w/ Roxul AFB	1,343.00	m ²	\$ 86.00	\$ 115,498.00		
.2 Concrete Block Wall - 190 mm, jointed and pointed	1,991.07	m ²	\$ 193.00	\$ 384,276.51		
<u>B112 Movable Partitions</u>						\$ 39,240.00
.1 Folding Partition - Acoustic	32.70	m ²	\$ 1,200.00	\$ 39,240.00		
<u>B113 Structural Partitions</u>						\$ -
B12 Doors						\$ 51,800.00

TAKE-OFF

EC2 - OPS Building

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.1 Pressed Steel Frames and Hollow Metal Doors c/w hardware include painting						
Single		26	Ea	\$ 750.00	\$ 19,500.00	
Double		6	Ea	\$ 1,300.00	\$ 7,800.00	
Single with sidelite		-	Ea	\$ 1,050.00	\$ -	
.2 3658 x 3048 x 90 HM Doors - to be specified		7	Ea	\$ 3,500.00	\$ 24,500.00	
.3 Barrier free automatic door openers - assume		-	ea	\$ 3,200.00	\$ -	
B2 FINISHES						
B21 Floor Finishes						\$ 99,749.00
.1 Porcelain Tile Floor		259	m²	\$ 123.00	\$ 31,906.20	
.2 Carpet Tiles		954	m²	\$ 55.00	\$ 52,459.00	
.3 Vinyl Composite Tiles		44	m²	\$ 35.00	\$ 1,529.50	
.4 Anti Static Tiles		12	m²	\$ 129.00	\$ 1,483.50	
.5 Base						
i 108mm Rubber Base		51	m	\$ 10.50	\$ 535.50	
ii Porcelain Tile Base		165	m	\$ 31.00	\$ 5,115.00	
iii Carpet Base		354	m	\$ 19.00	\$ 6,720.30	
B22 Ceiling Finishes						\$ 73,772.65
.1 Gypsum Board Ceiling include Painting in washrooms		316.30	m²	\$ 75.50	\$ 23,880.65	
.2 Acoustical Suspended Ceiling		1,247.30	m²	\$ 40.00	\$ 49,892.00	
B23 Wall Finishes						\$ 73,100.00
.1 Paint Finish		5,800.00	m²	\$ 8.60	\$ 49,880.00	
.2 Porcelain Wall Tiles in washrooms		215.00	m²	\$ 108.00	\$ 23,220.00	
B3 Fittings & Equipment						
B31 Fittings and Fixtures						\$ 89,599.00
B311 Metals						\$ 50,500.00
.1 Service ladders		3	Ea	\$ 3,500.00	\$ 10,500.00	
.2 Miscellenous metal - Allowance		1	LS	\$ 40,000.00	\$ 40,000.00	
B312 Millwork						\$ 12,600.00
.1 Typical kitchen upper and lower cabinet c/w countertop		4.60	m	\$ 1,400.00	\$ 6,440.00	
.2 Washroom vanity and counter		7.70	m	\$ 800.00	\$ 6,160.00	
B313 Specialties						\$ 23,224.00
.1 Toilet Compartment - Metal Ceiling Hung		7	ea	\$ 1,037.00	\$ 7,259.00	

TAKE-OFF

EC2 - OPS Building

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.2 Hadicapped Toilet Compartment		2	ea	\$ 1,685.00	\$ 3,370.00	
.3 Urinal Screen		2	ea	\$ 485.00	\$ 970.00	
.4 Toilet and Bath Accessories						
i Hand dryer		4	ea	\$ 450.00	\$ 1,800.00	
ii Paper towel dispenser - assumed		2	ea	\$ 150.00	\$ 300.00	
iii Toilet paper dispenser		9	ea	\$ 50.00	\$ 450.00	
iv Soap dispenser		8	ea	\$ 75.00	\$ 600.00	
v Waste receptacle - wall mounted semi-recessed - assumed		2	ea	\$ 500.00	\$ 1,000.00	
vi Sanitary disposal		6	ea	\$ 200.00	\$ 1,200.00	
viii Tilted mirror		2	ea	\$ 250.00	\$ 500.00	
.5 Unframed Mirror in washrooms above vanities		11.55	m²	\$ 500.00	\$ 5,775.00	
<u>B314 Furnishings</u>						\$ 3,275.00
.1 Window treatment - Allowance		65.50	m²	\$ 50.00	\$ 3,275.00	
B32 Equipment						
B33 Conveying Systems						
C. SERVICES						
C1 Mechanical						
C11 Plumbing and Drainage						\$ 365,371.55
<u>C111 Plumbing Fixtures</u>						\$ 43,299.90
.1 Water closets. Vitreous china, wall mounted fixtures with electronic flush valve. Water conservation type.		9.0	ea	\$ 2,336.90	\$ 21,032.10	
.2 Urinals		3.0	ea	\$ 1,875.00	\$ 5,625.00	
.3 Lavatories. Vitreous china, above counter mounted type with electronic 4in center set faucets. Barrier free to be of same type per accessibility requirements.		8.0	ea	\$ 1,357.90	\$ 10,863.20	
.4 Service sinks. Assume standard, stainless steel, counter-top single and double (where appropriate), in shared kitchenette areas.		1.0	ea	\$ 1,429.60	\$ 1,429.60	
.5 Custodial sinks. Stainless Steel, deep, floor mounted with braced hose faucet and trim.		1.0	ea	\$ 1,850.00	\$ 1,850.00	
.6 Drinking fountains. Assume barrier free recessed wall mounted, refridgerated, stainless steel, single bubbler.		1.0	allow	\$ 2,500.00	\$ 2,500.00	
<u>C112 Domestic Water</u>						\$ 21,800.00
.1 Domestic water service shall enter the building to serve domestic water and fire protection. Incoming service c/w backflow prevention and metering. Domestic hot water generated by gas fired cond boilers (included in HVAC). Thermal insulation included.		1.0	allow	\$ 16,800.00	\$ 16,800.00	
.2 Domestic water booster pumps and tanks.		1.0	allow	\$ 5,000.00	\$ 5,000.00	

TAKE-OFF

EC2 - OPS Building

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
<u>C113 Sanitary Waste & Vent</u>						\$ 234,933.00
.1 Sanitary system assume U/G to be PVC, while above grade piping shall be cast iron/copper DWV. Drains below the service entry shall be collected in sump pits c/w duplex submersible pumps (Assume 3 for this building). Thermal insulation included.		1.00	allow	\$ 50,683.00	\$ 50,683.00	
.2 Drain, trench, polyester polymer for cement concrete encasement, 300mm ingernal sieth, with grate		368.50	m	\$ 500.00	\$ 184,250.00	
<u>C114 Storm</u>						\$ 37,940.00
.1 Storm system shall include control flow type roof drains. U/G storm collection in PVC. Cast iron above grade. Weeping tile collected into sumps, then transferred to sump pits c/w duplex submersible pumps. Thermal insulation included. PVC Jacketed in exposed areas.		1.0	allow	\$ 37,940.00	\$ 37,940.00	
<u>C115 Natural Gas</u>						\$ 10,000.00
.1 Incoming gas service c/w gas meter. Distribution of natural gas to centralized mechanical PH to feed gas fired HVAC equipment. Piping to be schd 40 black malleable. Piping 50mm and smaller to be screwed, 65mm and over to be welded.		1.0	allow	\$ 10,000.00	\$ 10,000.00	
<u>C116 Fuel Oil</u>						\$ -
.1		1	allow	\$ -	\$ -	
<u>C117 Misc Works and General Accounts</u>						\$ 17,398.65
.1 Clean-up, HASSSP, rentals, small tools, fire stopping, permits, inspections, bonding and insurance, site trailer.		1.0	allow	\$ 17,398.65	\$ 17,398.65	
C12 Fire Protection						\$ 326,028.24
<u>C121 Sprinklers</u>						\$ 326,028.24
.1 Combined wet pipe sprinkler/standpipe system including pumping equipment.		7,533.00	m2	\$ 43.28	\$ 326,028.24	
.2 Extinguishers, and all misc works included in the rates above.						
C13 Heating, Ventilation & Air Conditioning						\$ 322,170.00
<u>C131 Liquid Heat Transfer (Heating)</u>						\$ 49,400.00
.1 Gas fired, high efficiency hot water heaters		2	allow	\$ 14,800.00	\$ 29,600.00	
.2 Venting and accessories.		1	allow	\$ 17,300.00	\$ 17,300.00	
.3 Heating water pumping (primary/secondary), assume verticle in-line.		1	allow	\$ 2,500.00	\$ 2,500.00	
<u>C132 Liquid Heat Transfer (Cooling)</u>						
<u>C133 Air Distribution</u>						\$ 229,270.00

TAKE-OFF

EC2 - OPS Building

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.1 Typical Floor - RTU c/w economizer, two stage filtration, gas fired burner, two stage high eff elec cooling, supply/return fans on VFD.		1	allow	\$ 59,000.00	\$ 59,000.00	
.2 Lobby System - RTU c/w economizer, two stage filtration, gas fired burner, two stage high eff elec cooling, supply/return fans on VFD.		1	allow	\$ 23,020.00	\$ 23,020.00	
.3 Perimeter wall/window ceiling mounted fan powered boxes c/w hot water heating coils.		1	allow	\$ 17,250.00	\$ 17,250.00	
.4 Garage Floor - RTU c/w economizer, two stage filtration, gas fired burner, two stage high eff elec cooling, supply/return fans on VFD. (.75 CFM/SF)		1	allow	\$ 50,000.00	\$ 50,000.00	
.5 Warehouse - 0.75 cfm/SF RTU		1	allow	\$ 30,000.00	\$ 30,000.00	
.6 Allowance for units heaters and door heaters		1	allow	\$ 50,000.00	\$ 50,000.00	
C134 Exhaust Systems						\$ 28,500.00
.1 Misc systems - ventilation & washroom exhaust.		1	allow	\$ 24,000.00	\$ 24,000.00	
.2 Generator exhaust muffler and venting (labour only).		1	allow	\$ 4,500.00	\$ 4,500.00	
C136 Misc Works and General Accounts						\$ 15,000.00
.1 Clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, fire stopping.		1	allow	\$ 15,000.00	\$ 15,000.00	
C14 EMCS Controls						\$ 301,320.00
C141 Controls and Automation						\$ 301,320.00
.1 Assume EMCS Interfacing with building AHU's, DHWT's, pumps, heating and cooling systems, energy management.		7,533.00	m2	\$ 40.00	\$ 301,320.00	
C2 Electrical						
C21 Service & Distribution						\$ 496,925.00
C211 Equipment						\$ 75,000.00
.1 Switchboard - Assume 1200A, 600/347V, 3ph, 4W. Main breaker digital metering, ammeter, voltmeter, selector switch.		1	ea	\$ 75,000.00	\$ 75,000.00	
.2 Incoming service by HOL.					\$ -	
C212 Emergency Power						\$ 235,000.00
.1 Emergency generator - including battery, charger, muffler and distribution.		1	allow	\$ 165,000.00	\$ 165,000.00	
.2 600A Automatic Transfer Switch.		2	allow	\$ 35,000.00	\$ 70,000.00	
C213 Distribution						\$ 55,150.00
.1 Lighting panels, power panels, transformers, digital metering.		1	allow	\$ 55,150.00	\$ 55,150.00	
C214 Feeders						\$ 45,450.00
.1 Main feeders.		1	allow	\$ 45,450.00	\$ 45,450.00	

TAKE-OFF

EC2 - OPS Building

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
<u>C215 Motor Controls & Wiring</u>						\$ 43,225.00
.1 Main MCC's for mechanical equipment including starters. Any VFD's required are in mechanical pricing. All power wiring to mechanical equipment included.		1	allow	\$ 43,225.00	\$ 43,225.00	
<u>C216 Grounding & Lightning Protection</u>						\$ 29,100.00
.1 Electrical grounding & lightning protection.		1	allow	\$ 29,100.00	\$ 29,100.00	
<u>C216 Misc Works and General Accounts</u>						\$ 14,000.00
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer, fire stopping		1	allow	\$ 14,000.00	\$ 14,000.00	
C22 Lighting, Devices and Heating						\$ 240,278.19
<u>C221 Lighting</u>						\$ 175,705.33
.1 Assume energy efficient, recessed, mounted on grid ceiling suspension system, electronic ballasts, acrylic prismatic diffusers.		2,646.00	m2	\$ 27.43	\$ 72,579.78	
.2 High Bay lighting.		4,887.00	m2	\$ 17.65	\$ 86,255.55	
.3 Allowance - specialty lighting (pots, LED's in common areas).		1	allow	\$ 9,370.00	\$ 9,370.00	
.4 Exit and emergency lighting.		1	allow	\$ 7,500.00	\$ 7,500.00	
<u>C222 Branch Devices & Wiring</u>						\$ 44,800.00
.1 All conduit systems concealed all finished areas.		1	allow	\$ 44,800.00	\$ 44,800.00	
<u>C223 Heating</u>						\$ 2,500.00
.1 Supplementary units inside vestibules & mech rms.		1	allow	\$ 2,500.00	\$ 2,500.00	
<u>C224 Misc Works and General Accounts</u>						\$ 17,272.86
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer, fire stopping		1	allow	\$ 17,272.86	\$ 17,272.86	
C23 Systems & Ancillaries						\$ 170,594.00
<u>C231 Fire Alarm</u>						\$ 135,594.00
.1 1-stage FA system, manual pull stations		7,533.00	m2	\$ 18.00	\$ 135,594.00	
<u>C232 Security System</u>						\$ -
.1 Cash allowance.			m2	\$ 9.50	\$ -	
<u>C233 Communications</u>						\$ -
.1 Cash allowance.			m2	\$ 30.00	\$ -	
<u>C234 Public Address & AV</u>						\$ -
.1 Cash allowance.			m2	\$ 23.00	\$ -	

TAKE-OFF

EC2 - OPS Building

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
<u>C235 Miscellaneous</u>						\$ -
.1 No requirement.		0	allow	\$ -	\$ -	
<u>C236 General Requirements</u>						\$ 35,000.00
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer,		1	allow	\$ 35,000.00	\$ 35,000.00	
D. SITE & ANCILLARY WORK						
D1 SITE WORK						
D11 Site Development						\$ 1,224,600.00
<u>D111 Preparation</u>						\$ 604,000.00
.1 Site preparation		1	LS	\$ 72,000.00	\$ 72,000.00	
.2 Dynamic compaction and placing a 1m thick engineered fill granular pad consisting of OPSS Granular B Type II material c/w geogrid liner		1	LS	\$ 532,000.00	\$ 532,000.00	
<u>D112 Hard Surfaces</u>						\$ 455,600.00
.1 OPS Employee Parking		80	car	\$ 1,600.00	\$ 128,000.00	
.2 Covered Parking (Canopy price included in A35)		20	car	\$ 1,600.00	\$ 32,000.00	
.3 Covered Fleet Parking		58	car	\$ 4,200.00	\$ 243,600.00	
.2 Walkway		1	LS	\$ 52,000.00	\$ 52,000.00	
<u>D113 Improvements</u>						\$ -
Included in EC1A Admin Building			ea		\$ -	
<u>D114 Landscaping</u>						\$ 165,000.00
.1 Landscaping allowance		1	LS	\$ 165,000.00	\$ 165,000.00	
D12 Mechanical Site Services						\$ 676,645.00
.1 Underslab passive ventilation system c/w a series of 150mm perforated , corrugated PVC pipes, a 10-mil poly liner and layers of clean sand, with 4 outlet pipes extending to roof level		7,533.00	m2	\$ 65.00	\$ 489,645.00	
.2 Utilites		1	LS	\$ 187,000.00	\$ 187,000.00	
.3 Storm water management		1	LS	\$ -	\$ -	
D13 Electrical Site Services						\$ 55,000.00
.1 Lighting		1	LS	\$ 55,000.00	\$ 55,000.00	
Z. GENERAL REQUIREMENTS & ALLOWANCES						
Z1 GENERAL REQUIREMENTS & FEE						
Z11 General Requirements						\$ 2,156,590.29
Z111 Design Fees (6%)			LS		\$ 808,721.36	

TAKE-OFF

EC2 - OPS Building

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
Z112 General Conditions (10.0%)			LS		\$ 1,347,868.93	
Z12 Fee						\$ 781,763.98
.1 G.C. Overhead and Profit (5.0%)					\$ 781,763.98	
Z2 ALLOWANCES						
Z21 Design Allowance (3.5%)			LS		\$ 574,596.52	\$ 574,596.52
Z22 Escalation Allowance (1.5%)			LS		\$ 246,255.65	\$ 246,255.65
TOTAL						\$ 17,237,895.73
SEPARATE PRICE						
.1 Canopy - Separate Price		365.0	m ²	\$ 800.00	\$ 292,000.00	

TAKE-OFF

EC3- Training Centre

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
A. SHELL						
A1 SUBSTRUCTURE						
A11 Foundations						\$ 335,939.00
<u>A111 Standard Foundations</u>						\$ 335,939.00
.1 Poured concrete conventional strip and spread footings based on a building footprint of 1,467.8 m ² include excavation to footings and backfill		1,467.8	m ²	\$ 215.00	\$ 315,577.00	
.2 Perimeter drainage		171	m	\$ 30.00	\$ 5,116.80	
.3 Perimeter Rigid Insulation 50 mm		426.40	m ²	\$ 28.00	\$ 11,939.20	
.4 Allowance for reinforcing dowels		1.20	TN	\$ 2,755.00	\$ 3,306.00	
<u>A112 Special Foundations</u>						\$ -
Assume none required.						
A12 Excavation						\$ 90,500.00
.10 Allowance for additional excavation and backfill		1	Allow	\$ 90,500.00	\$ 90,500.00	
A2 STRUCTURE						
A21 Lowest Floor Construction						\$ 130,651.76
.1 Slab on Grade - 125 thick		177.0	m ³	\$ 738.25		\$ 130,651.76
Fine grade 3 passes with grader and roller		1,415.8	m ²	\$ 3.00	\$ 4,247.40	
300 mm Granular A sub base		424.7	m ³	\$ 60.00	\$ 25,484.40	
Extruded polystyrene XPS Insulation - 50mm perimeter		208.0	m ²	\$ 32.00	\$ 6,656.00	
Vapour Barrier		1,415.8	m ²	\$ 3.05	\$ 4,318.19	
152 x 152 Mesh Re-inforcement		1,415.8	m ²	\$ 10.00	\$ 14,158.00	
Concrete (25 MPa) - direct chute		177.0	m ³	\$ 260.00	\$ 46,013.50	
Saw cut and control joints		1,415.8	m ²	\$ 4.00	\$ 5,663.20	
Cure with spray membrane curing compound		1,415.8	m ²	\$ 3.03	\$ 4,289.87	
Finishing floor, monolithic steel trowel		1,415.8	m ²	\$ 14.00	\$ 19,821.20	
A22 Upper Floor Construction						\$ 431,056.80
<u>A221 Upper Floor Construction</u>						\$ -
<u>A222 Stair Construction</u>						\$ -
<u>A223 Roof Construction</u>						\$ 431,056.80
.1 Structural steel roof construction		1,467.8	m ²	\$ 265.81		\$ 390,156.80
base plates and anchor bolts		40	No.	\$ 360.00	\$ 14,400.00	
structural steel columns (12Kg/m2)		17.6	TN	\$ 4,000.00	\$ 70,454.40	
structural steel beams (22Kg/m2)		32.3	TN	\$ 4,000.00	\$ 129,166.40	
open web steel joists - 550 Deep (14Kg/m2)		20.5	TN	\$ 4,000.00	\$ 82,196.80	
bridging and bracing (6Kg/m2)		8.8	TN	\$ 4,000.00	\$ 35,227.20	
38mm metal deck - .91 thick		1,467.8	m ²	\$ 40.00	\$ 58,712.00	
.4 Allowance for roof openings framing		1	LS	\$ 2,500.00	\$ 2,500.00	
.3 Structural reinforcement for mechanical equipment		1	LS	\$ 8,000.00	\$ 8,000.00	

TAKE-OFF

EC3- Training Centre

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.4 Premium for seismic protection design		1	LS	\$ 10,000.00	\$ 10,000.00	
.5 Roof Safety Anchors c/w cable system		8	ea	\$ 2,550.00	\$ 20,400.00	
A3 EXTERIOR ENCLOSURE						
A31 Walls Below Grade						\$ -
A311 Structural Walls Below Grade						
A32 Walls Above Grade						\$ 204,511.96
A321 Walls Above Grade						\$ 204,511.96
.2 Masonry Wall Assembly		189.40	m ²	\$ 263.76		\$ 49,956.14
90mm Architectural Block Veneer		189.40	m ²	\$ 170.00	\$ 32,198.00	
25mm Air Space		189.40				
Membrane Air/Vapour Barrier		189.40	m ²	\$ 2.50	\$ 473.50	
16mm Glass Matt Bypsum Sheathing		189.40	m ²	\$ 23.50	\$ 4,450.90	
152 Wind Bearing Metal Stud Wall Framing		189.40	m ²	\$ 29.70	\$ 5,625.18	
50mm Mineral Wool Insulation		189.40	m ²	\$ 8.50	\$ 1,609.90	
16mm Gypsum Board		189.40	m ²	\$ 21.50	\$ 4,072.10	
Paint Finish		189.40	m ²	\$ 8.06	\$ 1,526.56	
.3 Metal Siding Assembly		660.10	m ²	\$ 234.14		\$ 154,555.81
Steel Siding, galvanized on steel frame, 0.80mm thick		660.10	m ²	\$ 89.45	\$ 59,045.95	
127 Mineral Wool Insulation		660.10	m ²	\$ 14.54	\$ 9,597.85	
Membrane Air/Vapour Barrier		660.10	m ²	\$ 2.50	\$ 1,650.25	
16mm Glass Matt Bypsum Sheathing		-	m ²	\$ 23.50	\$ -	
152 Wind Bearing Metal Stud Wall Framing		660.10	m ²	\$ 29.70	\$ 19,604.97	
50mm Mineral Wool Insulation		660.10	m ²	\$ 8.50	\$ 5,610.85	
Steel Siding, galvanized on steel frame, 0.80mm thick		660.10	m ²	\$ 89.45	\$ 59,045.95	
A33 Windows and Entrance						\$ 49,870.00
A331 Windows and Louvres						\$ 23,470.00
.1 Glazing - Window System		53.80	m ²	\$ 400.00	\$ 21,520.00	
.2 Louvres for mechanical rooms - allowance		3.0	m ²	\$ 650.00	\$ 1,950.00	
A333 Doors						\$ 26,400.00
.1 Pressed steel frames and hollow metal doors Include Hardware and Painting						
Single		4	Ea	\$ 1,900.00	\$ 7,600.00	
Double		2	Pair	\$ 3,100.00	\$ 6,200.00	
.2 Overhead doors (3,600 x 2,700)		1	Ea	\$ 6,200.00	\$ 6,200.00	
.4 Barrier free door operators - assumed		2	Ea	\$ 3,200.00	\$ 6,400.00	
A34 Roof Covering						\$ 234,644.41
A341 Roofing						\$ 234,644.41
.1 SBS Modified Bituminous Roofing		1,467.80	m ²	\$ 150.00	\$ 220,170.00	
.2 Tapered insulation to attain roof slopes (5%)		73.39	m ²	\$ 19.00	\$ 1,394.41	
.3 Flashing		105.00	m ²	\$ 96.00	\$ 10,080.00	
.4 Roof Hatches		1	Ea	\$ 3,000.00	\$ 3,000.00	

TAKE-OFF

EC3- Training Centre

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
A35 Projection						\$ 34,000.00
.1 Parapets		170.0	m ²	\$ 200.00	\$ 34,000.00	
B. INTERIORS						
B1 PARTITIONS & DOORS						
B11 Partitions						\$ 146,477.78
<u>B111 Fixed Partitions</u>						\$ 146,477.78
.1 Drywall Metal Stud partitions slab to slab w/ Roxul AFB		1,703.23	m ²	\$ 86.00	\$ 146,477.78	
<u>B112 Movable Partitions</u>						\$ -
<u>B113 Structural Partitions</u>						\$ -
B12 Doors						\$ 45,300.00
.1 Pressed Steel Frames and Hollow Metal Doors c/w hardware include painting						
Single	28	Ea	\$ 750.00	\$ 21,000.00		
Double	4	Ea	\$ 1,300.00	\$ 5,200.00		
Single with sidelite	6	Ea	\$ 1,050.00	\$ 6,300.00		
.2 Barrier free automatic door openers - assume	4	ea	\$ 3,200.00	\$ 12,800.00		
B2 FINISHES						
B21 Floor Finishes						\$ 60,727.55
.1 Porcelain Tile Floor	74	m ²	\$ 123.00	\$ 9,138.90		
.2 Carpet Tiles	187	m ²	\$ 55.00	\$ 10,301.50		
.3 Vinyl Composite Tiles	471	m ²	\$ 35.00	\$ 16,471.00		
.4 Anti Static Tiles	5	m ²	\$ 129.00	\$ 657.90		
.5 Concrete Floor / Sealer	607	m ²	\$ 20.00	\$ 12,144.00		
.6 Base						
i 108mm Rubber Base	701	m	\$ 10.50	\$ 7,355.25		
ii Porcelain Tile Base	89	m	\$ 31.00	\$ 2,759.00		
iii Carpet Base	100	m	\$ 19.00	\$ 1,900.00		
B22 Ceiling Finishes						\$ 66,175.05
.1 Gypsum Board Ceiling include Painting in washrooms	65.10	m ²	\$ 75.50	\$ 4,915.05		
.2 Acoustical Suspended Ceiling	1,281.50	m ²	\$ 40.00	\$ 51,260.00		
.3 Allowance for drywall bulkheads	1.00	LS	\$ 10,000.00	\$ 10,000.00		
B23 Wall Finishes						\$ 67,040.00

TAKE-OFF

EC3- Training Centre

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.1 Paint Finish		3,400.00	m²	\$ 8.60	\$ 29,240.00	
.2 Porcelain Wall Tiles in washrooms		350.00	m²	\$ 108.00	\$ 37,800.00	
B3 Fittings & Equipment						
B31 Fittings and Fixtures						\$ 36,082.00
<u>B311 Metals</u>						\$ 7,500.00
.1 Service ladders		1	Ea	\$ 2,500.00	\$ 2,500.00	
.2 Miscellaneous metal - Allowance		1	LS	\$ 5,000.00	\$ 5,000.00	
<u>B312 Millwork</u>						\$ 10,700.00
.1 Typical kitchen upper and lower cabinet c/w countertop		4.90	m	\$ 1,400.00	\$ 6,860.00	
.2 Washroom vanity and counter		4.80	m	\$ 800.00	\$ 3,840.00	
<u>B313 Specialties</u>						\$ 15,192.00
.1 Toilet Compartment - Metal Ceiling Hung		1	ea	\$ 1,037.00	\$ 1,037.00	
.2 Hadicapped Toilet Compartment		2	ea	\$ 1,685.00	\$ 3,370.00	
.3 Urinal Screen		1	ea	\$ 485.00	\$ 485.00	
.4 Toilet and Bath Accessories						
i Hand dryer		4	ea	\$ 450.00	\$ 1,800.00	
ii Paper towel dispenser - assumed		4	ea	\$ 150.00	\$ 600.00	
iii Toilet paper dispenser		5	ea	\$ 50.00	\$ 250.00	
iv Soap dispenser		6	ea	\$ 75.00	\$ 450.00	
v Waste receptacle - wall mounted semi-recessed - assumed		4	ea	\$ 500.00	\$ 2,000.00	
vi Sanitary disposal		3	ea	\$ 200.00	\$ 600.00	
viii Tilted mirror		4	ea	\$ 250.00	\$ 1,000.00	
.5 Unframed Mirror in washrooms above vanities		7.20	m²	\$ 500.00	\$ 3,600.00	
<u>B314 Furnishings</u>						\$ 2,690.00
.1 Window treatment - Allowance		53.80	m²	\$ 50.00	\$ 2,690.00	
B32 Equipment						
B33 Conveying Systems						
C. SERVICES						
C1 Mechanical						
C11 Plumbing and Drainage						\$ 71,132.78
<u>C111 Plumbing Fixtures</u>						\$ 35,611.50
.1 Water closets. Vitreous china, wall mounted fixtures with electronic flush valve. Water conservation type.		5.0	ea	\$ 2,336.90	\$ 11,684.50	

TAKE-OFF

EC3- Training Centre

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.2 Showers, including trim, base, etc.		4.0	ea	\$ 2,500.00	\$ 10,000.00	
.3 Lavatories. Vitreous china, above counter mounted type with electronic 4in center set faucets. Barrier free to be of same type per accessibility requirements.		6.0	ea	\$ 1,357.90	\$ 8,147.40	
.4 Service sinks. Assume standard, stainless steel, counter-top single and double (where appropriate), in shared kitchenette areas.		1.0	ea	\$ 1,429.60	\$ 1,429.60	
.5 Custodial sinks. Stainless Steel, deep, floor mounted with braced hose faucet and trim.		1.0	ea	\$ 1,850.00	\$ 1,850.00	
.6 Drinking fountains. Assume barrier free recessed wall mounted, re Fridgerated, stainless steel, single bubbler.		1.0	allow	\$ 2,500.00	\$ 2,500.00	
<u>C112 Domestic Water</u>						\$ 10,370.00
.1 Domestic water service shall enter the building to serve domestic water and fire protection. Incoming service c/w backflow prevention and metering. Domestic hot water generated by gas fired cond boilers (included in HVAC). Thermal insulation included.		1.0	allow	\$ 7,320.00	\$ 7,320.00	
.2 Domestic water booster pumps and tanks.		1.0	allow	\$ 3,050.00	\$ 3,050.00	
<u>C113 Sanitary Waste & Vent</u>						\$ 8,174.00
.1 Sanitary system assume U/G to be PVC, while above grade piping shall be cast iron/copper DWV. Drains below the service entry shall be collected in sump pits c/w duplex submersible pumps (Assume 3 for this building). Thermal insulation included.		1.00	allow	\$ 8,174.00	\$ 8,174.00	
<u>C114 Storm</u>						\$ 9,015.00
.1 Storm system shall include control flow type roof drains. U/G storm collection in PVC. Cast iron above grade. Weeping tile collected into sumps, then transferred to sump pits c/w duplex submersible pumps. Thermal insulation included. PVC Jacketed in exposed areas.		1.0	allow	\$ 9,015.00	\$ 9,015.00	
<u>C115 Natural Gas</u>						\$ 4,575.00
.1 Incoming gas service c/w gas meter. Distribution of natural gas to centralized mechanical PH to feed gas fired HVAC equipment. Piping to be schd 40 black malleable. Piping 50mm and smaller to be screwed, 65mm and over to be welded.		1.0	allow	\$ 4,575.00	\$ 4,575.00	
<u>C116 Fuel Oil</u>						\$ -
.1		1	allow		\$ -	
<u>C117 Misc Works and General Accounts</u>						\$ 3,387.28
.1 Clean-up, HASSSP, rentals, small tools, fire stopping, permits, inspections, bonding and insurance, site trailer.		1.0	allow	\$ 3,387.28	\$ 3,387.28	
C12 Fire Protection						\$ 63,081.00
<u>C121 Sprinklers</u>						\$ 63,081.00

TAKE-OFF

EC3- Training Centre

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.1 Combined wet pipe sprinkler/standpipe system including pumping equipment.		1,467.00	m2	\$ 43.00	\$ 63,081.00	
.2 Extinguishers, and all misc works included in the rates above.						
C13 Heating, Ventilation & Air Conditioning						\$ 425,492.55
<u>C131 Liquid Heat Transfer (Heating)</u>						\$ 31,536.00
.1 Gas fired, high efficiency hot water heaters		2	allow	\$ 9,150.00	\$ 18,300.00	
.2 Venting and accessories.		1	allow	\$ 10,736.00	\$ 10,736.00	
.3 Heating water pumping (primary/secondary), assume verticle in-line.		1	allow	\$ 2,500.00	\$ 2,500.00	
<u>C132 Liquid Heat Transfer (Cooling)</u>						\$ -
.1		1	allow		\$ -	
<u>C133 Air Distribution</u>						\$ 111,575.00
.1 Typical Floor - RTU c/w economizer, two stage filtration, gas fired burner, two stage high eff elec cooling, supply/return fans on VFD.		1	allow	\$ 36,600.00	\$ 36,600.00	
.2 Lobby System - RTU c/w economizer, two stage filtration, gas fired burner, two stage high eff elec cooling, supply/return fans on VFD.		1	allow	\$ 14,275.00	\$ 14,275.00	
.3 Perimeter wall/window ceiling mounted fan powered boxes c/w hot water heating coils.		1	allow	\$ 10,700.00	\$ 10,700.00	
.4 DX Cooling		1	Allow	\$ 50,000.00	\$ 50,000.00	
<u>C134 Exhaust Systems</u>						\$ 262,120.00
.1 Misc systems - ventilation & washroom exhaust.		1	allow	\$ 7,620.00	\$ 7,620.00	
.2 Exhaust hood in PILC Room		1	allow	\$ 250,000.00	\$ 250,000.00	
.3 Generator exhaust muffler and venting (labour only).		1	allow	\$ 4,500.00	\$ 4,500.00	
<u>C136 Misc Works and General Accounts</u>						\$ 20,261.55
.1 Clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, fire stopping.		1	allow	\$ 20,261.55	\$ 20,261.55	
C14 EMCS Controls						\$ 80,685.00
<u>C141 Controls and Automation</u>						\$ 80,685.00
.1 Assume EMCS Interfacing with building AHU's, DHWT's, pumps, heating and cooling systems, energy management.		1,467.00	m2	\$ 55.00	\$ 80,685.00	
C2 Electrical						
C21 Service & Distribution						\$ 160,324.50
<u>C211 Equipment</u>						\$ 19,400.00

TAKE-OFF

EC3- Training Centre

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.1 Switchboard - Assume 600A, 600/347V, 3ph, 4W. Main breaker digital metering, ammeter, voltmeter, selector switch.		1	ea	\$ 19,400.00	\$ 19,400.00	
.2 Incoming service by HOL.					\$ -	
<u>C212 Emergency Power</u>						\$ 50,000.00
.1 Emergency power fed from EC-2		1	allow	\$ 50,000.00	\$ 50,000.00	
<u>C213 Distribution</u>						\$ 25,800.00
.1 Lighting panels, power panels, transformers, digital metering.		1	allow	\$ 25,800.00	\$ 25,800.00	
<u>C214 Feeders</u>						\$ 20,460.00
.1 Main feeders.		1	allow	\$ 20,460.00	\$ 20,460.00	
<u>C215 Motor Controls & Wiring</u>						\$ 26,800.00
.1 Main MCC's for mechanical equipment including starters. Any VFD's required are in mechanical pricing. All power wiring to mechanical equipment included.		1	allow	\$ 26,800.00	\$ 26,800.00	
<u>C216 Grounding & Lightning Protection</u>						\$ 10,230.00
.1 Electrical grounding & lightning protection.		1	allow	\$ 10,230.00	\$ 10,230.00	
<u>C216 Misc Works and General Accounts</u>						\$ 7,634.50
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer, fire stopping		1	allow	\$ 7,634.50	\$ 7,634.50	
C22 Lighting, Devices and Heating						\$ 77,778.55
<u>C221 Lighting</u>						\$ 57,089.81
.1 Assume energy efficient, recessed, mounted on grid ceiling suspension system, electronic ballasts, acrylic prismatic diffusers.		1,467.00	m2	\$ 27.43	\$ 40,239.81	
.2 Allowance - specialty lighting (pots, LED's in common areas).		1	allow	\$ 9,370.00	\$ 9,370.00	
.3 Exit and emergency lighting.		1	allow	\$ 7,480.00	\$ 7,480.00	
<u>C222 Branch Devices & Wiring</u>						\$ 15,410.00
.1 All conduit systems concealed all finished areas.		1	allow	\$ 15,410.00	\$ 15,410.00	
<u>C223 Heating</u>						\$ 1,575.00
.1 Supplementary units inside vestibules & mech rms.		1	allow	\$ 1,575.00	\$ 1,575.00	
<u>C224 Misc Works and General Accounts</u>						\$ 3,703.74
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer, fire stopping		1	allow	\$ 3,703.74	\$ 3,703.74	
C23 Systems & Ancillaries						\$ 38,508.75

TAKE-OFF

EC3- Training Centre

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
<u>C231 Fire Alarm</u>						\$ 36,675.00
.1 Addressable 2-stage FA system c/w remote annunciator panels, manual pull stations, signal speakers throughout		1,467.00	m2	\$ 25.00	\$ 36,675.00	
<u>C232 Security System</u>						\$ -
.1 Cash allowance.			m2	\$ 9.50	\$ -	
<u>C233 Communications</u>						\$ -
.1 Cash allowance.			m2	\$ 30.00	\$ -	
<u>C234 Public Address & AV</u>						\$ -
.1 Cash allowance.			m2	\$ 23.00	\$ -	
<u>C235 Miscellaneous</u>						\$ -
.1 No requirement.		0	allow	\$ -	\$ -	
<u>C236 General Requirements</u>						\$ 1,833.75
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer,		1	allow	\$ 1,833.75	\$ 1,833.75	
D. SITE & ANCILLARY WORK						
D1 SITE WORK						
D11 Site Development						\$ 594,238.00
<u>D111 Preparation</u>						\$ 190,000.00
.1 Site preparation - stripping, cut and fill		1	LS	\$ 85,000.00	\$ 85,000.00	
.2 Dynamic compaction and placing a 1m thick engineered fill granular pad consisting of OPSS Granular B Type II material c/w geogrid liner		1	LS	\$ 105,000.00	\$ 105,000.00	
<u>D112 Hard Surfaces</u>						\$ 44,000.00
.1 Visitor Parking		5	car	\$ 1,600.00	\$ 8,000.00	
.2 Walkway		1	LS	\$ 36,000.00	\$ 36,000.00	
<u>D113 Improvements</u>						\$ 272,994.00
.1 Gravel Yard		9,827	m2	\$ 22.00	\$ 216,194.00	
.2 Chain Link Fence 1.8m high		400	m	\$ 142.00	\$ 56,800.00	
<u>D114 Landscaping</u>						\$ 87,244.00
.1 Landscaping allowance		1	LS	\$ 87,244.00	\$ 87,244.00	
D12 Mechanical Site Services						\$ 210,620.00
.1 Underslab passive ventilation system c/w a series of 150mm perforated , corrugated PVC pipes, a 10-mil poly liner and layers of clean sand, with 4 outlet pipes extending to roof level		1,548.00	m2	\$ 65.00	\$ 100,620.00	
.2 Utilities		1	LS	\$ 110,000.00	\$ 110,000.00	

TAKE-OFF

EC3- Training Centre

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.3 Storm water management		1	LS	\$ -	\$ -	
D13 Electrical Site Services						\$ 30,000.00
.1 Lighting		1	LS	\$ 30,000.00	\$ 30,000.00	
Z. GENERAL REQUIREMENTS & ALLOWANCES						
Z1 GENERAL REQUIREMENTS & FEE						
Z11 General Requirements						\$ 589,573.99
Z111 Design Fees (6%)			LS		\$ 221,090.25	
Z112 General Conditions (10.0%)			LS		\$ 368,483.74	
Z12 Fee						\$ 213,720.57
.1 G.C. Overhead and Profit (5.0%)					\$ 213,720.57	
Z2 ALLOWANCES						
Z21 Design Allowance (3.5%)			LS		\$ 157,084.62	\$ 157,084.62
Z22 Escalation Allowance (1.5%)			LS		\$ 67,321.98	\$ 67,321.98
TOTAL						\$ 4,712,538.60

TAKE-OFF

EC4 - PILC Building

R-1

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
A. SHELL						
A1 SUBSTRUCTURE						
A11 Foundations						\$ 210,685.00
<u>A111 Standard Foundations</u>						\$ 210,685.00
.1 Poured concrete conventional strip and spread footings based on a building footprint of 962.6 m ² include excavation to footings and backfill		962.6	m ²	\$ 200.00	\$ 192,520.00	
.2 Perimeter drainage		154	m	\$ 30.00	\$ 4,623.00	
.3 Perimeter Rigid Insulation 50 mm		385.25	m ²	\$ 28.00	\$ 10,787.00	
.4 Allowance for reinforcing dowels		1.00	TN	\$ 2,755.00	\$ 2,755.00	
<u>A112 Special Foundations</u>						\$ -
Assume none required.						
A12 Excavation						\$ 62,000.00
.10 Allowance for additional excavation and backfill		1	Allow	\$ 62,000.00	\$ 62,000.00	
A2 STRUCTURE						
A21 Lowest Floor Construction						\$ 129,231.48
.1 Slab on Grade - 200 thick		192.5	m ³	\$ 561.26		\$ 108,054.28
Fine grade 3 passes with grader and roller		962.6	m ²	\$ 3.00	\$ 2,887.80	
300 mm Granular A sub base		288.8	m ³	\$ 60.00	\$ 17,326.80	
Extruded polystyrene XPS Insulation -50mm - perimeter		188.0	m ²	\$ 28.00	\$ 5,264.00	
Vapour Barrier		962.6	m ²	\$ 3.05	\$ 2,935.93	
15M @400 EW (assume 10kg/m2)		1.9	tn	\$ 2,652.00	\$ 5,105.63	
Concrete (35 MPa) - direct chute		192.5	m ³	\$ 282.00	\$ 54,290.64	
Saw cut and control joints		962.6	m ²	\$ 4.00	\$ 3,850.40	
Cure with spray membrane curing compound		962.6	m ²	\$ 3.03	\$ 2,916.68	
Finishing floor, monolithic steel trowel		962.6	m ²	\$ 14.00	\$ 13,476.40	
Concrete sealer		962.6	m ²	\$ 22.00	\$ 21,177.20	
A22 Upper Floor Construction						\$ 452,422.00
<u>A221 Upper Floor Construction</u>						\$ 452,422.00
Pre-engineered steel building, clear span rigid frame 0.5mmthick coloured roofing and siding, 7.9m eave height		962.6	m ²	\$ 470.00	\$ 452,422.00	
<u>A222 Stair Construction</u>						\$ -
<u>A223 Roof Construction</u>						\$ -
A3 EXTERIOR ENCLOSURE						
A31 Walls Below Grade						\$ -
A311 Structural Walls Below Grade						

TAKE-OFF

EC4 - PILC Building

R-1

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
A32 Walls Above Grade						\$ -
A321 Walls Above Grade						\$ -
A33 Windows and Entrance						\$ 45,216.00
<u>A331 Windows and Louvres</u>						\$ 5,616.00
.1 Louvres - allowance		8.6	m²	\$ 650.00	\$ 5,616.00	
<u>A333 Doors</u>						\$ 39,600.00
.1 Pressed steel frames and hollow metal doors Include Hardware and Painting						
Single		4	Ea	\$ 1,900.00	\$ 7,600.00	
Double		-	Pair	\$ 3,100.00	\$ -	
.2 Overhead doors (6200 x 5200)		2	Ea	\$ 16,000.00	\$ 32,000.00	
A34 Roof Covering						\$ -
<u>A341 Roofing</u>						\$ -
A35 Projection						\$ -
B. INTERIORS						
B1 PARTITIONS & DOORS						
B11 Partitions						\$ -
<u>B111 Fixed Partitions</u>						\$ -
<u>B112 Movable Partitions</u>						\$ -
<u>B113 Structural Partitions</u>						\$ -
B12 Doors						\$ -
B2 FINISHES						
B21 Floor Finishes						\$ -
B22 Ceiling Finishes						\$ -
B23 Wall Finishes						\$ -
B3 Fittings & Equipment						

TAKE-OFF

EC4 - PILC Building

R-1

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
B31 Fittings and Fixtures						\$ -
<u>B311 Metals</u>						\$ -
<u>B312 Millwork</u>						\$ -
<u>B313 Specialties</u>						\$ -
<u>B314 Furnishings</u>						\$ -
B32 Equipment						\$ 110,600.00
.1 Overhead Bridge Crane, under hung hoist, electric operating, 2 girder, Assume 7-ton, 13m span		1	ea	\$ 110,600.00	\$ 110,600.00	
B33 Conveying Systems						
C. SERVICES						
C1 Mechanical						
C11 Plumbing and Drainage						\$ 7,350.00
<u>C111 Plumbing Fixtures</u>						\$ -
.1 No requirement.			ea		\$ -	
<u>C112 Domestic Water</u>						\$ -
.1 No requirement.			allow		\$ -	
<u>C113 Sanitary Waste & Vent</u>						\$ -
.1 No requirement.			allow		\$ -	
<u>C114 Storm</u>						\$ 4,500.00
.1 Storm system shall include control flow type roof drains. U/G storm collection in PVC. Cast iron above grade. Weeping tile collected into sumps, then transferred to sump pits c/w duplex submersible pumps. Thermal insulation included. PVC Jacketed in exposed areas.		1.0	allow	\$ 4,500.00	\$ 4,500.00	
<u>C115 Natural Gas</u>						\$ 2,500.00
.1 Incoming gas service c/w gas meter. Distribution of natural gas to centralized mechanical PH to feed gas fired HVAC equipment. Piping to be schd 40 black malleable. Piping 50mm and smaller to be screwed, 65mm and over to be welded.		1.0	allow	\$ 2,500.00	\$ 2,500.00	
<u>C116 Fuel Oil</u>						\$ -
.1 No requirement.			allow		\$ -	
<u>C117 Misc Works and General Accounts</u>						\$ 350.00

TAKE-OFF

EC4 - PILC Building

R-1

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.1 Clean-up, HASSSP, rentals, small tools, fire stopping, permits, inspections, bonding and insurance, site trailer.		1.0	allow	\$ 350.00	\$ 350.00	
C12 Fire Protection						\$ 26,964.00
<u>C121 Sprinklers</u>						\$ 26,964.00
.1 Sprinkler system		963.00	m2	\$ 28.00	\$ 26,964.00	
C13 Heating, Ventilation & Air Conditioning						\$ 97,125.00
<u>C131 Liquid Heat Transfer (Heating)</u>						\$ -
.1 No requirement.			allow		\$ -	
<u>C132 Liquid Heat Transfer (Cooling)</u>						\$ -
.1 No requirement.			allow		\$ -	
<u>C133 Air Distribution</u>						\$ 92,500.00
.1 6 unit heaters		1	allow	\$ 60,000.00	\$ 60,000.00	
.2 Exhaust fans		3	allow	\$ 7,500.00	\$ 22,500.00	
.3 Dampers		1	allow	\$ 10,000.00	\$ 10,000.00	
<u>C134 Exhaust Systems</u>						\$ -
.1 No requirement.			allow		\$ -	
<u>C136 Misc Works and General Accounts</u>						\$ 4,625.00
.1 Clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, fire stopping.		1	allow	\$ 4,625.00	\$ 4,625.00	
C14 EMCS Controls						\$ -
<u>C141 Controls and Automation</u>						\$ -
.1 No requirement.			m2		\$ -	
C2 Electrical						
C21 Service & Distribution						\$ 35,700.00
<u>C211 Equipment</u>						\$ 25,000.00
.1 Assume power fed from EC3		1	ea	\$ 25,000.00	\$ 25,000.00	
.2 Incoming service by HOL.					\$ -	
<u>C212 Emergency Power</u>						\$ -
.1 Assume no requirement.		0	allow	\$ -	\$ -	
<u>C213 Distribution</u>						\$ 7,500.00
.1 Lighting panels, power panels, transformers, digital metering.		1	allow	\$ 7,500.00	\$ 7,500.00	

TAKE-OFF

EC4 - PILC Building

R-1

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
<u>C214 Feeders</u>						\$ -
.1 Main feeders.			allow		\$ -	
<u>C215 Motor Controls & Wiring</u>						\$ -
.1 Assume no MCC required.		1	allow	\$ -	\$ -	
<u>C216 Grounding & Lightning Protection</u>						\$ 1,500.00
.1 Electrical grounding & lightning protection.		1	allow	\$ 1,500.00	\$ 1,500.00	
<u>C216 Misc Works and General Accounts</u>						\$ 1,700.00
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer, fire stopping		1	allow	\$ 1,700.00	\$ 1,700.00	
C22 Lighting, Devices and Heating						\$ 11,445.00
<u>C221 Lighting</u>						\$ 6,400.00
.1 High Bay lighting.		1,000.00	m2	\$ 5.65	\$ 5,650.00	
.2 Exit and emergency lighting.		1	allow	\$ 750.00	\$ 750.00	
<u>C222 Branch Devices & Wiring</u>						\$ 4,500.00
.1 All conduit systems concealed all finished areas.		1	allow	\$ 4,500.00	\$ 4,500.00	
<u>C223 Heating</u>						\$ -
.1 No requirement.			allow		\$ -	
<u>C224 Misc Works and General Accounts</u>						\$ 545.00
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer, fire stopping		1	allow	\$ 545.00	\$ 545.00	
C23 Systems & Ancillaries						\$ 33,950.70
<u>C231 Fire Alarm</u>						\$ 17,334.00
.1 Single stage addressable. No voice communication		963.00	m2	\$ 18.00	\$ 17,334.00	
<u>C232 Security System</u>						\$ -
.1 Cash allowance.			m2		\$ -	
<u>C233 Communications</u>						\$ 15,000.00
.1 Fibre optic for alarm, phone, wireless connection		1.00	allow	\$ 15,000.00	\$ 15,000.00	
<u>C234 Public Address & AV</u>						\$ -
.1 Cash allowance.			m2		\$ -	
<u>C235 Miscellaneous</u>						\$ -
.1 No requirement.		0	allow	\$ -	\$ -	
<u>C236 General Requirements</u>						\$ 1,616.70

TAKE-OFF

EC4 - PILC Building

R-1

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer,		1	allow	\$ 1,616.70	\$ 1,616.70	
D. SITE & ANCILLARY WORK						
D1 SITE WORK						
D11 Site Development						\$ 488,383.80
<u>D111 Preparation</u>						\$ 131,000.00
.1 Site preparation - stripping, cut and fill		1	LS	\$ 68,000.00	\$ 68,000.00	
.2 Dynamic compaction and placing a 1m thick engineered fill granular pad consisting of OPSS Granular B Type II material c/w geogrid liner		1	LS	\$ 63,000.00	\$ 63,000.00	
<u>D112 Hard Surfaces</u>						\$ 165,623.80
.1 Heavy Duty Asphalt		2,102	m2	\$ 66.90	\$ 140,623.80	
.2 Walkway		1	LS	\$ 25,000.00	\$ 25,000.00	
<u>D113 Improvements</u>						\$ 166,760.00
.1 Gravel Yard		7,580	m2	\$ 22.00	\$ 166,760.00	
<u>D114 Landscaping</u>						\$ 25,000.00
.1 Landscaping allowance		1	LS	\$ 25,000.00	\$ 25,000.00	
D12 Mechanical Site Services						\$ 112,569.00
.1 Underslab passive ventilation system c/w a series of 150mm perforated , corrugated PVC pipes, a 10-mil poly liner and layers of clean sand, with 4 outlet pipes extending to roof level		962.60	m2	\$ 65.00	\$ 62,569.00	
.2 Utilites		1	LS	\$ 50,000.00	\$ 50,000.00	
.3 Storm water management		1	LS	\$ -	\$ -	
D13 Electrical Site Services						\$ 25,000.00
.1 Lighting		1	LS	\$ 25,000.00	\$ 25,000.00	
Z. GENERAL REQUIREMENTS & ALLOWANCES						
Z1 GENERAL REQUIREMENTS & FEE						
Z11 General Requirements						\$ 295,782.72
Z111 Design Fees (6%)			LS		\$ 110,918.52	
Z112 General Conditions (10.0%)			LS		\$ 184,864.20	
Z12 Fee						\$ 107,221.23
.1 G.C. Overhead and Profit (5.0%)					\$ 107,221.23	
Z2 ALLOWANCES						
Z21 Design Allowance (3.5%)			LS		\$ 78,807.61	\$ 78,807.61

TAKE-OFF

EC4 - PILC Building

R-1

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
Z22 Escalation Allowance (1.5%)			LS		\$ 33,774.69	\$ 33,774.69
TOTAL						\$ 2,364,228.23

HYDRO OTTAWA LIMITED SOUTH CAMPUS R2

19 Jan 2016

		GFA	BUILDING		SITE WORK	GENERAL CONDITIONS AND FEES	CONTINGENCY ALLOWANCES	TOTAL	
		m²	\$	\$ / SF	\$	\$	\$	\$	\$ / SF
SC1	OPS BUILDING	9,089.8	15,326,657	156.73	4,945,006	4,419,222	1,234,544	25,925,429	265.11
SC2	Fleet Services	1,840.1	3,211,831	162.24	158,620	734,758	205,260	4,310,470	217.74
	Storage Shed	348.6	367,954	98.11	15,000	65,100	22,403	470,457	125.46
			\$ 18,906,442		\$ 5,118,626	\$ 5,219,081	\$ 1,462,208	\$ 30,706,356	

SEPARATE PRICES

SC1

Covered Parking Canopy \$ 224,000 \$ 35,840 \$ 12,992 \$ **272,832**

SC2

High Roof \$ 133,818 \$ 21,411 \$ 7,761 \$ **162,990**
\$ 435,822

Inclusions and Exclusions

	Included	Excluded
Millwork	✓	
Furniture		✓
Lockers		✓
Site improvement and landscaping	✓	
Solar photovoltaic system		✓
Design Fees	✓	
Other Consultants' fees		✓
Development charges		✓
Design Allowance	✓	
Escalation allowance	✓	
Construction allowance		✓
HST		✓

SUMMARY

SC1 - OPS BUILDING

R-2

ELEMENTAL COST SUMMARY

Project: SC1 - OPS Building		Prepared by: F. Lo		Project No.		
GFA: 9,089.80 m ²		Architect: HOK		Date: 2016-01-19		
Element/Sub-Element	Amount	Cost per m ² Gross	Element Total	Cost per m ² Gross	Cost per SF Gross	% of Cost by Element
A SHELL						
A1 Sub-Structural			2,012,610	221.41	20.58	7.8%
A11 Foundation	1,912,610	210.41				
A12 Excavation	100,000	11.00				
A2 Structure			5,171,209	568.90	52.88	19.9%
A21 Lowest Floor Construction	1,077,023	118.49				
A22 Upper Floor Construction	4,094,185	450.42				
A3 Exterior Enclosure			2,358,374	259.45	24.12	9.1%
A31 Walls Below Grade	0	0.00				
A32 Walls Above Grade	761,419	83.77				
A33 Windows and Entrances	148,490	16.34				
A34 Roof Covering	1,403,065	154.36				
A35 Projection	45,400	4.99				
B INTERIORS						
B1 Partitions & Doors			1,097,775	120.77	11.23	4.2%
B11 Partitions	1,007,075	110.79				
B12 Doors	90,700	9.98				
B2 Finishes			599,074	65.91	6.13	2.3%
B21 Floor Finishes	255,802	28.14				
B22 Ceiling Finishes	167,928	18.47				
B23 Wall Finishes	175,344	19.29				
B3 Fittings & Equipment			293,762	32.32	3.00	1.1%
B31 Fittings & Fixtures	129,002	14.19				
B32 Equipment	164,760	18.13				
B33 Conveying Systems	0	0.00				
C SERVICES						
C1 Mechanical			2,110,023	232.13	21.58	8.1%
C11 Plumbing & Drainage	360,037	39.61				
C12 Fire Protection	305,601	33.62				
C13 HVAC	1,232,081	135.55				
C14 Controls	212,305	23.36				
C2 Electrical			1,683,829	185.24	17.22	6.5%
C21 Service & Distribution	1,153,369	126.89				
C22 Lighting, Devices & Heating	402,922	44.33				
C23 Systems & Ancillaries	127,537	14.03				

SUMMARY

SC1 - OPS BUILDING

R-2

NET BUILDING COST - EXCLUDING SITE			15,326,657	1,686.14	156.73	59%
D SITE & ANCILLARY WORK						
D1 Site Work			4,945,006	544.02	50.57	19.1%
D11 Site Development	2,949,006	324.43				
D12 Mechanical Site Services	1,561,000	171.73				
D13 Electrical Site Services	435,000	47.86				
D2 Ancillary Work			0	0.00		0.0%
D21 Demolition	0					
D22 Alterations	0					
NET BUILDING COST - INCLUDING SITE			20,271,663	2,230.15	207.29	78%
Z GENERAL REQUIREMENTS & ALLOWANCES						
Z1 General Requirements & Fee			4,419,222	486.17	45.19	17.0%
Z11 General Requirements	3,243,466	356.82				
Z12 Fee	1,175,756	129.35				
Z2 Allowances			1,234,544	135.82	12.62	4.8%
Z21 Design Allowance	864,181	95.07				
Z22 Escalation Allowance	370,363	40.74				
TOTAL HARD CONSTRUCTION ESTIMATE - EXCLUDING CONTINGENCIES			\$ 25,925,429	2,852.15	265.11	100%

SC2 - FLEET SERVICES BUILDING

R-1

ELEMENTAL COST SUMMARY

Project: SC2 - Fleet Services		Prepared by: F. Lo		Project No.		
GFA: 1,840.10 m ²		Architect: HOK		Date: 2016-01-04		
Element/Sub-Element	Amount	Cost per m ² Gross	Element Total	Cost per m ² Gross	Cost per SF Gross	% of Cost by Element
A SHELL						
A1 Sub-Structural			337,890	183.63	17.07	7.8%
A11 Foundation	322,890	175.47				
A12 Excavation	15,000	8.15				
A2 Structure			854,427	464.34	43.16	19.8%
A21 Lowest Floor Construction	248,099	134.83				
A22 Upper Floor Construction	606,328	329.51				
A3 Exterior Enclosure			899,311	488.73	45.43	20.9%
A31 Walls Below Grade	0	0.00				
A32 Walls Above Grade	484,269	263.18				
A33 Windows and Entrances	149,470	81.23				
A34 Roof Covering	237,572	129.11				
A35 Projection	28,000	15.22				
B INTERIORS						
B1 Partitions & Doors			237,929	129.30	12.02	5.5%
B11 Partitions	212,579	115.53				
B12 Doors	25,350	13.78				
B2 Finishes			23,235	12.63	1.17	0.5%
B21 Floor Finishes	575	0.31				
B22 Ceiling Finishes	19,220	10.44				
B23 Wall Finishes	3,440	1.87				
B3 Fittings & Equipment			282,816	153.70	14.29	6.6%
B31 Fittings & Fixtures	114,816	62.40				
B32 Equipment	168,000	91.30				
B33 Conveying Systems	0	0.00				
C SERVICES						
C1 Mechanical			254,294	138.20	12.85	5.9%
C11 Plumbing & Drainage	89,565	48.67				
C12 Fire Protection	46,000	25.00				
C13 HVAC	100,729	54.74				
C14 Controls	18,000	9.78				
C2 Electrical			321,930	174.95	16.26	7.5%
C21 Service & Distribution	233,153	126.71				
C22 Lighting, Devices & Heating	55,939	30.40				
C23 Systems & Ancillaries	32,839	17.85				

SC2 - FLEET SERVICES BUILDING

R-1

NET BUILDING COST - EXCLUDING SITE						
			3,211,831	1,745.47	162.24	75%
D SITE & ANCILLARY WORK						
D1 Site Work			153,620	83.48	7.76	3.6%
D11 Site Development	138,620	75.33				
D12 Mechanical Site Services	0	0.00				
D13 Electrical Site Services	15,000	8.15				
D2 Ancillary Work			5,000	2.72		0.1%
D21 Demolition	5,000	2.72				
D22 Alterations	0					
NET BUILDING COST - INCLUDING SITE						
			3,370,451	1,831.67	170.25	78%
Z GENERAL REQUIREMENTS & ALLOWANCES						
Z1 General Requirements & Fee			734,758	399.30	37.12	17.0%
Z11 General Requirements	539,272	293.07				12.5%
Z12 Fee	195,486	106.24				4.5%
Z2 Allowances			205,260	111.55	10.37	4.8%
Z21 Design Allowance	143,682	78.08				
Z22 Escalation Allowance	61,578	33.46				
TOTAL HARD CONSTRUCTION ESTIMATE - EXCLUDING CONTINGENCIES			\$ 4,310,470	2,342.52	217.74	100%

TAKE-OFF

SC1 - OPS Building

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
A. SHELL						
A1 SUBSTRUCTURE						
A11 Foundations						\$ 1,912,610.12
<u>A111 Standard Foundations</u>						\$ 1,912,610.12
.1 Poured concrete conventional strip and spread footings based on a building footprint of 9,089.8m ² bear on engineered fill or in-situ material (1.65m) include excavation to footings and backfill		9,089.8	m ²	\$ 205.00	\$ 1,863,409.00	
.2 Perimeter drainage		393	m	\$ 30.00	\$ 11,778.00	
.3 Perimeter Rigid Insulation 50 mm		647.79	m ²	\$ 28.00	\$ 18,138.12	
.4 Allowance for reinforcing dowels		7.00	TN	\$ 2,755.00	\$ 19,285.00	
<u>A112 Special Foundations</u>						\$ -
Assume none required.						
A12 Excavation						\$ 100,000.00
.10 Allowance for additional excavation and backfill		1	Allow	\$ 100,000.00	\$ 100,000.00	
A2 STRUCTURE						
A21 Lowest Floor Construction						\$ 1,077,023.45
.1 Slab on Grade - 150 thick		602.2	m ³	\$ 804.85		\$ 484,673.75
Fine grade 3 passes with grader and roller		4,014.6	m ²	\$ 3.00	\$ 12,043.80	
300 mm Granular A sub base		1,204.4	m ³	\$ 60.00	\$ 72,262.80	
Extruded polystyrene XPS Insulation - 50 mm perimeter only		480.0	m ²	\$ 28.00	\$ 13,440.00	
Vapour Barrier		4,014.6	m ²	\$ 3.05	\$ 12,244.53	
152 x 152 Mesh Re-inforcement		4,014.6	m ²	\$ 10.00	\$ 40,146.00	
Concrete (35 MPa) - direct chute		602.2	m ³	\$ 282.00	\$ 169,817.58	
Saw cut and control joints		4,014.6	m ²	\$ 4.00	\$ 16,058.40	
Cure with spray membrane curing compound		4,014.6	m ²	\$ 3.03	\$ 12,164.24	
Finishing floor, monolithic steel trowel		4,014.6	m ²	\$ 14.00	\$ 56,204.40	
Concrete Floor Sealer		4,014.6	m ²	\$ 20.00	\$ 80,292.00	
.2 Slab on Grade - 125 thick Unreinforced		308.7	m ³	\$ 620.64		\$ 191,568.29
Fine grade 3 passes with grader and roller		2,469.3	m ²	\$ 3.00	\$ 7,407.90	
300 mm Granular A sub base		740.8	m ³	\$ 60.00	\$ 44,447.40	
Vapour Barrier		2,469.3	m ²	\$ 3.05	\$ 7,531.37	
Concrete (25 MPa) - direct chute		308.7	m ³	\$ 260.00	\$ 80,252.25	
Saw cut and control joints		2,469.3	m ²	\$ 4.00	\$ 9,877.20	
Cure with spray membrane curing compound		2,469.3	m ²	\$ 3.03	\$ 7,481.98	
Finishing floor, monolithic steel trowel		2,469.3	m ²	\$ 14.00	\$ 34,570.20	
.3 Slab on Grade - 175 thick		423.9	m ³	\$ 711.03		\$ 301,381.90
Fine grade 3 passes with grader and roller		2,422.1	m ²	\$ 3.00	\$ 7,266.30	
300 mm Granular A sub base		726.6	m ³	\$ 60.00	\$ 43,597.80	
Vapour Barrier		2,422.1	m ²	\$ 3.05	\$ 7,387.41	
152 x 152 Mesh Re-inforcement		2,422.1	m ²	\$ 10.00	\$ 24,221.00	
Concrete (35 MPa) - direct chute		423.9	m ³	\$ 282.00	\$ 119,530.64	
Saw cut and control joints		2,422.1	m ²	\$ 4.00	\$ 9,688.40	
Cure with spray membrane curing compound		2,422.1	m ²	\$ 3.03	\$ 7,338.96	
Finishing floor, monolithic steel trowel		2,422.1	m ²	\$ 14.00	\$ 33,909.40	
Concrete Floor Sealer		2,422.1	m ²	\$ 20.00	\$ 48,442.00	

TAKE-OFF

SC1 - OPS Building

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.4 Slab recess for access flooring		371.0	m²	\$ 150.00	\$ 55,650.00	
.5 Slab thickening below masonry block walls		514.7	m	\$ 85.00	\$ 43,749.50	
A22 Upper Floor Construction						\$ 4,094,185.48
<u>A221 Upper Floor Construction</u>						\$ -
<u>A222 Stair Construction</u>						\$ -
<u>A223 Roof Construction</u>						\$ 4,094,185.48
.1 Structural steel roof construction - High Roof		6,415.9	m²	\$ 480.02		\$ 3,079,781.40
base plates and anchor bolts		87	No.	\$ 360.00	\$ 31,320.00	
structural steel columns (20Kg/m2)		128.3	TN	\$ 4,000.00	\$ 513,272.00	
structural steel beams (40Kg/m2)		256.6	TN	\$ 4,000.00	\$ 1,026,544.00	
open web steel joists - 2050 Deep (32Kg/m2)		92.6	TN	\$ 4,000.00	\$ 370,496.00	
open web steel joists - 800 Deep (20Kg/m2)		37.3	TN	\$ 4,000.00	\$ 149,040.00	
open web steel joists - 700 Deep (18Kg/m2)		12.2	TN	\$ 4,000.00	\$ 48,801.60	
open web steel joists - 650 Deep (14Kg/m2)		10.8	TN	\$ 4,000.00	\$ 43,125.60	
open web steel joists - 600 Deep (14Kg/m2)		2.9	TN	\$ 4,000.00	\$ 11,788.00	
bridging and bracing (18Kg/m2)		115.5	TN	\$ 4,000.00	\$ 461,944.80	
76mm metal deck - 1.21 thick (18ga)		6,415.9	m²	\$ 66.00	\$ 423,449.40	
.2 Structural steel roof construction - Low Roof		2,463.3	m²	\$ 335.49		\$ 826,404.08
base plates and anchor bolts		64	No.	\$ 360.00	\$ 23,040.00	
structural steel columns (12Kg/m2)		29.6	TN	\$ 4,000.00	\$ 118,238.40	
structural steel beams (30Kg/m2)		73.9	TN	\$ 4,000.00	\$ 295,596.00	
open web steel joists - 900 Deep (22Kg/m2)		20.8	TN	\$ 4,000.00	\$ 83,107.20	
open web steel joists - 800 Deep (20Kg/m2)		13.5	TN	\$ 4,000.00	\$ 53,824.00	
open web steel joists - 700 Deep (18Kg/m2)		11.1	TN	\$ 4,000.00	\$ 44,208.00	
open web steel joists - 450 Deep (12.2Kg/m2)		2.8	TN	\$ 4,000.00	\$ 11,326.48	
bridging and bracing (10Kg/m2)		24.6	TN	\$ 4,000.00	\$ 98,532.00	
38mm metal deck - .91 thick		2,463.3	m²	\$ 40.00	\$ 98,532.00	
.3 Allowance for roof openings framing		1	LS	\$ 6,000.00	\$ 6,000.00	
.4 Structural reinforcement for mechanical equipment		1	LS	\$ 25,000.00	\$ 25,000.00	
.5 Premium for seismic protection design		1	LS	\$ 55,000.00	\$ 55,000.00	
.6 Roof Safety Anchors c/w cable system		40	ea	\$ 2,550.00	\$ 102,000.00	
A3 EXTERIOR ENCLOSURE						
A31 Walls Below Grade						\$ -
A311 Structural Walls Below Grade						
A32 Walls Above Grade						\$ 761,419.13
A321 Walls Above Grade						\$ 761,419.13
.1 Masonry Wall Assembly		527.90	m²	\$ 263.76		\$ 139,238.90
90mm Architectural Block Veneer		527.90	m²	\$ 170.00	\$ 89,743.00	
25mm Air Space		527.90				
Membrane Air/Vapour Barrier		527.90	m²	\$ 2.50	\$ 1,319.75	
16mm Glass Matt Bypsum Sheathing		527.90	m²	\$ 23.50	\$ 12,405.65	
152 Wind Bearing Metal Stud Wall Framing		527.90	m²	\$ 29.70	\$ 15,678.63	
50mm Mineral Wool Insulation		527.90	m²	\$ 8.50	\$ 4,487.15	
16mm Gypsum Board		527.90	m²	\$ 21.50	\$ 11,349.85	
Paint Finish		527.90	m²	\$ 8.06	\$ 4,254.87	
.2 Metal Siding Assembly		2,657.30	m²	\$ 234.14		\$ 622,180.22

TAKE-OFF

SC1 - OPS Building

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
Steel Siding, galvanized on steel frame, 0.80mm thick		2,657.30	m ²	\$ 89.45	\$ 237,695.49	
127 Mineral Wool Insulation		2,657.30	m ²	\$ 14.54	\$ 38,637.14	
Membrane Air/Vapour Barrier		2,657.30	m ²	\$ 2.50	\$ 6,643.25	
16mm Glass Matt Gypsum Sheathing			m ²	\$ 23.50	\$ -	
152 Wind Bearing Metal Stud Wall Framing		2,657.30	m ²	\$ 29.70	\$ 78,921.81	
50mm Mineral Wool Insulation		2,657.30	m ²	\$ 8.50	\$ 22,587.05	
Steel Siding, galvanized on steel frame, 0.80mm thick		2,657.30	m ²	\$ 89.45	\$ 237,695.49	
A33 Windows and Entrance						\$ 148,490.00
<u>A331 Windows and Louvres</u>						<u>\$ 42,790.00</u>
.1 Glazing - Exterior Windows		82.60	m ²	\$ 400.00	\$ 33,040.00	
.2 Louvres for mechanical rooms - allowance		15.0	m ²	\$ 650.00	\$ 9,750.00	
<u>A333 Doors</u>						<u>\$ 105,700.00</u>
.1 Pressed steel frames and hollow metal doors Include Hardware and Painting						
Single		13	Ea	\$ 1,900.00	\$ 24,700.00	
Double		2	Pair	\$ 3,100.00	\$ 6,200.00	
.2 Overhead doors (6,000 x 2,500)		2	Ea	\$ 9,700.00	\$ 19,400.00	
.3 Overhead doors (3,700 x 5,100)		4	Ea	\$ 12,250.00	\$ 49,000.00	
.4 Barrier free door operators - assumed		2	Ea	\$ 3,200.00	\$ 6,400.00	
A34 Roof Covering						\$ 1,403,065.31
<u>A341 Roofing</u>						<u>\$ 1,403,065.31</u>
.1 SBS Modified Bituminous Roofing		9,089.80	m ²	\$ 150.00	\$ 1,363,470.00	
.2 Tapered insulation to attain roof slopes (5%)		454.49	m ²	\$ 19.00	\$ 8,635.31	
.3 Flashing		260.00	m ²	\$ 96.00	\$ 24,960.00	
.4 Roof Hatches		2	Ea	\$ 3,000.00	\$ 6,000.00	
A35 Projection						\$ 45,400.00
.1 Parapets		227.0	m ²	\$ 200.00	\$ 45,400.00	
.2 Canopy (Excluded in this estimate)		280.0	m ²		\$ -	
B. INTERIORS						
B1 PARTITIONS & DOORS						
B11 Partitions						\$ 1,007,075.24
<u>B111 Fixed Partitions</u>						<u>\$ 973,475.24</u>
.1 Drywall Metal Stud partitions slab to slab w/ Roxul AFB		2,376.60	m ²	\$ 86.00	\$ 204,387.60	
.2 Concrete Block Wall - 190 mm, jointed and pointed		3,965.48	m ²	\$ 193.00	\$ 765,337.64	
.3 Chain link fence		25.00	m	\$ 150.00	\$ 3,750.00	
<u>B112 Movable Partitions</u>						<u>\$ 33,600.00</u>

TAKE-OFF

SC1 - OPS Building

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.1 movable partitions c/w structural steel support		28.00	m2	\$ 1,200.00	\$ 33,600.00	
<u>B113 Structural Partitions</u>						\$ -
B12 Doors						\$ 90,700.00
.1 Pressed Steel Frames and Hollow Metal Doors c/w hardware include painting						
Single		54	Ea	\$ 750.00	\$ 40,500.00	
Double		8	Ea	\$ 1,300.00	\$ 10,400.00	
Single with sidelite		-	Ea	\$ 1,050.00	\$ -	
.2 Kitting Bay Sliding Doors - to be specified		13	Ea	\$ 1,500.00	\$ 19,500.00	
.3 Overhead door		1	ea	\$ 7,500.00	\$ 7,500.00	
.4 Barrier free automatic door openers - assume		4	ea	\$ 3,200.00	\$ 12,800.00	
B2 FINISHES						
B21 Floor Finishes						\$ 255,801.90
.1 Porcelain Tile Floor		176	m²	\$ 123.00	\$ 21,648.00	
.2 Carpet Tiles		722	m²	\$ 55.00	\$ 39,710.00	
.3 Vinyl Composite Tiles		127	m²	\$ 35.00	\$ 4,431.00	
.4 Anti Static Tiles		70	m²	\$ 129.00	\$ 8,978.40	
.5 Access Flooring, steel panels w/ carpet tile finish		371	m²	\$ 290.00	\$ 107,590.00	
.6 Epoxy Floor		612	m²	\$ 86.00	\$ 52,632.00	
.7 Base						
i 108mm Rubber Base		175	m	\$ 10.50	\$ 1,837.50	
ii Porcelain Tile Base		275	m	\$ 31.00	\$ 8,525.00	
iii Carpet Base		550	m	\$ 19.00	\$ 10,450.00	
B22 Ceiling Finishes						\$ 167,928.00
.1 Gypsum Board Ceiling include Painting in washrooms		176.00	m²	\$ 75.50	\$ 13,288.00	
.2 Acoustical Suspended Ceiling		2,246.00	m²	\$ 40.00	\$ 89,840.00	
.3 Exposed Ceiling - Painted		6,000.00	m²	\$ 10.80	\$ 64,800.00	
B23 Wall Finishes						\$ 175,344.00
.1 Paint Finish		12,000.00	m²	\$ 8.60	\$ 103,200.00	
.2 Porcelain Wall Tiles in washrooms and showers		668.00	m²	\$ 108.00	\$ 72,144.00	
B3 Fittings & Equipment						
B31 Fittings and Fixtures						\$ 129,002.00
<u>B311 Metals</u>						\$ 82,000.00
.1 Service ladders		2	Ea	\$ 3,500.00	\$ 7,000.00	

TAKE-OFF

SC1 - OPS Building

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.2 Miscellaneous metal - Allowance		1	LS	\$ 75,000.00	\$ 75,000.00	
<u>B312 Millwork</u>						\$ 14,440.00
.1 Typical kitchen upper and lower cabinet c/w countertop		4.60	m	\$ 1,400.00	\$ 6,440.00	
.2 Washroom vanity and counter		10.00	m	\$ 800.00	\$ 8,000.00	
<u>B313 Specialties</u>						\$ 28,432.00
.1 Toilet Compartment - Metal Ceiling Hung		6	ea	\$ 1,037.00	\$ 6,222.00	
.2 Hadicapped Toilet Compartment		4	ea	\$ 1,685.00	\$ 6,740.00	
.3 Urinal Screen		2	ea	\$ 485.00	\$ 970.00	
.4 Toilet and Bath Accessories						
i Hand dryer		5	ea	\$ 450.00	\$ 2,250.00	
ii Paper towel dispenser - assumed		5	ea	\$ 150.00	\$ 750.00	
iii Toilet paper dispenser		11	ea	\$ 50.00	\$ 550.00	
iv Soap dispenser		11	ea	\$ 75.00	\$ 825.00	
v Waste receptacle - wall mounted semi-recessed - assumed		5	ea	\$ 500.00	\$ 2,500.00	
vi Sanitary disposal		8	ea	\$ 200.00	\$ 1,600.00	
viii Tilted mirror		1	ea	\$ 250.00	\$ 250.00	
.5 Unframed Mirror in washrooms above vanities		11.55	m²	\$ 500.00	\$ 5,775.00	
<u>B314 Furnishings</u>						\$ 4,130.00
.1 Window treatment - Allowance		82.60	m²	\$ 50.00	\$ 4,130.00	
B32 Equipment						\$ 164,760.00
.1 Overhead Bridge Crane, under hung hoist, electric operating, 2 girder, 10-ton, 12m span		1	ea	\$ 142,760.00	\$ 142,760.00	
.2 Dock Levelers		2	ea	\$ 11,000.00	\$ 22,000.00	
B33 Conveying Systems						
C. SERVICES						
C1 Mechanical						
C11 Plumbing and Drainage						\$ 360,037.02
Refer to individual M & E take-off sheets for designated areas						
C12 Fire Protection						\$ 305,600.88
Refer to individual M & E take-off sheets for designated areas						
C13 Heating, Ventilation & Air Conditioning						\$ 1,232,080.50
Refer to individual M & E take-off sheets for designated areas						

TAKE-OFF

SC1 - OPS Building

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
C14 EMCS Controls						\$ 212,305.00
<u>C141 Controls and Automation</u>						\$ 212,305.00
Refer to individual M & E take-off sheets for designated areas						
C2 Electrical						
C21 Service & Distribution						\$ 1,153,369.35
Refer to individual M & E take-off sheets for designated areas						
C22 Lighting, Devices and Heating						\$ 402,922.09
Refer to individual M & E take-off sheets for designated areas						
C23 Systems & Ancillaries						\$ 127,537.20
Refer to individual M & E take-off sheets for designated areas						
D. SITE & ANCILLARY WORK						
D1 SITE WORK						
D11 Site Development						\$ 2,949,006.00
<u>D111 Preparation</u>						\$ 480,000.00
.1 Site preparation (Entire Site 20.3 acres)		1	LS	\$ 230,000.00	\$ 230,000.00	
.2 Engineered fill		1	LS	\$ 250,000.00	\$ 250,000.00	
<u>D112 Hard Surfaces</u>						\$ 1,258,895.00
.1 OPS Employee and Visitor Parking		100	car	\$ 1,600.00	\$ 160,000.00	
.2 Covered Parking (Canopy price included in A35)		15	car	\$ 1,600.00	\$ 24,000.00	
.3 Heavy Duty Asphalt		10,005	m2	\$ 59.00	\$ 590,295.00	
.4 Roadway		530	m	\$ 820.00	\$ 434,600.00	
.5 Walkway		1	LS	\$ 50,000.00	\$ 50,000.00	
<u>D113 Improvements</u>						\$ 985,111.00
.1 Flagpoles - Aluminum 11m (35') high include concrete base		1	ea	\$ 5,460.00	\$ 5,460.00	
.2 Chain Link Fence 2.4m high		1,230	m	\$ 190.00	\$ 233,605.00	
.3 Manual Gate		2	ea	\$ 12,000.00	\$ 24,000.00	
.4 Electric gate		2	ea	\$ 58,000.00	\$ 116,000.00	
.5 HOL Sign - carried in cash allowance		1	m		\$ -	
.6 Gravel Yard		17,093	m2	\$ 22.00	\$ 376,046.00	
.7 Loading dock retaining walls		1	allow	\$ 30,000.00	\$ 30,000.00	

TAKE-OFF

SC1 - OPS Building

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.8 Nortn bound right turn taper at Moodie		1	allow	\$ 200,000.00	\$ 200,000.00	
<u>D114 Landscaping</u>						\$ 225,000.00
.1 Landscaping allowance		1	LS	\$ 125,000.00	\$ 125,000.00	
.2 Tree conservation		1	LS	\$ 100,000.00	\$ 100,000.00	
D12 Mechanical Site Services						\$ 1,561,000.00
.1 Septic tank and bed		1	ea	\$ 165,000.00	\$ 165,000.00	
.2 Pumphouse - pre-eng building enclosure, equipment and water tanks		1	allow	\$ 350,000.00	\$ 350,000.00	
.3 Fire fighting tanks and fire pump		1	allow	\$ 90,000.00	\$ 90,000.00	
.4 Well and Utilites		1	LS	\$ 500,000.00	\$ 500,000.00	
.5 Storm water management		1	LS	\$ 456,000.00	\$ 456,000.00	
D13 Electrical Site Services						\$ 435,000.00
.1 Lighting		1	LS	\$ 125,000.00	\$ 125,000.00	
.2 On site hydro service		1	allow	\$ 100,000.00	\$ 100,000.00	
.3 4 x 100mm PVC ducts concrete encased duct bank for primary M.V. cables and padmount transformer base with grounding		1	allow	\$ 100,000.00	\$ 100,000.00	
.4 Premium for solar panel ductbank		1	allow	\$ 50,000.00	\$ 50,000.00	
.5 Power supply for well pumps, pumphouse and fire pump		1	allow	\$ 60,000.00	\$ 60,000.00	
Z. GENERAL REQUIREMENTS & ALLOWANCES						
Z1 GENERAL REQUIREMENTS & FEE						
Z11 General Requirements						\$ 3,243,466.03
Z111 Design Fees (6%)			LS		\$ 1,216,299.76	
Z112 General Conditions (10.0%)			LS		\$ 2,027,166.27	
Z12 Fee						\$ 1,175,756.43
.1 G.C. Overhead and Profit (5.0%)					\$ 1,175,756.43	
Z2 ALLOWANCES						
Z21 Design Allowance (3.5%)					\$ 864,180.98	\$ 864,180.98
Z22 Escalation Allowance (1.5%)					\$ 370,363.28	\$ 370,363.28
TOTAL						\$ 25,925,429.37
SEPEARATE PRICE (SC1)						
.1 Covered Parking Canopy		280.0	m²	\$ 800.00	\$ 224,000.00	

M / E Take-off

SC1 - OFFICE METERING

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
C. SERVICES						
C1 Mechanical						
C11 Plumbing and Drainage						\$ 103,406.52
<u>C111 Plumbing Fixtures</u>						\$ 53,922.40
.1 Water closets. Vitreous china, wall mounted fixtures with electronic flush valve. Water conservation type.		11.0	ea	\$ 2,336.90	\$ 25,705.90	
.2 Urinals		4.0	ea	\$ 1,875.00	\$ 7,500.00	
.3 Lavatories. Vitreous china, above counter mounted type with electronic 4in center set faucets. Barrier free to be of same type per accessibility requirements.		11.0	ea	\$ 1,357.90	\$ 14,936.90	
.4 Service sinks. Assume standard, stainless steel, counter-top single and double (where appropriate), in shared kitchenette areas.		1.0	ea	\$ 1,429.60	\$ 1,429.60	
.5 Custodial sinks. Stainless Steel, deep, floor mounted with braced hose faucet and trim.		1.0	ea	\$ 1,850.00	\$ 1,850.00	
.6 Drinking fountains. Assume barrier free recessed wall mounted, refrigerated, stainless steel, single bubbler.		1.0	allow	\$ 2,500.00	\$ 2,500.00	
<u>C112 Domestic Water</u>						\$ 18,560.00
.1 Domestic water service shall enter the building to serve domestic water and fire protection. Incoming service from well. Domestic hot water generated by gas fired cond boilers (included in HVAC). Thermal insulation included.		1.0	allow	\$ 13,560.00	\$ 13,560.00	
.2 Domestic water booster pumps and tanks.		1.0	allow	\$ 5,000.00	\$ 5,000.00	
<u>C113 Sanitary Waste & Vent</u>						\$ 9,000.00
.1 Sanitary system assume U/G to be PVC, while above grade piping shall be cast iron/copper DWV. Drains below the service entry shall be collected in sump pits c/w duplex submersible pumps (Assume 3 for this building). Thermal insulation included.		1.00	allow	\$ 9,000.00	\$ 9,000.00	
<u>C114 Storm</u>						\$ 9,500.00
.1 Storm system shall include control flow type roof drains. U/G storm collection in PVC. Cast iron above grade. Weeping tile collected into sumps, then transferred to sump pits c/w duplex submersible pumps. Thermal insulation included. PVC Jacketed in exposed areas.		1.0	allow	\$ 9,500.00	\$ 9,500.00	
<u>C115 Natural Gas</u>						\$ 7,500.00
.1 Incoming gas service c/w gas meter. Distribution of natural gas to centralized mechanical PH to feed gas fired HVAC equipment. Piping to be schd 40 black malleable. Piping 50mm and smaller to be screwed, 65mm and over to be welded.		1.0	allow	\$ 7,500.00	\$ 7,500.00	

M / E Take-off

SC1 - OFFICE METERING

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
<u>C116 Fuel Oil</u>						\$ -
.1						
<u>C117 Misc Works and General Accounts</u>						\$ 4,924.12
.1 Clean-up, HASSSP, rentals, small tools, fire stopping, permits, inspections, bonding and insurance, site trailer.		1.0	allow	\$ 4,924.12	\$ 4,924.12	
C12 Fire Protection						\$ 72,710.40
<u>C121 Sprinklers</u>						\$ 72,710.40
.1 Wet pipe sprinkler system including pumping equipment.		1,680.00	m2	\$ 43.28	\$ 72,710.40	
.2 Extinguishers, and all misc works included in the rates above.						
C13 Heating, Ventilation & Air Conditioning						\$ 302,100.75
<u>C131 Liquid Heat Transfer (Heating)</u>						\$ 32,980.00
.1 Gas fired, high efficiency hot water heaters		2	allow	\$ 9,620.00	\$ 19,240.00	
.2 Venting and accessories.		1	allow	\$ 11,240.00	\$ 11,240.00	
.3 Heating water pumping (primary/secondary), assume verticle in-line.		1	allow	\$ 2,500.00	\$ 2,500.00	
<u>C132 Liquid Heat Transfer (Cooling)</u>						\$ 77,240.00
.1 Chiller(s), valving, VFD's and headers.		1	allow	\$ 24,590.00	\$ 24,590.00	
.2 Geothermal piping and distribution system.		1	allow	\$ 14,500.00	\$ 14,500.00	
.3 Chilled/Condenser distribution piping inc insulation		1	allow	\$ 23,150.00	\$ 23,150.00	
.4 5-ton DX fan coil colling unit in UPS		1	allow	\$ 15,000.00	\$ 15,000.00	
<u>C133 Air Distribution</u>						\$ 165,000.00
.1 Typical Floor - RTU c/w economizer, two stage filtration, gas fired burner, two stage high eff elec cooling, supply/return fans on VFD.		1	allow	\$ 38,900.00	\$ 38,900.00	
.2 Lobby System - RTU c/w economizer, two stage filtration, gas fired burner, two stage high eff elec cooling, supply/return fans on VFD.		1	allow	\$ 14,900.00	\$ 14,900.00	
.3 Perimeter wall/window ceiling mounted fan powered boxes c/w hot water heating coils.		1	allow	\$ 11,200.00	\$ 11,200.00	
.4 Precision rooftop style unit in Control Room		1	allow	\$ 100,000.00	\$ 100,000.00	
<u>C134 Exhaust Systems</u>						\$ 12,495.00
.1 Misc systems - ventilation & washroom exhaust.		1	allow	\$ 7,995.00	\$ 7,995.00	
.2 Generator exhaust muffler and venting (labour only).		1	allow	\$ 4,500.00	\$ 4,500.00	

M / E Take-off

SC1 - OFFICE METERING

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
<u>C136 Misc Works and General Accounts</u>						\$ 14,385.75
.1 Clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, fire stopping.		1	allow	\$ 14,385.75	\$ 14,385.75	
C14 EMCS Controls						\$ 94,240.00
<u>C141 Controls and Automation</u>						\$ 94,240.00
.1 Assume EMCS Interfacing with building AHU's, DHWT's, pumps, heating and cooling systems, energy management.		2,356.00	m2	\$ 40.00	\$ 94,240.00	
C2 Electrical						
C21 Service & Distribution						\$ 203,201.25
<u>C211 Equipment</u>						\$ 20,350.00
.1 Switchboard - Assume 600A, 600/347V, 3ph, 4W. Main breaker digital metering, ammeter, voltmeter, selector switch.		1	ea	\$ 20,350.00	\$ 20,350.00	
.2 Incoming service by HOL.					\$ -	
<u>C212 Emergency Power</u>						\$ 81,350.00
.1 Emergency generator - including battery, charger, muffler and distribution.		1	allow	\$ 46,350.00	\$ 46,350.00	
.2 600A Automatic Transfer Switch.		1	allow	\$ 35,000.00	\$ 35,000.00	
<u>C213 Distribution</u>						\$ 27,000.00
.1 Lighting panels, power panels, transformers, digital metering.		1	allow	\$ 27,000.00	\$ 27,000.00	
<u>C214 Feeders</u>						\$ 21,450.00
.1 Main feeders.		1	allow	\$ 21,450.00	\$ 21,450.00	
<u>C215 Motor Controls & Wiring</u>						\$ 28,100.00
.1 Main MCC's for mechanical equipment including starters. Any VFD's required are in mechanical pricing. All power wiring to mechanical equipment included.		1	allow	\$ 28,100.00	\$ 28,100.00	
<u>C216 Grounding & Lightning Protection</u>						\$ 15,275.00
.1 Electrical grounding & lightning protection.		1	allow	\$ 15,275.00	\$ 15,275.00	
<u>C216 Misc Works and General Accounts</u>						\$ 9,676.25
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer, fire stopping		1	allow	\$ 9,676.25	\$ 9,676.25	
C22 Lighting, Devices and Heating						\$ 79,587.27
<u>C221 Lighting</u>						\$ 57,047.40
.1 Assume energy efficient, recessed, mounted on grid		1,680.00	m2	\$ 27.43	\$ 46,082.40	

M / E Take-off

SC1 - OFFICE METERING

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
ceiling suspension system, electronic ballasts, acrylic prismatic diffusers.						
.2 Allowance - specialty lighting (pots, LED's in common areas).		1	allow	\$ 6,090.00	\$ 6,090.00	
.3 Exit and emergency lighting.		1	allow	\$ 4,875.00	\$ 4,875.00	
<u>C222 Branch Devices & Wiring</u>						\$ 16,250.00
.1 All conduit systems concealed all finished areas.		1	allow	\$ 16,250.00	\$ 16,250.00	
<u>C223 Heating</u>						\$ 2,500.00
.1 Supplementary units inside vestibules & mech rms.		1	allow	\$ 2,500.00	\$ 2,500.00	
<u>C224 Misc Works and General Accounts</u>						\$ 3,789.87
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer, fire stopping		1	allow	\$ 3,789.87	\$ 3,789.87	
C23 Systems & Ancillaries						\$ 35,280.00
<u>C231 Fire Alarm</u>						\$ 33,600.00
.1 Addressable single stage FA system no voice comms		1,680.00	m2	\$ 20.00	\$ 33,600.00	
<u>C232 Security System</u>						\$ -
.1 Cash allowance.			m2	\$ 9.50	\$ -	
<u>C233 Communications</u>						\$ -
.1 Cash allowance.			m2	\$ 25.00	\$ -	
<u>C234 Public Address & AV</u>						\$ -
.1 Cash allowance.			m2	\$ 20.00	\$ -	
<u>C235 Miscellaneous</u>						\$ -
.1 No requirement.		0	allow	\$ -	\$ -	
<u>C236 General Requirements</u>						\$ 1,680.00
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer,		1	allow	\$ 1,680.00	\$ 1,680.00	

M / E Take-Off

SC1 - WAREHOUSE TRANSFORMER METERING STORAGE

R-1

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
C. SERVICES						
C1 Mechanical						
C11 Plumbing and Drainage						\$ 26,880.00
<u>C111 Plumbing Fixtures</u>						\$ -
.1 No requirement.		ea		\$ -		
<u>C112 Domestic Water</u>						\$ 5,600.00
.1 Domestic water service - assume some distribution.		1.0	allow	\$ 5,600.00	\$ 5,600.00	
<u>C113 Sanitary Waste & Vent</u>						\$ 7,500.00
.1 Sanitary system assume U/G to be PVC, while above grade piping shall be cast iron/copper DWV. Drains below the service entry shall be collected in sump pits c/w duplex submersible pumps (Assume 3 for this building). Thermal insulation included.		1.00	allow	\$ 7,500.00	\$ 7,500.00	
<u>C114 Storm</u>						\$ 7,500.00
.1 Storm system shall include control flow type roof drains. U/G storm collection in PVC. Cast iron above grade. Weeping tile collected into sumps, then transferred to sump pits c/w duplex submersible pumps. Thermal insulation included. PVC Jacketed in exposed areas.		1.0	allow	\$ 7,500.00	\$ 7,500.00	
<u>C115 Natural Gas</u>						\$ 5,000.00
.1 Incoming gas service c/w gas meter. Distribution of natural gas to centralized mechanical PH to feed gas fired HVAC equipment. Piping to be schd 40 black malleable. Piping 50mm and smaller to be screwed, 65mm and over to be welded.		1.0	allow	\$ 5,000.00	\$ 5,000.00	
<u>C116 Fuel Oil</u>						\$ -
.1						
<u>C117 Misc Works and General Accounts</u>						\$ 1,280.00
.1 Clean-up, HASSSP, rentals, small tools, fire stopping, permits, inspections, bonding and insurance, site trailer.		1.0	allow	\$ 1,280.00	\$ 1,280.00	
C12 Fire Protection						\$ 127,676.00
<u>C121 Sprinklers</u>						\$ 127,676.00
.1 Combined wet pipe sprinkler/standpipe system including pumping equipment.		2,950.00	m2	\$ 43.28	\$ 127,676.00	
.2 Extinguishers, and all misc works included in the rates above.						
C13 Heating, Ventilation & Air Conditioning						\$ 214,924.50
<u>C131 Liquid Heat Transfer (Heating)</u>						\$ 49,400.00

M / E Take-Off

SC1 - WAREHOUSE TRANSFORMER METERING STORAGE

R-1

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.1 Gas fired, high efficiency hot water heaters		2	allow	\$ 14,800.00	\$ 29,600.00	
.2 Venting and accessories.		1	allow	\$ 17,300.00	\$ 17,300.00	
.3 Heating water pumping (primary/secondary), assume verticle in-line.		1	allow	\$ 2,500.00	\$ 2,500.00	
<u>C132 Liquid Heat Transfer (Cooling)</u>						\$ 62,240.00
.1 Chiller(s), valving, VFD's and headers.		1	allow	\$ 24,590.00	\$ 24,590.00	
.2 Geothermal piping and distribution system.		1	allow	\$ 14,500.00	\$ 14,500.00	
.3 Chilled/Condenser distribution piping inc insulation		1	allow	\$ 23,150.00	\$ 23,150.00	
<u>C133 Air Distribution</u>						\$ 76,250.00
.1 Typical Floor - RTU c/w economizer, two stage filtration, gas fired burner, two stage high eff elec cooling, supply/return fans on VFD.		1	allow	\$ 59,000.00	\$ 59,000.00	
.2 Perimeter wall/window ceiling mounted fan powered boxes c/w hot water heating coils.		1	allow	\$ 17,250.00	\$ 17,250.00	
<u>C134 Exhaust Systems</u>						\$ 16,800.00
.1 Misc systems - ventilation & washroom exhaust.		1	allow	\$ 12,300.00	\$ 12,300.00	
.2 Generator exhaust muffler and venting (labour only).		1	allow	\$ 4,500.00	\$ 4,500.00	
<u>C136 Misc Works and General Accounts</u>						\$ 10,234.50
.1 Clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, fire stopping.		1	allow	\$ 10,234.50	\$ 10,234.50	
C14 EMCS Controls						\$ 35,400.00
<u>C141 Controls and Automation</u>						\$ 35,400.00
.1 Assume EMCS Interfacing with building AHU's, DHWT's, pumps, heating and cooling systems, energy management.		2,950.00	m2	\$ 12.00	\$ 35,400.00	
C2 Electrical						
C21 Service & Distribution						\$ 595,350.00
<u>C211 Equipment</u>						\$ 160,000.00
.1 Switchboard - Assume 1000A, 600/347V, 3ph, 4W. Main breaker digital metering, ammeter, voltmeter, selector switch.		1	ea	\$ 90,000.00	\$ 90,000.00	
.2 Secondary 600V Service		1	allow	\$ 70,000.00	\$ 70,000.00	
<u>C212 Emergency Power</u>						\$ 250,000.00
.1 Emergency generator - including battery, charger, muffler and distribution.		1	allow	\$ 180,000.00	\$ 180,000.00	
.2 600A Automatic Transfer Switch.		2	allow	\$ 35,000.00	\$ 70,000.00	

M / E Take-Off

SC1 - WAREHOUSE TRANSFORMER METERING STORAGE

R-1

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
<u>C213 Distribution</u>						\$ 43,500.00
.1 Lighting panels, power panels, transformers, digital metering.		1	allow	\$ 43,500.00	\$ 43,500.00	
<u>C214 Feeders</u>						\$ 37,000.00
.1 Main feeders.		1	allow	\$ 37,000.00	\$ 37,000.00	
<u>C215 Motor Controls & Wiring</u>						\$ 53,000.00
.1 Main MCC's for mechanical equipment including starters. Any VFD's required are in mechanical pricing. All power wiring to mechanical equipment included.		1	allow	\$ 53,000.00	\$ 53,000.00	
<u>C216 Grounding & Lightning Protection</u>						\$ 23,500.00
.1 Electrical grounding & lightning protection.		1	allow	\$ 23,500.00	\$ 23,500.00	
<u>C216 Misc Works and General Accounts</u>						\$ 28,350.00
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer, fire stopping		1	allow	\$ 28,350.00	\$ 28,350.00	
C22 Lighting, Devices and Heating						\$ 136,277.93
<u>C221 Lighting</u>						\$ 97,788.50
.1 Assume energy efficient, recessed, mounted on grid ceiling suspension system, electronic ballasts, acrylic prismatic diffusers.		2,950.00	m2	\$ 27.43	\$ 80,918.50	
.2 Allowance - specialty lighting (pots, LED's in common areas).		1	allow	\$ 9,370.00	\$ 9,370.00	
.3 Exit and emergency lighting.		1	allow	\$ 7,500.00	\$ 7,500.00	
<u>C222 Branch Devices & Wiring</u>						\$ 32,000.00
.1 All conduit systems concealed all finished areas.		1	allow	\$ 32,000.00	\$ 32,000.00	
<u>C223 Heating</u>						\$ -
.1 No requirement.			allow		\$ -	
<u>C224 Misc Works and General Accounts</u>						\$ 6,489.43
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer, fire stopping		1	allow	\$ 6,489.43	\$ 6,489.43	
C23 Systems & Ancillaries						\$ 55,755.00
<u>C231 Fire Alarm</u>						\$ 53,100.00
.1 Addressable single stage FA system no voice comms		2,950.00	m2	\$ 18.00	\$ 53,100.00	
<u>C232 Security System</u>						\$ -

M / E Take-Off

SC1 - WAREHOUSE TRANSFORMER METERING STORAGE

R-1

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.1 Cash allowance.			m2	\$ 9.50	\$ -	
<u>C233 Communications</u>						\$ -
.1 Cash allowance.			m2	\$ 20.00	\$ -	
<u>C234 Public Address & AV</u>						\$ -
.1 Cash allowance.			m2	\$ 16.00	\$ -	
<u>C235 Miscellaneous</u>						\$ -
.1 No requirement.		0	allow	\$ -	\$ -	
<u>C236 General Requirements</u>						\$ 2,655.00
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer,		1	allow	\$ 2,655.00	\$ 2,655.00	

M / E Take-off

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
C. SERVICES						
C1 Mechanical						
C11 Plumbing and Drainage						\$ 5,250.00
<u>C111 Plumbing Fixtures</u>						\$ -
.1 No requirement.			ea	\$	-	
<u>C112 Domestic Water</u>						\$ -
.1 No requirement.			allow	\$	-	
<u>C113 Sanitary Waste & Vent</u>						\$ -
.1 No requirement.			allow	\$	-	
<u>C114 Storm</u>						\$ -
.1 No requirement.			allow	\$	-	
<u>C115 Natural Gas</u>						\$ 5,000.00
.1 Incoming gas service c/w gas meter. Distribution of natural gas to roof to feed gas fired HVAC equipment. Piping to be schd 40 black malleable. Piping 50mm and smaller to be screwed, 65mm and over to be welded.		1.0	allow	\$ 5,000.00	\$ 5,000.00	
<u>C116 Fuel Oil</u>						\$ -
.1 Included in Office estimate.			allow	\$	-	
<u>C117 Misc Works and General Accounts</u>						\$ 250.00
.1 Clean-up, HASSSP, rentals, small tools, fire stopping, permits, inspections, bonding and insurance, site trailer.		1.0	allow	\$ 250.00	\$ 250.00	
C12 Fire Protection						\$ 9,214.48
<u>C121 Sprinklers</u>						\$ 9,214.48
.1 Dry pipe system.		283.00	m2	\$ 32.56	\$ 9,214.48	
C13 Heating, Ventilation & Air Conditioning						\$ 695,562.00
<u>C131 Liquid Heat Transfer (Heating)</u>						\$ 59,400.00
.1 Gas fired, high efficiency condensing boilers		1	allow	\$ 24,000.00	\$ 24,000.00	
.2 Venting and accessories.		1	allow	\$ 17,800.00	\$ 17,800.00	
.3 Heating water pumping (primary/secondary), assume verticle in-line.		1	allow	\$ 8,000.00	\$ 8,000.00	
.4 Perimeter wall and window fin tube radiation.		1	allow	\$ 9,600.00	\$ 9,600.00	
<u>C132 Liquid Heat Transfer (Cooling)</u>						\$ 103,040.00

M / E Take-off

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.1 Chiller(s), valving, VFD's and headers.		1	allow	\$ 43,200.00	\$ 43,200.00	
.2 Geothermal piping and distribution system.		1	allow	\$ 32,640.00	\$ 32,640.00	
.3 Chilled/Condenser distribution piping inc insulation		1	allow	\$ 27,200.00	\$ 27,200.00	
<u>C133 Air Distribution</u>						\$ 492,000.00
.1 2 pumped refrigerant CRAC units, condensers on roof split for Lab/setup area		1	allow	\$ 340,000.00	\$ 340,000.00	
.2 Operations Center - raised floor air distribution system.		1	allow	\$ 152,000.00	\$ 152,000.00	
<u>C134 Exhaust Systems</u>						\$ 8,000.00
.1 Misc systems - ventilation and washroom exhaust		1	allow	\$ 8,000.00	\$ 8,000.00	
<u>C136 Misc Works and General Accounts</u>						\$ 33,122.00
.1 Clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, fire stopping.		1	allow	\$ 33,122.00	\$ 33,122.00	
C14 EMCS Controls						\$ 21,225.00
<u>C141 Controls and Automation</u>						\$ 21,225.00
.1 Assume EMCS Interfacing with building AHU's, heating and cooling systems, energy management.		283.00	m2	\$ 75.00	\$ 21,225.00	
C2 Electrical						
C21 Service & Distribution						\$ 295,545.60
<u>C211 Equipment</u>						\$ 60,480.00
.1 Switchboard - Assume 600A, 600/347V, 3ph, 4W. Main breaker digital metering, ammeter, voltmeter, selector switch.		1	ea	\$ 60,480.00	\$ 60,480.00	
.2 Incoming service by HOL.					\$ -	
<u>C212 Emergency Power</u>						\$ 40,000.00
.1 Fed from Office.		1	allow	\$ 40,000.00	\$ 40,000.00	
<u>C213 Distribution</u>						\$ 84,800.00
.1 Lighting panels, power panels, transformers, digital metering.		1	allow	\$ 84,800.00	\$ 84,800.00	
<u>C214 Feeders</u>						\$ 56,000.00
.1 Main feeders.		1	allow	\$ 56,000.00	\$ 56,000.00	
<u>C215 Motor Controls & Wiring</u>						\$ 28,672.00
.1 Main MCC's for mechanical equipment including starters. Any VFD's required are in mechanical pricing. All power wiring to mechanical equipment included.		1	allow	\$ 28,672.00	\$ 28,672.00	
<u>C216 Grounding & Lightning Protection</u>						\$ 11,520.00

M / E Take-off

R-2

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.1 Electrical grounding & lightning protection.		1	allow	\$ 11,520.00	\$ 11,520.00	
<u>C216 Misc Works and General Accounts</u>						\$ 14,073.60
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer, fire stopping		1	allow	\$ 14,073.60	\$ 14,073.60	
C22 Lighting, Devices and Heating						\$ 99,727.66
<u>C221 Lighting</u>						\$ 29,378.72
.1 Assume energy efficient, recessed, mounted on grid ceiling suspension system, electronic ballasts, acrylic prismatic diffusers.		283.00	m2	\$ 37.84	\$ 10,708.72	
.2 Allowance - specialty lighting (pots, LED's in common areas).		1	allow	\$ 17,920.00	\$ 17,920.00	
.3 Exit and emergency lighting.		1	allow	\$ 750.00	\$ 750.00	
<u>C222 Branch Devices & Wiring</u>						\$ 65,600.00
.1 All conduit systems concealed all finished areas.		1	allow	\$ 65,600.00	\$ 65,600.00	
<u>C223 Heating</u>						\$ -
.1 No requirement.			allow		\$ -	
<u>C224 Misc Works and General Accounts</u>						\$ 4,748.94
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer, fire stopping		1	allow	\$ 4,748.94	\$ 4,748.94	
C23 Systems & Ancillaries						\$ 5,943.00
<u>C231 Fire Alarm</u>						\$ 5,660.00
.1 Addressable single stage FA system no voice comms		283.00	m2	\$ 20.00	\$ 5,660.00	
<u>C232 Security System</u>						\$ -
.1 Cash allowance.			m2	\$ 9.50	\$ -	
<u>C233 Communications</u>						\$ -
.1 Cash allowance.			m2	\$ 30.00	\$ -	
<u>C234 Public Address & AV</u>						\$ -
.1 Cash allowance.			m2	\$ 23.00	\$ -	
<u>C235 Miscellaneous</u>						\$ -
.1 No requirement.		0	allow	\$ -	\$ -	
<u>C236 General Requirements</u>						\$ 283.00
permits, inspections, bonding and insurance, site trailer,						
.1 Supervision, cleanC up, HASSSP, rentals, small tools,		1	allow	\$ 283.00	\$ 283.00	

M / E Take-off

SC1 - GARAGE

R-1

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
C. SERVICES						
C1 Mechanical						
C11 Plumbing and Drainage						\$ 224,500.50
<u>C111 Plumbing Fixtures</u>						\$ -
.1 No requirement.		ea		\$ -		
<u>C112 Domestic Water</u>						\$ 86,650.00
.1 Domestic water service shall enter the building to serve domestic water and fire protection. Incoming service c/w backflow prevention and metering. Domestic hot water generated by gas fired cond boilers (included in HVAC). Thermal insulation included.		1.0	allow	\$ 3,400.00	\$ 3,400.00	
.2 Drain, trench, polyester polymer for cement concrete encasement, 300mm internal width, with grate		166.50	m	\$ 500.00	\$ 83,250.00	
<u>C113 Sanitary Waste & Vent</u>						\$ 25,500.00
.1 Sanitary system assume U/G to be PVC, while above grade piping shall be cast iron/copper DWV. Drains below the service entry shall be collected in sump pits c/w duplex submersible pumps (Assume 2 for this building). Thermal insulation included.		1.00	allow	\$ 25,500.00	\$ 25,500.00	
<u>C114 Storm</u>						\$ 99,160.00
.1 Storm system shall include control flow type roof drains. U/G storm collection in PVC. Cast iron above grade. Weeping tile collected into sumps, then transferred to sump pits c/w duplex submersible pumps. Thermal insulation included. PVC Jacketed in exposed areas.		1.0	allow	\$ 15,910.00	\$ 15,910.00	
.2 Drain, trench, polyester polymer for cement concrete encasement, 300mm internal width. With grate		166.5	m	\$ 500.00	\$ 83,250.00	
<u>C115 Natural Gas</u>						\$ 2,500.00
.1 Incoming gas service c/w gas meter. Distribution of natural gas to centralized mechanical PH to feed gas fired HVAC equipment. Piping to be schd 40 black malleable. Piping 50mm and smaller to be screwed, 65mm and over to be welded.		1.0	allow	\$ 2,500.00	\$ 2,500.00	
<u>C116 Fuel Oil</u>						\$ -
.1 No requirement.		allow		\$ -		
<u>C117 Misc Works and General Accounts</u>						\$ 10,690.50
.1 Clean-up, HASSSP, rentals, small tools, fire stopping, permits, inspections, bonding and insurance, site trailer.		1.0	allow	\$ 10,690.50	\$ 10,690.50	
C12 Fire Protection						\$ 96,000.00
<u>C121 Sprinklers</u>						\$ 96,000.00
.1 Combined wet pipe sprinkler/standpipe system		3,840.00	m2	\$ 25.00	\$ 96,000.00	

M / E Take-off

SC1 - GARAGE

R-1

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
including pumping equipment.						
C13 Heating, Ventilation & Air Conditioning						\$ 19,493.25
<u>C131 Liquid Heat Transfer (Heating)</u>						\$ -
.1 No requirement.			allow	\$	-	
<u>C132 Liquid Heat Transfer (Cooling)</u>						\$ -
.1 No requirement.			allow	\$	-	
<u>C133 Air Distribution</u>						\$ 10,200.00
.1 Garage Floor - RTU c/w economizer, two stage filtration, gas fired burner, two stage high eff elec cooling, supply/return fans on VFD.		1	allow	\$ 10,200.00	\$ 10,200.00	
<u>C134 Exhaust Systems</u>						\$ 8,365.00
.1 Misc systems - vehicle exhaust.		1	allow	\$ 8,365.00	\$ 8,365.00	
<u>C136 Misc Works and General Accounts</u>						\$ 928.25
.1 Clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, fire stopping.		1	allow	\$ 928.25	\$ 928.25	
C14 EMCS Controls						\$ 61,440.00
<u>C141 Controls and Automation</u>						\$ 61,440.00
.1 Assume EMCS Interfacing with building AHU's, heating and cooling systems, energy management.		3,840.00	m2	\$ 16.00	\$ 61,440.00	
C2 Electrical						
C21 Service & Distribution						\$ 59,272.50
<u>C211 Equipment</u>						\$ -
.1 Assume power fed from Office bldg.		1	ea	\$ -	\$ -	
.2 Incoming service by HOL.				\$	-	
<u>C212 Emergency Power</u>						\$ 35,000.00
.1 Allow emergency power panels and transformers for emergency lighting and essential power outlets		1	allow	\$ 35,000.00	\$ 35,000.00	
<u>C213 Distribution</u>						\$ 9,180.00
.1 Lighting panels, power panels, transformers, digital metering.		1	allow	\$ 9,180.00	\$ 9,180.00	
<u>C214 Feeders</u>						\$ 8,460.00
.1 Main feeders.		1	allow	\$ 8,460.00	\$ 8,460.00	
<u>C215 Motor Controls & Wiring</u>						\$ -
.1 Assume no MCC required.		1	allow	\$ -	\$ -	

M / E Take-off

SC1 - GARAGE

R-1

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
<u>C216 Grounding & Lightning Protection</u>						\$ 3,810.00
.1 Electrical grounding & lightning protection.		1	allow	\$ 3,810.00	\$ 3,810.00	
<u>C216 Misc Works and General Accounts</u>						\$ 2,822.50
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer, fire stopping		1	allow	\$ 2,822.50	\$ 2,822.50	
C22 Lighting, Devices and Heating						\$ 87,329.24
<u>C221 Lighting</u>						\$ 69,710.70
.1 High Bay lighting.		3,638.00	m2	\$ 17.65	\$ 64,210.70	
.2 Allowance - specialty lighting (pots, LED's in common areas).		1	allow	\$ 3,000.00	\$ 3,000.00	
.3 Exit and emergency lighting.		1	allow	\$ 2,500.00	\$ 2,500.00	
<u>C222 Branch Devices & Wiring</u>						\$ 13,460.00
.1 All conduit systems concealed all finished areas.		1	allow	\$ 13,460.00	\$ 13,460.00	
<u>C223 Heating</u>						\$ -
.1 No requirement.			allow		\$ -	
<u>C224 Misc Works and General Accounts</u>						\$ 4,158.54
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer, fire stopping		1	allow	\$ 4,158.54	\$ 4,158.54	
C23 Systems & Ancillaries						\$ 30,559.20
<u>C231 Fire Alarm</u>						\$ 29,104.00
.1 Addressable 1-stage FA system, no voice communications		3,638.00	m2	\$ 8.00	\$ 29,104.00	
<u>C232 Security System</u>						\$ -
.1 Cash allowance.			m2	\$ 9.50	\$ -	
<u>C233 Communications</u>						\$ -
.1 Cash allowance.			m2	\$ 20.00	\$ -	
<u>C234 Public Address & AV</u>						\$ -
.1 Cash allowance.			m2	\$ 10.00	\$ -	
<u>C235 Miscellaneous</u>						\$ -
.1 No requirement.		0	allow	\$ -	\$ -	
<u>C236 General Requirements</u>						\$ 1,455.20
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer,		1	allow	\$ 1,455.20	\$ 1,455.20	

TAKE-OFF

SC2 - Fleet Services Building + Aerial Testing Pad

R-1

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
A. SHELL						
A1 SUBSTRUCTURE						
A11 Foundations						\$ 322,889.80
<u>A111 Standard Foundations</u>						\$ 322,889.80
.1 Poured concrete conventional strip and spread footings based on a building footprint of 1500m ² include excavation to footings and backfill		1,500.0	m ²	\$ 205.00	\$ 307,500.00	
.7 Perimeter drainage		159	m	\$ 30.00	\$ 4,757.40	
.8 Perimeter Rigid Insulation 50 mm		261.66	m ²	\$ 28.00	\$ 7,326.40	
.9 Allowance for reinforcing dowels		1.20	TN	\$ 2,755.00	\$ 3,306.00	
<u>A112 Special Foundations</u>						\$ -
Assume none required.						
A12 Excavation						\$ 15,000.00
.10 Allowance for additional excavation and backfill		1	Allow	\$ 15,000.00	\$ 15,000.00	
A2 STRUCTURE						
A21 Lowest Floor Construction						\$ 248,098.59
.1 Slab on Grade - 150 thick		105.1	m ³	\$ 1,000.89		\$ 105,183.43
Fine grade 3 passes with grader and roller		700.6	m ²	\$ 3.00	\$ 2,101.80	
300 mm Granular A sub base		210.2	m ³	\$ 60.00	\$ 12,610.80	
Extruded polystyrene XPS Insulation - 50 mm perimeter only		194.0	m ²	\$ 28.00	\$ 5,432.00	
Vapour Barrier		700.6	m ²	\$ 3.05	\$ 2,136.83	
152 x 152 Mesh Re-inforcement		700.6	m ²	\$ 10.00	\$ 7,006.00	
Concrete (35 MPa) - direct chute		105.1	m ³	\$ 282.00	\$ 29,635.38	
Saw cut and control joints		700.6	m ²	\$ 4.00	\$ 2,802.40	
Cure with spray membrane curing compound		700.6	m ²	\$ 3.03	\$ 2,122.82	
Finishing floor, monolithic steel trowel		700.6	m ²	\$ 14.00	\$ 9,808.40	
Floor Hardener		700.6	m ²	\$ 25.00	\$ 17,515.00	
Concrete Floor Sealer		700.6	m ²	\$ 20.00	\$ 14,012.00	
.2 Slab on Grade - 250 thick		181.5	m ³	\$ 698.06		\$ 126,697.16
Fine grade 3 passes with grader and roller		726.0	m ²	\$ 3.00	\$ 2,178.00	
300 mm Granular A sub base		217.8	m ³	\$ 60.00	\$ 13,068.00	
Vapour Barrier		726.0	m ²	\$ 3.05	\$ 2,214.30	
15M @400 EW T & B (assume 18kg/m2)		3.3	tn	\$ 2,652.00	\$ 8,664.08	
Concrete (35 MPa) - direct chute		181.5	m ³	\$ 282.00	\$ 51,183.00	
Saw cut and control joints		726.0	m ²	\$ 4.00	\$ 2,904.00	
Cure with spray membrane curing compound		726.0	m ²	\$ 3.03	\$ 2,199.78	
Finishing floor, monolithic steel trowel		726.0	m ²	\$ 14.00	\$ 10,164.00	
Floor Hardener		726.0	m ²	\$ 25.00	\$ 18,150.00	
Concrete sealer		726.0	m ²	\$ 22.00	\$ 15,972.00	
.3 Slab thickening below masonry block walls		190.8	m	\$ 85.00	\$ 16,218.00	
A22 Upper Floor Construction						\$ 606,328.37
<u>A221 Upper Floor Construction</u>						\$ 72,357.15
.1 Structural steel floor construction - mezzanine base plates and anchor bolts		340.1	m ²	\$ 212.75		\$ 72,357.15
		5	No.	\$ 360.00	\$ 1,800.00	

TAKE-OFF

SC2 - Fleet Services Building + Aerial Testing Pad

R-1

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
structural steel columns (6Kg/m2)		2.0	TN	\$ 4,000.00	\$ 8,162.40	
structural steel beams (10Kg/m2)		3.4	TN	\$ 4,000.00	\$ 13,604.00	
open web steel joists - 550 Deep (14Kg/m2)		4.8	TN	\$ 4,000.00	\$ 19,045.60	
bridging and bracing (5Kg/m2)		1.7	TN	\$ 4,000.00	\$ 6,802.00	
38mm metal deck - 0.76 thick (20ga)		340.1	m²	\$ 45.21	\$ 15,375.92	
89mm concrete slab c/w wire mesh		30.3	m3	\$ 250.00	\$ 7,567.23	
A222 Stair Construction						\$ 82,500.00
.1 Metal gratng stairs, shop fabricated, steel stringers, safety nosing on treads		5	flight	\$ 16,500.00	\$ 82,500.00	
A223 Roof Construction						\$ 451,471.23
.1 Structural steel roof construciton - High Roof		221.0	m²	\$ 308.24		\$ 68,120.95
base plates and anchor bolts		10	No.	\$ 360.00	\$ 3,600.00	
structural steel columns (12Kg/m2)		2.7	TN	\$ 4,000.00	\$ 10,608.00	
structural steel beams (15Kg/m2)		3.3	TN	\$ 4,000.00	\$ 13,260.00	
W310x24 beams (16Kg/m2)		3.5	TN	\$ 4,000.00	\$ 14,144.00	
bridging and bracing (10Kg/m2)		3.3	TN	\$ 4,000.00	\$ 13,260.00	
38mm metal deck - 1.21 thick (18ga)		221.0	m²	\$ 59.95	\$ 13,248.95	
.2 Structural steel roof construciton - Low Roof		1,218.5	m²	\$ 281.04		\$ 342,450.28
base plates and anchor bolts		10	No.	\$ 360.00	\$ 3,600.00	
structural steel columns (12Kg/m2)		14.6	TN	\$ 4,000.00	\$ 58,488.00	
structural steel beams (15Kg/m2)		18.3	TN	\$ 4,000.00	\$ 73,110.00	
open web steel joists - 1000 Deep (24Kg/m2)		10.9	TN	\$ 4,000.00	\$ 43,641.60	
open web steel joists - 600 Deep (14Kg/m2)		7.3	TN	\$ 4,000.00	\$ 29,383.20	
open web steel joists - 500 Deep (13Kg/m2)		3.1	TN	\$ 4,000.00	\$ 12,438.40	
bridging and bracing (10Kg/m2)		12.2	TN	\$ 4,000.00	\$ 48,740.00	
38mm metal deck - 1.21 thick (18ga)		1,218.5	m²	\$ 59.95	\$ 73,049.08	
.3 Allownace for roof openings framing		1	LS	\$ 2,500.00	\$ 2,500.00	
.4 Structural reinforcement for mechanical equipment		1	LS	\$ 8,000.00	\$ 8,000.00	
.5 Premium for seismic protection design		1	LS	\$ 10,000.00	\$ 10,000.00	
.6 Roof Safety Anchors c/w cable system		8	ea	\$ 2,550.00	\$ 20,400.00	
A3 EXTERIOR ENCLOSURE						
A31 Walls Below Grade						\$ -
A311 Structural Walls Below Grade						
A32 Walls Above Grade						\$ 484,268.60
A321 Walls Above Grade						\$ 484,268.60
.1 Metal Sidingl with concrete block shearwall backup		1,258.20	m²	\$ 384.89		\$ 484,268.60
Steel Siding, galvanized, 0.80mm thick		1,258.20	m²	\$ 96.00	\$ 120,787.20	
127 Mineral Wool Insulation		1,258.20	m²	\$ 14.54	\$ 18,294.23	
25mm Air Space		1,258.20				
Membrane Air/Vapour Barrier		1,258.20	m²	\$ 2.50	\$ 3,145.50	
Spray Insulation - 75mm		1,258.20	m²	\$ 40.00	\$ 50,328.00	
AVB		1,258.20	m²	\$ 2.50	\$ 3,145.50	
CMU 290		1,258.20	m²	\$ 229.35	\$ 288,568.17	
A33 Windows and Entrance						\$ 149,470.00
A331 Windows and Louvres						\$ 5,020.00
.1 Glazing - Exterior Windows		2.80	m²	\$ 400.00	\$ 1,120.00	

TAKE-OFF

SC2 - Fleet Services Building + Aerial Testing Pad

R-1

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.2 Louvres for mechanical rooms - allowance		6.0	m²	\$ 650.00	\$ 3,900.00	
<u>A333 Doors</u>						\$ 144,450.00
.1 Pressed steel frames and hollow metal doors Include Hardware and Painting						
Single	6	Ea	\$ 1,900.00	\$ 11,400.00		
Double	2	Pair	\$ 3,100.00	\$ 6,200.00		
.2 Overhead doors (9,700 x 5,000)		1	Ea	\$ 31,000.00	\$ 31,000.00	
.3 Overhead doors (5,500 x 5,000)		1	Ea	\$ 17,600.00	\$ 17,600.00	
.4 Overhead doors (4,800 x 5,000)		1	Ea	\$ 15,350.00	\$ 15,350.00	
.5 Overhead doors (3,600 x 5,000)		4	Ea	\$ 12,250.00	\$ 49,000.00	
.6 Overhead doors (3,600 x 3,200)		1	Ea	\$ 7,500.00	\$ 7,500.00	
.7 Barrier free door operators - assumed		2	Ea	\$ 3,200.00	\$ 6,400.00	
A34 Roof Covering						\$ 237,572.33
<u>A341 Roofing</u>						\$ 237,572.33
.1 SBS Modified Bituminous Roofing		1,218.50	m²	\$ 150.00	\$ 182,775.00	
.2 Tapered insulation to attain roof slopes (5%)		60.93	m²	\$ 19.00	\$ 1,157.58	
.3 SBS Modified Bituminous Roofing - High Roof		221.00	m²	\$ 150.00	\$ 33,150.00	
.4 Tapered insulation to attain roof slopes (25%) - High Roof		55.25	m²	\$ 19.00	\$ 1,049.75	
.5 Flashing		140.00	m²	\$ 96.00	\$ 13,440.00	
.6 Roof Hatches		2	Ea	\$ 3,000.00	\$ 6,000.00	
A35 Projection						\$ 28,000.00
.1 Parapets		140.0	m²	\$ 200.00	\$ 28,000.00	
B. INTERIORS						
B1 PARTITIONS & DOORS						
B11 Partitions						\$ 212,578.92
<u>B111 Fixed Partitions</u>						\$ 212,578.92
.1 Drywall Metal Stud partitions slab to slab w/ Roxul AFB		46.96	m²	\$ 86.00	\$ 4,038.56	
.2 Concrete Block Wall - 190 mm, jointed and pointed		1,080.52	m²	\$ 193.00	\$ 208,540.36	
<u>B112 Movable Partitions</u>						\$ -
<u>B113 Structural Partitions</u>						\$ -
B12 Doors						\$ 25,350.00

TAKE-OFF

SC2 - Fleet Services Building + Aerial Testing Pad

R-1

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.1 Pressed Steel Frames and Hollow Metal Doors c/w hardware include painting						
Single		15	Ea	\$ 750.00	\$ 11,250.00	
Double		1	Ea	\$ 1,300.00	\$ 1,300.00	
Single with sidelite		-	Ea	\$ 1,050.00	\$ -	
.2 Barrier free automatic door openers - assume		4	ea	\$ 3,200.00	\$ 12,800.00	
B2 FINISHES						
B21 Floor Finishes						\$ 575.05
.1 Exposed concrete with sealer price included in slab on grade						
.2 VCT in office		12	m²	\$ 35.00	\$ 427.00	
.3 Ruber Base		14	m	\$ 10.50	\$ 148.05	
B22 Ceiling Finishes						\$ 19,219.68
.1 Exposed Ceiling - Painted		1,779.60	m²	\$ 10.80	\$ 19,219.68	
B23 Wall Finishes						\$ 3,440.00
.1 Paint Finish		400.00	m²	\$ 8.60	\$ 3,440.00	
B3 Fittings & Equipment						
B31 Fittings and Fixtures						\$ 114,816.00
<u>B311 Metals</u>						\$ 101,468.00
.1 Service ladders		2	Ea	\$ 3,500.00	\$ 7,000.00	
.2 Catwalk		1	ea	\$ 38,000.00	\$ 38,000.00	
.3 Mezzanine railings		38.5	m	\$ 168.00	\$ 6,468.00	
.4 Miscellenous metal - Allowance		1	LS	\$ 50,000.00	\$ 50,000.00	
<u>B312 Millwork</u>						\$ 2,800.00
.1 Typical kitchen upper and lower cabinet c/w countertop		2.00	m	\$ 1,400.00	\$ 2,800.00	
<u>B313 Specialties</u>						\$ 10,170.00
.1 Toilet Compartment - Metal Ceiling Hung		-	ea	\$ 1,037.00	\$ -	
.2 Hadicapped Toilet Compartment		2	ea	\$ 1,685.00	\$ 3,370.00	
.3 Urinal Screen		-	ea	\$ 485.00	\$ -	
.4 Toilet and Bath Accessories						
i Hand dryer		4	ea	\$ 450.00	\$ 1,800.00	
ii Paper towel dispenser - assumed		4	ea	\$ 150.00	\$ 600.00	
iii Toilet paper dispenser		4	ea	\$ 50.00	\$ 200.00	
iv Soap dispenser		4	ea	\$ 75.00	\$ 300.00	
v Waste receptacle - wall mounted semi-recessed - assumed		4	ea	\$ 500.00	\$ 2,000.00	
vi Sanitary disposal		2	ea	\$ 200.00	\$ 400.00	
viii Tilted mirror		-	ea	\$ 250.00	\$ -	

TAKE-OFF

SC2 - Fleet Services Building + Aerial Testing Pad

R-1

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.5 Unframed Mirror in washrooms above vanities		3.00	m²	\$ 500.00	\$ 1,500.00	
<u>B314 Furnishings</u>						\$ 378.00
.1 Window treatment - Allowance		2.80	m²	\$ 135.00	\$ 378.00	
B32 Equipment						\$ 168,000.00
.1 Overhead Bridge Crane, under hung hoist, electric operating, 2 girder, 10-ton, 8m span		1	ea	\$ 98,000.00	\$ 98,000.00	
.2 Jib Crane with monorail		1	ea	\$ 70,000.00	\$ 70,000.00	
B33 Conveying Systems						
C. SERVICES						
C1 Mechanical						
C11 Plumbing and Drainage						\$ 89,565.00
Refer to individual M & E take-off sheets for designated areas						
C12 Fire Protection						\$ 46,000.00
Refer to individual M & E take-off sheets for designated areas						
C13 Heating, Ventilation & Air Conditioning						\$ 100,728.60
Refer to individual M & E take-off sheets for designated areas						
C14 EMCS Controls						\$ 18,000.00
<u>C141 Controls and Automation</u>						\$ 18,000.00
Refer to individual M & E take-off sheets for designated areas						
C2 Electrical						
C21 Service & Distribution						\$ 233,152.50
Refer to individual M & E take-off sheets for designated areas						
C22 Lighting, Devices and Heating						\$ 55,938.75
Refer to individual M & E take-off sheets for designated areas						
C23 Systems & Ancillaries						\$ 32,838.75
Refer to individual M & E take-off sheets for designated areas						

TAKE-OFF

SC2 - Fleet Services Building + Aerial Testing Pad

R-1

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
D. SITE & ANCILLARY WORK						
D1 SITE WORK						
D11 Site Development						\$ 138,620.00
<u>D111 Preparation</u>						\$ 45,000.00
.1 Engineered fill		1	LS	\$ 45,000.00	\$ 45,000.00	
<u>D112 Hard Surfaces</u>						\$ 43,620.00
.1 Aerial Testing Pad		145	m2	\$ 300.00	\$ 43,620.00	
.2 Walkway		1	LS	\$ -	\$ -	
<u>D113 Improvements</u>						
<u>D114 Landscaping</u>						\$ 50,000.00
.1 Landscaping allowance		1	LS	\$ 50,000.00	\$ 50,000.00	
D12 Mechanical Site Services						
.1 included in SC1 pricing						
D13 Electrical Site Services						\$ 15,000.00
.1 Lighting		1	LS	\$ 15,000.00	\$ 15,000.00	
D2 ANCILLARY WORK						
D21 Demolition						\$ 5,000.00
.1 Well decommissioning		1	allow	\$ 5,000.00	\$ 5,000.00	
Z. GENERAL REQUIREMENTS & ALLOWANCES						
Z1 GENERAL REQUIREMENTS & FEE						
Z11 General Requirements						\$ 539,272.15
Z111 Design Fees (6%)			LS		\$ 202,227.06	
Z112 General Conditions (10.0%)			LS		\$ 337,045.09	
Z12 Fee						\$ 195,486.15
.1 G.C. Overhead and Profit (5.0%)					\$ 195,486.15	
Z2 ALLOWANCES						
Z21 Design Allowance (3.5%)					\$ 143,682.32	\$ 143,682.32
Z22 Escalation Allowance (1.5%)					\$ 61,578.14	\$ 61,578.14
TOTAL						\$ 4,310,469.70
SEPARATE PRICE (SC2)						

TAKE-OFF

SC2 - Fleet Services Building + Aerial Testing Pad

R-1

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.1 Structural steel roof constructon - High Roof		221.0	m ²	\$ 64.00		\$ 14,144.00
base plates and anchor bolts		No.		\$ 360.00	\$ -	
structural steel columns (6Kg/m2)		1.3	TN	\$ 4,000.00	\$ 5,304.00	
structural steel beams (5Kg/m2)		1.1	TN	\$ 4,000.00	\$ 4,420.00	
W310x24 beams (16Kg/m2)			TN	\$ 4,000.00	\$ -	
bridging and bracing (5Kg/m2)		1.1	TN	\$ 4,000.00	\$ 4,420.00	
38mm metal deck - 1.21 thick (18ga)			m ²	\$ 59.95	\$ -	
.2 Metal Siding Assembly		464.50	m ²	\$ 257.64		\$ 119,673.78
Steel Siding, galvanized on steel frame, 0.80mm thick		464.50	m ²	\$ 89.45	\$ 41,549.53	
127 Mineral Wool Insulation		464.50	m ²	\$ 14.54	\$ 6,753.83	
Membrane Air/Vapour Barrier		464.50	m ²	\$ 2.50	\$ 1,161.25	
16mm Glass Matt Bypsum Sheathing		464.50	m ²	\$ 23.50	\$ 10,915.75	
152 Wind Bearing Metal Stud Wall Framing		464.50	m ²	\$ 29.70	\$ 13,795.65	
50mm Mineral Wool Insulation		464.50	m ²	\$ 8.50	\$ 3,948.25	
Steel Siding, galvanized on steel frame, 0.80mm thick		464.50	m ²	\$ 89.45	\$ 41,549.53	

M / E Take-Off

SC2 - Fleet Services

R-1

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
C. SERVICES						
C1 Mechanical						
C11 Plumbing and Drainage						\$ 89,565.00
<u>C111 Plumbing Fixtures</u>						\$ 7,200.00
.1 Water Closets & lavatories.		4.0	ea	\$ 1,800.00	\$ 7,200.00	
<u>C112 Domestic Water</u>						\$ 7,500.00
.1 Domestic water service shall enter the building to serve domestic water and fire protection. Incoming service c/w backflow prevention and metering. Domestic hot water generated by gas fired cond boilers (included in HVAC). Thermal insulation included.		1.0	allow	\$ 7,500.00	\$ 7,500.00	
<u>C113 Sanitary Waste & Vent</u>						\$ 38,900.00
.1 Sanitary system assume U/G to be PVC, while above grade piping shall be cast iron/copper DWV. Drains below the service entry shall be collected in sump pits c/w duplex submersible pumps (Assume 2 for this building). Thermal insulation included.		1.00	allow	\$ 26,700.00	\$ 26,700.00	
.2 Drain, trench, polyester polymer for cement concrete encasement, 300mm ingernal sieth, with grate		24.40	m	\$ 500.00	\$ 12,200.00	
<u>C114 Storm</u>						\$ 26,700.00
.1 Storm system shall include control flow type roof drains. U/G storm collection in PVC. Cast iron above grade. Weeping tile collected into sumps, then transferred to sump pits c/w duplex submersible pumps. Thermal insulation included. PVC Jacketed in exposed areas.		1.0	allow	\$ 26,700.00	\$ 26,700.00	
<u>C115 Natural Gas</u>						\$ 5,000.00
.1 Incoming gas service c/w gas meter. Distribution of natural gas to centralized mechanical PH to feed gas fired HVAC equipment. Piping to be schd 40 black malleable. Piping 50mm and smaller to be screwed, 65mm and over to be welded.		1.0	allow	\$ 5,000.00	\$ 5,000.00	
<u>C116 Fuel Oil</u>						\$ -
.1 No requirement.			allow		\$ -	
<u>C117 Misc Works and General Accounts</u>						\$ 4,265.00
.1 Clean-up, HASSSP, rentals, small tools, fire stopping, permits, inspections, bonding and insurance, site trailer.		1.0	allow	\$ 4,265.00	\$ 4,265.00	
C12 Fire Protection						\$ 46,000.00
<u>C121 Sprinklers</u>						\$ 46,000.00
.1 Wet pipe sprinkler including pumps		1,840.00	m2	\$ 25.00	\$ 46,000.00	
C13 Heating, Ventilation & Air Conditioning						\$ 100,728.60

M / E Take-Off

SC2 - Fleet Services

R-1

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
<u>C131 Liquid Heat Transfer (Heating)</u>						\$ 51,632.00
.1 Radiant in-floor heating		368.8	m2	\$ 140.00	\$ 51,632.00	
<u>C132 Liquid Heat Transfer (Cooling)</u>						\$ -
.1 No requirement.			allow		\$ -	
<u>C133 Air Distribution</u>						\$ 32,000.00
.1 FS Floor - RTU c/w economizer, two stage filtration, gas fired burner, two stage high eff elec cooling, supply/return fans on VFD.		1	allow	\$ 32,000.00	\$ 32,000.00	
<u>C134 Exhaust Systems</u>						\$ 12,300.00
.1 Misc systems - vehicle exhaust.		1	allow	\$ 12,300.00	\$ 12,300.00	
<u>C136 Misc Works and General Accounts</u>						\$ 4,796.60
.1 Clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, fire stopping.		1	allow	\$ 4,796.60	\$ 4,796.60	
C14 EMCS Controls						\$ 18,000.00
<u>C141 Controls and Automation</u>						\$ 18,000.00
.1 No requirement.		1,500.00	m2	\$ 12.00	\$ 18,000.00	
C2 Electrical						
C21 Service & Distribution						\$ 233,152.50
<u>C211 Equipment</u>						\$ 35,000.00
.1 Assume power fed from Office bldg.		1	ea	\$ -	\$ -	
.2 Incoming service - fed from SC1		1		\$ 35,000.00	\$ 35,000.00	
<u>C212 Emergency Power</u>						\$ 145,000.00
.1 Emergency generator - including battery, charger, muffler and distribution.		1	allow	\$ 115,000.00	\$ 115,000.00	
.2 600A Automatic Transfer Switch.		1	allow	\$ 30,000.00	\$ 30,000.00	
<u>C213 Distribution</u>						\$ 24,000.00
.1 Lighting panels, power panels, transformers, digital metering.		1	allow	\$ 24,000.00	\$ 24,000.00	
<u>C214 Feeders</u>						\$ 12,450.00
.1 Main feeders.		1	allow	\$ 12,450.00	\$ 12,450.00	
<u>C215 Motor Controls & Wiring</u>						\$ -
.1 Assume no MCC required.		1	allow	\$ -	\$ -	
<u>C216 Grounding & Lightning Protection</u>						\$ 5,600.00

M / E Take-Off

SC2 - Fleet Services

R-1

Description	No.	Quantity	Unit	Unit Price	Cost	TOTAL
.1 Electrical grounding & lightning protection.		1	allow	\$ 5,600.00	\$ 5,600.00	
<u>C216 Misc Works and General Accounts</u>						\$ 11,102.50
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer, fire stopping		1	allow	\$ 11,102.50	\$ 11,102.50	
C22 Lighting, Devices and Heating						\$ 55,938.75
<u>C221 Lighting</u>						\$ 33,475.00
.1 High Bay lighting.		1,500.00	m2	\$ 17.65	\$ 26,475.00	
.2 Allowance - specialty lighting (pots, LED's in common areas).		1	allow	\$ 4,500.00	\$ 4,500.00	
.3 Exit and emergency lighting.		1	allow	\$ 2,500.00	\$ 2,500.00	
<u>C222 Branch Devices & Wiring</u>						\$ 19,800.00
.1 All conduit systems concealed all finished areas.		1	allow	\$ 19,800.00	\$ 19,800.00	
<u>C223 Heating</u>						\$ -
.1 No requirement.			allow		\$ -	
<u>C224 Misc Works and General Accounts</u>						\$ 2,663.75
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer, fire stopping		1	allow	\$ 2,663.75	\$ 2,663.75	
C23 Systems & Ancillaries						\$ 32,838.75
<u>C231 Fire Alarm</u>						\$ 31,275.00
.1 Addressable 1-stage FA system no voice communication		1,500.00	m2	\$ 20.85	\$ 31,275.00	
<u>C232 Security System</u>						\$ -
.1 Cash allowance.			m2	\$ 9.50	\$ -	
<u>C233 Communications</u>						\$ -
.1 Cash allowance.			m2	\$ 20.00	\$ -	
<u>C234 Public Address & AV</u>						\$ -
.1 Cash allowance.			m2	\$ 10.00	\$ -	
<u>C235 Miscellaneous</u>						\$ -
.1 No requirement.		0	allow	\$ -	\$ -	
<u>C236 General Requirements</u>						\$ 1,563.75
.1 Supervision, clean-up, HASSSP, rentals, small tools, permits, inspections, bonding and insurance, site trailer,		1	allow	\$ 1,563.75	\$ 1,563.75	

INTERROGATORY RESPONSE - OEB-118

2-Staff-63

EXHIBIT REFERENCE:

Exhibit 2/Tab 1/Schedule 1/Attachment A/page 40 of 73

SUBJECT AREA: Facilities Renewal Program

Question(s):

a) Please provide a copy of the Quantity Survey Report dated May 18, 2016.

RESPONSE:

a) Please see Attachment OEB-117(A): Class B Estimate for a copy of the Quantity Survey Report, dated May 18, 2016.

INTERROGATORY RESPONSE - OEB-119

2-Staff-64

EXHIBIT REFERENCE:

EB-2019-0077/Exhibit B/Tab 9/Schedule 1/page 2 of 18

EB-2019-0077/Decision and Order/page 9

Exhibit 2/Tab 4/Schedule 3/Attachment E/page 234 of 534

Exhibit 2/Tab 1/Schedule 1/page 11 of 13

Exhibit 2/Tab 4/Schedule 1/page 8 of 13

SUBJECT AREA: Distribution System Plan

Preamble:

With respect to the Cambrian municipal transformer station (MTS) project, it was noted in the leave to construct application that the cost of the transmission line will be borne by both Hydro Ottawa and Hydro One. Hydro One will be responsible for the avoided cost of the sustainment work. Hydro Ottawa will be responsible for the remainder of the line project cost which will be paid through load revenue and capital contribution.

In the decision and order on the leave to construct application, it was noted that "The incremental cost to Hydro Ottawa for the line work is \$50.1 million. This cost will be met through a capital contribution of \$48.2 million and load revenue. The station facilities' costs of \$27.0 million will be included in Hydro Ottawa's rate base once in service."

Question(s):

a) Please explain the discrepancy between the \$48.2 million cost estimate approved in the leave to construct application and the proposed Connection and Cost Recovery Agreements (CCRAs) payments of \$50.2 million to Hydro One in this current application for the transmission line portion of the Cambrian MTS project.

b) Please update Table 2.9, Expenditure for Cambrian MTS project (Ex 2-4-3, Attachment E, page 234), for 2019 actual and the latest forecast for 2020.

c) Hydro Ottawa noted that the construction of Cambrian MTS started the week of November 25, 2019. Please clarify whether the current COVID-19 crisis has any impact on the expected in-service date of Q2 2022.

d) Please confirm that the 2021 budgeted capital additions include \$50 million CCRAs payments to Hydro One associated with the transmission line portion of the Cambrian MTS project.

i) If yes, please explain why Hydro Ottawa proposes to include \$50 million additions in 2021 given that the expected in-service date has changed to Q2 2022.

RESPONSE:

a) The cost estimate for Capital Contributions for the transmission and network-related portions of the Power South Nepean project were \$48.2M, while the estimated Cost Responsibility, or total costs, were \$50.1M. For the cost breakdown, please refer to Exhibit B, Tab 9, Schedule 1, Table 3 "Total Project Cost Responsibility and Capital Contribution" in the Leave to Construct application filed in EB-2019-0077. For forecasted project expenditures, see page 234 of Attachment 2-4-3(E): Material Investments filed in this Application on February 10, 2020.

b) Please see Table A below, updated with 2019 actuals and the forecasted values for 2020-2022, for a total of \$77.2M.

1 **Table A – Expenditure for Cambrian MTS Project (\$'000,000s)**

	Historical				Bridge	Test					Total
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	
Cambrian MTS	\$0	\$0.21	\$0.19	\$2.18	\$10.22	\$11.91	\$2.24	\$0	\$0	\$0	\$26.95
Transmission (CCRA)	\$0	\$1.49	\$0.37	\$3.32	\$29.08	\$16.03	\$0	\$0	\$0	\$0	\$50.29

2

3 c) At this time, the COVID-19 crisis is not expected to impact the target in-service date of
4 Q2 2022. Please see the response to interrogatory SEC-1 for additional information on
5 how Hydro Ottawa is assessing the impacts of COVID-19 on its business and
6 operations.

7

8 d) Yes, the 2021 budgeted capital additions include \$50M in CCRA payments to Hydro One
9 for the transmission line portion of the Cambrian MTS project.

10

11 i) While energization of the station portion of the project has been delayed to Q2
12 2022, the transmission portion of the project remains on the original timeline to
13 be completed, energized, and therefore capitalized in late 2021.

INTERROGATORY RESPONSE - OEB-120

2-Staff-65

EXHIBIT REFERENCE:

Exhibit 2/Tab 4/Schedule 3/Attachment E/pp. 254-267 of 13

SUBJECT AREA: Distribution System Plan

Preamble:

Hydro Ottawa forecasted \$30.69 million (including CCRA payments) over 2021 to 2025 for the New East Station project.

Question(s):

a) Please confirm that the IESO confirmed the need and recommended Hydro Ottawa proceed with the plan to build the New East Station in the final 2019 Integrated Regional Resource Planning (IRRP) for the Greater Ottawa region.

b) Please clarify whether there will be a Regional Infrastructure Planning (RIP) process following the IRRP.

i) If yes, please explain when the RIP will be completed. Please also identify any risks associated with the ongoing RIP process on the scope, schedule and cost estimate for the New East Station.

c) Please confirm that a leave to construct application is not required for the New East Station project.

d) Hydro Ottawa noted that the primary driver for the New East Station is load growth, which depends on the residential housing market and the implementation of City of

1 Ottawa's Light Rail Transit (LRT) project. Please provide the City's planned
2 implementation schedule for the LRT project.

3
4 **RESPONSE:**

5
6 a) The IESO has confirmed the need and recommended that Hydro Ottawa proceed with
7 the plan to build the New East Station in the most recent IRRP for the Greater Ottawa
8 Region.¹

9
10 b) There will be a RIP process following the IRRP to further discuss all of the
11 recommendations from the IRRP.

12 i) The planned completion date for the RIP process is November 2020. Risks
13 associated with the ongoing RIP process include a risk to the station energization
14 target date if completion of the RIP process is delayed. External risks to scope,
15 schedule, and cost of the project are the outcomes of the IESO System Impact
16 Assessment ("SIA") and Hydro One Networks Connection Impact Assessment
17 ("CIA") which are scheduled to begin in 2021.

18
19 c) At this point, a Leave to Construct application is not expected to be required for the New
20 East Station project, as the transmission line extension is estimated to be less than 2
21 km. This will be determined once the location for the new New East Station is selected.

22
23 d) The City of Ottawa has published the following planned revenue service dates for the
24 three LRT line extensions:

- 25 i) Trillium Line south extension - 2022
26 ii) Confederation Line east extension - 2024
27 iii) Confederation Line west extension - 2025

28 ¹ For a copy of the new IRRP for the Greater Ottawa Region, please see Attachment PP-11(A): Ottawa Sub-Region
29 2020 IRRP.

INTERROGATORY RESPONSE - OEB-121

2-Staff-66

EXHIBIT REFERENCE:

Exhibit 2/Tab 4/Schedule 3/Attachment E/pp. 80-84

SUBJECT AREA: Distribution System Plan

Preamble:

On page 84, it has been stated that the pole renewal project “may also require replacement of adjacent assets in poor condition including overhead switches, insulators, and overhead transformers.” Also the program details on page 84 mention the specific areas in which the pole renewal projects are planned to be conducted. Table 1.35 on page 80 shows the number of poles to be replaced (i.e. 400 per year for years 2021 to 2025).

Question(s):

a) Does Hydro Ottawa have a separate dedicated overhead transformer renewal program or are the overhead transformers always replaced as a part of the pole renewal and corrective renewal programs?

b) For each year (2021 to 2025), please provide the total number of overhead transformers that are currently installed on the proposed 400 poles to be replaced. Out of those currently installed transformers, how many are proposed to be concurrently replaced along with the poles as a part of the pole renewal program?

c) For each year (2021 to 2025), please provide the total number of overhead switches that are currently installed on the proposed 400 poles to be replaced. Out of those currently installed switches, how many are proposed to be concurrently replaced along with the poles as a part of the pole renewal program?

1

2 **RESPONSE:**

3

4 a) Hydro Ottawa renews overhead transformers on an unplanned basis when their
5 condition warrants it, but does not have a dedicated planned program of renewal.
6 Overhead transformers may also be renewed at the same time when renewal occurs for
7 the corresponding support pole, if it is determined to be economical to do so and the
8 transformer's condition warrants it.

9

10 b) Hydro Ottawa does not have finalized detailed scopes of work for planned pole renewal
11 for years 2021-2025, therefore the exact number of transformers requiring replacement
12 is not known at this time. Based on historical data (2016-2019), approximately 17.3% of
13 the poles issued for planned pole renewal projects also had an overhead transformer
14 issued. This suggests that replacing 400 poles annually on a planned basis will require
15 an average annual renewal of 69 overhead transformers for the years 2021-2025.

16

17 c) Similarly, a precise number of overhead switches planned for renewal for 2021-2025 is
18 not known at this time. Using 2016-2019 data, approximately 14.7% of poles issued for a
19 planned pole renewal project also had an overhead switch issued. This suggests that
20 replacing 400 poles annually on a planned basis will require an average annual renewal
21 of 59 overhead switches for the years 2021-2025.

INTERROGATORY RESPONSE - OEB-122

2-Staff-67

EXHIBIT REFERENCE:

Exhibit 2/Tab 4/Schedule 3/Attachment E/pp. 138-143

SUBJECT AREA: Distribution System Plan

Preamble:

On page 143, it is stated that the underground cable renewal project “also includes the replacement of adjacent end of life assets including pad-mounted transformers and pad-mounted switchgear”. The program details on page 143 mentions the specific areas in which the underground cable renewal projects are planned to be conducted. Moreover, Table 1.65 on page 138 shows the length of the underground cable to be replaced (i.e. 26 km per year for years 2021 to 2025).

Question(s):

a) For each year (2021 to 2025), please provide the total number of pad-mounted transformers that are currently installed along the 26 km of underground cable to be replaced. Out of those currently installed transformers, how many are proposed to be concurrently replaced along with the cable as part of the underground cable renewal program?

b) For each year (2021 to 2025), please provide the total number of pad-mounted switchgear that are currently installed along the 26 km of underground cable to be replaced. Out of those currently installed switches, how many are proposed to be concurrently replaced along with the cable as part of the underground cable renewal program?

1

2 **RESPONSE:**

3

4 a) As described in the utility's Capital Expenditure Process detailed in Exhibit 2-4-3:
5 Distribution System Plan (section 5.2 on page 107), Hydro Ottawa prioritizes projects to
6 be executed under the Cable Renewal program on an annual basis through a project
7 optimization process based on multiple value measures. As a result, determining the
8 precise number of underground transformers planned for simultaneous renewal with
9 adjacent underground cable for 2021-2025 is not possible.

10

11 As a comparison, 2016-2019 resulted in 115 transformers installed for the 92 kms of
12 cable replaced. For future projects this number could vary considerably depending on
13 the function and location of cable renewed. For example, cable forming part of the trunk
14 distribution system would be expected to affect a fewer number of transformers per
15 kilometer renewed compared to underground cables located in residential
16 neighbourhoods.

17

18 b) Similar to the response to part (a) above, pinpointing the precise number of underground
19 switchgears planned for simultaneous renewal with adjacent underground cable for
20 2021-2025 is not feasible. Using 2016-2019 data, three switchgear units were installed
21 for the 92 km of cable replaced. For future projects, this number could vary considerably
22 depending on the function and location of cable renewed.

INTERROGATORY RESPONSE - OEB-123

2-Staff-68

EXHIBIT REFERENCE:

Exhibit 2/Tab 4/Schedule 3/Attachment E/pp. 153-157

SUBJECT AREA: Distribution System Plan

Preamble:

On page 157, it has been stated that underground switchgear renewal project “may also require the replacement of adjacent assets in poor condition, including underground cable.” Moreover, Table 1.72 on page 153 shows the number of switchgear to be replaced (i.e. 4 per year for years 2021 to 2025).

Question(s):

a) For each year (2021-2025), please provide the total length of underground cable to be replaced as a part of the underground switchgear renewal program?

RESPONSE:

a) Hydro Ottawa does not have detailed scopes of work for planned underground switchgear renewal for the years 2022-2025, meaning that reporting a precise quantity of adjacent underground cable is not possible. Based on 2016-2019 data, for every underground switchgear renewed, approximately 243.3m of adjacent underground cable was also renewed. This estimate suggests renewing an average of four underground switchgear annually will also require the annual renewal of approximately 973m of adjacent underground cable for the years 2021-2025.

INTERROGATORY RESPONSE - OEB-124

2-Staff-69

EXHIBIT REFERENCE:

Exhibit 2/Tab 2/Schedule 1/Attachment C: Appendix 2-BA 2018 Fixed Asset Continuity Schedule

Exhibit 1/Tab 3/Schedule 2/Table 6 on page 7

SUBJECT AREA: Fixed Asset Continuity

Preamble:

Hydro Ottawa provided a reconciliation of capital assets from 2018 AFS to the regulated capital assets for 2018 in an amount of \$1,062,410,000.

Hydro Ottawa presented the Fixed Asset Continuity Schedule for 2018 in Appendix 2-BA with the ending Net Book Value (NBV) of \$918,374,276.

Question(s):

- a) Please reconcile the 2018 regulated capital assets balance of \$1,062,410,000 to the NBV balance of \$918,374,276 from 2018 Fixed Asset Continuity Schedule.

RESPONSE:

- a) In Table A below, please see reconciliation of the 2018 regulated capital assets balance of \$1,062,410,000 to the net book value balance of \$918,374,276 from 2018 Fixed Asset Continuity Schedule.

1 **Table A – Reconciliation of the 2018 Regulated Capital Assets Balance to Net Book Value**
2 **Balance from 2018 Fixed Asset Continuity Schedule**

2018 Regulated Capital Assets Balance		\$1,062,410,000
NBV balance from 2018 Fixed Asset Continuity Schedule		\$918,374,000
Difference		\$144,036,000
Assets under construction - included in AFS not Fixed Asset Continuity Schedule:		
Assets under construction related to Property, plant and equipment	\$(139,035,000)	
Assets under construction related Intangible assets	(\$11,172,000)	
Customer deposits included in deferred revenue	\$6,171,000	
TOTAL ASSETS UNDER CONSTRUCTION		\$144,036,000
Unreconciled difference		\$0

3

INTERROGATORY RESPONSE - OEB-125

2-Staff-70

EXHIBIT REFERENCE:

Updated Exhibit 2/Tab 2/Schedule 1/Attachment D: Appendix 2-BA 2019 Fixed Asset Continuity Schedule

Updated Exhibit 1/Tab 3/Schedule 1/Attachment C 2019 AFS

SUBJECT AREA: Fixed Asset Continuity

Preamble:

Hydro Ottawa provided the updated Fixed Asset Continuity Schedule for 2019 in Appendix 2-BA with the ending NBV of \$1,067,031,846.

Question(s):

- a) Please provide the 2019 capital assets reconciliation between the amounts from the AFS and the regulated capital assets NBV of \$1,067,031,846 from the Fixed Asset Continuity Schedule.

RESPONSE:

- a) Please see Table A below for the 2019 capital assets reconciliation between the amounts from the Audited Financial Statements and the regulated capital assets NBV of \$1,067,031,846 from the Fixed Asset Continuity Schedule.

1 **Table A – Reconciliation between 2019 AFS and Fixed Asset Continuity Schedule**

2019 AFS		
Property, plant and equipment	\$1,182,649,395	
Intangible assets	\$71,722,253	
Investment properties	\$2,258,256	
Deferred revenue	\$(142,186,839)	
Total 2019 regulated capital assets balance		\$1,114,443,064
NBV balance from 2019 Fixed Asset Continuity Schedule		\$1,067,031,846
Difference		\$47,411,218
Below items included in AFS but not in the Fixed Asset Continuity Schedule:		
Assets under construction related to Property, plant and equipment	\$46,923,519	
Assets under construction related Intangible assets	\$9,490,542	
Non-rate base assets	2,362,161	
Customer deposit included in deferred revenue	\$(11,365,004)	
Total adjustment		\$47,411,218
Unreconciled difference		\$-

2

INTERROGATORY RESPONSE - OEB-126

2-Staff-71

EXHIBIT REFERENCE:

Exhibit 4/Tab 2/Schedule 1/pp. 4-5

SUBJECT AREA: Shared Services and Corporate Cost Allocation

Preamble:

Hydro Ottawa is wholly owned by Hydro Ottawa Holding Inc. (Holding Company). Hydro Ottawa has two other affiliated companies: Energy Ottawa Inc. (Energy Ottawa) and Envari Holding Inc. (Envari). Hydro Ottawa made the following changes to its shared service methodology since its last rebasing in 2016:

- 1) The pricing methodology for Finance Services provided by Hydro Ottawa to its affiliates changed in 2018 from being based on the proportionate share of cost, factored by time spent, to being based on the number and/or value of transactions processed. Hydro Ottawa stated that this measure more accurately reflected the time and effort spent on the various finance services provided, such as procurement (now based on number of transactions), warehousing (now based on value of inventory) and accounts payable (now based on number of payments processed).
- 2) The pricing methodology for Treasury Services provided by Hydro Ottawa to the Holding Company, and vice versa, changed in 2018 from being based on the proportionate share of cost, factored by time spent, to being based on the proportionate share of cost, based on the value of debt outstanding. Hydro Ottawa stated that this measure more accurately reflected the time and effort spent on the various treasury functions.
- 3) Key account services provided by Hydro Ottawa to Envari were added to the allocations in 2019 to capture Hydro Ottawa's time spent towards developing opportunities with its large commercial customers on behalf of Envari.

1 Question(s):

2

3 a) Please explain what gave rise to the changes in the shared service methodology in 1)
4 and 2).

5

6 b) Please demonstrate why the proposed changes captured the value of the shared
7 services provided by Hydro Ottawa more accurately. Was there any study done?

8

9 c) Please explain how the revenue earned from Key Account Services provided to
10 Enviro as identified in 3) was determined.

11

12 **RESPONSE:**

13

14 a) The changes in Hydro Ottawa's shared services cost allocation methodology was in
15 response to an increase in services provided by Hydro Ottawa to affiliates as they began
16 to grow and expand. The associated costs were becoming more significant. As such, an
17 activity-based costing methodology was introduced for services that were routine and
18 repetitive in nature, in order to accurately allocate associated costs.

19

20 b) The costs for the services listed below were allocated based upon the following
21 volumetric measures or key activities. Hydro Ottawa determined that this approach
22 would more accurately reflect the costs associated with the provision of those services.
23 The utility monitors its cost allocation methodology on an ongoing basis and makes
24 refinements, as needed.

25

- 26 • Accounts Payable Service was allocated based on the number of payments
27 processed in the year for each entity.
- 28 • Accounts Receivable Service was based on the number of receipts processed for
29 each entity.
- 30 • Treasury Services was allocated based on the value of debt outstanding for each
31 entity.

- 1 • Procurement services were allocated based on the number of purchase orders,
2 as well as the amount of orders for each entity.

3

4 All of the above units are readily available from the financial system. There was no
5 independent study performed.

6

- 7 c) Hydro Ottawa's Service Level Agreement revenue earned from Key Account Services
8 provided to Envari was determined based on fully allocated costs. This includes a return
9 on Hydro Ottawa's invested capital (e.g., weighted average cost of capital) multiplied by
10 the percentage of time spent on the service.

INTERROGATORY RESPONSE - OEB-127

3-Staff-1

EXHIBIT REFERENCE:

Updated Exhibit 3, Tab 1, Schedule 2, page 2

Updated Chapter 2 Appendix 2-IB

SUBJECT AREA: Load Forecast

Preamble:

Hydro Ottawa states that:

Hydro Ottawa has provided Attachment 3-1-1(A): Appendix 2-IB - Load Forecast Analysis, which summarizes the data and develops year-over-year trends in historical and forecast customer counts, consumption, demand, and revenues. The utility completed Appendix 2-IB with the following inputs:

- 2016-2019 actual sales, demand, customer count and connections, and distribution revenue;
- 2016-2019 actual weather-normalized sales and demand;
- 2020 updated load forecast and approved distribution revenue; and
- 2021-2025 proposed load forecast and proposed distribution revenue.

Question(s):

- a) Please provide forecasts for 2013 to 2019 energy, demand and customer connections using the proposed forecast models with actual values used for explanatory variables.

1 **RESPONSE:**

2

- 3 a) For a forecast of 2013-2019 energy, demand, and customer connections using the
4 proposed forecast models, with actual values used for explanatory variables, please
5 refer to Attachment OEB-127(A): 2013-2019 Forecasts.

INTERROGATORY RESPONSE - OEB-128

3-Staff-2

EXHIBIT REFERENCE:

Updated Chapter 2 Appendix 2-IB

Part 2 Load Forecast Data

SUBJECT AREA: Load Forecast

Preamble:

The energy forecast Data workbook has identified with the prefixes, Res, GS 50, GS 1000, GS 1000NI, GS 5000, L, MU, SL, DCL.

Hydro Ottawa has the rate classes Residential, General Service < 50 kW, General Service 50 to 1,000 kW Non Interval, General Service 50 to 1,000 kW Interval, General Service 1,000 to 1,499 kW, General Service 1,500 to 4,999 kW, Large Use, Unmetered Scattered Load, Sentinel Lighting, Street Lighting.

Question(s):

a) Please provide a mapping from regression models to rate classes.

b) Please indicate which variable is the dependent variable in each model. If the dependent variable is not provided, please provide.

c) Please reconcile any variances between the dependent variables and the historic energy use as indicated in Appendix 2-IB

d) If a dependent variable is not energy, please explain how it relates to energy, and how the model is used to calculate energy use.

1

2 **RESPONSE:**

3

4 a) Rate classes are as follows:

5

6 • Res = Residential

7

8 • GS 50 = General Service < 50 kW

9

10 • GS 1000 = General Service 50 to 1,000 kW Non Interval and General Service 50
11 to 1,000 kW Interval. The sales for these classes are aggregated and modeled
12 as one. A share model (GS 1000NI) is then used to allocate the GS 1000 model
13 results to General Service 50 to 1,000 kW Non Interval and General Service 50
14 to 1,000 kW Interval classes.

15

16 • GS 1000NI = General Service 50 to 1,000 kW Interval. This model is the share
17 of GS 1000NI of total GS 1000 sales used to allocate the GS 1000 model results
18 to the Non Interval and Interval classes.

19

20 • GS 1500 = General Service 1,000 to 1,499 kW

21

22 • GS 5000 = General Service 1,500 to 4,999 kW

23

24 • L = Large Use

25

26 • MU = Unmetered Scattered Load

27

28 • SL = Street Lighting

29

30 • DCL = Dry Core Losses

31

- 1 b) The dependent variable for each model is the historical monthly sales, with the exception
2 being the residential model and GS 1000NI model. The residential model dependent
3 variable is monthly average use (Sales/Customers). The GS 1000NI dependent variable
4 is GS 1000NI sales' share of total GS 1000 sales (GS 1000NI sales/GS 1000 sales).
5
6 c) There are no differences between the dependent variables and the historic energy use,
7 as indicated in Appendix 2-IB.
8
9 d) The dependent variable in the residential model is monthly average use
10 (sales/customers). The dependent variable in the GS 1000NI model is GS 1000NI share
11 of total GS 1000 sales.

INTERROGATORY RESPONSE - OEB-129

3-Staff-3

EXHIBIT REFERENCE:

Part 2 Load Forecast Data

SUBJECT AREA: Load Forecast

Preamble:

The energy forecast models include several binary variables. These are summarized in the table below:

	Res	GS 50	GS 1000	GS 1000NI	GS 5000	L	SL
January				X			X
February				X			X
March	X			X			X
April	X			X			X
May	X			X			X
June				X			X
July				X			X
August				X			X
September				X			X
October				X			X
November	X			X			X
December				X			X
2015	X						
2016	X						
2018							X
January 2013			X				
September 2013						X	
December 2013						X	
February 2014				X			
March 2014				X	X		

	Res	GS 50	GS 1000	GS 1000NI	GS 5000	L	SL
June 2014		X					
May 2015					X		
June 2015						X	
July 2016					X		
October 2017					X		
July 2018			X				
April 2015 Plus						X	
May 2016 Plus						X	
2019 Plus							X

1

2 For the GS 1000NI model, dummy variables are used for every month, and no intercept (or
3 constant) coefficient is calculated. The monthly binary variables have coefficients ranging from
4 to 0.532 (June) 0.577 (January) and average 0.552. April is ranked sixth largest out of the 12
5 months, and is closest to the average with a coefficient of 0.555.

6

7 For the SL model, dummy variables are also used for every month, and no intercept (or
8 constant) coefficient is calculated. The monthly binary variables have coefficients ranging from
9 to 2662 (June) 4468 (January) and average 3527. September is ranked seventh largest out of
10 the 12 months, and is closest to the average with a coefficient of 3389.

11

12 Single month dummy variables have been used 12 times in 11 distinct months.

13

14 Question(s):

15

16 a) Please prepare a scenario for GS 1000NI where April is not included as an explanatory
17 variable, and a Constant or Intercept value is included.

18

19 b) Please prepare a scenario for SL where September is not included as an explanatory
20 variable, and a Constant or Intercept value is included.

1 c) Has Hydro Ottawa looked into seasonality of energy use underpinning the regression
2 models Res, GS1000NI, and SL that has led to the use of monthly dummy variables? If
3 so, please explain. If not please examine possible causes and how they might be
4 impacting seasonal energy use.

5
6 d) What steps have Hydro Ottawa and Itron taken to review the data entries for the 12
7 instances where a single month dummy variable was used?

8
9 e) Dummy variables for 2018 and 2019 plus are used in the SL regression model. Please
10 explain the underlying reasons which necessitated the dummy variables in 2018 and
11 2019, and why 2019 Plus was used instead of only 2019.

12
13 **RESPONSE:**

14
15 a) The result of the scenario is identical to the forecast with an April binary and no
16 intercept.

17
18 b) The result of the scenario is identical to the forecast with a September binary and no
19 intercept.

20
21 c) The GS1000NI model is a share model used to allocate the aggregate GS1000 model
22 results to the General Service 50 to 1,000 kW Non Interval and General Service 50 to
23 1,000 kW Interval classes. All 12 monthly binaries are used to calculate an average
24 share for each month.

25
26 The seasonal variation in residential average use model is largely captured by the
27 heating and cooling variables. The addition of the monthly binaries in the shoulder
28 months help capture some of the seasonal variation that is not able to be accounted for
29 with the primary model drivers.
30

- 1 d) Monthly binaries are used to capture variation that cannot be explained with weather,
2 economic drivers, end-use efficiency drivers, or CDM trends. Binaries are included
3 where they help to explain the monthly load pattern and improve on the model statistical
4 fit. Isolating variation unrelated to weather and economics strengthens the model
5 coefficient and explanatory power of the primary model variables.
6
- 7 e) Street Lighting sales have declined as a result of switching to more efficient bulbs,
8 starting in 2018. This decline continues into 2019. The 2019 plus binary continues the
9 downward shift into the future.

INTERROGATORY RESPONSE - OEB-130

3-Staff-4

EXHIBIT REFERENCE:

Exhibit 3, Tab 1, Schedule 1, Attachment C, pp. 23-25

Updated Chapter 2 Appendix 2-IB

SUBJECT AREA: Load Forecast

Preamble:

Itron states that "Large User sales have been relatively constant since 2016. We assume that sales continue at this level over the next five years." With respect to street lighting, it states that "the forecast is derived by holding current street lighting sales constant and then adjusting for expected savings from further CDM street lighting activity. Finally, it states that "MU and DCL classes are both small rate classes with little sales. Given there is little information to explain sales trends, models are estimated with simple exponential smoothing."

Forecasted loads, kWh and kW where applicable, exhibit decreasing trend in the Large Use, Street Light, and Unmetered Scattered Load (USL) rate classes over the time period from 2019 to 2025. In USL, the annual load reductions vary from 2.1% to 2.7% over the 2015-2019 period. Over the 2020-2025 period, the forecasted annual reductions vary from 3.5% to 3.8%.

Question(s):

a) Please confirm that the MU model is used to forecast the USL rate class.

b) Please explain whether the forecast reductions in Large Use and Street Light are driven entirely by CDM. If something else is causing the reductions in use, please explain the cause.

- 1 c) Please explain how exponential smoothing has resulted in larger decreases in the
2 forecast period than in the historic period.

3

4 **RESPONSE:**

5

- 6 a) Hydro Ottawa confirms that the MU model is used to forecast the USL rate class.

7

- 8 b) The declines are driven entirely by CDM.

9

- 10 c) The larger decrease in the forecast period is the result of CDM.

INTERROGATORY RESPONSE - OEB-131

3-Staff-5

EXHIBIT REFERENCE:

Exhibit 3, Tab 1, Schedule 1, Attachment C, page 26 Part 3 Load Forecast Data

SUBJECT AREA: Load Forecast

Preamble:

Itron states that "Monthly billing demand regression models are estimated for each rate class." However, the provided Part 3 Load Forecast Data only has one regression model. Only one model has been provided in the referenced Excel workbook. The provided model includes variables for GS1000I_kW, GS1000I_MWh, and dummy variables for 12 calendar months of the year, June 2013, and Yr18Plus (identifying all observations beginning in 2018).

Question(s):

- a) Please explain which rate classes are forecasted using this model.
- b) For any rate classes not forecasted by the provided model, please provide models underpinning the forecasts, or, if regression is not used, please describe the methodology used, and provide the supporting calculations.
- c) Does Hydro Ottawa know the underlying reason the billing demand was different in June 2013, and change from January 2018 onwards necessitating the June 2013 and Yr18Plus variables.

1

2 **RESPONSE:**

3

4 a) Each rate class has its own regression model. There are separate demand models for
5 the following rate classes:

6

- 7 • General Service 50 to 1,000 kW Non Interval
- 8 • General Service 50 to 1,000 kW Interval
- 9 • General Service 1,000 to 1,499 kW
- 10 • General Service 1,500 to 4,999 kW
- 11 • Large Use
- 12 • Street Lighting

13

14 b) The separate demand models for the rate classes listed in the response to part (a)
15 above can be found in Attachment OEB-131(A): Part 3 - Load Forecast Data kW. Model
16 data, specification, and model statistics are provided within the attachment.

17

18 c) The June 2013 binary was needed, as the variation in demand could not be explained by
19 the June 2013 MWh sales. The January 2018 Plus binary variable was used to capture
20 the change in relationship between sales and demand that began to occur in 2018.

INTERROGATORY RESPONSE - OEB-132

3-Staff-6

EXHIBIT REFERENCE:

Updated Exhibit 3, Tab 1, Schedule 1, page

Updated Exhibit 3, Tab 1, Schedule 1, Attachment C, pp. 26, 31

SUBJECT AREA: Load Forecast

Preamble:

The table at the first reference:

Table 2 – UPDATED FOR 2019 ACTUALS – 2021-2025 Demand Sales Forecast by Customer Class (kW)

	2021	2022	2023	2024	2025
General Service 50 to 1,000 kW Non Interval	2,786,967	2,702,337	2,617,997	2,538,583	2,448,864
General Service 50 to 1,000 kW Interval	3,174,724	3,259,157	3,344,504	3,436,652	3,517,111
General Service 1,000 to 1,499 kW	853,438	855,951	858,556	863,172	865,281
General Service 1,500 to 4,999 kW	1,517,165	1,516,028	1,516,400	1,519,896	1,518,291
Large Use	1,052,901	1,050,767	1,049,467	1,050,683	1,046,964
Standby Power	7,440	7,440	7,440	7,440	7,440
Sentinel Lighting	132	132	132	132	132
Street Lighting	61,590	58,864	56,618	54,374	52,530
TOTAL KW DEMAND SALES	9,454,357	9,450,676	9,451,114	9,470,932	9,456,613

Is materially different from the table at the second reference:

1 Table 8: Class Demand Forecast

Class Billing Demand (MW)												
Year	GS 1000 NI	Chg	GS 1000 I	Chg	GS 1500	Chg	GS 5000	Chg	Large Users	Chg	St Light	Chg
2013	387,717		254,033		70,296		191,749		121,622		10,344	
2014	357,675	-7.7%	232,563	-8.5%	65,093	-7.4%	174,815	-8.8%	102,709	-15.6%	10,344	0.0%
2015	357,091	-0.2%	245,936	5.8%	79,880	22.7%	169,512	-3.0%	104,951	2.2%	10,810	4.5%
2016	355,176	-0.5%	264,544	7.6%	85,387	6.9%	165,417	-2.4%	104,754	-0.2%	10,665	-1.3%
2017	324,676	-8.6%	263,462	-0.4%	90,763	6.3%	179,137	8.3%	102,642	-2.0%	9,793	-8.2%
2018	342,355	5.4%	278,914	5.9%	88,992	-2.0%	173,017	-3.4%	104,001	1.3%	7,818	-20.2%
2019	288,388	-15.8%	289,047	3.6%	81,320	-8.6%	155,831	-9.9%	103,877	-0.1%	6,606	-15.5%
2020	274,479	-4.8%	285,282	-1.3%	77,147	-5.1%	142,531	-8.5%	100,489	-3.3%	5,873	-11.1%
2021	264,819	-3.5%	291,205	2.1%	77,120	0.0%	139,884	-1.9%	98,814	-1.7%	5,313	-9.5%
2022	257,330	-2.8%	299,008	2.7%	77,407	0.4%	140,051	0.1%	98,706	-0.1%	4,991	-6.1%
2023	249,962	-2.9%	306,779	2.6%	77,676	0.3%	140,198	0.1%	98,597	-0.1%	4,804	-3.7%
2024	242,511	-3.0%	314,611	2.6%	77,984	0.4%	140,364	0.1%	98,489	-0.1%	4,617	-3.9%
2025	235,832	-2.8%	322,574	2.5%	78,355	0.5%	140,597	0.2%	98,385	-0.1%	4,430	-4.1%
2013-19		-4.6%		2.3%		3.0%		-3.2%		-2.4%		-6.8%
2020-25		-3.0%		2.5%		0.3%		-0.3%		-0.4%		-5.5%

3 It is noted that the system peak demand at in Table 9 is less than 1,500 MW in every year.

4

5 Question(s):

6

7 a) Please explain how the first table, reflecting Hydro Ottawa's forecasted billing demand
8 results from the table at the second reference reflecting Itron's forecasted billing
9 demand.

10

11 b) Please reconcile billing demand in the hundreds of GW for multiple rate classes in Table
12 8 with the system peak demand less than 1.5 GW in Table 9.

13

14 c) If any tables are in error, please re-state with a corrected table.

15

16 **RESPONSE:**

17

18 a) The updated version of Table 2 in UPDATED Exhibit 3-1-1: Load Forecast is the sum of
19 the peak demand for all 12 months in each year. Table 8 in UPDATED Attachment
20 3-1-1(C): Hydro Ottawa Long-Term Electric Energy Demand Forecast is the maximum

- 1 peak demand for the 12 months in each year. This is why the tables are materially
2 different.
- 3
- 4 b) Table 8 in UPDATED Attachment 3-1-1(C): Hydro Ottawa Long-Term Electric Energy
5 Demand Forecast is the maximum peak demand for each rate class separately for the
6 entire year. Table 9 in UPDATED Attachment 3-1-1(C) is the maximum peak demand for
7 the entire system for the entire year. This is why the tables are materially different.
- 8
- 9 c) There are no errors in the tables.

INTERROGATORY RESPONSE - OEB-133

3-Staff-7

EXHIBIT REFERENCE:

Updated Exhibit 3, Tab 1, Schedule 1, pp 3, 5

Updated Exhibit 3, Tab 1, Schedule 1, Attachment C, pp. 26-27

Part2LoadForecast Data kWh, sheet Res – Data

SUBJECT AREA: Load Forecast

Preamble:

Itron states:

Estimated historical and forecasted CDM savings are directly incorporated into the estimated rate class sales forecast models; cumulative historical CDM are included as a separate model variable.

...

There are two reasons to include CDM as a model variable. First, adding CDM helps explain the declining customer usage and as a result improves on the model fit statistics. Second, it helps avoid double-counting savings.

In the Res – Data worksheet, the variable ResCDM_PC has a value of 47.94 in December, 2019. The value continues to increase each month until November 2021 when it has a value of 50.32. From November 2021 to December 2025, the value of 50.32 is maintained.

On Page 5, Hydro Ottawa has also identified CDM adjustments to the load forecast.

1 Question(s):

2

3 a) Please explain the reason for the continued increase in the ResCDM_PC variable in
4 2020 and 2021. Please differentiate these savings in the regression model from the
5 CDM Adjustments discussed on page 5 of the first reference, and explain how the
6 potential for double-counting has been avoided.

7

8 b) Please explain how historical CDM savings, and persisting savings from historical CDM
9 delivery, are reflected in the energy models for rate classes other than Residential.

10

11 c) Please differentiate between savings captured in the regression models in part b) from
12 CDM Adjustments discussed on page 5 of the first reference, and explain how the
13 potential for double-counting has been avoided.

14

15 **RESPONSE:**

16

17 a) The ResCDM_PC variable is constructed as a total residential CDM divided by
18 residential customers. This variable increases through 2021. Although total residential
19 CDM increases in 2022, it begins to decrease on a per customer basis, as customer
20 growth outpaces additional CDM. The ResCDM_PC variable and the CDM Adjustments
21 on page 5 of UPDATED Exhibit 3-1-1: Load Forecast are based on the same historical
22 and projected CDM estimates.

23

24 b) The General Service < 50 kW, General Service 50 to 1,000 kW Non Interval, and
25 General Service 50 to 1,000 kW Interval models include a CDM variable in the
26 regression models. The CDM variables represent the historical and forecasting CDM for
27 each class. The resulting model output includes the impact of future CDM. Adjustments
28 for CDM for the General Service 1,000 to 1,499 kW, General Service 1,500 to 4,999 kW,
29 Large Use, Unmetered Scattered Load, and Street Lighting classes happen outside of
30 the model specification.

31

- 1 c) CDM Adjustments on page 5 of UPDATED Exhibit 3-1-1: Load Forecast are based on
- 2 the same historical and projected CDM estimates that are used in the models.

INTERROGATORY RESPONSE - OEB-134

3-Staff-8

EXHIBIT REFERENCE:

Updated Exhibit 3/ Tab 1/ Schedule 1/ Tables 6 and 7

Exhibit 4/ Tab 1/ Schedule 6, p. 9

IESO CDM 2017 Final Verified Results Report, Tab “LDC Persistence”

SUBJECT AREA: CDM Adjustments

Preamble:

Exhibit 3, Tab 1, Schedule 1 includes the following five-year Conservation and Demand Management (CDM) adjustments provided below:

Table 6 – 2021-2025 Energy Sales CDM Adjustments by Customer Class (MWh)³

	2021	2022	2023	2024	2025
Residential	8,478	9,135	9,219	9,300	9,379
General Service < 50 kW	16,151	19,798	24,180	28,566	31,935
General Service 50 to 1,000 kW Non Interval	20,319	23,573	26,304	28,816	30,851
General Service 50 to 1,000 kW Interval	25,653	31,796	37,983	44,596	51,222
General Service 1,000 to 1,499 kW	8,487	10,056	11,313	12,369	13,090
General Service 1,500 to 4,999 kW	48,038	53,795	58,785	63,772	68,370
Large Use	29,971	31,374	32,230	33,085	33,873
Unmetered Scattered Load	112	131	149	168	179
Sentinel Lighting	0	0	0	0	0
Street Lighting	5,308	6,194	7,006	7,816	8,565
TOTAL MWh SALES	162,517	185,852	207,169	228,488	247,464

Table 7 – 2021-2025 Demand Sales CDM Adjustments by Customer Class (kW)

	2021	2022	2023	2024	2025
General Service > 50 to 1,499 kW	112,290	134,704	155,421	176,080	195,031
General Service 1,500 to 4,999 kW	87,899	98,431	107,562	116,692	125,101
Large Use	45,592	47,724	49,024	50,327	51,527
Standby Power	0	0	0	0	0
Sentinel Lighting	0	0	0	0	0
Street Lighting	14,272	17,025	19,270	21,515	23,358
TOTAL KW DEMAND SALES	260,053	297,884	331,277	364,614	395,017

Source: Updated Exhibit 3, Tab 1, Schedule 1

The five-year CDM adjustments are based on three components:

- i. contractual agreements between Hydro Ottawa and customers made on/before April 30, 2019
- ii. estimated rate-based savings of 2 GWh per year from commercial customers

Table 1 – 2021-2025 Forecasted Annual Energy and Demand Savings from Rate-Based CDM Activities for Commercial Customers

Commercial Accounts	2021	2022	2023	2024	2025
Annual Savings (MWh)	2,000	2,000	2,000	2,000	2,000
Persisting Savings (MWh)	2,000	4,000	6,000	8,000	10,000
Annual Savings* (kW)	298	298	298	298	298

*Note: A conversion rate of 6,702 kWh/kW was used to forecast annual demand savings. This conversion rate is based on an average taken from the 2017 Verified Savings Report issued by the IESO using totals from the entire suite of Provincial Business Programs.

Source: Exhibit 4, Tab 1, Schedule 6, p. 9

- iii. estimated impacts related to the continuation of CDM programs which are still being administered at the provincial level by the IESO

Based on the CDM forecasts in Tables 6 and 7, it shows a progressive increase in forecasted energy and demand savings from ongoing and potentially new programs. The forecasted

29 demand savings in Table 7 are significantly higher than the persistence of demand savings of
30 2017 programs in the former Conservation First Framework (CFF) into the 2021-2025 years:

Year	Energy savings (kWh)	Demand savings (kW)
2021	273,675,778	36,977
2022	268,541,589	35,959
2023	267,015,594	35,625
2024	262,747,721	34,966
2025	248,446,183	33,009

31 *Source: 2017 Final Verified Results Report*

32 Question(s)

33

34 a) In excel format, please re-file Tables 6 and 7 (Exhibit 3, Tab 1, Schedule 1) with the
35 breakdown of each of the rate class savings into the following three categories:

36 i. amount of persisting savings from remaining contracts executed under the CFF
37 on/before April 30, 2019

38 ii. "rate-based" savings from new projects (showing the allocation of 2 GWh/year of
39 projected savings across commercial classes)

40 iii. continuation of CDM programs which are still being administered at the provincial
41 level by the IESO

42

43 b) For the first category of savings related to i) persisting savings from remaining contracts
44 executed on/before April 30, 2019:

45 i. Please discuss how Hydro Ottawa has revised its future estimated CDM savings from
46 CFF programs following the cancellation of the CFF.

47 ii. Please reconcile the CDM savings (in Tables 6 and 7) with the savings from the
48 CDM-IS project reports that were part of the former CFF.

49 Please file the project lists from the CDM-IS savings report in excel format, inclusive of
50 the following information:

- 51 (1) What CFF program the project(s) are being completed under
52 (2) The timing of approval for each project
53 (3) Confirmation that Hydro Ottawa and its customer(s) have entered into a
54 contractual agreement for the energy efficiency project(s) to be completed
55 (4) The total estimated savings and project timeframe for each
56 CFF-project(s) that Hydro Ottawa is contractually obligated to complete
57
- 58 c) For the second category of savings related to ii) on “rate-based” savings from commercial
59 customers, please clarify what “rate-based” savings mean. It appears that Hydro Ottawa is
60 not seeking approval of a distributor-specific, ratepayer funded CDM program in this
61 Application.
- 62 i. Please confirm these savings will only be achieved from yet to be approved annual
63 costs of \$0.2-0.5 million related to compensation, marketing and miscellaneous costs
64 in OM&A. If not, please clarify.
- 65 ii. Please explain the appropriateness of including CDM staffing costs in OM&A, as they
66 were formerly not included in the revenue requirement[1]. Please explain the need for
67 new CDM staff, if there are existing staff available for delivery of conservation activities
68 related to the former CFF, and provide greater clarity on what planning tools, reports
69 and information Hydro Ottawa is relying on to support the need for an increase to its
70 OM&A.
- 71 iii. Please discuss whether Hydro Ottawa has sought approval or engaged in discussions
72 with the IESO related to the projected rate-based savings from commercial
73 customers. In Hydro Ottawa’s response, please provide any correspondence with the
74 IESO on this topic.
- 75 (1) If the OEB does not approve of the requested OM&A funding for these
76 rate-based CDM activities, please discuss whether Hydro Ottawa will
77 continue to pursue these opportunities.
- 78 iv. In excel format, please file the following details by project to support the inclusion of
79 rate-based savings in the CDM adjustment:
- 80 (1) What program (e.g., interim framework, post-CFF) the project(s) or CDM
81 activities will be completed under

- 82 (2) What entity (e.g., IESO, Hydro Ottawa) will be delivering each project or
83 CDM activity?
- 84 (3) The timing of approval for each project or CDM activity
- 85 (4) What kind of confirmation Hydro Ottawa will receive to indicate that the
86 project will be completed
- 87 (5) The total estimated savings (including net-to-gross ratios) and project
88 timeframe for each project or CDM activity. Please provide all relevant
89 input assumptions including savings by measure and customer
90 participation rates, if available.
- 91 v. Please discuss the appropriateness of including projected savings from rate-based
92 activities in the CDM adjustment, as they have yet to be defined and appear to be
93 beyond the scope of the former CFF.
- 94 (1) What OEB policy guidance is Hydro Ottawa relying on in making this
95 proposal?
- 96 (2) How will Hydro Ottawa ensure these potential savings can be achieved
97 and verified?
- 98 (3) Please discuss the proposed process that would follow in the event the
99 projected CDM savings do not materialize, including cost responsibility.
- 100
- 101 d) For the third category of savings related to iii) continuation of CDM projects administered at
102 the provincial level, please address the following:
- 103 i. Please clarify what “the continuation of CDM projects administered at the provincial
104 level” specifically refers to.
- 105 (1) Please explain how Hydro Ottawa has estimated lost revenue results at
106 the distributor level.
- 107 (2) Please discuss whether Hydro Ottawa has sought direction, approval or
108 advice from the IESO in developing these savings estimates. In Hydro
109 Ottawa’s response, please provide all correspondence between Hydro
110 Ottawa and the IESO on this topic.
- 111 ii. As the IESO will no longer be providing distributor-level savings reports to LDCs,
112 please discuss the appropriateness of including an estimate of savings from the

- 113 continuation of CDM projects administered at the provincial level in the CDM
114 adjustment.
- 115 iii. In excel format, please file the following details by project to support the estimated
116 savings from the continuation of CDM projects administered at the provincial level:
- 117 (1) What program (e.g., interim framework, post-CFF) the project(s) will be
118 completed under
 - 119 (2) What entity (e.g., IESO, Hydro Ottawa) will be delivering each project or
120 program?
 - 121 (3) The timing of approval for each project
 - 122 (4) What kind of confirmation Hydro Ottawa will receive to indicate that the
123 project will be completed
 - 124 (5) The total estimated savings (including net-to-gross ratios) and project
125 timeframe for each project. Please provide all relevant input assumptions
126 including savings by measure and customer participation rates, if
127 available.
- 128
- 129 e) For the savings forecast from street lighting customers in Tables 6 and 7, please discuss
130 the source of funding for the street light retrofit upgrades, the planned number of upgrades
131 (also as % of total street lights) over the 2021-2025 period, and what the street light bulbs
132 will be upgraded to.

133 _____

134 [1] Section 2.4.6 of Chapter 2 Filing Requirements (2018 Edition for 2019 Rate Applications), July 12,
135 2018

136 _____

137 **RESPONSE:**

138

139 A response to this interrogatory will be provided in full during the week of June 8th, 2020.

INTERROGATORY RESPONSE - OEB-135

3-Staff-9

EXHIBIT REFERENCE:

Exhibit 2/ Tab 4/ Schedule 3/ pp. 273-274

Exhibit 4/ Tab 1/ Schedule 6/ pp. 7-8

SUBJECT AREA: Distribution System Plan

Preamble:

Based on its Local Achievable Potential Study, Hydro Ottawa notes that utility-scale energy storage is needed to reduce peak of 3.75-7.5 MW at a cost of \$9.6-22.7 million.

To date, Hydro Ottawa has submitted an application for funding from the IESO (for \$3.25 million) to relieve of capacity constrained areas in Kanata North (Thermostat and Retrofit Program) that could contribute 2.56 MW towards peak reduction.

Hydro Ottawa states that it could help with minimizing the rates for customers and provide short-term capacity relief in Kanata North, but did not include expenditures for non-distribution activities in the forecast expenditure plan.

Question(s):

a) What is the status of the application for IESO funding (\$3.25 million) for the two projects to relieve of capacity issues in Kanata North?

b) Does Hydro Ottawa plan to request ratepayer funding for the remainder of the project in a future application?

RESPONSE:

a) The IESO has approved Hydro Ottawa's applications to operate two local conservation programs to provide short-term capacity relief in Kanata North: Kanata North Smart Thermostat Program (approved April 3, 2020) and Kanata North Retrofit + Program (approved April 15, 2020). The total combined funding for these two programs has increased from \$3.25M, as reported on page 274 of Exhibit 2-4-3: Distribution System Plan, to \$6.55M. The total demand reduction target in the Kanata North area from these two programs has increased from 2.6 MW to 3.4 MW. Due to the timing of these two local program approvals, this Application was not updated to reflect the increased funding.

b) Hydro Ottawa does not have any plans to request ratepayer funding for utility scale energy storage in a future application since it was determined to not be economically viable for the capacity requirements in this area. In the short-term, Hydro Ottawa will be mitigating the capacity requirements in the Kanata North area through distribution activities, as described on pages 281-300 of Attachment 2-4-3(E): Material Investments, in conjunction with the IESO-funded projects. Hydro Ottawa's long-term plan to address load growth in the Kanata North area will be confirmed after the bulk transmission plan for the area is completed by the IESO later in 2020. In addition to considering new station connection options that arise from the bulk transmission supply plan, the IESO's plan will consider the latest information on the potential and associated cost for non-wires alternatives.

INTERROGATORY RESPONSE - OEB-136

3-Staff-10

EXHIBIT REFERENCE:

Appendix 2-I

Updated Exhibit 3/ Tab 1/ Schedule 1/ Tables 6 and 7

SUBJECT AREA: CDM Adjustments

Question(s):

Based on the responses to the above CDM adjustment interrogatories:

a) Please confirm whether there were any change(s) made. If yes, please re-file revised forecasts of CDM savings and updates to all related models from 2021 to 2025.

b) Please provide the LRAMVA thresholds (i.e., annualized equivalent of the CDM adjustments) for each year from 2021 to 2025, as the tables in Appendix 2-I did not include the test years' CDM adjustments and LRAMVA threshold amounts.

RESPONSE:

A response to this interrogatory will be provided in full during the week of June 8th, 2020.

INTERROGATORY RESPONSE - OEB-137

3-Staff-11

EXHIBIT REFERENCE:

Exhibit 3, Tab 1, Schedule 1, Attachment C, page 5

Chapter 2 filing requirements, issued July 12, 2018, page 23.

SUBJECT AREA: Load Forecast

Preamble:

Itron has calculated normal monthly degree days “as an average of monthly degree-days over the past twenty years - 1999 through 2018.”

The filing requirements require “In addition to the proposed test year load forecast, the load forecasts based on a 10-year average and 20-year trends in HDD and CDD”.

Question(s):

a) Please provide a forecast where a 10-year average has been used.

b) Please provide a forecast where a 20-year trend has been used.

RESPONSE:

a) A forecast using a 10-year average (2009-2018) is included as Attachment OEB-137(A):
10-Year Average 2009-2018.

b) A 20-year trended normal was calculated by averaging the trends in annual heating and cooling degree days from 1999-2018. Heating degree days are decreasing, and cooling

- 1 degree days are increasing. The forecast is as Attachment OEB-137(B): 20-Year
- 2 Trended Normal.

INTERROGATORY RESPONSE - OEB-138

3-Staff-12

EXHIBIT REFERENCE:

Exhibit 3, Tab 1, Schedule 1, Attachment C, page 6

SUBJECT AREA: Load Forecast

Preamble:

Itron states that:

Normal peak-day HDD and TDD are derived as a twenty-year average using a rank and average approach. This approach entails first finding the highest HDD and TDD that occurred in each month over the last twenty years (1999 to 2018), and within each year ranking the degree-days from the highest to the lowest value so that there are 12 monthly ranked HDD and TDD in each year. The ranking across the years are then averaged effectively generating peak-weather TDD and HDD duration curves with 12 average values.

The ranked-average TDD and HDD are assigned to specific months based on that peak month TDD or HDD is most likely to occur. The highest weighted TDD is assigned to July, the next highest August, the third highest June, and so forth. The highest HDD value is assigned to January, the next highest to February, the third highest to December, and so forth.

Question(s):

- a) Please explain why the ranked-average TDD and HDD are assigned to specific months based on the month the peak is most likely to occur, instead of the month it actually occurred?

1

2 b) Has Itron considered averaging 20 peak HDD and TDD from January, 20 from February
3 and so on, assigning those to the respective months? Why was this approach
4 discounted?

5

6 c) What measures has Itron taken to validate the suitability of a 20-year average with
7 respect to long-term trends in weather?

8

9 **RESPONSE:**

10

11 a) The objective is to estimate representative peak demands for a forecast period that is
12 consistent with forecasted sales and energy. Assigning peak-producing normal weather
13 to the months where that temperature is most likely to occur results in peak demand
14 forecasts consistent with normalized sales and energy forecasts.

15

16 b) Averaging peak-day weather by month generally results in lower peak-demand
17 estimates than what would be expected on an annual basis, as the peak-day weather
18 does not always occur in the same month. If the peak-day weather in a given year
19 occurred in June or August, averaging just the July peak-day weather would
20 underestimate expected annual peak-day weather conditions. The rank and average
21 method averages across all the historical peak-day producing weather regardless of the
22 month in which it occurred.

23

24 c) The 20-year normal peak producing weather is consistent with the 20-year normal
25 monthly HDD and CDD used in generating the sales and energy forecast. This has been
26 the generally accepted measure in Ontario. This is also consistent with generally
27 accepted methods in the industry. In Itron's 2017 Forecasting Benchmark Survey, the
28 largest majority of respondents, 40%, use a 20-year period for weather normalization;
29 24% use a 30-year period; 15% a 10-year period; 12% use a 15-year period; and 7%
30 more than 30 years. The survey question will be updated in the Itron's 2020 Forecasting
31 Benchmark Survey.

INTERROGATORY RESPONSE - OEB-139

3-Staff-13

EXHIBIT REFERENCE:

Exhibit 3, Tab 2, Schedule 1, page 17 of 26

SUBJECT AREA: Other Revenue

Question(s):

a) Please provide supporting calculations for the forecasted revenue related to the Dry Core Transformer Distribution Charges for 2021-2025.

b) Please specify what assumptions are used regarding the forecasted Regulated Price Plan, transmission rate, low voltage rate, and regulatory charge.

RESPONSE:

a) The supporting calculations for the forecasted distribution revenue related to the Dry Core Transformer Charges for 2021-2025 have been provided as Attachment OEB-139(A): 2021-2025 Dry Core Calculations.

b) As part of UPDATED Exhibit 3-2-1: Other Revenue Summary, Hydro Ottawa has forecasted the revenue for distribution charge only. The increase for 2021-2025 was based on an average preliminary rate increase for the three commercial classes for the five-year period, which was 6.33%. Hydro Ottawa has not included any assumptions regarding the Regulated Price Plan ("RPP"), transmission rate, low voltage rate, and regulatory charge as part of this Exhibit.

1 Please see UPDATED Exhibit: 8-7-1 Specific Service Charges for details regarding the
2 proposed Dry Core charges. Hydro Ottawa has used the rates in effect as of January 1,
3 2020 for the RPP, transmission rate, and regulatory charges for all years. The proposed
4 rates for 2021-2025 have been used for distribution and low voltage rates. Please see
5 UPDATED Attachment 8-7-1(B): Dry Core Calculations for detailed calculations, as well
6 as the response to interrogatory OEB-38.

7
8 As discussed in UPDATED Exhibit: 8-7-1 Specific Service Charges, Hydro Ottawa is
9 proposing to adjust these rates on an annual basis to reflect any changes in the RPP as
10 well as transmission rates. In addition, Regulatory rates will be updated as per any
11 applicable OEB Decision and/or Order. The approved rates for 2021-2025 will be used
12 for distribution and low voltage rates.

INTERROGATORY RESPONSE - OEB-140

4-Staff-1

EXHIBIT REFERENCE:

Exhibit 4/Tab 1/Schedule 1/pp 4-5 of 6

SUBJECT AREA: OM&A

Preamble:

Hydro Ottawa noted that the proposed 2021-2025 OM&A spending levels were reviewed by the Executive Management Team (EMT) and several adjustments/reductions were made to the proposals.

Question(s):

a) Please provide the initial OM&A budget presented to the EMT for each year of the 2021-2025 period.

b) Please specify and explain the nature of each adjustment/reduction made to the initial OM&A budget for the 2021-2025 period, please also quantify the impact of each adjustment/reduction by year.

c) With the upgrade/acquisition of new IT and operational technology systems (e.g. Supervisory Control and Data Acquisition System and the Enterprise Resource Planning System), please discuss how much OM&A will be saved for the 2021-2025 period.

RESPONSE:

- a) Table A below outlines the initial OM&A budget presented to the EMT for each year of the 2021-2025 period.

Table A – Initial OM&A Budget Presented to EMT (\$'000,000s)

2021	2022	2023	2024	2025
\$99.0	\$102.4	\$105.5	\$109.6	\$112.0

- b) There were multiple reductions made from the initial budget, as shown in Table A above. The first round of reductions resulted in a total of \$21.6M, after a review and refinement of budget assumptions used by each functional area was undertaken. The second round of reductions resulted in a total of \$13.1M, and was undertaken to limit the total OM&A levels with an escalator of 2.51% in the years 2022 through 2025, based on the use of a Custom Price Escalation Factor ("CPEF"). For details on the CPEF, please refer to UPDATED Exhibit 1-1-10: Alignment with the Renewed Regulatory Framework. The reductions aim to maximize productivity, minimize bill impacts, and simultaneously ensure the financial health and viability of the utility.

Table B specifies the total reduction from the initial budget.

Table B – Reduction from Initial Budget Presented to EMT (\$'000,000s)

2021	2022	2023	2024	2025	TOTAL
\$5.1	\$6.1	\$6.8	\$8.4	\$8.3	\$34.7

- c) The Supervisory Control and Data Acquisition ("SCADA") system replacement project was based on the replacement of an out-of-date system that had reached the end of its useful life. Therefore, this project was primarily focused on risk reduction and no OM&A savings were realized.

1 Likewise, the upgrades to the Enterprise Resource Planning (“ERP”) system were
2 targeted both at mitigating the risk of the system which was nearing end-of-life, while
3 also ensuring efficient and effective ERP business outcomes are sustained for Hydro
4 Ottawa’s ongoing business operations. Hydro Ottawa’s ERP upgrades focused on
5 moving to out-of-the-box functionality so that future upgrades could be undertaken with
6 reduced time and effort. The other focus of the ERP upgrades was to automate
7 processes that were previously paper-based. Efficiency and future cost avoidance was
8 gained, rather than immediate quantifiable OM&A savings.

INTERROGATORY RESPONSE - OEB-141

4-Staff-2

EXHIBIT REFERENCE:

Exhibit 4/Tab 1/Schedule 3/page 9 of 10

SUBJECT AREA: OM&A

Preamble:

Hydro Ottawa noted that an inflation rate of 2.01% was assumed for 2021 for all non-compensation related costs.

Question(s):

a) Please specify the inflation rate used for 2020 for non-compensation related costs.

RESPONSE:

a) There is no general inflationary increase applied to the 2020 budget. The 2020 budget is largely based on known contract pricing with vendors.

INTERROGATORY RESPONSE - OEB-142

4-Staff-3

EXHIBIT REFERENCE:

Exhibit 4/Tab 1/Schedule 4/page 3 of 43

Exhibit 4/Tab 1/Schedule 5/Attachment A

Appendix 2-K Employee Costs

SUBJECT AREA: OM&A

Question(s):

a) Please explain the difference between Table 2 (Updated Ex 4-1-4, page 5) and Table 7 (Updated Ex 4-1-5, Attachment A, page 16). For example, for the 2021 test year, there is a difference of approximately \$2 million between these two tables.

b) Please specify OM&A costs incurred in 2018 that are attributable to the three extreme weather events.

c) With respect to the salary structure for executive and management:

i) Hydro Ottawa notes that "Performance and contributions are directly tied to Hydro Ottawa's corporate performance scorecard, ensuring that the focus of this workforce segment is aligned to the advancement of the utility's Strategic Direction." Please explain how performance and contributions are directly tied to Hydro Ottawa's corporate performance scorecard.

ii) Please provide historical and the forecast range of merit increases (i.e. lowest and highest increases in percentage) for executives and management for historical (2016-2019), bridge (2020), and the test year (2021).

d) For unionized employees, Hydro Ottawa noted that the current collective agreement is in effect from April 1, 2017 until March 31, 2021. Negotiated wage increases are 2.0% for

1 2017, 2.10% for 2018, 2.10% for 2019, and 2.2% for 2020. Please specify the
2 assumption of wage increases used for 2021.

3

4 e) Please provide a revised version of Appendix 2-K, Employee Costs, to reflect requests
5 as follows:

6

7 A breakdown of management positions by executives and non-executive positions.

8

9 A breakdown of non-management employees by union and non-union.

10

11 To show the expensed and capitalized compensation costs for historical (2016-2019),
12 bridge (2020), and the test year (2021).

13

14 **RESPONSE:**

15

16 a) Table 2 in UPDATED Exhibit 4-1-4: Operations, Maintenance and Administration Cost
17 Drivers and Program Variance Analysis is based on total compensation values that
18 include costs for Students and Co-ops, Employee Future Benefits, the Employee
19 Assistance Plan, and payroll accruals and other compensation-related adjustments.
20 These costs are not included in Table 7 of UPDATED Attachment 4-1-5(A): Employee
21 Compensation Strategy. Table 7 is based on the numbers provided in UPDATED
22 Attachment 4-1-5(C): OEB Appendix 2K - Employee Costs. Accruals and lump sum
23 payments are not easily identified to individual compensation categories (Management
24 versus Non-Management) and are therefore excluded from UPDATED Attachment
25 4-1-5(C): OEB Appendix 2K - Employee Costs.

26

27 b) The total OM&A costs incurred in 2018 that relate to the three extreme weather events
28 was \$1.3M.

c)

- i) Goals and supporting priorities are set out annually in the Corporate Performance Scorecard and align to the four critical areas of performance around which the strategic plan is structured: customer value, financial strength, organizational effectiveness, and corporate citizenship. These are cascaded to executive, management, and non-union employees through a robust performance management system.
- ii) The actual and forecast range of merit increases for executive and management positions are outlined in Table A.

Table A – Historical and Forecast Merit Increases - Executive & Management Positions

	2016 Actual	2017 Actual	2018 Actual	2019 Actual	2020 Bridge	2021 Test
Executive ¹	1.1 - 3%	1.7 - 3%	1.7 - 3%	2 - 3%	0 - 3%	0 - 3%
Management	0 - 4%	1 - 4%	0 - 4%	0 - 4%	0 - 4%	0 - 4%

- d) Hydro Ottawa has used an assumption similar to the non-compensation related inflation rate, as noted in section 2.6 of UPDATED Exhibit 4-1-3: Operations, Maintenance and Administration Program Costs.
- e) Please refer to Attachment OEB-142(A): Updated Appendix 2-K - Management & Non-Management.

¹ Executive for this purpose includes the only executive position in Hydro Ottawa Limited, as well as the director level positions in Hydro Ottawa Limited.

INTERROGATORY RESPONSE - OEB-143

4-Staff-4

EXHIBIT REFERENCE:

Updated Exhibit 4/Tab 1/Schedule 4/pp.28-29 of 54

SUBJECT AREA: OM&A

Preamble:

For the Collections, Accounts and Activities program, there is a 47% increase in budgeted costs for 2020 compared to the level of expenses for 2019. The year-over-year variances in this program are mainly due to fluctuations in bad debt expense. Hydro Ottawa noted that in 2018, the bad debt expense dropped, due to the implementation of a Disconnection Moratorium. The expectation is that these levels will be maintained over the 2020-2021 period.

Question(s):

- a) Please explain why a 47% increase in budgeted costs for 2020, and a further 3% increase for 2021 are necessary, given that the expectation is that the level of bad debt expense will be maintained over the 2020-2021 period.

RESPONSE:

- a) Please see Table A below for the costs in this category and an explanation of the increase from 2019.

Table A – Collections, Accounts and Activities Program by Expense Category
(\$'000s)

	2019	2020	2021	Increase 2020 vs. 2019	Increase 2021 vs. 2020
Compensation (Net of Capital Allocation)	\$1,238	\$1,529	\$1,585	24%	4%
Bad Debt Expense	\$810	\$1,458	\$1,498	80%	3%
Others	\$184	\$292	\$295	58%	1%
TOTAL	\$2,232	\$3,279	\$3,378	47%	3%

The increase in 2020 is largely explained by increased compensation and increased bad debt expense from 2019, as described below.

1) Compensation in 2019 was light due to 1.5 position vacancies in the year. Moreover, in 2019 approximately \$0.1M in labour costs were capitalized to capital assets. This is not anticipated to be the case in 2020.

2) The increase in 2017 bad debt expense as shown in Table B below was attributable to the initial implementation of the Disconnection Moratorium. The moratorium resulted in high accounts receivable aging, and an increase in bad debt expense by virtue of a rise in the expected credit loss provision. In 2018, the bad debt expense dropped, as the actual write-offs were lower than the initially provisioned amounts. Despite the fact that many customers did not pay their bills during the Disconnection Moratorium, many were able to pay when the moratorium ended. In addition, the introduction of the Fair Hydro Plan reduced the average bill amount, thereby reducing the amount that would have otherwise been owed.

Similar to 2018, the bad debt expense for 2019 saw a further reduction as actual write-offs were lower than the previously provisioned amounts.

Hydro Ottawa budgeted 2020 bad debt expense at \$1.458M. This budget amount

is based upon actual write-offs in 2019, plus two additional provisions: (1) a provision for the increase in rates in 2020, and (2) a provision for additional arrears due to forecasted slowdown in economic growth (prior to COVID-19) on account of trade uncertainty, fiscal restraint, and slowing economic growth in the U.S. and globally.¹

The 3% increase for 2021 is largely due to the increase in total bill year-over-year. Hydro Ottawa is committed to maintaining bad debt as a percentage of total electricity revenue at the same level or lower. It is a performance target that is measured quarterly. In addition, it has been proposed for inclusion in the utility's 2021-2025 Custom Performance Scorecard. (Please see Exhibit 1-1-11: Proposed Annual Reporting – 2021-2025 for details).

Please note that the foregoing response presumes normal business activity and does not take the impact of the COVID-19 pandemic into account.

Table B – Bad Debt Expense included in Collections, Accounts and Activities Program (\$'000s)

2016	2017	2018	2019	2020	2021
\$1,424	\$2,149	\$1,345	\$810	\$1,458	\$1,498

¹ Conference Board of Canada, *Provincial Outlook Economic Forecast: Ontario* (Autumn 2019); and Government of Ontario, *2019 Ontario Economic Outlook and Fiscal Review*, 2019 Fall Statement (November 6, 2019).

INTERROGATORY RESPONSE - OEB-144

4-Staff-5

EXHIBIT REFERENCE:

Updated Exhibit 4/Tab 1/Schedule 4/pp.31-32 of 54

SUBJECT AREA: OM&A

Preamble:

Hydro Ottawa explained that the increase of 22% in 2020 from 2019, for the Customer and Community Relations program, is driven by investments in increased automation. These solutions will enhance the customer experience and the efficiency of field operations. OEB staff notes that there is an incremental increase of 7% budgeted for 2021 for this program.

Question(s):

a) Please explain the drivers for this incremental increase of 7% for 2021 considering the expected efficiencies gained from increased automation.

RESPONSE:

a) A total of \$0.2M was included in 2021 for the CDM program, as referenced on page 31 of UPDATED Exhibit 4-1-4: Operations, Maintenance and Administration Cost Drivers and Program Variance Analysis. Excluding the CDM program, the incremental increase is 4% or \$0.3M. The remaining 4% increase can be largely attributed to employee costs and increased investments in automation such as Hydro Ottawa's mobile application and Field Service Management programs.

INTERROGATORY RESPONSE - OEB-145

4-Staff-6

EXHIBIT REFERENCE:

Updated Exhibit 4/Tab 1/Schedule 4/page 33 of 54

SUBJECT AREA: OM&A

Question(s):

- a) Hydro Ottawa notes that the increase in customer billing program in 2020 is partially due to the timing of the Customer Care & Billing System upgrade project. Please specify the budgeted OM&A costs related to the Customer Care & Billing System upgrade project for 2020 and 2021 respectively.

RESPONSE:

- a) Before any capitalized internal labour to the Customer Care & Billing ("CC&B") system upgrade project, Customer Billing Operating Maintenance & Administration costs remain relatively flat from 2019-2021. See Table A below for details. In 2019 and 2020, internal resources were dedicated to the development, configuration, and implementation of the CC&B upgrade project, resulting in \$631K in 2019 and \$547K in 2020 capitalized to this project. The CC&B upgrade project is scheduled to be completed in 2020, therefore there is zero budgeted in 2021 for Capital Labour Recovery.

Table A – OM&A Program Costs (\$'000s)

Programs	2019	2020	2021
Customer Billing	\$9,120	\$9,181	\$9,193
CC&B Capital Labour Recovery	\$(631)	\$(547)	\$0
TOTAL	\$8,489	\$8,634	\$9,193

INTERROGATORY RESPONSE - OEB-146

4-Staff-7

EXHIBIT REFERENCE:

Exhibit 4/Tab 1/Schedule 5/Attachment A/pp.9-11 of 13

SUBJECT AREA: OM&A

Question(s):

a) Please clarify whether Hydro Ottawa has a target percentage of temporary equivalents of the total number of FTEs for the 2021-2025 period.

i) If so, please specify the target.

ii) If so, please also explain how the target is determined.

RESPONSE:

a) Hydro Ottawa does not have a target percentage of temporary equivalents of the total number of FTEs.

INTERROGATORY RESPONSE - OEB-147

4-Staff-8

EXHIBIT REFERENCE:

Updated Exhibit 4/Tab 4/Schedule 1/Attachments D-H: PILS Workforms

Updated Exhibit 2/Tab 2/Schedule 1/Attachments F-J: Fixed Assets Continuity Schedules

SUBJECT AREA: Payment in Lieu of Taxes

Question(s):

- a) Please explain and reconcile the differences between the amortization added back in the PILS workforms to the Fixed Assets Continuity Schedules for the following test years.

	2021	2022	2023	2024	2025
PILS Workforms	52,776,147	57,126,035	59,374,339	60,928,907	64,253,232
Fixed Assets Continuity Schedules	52,332,724	56,698,553	59,015,340	60,584,926	63,900,235
Difference	443,423	427,482	358,999	343,981	352,997

- b) Please explain and reconcile the differences between the capital additions in Schedule 8 from the PILS workforms to the Fixed Assets Continuity Schedules for the following test years.

	2021	2022	2023	2024	2025
PILS Workforms	144,309,432	122,590,315	77,337,485	81,134,789	118,998,588
Fixed Assets Continuity Schedules	142,171,776	120,888,872	75,337,301	80,547,814	120,332,875
Difference	2,137,656	1,701,443	2,000,184	586,975	(1,334,287)

RESPONSE:

- a) The difference between the amortization added back in the PILS Workforms to the Fixed Assets Continuity Schedules in each test year relates to the amortization of the Capital SR&ED ("SR&ED") Tax Credits.

For accounting purposes, the Capital SR&ED Tax Credits are included as credits in OEB Account 2440 (Capital Contributions/Deferred Revenue) in the test year the tax credit is expected to be claimed for tax purposes. This credit is then amortized over five years. The Fixed Assets Continuity Schedule includes the amortization of these Capital SR&ED Tax Credits.

For tax purposes, these amounts are not included when determining the amortization added back in the PILS Workforms. Please see UPDATED Exhibit 4-4-1: Payments in Lieu of Taxes for discussion of SR&ED tax credits.

Table A provides a reconciliation of the Fixed Asset Continuity Schedule amortization and the PILS Workforms amortization.

Table A – Reconciliation of Fixed Asset Continuity Schedule Amortization and PILS Workforms Amortization by Test Year

	2021	2022	2023	2024	2025
Fixed Asset Continuity Schedules Amortization	\$52,332,724	\$56,698,553	\$59,015,340	\$60,584,926	\$63,900,235
Add : Capital SR&ED Tax Credits Amortization¹	\$443,423	\$427,482	\$358,999	\$343,981	\$352,997
PILS Workforms Amortization	\$52,776,147	\$57,126,035	\$59,374,339	\$60,928,907	\$64,253,232

¹ Please see Table C below for more information.

b) Table B provides a reconciliation of the differences between the capital additions in Schedule 8 from the PILS Workforms to the Fixed Assets Continuity Schedules for the following test years.

Table B – Reconciliation of Fixed Asset Continuity Schedules Additions and Schedule 8 Capital Additions in PILS Workforms by Test Year

	2021	2022	2023	2024	2025
Fixed Asset Continuity Schedules (net of additions & disposals)	\$142,171,776	\$120,888,872	\$75,337,301	\$80,547,814	\$120,332,875
Add : Disposals	\$4,206,783	\$3,796,502	\$3,316,400	\$2,800,571	\$2,225,887
Fixed Asset Continuity Schedules Additions	\$146,378,559	\$124,685,374	\$78,653,701	\$83,348,385	\$122,558,762
Add : Capital SR&ED Tax Credits²	\$360,000	\$340,000	\$230,000	\$390,000	\$480,000
Less : SR&ED expenses capitalized³	\$(2,429,127)	\$(2,273,041)	\$(1,546,216)	\$(2,603,596)	\$(3,260,490)
Less : Land⁴	\$-	\$(162,018)	\$-	\$-	\$(779,684)
PILS Workforms Schedule 8 Additions	\$144,309,432	\$122,590,315	\$77,337,485	\$81,134,789	\$118,998,588

Please see Table C below for the Accounting Amortization of Capital Related SR&ED Tax Credits for Test Years 2021-2025.

² SR&ED Tax Credits are recorded as credits, included in OEB Account 2440 for accounting purposes, and depreciated over five years. Please see UPDATED Exhibit 4-4-1: Payments in Lieu of Taxes and Table C below for details.

³ This represents current year SR&ED expenditures capitalized for accounting purposes but expensed for tax purposes. SR&ED expenditures are considered current expenditures for tax purposes.

⁴ Land is not depreciable for tax purposes.

**Table C – Accounting Amortization of Capital Related SR&ED Tax Credits
for Test Years 2021-2025**

Dec. 31, 2020 ending balance	(\$471,889)
Add: Capital SR&EDTCs for 2021	(\$360,000)
Less : SR&EDTCs amortization for 2021	\$443,424
Dec. 31, 2021 ending balance	(\$388,465)
Add: Capital SR&EDTCs for 2022	(\$340,000)
Less : SR&EDTCs amortization for 2022	\$427,481
Dec. 31, 2022 ending balance	(\$300,984)
Add: Capital SR&EDTCs for 2023	(\$230,000)
Less : SR&EDTCs amortization for 2023	\$359,000
Dec. 31, 2024 ending balance	(\$171,984)
Add: Capital SR&EDTCs for 2024	(\$390,000)
Less : SR&EDTCs amortization for 2024	\$343,984
Dec. 31, 2024 ending balance	(\$218,000)
Add: Capital SR&EDTCs for 2025	(\$480,000)
Less : SR&EDTCs amortization for 2025	\$353,000
Dec. 31, 2025 ending balance	(\$345,000)

INTERROGATORY RESPONSE - OEB-148

5-Staff-1

EXHIBIT REFERENCE:

Exhibit 5/Tab 1/Schedule 1/p. 2

SUBJECT AREA: Cost of Capital

Preamble:

Hydro Ottawa proposes to use the deemed short-term debt rate of 2.75% established and issued by the OEB for 2020 as the deemed short-term debt for all years of the plan from 2021 to 2025.

Question(s):

a) Please confirm OEB staff's understanding that Hydro Ottawa is not proposing to update the deemed short-term debt rate at the time of the decision and draft rate order for 2021 rates, even in the event that the updated cost of capital parameters for 2021 have been issued by the OEB.

b) Please explain how Hydro Ottawa's proposal is consistent with the OEB's policies and practices, particularly as documented in the Rate Handbook, and *the Report of the Board on the Cost of Capital for Ontario's Regulated Utilities*, (EB-2009-0084), issued December 11, 2009 (the Cost of Capital Report).

c) Please identify any precedents that Hydro Ottawa is relying on in support of its deemed short-term debt rate proposal.

RESPONSE:

a) Hydro Ottawa confirms OEB Staff's understanding of the utility's position on the deemed short-term debt rate. Hydro Ottawa is not proposing to update the rate for each year, nor is it proposing to update the rate at the decision and draft rate order stage this year (i.e. for 2021 rates). If directed by the OEB Panel, Hydro Ottawa will update its short-term debt rate at the time that the 2021 draft rate order is provided.

b) This is in line with the guidance set forth in the *Handbook for Utility Rate Applications*, which states that "the OEB expects there to be no further rate applications for annual updates within the five-year term" and "the OEB does not expect to address annual rate applications for updates for cost of capital."¹ What's more, this OEB policy states the following: "The OEB therefore expects that a utility that applies under Custom IR will be committed to that method for the duration of the approved term and will not seek early termination or in-term updates except under exceptional circumstances and with compelling rationale."

The *Report of the Board on the Cost of Capital for Ontario's Regulated Utilities*, issued on December 11, 2009,² speaks to annual updates to be issued by the OEB but does not address how to approach a Custom IR rate application for covering a five-year period. This is understandable, given that this report predated the establishment of the Custom IR rate-setting method under the 2012 Renewed Regulatory Framework.

c) Hydro Ottawa is following the approach used in its 2016-2020 rate application, with the exception of excluding the mid-term update part way through the Custom IR term. Hydro Ottawa is not suggesting any in-term updates, so as to ensure that the annual

¹ Ontario Energy Board, *Handbook for Utility Rate Applications* (October 13, 2016), page 26.

² Ontario Energy Board, *Report of the Board on the Cost of Capital for Ontario's Regulated Utilities*, EB-2009-0084 (December 11, 2009).

- 1 update process is as mechanistic as possible, which will provide regulatory efficiency
- 2 and comport with OEB policy expectations.

INTERROGATORY RESPONSE - OEB-146

4-Staff-7

EXHIBIT REFERENCE:

Exhibit 4/Tab 1/Schedule 5/Attachment A/pp.9-11 of 13

SUBJECT AREA: OM&A

Question(s):

a) Please clarify whether Hydro Ottawa has a target percentage of temporary equivalents of the total number of FTEs for the 2021-2025 period.

i) If so, please specify the target.

ii) If so, please also explain how the target is determined.

RESPONSE:

a) Hydro Ottawa does not have a target percentage of temporary equivalents of the total number of FTEs.

INTERROGATORY RESPONSE - OEB-149

5-Staff-2

EXHIBIT REFERENCE:

Exhibit 5/Tab 1/Schedule 1/pp. 3-8

Appendices 2-OB for years 2021-2025

SUBJECT AREA: Cost of Capital

Preamble:

Hydro Ottawa has calculated its actual and forecasted long-term debt for each year of the plan from 2021 to 2025. Hydro Ottawa forecasts new debt issuances of \$60 million in 2021 and \$80 million in 2023, as shown in Table 1 on page 6 of Exhibit 5/Tab 1/Schedule 1.

Hydro Ottawa has forecasted the long-term debt rate for each year of the plan, stating:

The long-term debt rate is calculated as the weighted average rate of existing embedded debt and forecast debt planned to be issued from 2021-2025. The calculation to determine the anticipated long-term debt rate is comprised of three components:

- The forecast Government of Canada 10-year bond yield;
- The 30-year to 10-year Government of Canada bond yield spread; and
- The Hydro Ottawa credit risk spread.

The use of these three components emulates the calculation of the OEB Cost of Capital Report.

1 Hydro Ottawa then describes the methodology that it used for forecasting the debt rates for
2 forecasted debt of 10-year and 30-year maturities for each year:

3

4 The underlying forecast for the Government of Canada 10-year yield is that
5 which is presented in the October 2019 Consensus Long-Term Forecast (which
6 is issued twice per year, in October and April).

7

8 Hydro Ottawa 10-year bonds are forecast by adding the Hydro Ottawa historical
9 credit spread of 112 basis points ("bps") for 10-year bonds to the forecast
10 Government of Canada 10-year yield.

11

12 The 30-year Government of Canada bond yield is calculated using the
13 Consensus Long-Term Forecast 10-year bond yield plus 44 bps, which as of
14 October 2019 is the historical five-year average spread of the 30-year over
15 10-year Government of Canada bond yield, as calculated per the OEB Cost of
16 Capital Report.

17

18 Hydro Ottawa 30-year bonds are then forecast by adding the Hydro Ottawa
19 historical credit spread of 148 bps for 30-year bonds to the forecast 30-year
20 Government of Canada yields.

21

22 The Hydro Ottawa historical credit spreads used for 10-year and 30-year bonds
23 are as of October 2019 and are based on the average Bank of Montreal ("BMO")
24 Capital Markets indicative spreads over the past two-and-a-half years for the
25 Holding Company.

26

27 For the deemed long-term debt rate and the Return on Equity (ROE), the OEB uses spreads
28 over between actual data (i.e., actual 10-year and 30-year Government of Bond yields, and
29 30-year Canadian utility A-rated corporate bond yields) for the same month of the *Consensus*
30 *Forecasts*. For the annual cost of capital forecasts for the following rate year (January
31 1-December 31), this uses actual data for all business days in the month of September, and the

1 September *Consensus Forecasts*. Consensus Economics conducts the survey around
2 mid-month, and the date on the publication is the date the survey is conducted (publication is a
3 few days later). This temporal alignment is used to get forecasts for the 30-year Government of
4 Canada bond yields and Canadian A-rated Utility bond yields based on the most current
5 information and which should most closely correspond with the 3-month ahead and 12-month
6 ahead forecasts of the 10-year Government of Canada bond yields published in *Consensus*
7 *Forecasts* (i.e. current information that the surveyed economic forecasters would have also had
8 for making their 10-year Government of Canada bond yield forecast).

9

10 This approach has been continued from when the OEB first adopted a formulaic ROE approach
11 in 1997 for natural gas distributors, with the *Ontario Energy Board Draft Guidelines on a*
12 *Formula-Based Return on Common Equity for Regulated Utilities* (Draft Guidelines), issued
13 March 1997. Developed for Ontario natural gas distributors, it was the starting point for the
14 OEB's policies for electricity utility rate regulation in the 2000s following electricity sector
15 restructuring, until reviewed and updated in late 2009 by the current Cost of Capital Report.

16

17 The Draft Guidelines were also based on ROE adjustment formulae adopted by the National
18 Energy Board (NEB) (now the Canadian Energy Regulator), the British Columbia Utilities
19 Commission and the Public Utilities Board of Manitoba; these formulae were generally
20 referenced as the RH-2-94 formula, referring to the NEB's 1994 order adopting this formulaic
21 approach.

22

23 Question(s):

24

25 a) OEB staff observes that forecasts are subject to uncertainty – they are not actuals, but
26 predictions of what is likely to occur, based on past and current circumstances, and what
27 is currently identified as the trend into the future. Further, the degree of uncertainty
28 increases the further out the forecast, and in an increasing and non-linear pace. While
29 we have a point estimate forecast for any point in time, the confidence interval
30 increases, typically in what can be described as a horn shape.

31

1 Does Consensus Economics provide any information on the confidence interval or other
2 caveats regarding its long-range forecasts? If so, please provide.

3

4 b) In its Application, as noted above, Hydro Ottawa has adopted: i) a five-year average
5 historical variance between actual 10-year and 30-year Government of Canada bonds;
6 and ii) a 2.5 year average historical variance between Government of Canada and
7 corporate bond spreads ("credit spreads") for similar maturities (10 years or 30 years).

8

9 Please explain the basis and rationale for:

10 i) Using longer-term historical periods than used by the OEB and previously
11 by other Canadian regulators for estimating the variances between
12 Government and corporate/utility bond yields;

13 ii) Using, on the one hand, a 5-year period for estimating the average
14 spread between 10-year and 30-year Government of Canada bond yields,
15 and, on the other, 2.5 years for estimating the spreads between
16 Government of Canada and corporate/utility bond yields of similar
17 maturities.

18

19 **RESPONSE:**

20

21 a) A review of Attachment OEB-149(A): October 2019 Consensus Forecasts reveals that
22 there is no information provided regarding the confidence interval or other caveats in
23 relation to Consensus Economics' long-range forecasts. A review of Attachment
24 OEB-149(B): Economic Forecasts and Indicators reveals that Consensus Economics
25 supports its forecast methodology and provides references to various academic studies,
26 which suggest that combining forecasts from different sources with simple equal weights
27 can both improve accuracy and reduce forecast error.

28

1 b) i) The *Report of the Board on the Cost of Capital for Ontario's Regulated Utilities* issued
2 in 2009¹ (the "OEB Cost of Capital Report") uses information from September (a point in
3 time) to calculate the deemed rates for the ensuing rate year. As Hydro Ottawa has filed
4 a five-year Custom IR rate application, it has utilized longer-term historical periods to
5 calculate an average spread to reduce the impact of outlier periods of economic highs
6 and lows on the calculation covering a longer period of time. This is consistent with the
7 forecast approach used by Hydro Ottawa in its previous Custom IR application filed in
8 2015.²

9
10 ii) Hydro Ottawa utilized a five-year period for estimating the average spread between
11 10-year and 30-year Government of Canada/30-year "A" Rated Utility Curve bond yields
12 and a 2.5-year period for estimating the spreads between Government of Canada and
13 Hydro Ottawa Holding Inc. indicative bond yields of similar maturities to remain
14 consistent in its forecast approach from its previous Custom IR application.³

15
16 For the purpose of responding to this interrogatory, Hydro Ottawa calculated what the
17 average historical spreads used for 10-year and 30-year bonds would be over the past
18 five years, rather than the two and half years utilized. As expected, the difference is not
19 significant – albeit the result was slightly higher at 120 bps and 160 bps, respectively, for
20 this particular timeframe.

21 ¹ Ontario Energy Board, *Report of the Board on the Cost of Capital for Ontario's Regulated Utilities*, EB-2009-0084
22 (December 11, 2009).

23 ² Hydro Ottawa Limited, *2016-2020 Custom Incentive Rate-Setting Distribution Rate Application*, EB-2015-0004 (April
24 29, 2015).

25 ³ *Ibid.*



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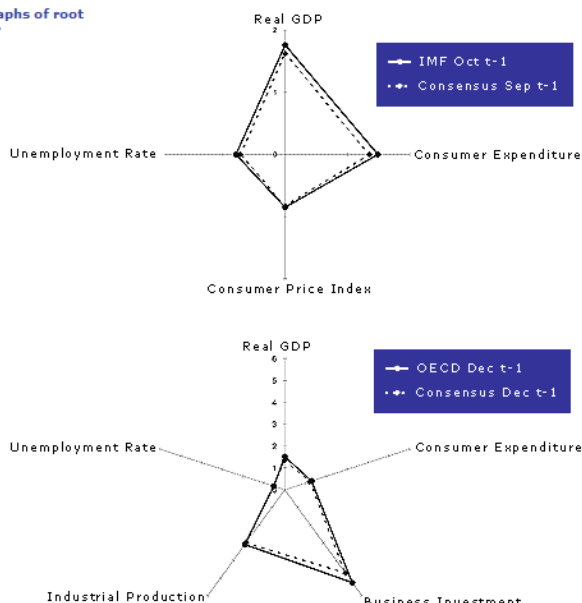
(<https://www.consensuseconomics.com/about/>)

Academic and Central Bank Research

A significant body of academic and central bank research (see below) has concluded that group forecasts and, specifically, Consensus Forecasts™ have a better track record than most of the individual forecasts which make up the group, because few, if any, individuals manage to consistently outperform the average. While in any one year some forecasting panellists will probably do better than our Consensus Forecasts™ in terms of predicting the correct outcome, these 'top performers' will vary from year to year and are very difficult to identify in advance. Consequently, using Consensus Forecasts™ which are surveyed from a group of expert economists can improve accuracy and enhance the work of our subscribers, who include investment managers, treasury executives, corporate planners, central bankers and government departments around the world.

Chart From: "The IMF and the OECD Versus Consensus Forecasts" (Reference below)

Figure 1. Radar graphs of root mean square error
% per annum
Source: Table 3



(<https://www.consensuseconomics.com/>)

Academic Research on Combining Forecasts and Forecast Accuracy Using Consensus Forecasts:

Roy Batchelor (City University Business School), "The IMF and OECD versus Consensus Forecasts", August 2000 (see above radar graphs). Applied Economics, 33(2), p.225-235; [Peer Reviewed]. Click [here](https://www.consensuseconomics.com/wp-content/uploads/2018/01/Batchelor_Study.pdf) (https://www.consensuseconomics.com/wp-content/uploads/2018/01/Batchelor_Study.pdf) to download a PDF copy of the study.

Marten Blix, Joachim Wadefjord, Ulrika Wienecke and Martin Adahl (Swedish Central Bank), "How Good is the Forecasting Performance of Major Institutions?", Economic Review of the Swedish Central Bank, Autumn 2001. The complete study is available as a PDF download at the Riksbank website (http://archive.riksbank.se/Upload/Dokument_riksbank/Kat_publicerat/PoV_sve/eng/2001/economic_review_2001_3.pdf).

Filip Novotný and Marie Raková (both Czech National Bank), "Assessment of Consensus Forecasts Accuracy: The Czech National Bank Perspective

(http://www.cnb.cz/miranda2/export/sites/www.cnb.cz/en/research/research_publications/cnb_wp/download/cnbwp_2010_14.pdf)", Working Paper Series 14, December 2010.

Scott J. Armstrong, "Combining Forecasts", Chapter 13, Principles of Forecasting: A Handbook for Researchers and Practitioners, The Wharton School, University of Pennsylvania, P.417- 439, 2001.

Robert C. Jones, "Making Better Investment Decisions", The Journal of Portfolio Management, Volume 40 No 2, P.128- 143, Winter 2014.

"At least since the publication of "The Combination of Forecasts" (Bates and Granger [1969]), economists have known that combining forecasts from different sources can both improve accuracy and reduce forecaster error. In the intervening years, numerous studies have confirmed these conclusions, outlined conditions under which forecast combinations are most effective, and tried to explain why simple equal weights work so well relative to more sophisticated statistical techniques."

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INTERROGATORY RESPONSE - OEB-150

5-Staff-3

EXHIBIT REFERENCE:

Exhibit 5/Tab 1/Schedule 1/pp. 8-10

Exhibit 1/Tab 1/Schedule x

SUBJECT AREA: Cost of Capital

Preamble:

Hydro Ottawa has forecasted the ROE for each year of the plan for 2021 (the rebasing year) and the subsequent years for 2022-2025. Hydro Ottawa states:¹

Hydro Ottawa has used a forecast ROE for the full five-year period covered by this Application. This is in line with the guidance set forth in the Handbook for Utility Rate Applications, which states that “the OEB expects there to be no further rate applications for annual updates within the five-year term” and “the OEB does not expect to address annual rate applications for updates for cost of capital.”⁴ Hydro Ottawa has followed this guidance and has proposed an ROE that balances Hydro Ottawa’s expectation of a reasonable return with customers’ needs for investment in the system, while providing regulatory efficiency. Hydro Ottawa has utilized the OEB’s formulaic calculation in determining the forward-looking ROE.

1. Ontario Energy Board, Handbook for Utility Rate Applications (October 13, 2016), page 26.

Hydro Ottawa then states the changes that it has made to the application of the OEB’s ROE formula, since Hydro Ottawa is forecasting longer than 1 year ahead:

¹ Exhibit 5/Tab 1/Schedule 1/page 8

1 The ROE calculation utilizes three components:

- 2 • The Consensus Forecast Government of Canada 10-year bond yield;
- 3 • The 30-year to 10-year Government of Canada bond yield spread; and
- 4 • Change in A-rated Utility Bond Yield Spread from September 2009.

5

6 The ROE calculation in the model utilizes Consensus Forecast forward-looking
7 rates for 10-year bonds on a three-month and 12-month basis. To forecast the
8 ROE over the five-year period of 2021-2025, the October 2019 Consensus
9 Long-Term Forecast was utilized using the average annual yield for 10-year
10 bonds.

11

12 Similar to long-term debt, the 30-year Government of Canada bond yield is then
13 calculated using the forecast 10-year bond yield plus 44 bps, which is the
14 five-year historical average spread of the 30-year over 10-year Government of
15 Canada bond yield as calculated per the OEB Cost of Capital Report.

16

17 To determine the change in A-rated 30-year Utility Bond Yield spreads, the
18 five-year historical average spread as utilized in the Cost of Capital calculations
19 up to October 2019 was used. This five-year historical average equals 154 bps.

20

21 Table 4 on page 10 of this exhibit documents the forecasted ROE for each year. OEB
22 staff has compiled the following table summarizing the forecasted ROEs along with the
23 OEB-issued ROE for 2020, per the OEB's letter on the Cost of Capital Parameters as
24 issued on October 31, 2019.

1 **Table 5-Staff-3-1: OEB-issued ROE for 2020 and Hydro Ottawa forecasted ROEs**
2 **for 2021-2025**

	OEB-issued	Hydro Ottawa forecasts				
Year	2020	2021	2022	2023	2024	2025
ROE	8.52%	8.88%	9.13%	9.31%	9.41%	9.46%

3
4 Question(s):

- 5
- 6 a) Please confirm the entries in the above table.
- 7
- 8 b) Please explain what Hydro Ottawa means in stating that it “has proposed an ROE that
9 balances Hydro Ottawa’s expectation of a reasonable return with customers’ needs for
10 investment in the system”. What is the evidence that Hydro Ottawa is relying on in
11 support of this statement?
- 12
- 13 c) In the methodology to calculate the long-term debt rate and the ROE, the spreads
14 between: i) 10-year and 30-year Government of Canada bond yields; and ii) 30-year
15 Canadian A-rated Utility Bond and 30-year Government of Canada bond yields are done
16 for the business days in the same month that the Consensus Forecasts survey was
17 done in. This ensures that there is a temporal alignment between the forecasts, and the
18 current economic data that the surveyed forecasters would be aware of in making their
19 predictions. Please explain the rationale for Hydro Ottawa using 5-year historical
20 averages to estimate these spreads for the purposes of forecasting the ROE for all years
21 of its Custom IR plan term.

22
23 **RESPONSE:**

- 24
- 25 a) Hydro Ottawa confirms the values in Table 5 are correct.

1 b) The statement is holistic in nature based on the many considerations covered in detail in
2 the *Report of the Board on the Cost of Capital for Ontario's Regulated Utilities*,² to meet
3 the Fair Return Standard. A key principle for the Return on Equity ("ROE") is the balance
4 between the opportunity cost and predictability of capital invested by an investor and the
5 expectations of the customer for appropriate investment to ensure a strong and reliable
6 system to meet their needs.

7
8 c) The OEB methodology gathers all of the components to calculate the ROE in the month
9 of September and then subsequently issues the Cost of Capital Parameters for the
10 following year. This calculation is made at a point in time and uses the best information
11 available at that time to forecast the ROE calculation for the future (albeit, one year). As
12 it is a point in time, it reflects the economic circumstances at that time, including the
13 underlying government yields and A-rated utility spreads. As has been seen, these
14 yields and spreads can change quickly and significantly due to world events –
15 economical, geopolitical, and others, such as the current COVID-19 pandemic.

16
17 As Hydro Ottawa is forecasting for a five-year period, as covered by this Application,
18 using a longer term historical average would eliminate outlier market conditions that may
19 be prevalent at any given point in time. Using a historical average over the same period
20 of time that is being forecast should produce less volatility versus a single point in time,
21 which may be biased by high or low market conditions at that point in time. This is also
22 consistent with the approach for long-term debt forecasting, as discussed in the
23 response to interrogatory OEB-149 part (b).

24 ² Ontario Energy Board, *Report of the Board on the Cost of Capital for Ontario's Regulated Utilities*, EB-2009-0084
25 (December 11, 2009).

1 **INTERROGATORY RESPONSE - OEB-151**

2 **5-Staff-4**

3 EXHIBIT REFERENCE:

4 **Exhibit 5/Tab 1/Schedule 1**

5

6 SUBJECT AREA: Cost of Capital

7

8 Preamble:

9

10 Hydro Ottawa's forecasts were prepared based on data from October 2019. This was
11 long before the current COVID-19 crisis emerged, and which has caused significant
12 socioeconomic shock world-wide, affecting financial markets, economic activity and our
13 daily way of living.

14

15 Hydro Ottawa notes, on page 6 of this exhibit, that the *Long-Term Consensus Forecasts*
16 publication that it used is published semi-annually, in April and November of each year.

17 Question(s):

18

- 19 a) Please provide an updated forecast of the cost of capital parameters using Hydro
20 Ottawa's proposed methodology and the April 2020 Long-Term Consensus
21 Forecasts. Please provide the data used, and identify or provide the sources.
22 Please document all assumptions, and identify any changes in assumptions from
23 what is documented in this exhibit as initially filed. If possible, please provide the
24 data and calculations in a working Microsoft Excel spreadsheet.

1
2 **RESPONSE:**
3
4 a) Hydro Ottawa has updated the forecast cost of capital parameters using the
5 methodology outlined in UPDATED Exhibit 5-1-1: Cost of Capital and Capital Structure
6 and the April 2020 Long-Term Consensus Forecast, included as Attachment
7 OEB-151(A): April 2020 Long-Term Consensus Forecasts.

8
9 The Hydro Ottawa historical credit spreads used for 10-year and 30-year bonds are as of
10 April 2020 and are based on the average Bank of Montreal (“BMO”) Capital Markets
11 indicative spreads over the past two-and-a-half years for Hydro Ottawa Holding Inc. and
12 are provided in Attachment OEB-151(B): Historical Credit Spreads.

13
14 The Government of Canada 30s over 10s Historical Yield Spread are as of April 2020
15 and are based on the past five years’ information, as shown in Attachment OEB-151(C):
16 GoC 30s over 10s Yield Spread Average.

17
18 **Table A – Forecast Yield for Long-Term Debt Issuances (2021-2025)**

Year	Govt. of Canada 10-Year Yield (based on April 2020 Consensus Forecast) ¹	Hydro Ottawa Historical 10-Year Spread	Forecast Hydro Ottawa Yield 10-Year Bonds	Historical Spread (30-Year Govt. Yield over 10-Year Govt. Yield)	Govt. of Canada 30-Year Yield	Hydro Ottawa Historical 30-Year Spread	Forecast Hydro Ottawa Yield 30-Year Bonds
2021	1.09%	114 bps	2.23%	41 bps	1.50%	150 bps	3.00%
2022	1.63%	114 bps	2.77%	41 bps	2.04%	150 bps	3.54%
2023	2.15%	114 bps	3.29%	41 bps	2.56%	150 bps	4.06%
2024	2.50%	114 bps	3.64%	41 bps	2.91%	150 bps	4.41%
2025	2.75%	114 bps	3.89%	41 bps	3.16%	150 bps	4.66%

19
20
21 ¹ Interpolated yield assuming July 1 issuance.

1 For the purpose of this interrogatory, Hydro Ottawa has updated the forecasted weighted
2 average long-term debt rates, as shown in Table B below.

3

4 **Table B – Updated Forecast Weighted Average Long-Term Debt Rate**

Year	Rate
2021	3.30%
2022	3.28%
2023	3.29%
2024	3.31%
2025	3.51%

5

6

7 The updated calculations for the Return on Equity (“ROE”) forecast for the purpose of
8 this interrogatory response are shown below in Table C. The historical A-rated Utility
9 Bond Yield Spread calculation is provided in Attachment OEB-151(D): Canadian Utility
10 Sector Yield Spread Average.

1

Table C – Updated 2021-2025 Forecast ROE

	2021	2022	2023	2024	2025
Long Canada Bond Forecast (“LCBF”)					
Consensus Forecast ² (@ December 31)	1.00% ³	1.90%	2.40%	2.60%	2.90%
Mid-year Interpolated Yield (@ July 1)	1.09%	1.63%	2.15%	2.50%	2.75%
30-Year over 10-Year Govt. Spread	0.41%	0.41%	0.41%	0.41%	0.41%
LCBF	1.50%	2.04%	2.56%	2.91%	3.16%
ROE Forecast					
Initial ROE (A)	9.75%	9.75%	9.75%	9.75%	9.75%
Change in LCBF from September 2009					
LCBF	1.50%	2.04%	2.56%	2.91%	3.16%
Base LCBF (as per OEB Cost of Capital Report)	4.25%	4.25%	4.25%	4.25%	4.25%
Difference	(2.75)%	(2.21)%	(1.69)%	(1.34)%	(1.09)%
Difference X 0.5 (B)	(1.38)%	(1.11)%	(0.85)%	(0.67)%	(0.55)%
Change in A-rated Utility Bond Yield Spread from September 2009					
A-rated Utility Bond Yield Spread	1.55%	1.55%	1.55%	1.55%	1.55%
Base A-rated Utility Bond Yield Spread (as per OEB Cost of Capital Report)	1.42%	1.42%	1.42%	1.42%	1.42%
Difference	0.13%	0.13%	0.13%	0.13%	0.13%
Difference X 0.5 (C)	0.07%	0.07%	0.07%	0.07%	0.07%
FORECAST ROE (A+B+C)	8.44%	8.71%	8.97%	9.15%	9.27%

2

³ ² April 2020, 10 Year Treasury Bond Yield Consensus Forecast.

⁴ ³ End April 2020.

Hydro Ottawa Holding Inc.'s Historical Credit Spreads

Hydro Ottawa Limited
EB-2019-0261
Interrogatory Response
IRR OEB-151
Attachment B
ORIGINAL
Page 1 of 3

Period	2.5 yrs
Start	May 2020
End	Nov 2017

Average	114bps	150bps
Max	160bps	195bps
Min	91bps	126bps

Week of	BMO CM 10 yr Spread	BMO CM 30 yr Spread
8 May 2020	150	190
24 Apr 2020	160	195
17 Apr 2020	150	180
28 Feb 2020	115	165
21 Feb 2020	104	145
14 Feb 2020	102	145
7 Feb 2020	102	144
31 Jan 2020	105	148
24 Jan 2020	103	144
17 Jan 2020	98	139
10 Jan 2020	93	133
20 Dec 2019	93	133
13 Dec 2019	98	139
6 Dec 2019	100	141
29 Nov 2019	102	142
22 Nov 2019	107	148
15 Nov 2019	111	152
8 Nov 2019	113	156
1 Nov 2019	116	160
25 Oct 2019	116	160
18 Oct 2019	118	163
11 Oct 2019	118	160
4 Oct 2019	118	163
27 Sep 2019	117	159
20 Sep 2019	117	162
13 Sep 2019	118	163
6 Sep 2019	120	165
30 Aug 2019	120	165
23 Aug 2019	118	163
16 Aug 2019	121	163
9 Aug 2019	113	158
2 Aug 2019	107	151
26 Jul 2019	107	147
19 Jul 2019	108	148
12 Jul 2019	109	149
5 Jul 2019	112	151
28 Jun 2019	115	154
21 Jun 2019	121	154
14 Jun 2019	127	162
7 Jun 2019	130	164
31 May 2019	132	170
24 May 2019	127	165
17 May 2019	127	163
10 May 2019	128	160
3 May 2019	128	162
26 Apr 2019	130	161
19 Apr 2019	127	161
12 Apr 2019	130	164
5 Apr 2019	130	165
29 Mar 2019	134	167
22 Mar 2019	131	163
15 Mar 2019	132	162
8 Mar 2019	132	165
1 Mar 2019	128	160

Week of	BMO CM 10 yr Spread	BMO CM 30 yr Spread
22 Feb 2019	129	162
15 Feb 2019	128	161
8 Feb 2019	128	161
1 Feb 2019	131	158
25 Jan 2019	133	160
18 Jan 2019	138	162
11 Jan 2019	146	170
4 Jan 2019	148	177
14 Dec 2018	136	170
7 Dec 2018	136	170
30 Nov 2018	134	166
23 Nov 2018	123	162
16 Nov 2018	123	162
9 Nov 2018	118	155
2 Nov 2018	122	159
26 Oct 2018	122	159
19 Oct 2018	119	155
12 Oct 2018	117	153
5 Oct 2018	113	147
28 Sep 2018	114	148
21 Sep 2018	114	147
14 Sep 2018	114	146
7 Sep 2018	112	149
31 Aug 2018	113	148
24 Aug 2018	110	145
17 Aug 2018	108	143
13 Aug 2018	107	141
3 Aug 2018	105	142
30 Jul 2018	106	142
23 Jul 2018	107	143
16 Jul 2018	105	142
9 Jul 2018	105	142
3 Jul 2018	103	142
25 Jun 2018	102	141
18 Jun 2018	101	135
11 Jun 2018	102	137
4 Jun 2018	106	138
28 May 2018	102	136
22 May 2018	102	136
14 May 2018	103	137
4 May 2018	102	136
30 Apr 2018	102	136
23 Apr 2018	102	136
16 Apr 2018	105	138
6 Apr 2018	112	143
2 Apr 2018	107	139
23 Mar 2018	103	136
16 Mar 2018	102	134
9 Mar 2018	102	135
2 Mar 2018	101	134
23 Feb 2018	98	132
16 Feb 2018	98	132
9 Feb 2018	100	135
5 Feb 2018	94	128
29 Jan 2018	91	126
22 Jan 2018	94	127
15 Jan 2018	95	129
5 Jan 2018	98	133
29 Dec 2017	101	136
22 Dec 2017	101	136
15 Dec 2017	101	136
8 Dec 2017	101	135
1 Dec 2017	101	135
24 Nov 2017	101	133
17 Nov 2017	101	133

Week of	BMO CM	
	10 yr Spread	30 yr Spread
10 Nov 2017	100	131
3 Nov 2017	100	135

Government of Canada 30s over 10s Yield Spread Average

Revision Date

1-May-20

Period	5 yrs
Start	Apr 2020
End	May 2015

Average	0.41%	41bps
Max	0.81%	
Min	0.01%	

Month	10-Yr Gov't CAN V39055	30-Yr Gov't CAN V39056	Spread
Apr 2020	0.6571%	1.2529%	0.5957%
Mar 2020	0.8191%	1.2323%	0.4132%
Feb 2020	1.2947%	1.4211%	0.1263%
Jan 2020	1.4923%	1.6109%	0.1186%
Dec 2019	1.6045%	1.6850%	0.0805%
Nov 2019	1.4995%	1.6285%	0.1290%
Oct 2019	1.4500%	1.5940%	0.1440%
Sep 2019	1.3640%	1.5600%	0.1960%
Aug 2019	1.2050%	1.4410%	0.2360%
Jul 2019	1.5190%	1.7300%	0.2110%
Jun 2019	1.4630%	1.7160%	0.2530%
May 2019	1.6650%	1.9110%	0.2460%
Apr 2019	1.7240%	2.0130%	0.2890%
Mar 2019	1.7120%	2.0060%	0.2940%
Feb 2019	1.9070%	2.1580%	0.2510%
Jan 2019	1.9540%	2.1750%	0.2210%
Dec 2018	2.0580%	2.2160%	0.1580%
Nov 2018	2.4080%	2.4620%	0.0540%
Oct 2018	2.4890%	2.5050%	0.0160%
Sep 2018	2.3540%	2.3670%	0.0130%
Aug 2018	2.2950%	2.3080%	0.0130%
Jul 2018	2.1870%	2.2300%	0.0430%
Jun 2018	2.2090%	2.2600%	0.0510%
May 2018	2.3750%	2.4150%	0.0400%
Apr 2018	2.2490%	2.3670%	0.1180%
Mar 2018	2.1890%	2.3390%	0.1500%
Feb 2018	2.3240%	2.4530%	0.1290%
Jan 2018	2.1980%	2.3540%	0.1560%
Dec 2017	1.9150%	2.1880%	0.2730%
Nov 2017	1.9190%	2.2560%	0.3370%
Oct 2017	2.0510%	2.4060%	0.3550%
Sep 2017	2.0500%	2.4110%	0.3610%
Aug 2017	1.8840%	2.3120%	0.4280%
Jul 2017	1.9080%	2.2800%	0.3720%
Jun 2017	1.5030%	2.0350%	0.5320%
May 2017	1.5100%	2.1430%	0.6330%
Apr 2017	1.5260%	2.1910%	0.6650%
Mar 2017	1.7140%	2.3910%	0.6770%
Feb 2017	1.7020%	2.3910%	0.6890%
Jan 2017	1.7220%	2.3400%	0.6180%
Dec 2016	1.7320%	2.3340%	0.6020%
Nov 2016	1.4380%	2.0650%	0.6270%
Oct 2016	1.1670%	1.8180%	0.6510%
Sep 2016	1.0860%	1.7230%	0.6370%
Aug 2016	1.0430%	1.6500%	0.6070%
Jul 2016	1.0510%	1.6660%	0.6150%
Jun 2016	1.1680%	1.8200%	0.6520%
May 2016	1.3500%	1.9920%	0.6420%
Apr 2016	1.3360%	2.0090%	0.6730%
Mar 2016	1.2680%	2.0540%	0.7860%
Feb 2016	1.1250%	1.9310%	0.8060%
Jan 2016	1.2580%	2.0480%	0.7900%
Dec 2015	1.4600%	2.1960%	0.7360%
Nov 2015	1.6340%	2.3430%	0.7090%
Oct 2015	1.4630%	2.2580%	0.7950%
Sep 2015	1.4810%	2.2380%	0.7570%
Aug 2015	1.3920%	2.1070%	0.7150%
Jul 2015	1.5700%	2.2360%	0.6660%
Jun 2015	1.7800%	2.3750%	0.5950%
May 2015	1.7440%	2.3350%	0.5910%

Canadian Utility Sector Yield Spread Average

Revision Date

1-May-20

Period	5 yrs
Start	Apr 2020
End	May 2015

Average	1.55%	155bps
Max	2.07%	
Min	1.24%	

Month	30-Yr Gov't CAN V39056	Canadian Utility A-rated 30-Yr Bond (Bloomberg Index C29530Y)	Spread
Apr 2020	1.2529%	3.1200%	1.8671%
Mar 2020	1.2323%	3.2000%	1.9677%
Feb 2020	1.4211%	2.8000%	1.3789%
Jan 2020	1.6109%	2.9400%	1.3291%
Dec 2019	1.6850%	3.0300%	1.3450%
Nov 2019	1.6285%	3.0700%	1.4415%
Oct 2019	1.5940%	3.1000%	1.5060%
Sep 2019	1.5600%	3.0800%	1.5200%
Aug 2019	1.4410%	2.9400%	1.4990%
Jul 2019	1.7300%	3.1200%	1.3900%
Jun 2019	1.7160%	3.2100%	1.4940%
May 2019	1.9110%	3.4300%	1.5190%
Apr 2019	2.0130%	3.5500%	1.5370%
Mar 2019	2.0060%	3.5500%	1.5440%
Feb 2019	2.1580%	3.7000%	1.5420%
Jan 2019	2.1750%	3.8000%	1.6250%
Dec 2018	2.2160%	3.8600%	1.6440%
Nov 2018	2.4620%	3.9700%	1.5080%
Oct 2018	2.5050%	3.9400%	1.4350%
Sep 2018	2.3670%	3.7800%	1.4130%
Aug 2018	2.3080%	3.6900%	1.3820%
Jul 2018	2.2300%	3.6200%	1.3900%
Jun 2018	2.2600%	3.6200%	1.3600%
May 2018	2.4150%	3.7700%	1.3550%
Apr 2018	2.3670%	3.7200%	1.3530%
Mar 2018	2.3390%	3.6500%	1.3110%
Feb 2018	2.4530%	3.7200%	1.2670%
Jan 2018	2.3540%	3.5900%	1.2360%
Dec 2017	2.1880%	3.4700%	1.2820%
Nov 2017	2.2560%	3.5300%	1.2740%
Oct 2017	2.4060%	3.7700%	1.3640%
Sep 2017	2.4110%	3.8100%	1.3990%
Aug 2017	2.3120%	3.6600%	1.3480%
Jul 2017	2.2800%	3.6000%	1.3200%
Jun 2017	2.0350%	3.4300%	1.3950%
May 2017	2.1430%	3.5000%	1.3570%
Apr 2017	2.1910%	3.8300%	1.6390%
Mar 2017	2.3910%	3.8300%	1.4390%
Feb 2017	2.3910%	3.8500%	1.4590%
Jan 2017	2.3400%	3.8300%	1.4900%
Dec 2016	2.3340%	3.8900%	1.5560%
Nov 2016	2.0650%	3.7100%	1.6450%
Oct 2016	1.8180%	3.5000%	1.6820%
Sep 2016	1.7230%	3.4000%	1.6770%
Aug 2016	1.6500%	3.3700%	1.7200%
Jul 2016	1.6660%	3.4200%	1.7540%
Jun 2016	1.8200%	3.5800%	1.7600%
May 2016	1.9920%	3.6400%	1.6480%
Apr 2016	2.0090%	3.7000%	1.6910%
Mar 2016	2.0540%	3.9100%	1.8560%
Feb 2016	1.9310%	4.0000%	2.0690%
Jan 2016	2.0480%	4.0100%	1.9620%
Dec 2015	2.1960%	4.0500%	1.8540%
Nov 2015	2.3430%	4.1700%	1.8270%
Oct 2015	2.2580%	4.1400%	1.8820%
Sep 2015	2.2380%	4.0700%	1.8320%
Aug 2015	2.1070%	3.8900%	1.7830%
Jul 2015	2.2360%	3.8900%	1.6540%
Jun 2015	2.3750%	3.8900%	1.5150%
May 2015	2.3350%	3.7800%	1.4450%

INTERROGATORY RESPONSE - OEB-152

6-Staff-1

EXHIBIT REFERENCE:

Exhibit 6/Tab 1/Schedule 1/page 5 of 7

SUBJECT AREA: Revenue Deficiency Amounts & Cost Drivers

Preamble:

Hydro Ottawa notes an increase of \$11.9 million in return on rate base budgeted for 2021 compared to the 2020 OEB-approved level, which is driven by a \$171.9 million increase in net fixed assets.

Question(s):

- a) Please provide a breakdown of the \$171.9 million increase in net fixed assets by key capital projects/programs.

RESPONSE:

- a) The \$171.9M increase in average net fixed assets in 2021 is predicated on an average increase in capital additions and depreciation of \$225.4M and \$53.5M, respectively.

Of the \$225.4M in capital assets, \$99.5M relates to the New Administrative Office and Operations Facilities, as noted on page 7 of UPDATED Exhibit 2-1-1: Rate Base Overview, as well \$13.8 million in CCRA additions. The new administrative office and operational centres, and the CCRA additions in years 2016-2020, represent an increase in the opening net book value of fixed assets in 2021. These capital assets were previously recorded in a regulatory deferral account and are included in the rate base.

1 The remaining average additions of \$112M represent all other capital additions in 2021.
2 Table A below provides the 10 largest projects.
3

4 **Table A – Key Capital Projects/Programs for Increase in Net Fixed Assets -**
5 **2021 over 2020 (\$'000s)**

Capital Projects/Programs	Average ¹ Addition
New CCRA related to the Cambrian MTS	\$25,069
Bells Corners Rebuild	\$3,619
Uplands MTS Second Transformer	\$3,294
Fleet Replacements	\$3,144
System expansion demand	\$2,069
Baywater transformer replacement	\$1,689
Limebank MTS Transformer	\$1,491
Residential Subdivision	\$1,451
Light Rail Transit - phase two	\$1,350
Critical Poles	\$1,311
TOTAL	\$39,274

6

7 ¹ Average amount is total addition divided by two.

INTERROGATORY RESPONSE - OEB-153

7-Staff-1

EXHIBIT REFERENCE:

Exhibit 7, Tab 1, Schedule 1, Attachment B, pp 2-3

SUBJECT AREA: Cost Allocation

Preamble:

Elenchus stated that “Hydro Ottawa filed a separate cost allocation model for each year of the rate period in Proceeding EB-2015-0004.” OEB staff notes that Hydro Ottawa filed updated cost allocation models in each year of its Custom IR term.

Elenchus states that it advised Hydro Ottawa that “a single cost allocation model based on the test year would be suitable for the purposes of cost allocation and rate design for this CIR application.” Accordingly, Hydro Ottawa has filed a single cost allocation model for 2021.

Question(s):

a) Please confirm that Hydro Ottawa does not intend to perform updates to its cost allocation model through its Custom IR term in 2022-2025.

i) If confirmed, please explain how Hydro Ottawa plans to determine revenue requirements by rate classes for 2022-2025?

RESPONSE:

a) Hydro Ottawa confirms that there will be no updates to the Cost Allocation model through 2022-2025 of its Custom IR term.

i) Hydro Ottawa will utilize the 2021 Cost Allocation Study to support the revenue requirements by rate classes for the 2022-2025 years. Hydro Ottawa

1 plans to apply uniform rate increases in subsequent years, as outlined in
2 UPDATED Exhibit 7-1-1: Cost Allocation and UPDATED Exhibit 8-1-1:
3 Fixed/Variable Proportion.

INTERROGATORY RESPONSE - OEB-154

7-Staff-2

EXHIBIT REFERENCE:

Updated Cost Allocation Model, sheet I4 BO Assets

SUBJECT AREA: Cost Allocation

Preamble:

In completing sheet I4 BO Assets, Hydro Ottawa has broken out the assets as operating at primary and secondary voltage as follows:

- Account 1830 – Poles, Towers and Fixtures – 70% Primary, 30% Secondary
- Account 1835 – Overhead Conductors and Devices – 100% Primary
- Account 1840 – Underground Conduit – 71.9% Primary, 28.1% Secondary
- Account 1845 – Underground Conductors and Devices – 100% Primary

Question(s):

- Please explain how Hydro Ottawa determines the primary and secondary proportions.
- Please explain the apparent inconsistency of requiring secondary poles and underground conduit when there are no secondary conductors.

RESPONSE:

- The proportion of primary and secondary conduit is modeled in Hydro Ottawa's geographic information system ("GIS"). As Poles, Towers and Fixtures often house both primary and secondary conductors, it is not possible to obtain an accurate split of primary and secondary usage. The primary/secondary split for this asset class has been

31 estimated by experienced staff using available data at the time. This proportion has
32 remained unchanged from the 2016-2020 rate application in the absence of more
33 conclusive data.

34

35 Hydro Ottawa proposes to set the proportions for conductors at the same level as those
36 for Poles, Towers and Fixtures, and Conduit, respectively. This is in line with the
37 approach previously approved in Toronto Hydro's 2020-2024 Rate Application.

38

39 b) Please see the response to part (a) above. The adjustment has been made in
40 Attachment OEB-38(A): Updated OEB Workform - Cost Allocation Model.

INTERROGATORY RESPONSE - OEB-155

7-Staff-3

EXHIBIT REFERENCE:

Exhibit 7, Tab 1, Schedule 1, page 1

Updated Cost Allocation Model, sheet I5.2 Weighting Factors

EB-2015-0004, 2016 Cost Allocation Model, sheet I5.2 Weighting Factors

SUBJECT AREA: Cost Allocation

Preamble:

In the section detailing Weighting Factors, Hydro Ottawa states: "For a detailed description of the methodology for development of allocation and load factors, please refer to Attachment 7-1-1(B): Hydro Ottawa Cost Allocation Report." However, the referenced report does not provide details on weighting factors.

In this application, the weighting factors for Billing and Collecting have been updated since the cost allocation model filed with its 2016 Custom IR application. The weighting factors for services are proposed to be the same in 2021 as 2016. These are summarized in the following table:

1

	Services – 2016 and 2021 models	Billing and Collecting – 2016 model	Billing and Collecting 2021 model
Residential	1.0	1.0	1.0
General Service < 50 kW	2.0	1.0	1.1
General Service 50 to 1,499 kW	10.0	6.4	3.0
General Service 1,500 to 4,999 kW	10.0	25.3	4.0
Large Use	30.0	25.2	3.9
Street Light	1.0	25.2	4.1
Sentinel	1.0	0.7	0.7
Unmetered Scattered Load	1.0	1.0	1.1
Standby (all volumes)	10.0	24.9	3.9

2

3 Question(s):

4 a) Please provide a derivation of the weighting factors used for Service and Billing and
5 Collecting.

6

7 b) Has Hydro Ottawa reviewed its costs for Services in the context of this application, and if
8 not, when was the last time these costs were reviewed?

9

10 **RESPONSE:**

11

12 a) Bill and Collect weighting factors have been recalculated using 2021 expense forecast
13 data and customer counts by class. Each expense type was assessed for its impact on
14 customer classes. Hydro Ottawa has identified nine distinct patterns of customer
15 utilization for the 23 major vendors providing Bill and Collect services, as depicted in
16 Table A below.

Table A – Allocation Factors

Vendor Pattern	Residential	GS<50	GS 50 - 1,499	GS 1,500 - 4,999	Large Use	Street Light	Standby	USL	Sentinel
1	1	1	1	1	1	1	1	1	
2	1	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1		
4	1	1	1	1	1		1		
5		1	1	1	1				
6			1	1	1	1	1		
7			1	1	1		1		
8	1	1	1						
9	1	1							

As the majority of large vendors have unique customer impact patterns, Hydro Ottawa has grouped them into three vendor groups. Group one vendors were allocated on the basis of patterns 1, 3, and 4; group two vendors were allocated on the basis of pattern 2; and group three vendors were allocated on the basis of patterns 5-9. The weightings for these three groups are presented in Table B.

Table B – Weighting Factors for Vendor Groups

Vendor Group	Residential	GS<50	GS 50 - 1,499	GS 1,500 - 4,999	Large Use	Street Light	Standby	USL	Sentinel
1	1.0	1.1	4.1	10.3	10.3	10.9	11.1	1.3	0.1
2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
3	1.0	1.1	9.2	24.1	23.4	0.7	23.3	0.0	0.0

Please see the response to part (b) below for a discussion of the weighting factors for Services.

b) An analysis of cumulative USofA 1855 Service costs to the end of 2018 found little difference between the resulting weighting factors and the factors used in Hydro

1 Ottawa's previous rebasing application.¹ While the results of this analysis were not
2 robust enough to justify changing the weighting factors for Service, they did provide
3 sufficient validation to continue using the 2016 factors.

4 ¹ Hydro Ottawa Limited, *2016-2020 Custom Incentive Rate-Setting Distribution Rate Application*, EB-2015-0004 (April
5 29, 2015).

INTERROGATORY RESPONSE - OEB-156

7-Staff-4

EXHIBIT REFERENCE:

Updated Cost Allocation Model, sheet I6.1 Revenue; sheet I8 Demand Data

EB-2015-0004, 2016 Cost Allocation Model, sheet I6.1 Revenue; sheet I8 Demand Data

SUBJECT AREA: Cost Allocation

Preamble:

The Standby rate class billing demand and demand allocators from the previous proceeding and proposed in this proceeding are summarized below:

	2016 Cost Allocation Model (kW)	2021 Cost Allocation Model (kW)
Billing Demand	4,800	7,440
Classification 1NCP	1,152	1,152
Primary 1NCP	1,152	1,152
Line Transformer 1NCP	680	680
Classification 4NCP	3,836	412
Primary 4NCP	3,836	412
Line Transformer 4NCP	2,263	243
Classification 12NCP	7,657	642
Primary 12NCP	7,657	642
Line Transformer 12NCP	4,517	379

1 Question(s):

2

3 a) Please describe the methodology used to arrive at the demand allocators in 2021 and
4 contrast that with 2016. In particular, please detail any assumptions around actual or
5 deemed demand used.

6

7 b) Please explain how the 1NCP values are higher than the 4NCP values. Logically, the
8 total peak demand from each of the four months demand during the highest month of the
9 year would include the peak from the 1NCP, and the next three highest monthly peaks
10 would be included in the 4NCP.

11

12 **RESPONSE:**

13

14 a) The 2016 and 2021 demand allocators relied on the 2006 CAIF demand data, except for
15 the Large Use class, for which 2013 hourly demand data was used.

16

17 The 2016 demand allocators were derived by scaling annual 2004 and 2013 class hourly
18 demand data to the annual 2016 class-specific consumption forecast. This method used
19 a single annual scaling factor for each class so that the sum of hourly demand equals
20 the annual 2016 forecast for each class.

21

22 The 2021 demand allocators instead scaled hourly 2004 and 2013 demand data to the
23 monthly 2021 consumption forecast. The hourly data is scaled such that the sum of
24 hourly demand in a given month for a given class is equal to the 2021 consumption
25 forecast for that month and class.

26

27 This method assumes that seasonal changes in demand profiles are consistent with the
28 seasonal changes in consumption profiles since 2004. For example, residential class
29 consumption has declined since 2004 but consumption in July has increased. The use of
30 monthly scaling factors results in higher July demands, consistent with consumption

- 1 trends, whereas annual scaling factors would result in lower July demands, consistent
2 with seasonal load shapes from 2004.
3
- 4 b) Due to a formula error in the demand data worksheet, the Standby rate class CP figures
5 were used as the NCP figures. This error did not impact the demand data of the
6 remaining classes. The corrected demand data worksheet is provided in Attachment
7 OEB-156(A): 2021 Demand Factor Calculations and the corrected figures are used in
8 the updated cost allocation model as Attachment OEB-38(A): OEB Workform - Cost
9 Allocation Model and rate design.

INTERROGATORY RESPONSE - OEB-157

7-Staff-5

EXHIBIT REFERENCE:

Updated Cost Allocation Model, sheet I6.2 Customer Data; sheet I8 Demand Data

SUBJECT AREA: Cost Allocation

Preamble:

Hydro Ottawa indicates that out of 316,346 residential customers, 286,894 rely on secondary distribution, and out of 25,391 General Service < 50 customers, 18,091 rely on secondary distribution. However, on sheet I8 Demand Data, the 1NCP, 4NCP and 12NCP indicate the Secondary NCP, Line Transformer NCP, Primary NCP, and Classification NCP are all the same for these rate classes, implying that all of the load receives secondary distribution.

Question(s):

a) Please reconcile the apparent inconsistency.

b) Does Hydro Ottawa have any residential condominiums or other buildings which are served using customer owned transformers or secondary distribution? If so, please provide customer count and aggregate consumption information for customer owned transformation and secondary distribution.

c) Does Hydro Ottawa have any General Service < 50 kW customers in analogous buildings where customers are served using customer owned transformers or secondary distribution?

RESPONSE:

a) The secondary customer count figures in tab 'I6.2 Customer Data' relied on GIS data of addresses that receive secondary service from equipment not owned by Hydro Ottawa. However, the utility does not have sufficiently detailed demand data to derive secondary demand separately from primary demand. Given that secondary demand cannot be reasonably estimated, Hydro Ottawa is proposing to revise the secondary customer counts. The secondary customer counts for the Residential and GS<50 kW classes have been changed in the revised cost allocation model filed as Attachment OEB-38(A): Updated OEB Workform - Cost Allocation Model. Rate design has been updated to reflect the change in allocating secondary costs.

Elenchus notes that including all residential and GS<50 kW customers as secondary connected is consistent with the OEB's direction for Toronto Hydro to include all residential demand as secondary demand.¹ This approach has been maintained by Toronto Hydro through to its most recent Custom IR application.² In each case, all of Toronto Hydro's primary customers are included as secondary customers.

b) Please see the response to part (a) above. All residential customers have been included in secondary and line transformer customer counts. As noted in part (a), this is consistent with the OEB's direction given to Toronto Hydro.

c) Please see the response to part (a) above. All GS < 50 kW customers have been included in secondary and line transformer customer counts. This is consistent with the direction given to Toronto Hydro by the OEB and referenced in part (a) above. An updated Cost Allocation model can be found in Excel Attachment OEB-38(A): Updated OEB Workform - Cost Allocation Model.

¹ Ontario Energy Board, Decision and Order on Suite Metering Issues, EB-2010-0142 (February 22, 2012, corrected March 9, 2012), pages 16-18.

² Toronto Hydro-Electric System Limited, *2020-2024 Custom Incentive Rate-setting Distribution Rate Application*, EB-2018-0165 (August 15, 2018).

INTERROGATORY RESPONSE - OEB-158

7-Staff-6

EXHIBIT REFERENCE:

SUBJECT AREA: Cost Allocation

Question(s):

- a) Please provide an updated cost allocation model to reflect any updates to the application resulting from the interrogatories. If available, please use the 2021 Cost Allocation model.

RESPONSE:

- a) Please see the response to interrogatory OEB-38 for all updated models resulting from IRR responses. In particular, see excel Attachment OEB-38(A): Updated OEB Workform - Cost Allocation.

1 **INTERROGATORY RESPONSE - OEB-159**

2 **7-Staff-7**

3 EXHIBIT REFERENCE:

4 **Chapter 2 filing requirements, issued July 12, 2018, page 46.**

5

6 SUBJECT AREA: Cost Allocation

7

8 Preamble:

9

10 The filing requirements state that:

11

12 The OEB expects distributors to document their communications with unmetered load
13 customers, including street lighting customers, and how the distributor assisted them in
14 understanding the regulatory context in which distributors operate and how it affects unmetered
15 load customers.

16

17 Question(s):

18

19 a) Please provide details on the communication that has taken place with the unmetered
20 load customers, including street lighting customers.

21

22 **RESPONSE:**

23

24 a) The 2021-2025 rate application customer engagement process was accessible to all
25 Hydro Ottawa customers through participation in an online survey (referred to as the
26 "workbook"). Customers who chose to complete the workbook were asked to identify as
27 either a residential or commercial customer, only. It is therefore not possible to confirm to
28 what extent unmetered loads, including street lighting customers, participated in the
29 workbook survey and provided feedback.

INTERROGATORY RESPONSE - OEB-160

7-Staff-8

EXHIBIT REFERENCE:

Exhibit 7, Tab 1, Schedule 1, pp. 2, 4

Updated Revenue Requirement Work Form, sheet 11. Cost_Allocation

SUBJECT AREA: Cost Allocation

Preamble:

The revenue-to-cost ratio for the Sentinel Rate class has increased from 21.03% in 2016 to 156.34% proposed in this application.

Question(s):

a) Has Hydro Ottawa examined the cause of the change in the Standby rate class revenue-to-cost ratio?

RESPONSE:

a) Hydro Ottawa is interpreting the preamble of the question as intending to refer to the Standby Rate class rather than the Sentinel Rate class.

Please see the response to interrogatory OEB-156 for an explanation of the changes to be made to demand factors in the Cost Allocation Model for the Standby Rate class. Updated models reflecting all changes arising from the interrogatory process are presented in response to interrogatory OEB-38.

INTERROGATORY RESPONSE - OEB-161

8-Staff-1

EXHIBIT REFERENCE:

Updated Exhibit 8, Tab 1, Schedule 1, pp. 3-8

Updated Exhibit 8, Tab 10, Schedule 1, Attachment A, pp. 48-50

SUBJECT AREA: Rate Design

Preamble:

In the Street Lighting rate class, Hydro Ottawa is proposing to increase the proportion of rate revenue to be collected by the fixed charge from 44% of the total in 2020 to 64% in 2021, increasing each year to 68% in 2025. Similarly for Sentinel Lighting, the proportion of total revenue collected from the fixed charge is proposed to increase from 32% in 2020 to 52% in 2021. A smaller increase in the fixed charge percentage is proposed for the Unmetered Scattered Load (USL) rate class.

The changes to the both fixed and variable charges are approximately 9-10% for USL, 23-24% for Sentinel Light, and 4-5% for Street Light.

Hydro Ottawa states that "for customer classes where the 2020 fixed charge is higher than the calculated upper bound, Hydro Ottawa proposes to maintain the current fixed charge for 2021." But "Starting in 2022, Hydro Ottawa proposes to maintain the fixed/variable split in recovering the revenue requirement." The filing requirements state:

If a distributor's current fixed charge for any non-residential class is higher than the calculated ceiling, there is no requirement to lower the fixed charge to the ceiling, nor are distributors expected to raise the fixed charge further above the ceiling for any non-residential class.

1 Hydro Ottawa proposes to increase the fixed charge for the General Service > 50 to 1,499 kW
2 rate class from \$200 in 2020 and 2021 to \$212.51 in 2022 and every year to 2025 despite the
3 calculated ceiling being \$78.85. Similarly, in the General Service > 1,500 to 4,999 kW rate
4 class, Hydro Ottawa is proposing increases every year starting in 2022 to 2024, and in the
5 Large Use rate class in 2022 and 2023 despite the fixed charges for these rate classes already
6 being above the calculated ceiling.

7

8 In the General Service < 50 kW rate class, Hydro Ottawa is proposing to increase the fixed
9 charge to \$20.61 in 2021, which remains below the ceiling of \$21.04, but then to \$22.03 in
10 2022, and every year to 2025.

11

12 Question(s):

13

14 a) Please confirm that Hydro Ottawa is proposing to change fixed and variable charges by
15 the same percentages, with differences due to rate rounding.

16

17 b) Please confirm that the changes in fixed/variable splits arise from changes in forecasted
18 volumes, and absent changes in projected volumes, the fixed/variable splits would not
19 change.

20

21 c) Please explain why Hydro Ottawa is proposing to increase the fixed charges for these
22 rate classes to rates that are either above or further above the ceiling.

23

24 **RESPONSE:**

25

26 a) Hydro Ottawa proposes to maintain the fixed/variable ratio for most customer rate
27 classes from 2021-2025. In a scenario of increasing consumption, a byproduct of this
28 intent would be equivalent changes to the fixed and variable portions of the rates. In the
29 cases of USL and Street Lighting, decreasing volumes throughout the five-year period
30 result in an increasing fixed portion of the rate structure. The change in fixed/variable
31 ratio for Sentinel customer class arises from a graduated plan to move its revenue/cost

1 ratio from 55% in 2021 to 80% in 2025, to bring the ratio within the bounds set by the
2 OEB.

3

4 b) Hydro Ottawa confirms that changes to the fixed/variable rate structure are, in most
5 cases, a result of changes to forecasted volumes. As described in the response to part
6 (a) above, Sentinel rate class is an exception in this Application.

7

8 c) Hydro Ottawa is proposing a similar rate design as followed through an IR period, where
9 the fixed/variable ratios are maintained. This preserves the risk between the fixed and
10 variable portions of the rate.

11

12 There are two exceptions to this principle. In 2021, in instances where the fixed rate is
13 already above the ceiling, such rates were held constant. In the later years of the
14 2021-2025 rate term, where changing demand caused the fixed portion of the rate to fall,
15 those rates were also held constant.

16

17 Hydro Ottawa notes that the residential customer class has transitioned to a fully fixed
18 distribution rate, as per OEB policy.¹ This is, in part, to ensure that the value of the
19 connection is paid by each customer. It is worth noting that the current cost allocation
20 methodology provides a 2021 rate at the highest ceiling of 59% of the proposed fully
21 fixed charge, as presented in response to interrogatory OEB-38.

22 ¹ Ontario Energy Board, *A New Distribution Rate Design for Residential Electricity Customers*, EB-2012-0410 (April 2,
23 2015).

INTERROGATORY RESPONSE - OEB-162

8-Staff-2

EXHIBIT REFERENCE:

Updated Exhibit 8, Tab 1, Schedule 1, page 9

SUBJECT AREA: Rate Design

Preamble:

Hydro Ottawa states that Effective April 1, 2015, customers with customer-owned transformers installed after November 1, 2000 were no longer eligible to receive the Transformer Ownership Credit (TOC). As of November 1, 2025, the TOC is proposed to be eliminated entirely.

Question(s):

a) Please provide the reason for the November 1, 2000 cut-off date.

b) Please provide copies of communication on April 1, 2015 to customers indicating the change to the TOC.

c) Please explain the reason for the November 1, 2025 end date for the TOC, two months prior to the end of the period covered by this Custom IR application.

RESPONSE:

a) November 1, 2000 is the date upon which former local distribution companies ("LDCs") operating in the Ottawa area – Gloucester Hydro, Kanata Hydro, Nepean Hydro, and Ottawa Hydro – amalgamated to form Hydro Ottawa. The date represents the cut-off for customer owned transformers installed prior to amalgamation.

1 Prior to amalgamation, some of the predecessor Ottawa LDCs permitted customers to
2 privately buy and maintain their transformers, usually for security or environmental
3 reasons. These customers were given a Transformer Ownership Credit ("TOC") to
4 compensate them for the portion of their bills relating to utility transformer costs, which
5 did not apply to them.

6

7 Post-amalgamation, Hydro Ottawa changed its transformer funding model so that all
8 customers paid for their share of transformer installation cost at the time of construction,
9 whether the transformer was privately-owned or utility-owned. Because all
10 post-amalgamation transformer installations (whether privately-owned or utility-owned)
11 were now paid for by the customer at the time of construction, the rationale for issuing
12 TOCs is no longer applicable.

13

14 b) From April 2, 2015 to May 6, 2015, all Hydro Ottawa customers received notification of
15 the Conditions of Service - Version 5 (effective April 1, 2015) update via communication
16 through on-bill messaging. A copy has been provided in Attachment OEB-162(A):
17 Conditions of Service On-Bill Message. Upon further investigation, Hydro Ottawa did not
18 stop providing the TOC to all affected customers per the April 1, 2015 Conditions of
19 Service. In compliance with the OEB's Letter of Direction issued on March 4, 2020 in this
20 proceeding, Hydro Ottawa notified all transformer customers who are currently receiving
21 the TOC of the changes proposed in this Application. The letter was sent by physical
22 mail on March 11, 2020 along with a copy of the Notice of Hearing, Hydro Ottawa's List
23 of Requested Approvals and Exhibit 8-1-1: Fixed/Variable Proportion (as originally
24 submitted). Please see Attachment OEB-162(B): Transformer Ownership Credit
25 Customer Letter.

26

27 c) Prior to amalgamation, the TOC was established to compensate transformer-owners
28 over the expected life of those transformers (25 years) or until the transformer was/is
29 replaced. With the change in funding model post-amalgamation, as noted in part (a)
30 above, the 25-year period was deemed to start on November 1, 2000 regardless of
31 actual installation date and will expire on November 1 2025. After that date, the

1 transformers in question would be fully depreciated if they were on Hydro Ottawa's
2 books and would not factor into the calculation of future revenue requirement. As the
3 rationale for issuing the credit will have disappeared, Hydro Ottawa has signalled its
4 intention to stop any remaining TOC as of November 1, 2025.

Bill Date Date de la facture	2015-04-07	Due Date Date d'échéance	2015-04-27	Bank Debit Retrait bancaire
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For your information • Autres renseignements

Revised version of Hydro Ottawa's Conditions of Service came into effect on April 1, 2015. This replaces any pre-existing Conditions of Service. Visit hydroottawa.com/conditionsofservice to read the full document.

Les Conditions de service révisées d'Hydro Ottawa, qui remplacent la version précédente, sont entrées en vigueur le 1er avril 2015. Le document intégral est affiché à hydroottawa.com/conditionsofservice.

It's spring digging season! Planning outdoor work? Before you dig, be safe and contact Ontario One Call at 1-800-400-2255 or www.on1call.com to have your underground utility lines located.

C'est le printemps - la saison de creuser! Vous prévoyez des travaux à l'extérieur? Faites-les en sécurité. Avant de creuser, téléphonez à Info-Excavation au 1-800-400-2255 ou visitez le www.on1call.com.

*Ontario Clean Energy Benefit takes 10% off the cost of up to 3,000 kWh/month of electricity use. Some exceptions apply, please see Ontario.ca/OCEB or 1-888-668-4636.



<<insert date>>

<<insert name>>

<<insert address>>

<<city>>, <<province>>

<<postal code>>

IMPORTANT: Hydro Ottawa Limited 2021-2025 Rate Application – Transformer Ownership Customer

Dear customer,

Hydro Ottawa Limited has applied to the Ontario Energy Board (OEB) to change our electricity distribution rates and other charges.

As a customer currently receiving a transformer ownership credit, it is important that you review the application carefully to determine how you may be affected by these changes. Included in this package are specific pieces of evidence included in Hydro Ottawa's application to the OEB related to the transformer ownership credit, namely:

- Hydro Ottawa's List of Requested Approvals (Attachment 1-1-4(A))
- Original Evidence: Exhibit 8-1-1 Fixed/Variable Proportion of Hydro Ottawa's Rate Design

Please see the attached Ontario Energy Board's Notice of Hearing to learn more and to find out how you can participate in the Ontario Energy Board's hearing.

The Notice of Hearing and Rate Application can also be accessed at hydroottawa.com/applications

For more information, please contact us online at hydroottawa.com/contactus.

Sincerely,

Customer Service

Hydro Ottawa

Tel. 613 738-6400

hydroottawa.com/contact

INTERROGATORY RESPONSE - OEB-163

8-Staff-3

EXHIBIT REFERENCE:

Exhibit 8, Tab 3, Schedule 1, page 1

RTSR Workform, Sheet 3. RRR Data; Sheet 4. UTRs and Sub-Transmission

SUBJECT AREA: Rate Design

Preamble:

Hydro Ottawa has filed a 2020 RTSR model, which was current as of the date of filing. The RTSR model has been filed with 2019 UTRs and Hydro One Sub-Transmission rates. Hydro Ottawa states that its "rates are derived from 2018 billing determinants, as those are the determinants that have been most recently reported through the utility's RRR filings."

Question(s):

- a) Please update using 2019 RRR data, 2020 UTRs and 2020 Hydro One Sub-Transmission rates. Please use the 2021 RTSR model, if available.

RESPONSE:

Hydro Ottawa has updated the 2021 RTSR model as an Excel Attachment OEB-163(A): 2021 RTSR Workform for 2019 RRR data, and 2020 UTRs and Sub-Transmission Rates. Please also see the response to interrogatory OEB-38 for updated Bill Impacts.

INTERROGATORY RESPONSE - OEB-164

8-Staff-4

EXHIBIT REFERENCE:

Updated Exhibit 1, Tab 1, Schedule 10, page 25

Exhibit 8, Tab 4, Schedule 1, page 1

Updated Exhibit 8, Tab 7, Schedule 1, pp 1, 6-9

SUBJECT AREA: Rate Design

Preamble:

In reference to retail service charges, Hydro Ottawa states that it “will not be seeking distributor-specific RSCs.” It states that “as a placeholder for the generic RSCs, 2021 has been inflated by the OEB’s 2020 inflationary rate of 2.0%, while 2022-2025 charge have been escalated annually by 2.51%”

OEB staff note that, in the event the escalation factor used by Hydro Ottawa to escalate its retail service charges differs from the rate used by the OEB, Hydro Ottawa will in effect have distributor-specific retail service charges.

Similar proposals are made to escalate charges for Specific Service Charges, Wireline Attachments, Generator Fixed Service Charges and the Standard Supply Service Charge.

Hydro Ottawa’s Custom Price Escalation Factor of 2.51% is calculated including a customer Growth Factor of 0.40% to reflect growth in costs due to an increasing number of customers.

1 Question(s):

2

3 a) Please confirm whether or not Hydro Ottawa plans to adopt the OEB's 2021 inflation for
4 2021 when that is known.

5

6 b) Does Hydro Ottawa propose to apply its escalation factor of 2.51% for the years
7 2022-2025, or does it plan to apply the OEB's generic escalation factor as this is known?

8

9 c) Please explain why it is appropriate to inflate per-incident and per-customer charges on
10 the basis of an escalation factor which includes growth in customer counts as one of the
11 causes of growth in costs.

12

13 **RESPONSE:**

14

15 a) Hydro Ottawa confirms that it plans to adopt the OEB's 2021 inflation rate for 2021 for
16 Retail Service Charges ("RSCs") and Wireline Attachments. Hydro Ottawa also intends
17 to use the OEB's 2021 inflation rate for the Standard Supply Service Administration
18 Charge ("SSS Charge") to keep the rate aligned to the Retail Services
19 Distributor-consolidated billing monthly charge.

20

21 Hydro Ottawa currently has utility-specific Generation rates and proposes to maintain
22 utility-specific rates for the Generator Fixed Service Charges in 2021.

23

24 b) For the years 2022-2025, Hydro Ottawa intends to apply the OEB's generic escalation
25 factor, when known, for RSCs, the SSS Charge, and Wireline Attachments.

26

27 Hydro Ottawa is proposing to maintain utility-specific rates for the Generator Fixed
28 Service Charges through this period and set them as part of this proceeding.

29

- 1 c) Hydro Ottawa is proposing to inflate per-incident and per-customer charges on the basis
2 of an escalation factor which includes growth in customer count. Given that these
3 charges are based on OM&A costs incurred in servicing customers, an increase in the
4 cost of OM&A drives a proportionate increase in the cost of services provided.

INTERROGATORY RESPONSE - OEB-165

8-Staff-5

EXHIBIT REFERENCE:

Updated Exhibit 8, Tab 7, Schedule 1, page 1

Exhibit 8, Tab 7, Schedule 1, Attachment A, pp. 1-9

SUBJECT AREA: Specific Service Charges

Preamble:

Hydro Ottawa states that it has “undertook a review of many routine service charges to ensure they reflected the associated costs of providing services”. Hydro Ottawa is proposing to update several specific service charges, while some are decreasing, others are increasing. In addition, in some cases, the proposed charge does not reconcile to the calculated costs at the second reference. In particular the following are increases or have costs that a materially different from the proposed change:

Description	2020 Charge	2021 Charge	Proposed Increase	Charge per Costing
Arrears Certificate (Account Certificate in 2020)	\$15	\$16		\$51
Easement Certificate (Account Certificate in 2020)	\$15	\$25	67%	\$99
Special Billing Service, per hour	\$104	\$122	17%	\$122
Unprocessed Payment Charge (+ bank charges)	\$15	\$25	67%	\$28
Reconnect at Pole – Regular Hours	\$185	\$250	35%	\$270

1 Question(s):

2

3 a) Please provide details of consultation Hydro Ottawa has performed with customers
4 regarding the increased charges.

5

6 b) Please provide any feedback received from customers on the proposed service charge
7 changes.

8

9 c) Please provide an explanation of material differences between the costs to provide
10 services, and the proposed charges in the context of this update to ensure service
11 charges reflect costs of providing services.

12

13 **RESPONSE:**

14

15 a) Hydro Ottawa's customer engagement activities did not focus on specific service charge
16 changes. These charges were adjusted to reflect the related costs to provide the service
17 – both upwards and downwards. A majority of customers who responded (84%)
18 supported maintaining or improving service levels. For details, please refer to page 8 of
19 Attachment 1-2-2(A): Innovative Research Group - Customer Engagement Report on
20 Hydro Ottawa's 2021-2025 Rate Application.

21

22 b) Customers did not provide feedback specific to Hydro Ottawa's service charge changes.

23

24 c) For an explanation of material differences between the costs to provide services and the
25 proposed charges in the context of this update, see Table A below.

1 **Table A – Rationale for Variance Between Proposed Charge and Cost for Service**

Description	2021 Proposed Charge	Cost per Internal Costing Exercise	Explanation	Rationale for Variance to Calculated Cost (Attachment 8-7-1(A))
Arrears Certificate (Account Certificate in 2020) & Easement Certificate (Account Certificate in 2020)	\$16 for Arrears Certificate \$25 for Easement Certificate	\$51 for Arrears Certificate \$99 for Easement Certificate	Rationale: Hydro Ottawa wishes to separate the Easement Certificate for Unregistered Easements from the former Account Certificate for the 2021-2015 period. Cost of providing both of these services is labour driven. Internal costing exercise completed that accounted for internal costs of labour using the hourly Labour Rate for 2021-2025. Please refer to Exhibit 8-7-1, section 5.1 and Exhibit 8-7-1, section 3.1.1	For both these services, the main driver is the cost associated with internal labour. Through the optimization of process flow and efficiencies achieved through digitalization, it is anticipated that the time involved to perform these services will in turn reduce Hydro Ottawa's internal costs.
Special Billing Service, per hour	\$122	\$122	Rationale: Cost of providing this service is labour driven. This rate reflects the labour involved in providing this service on a per hour basis. The hourly Labour Rate for 2021-2025. Please refer to Exhibit 8-7-1, section 3.3	n/a
Unprocessed Payment Charge (+ bank charges)	\$25	\$28	Rationale: To date, Hydro Ottawa has been using the standard 2006 Electricity Distribution Rate ("EDR") Handbook rate. Cost of providing this service includes a bank fee and labour. Internal costing exercise completed that accounted for processing a non-sufficient funds ("NSF") payment, including fees and labour. Please refer to Exhibit 8-7-1, section 3.4	Optimization of process sought to drive down internal costs.

Description	2021 Proposed Charge	Cost per Internal Costing Exercise	Explanation	Rationale for Variance to Calculated Cost (Attachment 8-7-1(A))
Reconnect at Pole – Regular Hours	\$250	\$270	<p>Rationale: To date, Hydro Ottawa has been using the standard 2006 EDR Handbook rate. Cost of providing this service is fleet and labour driven. Internal costing exercise completed that accounted for internal costs of labour and fleet.</p> <p>Please refer to Exhibit 8-7-1, section 3.8</p>	Optimization of process sought to drive down internal costs.

INTERROGATORY RESPONSE - OEB-166

8-Staff-6

EXHIBIT REFERENCE:

Updated Exhibit 8, Tab 7, Schedule 1, page 8

SUBJECT AREA: Rate Design

Preamble:

Hydro Ottawa is proposing to revise its generator fixed service charges including microFIT, Net-Metering ERF, FIT ERF, HCI, RESOP, and other ERF. Several customers have filed comments expressing concern over the microFIT fixed charges. The HCI, RESOP, and Other ERF charge is proposed to increase 12% from \$281 to \$314.

Question(s):

a) Please provide details of any consultation Hydro Ottawa has performed with its customers regarding the generator fixed service charges.

RESPONSE:

a) Hydro Ottawa did not directly consult with generation customers regarding fixed service charges as part of the 2021-2025 rate application customer engagement process, nor was any related feedback received during the customer engagement workbook exercise conducted in 2019.

It should be noted that Hydro Ottawa is proposing to decrease the monthly service charges for Net Metering, MicroFIT, and FIT generation accounts in 2021. This is due to the utility's investment in partially automated solutions for its customer billing system. As a result, the amount of time required to bill a generator account has reduced. Meanwhile,

1 the number of generator customers has continued to grow. Therefore, the cost
2 attributable to each contract in this Application has decreased, resulting in a lower
3 monthly charge. However, the monthly fixed service charge for the HCI and RESOP
4 group will rise in 2021.

INTERROGATORY RESPONSE - OEB-167

8-Staff-7

EXHIBIT REFERENCE:

Updated Exhibit 8, Tab 7, Schedule 1, pp. 8-9

SUBJECT AREA: Rate Design

Preamble:

Hydro Ottawa is to increase its standard supply service from \$0.25 in 2020 to \$0.62 in 2021. This is "to align with the 2021-2025 Retail Services Distributor-consolidated billing monthly charge".

Question(s):

a) Does Hydro Ottawa incur the same costs in providing this for retail customers as it does for its own customers?

b) Has Hydro Ottawa estimated the costs incurred in providing this service? If so, please provide.

c) Please provide details of any consultation Hydro Ottawa has performed with its customers regarding the increased charge.

RESPONSE:

a) Hydro Ottawa does not incur the same costs for providing billing services for standard supply service ("SSS") customers compared to Retailer enrolled customers.

1 In addition, the costs to serve SSS customers are not the same for all customers. Cost
2 drivers vary between Class A customers versus Class B customers, as well as between
3 the different customer rate classes.

4

5 Hydro Ottawa is using the Retail Services Distributor-consolidated billing monthly charge
6 as a basis for the SSS Charge. As per the *2006 Electricity Distribution Rate Handbook*,
7 the Retail Services Distributor-Consolidated Billing charge (per month, per customer) is
8 intended to recover the incremental costs incurred by a distributor in providing a
9 distributor-consolidated, bill ready service.¹

10

11 The OEB set the Retail Service Charges (“RSCs”) based on a “one size fits all”
12 approach which took into consideration that operational differences can make
13 standardization difficult.² Hydro Ottawa took this same approach with the proposed SSS
14 charges and used the methodology as described below in part (b).

15

16 b) Hydro Ottawa has not completed a cost study for the costs incurred in providing the SSS
17 charge. Hydro Ottawa has considered the amount of time that has elapsed since the
18 original rate was set over 15 years ago and the change in complexity in providing the
19 SSS services. Since implementation, the rate has not been adjusted to reflect actual
20 costs or inflation. The main objective in aligning this charge with the Retailer Services
21 Distributor-Consolidated Billing monthly charge is to facilitate customer choice and
22 ensure all customers, Retailer or SSS, are paying an equal service charge for billing
23 services regardless of their electricity service provider. Another objective is to keep the
24 rate structure easier for customers to understand, as it maintains the price between the
25 SSS Charge and the equivalent RSC.

26

27 Similar to the OEB’s approach with RSCs, Hydro Ottawa has proposed a method that is
28 simple, flexible, and does not impose undue regulatory burden going forward. At this

¹ Ontario Energy Board, *2006 Electricity Distribution Rate Handbook* (May 11, 2005), page 126.

² Ontario Energy Board, *Report of the Ontario Energy Board - Energy Retailer Service Charges*, EB-2015-0304 (November 29, 2018), page 20.

- 1 time, Hydro Ottawa is proposing a utility-specific rate. However, it believes the
2 methodology leads to an approach that could be used generically.
3
4 c) Hydro Ottawa has not performed specific consultation with its customers regarding the
5 increased charge. Hydro Ottawa notes that the cost driver of the SSS charge is mainly
6 driven by factors outside the utility's control.

INTERROGATORY RESPONSE - OEB-168

9-Staff-1

EXHIBIT REFERENCE:

Updated Exhibit 4/Tab 5/Schedule 2/pp. 1-6

LRAMVA Workforms A, B, C, D and E

SUBJECT AREA: Deferral and Variance Accounts

Preamble:

At the time of filing, Hydro Ottawa applied for lost revenues up to the 2014 CDM year, amounting to debit \$491,812. Hydro Ottawa indicated it may provide LRAMVA claims for years after 2014 as part of subsequent updates to this application.

At the time of filing for 2019 actuals, Hydro Ottawa filed for the additional recovery of lost revenues related to 2015 and 2016 activity. A total debit amount of \$2,733,351 is claimed up to the end of 2016 (as part of its 2021-2025 CIR application) inclusive of carrying charges up to Jan. 1, 2021, with the components of the claim summarized below:

Workform A (\$424,027): 2014 new CDM, and 2013 persistence into 2014

Workform B (\$67,785): 2013 adjustments (in 2013)

Workform C (\$334,574): 2011-2014 persistence into 2015

Workform D (\$1,071,818): 2015 new CDM

Workform E (\$835,147): 2016 new CDM, and 2015 persistence into 2016

Question(s):

a) Please clarify why Hydro Ottawa has not claimed lost revenues up to the end of the Conservation First Framework

b) There are a few inconsistencies in the LRAMVA workforms with respect to the LRAMVA thresholds used in each. For example, Workforms B and D do not include LRAMVA thresholds in Tab 2, but the corresponding Workforms A and C include one. Please clarify whether that was excluded in error. If not, please discuss how the LRAMVA balances in Workforms B and D are accurate when there is no forecast savings being compared to actual savings for each of Workform B (2013 adjustments) and Workform D (2015 incremental savings).

c) Please explain why Hydro Ottawa did not combine all filings in one LRAMVA workform.

d) Please confirm that the total LRAMVA debit balance of \$2,733,351 is to be disposed of over a 1-year period. (Note: Workforms A and B indicate 1-year disposition, while Workforms C, D and E indicate 2-year disposition)

RESPONSE:

a) The IESO provided a preliminary unverified Participation and Cost report for the 2018 reporting year. This report required distributors to convert gross saving to net saving for LRAM claims. Hydro Ottawa has completed this task in support of its LRAM claims to the end of 2017. Even with the 2018 preliminary report, it took time for Hydro Ottawa to familiarize itself with the details of the reporting that is usually performed by the IESO. The task for the 2019 period will require even more time, as it is anticipated that the IESO will not provide reporting for that year. Hydro Ottawa plans to complete the exercise later in 2020 (which is no earlier than the timeframe in which the IESO usually published its historical annual reporting). In addition, as the 2019 saving report would normally be received in 2020, any balances recorded in the LRAM Account will not be audited until after this Application process is set to be completed.

Using detailed project level data, Hydro Ottawa has determined a material amount of savings had not been processed and included in the IESO's preliminary 2018 unverified Participation and Cost reports. The majority of the savings relate to 2017 and 2018. As

1 such, Hydro Ottawa opted not to make claims for those years, as OEB guidelines
2 stipulate that a utility can only request LRAM once for a single calendar year.

3

4 b) Workform A (submitted as Attachment 4-5-2(A): OEB Workform - 2014 LRAM VA
5 Workform on February 10, 2020) relates to 2013 adjustments and determines
6 incremental adjustments rather than a cumulative balance. The 2013 threshold was
7 used in the original clearance of 2013. Please refer to UPDATED Exhibit 4-5-2: LRAM
8 Variance Account for the reason related to an additional claim, including that the
9 threshold in Workform A would result in applying the threshold twice to the 2013 year.

10

11 A similar situation occurs for Workforms C and D (respectively submitted as Attachment
12 4-5-2(C) and Attachment 4-5-2(D) on May 5, 2020). Both workforms relate to 2015
13 savings. Workform C relates to 2015 savings that persist from the 2011-2014 CDM
14 programs, while Workform D relates to 2015 savings from the 2015-2020 CFF programs.
15 Using the threshold in both Workforms would result in the threshold being applied twice
16 to the 2015 year.

17

18 c) Hydro Ottawa did not combine the LRAM filings into one LRAM Workform for multiple
19 reasons. Firstly, the Workform only allows for two years' worth of thresholds. Secondly,
20 Hydro Ottawa found it was difficult to uniformly create formulas to populate the Workform
21 stretching over both CDM program periods. As a result, 2015 could not be combined
22 with 2014 or 2016. Lastly, as 2013 is only incremental savings rather than cumulative
23 saving, it was not easily combined with the 2014 year.

24

25 d) In its original evidence filed on February 10, 2020, Hydro Ottawa proposed to dispose of
26 the LRAM balance over one year. In its updated submission on May 5, 2020, Hydro
27 Ottawa proposed to dispose of LRAM over two years. Workforms A and B were
28 submitted in the original evidence as Attachment 4-5-2(A) and Attachment 4-5-2(B).
29 Workforms C and D were subsequently submitted as UPDATED Attachment 4-5-2(C)
30 and UPDATED Attachment 4-5-2(D), respectively, as part of the updates to the

- 1 Application filed on May 5, 2020. Hydro Ottawa confirms that it is proposing to dispose of
- 2 LRAM over two years.

INTERROGATORY RESPONSE - OEB-169

9-Staff-2

EXHIBIT REFERENCE:

EB-2015-0004/Exhibit D/Tab 5/Schedule 2

Updated Exhibit 4/Tab 5/Schedule 2/p. 3

LRAMVA Workform A ("2014LRAMVA_452A")

LRAMVA Workform B ("2014Adjustments_LRAMVA_452B")

SUBJECT AREA: Deferral and Variance Accounts

Preamble:

In the 2016-2020 CIR proceeding (EB-2015-0004), Hydro Ottawa was approved to dispose of lost revenues related to 2011 to 2013 CDM activity.

In the current proceeding, Hydro Ottawa is requesting to dispose of a total debit balance of \$491,812 for 2014 activity based on:

- i) new 2014 CDM amounts (debit of \$424,027) per Workform A ("2014LRAMVA_452A")
- ii) 2013 adjustments (debit of \$67,785) that were not included in its previous claim per Workform B ("2014Adjustments_LRAMVA_452B")

As noted above, these two components were filed in two separate workforms:

- In Workform A ("2014LRAMVA_452A"), the 2014 LRAMVA balance of \$424,027 is inclusive of persistence from 2011-2013 program savings in 2014, and persistence of 2013 savings adjustments in 2014.
- In Workform B ("2014Adjustments_LRAMVA_452B"), the LRAMVA balance of \$67,785 is inclusive of 2013 adjustments and the persistence of 2012 program savings in 2013.

1 Hydro Ottawa stated that it has complied with the OEB's direction to dispose of the LRAMVA
2 balance as part of their COS application. Hydro Ottawa notes that it would have waited to clear
3 the 2013 year (as IESO reports could include significant adjustments) had it received further
4 clarity from the OEB that the LRAMVA balance was related to calendar year savings rather than
5 the IESO report.

6

7 Question(s):

8

9 a) As 2013 CDM amounts were disposed of in its 2016-2020 CIR proceeding, please
10 explain how claiming 2013 savings adjustments in this proceeding would not constitute
11 rate retroactivity, and how it falls within prospective treatment of changes.

12

13 b) Please clarify which appropriate guideline, filing requirement or workform was
14 referenced by Hydro Ottawa where it learned the "LRAMVA balance was related to
15 calendar year savings rather than the IESO report".

16

17 c) In light of the OEB's guidance (Chapter 2 Filing Requirements for [2018 COS Filers](#)) and
18 prior decisions¹ where the OEB did not allow for retroactivity, please explain why Hydro
19 Ottawa is seeking to recover 2013 adjustments (as per
20 "2014Adjustments_LRAMVA_452B") and the appropriateness of doing so. In response
21 to this interrogatory, please indicate if Hydro Ottawa seeks to maintain its retroactive
22 request to recover 2013 adjustments filed in Workform B.

23

24 **RESPONSE:**

25

26 A response to this interrogatory will be provided in full during the week of June 8th, 2020.

27 ¹ EB-2016-0075 (Guelph Hydro 2017 IRM); EB-2016-0080 (Hydro One Brampton 2017 IRM); EB-2016-0214 (North
28 Bay Hydro 2017 IRM)

INTERROGATORY RESPONSE - OEB-170

9-Staff-3

EXHIBIT REFERENCE:

LRAMVA Workforms A, B, C and D

EB-2011-0054/2012 Settlement Agreement/Section 3.3 (p. 13 of 33)

EB-2011-0054/IRRs – Part I/Exhibit K3/Issue 3.3/IR #2 (Energy Probe #28b) / PDF p. 407 of 729

SUBJECT AREA: Deferral and Variance Accounts

Preamble:

In this proceeding, Workforms A and C included a LRAMVA threshold of 29,390,965 kWh, which are the forecast savings applied against actual savings in 2014 and 2015. An extract of the LRAMVA threshold (and its rate class breakdown) is provided below:

	Total	Residential	GS<50 kW	Commercial 50 kW to Large Use	Unmetered Scattered Load	Street Lighting
	kWh	kWh	kWh	kW	kWh	kW
kWh	29,390,965	22,228,164	6,993,000		169,801	
kW	322,951			319193		3758
Summary		22228164	6993000	319193	169800.7857	3758
Years Included in Threshold						
Source of Threshold	20XX Settlement Agreement, p. X					

Source: LRAMVA Workforms A and C, Tab 2

The 2012 Settlement Agreement noted that the CDM adjustment to the load forecast was 75 million kWh (p. 13) but this amount is not reflected in its entirety in the workform.

1 Notwithstanding the above, Table 6 from Part 1 of its 2012 COS proceeding IRRs showed
2 different 2011 and 2012 CDM adjustment figures than the amounts included in the LRAMVA
3 workform:

Table 6 – CDM Adjusted Load Forecast

	Forecasted System Peak (MW)				Forecasted System Energy (GWh)			
	Without CDM	With CDM	CDM Reduction	% Change	Without CDM	With CDM	CDM Reduction	% Change
2011	1,435	1,426	9	-0.6%	7,957	7,919.5	37.5	-0.5%
2012	1,448	1,422	26	-1.8%	8,030	7,917.5	112.5	-1.4%

5 Source: EB-2011-0054, Part 1 IRRs, K3-3-2 (Energy Probe #28b)

6

7 Question(s):

8

9 a) Please clarify whether the 29,390,965 kWh used as LRAMVA threshold in Workforms A
10 and C is a component of the 75 GWh CDM adjustment associated with energy billed
11 customers.

12

13 b) Please confirm the figures in Table 6 (preamble):

14 i) 75 GWh reflects the incremental CDM adjustment to the 2012 load forecast
15 based on the difference between 112.5 GWh (2012 figure) and 37.5 GWh (2011
16 figure)

17 ii) 112.5 GWh reflects the cumulative CDM impact included in the 2012 load
18 forecast

19

20 c) In light of the OEB's partial decision in Alectra's 2020 IRM application where a
21 cumulative LRAMVA threshold was used in the Horizon Rate Zone¹, please explain why
22 Hydro Ottawa is using an 'incremental' LRAMVA threshold of 29,390,965 kWh (LRAMVA
23 Workforms A and C) rather than 'cumulative' forecast savings of 112.5 million kWh (per
24 Table 6 in K3-3-2 (#28) to EP).

25

26 ¹ EB-2019-0018, Partial Decision and Interim Rate Order, December 12, 2019, p. 20-21

1 d) Please update Tab 2 of Workforms A, B (if applicable), C and D with a LRAMVA
2 threshold value of 112.5 million kWh along with the appropriate rate class breakdown.
3 Please ensure that the total kWh LRAMVA threshold by rate class (as entered in
4 LRAMVA workform) matches the LRAMVA threshold amounts on the EB-2011-0054
5 record.

6 _____

7 **RESPONSE:**

8

9 A response to this interrogatory will be provided in full during the week of June 8th, 2020.

INTERROGATORY RESPONSE - OEB-171

9-Staff-4

EXHIBIT REFERENCE:

LRAMVA Workform A ("2014LRAMVA_452A")/ Tab

LRAMVA Workform B ("2014Adjustments_LRAMVA_452B")/ Tab 4

SUBJECT AREA: Deferral and Variance Accounts

Preamble:

It appears there are two 2013 adjustments entered into Workform B ("2014Adjustments_LRAMVA_452B") that were not included in Workform A ("2014LRAMVA_452A").

- Energy Manager (846,892 kWh in 2013; 1,141,184 kWh in 2014)
- High Performance New Construction (-949,590 kWh in 2013 and 2014)

Question(s):

a) Please re-file Workform A ("2014LRAMVA_452A") with the two above-noted adjustments included.

b) If Hydro Ottawa believes that the adjustments should not be included, please explain why.

RESPONSE:

A response to this interrogatory will be provided in full during the week of June 8th, 2020.

INTERROGATORY RESPONSE - OEB-172

9-Staff-5

EXHIBIT REFERENCE:

LRAMVA Workforms A, B, C, D and E / Tabs 4 and 5

Updated Exhibit 4/Tab 5/Schedule 2/pp. 4-5

SUBJECT AREA: Deferral and Variance Accounts

Preamble:

For 2014, Hydro Ottawa noted that it does not have customer-level data to allocate savings to the GS> 50 kW customer classes. The utility has continued to use the same methodology for disposing of LRAM claims for the 2014 Report as was used for the 2011-2013 reports. Hydro Ottawa has confirmed that, for years after 2014, customer-level data will be used to allocate savings to customer classes.

In its re-filing of 2019 actuals, Hydro Ottawa updated the allocation of GS 50-1,499 kW, GS 1,500-4,999 kW, and Large Use classes based on 2019 actual non-RPP consumption.

Table 2 – UPDATED FOR 2019 ACTUALS – > 50 kW Commercial Allocation

	kW	Allocated %	Allocated \$
General Service 50 to 1,499 kW	6,702,839	73.3%	\$(35,981)
General Service 1,500 to 4,999 kW	1,429,266	15.6%	\$(7,672)
Large Use	1,007,309	11.0%	\$(5,407)
TOTAL⁷	9,139,414	100%	\$(49,061)

Source: Updated Exhibit 4, Tab 5, Schedule 2, p. 5

1 Question(s):

2

3 a) As Hydro Ottawa did not have customer-level data to allocate savings to GS>50 kW
4 classes for 2014 and prior, please clarify the basis of the customer class allocations by
5 residential, commercial and industrial CDM programs from 2014 and prior years. As the
6 utility has continued to use the same methodology for disposing of LRAMVA claims for
7 the 2014 Report as was used for the 2011-2013 reports, please discuss the
8 methodology applied

9

10 b) For the GS>50 kW class allocations, please explain how these class allocations in Table
11 2 (included in preamble) reconcile with the allocations used in Tab 4 (of the LRAMVA
12 Workforms D and E) which show class specific allocations broken down by program in
13 2015 and 2016.

14

15 c) Please explain whether the basis of GS>50 kW class allocations derived from non-RPP
16 consumption is reflective of the consumption from participating customers for the
17 purposes of allocating lost revenues.

18

19 **RESPONSE:**

20

21 A response to this interrogatory will be provided in full during the week of June 8th, 2020.

INTERROGATORY RESPONSE - OEB-173

9-Staff-6

EXHIBIT REFERENCE:

LRAMVA Workform E/Tab 2

EB-2015-0004/Settlement Proposal/Attachment 4 (pp. 57-58)

EB-2015-0004/IRRs to VECC/Question #27/ PDF p. 59 of 159

SUBJECT AREA: Deferral and Variance Accounts

Preamble:

In this proceeding, Workform E included a LRAMVA threshold of 27,452,000 kWh, which are the forecast savings applied against actual savings in 2016. An extract of the LRAMVA threshold (and its rate class breakdown) is provided below:

	Total	Residential	GS<50 kW	GS 50 TO 1,499 KW	GS 1,500 TO 4,999	Large User	Unmetered Scattered Load	Street Lighting
	kWh	kWh	kWh	kWh	kWh	kWh	kWh	kWh
	27,452,000	16,725,000	10,727,000	191,563				
	kWh	kWh	kWh	kWh	kWh	kWh	kWh	kWh
	191,563							
Summary		16725000	10727000	191563	0	0	0	0
Threshold	2016							
Source of Threshold	2016-2020 Settlement Agreement, p. 57 & 58							

Source: LRAMVA Workform E, Tab 2

In the 2016-2020 Custom IR Settlement Proposal, the following approved CDM adjustments were included in Attachment 4:

1 9-Staff-6-1:

CDM Adjustment					
	2016	2017	2018	2019	2020
RESIDENTIAL	16,725	28,574	39,437	49,312	59,186
GENERAL SERVICE <50KW	10,727	18,627	25,869	32,452	39,035
GENERAL SERVICE 50-1000KW Non Interval	37,380	64,684	89,512	111,938	134,259
GENERAL SERVICE 50-1000KW Interval	32,771	57,538	80,453	101,447	122,573
2 GENERAL SERVICE 1000-1500KW	9,666	16,844	23,414	29,368	35,296
GENERAL SERVICE 1500-5000 KW	0	0	0	0	0
LARGE USER	0	0	0	0	0
STREETLIGHTING	0	0	0	0	0
MU	0	0	0	0	0
SENTINEL LIGHTS	0	0	0	0	0
TOTAL MWH SALES	107,269	186,267	258,685	324,517	390,349

3 9-Staff-6-2:

CDM					
	2016	2017	2018	2019	2020
GENERAL SERVICE 50-1000KW Non Interval	5,215	10,723	16,118	20,642	25,146
GENERAL SERVICE 50-1000KW Interval	6,730	11,679	16,227	20,422	24,643
GENERAL SERVICE 1000-1500KW	1,825	3,220	4,506	5,663	6,814
4 GENERAL SERVICE 1500-5000 KW	0	0	0	0	0
STANDBY	0	0	0	0	0
LARGE USER	0	0	0	0	0
STREETLIGHTING	0	0	0	0	0
SENTINEL LIGHTS	0	0	0	0	0
TOTAL	13,770	25,622	36,851	46,727	56,603

5 Source: EB-2015-0004, Settlement Proposal, refiled December 7, 2015, Attachment 4

6

7 The LRAMVA threshold (kWh) in the Settlement Proposal is consistent with the cumulative
8 savings embedded in the 2016 to 2020 load forecasts.

1 9-Staff-6-3:

Table 1 - CDM Adjustment to Load Forecast (MWh)

	Yearly Target	Savings related to Current Year A	Savings Related to Previous Year B	Total Savings in Year A+B	Cumulative Savings
2014	42,400	7,611		7,611	7,611
2015	39,500	19,750	20,656	40,406	48,017
2016	79,000	39,500	19,750	59,250	107,267
2017	79,000	39,500	39,500	79,000	186,267
2018	65,833	32,917	39,500	72,417	258,684
2019	65,833	32,917	32,917	65,834	324,518
2020	65,833	32,917	32,917	65,834	390,352
2015 to 2020 CDM Impact				390,352	

3 Source: EB-2015-0004, IRR 3-VECC#27

4

5 Question(s):

6

7 a) Please reconcile the LRAMVA threshold (199,563 kW) in Tab 2 of the LRAMVA workform
8 with Table 2 in the preamble, and explain whether the LRAMVA threshold (kW) used in
9 the lost revenue calculation is correct.

10

11 b) Please provide the inputs and assumptions used to arrive at the class breakdown of
12 CDM adjustments of 199,543 kW for the GS>kW class.

13

14 c) For consistency, please revise Tab 2 of LRAMVA Workform E to show the LRAMVA
15 threshold (kWh) for all classes, in order to match the approved LRAMVA threshold of
16 107,267,000 kWh in 2016.

17

18 **RESPONSE:**

19

20 A response to this interrogatory will be provided in full during the week of June 8th, 2020.

INTERROGATORY RESPONSE - OEB-174

9-Staff-7

EXHIBIT REFERENCE:

LRAMVA Workform E/Tab 8

SUBJECT AREA: Deferral and Variance Accounts

Preamble:

As part of the filing of 2019 actuals, Hydro Ottawa included street light demand savings amounting to a debit of \$12,301 (principal) as part of its 2016 lost revenue claim. The savings were achieved through the streetlight upgrades on a monthly basis, and detailed tables were provided to show the change in demand by type of bulb for several months of 2016.

Question(s):

- a) Please confirm whether street light demand savings were funded through the IESO saveOnEnergy retrofit program in 2016.
- b) Please confirm whether there were any street lighting upgrades completed outside of the IESO's saveOnEnergy Retrofit program that are counted in total billed demand. If yes, please quantify and remove the impact of these savings in the LRAMVA.
- c) If yes to a) above, please confirm whether the energy savings from street light projects have been deducted from the respective 2016 saveOnEnergy retrofit program. If not, please revise Tab 5 of LRAMVA Workform E to show that the 2016 retrofit program's energy savings (claimed in the LRAMVA) are exclusive of street light retrofits.

- 1 d) Please discuss whether Hydro Ottawa received reports from the City of Ottawa to
2 confirm the number of bulbs, types of bulbs and timing of the bulbs replaced. If not,
3 please discuss whether the number or wattage of bulb retrofits were validated.
4
- 5 e) Please confirm that the change in demand savings were tracked on a monthly basis; and
6 thus, it is appropriate to multiple the monthly savings by the number of months the new
7 bulbs were in-service for the remainder of the year.
8
- 9 f) Without a net-to-gross ratio (NTG) applied, savings from street light upgrades are gross
10 values. Please explain why it is appropriate not to apply a free ridership assumption to
11 municipal streetlighting projects. Alternatively, please discuss whether it is reasonable to
12 apply a 85% NTG ratio¹ based on similar retrofit projects in Hydro Ottawa's service
13 territory. Please make the necessary revision(s) to Tab 8, as applicable.

14 _____

15 **RESPONSE:**

16

17 A response to this interrogatory will be provided in full during the week of June 8th, 2020.

18 ¹ 2017 verified program results, Tab "LDC Progress", Col. FQ, NTG for the 2016 retrofit program

INTERROGATORY RESPONSE - OEB-175

9-Staff-8

EXHIBIT REFERENCE:

LRAMVA Workforms A, B, C, D and E

Updated Exhibit 4/Tab 5/Schedule 2/p. 6/Table 3

SUBJECT AREA: Deferral and Variance Accounts

Question(s):

a) Please file the 2011-2015 Persistence Savings Report.

b) Please file updated LRAMVA workform(s) as requested in the above LRAMVA interrogatories or as one consolidated LRAMVA workform with all years inclusive, if this can be done. Please confirm the LRAMVA balance requested for disposition, the disposition period and the revised rate riders.

c) Please confirm any changes to the LRAMVA workform in response to these LRAMVA interrogatories in "Table A-2. Updates to LRAMVA Disposition (Tab 1-a)".

RESPONSE:

A response to this interrogatory will be provided in full during the week of June 8th, 2020.

1 **INTERROGATORY RESPONSE - OEB-176**

2 **9-Staff-9**

3 EXHIBIT REFERENCE:

4 **Updated Exhibit 9/Tab 1/Schedule 3/pp. 14-15**

5

6 SUBJECT AREA: Deferral and Variance Accounts

7

8 Preamble:

9

10 The accounting order from the 2016 -2020 Custom IR¹[1] established the following for Account
11 1508 Other Regulatory – Sub-account Gains/Losses from the Sale of Existing Facilities Deferral
12 Account

13

14 Hydro Ottawa shall establish a new deferral account 1508 Other Regulatory Assets –
15 Subaccount Gains/Losses from Sale of Existing Facilities, effective January 1, 2016, to
16 record the **after tax** gains/losses from the sale of existing buildings and land. (Emphasis
17 added)

18

19 This account shall capture 100% of the **after tax** net gains/losses on the sale of land and
20 existing facilities buildings at Albion Road, Merivale Road and Bank Street. (Emphasis
21 added)

22

23 In the current application, Hydro Ottawa seeks disposition of a total gain of \$2,151,861 in
24 Sub-account 1508. Hydro Ottawa proposes no tax adjustment to the gain being returned to
25 customers. Hydro Ottawa proposes to use the Replacement Property rules under the *Income*
26 *Tax Act* to defer the capital gain on the sale of the land and buildings of the Existing Facilities
27 and reduce the additions to the New Facilities by the gain for tax purposes of \$7.9 million in
28 2019.

29 ¹ Schedule C, Accounting Orders, EB-2015-0004

1 Question(s):

2

3 a) Please explain if and how this proposal is consistent with the accounting order from the
4 2016 -2020 Custom IR.

5

6 b) Please explain how the \$7.9 million gain for tax purposes was determined.

7

8 c) Please quantify the impact to the relevant account(s) in reference to the Accounting
9 Order from the 2016-2020 Custom IR without the application of the Replacement
10 Property rules.

11

12 **RESPONSE:**

13

14 a) This proposal is consistent with the accounting order from the 2016-2020 Custom IR
15 application. In addition, the Replacement Property rules tax treatment was discussed
16 during the Technical Conference held on August 14, 2015. Using the Replacement
17 Property rules allows Hydro Ottawa to maximize tax savings by deferring the tax gain.
18 These rules result in tax payable of \$NIL on the sale of land and building of the Existing
19 Facilities. This tax of \$NIL is thus deducted from the calculation of the accounting gain.

20

21 b) Please see Table A below for the calculation of the \$7.9M gain for tax purposes. The
22 gain for tax purposes was calculated by applying the Replacement Property rules.

23

1 **Table A – Calculation of Gain on Sale of Existing Facilities for Tax Purposes**

Details	Amount
Proceeds from sale (land & buildings)	\$17,827,000
Deduct : selling costs	(\$1,126,026) ²
Deduct : proceeds related to sale of buildings ³	(\$8,200,000)
Deduct : original costs of land	(\$610,505)
Gain on land for tax purposes	\$7,890,469

2

3 c) Table B provides the calculation of tax payable on the sale of the Existing Facilities, if the
4 Replacement Property rules were not applied to defer the tax gain.

5

6 **Table B – Calculation of Tax on Sale of Existing Facilities**
7 **(Without the Application of Replacement Property Rules)**

Details	Amount
Capital gain on sale of land	\$7,890,469
Taxable capital gain (50% of capital gain)	3,945,235
Federal Part I Tax (38%)	\$1,499,189
Federal Part I Refundable tax (10 ⅔%)	\$420,825
Less : Federal tax abatement (10%)	(\$394,524)
Total Federal Part 1 tax payable	\$1,525,490
Ontario tax payable (11.5%)	\$453,702
Total tax payable (before dividend refund)	\$1,979,192
Less : Dividend refund ⁴	(\$1,209,872)
Less : General tax reduction ⁵	\$0
Total tax payable (after dividend refund)	\$769,320

8

9 If the replacement property rules were not applied, the total gain of \$2,151,861 in
10 Sub-account 1508 would need to be reduced by tax payable of \$769,320.
11 Correspondingly, the deferred tax gain of \$7,890,469 would need to be added back to

² Please note that for tax purposes total selling costs include \$1,801 related to non-distribution solar assets.

³ Buildings are considered depreciable property for tax purposes. The proceeds related to the sale of the buildings are deducted from Schedule 8 in 2019 (year of sale).

⁴ The dividend refund is available when dividends are paid out by Hydro Ottawa.

⁵ Investment income does not qualify for 13% general tax reduction.

- 1 Schedule 8 in the PILS models for 2019 in UCC class 1.3. This would result in an
- 2 increase in CCA deductions available in UCC class 1.3 for 2019 and subsequent tax
- 3 years.

INTERROGATORY RESPONSE - OEB-177

9-Staff-10

EXHIBIT REFERENCE:

Exhibit 9/Tab 1/Schedule 3/page 2

Updated Exhibit 9/Tab 3/Schedule 1/page 7

SUBJECT AREA: Deferral and Variance Accounts

Preamble:

In the current application, Hydro Ottawa proposes to dispose 1508 Sub-account Energy East TransCanada Pipeline balance of \$55,424 on a final basis and to discontinue use of this Account.

In Question 4 of the APH issued on March 2015, OEB stated the following:

This is a Group 2 account and disposition will normally occur when the utility files a cost of service or custom IR application. **Materiality thresholds apply to the amounts recorded.** Carrying charges will apply and these should be recorded in a separate sub-account. (Emphasis added)

Question(s):

a) Please explain why Hydro Ottawa requested disposition when the balance is below materiality.

1 _____

2 **RESPONSE:**

3

4 a) Hydro Ottawa is proposing to dispose of the Sub-Account 1508 Energy East

5 TransCanada Pipeline¹ balance of \$55,424 on a final basis as part of the total Group 2

6 account balance.

7

8 Hydro Ottawa agrees that both Question 2 of the Accounting Procedures Handbook

9 issued March 2015² and the OEB's letter of June 13, 2014³ with instructions to set-up

10 the deferral account stipulate that disposition of this sub-account must meet established

11 materiality thresholds. Hydro Ottawa believes materiality is viewed from a total Group 2

12 account perspective. As a general practice, the utility does not have a separate rate rider

13 for each account. Therefore clearance of the separate smaller balances to be collected

14 from customers, such as the debit balance for the 1508 Energy East Sub-Account, or the

15 credit balance of \$36,725 in Sub Account 1508 RCVA Retail Incremental Revenue to be

16 returned to customers, are not creating rate riders of less than four decimals.

17

18 Please see the OEB's Policy and Rationale under Disposition Threshold in the *Electricity*

19 *Distributors' Deferral and Variance Account Review Initiative* ("EDDVAR") where the

20 OEB agreed that using net balances of all account balances to determine disposition is

21 practical.⁴ Hydro Ottawa is thus disposing of the total Group 2 balance as it does meet

22 the materiality threshold.

23 ¹ This is referred to as Sub-Account 1508 - East Energy Cost Defer Cost in UPDATED Attachment 9-1-1(A): OEB

24 Workform - Deferral and Variance Account (Continuity Schedule).

25 ² Ontario Energy Board, Accounting Procedures Handbook Guidance, Question 4 (March, 2015), page 4.

26 ³ Ontario Energy Board, Letter re: *Board Costs Associated with Consultations on TransCanada Pipelines Limited's*

27 *Proposed Energy East Pipeline Project*, EB-2013-0398 (June 13, 2014), pages 1-2.

28 ⁴ Ontario Energy Board, *Electricity Distributors' Deferral and Variance Account Review Initiative* ("EDDVAR"), Section

29 5.1 Disposition Threshold, (July 31, 2009), page 13.

INTERROGATORY RESPONSE - OEB-178

9-Staff-11

EXHIBIT REFERENCE:

Exhibit 9/Tab 1/Schedule 3/page 2

Updated Exhibit 9/Tab 1/Schedule 1/Attachment A: DVA Workform

SUBJECT AREA: Deferral and Variance Accounts

Preamble:

Sub-Account 1508 Other Post-Employment Benefits (OPEB) was originally approved in Hydro Ottawa's 2012 rate application to record cumulative actuarial gains or losses in Hydro Ottawa's post-retirement benefits. The Accounting Order¹ from the 2012 Rate Order stated:

Hydro Ottawa shall capture the one-time adjustment of approximately \$2.8 million to the post-retirement liability on the date of transition to IFRS. This amount shall result from an election applied under IFRS 1 that would otherwise result in a charge to Hydro Ottawa's retained earnings. The amount of the one-time adjustment that will be recorded in this account shall be supported by an actuarial valuation when disposition of the deferral account is sought by Hydro Ottawa.

In the current application, Hydro Ottawa is seeking disposition of a credit balance of \$4,431,595 in Sub-account 1508 OPEB.

The Report of the Ontario Energy Board: Regulatory Treatment of Pension and Other Post-employment Benefits (OPEBs) Costs stated "Utilities may propose disposition of

¹ Appendix B, Rate Order EB-2011-0054

1 the account in future cost based rate proceedings if the gains and losses that are
2 tracked in this account do not substantially offset over time.”²

3

4 Question(s):

5

6 a) Please confirm if Hydro Ottawa has recorded the \$2.8 million one-time
7 adjustment according to the 2012 Accounting Order.

8 i) If Hydro Ottawa has recorded a different amount or has not recorded the
9 one-time adjustment, please explain why and clarify what balance has
10 been recorded.

11

12 b) Please provide the support for the balance requested for disposition.

13

14 c) What is the projected gain/loss for this account in 2020 and the current Custom
15 IR period of 2021 to 2025, if available?

16

17 d) Please provide the balances for the gain/loss in this account since the approval
18 of this account in 2012 rate application and explain if the OPEB gains and losses
19 tracked in this account have substantially offset over time.

20

21 **RESPONSE:**

22

23 a) Yes, Hydro Ottawa recorded a \$2.8M one-time adjustment according to the 2012
24 Accounting Order.

25

26 Note that, in addition to the one-time adjustment, the Accounting Order allows for
27 subsequent adjustments. Please see additional wording from the Accounting
28 Order below:

29

30 ² Page 13 of the Report of the Ontario Energy Board: Regulatory Treatment of Pension and Other
31 Post-employment Benefits (OPEBs) Costs EB-2015-0040

1 “The deferral account shall be adjusted as required to record changes in
2 the cumulative actuarial gains or losses in Hydro Ottawa’s post
3 retirement benefits as supported by updated actuarial valuations
4 prepared for Hydro Ottawa. The adjustments to the deferral account shall
5 be made to offset the effect on Hydro Ottawa’s income that would
6 otherwise result from the actuarial adjustments made to the cumulative
7 actuarial gains or losses.”³

8
9 b) Please refer to Attachment OEB-178(B): Actuarial Reports for Sub-Account 1508
10 P&OPEB for post-retirement life insurance documentation. Note that some
11 schedules have been redacted to remove affiliate company information.

12
13 The balance requested for disposition is outlined below in Table A. Please note
14 that Hydro Ottawa has no carrying charges on this Sub-Account.

15
16 **Table A – Disposition of Other Regulatory Assets - 1508 - Sub-Account P&OPEB⁴**

Disposition of Other Regulatory Assets - 1508 - Sub-Account P&OPEB As of December 31, 2019		
Description	Cell Reference ⁵	Amount (\$)
Opening Principal Balance Jan 1, 2019	BC53	(272,000)
Transactions during 2019	BD53	1,522,000
Reverse Opening Principal Balance Jan 1, 2019	BF53	272,000
Reverse Transactions during 2019	BF53	(1,522,000)
Reverse Charge to Customers from 2016 Rate Application	BF53 (to reverse AA53)	(4,431,595)
TOTAL PROPOSED DISPOSITION	BT53	\$(4,431,595)

17
18 c) Hydro Ottawa does not have projected gain/loss for the P&OPEB sub-account in
19 2020 or for the Custom IR period of 2021-2025, since the assumptions

³ Ontario Energy Board, *Rate Order*, EB-2011-0054 (January 26, 2012), Appendix B.

⁴ As noted in the preamble to this interrogatory, “P & OPEB” stands for Pension and Other Post-Employment Benefits.

⁵ Cell References are for UPDATED Attachment 9-1-1(A): OEB Workform - Deferral and Variance Continuity Schedule, tab ‘2b.2017 Continuity Schedule’.

1 underlying the actuarial valuation did not change from 2019.

2

3 d) As evidenced by the gain/loss in this account since the approval of this account

4 in 2012, the P&OPEB gains and losses do not substantially offset over time.

5 Hydro Ottawa is seeking disposition of a credit balance of \$4,431,595 in

6 Sub-Account 1508 P&OPEB. Please refer to details in part (b) above.

7

8 After the disposition, the remaining balance in P&OPEB will be \$5,681,600.

9 Please refer to excel Attachment OEB-178(A): Summary of Sub-Account 1508

10 P&OPEB 2010-2019 for a table that provides the balances for the gain/loss in

11 this account since 2010.

Post-Retirement Life Insurance 2010, 2011 and 2012

**Hydro Ottawa
LDC - Post Retirement Life
CICA 3461**

January 1st	2011	2012	2013 (estimate)
III- Required amortization of unamortized net actuarial gain (loss)			
. Accrued benefit obligation	7,761,600	8,844,800	9,871,900
. Value of plan assets	0	0	0
. 10% of the greater of obligation and assets	776,160	884,480	987,190
. Unamortized net actuarial gain (loss)	-2,830,600	-3,730,000	-4,556,800
. Less actuarial gain not yet in market-related value	0	0	0
. Sub-total	-2,830,600	-3,730,000	-4,556,800
. Amount subject to amortization	2,054,440	2,845,520	3,569,610
. Minimum required amortization	156,800	207,700	260,600
IV- Schedule of unamortized net actuarial gain (loss)			
. Opening balance	-2,830,600	-3,730,000	-4,556,800
. Net gain (loss) for the year	-1,051,700	-1,028,600	0
. Special adjustment to match ABL	0	0	0
. Amortization for current year	152,300	201,800	254,900
. Closing balance	-3,730,000	-4,556,800	-4,301,900
V- Amortization of past service costs			
. Opening balance	0	0	0
. Past service costs this year	0	0	0
. Amortization for current year	0	0	0
. Closing balance	0	0	0
VI- Determination of benefit cost			
. Current service cost	107,000	133,500	167,800
. Interest cost on accrued benefit obligation	381,800	375,300	371,700
. Actual return on plan assets	0	0	0
. Actuarial loss (gain) on obligation	1,051,700	1,028,600	0
. Past service costs	0	0	0
. Special event	0	0	0
. Benefit cost before adjustments	1,540,500	1,537,400	539,500
. Adjustments			
- expected return vs actual return on plan assets	0	0	0
- amortization of loss (gain) vs year loss (gain) on obligation	-899,400	-826,800	254,900
- amortization of past service costs vs year past service costs	0	0	0
- amortization of the transitional obligation (asset)	0	0	0
- sub-total	-899,400	-826,800	254,900
. Change in valuation allowance	0	0	0
. Benefit cost for defined benefit	641,100	710,600	794,400
. Benefit cost for defined contribution	0	0	0
. Total benefit cost	641,100	710,600	794,400

Retirement Grant 2010, 2011 and 2012

**Hydro Ottawa
Retirement Grant
CICA 3461**

January 1st

	2011	2012	2013 (estimate)
IV- Actuarial gain (loss) on accrued benefit obligation			
. Accrued benefit obligation	809,100	902,600	981,800
. Current service cost and employee contributions	36,800	42,500	46,800
. Past service costs	0	0	0
. Interest cost on accrued benefit obligation	39,000	37,500	36,300
. Benefit payments	-33,500	-32,400	-147,900
. Expected value of accrued benefit obligation	851,400	950,200	917,000
. Actual value of accrued benefit obligation	902,600	981,800	917,000
. Experience gain (loss)	-51,200	-31,600	0
V- Required amortization of unamortized net actuarial gain (loss)			
. Accrued benefit obligation	809,100	902,600	981,800
. Value of plan assets	0	0	0
. 10% of the greater of obligation and assets	80,910	90,260	98,180
. Unamortized net actuarial gain (loss)	16,800	-34,400	-66,000
. Less actuarial gain not yet in market-related value	0	0	0
. Sub-total	16,800	-34,400	-66,000
. Amount subject to amortization	0	0	0
. Minimum required amortization	0	0	0
VI- Schedule of unamortized net actuarial gain (loss)			
. Opening balance	16,800	-34,400	-66,000
. Net gain (loss) for the year	-51,200	-31,600	0
. Amortization for current year	0	0	0
. Closing balance	-34,400	-66,000	-66,000
VII- Amortization of past service costs			
. Opening balance	0	0	0
. Past service costs this year	0	0	0
. Amortization for current year	0	0	0
. Closing balance	0	0	0
VIII- Determination of benefit cost			
. Current service cost	36,800	42,500	46,800
. Interest cost on accrued benefit obligation	39,000	37,500	36,300
. Actual return on plan assets	0	0	0
. Actuarial loss (gain) on obligation	51,200	31,600	0
. Past service costs	0	0	0
. Special event	0	0	0
. Benefit cost before adjustments	127,000	111,600	83,100
. Adjustments			
- expected return vs actual return on plan assets	0	0	0
- amortization of loss (gain) vs year loss (gain) on obligation	-51,200	-31,600	0
- amortization of past service costs vs year past service costs	0	0	0
- amortization of the transitional obligation (asset)	0	0	0
- sub-total	-51,200	-31,600	0
. Change in valuation allowance	0	0	0
. Benefit cost for defined benefit	75,800	80,000	83,100
. Benefit cost for defined contribution	0	0	0
. Total benefit cost	75,800	80,000	83,100

Post-Retirement Life Insurance 2013

Hydro Ottawa LDC - Post Retirement Life CICA 3461

January 1st

	2012	2013	2014 (estimate)
III- Determination of benefit cost			
. Current service cost	133,500	167,800	121,400
. Interest cost on accrued benefit obligation	375,300	371,700	386,600
. Actuarial loss (gain) on obligation	1,028,600	-1,807,400	0
. Past service costs	0	0	0
. Benefit cost	1,537,400	-1,267,900	508,000
IV- Accrued benefit liability (asset)			
. Opening balance	8,844,800	9,871,900	8,170,400
. Benefit cost for the year	1,537,400	-1,267,900	508,000
. Contributions by the company	-510,300	-433,600	-473,400
. Closing Balance	9,871,900	8,170,400	8,205,000

ADDITIONAL DISCLOSURE ITEMS REQUIRED

Reconciliation of Accrued Benefit Obligation

. Opening balance	8,844,800	9,871,900	8,170,400
. Current service cost	133,500	167,800	121,400
. Interest cost on accrued benefit obligation	375,300	371,700	386,600
. Benefit payments	-510,300	-433,600	-473,400
. Past service costs	0	0	0
. Actuarial loss (gain)	1,028,600	-1,807,400	0
. Special event	0	0	0
. Closing balance	9,871,900	8,170,400	8,205,000

Reconciliation of accrued benefit obligation to accrued benefit asset (liability) at end of year

. Plan assets at fair value	0	0	0
. Accrued benefit obligation	9,871,900	8,170,400	8,205,000
. Plan surplus (deficit)	-9,871,900	-8,170,400	-8,205,000
. Unamortized transitional obligation (asset)	0	0	0
. Unamortized past service costs	0	0	0
. Unamortized net actuarial loss (gain)	0	0	0
. Accrued benefit asset (liability)	-9,871,900	-8,170,400	-8,205,000

Assumptions

. Benefit cost (current year)			
- discount rate	4.30%	3.80%	4.80%
- rate of salary escalation	3.10%	3.10%	3.10%
. Accrued benefit obligation (end of year)			
- discount rate	3.80%	4.80%	4.80%
- rate of salary escalation	3.10%	3.10%	3.10%

Retirement Grant 2013

Hydro Ottawa Retirement Grant CICA 3461

January 1st

	2012	2013	2014
			(estimate)
III- Determination of benefit cost			
. Current service cost	42,500	46,800	44,000
. Interest cost on accrued benefit obligation	37,500	36,300	45,800
. Actuarial loss (gain) on obligation	31,600	-59,700	0
. Past service costs	0	0	0
. Benefit cost	111,600	23,400	89,800
IV- Accrued benefit liability (asset)			
. Opening balance	902,600	981,800	983,900
. Benefit cost for the year	111,600	23,400	89,800
. Contributions by the company	-32,400	-21,300	-147,700
. Closing Balance	981,800	983,900	926,000
ADDITIONAL DISCLOSURE ITEMS REQUIRED			
Reconciliation of Accrued Benefit Obligation			
. Opening balance	902,600	981,800	983,900
. Current service cost	42,500	46,800	44,000
. Interest cost on accrued benefit obligation	37,500	36,300	45,800
. Benefit payments	-32,400	-21,300	-147,700
. Past service costs	0	0	0
. Actuarial loss (gain)	31,600	-59,700	0
. Special event	0	0	0
. Closing balance	981,800	983,900	926,000
Reconciliation of accrued benefit obligation to accrued benefit asset (liability) at end of year			
. Plan assets at fair value	0	0	0
. Accrued benefit obligation	981,800	983,900	926,000
. Plan surplus (deficit)	-981,800	-983,900	-926,000
. Unamortized transitional obligation (asset)	0	0	0
. Unamortized past service costs	0	0	0
. Unamortized net actuarial loss (gain)	0	0	0
. Accrued benefit asset (liability)	-981,800	-983,900	-926,000
Assumptions			
. Benefit cost (current year)			
- discount rate	4.30%	3.80%	4.80%
- rate of salary escalation	3.10%	3.10%	3.10%
. Accrued benefit obligation (end of year)			
- discount rate	3.80%	4.80%	4.80%
- rate of salary escalation	3.10%	3.10%	3.10%

Post-Retirement Life Insurance 2014

Hydro Ottawa LDC - Post Retirement Life CICA 3461

January 1st

	2013	2014	2015 (estimate)
III- Determination of benefit cost			
. Current service cost	167 800	121 400	154 100
. Interest cost on accrued benefit obligation	371 700	386 600	380 000
. Actuarial loss (gain) on obligation	-1 807 400	1 389 400	0
. Past service costs	0	0	0
. Benefit cost	-1 267 900	1 897 400	534 100
IV- Accrued benefit liability (asset)			
. Opening balance	9 871 900	8 170 400	9 604 600
. Benefit cost for the year	-1 267 900	1 897 400	534 100
. Contributions by the company	-433 600	-463 200	-516 000
. Closing Balance	8 170 400	9 604 600	9 622 700

ADDITIONAL DISCLOSURE ITEMS REQUIRED

Reconciliation of Accrued Benefit Obligation

. Opening balance	9 871 900	8 170 400	9 604 600
. Current service cost	167 800	121 400	154 100
. Interest cost on accrued benefit obligation	371 700	386 600	380 000
. Benefit payments	-433 600	-463 200	-516 000
. Past service costs	0	0	0
. Actuarial loss (gain)	-1 807 400	1 389 400	0
. Special event	0	0	0
. Closing balance	8 170 400	9 604 600	9 622 700

Reconciliation of accrued benefit obligation

to accrued benefit asset (liability) at end of year			
. Plan assets at fair value	0	0	0
. Accrued benefit obligation	8 170 400	9 604 600	9 622 700
. Plan surplus (deficit)	-8 170 400	-9 604 600	-9 622 700
. Unamortized transitional obligation (asset)	0	0	0
. Unamortized past service costs	0	0	0
. Unamortized net actuarial loss (gain)	0	0	0
. Accrued benefit asset (liability)	-8 170 400	-9 604 600	-9 622 700

Assumptions

. Benefit cost (current year)			
- discount rate	3,80%	4,80%	4,00%
- rate of salary escalation	3,10%	3,10%	3,10%
. Accrued benefit obligation (end of year)			
- discount rate	4,80%	4,00%	4,00%
- rate of salary escalation	3,10%	3,10%	3,10%

Retirement Grant 2014

Hydro Ottawa Retirement Grant CICA 3461

January 1st

	2013	2014	2015 (estimate)
III- Determination of benefit cost			
. Current service cost	46 800	44 000	41 300
. Interest cost on accrued benefit obligation	36 300	45 800	34 600
. Actuarial loss (gain) on obligation	-59 700	-67 600	0
. Past service costs	0	0	0
. Benefit cost	23 400	22 200	75 900
IV- Accrued benefit liability (asset)			
. Opening balance	981 800	983 900	898 800
. Benefit cost for the year	23 400	22 200	75 900
. Contributions by the company	-21 300	-107 300	-151 000
. Closing Balance	983 900	898 800	823 700
ADDITIONAL DISCLOSURE ITEMS REQUIRED			
Reconciliation of Accrued Benefit Obligation			
. Opening balance	981 800	983 900	898 800
. Current service cost	46 800	44 000	41 300
. Interest cost on accrued benefit obligation	36 300	45 800	34 600
. Benefit payments	-21 300	-107 300	-151 000
. Past service costs	0	0	0
. Actuarial loss (gain)	-59 700	-67 600	0
. Special event	0	0	0
. Closing balance	983 900	898 800	823 700
Reconciliation of accrued benefit obligation to accrued benefit asset (liability) at end of year			
. Plan assets at fair value	0	0	0
. Accrued benefit obligation	983 900	898 800	823 700
. Plan surplus (deficit)	-983 900	-898 800	-823 700
. Unamortized transitional obligation (asset)	0	0	0
. Unamortized past service costs	0	0	0
. Unamortized net actuarial loss (gain)	0	0	0
. Accrued benefit asset (liability)	-983 900	-898 800	-823 700
Assumptions			
. Benefit cost (current year)			
- discount rate	3,80%	4,80%	4,00%
- rate of salary escalation	3,10%	3,10%	3,10%
. Accrued benefit obligation (end of year)			
- discount rate	4,80%	4,00%	4,00%
- rate of salary escalation	3,10%	3,10%	3,10%

Post-Retirement Life Insurance 2015

Hydro Ottawa LDC - Post Retirement Life IAS 19

January 1st	2015	2016
	2015-01-01	(estimate) 2016-01-01
	2015-12-31	2016-12-31
III- Expense (income)		
. Current service cost	154 100	160 300
. Past service cost (including curtailment)	0	0
. Service cost	154 100	160 300
. Interest cost on the accrued benefit obligation	380 000	386 800
. Net interest on the net accrued benefit liability (asset)	380 000	386 800
. Expense (income) recognized in profit or loss	534 100	547 100
IV- Remeasurements of the net defined benefit liability (asset)		
. Actuarial loss (gain) on the accrued benefit obligation	0	0
. Loss (gain) recognized in other comprehensive income	0	0
V- Components of the defined benefit cost		
. Service cost	154 100	160 300
. Net interest on the net accrued benefit liability (asset)	380 000	386 800
. Remeasurements of the net accrued benefit liability (asset)	0	0
. Accrued benefit cost	534 100	547 100
VI- Net defined benefit asset (liability) recognized in the statement of financial position		
. Present value of the accrued benefit obligation	9 768 000	9 799 100
. Fair value of plan assets	0	0
. Plan surplus (deficit)	-9 768 000	-9 799 100
. Net accrued benefit asset (liability)	-9 768 000	-9 799 100
VII- Net defined benefit asset (liability) reconciliation		
. Opening balance	-9 604 600	-9 768 000
. (Expense) income for the reporting period	-534 100	-547 100
. (Loss) gain recognized in other comprehensive income	0	0
. Contributions by the company	370 700	516 000
. Closing Balance	-9 768 000	-9 799 100
ADDITIONAL DISCLOSURE ITEMS REQUIRED		
Reconciliation of Accrued Benefit Obligation		
. Opening balance	9 604 600	9 768 000
. Current service cost	154 100	160 300
. Interest cost on accrued benefit obligation	380 000	386 800
. Actual Benefit payments	-370 700	-516 000
. Past service costs	0	0
. Actuarial loss (gain) arising from plan experience	0	0
. Actuarial loss (gain) arising from changes in demographic assumptions	0	0
. Actuarial loss (gain) arising from changes in financial assumptions	0	0
. Curtailment gain	0	0
. Closing balance	9 768 000	9 799 100
Assumptions		
. Accrued benefit obligation (end of year)		
- discount rate	4,00%	4,00%

Retirement Grant 2015

Hydro Ottawa Retirement Grant IAS 19

January 1st	2015	2016 (estimate)
	2015-01-01	2016-01-01
	2015-12-31	2016-12-31
III- Expense (income)		
. Current service cost	41 300	43 000
. Past service cost (including curtailment)	0	0
. Service cost	41 300	43 000
. Interest cost on the accrued benefit obligation	34 600	36 300
. Net interest on the net accrued benefit liability (asset)	34 600	36 300
. Expense (income) recognized in profit or loss	75 900	79 300
IV- Remeasurements of the net defined benefit liability (asset)		
. Actuarial loss (gain) on the accrued benefit obligation	0	0
. Loss (gain) recognized in other comprehensive income	0	0
V- Components of the defined benefit cost		
. Service cost	41 300	43 000
. Net interest on the net accrued benefit liability (asset)	34 600	36 300
. Remeasurements of the net accrued benefit liability (asset)	0	0
. Accrued benefit cost	75 900	79 300
VI- Net defined benefit asset (liability) recognized in the statement of financial position		
. Present value of the accrued benefit obligation	939 100	867 400
. Fair value of plan assets	0	0
. Plan surplus (deficit)	-939 100	-867 400
. Net accrued benefit asset (liability)	-939 100	-867 400
VII- Net defined benefit asset (liability) reconciliation		
. Opening balance	-898 800	-939 100
. (Expense) income for the reporting period	-75 900	-79 300
. (Loss) gain recognized in other comprehensive income	0	0
. Contributions by the company	35 600	151 000
. Closing Balance	-939 100	-867 400

ADDITIONAL DISCLOSURE ITEMS REQUIRED

Reconciliation of Accrued Benefit Obligation

. Opening balance	898 800	939 100
. Current service cost	41 300	43 000
. Interest cost on accrued benefit obligation	34 600	36 300
. Actual Benefit payments	-35 600	-151 000
. Past service costs	0	0
. Actuarial loss (gain) arising from plan experience	0	0
. Actuarial loss (gain) arising from changes in demographic assumptions	0	0
. Actuarial loss (gain) arising from changes in financial assumptions	0	0
. Curtailment gain	0	0
. Closing balance	939 100	867 400

Assumptions

. Accrued benefit obligation (end of year)		
. discount rate	4,00%	4,00%

Post-Retirement Life Insurance and Retirement Grant 2016



Highlight of Result for Fiscal 2016 and Projected 2017

The table below highlights the key financial reporting results for Fiscal 2016 and the projected defined benefit cost for Fiscal 2017. For accounting under IAS 19, the life insurance, retirement grant and post-retirement health and dental plans have been categorized as Post-Employment Benefits and gains or losses for these plans are recognized through Other Comprehensive Income (OCI) in the year they arise. The NVSL Plan however, have been categorized as Other Long Term Employee Benefits and gains or losses are recognized immediately through the Benefit Cost in the year they arise. Details of the results are provided in Sections 4 and 5.

Fiscal 2016 Disclosure Information	Hydro Ottawa	Retirement Grant
	\$	\$
Components Defined Benefit Cost/(Income)		
Service cost in the Income Statement:	160,300	43,000
Interest on the net defined benefit liability in Income Statement:	386,800	36,300
Remeasurements of the net defined benefit liability in Income Statement	n/a	n/a
2016 Defined benefit cost/(income) reflected in Income Statement	\$547,100	\$79,300
Funded Status at End of Period		
Plan assets at end of period	0	0
Defined benefit obligation at end of period	10,118,200	919,400
Funded status at end of period	(\$10,118,200)	(\$919,400)
Reconciliation of Defined Benefit (Liability)/Asset		
Defined benefit (liability)/asset at start of period	(9,788,000)	(939,100)
Defined benefit (cost)/income reflected in Income Statement	(547,100)	(79,300)
Remeasurements of the net defined benefit liability reflected in OCI	(183,200)	36,200
Employer contributions	380,100	62,800
Defined benefit (liability)/asset at end of period	(\$10,118,200)	(\$919,400)
IAS 24 disclosure information for Key Management Personnel	2,400	0
Weighted average assumptions for defined benefit cost/(income)		
Discount rate	4.00%	4.00%
Annual salary increase	3.10%	3.10%
Initial weighted average health care trend rate	n/a	n/a
Ultimate weighted average health care trend rate	n/a	n/a
Year ultimate health care trend rate is reached	n/a	n/a
Weighted average assumptions for disclosure		
Discount rate	3.90%	3.90%
Annual salary increase	2.00%	2.00%
Initial weighted average health care trend rate	n/a	n/a
Ultimate weighted average health care trend rate	n/a	n/a
Year ultimate health care trend rate is reached	n/a	n/a
	\$	\$
Estimated Fiscal 2017 Defined Benefit Cost		
Service cost in the Income Statement:	140,700	41,000
Interest on the net defined benefit liability in Income Statement:	389,100	34,200
Remeasurements of the net defined benefit liability in Income Statement	n/a	n/a
2017 Defined benefit cost/(income) reflected in Income Statement	\$529,800	\$75,200

Post-Retirement Life Insurance and Retirement Grant 2017



Highlight of Result for Fiscal 2017 and Projected 2018

The table below highlights the key financial reporting results for Fiscal 2017 and the projected defined benefit cost for Fiscal 2018. For accounting under IAS 19, the life insurance, retirement grant and post-retirement health and dental plans have been categorized as Post-Employment Benefits and gains or losses for these plans are recognized through Other Comprehensive Income (OCI) in the year they arise. The NVSL Plan however, have been categorized as Other Long-Term Employee Benefits, and gains or losses are recognized immediately through the Defined Benefit Cost in the year they arise. Details of the results are provided in Sections 3 and 4.

Fiscal 2017 Disclosure Information	Hydro Ottawa	Retirement Grant
Components Defined Benefit Cost/(Income)	\$	\$
Service cost in the Income Statement:	140,700	41,000
Interest on the net defined benefit liability in Income Statement:	389,100	34,200
Remeasurements of the net defined benefit liability in Income Statement	n/a	n/a
2017 Defined benefit cost/(income) reflected in Income Statement	\$529,800	\$75,200
Funded Status at End of Period		
Plan assets at end of period	0	0
Defined benefit obligation at end of period	10,933,000	\$55,400
Funded status at end of period	(\$10,933,000)	(\$55,400)
Reconciliation of Defined Benefit (Liability)/Asset		
Defined benefit (liability)/asset at start of period	(10,118,200)	(919,400)
Defined benefit (cost)/income reflected in Income Statement	(529,800)	(75,200)
Remeasurements of the net defined benefit liability reflected in OCI	(848,600)	11,600
Employer contributions	361,600	127,700
Defined benefit (liability)/asset at end of period	(\$10,933,000)	(\$55,400)
IAS 24 disclosure information for Key Management Personnel	1,100	0
Weighted average assumptions for defined benefit cost/(income)		
Discount rate	3.90%	3.90%
Annual salary increase	2.00%	2.00%
Initial weighted average health care trend rate	n/a	n/a
Ultimate weighted average health care trend rate	n/a	n/a
Year ultimate health care trend rate is reached	n/a	n/a
Weighted average assumptions for disclosure		
Discount rate	3.40%	3.40%
Annual salary increase	2.00%	2.00%
Initial weighted average health care trend rate	n/a	n/a
Ultimate weighted average health care trend rate	n/a	n/a
Year ultimate health care trend rate is reached	n/a	n/a
Estimated Fiscal 2018 Defined Benefit Cost	\$	\$
Service cost in the Income Statement:	174,000	43,700
Interest on the net defined benefit liability in Income Statement:	368,400	28,400
Remeasurements of the net defined benefit liability in Income Statement	n/a	n/a
2018 Defined benefit cost/(income) reflected in Income Statement	\$542,400	\$72,100

Post-Retirement Life Insurance and Retirement Grant 2018



Highlight of Result for Fiscal 2018 and Projected 2019

The table below highlights the key financial reporting results for Fiscal 2018 and the projected defined benefit cost for Fiscal 2019. For accounting under IAS 19, the life insurance, retirement grant and post-retirement health and dental plans have been categorized as Post-Employment Benefits and gains or losses for these plans are recognized through Other Comprehensive Income (OCI) in the year they arise. The NVSL Plan, however, have been categorized as Other Long-Term Employee Benefits, and gains or losses are recognized immediately through the Defined Benefit Cost in the year they arise. Details of the results are provided in Sections 3 and 4.

Fiscal 2018 Disclosure Information	Hydro Ottawa	Retirement Grant
Components Defined Benefit Cost/(Income)	\$	\$
Service cost in the Income Statement:	174,000	43,700
Interest on the net defined benefit liability in Income Statement:	368,400	28,400
Remeasurements of the net defined benefit liability in Income Statement	n/a	n/a
2018 Defined benefit cost/(income) reflected in Income Statement	\$542,400	\$72,100
Funded Status at End of Period		
Plan assets at end of period	0	0
Defined benefit obligation at end of period	10,074,500	776,600
Funded status at end of period	(\$10,074,500)	(\$776,600)
Reconciliation of Defined Benefit (Liability)/Asset		
Defined benefit (liability)/asset at start of period	(10,933,000)	(855,400)
Defined benefit (cost)/income reflected in Income Statement	(542,400)	(72,100)
Remeasurements of the net defined benefit liability reflected in OCI	996,300	67,800
Employer contributions	414,500	83,100
Defined benefit (liability)/asset at end of period	(\$10,074,500)	(\$776,600)
IAS 24 disclosure information for Key Management Personnel	1,200	0
Weighted average assumptions for defined benefit cost/(income)		
Discount rate	3.40%	3.40%
Annual salary increase	2.00%	2.00%
Initial weighted average health care trend rate	n/a	n/a
Ultimate weighted average health care trend rate	n/a	n/a
Year ultimate health care trend rate is reached	n/a	n/a
Weighted average assumptions for disclosure		
Discount rate	3.90%	3.90%
Annual salary increase	2.00%	2.00%
Initial weighted average health care trend rate	n/a	n/a
Ultimate weighted average health care trend rate	n/a	n/a
Year ultimate health care trend rate is reached	n/a	n/a
Estimated Fiscal 2019 Defined Benefit Cost	\$	\$
Service cost in the Income Statement:	149,000	41,700
Interest on the net defined benefit liability in Income Statement:	388,300	30,000
Remeasurements of the net defined benefit liability in Income Statement	n/a	n/a
2019 Defined benefit cost/(income) reflected in Income Statement	\$537,300	\$71,700

Post-Retirement Life Insurance and Retirement Grant 2019



Highlight of Result for Fiscal 2019 and Projected 2020 and 2021

The table below highlights the key financial reporting results for Fiscal 2019 and the projected defined benefit cost for Fiscal 2020 and Fiscal 2021. For accounting under IAS 19, the life insurance, retirement grant and post-retirement health and dental plans have been categorized as Post-Employment Benefits and gains or losses for these plans are recognized through Other Comprehensive Income (OCI) in the year they arise. The NVSL Plan, however, have been categorized as Other Long-Term Employee Benefits, and gains or losses are recognized immediately through the Defined Benefit Cost in the year they arise. Details of the results are provided in Sections 3 and 4.

Fiscal 2019 Disclosure Information	Hydro Ottawa	Retirement Grant
Components Defined Benefit Cost/(Income)	\$	\$
Service cost in the Income Statement		
Current service cost	149,000	41,700
Past service cost	70,100	0
Interest on the net defined benefit liability in Income Statement	388,300	30,000
Remeasurements of the net defined benefit liability in Income Statement	n/a	n/a
Defined benefit cost/(income) reflected in Income Statement	\$507,400	\$71,700
Funded Status at End of Period		
Plan assets at end of period	0	0
Defined benefit obligation at end of period	11,598,100	894,300
Funded status at end of period	(\$11,598,100)	(\$894,300)
Reconciliation of Defined Benefit (Liability)/Asset		
Defined benefit (liability)/asset at start of period	(10,074,500)	(776,600)
Defined benefit (cost)/income reflected in Income Statement	(507,400)	(71,700)
Remeasurements of the net defined benefit liability reflected in OCI	(1,385,900)	(536,600)
Employer contributions	469,700	50,100
Defined benefit (liability)/asset at end of period	(\$11,598,100)	(\$894,300)
IAS 24 disclosure information for Key Management Personnel	\$300	\$0
Weighted average assumptions for defined benefit cost/(income)		
Discount rate	3.90%	3.90%
Annual salary increase	2.00%	2.00%
Initial weighted average health care trend rate	n/a	n/a
Ultimate weighted average health care trend rate	n/a	n/a
Year ultimate health care trend rate is reached	n/a	n/a
Weighted average assumptions for disclosure		
Discount rate	3.10%	3.10%
Annual salary increase	2.00%	2.00%
Initial weighted average health care trend rate	n/a	n/a
Ultimate weighted average health care trend rate	n/a	n/a
Year ultimate health care trend rate is reached	n/a	n/a
Fiscal 2020 Disclosure Information (Estimate)	Hydro Ottawa	Retirement Grant
Estimated Fiscal 2020 Defined Benefit Cost	\$	\$
Service cost in the Income Statement	177,100	41,600
Interest on the net defined benefit liability in Income Statement	355,200	25,300
Remeasurements of the net defined benefit liability in Income Statement	n/a	n/a
Defined benefit cost/(income) reflected in Income Statement	\$532,300	\$66,900
Fiscal 2021 Disclosure Information (Estimate)	Hydro Ottawa	Retirement Grant
Estimated Fiscal 2021 Defined Benefit Cost	\$	\$
Defined benefit obligation at end of period	182,600	42,900
Reconciliation of Defined Benefit (Liability)/Asset	352,800	22,800
Defined benefit (liability)/asset at start of period	n/a	n/a
Defined benefit (cost)/income reflected in Income Statement	\$535,400	\$65,700

INTERROGATORY RESPONSE - OEB-179

9-Staff-12

EXHIBIT REFERENCE:

Exhibit 9/Tab 1/Schedule 3/Table 7 on page 13

Updated Exhibit 9/Tab 1/Schedule 3/Table 6 on page 17

SUBJECT AREA: Deferral and Variance Accounts

Preamble:

Sub-account 1508 Gains and Losses on Disposal of Fixed Assets was established in the accounting order from the 2016 -2020 Custom IR¹[1] to record the difference between the forecast and actual loss on the disposal of fixed assets, related to the retirement of assets or damage to plant. The forecasted amount was an annual gain of \$198,349 for the period of 2016 to 2020.

Question(s):

a) Please explain why the 2019 actual loss of \$1,984k was at least 5 times higher as compared to the rest of the years from 2016 to 2020.

b) Please explain how the estimated losses for 2021 to 2025 were determined and confirm if Hydro Ottawa intends to use the estimated losses as the forecast amounts to determine the account balances for the period of 2021 to 2025.

c) Please explain why the estimated loss in 2022 is doubled as compared to the rest of the test years from 2021 to 2025?

¹ Schedule C, Accounting Orders, EB-2015-0004

29

30 **RESPONSE:**

31

32 a) In 2019, Hydro Ottawa moved its office and warehouse locations at Albion and Merivale
33 to two new office and warehouse locations (East and South Campus). This move
34 resulted in significant warehouse clean-up activity and a higher than normal amount of
35 obsolete inventory was scrapped. Therefore, in 2019 Hydro Ottawa's actual losses of
36 \$1,984K included larger than normal write-off of obsolete inventory.

37

38 b) The estimated losses for 2021-2025 were determined using both historical trends and
39 planned asset retirements in years 2021-2025. Hydro Ottawa intends to use the
40 estimated losses as the forecast amounts to determine the account balances for the
41 period of 2021-2025 on loss from retirement of utility and other property as noted in
42 UPDATED Exhibit 9-1-3: Group 2 Accounts.

43

44 c) Based on the AMI roadmap strategy, Hydro Ottawa is planning to dispose of some smart
45 meters in 2022 that will not be fully depreciated by that time. The AMI roadmap strategy
46 includes making use of next generation technology such as machine learning and
47 artificial intelligence capabilities that can help with operational efficiencies and provide
48 higher quality of service to customers. Please refer to section 3.6.2. of Attachment
49 2-4-3(E): Material Investments for more information.

INTERROGATORY RESPONSE - OEB-180

9-Staff-13

EXHIBIT REFERENCE:

Updated Exhibit 9/Tab 1/Schedule 3/Table 8 on page 20

Updated Exhibit 9/Tab 1/Schedule 1/Attachment A: DVA Workform

SUBJECT AREA: Deferral and Variance Accounts

Preamble:

As stated in Hydro Ottawa's 2019 Decision¹, Hydro Ottawa recorded \$1,384,801 in the Sub-account 1508 Earning Sharing Mechanism (ESM) in 2017 related to 2016 earnings.

As stated in Hydro Ottawa's 2020 Decision², Hydro Ottawa recorded \$2,149,000 in the Sub-account 1508 Earning Sharing Mechanism (ESM) in 2018 related to 2017 earnings.

In the current application, Hydro Ottawa presented the calculations for the 2016 ESM as a credit balance of \$1,309,000 and 2017 ESM as a credit balance of \$2,364,000.

Hydro Ottawa stated that no ESM was recorded related to 2018 earnings as it didn't over earn in 2018.

In the updated DVA Workform in the current application, Hydro Ottawa recorded a credit balance of \$1,384,801 (column AJ) and a credit balance of \$1,976,394 (column AT) in the transaction columns for 2017 and 2018 related to 2016 and 2017 ESM for a total credit principal amount of \$3,361,195. Hydro Ottawa also recorded a credit balance of \$311,490 (column BD) in the transaction column for 2019.

¹ EB-2018-0044, section 4 Base Rate Adjustment pp. 6-7

² EB-2019-0046, section 4 Base Rate Adjustment pp. 5-6

1 Question(s):

2

3 a) Please explain the differences and confirm the balances recorded in the Sub-account
4 1508 ESM related to 2016 and 2017 earnings

5

6 b) Please explain what the credit balance of \$311,490 relates to.

7

8 c) Please update the DVA Workform if necessary.

9

10 **RESPONSE:**

11

12 A response to this interrogatory will be provided in full during the week of June 8th, 2020.

INTERROGATORY RESPONSE - OEB-181

9-Staff-14

EXHIBIT REFERENCE:

Exhibit 9/Tab 1/Schedule 3/page 19

Updated Exhibit 9/Tab 3/Schedule 1/Table 1 on page 7

Updated Exhibit 4/Tab 2/Schedule 4/Attachment A: Appendix 2-M

SUBJECT AREA: Deferral and Variance Accounts

Preamble:

Sub-account 1508 OEB Cost Assessment is to record any material difference between OEB cost assessment that were built into rates, and cost assessments that would result from the application of the new Cost Assessment Model effective April 1, 2016. \$916k projection was included in Hydro Ottawa's 2016 rebasing year.

Hydro Ottawa is seeking disposition of principal balance of \$1,879,684 along with interest in Sub-account 1508 OEB Cost Assessment.

Question(s):

a) Please provide a schedule for the relevant years to support the principal balance of \$1,879,684. Please ensure the amounts from the schedule are reconciled to the amounts presented in the updated Appendix 2-M Regulatory Cost Schedule, if applicable.

1 _____

2 **RESPONSE:**

3

4 a) Please see Table A below for a schedule that supports the cumulative amount of costs

5 incurred as a result of the OEB's new methodology for cost assessment from 2016-2019.

6 (Please see page 1 of UPDATED Exhibit 4-2-4: Regulatory Costs for further information).

7

8 Hydro Ottawa confirms that the amount of disposition of the principal balance of

9 \$1,879,684 for Sub-Account - 1508 OEB Cost Assessment Variance from UPDATED

10 Attachment 9-1-1(A): OEB Workform - Deferral and Variance Account Continuity

11 Schedule, cell BO65 of tab 2b.2017 Continuity Schedule is correct.

12

13 Hydro Ottawa has recorded into Sub-Account - 1508 OEB Cost Assessment Variance

14 the costs incurred as a result of the OEB's new allocation methodology. Cost

15 Assessment expenses that were not as a result of the new methodology, based on what

16 was estimated as part of Hydro Ottawa's 2016-2020 CIR Application,¹ were recorded in

17 USofA 5655. Hydro Ottawa has attached a revised Appendix 2-M to correct the total of

18 the OEB Annual Assessment amount. Please refer to excel Attachment OEB-181(A):

19 Revised UPDATED Appendix 2-M to support Table A below.

20

21 **Table A – Reconciliation of Sub-Account 1508 OEB Cost Assessment to Appendix 2-M**

	2016	2017	2018	2019	2016-2019
OEB Cost Assessment Invoices	\$1,374,936	\$1,463,702	\$1,373,571	\$1,399,785	\$5,611,994
Less: OEB Annual Assessment in Appendix 2-M Revised	\$(983,377)	\$(916,311)	\$(916,311)	\$(916,311)	\$(3,732,310)
Less: Sub-Account 1508 OEB Cost Assessment	\$(522,056)	\$(542,713)	\$(331,441)	\$(483,474)	\$(1,879,684)
TOTAL²	\$(130,497)	\$4,678	\$125,819	\$0	\$0

22

23 ¹ Hydro Ottawa Limited, 2016-2020 Custom Incentive Rate-Setting Distribution Rate Application, EB-2015-0004 (April

24 29, 2015)

25 ² Hydro Ottawa made corrections in 2018 related to 2016 and 2017. The cumulative total for 2016-2019 that was

26 recorded in USofA 5655 and USofA 1508 OEB Cost Assessment balances to the Cost Assessment Invoices.

INTERROGATORY RESPONSE - OEB-182

9-Staff-15

EXHIBIT REFERENCE:

Exhibit 9/Tab 1/Schedule 4/Table 3 on page 3

Updated Exhibit 9/Tab 1/Schedule 3/Table 9 on page 23

SUBJECT AREA: Deferral and Variance Accounts

Preamble:

Hydro Ottawa stated that there were no qualifying CCRA payments made in 2018 when calculating the impact of the accelerated CCA in 1592 Sub-account PILs in Table 3.

Hydro Ottawa recorded the revenue requirement for an additional \$2,163,940 CCRA payments in 2018 in Table 9 for 1508 Sub-account CCRA.

Question(s):

a) Please confirm the nature and the period CCRA payments related to. (i.e. before or after November 20, 2018)

RESPONSE:

a) The balances in 1592 Sub-account PILs presented in Table 3 relate to the Connection Cost Recovery Agreement ("CCRA") Payments Deferral Account, which was authorized as part of the Approved Settlement Agreement governing Hydro Ottawa's 2016-2020 rate term.¹ Based upon the actual timing of the capitalized 2018 CCRA additions, none

¹ Hydro Ottawa Limited, 2016-2020 Custom Incentive Rate-Setting Approved Settlement Proposal, EB-2015-0004 (December 7, 2015).

- 1 of the 2018 capital additions related to the CCRA Deferral Account qualified for
- 2 accelerated CCA.
- 3
- 4 Hydro Ottawa confirms that the CCRA payments of \$2,163,940 relate to the period
- 5 before November 20, 2018.

INTERROGATORY RESPONSE - OEB-183

9-Staff-16

EXHIBIT REFERENCE:

Exhibit 9/Tab 1/Schedule 4/Attachments A

Updated Exhibit 9/Tab 1/Schedule 4/Attachments B, C, F, G

Updated Exhibit 9/Tab 1/Schedule 4/Table 1 on page 2

Updated Exhibit 9/Tab 1/Schedule 4/Table 2 on page 4

Updated Exhibit 9/Tab 1/Schedule 4/pp. 2-3

SUBJECT AREA: Deferral and Variance Accounts

Preamble:

The OEB issued a guidance on July 25, 2019 to establish a separate sub-account of Account 1592 to track the impact of the Bill C-97 CCA rules changes for the period of November 21, 2018 until the effective date of the Utility's next cost-based rate order. Utilities will record the full revenue requirement impact of any changes in CCA rules that are not reflected in base rates.¹

Hydro Ottawa has recorded the impact of the Bill C-97 in Sub-account 1592 – PILs and Tax Variances - CCA changes for capital additions for the period of 2018 to 2020, cost of the New Facilities up to \$66 million and the New Facilities above \$66 million. The impact of Bill C-97 was not included in the sub-account 1508 Y-Factor and sub-account 1508 New Facilities.

In the updated evidence on capital additions, Hydro Ottawa stated that "originally, it was estimated that 100% of additions in 2019 and 2020 would qualify for accelerated CCA. Table 1 has been updated to reflect remeasurements of 2019 and 2020 additions that would qualify for accelerated CCA."

¹ Accounting Direction Regarding Bill C-97 and Other Changes in Regulatory or legislated Tax Rules for Capital Cost Allowance dated July 25, 2019.

1 In the updated evidence on New Facilities, Hydro Ottawa stated that “originally, it was estimated
2 that 28% of new additions for the New Facilities in 2019 would qualify for accelerated CCA. This
3 estimate has been updated, with approximately 40% of new additions for the New Facilities in
4 2019 set to qualify for accelerated CCA.”

5

6 Question(s):

7

8 Capital Additions

9 a) Please confirm if the amounts in column (3) titled “cost of acquisition during the year” for
10 2018 to 2020 in Attachment A and the updated Attachments B and C were the approved
11 capital additions as part of the 2016 Settlement Agreement, or actual capital additions
12 for 2018, 2019 and 2020.

13 i) Please explain why Hydro Ottawa has chosen to use approved or actual
14 additions.

15

16 b) Please confirm if the amounts in column (4) titled “cost of acquisitions from column 3 that
17 are accelerated investment incentive property (AIIP)” in Attachment A represent the
18 capital additions available for use and acquired after November 20, 2018. Please also
19 confirm if the amounts in column (4) were based on estimates or actuals.

20 i) Please explain why Hydro Ottawa has chosen to use estimates or actuals.

21

22 c) Please explain how the amounts in column (4) titled “cost of acquisitions from column 3
23 that are AIIP” in the updated Attachments B and C were determined. What criteria were
24 used to determine if the additions would qualify for accelerated CCA in 2019 and 2020.

25

26 d) Please provide supporting calculations for the amounts in column “Prior CCA/ECE” as
27 shown in Table 1 for capital additions.

28

29 e) Please confirm if the accelerated CCA calculated agreed with the amounts from Hydro
30 Ottawa's Tax Returns for 2018 and 2019, if actuals were used.

1 f) Please explain why Hydro Ottawa is seeking disposition for 2020 balances in the current
2 application.

3

4 New Facilities up to \$66 million

5 g) Please confirm the New Facilities additions in column (3) titled "cost of acquisition during
6 the year" and column (4) titled "cost of acquisitions from column 3 that are AIIP" in
7 updated Attachments F are based on actuals or estimates for 2019. Please explain why
8 Hydro Ottawa has chosen to use actual or estimates.

9

10 h) The New Facilities up to \$66 million includes \$51 million of facilities and \$15 million of
11 land. The New Facilities addition in column (3) titled "cost of acquisition during the year"
12 shows a balance of \$43 million in updated Attachment F for 2019. Please explain what
13 the difference between \$51 million and \$43 million relates to.

14

15 i) Please explain what criteria were used to determine 40% of new additions in 2019 would
16 qualify for accelerated CCA.

17

18 j) Please confirm if the accelerated CCA calculated agreed with the amounts from Hydro
19 Ottawa's Tax Return for 2019, if actuals were used.

20

21 New Facilities above \$66 million

22 k) Please explain why \$72 million was recorded in column (3) titled "cost of acquisition
23 during the year" where new addition in 2019 would be no more than \$33.5 million.

24

25 l) Please confirm the New Facilities additions in column (3) titled "cost of acquisition during
26 the year" and column (4) titled "cost of acquisitions from column 3 that are AIIP" in the
27 updated Attachment G were based on actual or estimates for 2019.

28 i) Please explain why Hydro Ottawa has chosen to use actuals or estimates

29

30 m) Please explain what criteria were used to determine 40% of new additions in 2019 would
31 qualify for accelerated CCA.

n) Please confirm if the accelerated CCA calculated agreed with Hydro Ottawa's Tax Return for 2019, if actuals were used.

o) Please explain why Hydro Ottawa is seeking disposition for 2020 balances in the current application.

RESPONSE:

Capital Additions

a) Hydro Ottawa confirms that the amounts in column (3) titled "cost of acquisition during the year" for 2018-2020 in Attachment 9-1-4(A), as well as in UPDATED Attachment 9-1-4(B) and UPDATED Attachment 9-1-4(C), were the approved capital additions as part of the Approved Settlement Agreement governing the utility's 2016-2020 rate term.

i) The OEB's guidance letter on Accounting for Bill-97 states the following: "Under the Accounting Procedures Handbook, electricity distributors and transmitters are to record the impact of any differences that result from a legislative or regulatory change to the tax rates or rules assumed in the OEB Tax Model that is used to determine the tax amount that underpins rates (emphasis added)."² As per this direction, Hydro Ottawa has used approved additions.

b) Hydro Ottawa confirms that the amounts in column (4) titled "cost of acquisitions from column 3 that are accelerated investment incentive property (AIIP)" in Attachment 9-1-4(A) represent the capital additions available for use and acquired after November 20, 2018 for tax year 2018. Hydro Ottawa further confirms that the amounts in column (4) that qualify as AIIP were determined based on an analysis of the capital additions for 2018 that were approved as part of the Approved Settlement Agreement.

i) Please see the response to part (a, i) above.

² Ontario Energy Board, Letter re: Accounting Direction Regarding Bill C-97 and Other Changes in Regulatory or Legislated Tax Rules for Capital Cost Allowance (July 25, 2019), page 2.

c) For tax year 2019, the percentage of additions that would qualify for accelerated CCA by CCA class were based on the actual percentage of 2019 additions that became available for use in 2019 and when these 2019 additions were paid for. This percentage was applied against 2019 approved capital additions.

For the 2020 tax year, the 2020 percentages were determined based on when forecasted 2020 additions would become available for use in 2020 and when these 2020 forecasted additions would be paid for in 2020. The percentage was applied against 2020 approved capital additions.

d) The amounts in Table 1 of UPDATED Exhibit 9-1-4: Account 1592 PILS and Tax Variance are from Schedule 8 and Schedule 10 in the 2018-2020 PILS models of the Approved Settlement Agreement. Please see Table A for a summary of these amounts split out by CCA and ECE.

Table A – Calculation of “Prior CCA” on 2018-2020 Approved Additions

Year	Prior CCA	Prior ECE	Total Prior CCA/ECE
2018	\$66,246,978	\$841,018	\$67,087,996
2019	\$62,567,518	\$785,124	\$63,352,642
2020	\$67,909,279	\$734,870	\$68,644,149

e) The accelerated CCA calculated in Attachment 9-1-4(A), UPDATED Attachment 9-1-4(B), and UPDATED Attachment 9-1-4(C) do not agree with Hydro Ottawa's Tax Returns for 2018 (filed) and 2019 (not yet filed). As responded in part (a) above, the accelerated CCA in the aforementioned Attachments were calculated using the approved capital additions as part of the Approved Settlement Agreement, whereas the tax filings used the actuals.

f) The OEB's guidance letter on Accounting for Bill-97 states the following: “Consistent with the OEB's filing requirements for the disposition timing and parameters of deferral and

1 variance accounts, the OEB expects Utilities to bring forward any amounts tracked in
2 their applicable CCA-related sub-account for review and disposition in accordance with
3 the OEB's filing requirements for the disposition of deferral and variance accounts.
4 Unless the OEB orders otherwise, this would generally coincide with a Utility's next
5 cost-based rate application.³ As per this direction Hydro Ottawa is seeking disposition for
6 2018-2020 balances in this Application.

7
8 The calculation is based on approved addition, as a result the amount of addition
9 will not change. Hydro Ottawa acknowledges the estimated percentage that
10 ultimately qualifies in 2020 based on actuals could be slightly different.

11 New Facilities up to \$66 million

12 g) Hydro Ottawa confirms the New Facilities additions in column (3) titled "cost of
13 acquisition during the year" and column (4) titled "cost of acquisitions from column 3 that
14 are AIIP" in UPDATED Attachment 9-1-4(F) are based on actual New Facilities additions
15 for 2019 up to \$66M. Hydro Ottawa has chosen to use actuals, as that is what is
16 underpinned in rates (i.e. approved rate rider). Please also see the response to part (a, i)
17 above.

18
19 h) The difference between \$51M and \$43M represents the tax gain that is being deferred
20 by applying the Replacement Property rules. Please see the response to interrogatory
21 OEB-176 for a calculation of the tax gain on the sale of the Existing Facilities. The
22 Replacement Property rules allow Hydro Ottawa to reduce the additions to Class 1.3 of
23 the New Facilities by the tax gain of \$7.9M, which is the difference between the \$51M
24 and the \$43M. Please see Table B for a reconciliation.

³ Ontario Energy Board, Letter re: Accounting Direction Regarding Bill C-97 and Other Changes in Regulatory or Legislated Tax Rules for Capital Cost Allowance (July 25, 2019), page 2.

Table B – Reconciliation between \$66M and \$43M (New Facilities Costs)
(\$'000,000s)

Total New Facilities additions	\$66.0
Less : land	(\$15.0)
Less : tax gain on sale of Existing Facilities deferred	\$(7.9)
Schedule 8 additions for tax purposes (Attachment F)	\$43.0

i) The New Facilities were available for use in 2019. An analysis of the New Facilities additions determined that approximately 40% of the invoices for the New Facilities were paid after November 20, 2018. These additions would therefore qualify for accelerated CCA.

j) Hydro Ottawa's 2019 tax return is due June 30, 2020. It has not yet been filed. The accelerated CCA calculated for the additions of New Facilities of \$99.5M (which includes the \$66M) is expected to agree with the amounts in Hydro Ottawa's tax return for 2019, when the return is filed.

New Facilities above \$66 million

k) UPDATED Attachment 9-1-4(G) represents the Schedule 8 - Accelerated CCA schedule for New Facilities additions of \$99.5M with \$72M being the additions for tax purposes. UPDATED Attachment 9-1-4(G) shows total additions for New Facilities of \$99.5M and not the difference between \$66M and \$99.5M of \$33.5M. Table C shows the reconciliation between the \$99.5M and the \$72M.

Table C – Reconciliation between \$99.5M and \$72M (New Facilities Costs)
(\$000,000's)

Total New Facilities additions	\$99.5
Less : land	(\$19.45)
Less : tax gain on sale of Existing Facilities deferred	\$(7.9)
Schedule 8 additions for tax purposes (Attachment G)	\$72.15

l) Hydro Ottawa confirms the New Facilities additions in column (3) titled “cost of acquisition during the year” and column (4) titled “cost of acquisitions from column 3 that are AIIP” in UPDATED Attachment 9-1-4(G) are based on actuals for 2019 up to \$99.5M.

i) Hydro Ottawa has used actuals, as actuals will be what is underpinned in rates (i.e. through clearance of Account 1508 Sub-account New Facilities Deferral Account for New Facilities and land above \$66.0M). Please see the response to part (a, i) above for more information.

m) Please see the response to part (i) above.

n) Please see the response to part (j) above.

o) Hydro Ottawa is seeking disposition for 2020 balances in this Application, as actual and final costs for the New Facilities are known at this time.

INTERROGATORY RESPONSE - OEB-184

9-Staff-17

EXHIBIT REFERENCE:

Exhibit 9/Tab 2/Schedule 1/pp.1-2

SUBJECT AREA: Deferral and Variance Accounts

Preamble:

As part of Hydro Ottawa's 2016-2020 application, \$5 million of CCRA payments to HONI were estimated per year. During the adjudication process of Hydro Ottawa's 2016-2020 application, it was agreed to move the CCRA payments out of the proposed revenue requirement. As a result, Sub-account 1508 CCRA was established in the Accounting Order from 2016 -2020 Custom IR¹ to record the revenue requirement impact of CCRA payment made to Hydro One commencing in the year in which the facilities to which each CCRA payment relates provide services to Hydro Ottawa customers.

In the current application, Hydro Ottawa requests a modification to the account that, as of January 1, 2021, the CCRA account include both new and true-up payments and functions as a symmetrical account to collect or refund the differences for CCRA payments between what Hydro Ottawa has forecasted and what is actually paid for both new and true-up CCRA payments.

Question(s):

a) Please explain the impacts of the requested modification on Hydro Ottawa and Hydro Ottawa's ratepayers.

¹ Schedule C, Accounting Orders, EB-2015-0004

b) Please explain if the differences between forecast and actual new and true-up CCRA payments will substantially offset during the period of 2021 to 2025.

RESPONSE:

a) As the requested modification includes a forecasted amount for estimated CCRA payments, revenue requirement, and rates, the modification will better align with the timing of in-service assets. This will eliminate the temporary rate increases at the time the Regulatory Asset is cleared and create better rate stability.

The inclusion of true-up payments allows Hydro Ottawa to collect revenue requirement related to true-up payments as a result of load not materializing related to transmission assets serving Hydro Ottawa customers.

With both modifications, the Regulatory Assets will true-up the difference between the actual and estimated revenue requirement included in rates, both in terms of timing and cost. This safeguards both the customer and Hydro Ottawa in terms of CCRA payments that are dependent on customer load materializing in a specific area of Hydro Ottawa's service territory. Additionally, this safeguards both the customer and Hydro Ottawa in terms of new CCRA payments, for deviations in Hydro One Networks' ("HONI") rates and what is included in HONI's planned assets as part of its rate application.

b) Hydro Ottawa has developed a detailed estimate of future CCRA payments related to both new CCRAs as well as any related true-up payments. The timing and amount of CCRA payments are based on future load expectations using current assumptions as well as current estimate of labour and material cost. Where Hydro Ottawa's estimate differs only in timing, the difference between forecast and actual new and true-up CCRA payments could be nominal during the 2021-2025 period. However, if final project cost and/or if load does not materialize fully, both of which are not within Hydro Ottawa's control, significant differences could exist between forecasted and actual new and

- 1 true-up CCRA payments, and therefore will not substantially offset during the 2021-2025
- 2 period.

INTERROGATORY RESPONSE OEB-185

9-Staff-18

EXHIBIT REFERENCE:

Exhibit 9/Tab 2/Schedule 1/pp. 3-5

SUBJECT AREA: Deferral and Variance Accounts

Preamble:

Sub-account 1508 Capital Additions was established in the Accounting Order from 2016-2020 Custom IR to track revenue requirement resulting from underspending in Hydro Ottawa's three capital spending categories: System renewal/System service, System access and General plant.

For the period of 2016 to 2018, no amount was recorded as a result of overspending than forecast. Hydro Ottawa will update 2019 actual later in the proceeding.

In the current application, Hydro Ottawa is requesting to split System Access capital additions into a separate sub-account. The sub-account 1508 System Access Capital Additions will be a symmetrical account to record the revenue requirement related to overspending or underspending in the System Access category for 2021-2025.

Hydro Ottawa drew a similar comparison of the proposed System Access capital additions sub-account to the Externally Driven Capital variance account approved in Toronto Hydro's 2015-2019¹[1] and 2020-2024²[2] rate applications.

In Toronto Hydro's application, Toronto Hydro proposes to only include spend for relocation and expansion work that is currently committed in its Distribution System Plan (DSP) for the

¹ Decision and Order EB-2014-0116 (March 1, 2016), Appendix E, pp. 1-2

² Decision and Order EB-2018-0165 (December 19, 2019), pp. 42-43

1 2020-2024 period (e.g. Metrolinx Eglinton Crosstown 18 LRT and Metrolinx Finch LRT)³ [3] in its
2 Externally Driven Capital variance account.

3

4 The methodology for sub-account 1508 Capital Addition (excluding System Access) is
5 consistent with what was approved in 2016 Custom IR and will continue to be an asymmetrical
6 account where overspending or earlier spending will not result in recovery from customers
7 during the 2021- 2025 period.

8

9 Question(s):

10

11 a) Please explain the impacts of the requested modifications on Hydro Ottawa and Hydro
12 Ottawa's ratepayers.

13

14 b) Please explain how the modifications of the account meets the materiality and prudence
15 criteria.

16

17 c) Given that Toronto Hydro only captured investments on the externally initiated plant
18 relocation and expansion program in the approved Externally Driven Capital Variance
19 account, please explain why it is appropriate for Hydro Ottawa to capture all investments
20 under System Access in the proposed sub-account, including customer requests for new
21 connections.

22

23 **RESPONSE:**

24

25 a) The intention of the modified Sub-account 1508 - System Access Capital Additions (net
26 of contributions) Revenue Requirement Differential Variance Account is to keep both the
27 customer and the utility whole. This means that if Hydro Ottawa overspends, this will be
28 recovered from customers, and if Hydro Ottawa underspends, funds will be returned to

29 ³ EB-2018-0165 Ex9/Tab 1/Sch 1/pp. 14-17

1 customers. This recovery/return will be achieved using a rate rider for Hydro Ottawa
2 ratepayers.

3

4 Hydro Ottawa has proposed to recover or return the amount in the variance account
5 from 2021-2024 at the utility's next rebasing application. The 2025 balance is to be
6 recovered or returned to customers based on the materiality level, as per OEB
7 guidelines related to Group 2 Accounts.

8

9 b) At the utility's next rebasing application, Hydro Ottawa will follow OEB guidelines related
10 to Group 2 Accounts, under which all 1508 Sub-Accounts fall for purposes of
11 determining if the amount for disposition is material. As this disposal will be part of a rate
12 application proceeding which is open and transparent, the OEB and registered
13 intervenors will have the opportunity to ask any questions related to the balances in the
14 variance account proposed for disposition, thus ensuring prudence within the rate
15 hearing.

16

17 c) Hydro Ottawa's capital investments are grouped in accordance with the OEB's Chapter 5
18 Filing Requirements for a Consolidated Distribution System Plan. System Access
19 investments include customer service requests and other third-party infrastructure
20 development requirements which are mandated service obligations. Hydro Ottawa does
21 not view the risk of unplanned investment associated with Plant Relocation and
22 Expansion programs any differently than Residential, Commercial, Infill & Upgrade, and
23 others. All System Access investments are driven by third-party requests, with statutory
24 or regulatory requirements to complete. The investment amounts and timing are difficult
25 to predict, and the utility has little control over the scope and timing of activities.

26

27 As summarized in Table 4 of UPDATED Exhibit 2-4-1: Capital Expenditures Summary,
28 Hydro Ottawa's capital additions exceeded OEB-approved amounts in the 2016-2020
29 period by \$39.2M. The level of activities were significantly larger than historical trends
30 due to several large projects in Hydro Ottawa's service territory. These include the City
31 of Ottawa's Light Rail Transit, renovation and expansion at the Canada Science and

- 1 Technology Museum, Elgin Street Renewal, and construction of an Amazon distribution
- 2 warehouse. Hydro Ottawa is therefore requesting a symmetrical account to record the
- 3 revenue requirement related to overspending or underspending in all programs in the
- 4 System Access category for the 2021-2025 period.

INTERROGATORY RESPONSE - OEB-186

U-Staff-1

EXHIBIT REFERENCE:

Updated Exhibit 2/Tab 4/Schedule 1/page 1 of 21

Updated Exhibit 2/Tab 4/Schedule 3/Attachment E/page 11 of 43

SUBJECT AREA: MiGen

Preamble:

Hydro Ottawa provided updates to capital expenditures in 2021 and 2022 as the result of the updated MiGen project.

The original and updated capital expenditures on MiGen are summarized in the tables below.

Table 2.56 - AS ORIGINALLY SUBMITTED - Historical and Future Expenditure Levels
(\$'000,000s)

	Historical			Bridge		Test				
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Expenditure (Gross)				\$1.07	\$1.48	\$4.65	\$1.01			
Capital Contribution					\$(2.68)	\$(3.08)	\$(1.98)			
Contributed Plant					\$1.50	\$1.06	\$0.25			
Expenditure (Net)				\$1.07	\$0.31	\$2.63	\$(0.71)			
Total Expenditure				\$1.07	\$0.31	\$2.63	\$(0.71)			

Table 2.56 - UPDATED FOR 2019 ACTUALS - Historical and Future Expenditure Levels
(\$'000,000s)

	Historical			Bridge		Test				
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Total Expenditure						\$0.31	\$1.91			

1 Question(s):

2

3 a) In the summary of 2021-2025 capital expenditures, Hydro Ottawa highlighted updates to
4 System Service and Capital Contributions (Updated Ex 2/Tab 4/Sch 1/page 1/Table 1).
5 Please clarify whether the updates to System Service and Capital Contributions are
6 solely attributable to updates to the MiGen project. If not, please identify updates to other
7 programs/projects within the Distribution Enhancements program.

8

9 b) Please provide the historical and future expenditures in the format of Table 2.56 as
10 originally submitted (including gross expenditure, capital contribution, and net
11 expenditure) for each of the following programs: Smart Grid Fund Initiatives, MiGen, and
12 Other Distribution Enhancements Projects.

13

14 c) Hydro Ottawa stated that it is engaged in detailed discussions with Natural Resources
15 Canada regarding the lessons learned from the initial phase of the MiGen project (i.e.
16 the GREAT-DR) and how these lessons can be incorporated into the next phase. Please
17 specify the actual/planned start and completion dates for the initial and second phases
18 of the MiGen project.

19

20 d) Please confirm Table 5 (Updated Ex 1/Tab 1/Sch 5/page 12), Updated for 2019 Actuals –
21 Planned Smart Grid Investments, shows net capital expenditures (i.e. excluding capital
22 contributions) for all budget program and project summarized in the table.

23

24 e) Descriptions on project scope filed in the original application were removed in the
25 updated filing (Updated Ex 2/Tab 4/Sch 3/Attachment E-s.2.3.3/pp. 16-17). Please
26 explain the current scope of the MiGen project.

27

28 f) Descriptions on project performance targets and objectives filed in the original
29 application were removed in the updated filing (Updated Ex 2/Tab 4/Sch 3/Attachment
30 E-s.2.3.3/page 21). Please explain the current performance targets and objectives of the

1 MiGen project.

2

3 g) Descriptions on consequences of deferral filed in the original application were removed
4 in the updated filing (Updated Ex 2/Tab 4/Sch 3/Attachment E-s.2.3.3/page 28). Does
5 this mean there is no negative consequences to Hydro Ottawa's distribution system and
6 customers if this MiGen project is deferred beyond 2021-2025?

7

8 h) Descriptions on project execution path/implementation plan filed in the original
9 application were removed in the updated filing (Updated Ex 2/Tab 4/Sch 3/Attachment
10 E-s.2.3.3/page 29). Please explain the current execution path/implementation plan of the
11 MiGen project.

12

13 i) With respect to project benefits, 6 benefits to customers identified in the original
14 application were removed in the updated filing (Updated Ex 2/Tab 4/Sch 3/Attachment
15 E-s.2.3.3/page 26). Please explain why these 6 benefits cannot be achieved under the
16 current scope of the MiGen project.

17

18 **RESPONSE:**

19

20 a) The updates to System Service and Capital Contributions in Table 1 of UPDATED
21 Exhibit 2-4-1: Capital Expenditures Summary are solely attributable to updates in the
22 MiGen Program.

23

24 b) There are no changes to be made to the tables disclosed for Smart Grid Fund Initiatives,
25 MiGen, and Other Distribution Enhancements Projects. These programs do not have
26 capital contributions and, as a result, the gross capital expenditures equal the net capital
27 expenditures. The original MiGen Program disclosed capital contributions after external
28 funding was secured. Under the new Program, external funding has not been secured
29 and, as a result, the capital contributions have been removed.

- 1 c) Phase I was completed at the end of 2019 and is currently in closure stage. Phase II as
2 a project officially started in December 2018, though Hydro Ottawa slowed the pace of
3 activity in favour of completing Phase I on schedule. However, Hydro Ottawa will not be
4 pursuing MiGen Phase II as originally planned; rather, the MiGen Program will be strictly
5 a Hydro Ottawa-led program, as described in the updated Material Investment Plan
6 located in section 2.3.3 of Attachment 2-4-3(E): Material Investments (as filed on May 5,
7 2020).
- 8
- 9 d) UPDATED Exhibit 1-1-5: Application Summary, Table 5, discloses gross capital
10 expenditures (i.e. excluding capital contributions) for all budgeted programs and projects
11 summarized.
- 12
- 13 e) Further to the response in part (c) above, the current project scope for MiGen is as
14 described in the updated Material Investment Plan located in section 2.3.3 of Attachment
15 2-4-3(E): Material Investments (as filed on May 5, 2020). In particular, please see the
16 "Project Summary" and "Project Description" sections in the updated Material Investment
17 Plan. Projects developed during the next five years will be assessed under the new
18 MiGen Program.
- 19
- 20 f) The objective of the MiGen Program remains as described in the "Project Summary"
21 section in the updated Material Investment Plan. Upon further reflection, Hydro Ottawa
22 acknowledges that it may have been made clearer if the section heading that was
23 utilized throughout was "Program Summary." Performance targets will be set for each
24 project based on similar criteria for the Smart Grid Fund Initiatives and how the
25 objectives can best be met.
- 26
- 27 g) There will be negative consequences by deferring qualifying projects addressing
28 non-wires alternative solutions under the MiGen Phase II Program. However, it is difficult
29 to provide a quantitative response prior to vetting projects.
- 30

- 1 h) Hydro Ottawa's intent is to formalize the vetted projects within the first year, plan and
2 execute in the second through fourth years, and then close out the projects in the fifth
3 and final year.
4
- 5 i) The current scope of the MiGen Program can achieve the referenced benefits. The text
6 that was struck out in the updated filing (page 26 of updated section 2.3.3 in Attachment
7 2-4-3(E)) contained the details applicable only to the original project. The intended
8 benefits are addressed in the generalized language pertaining to program benefit.

INTERROGATORY RESPONSE - OEB-187

U-Staff-2

EXHIBIT REFERENCE:

Updated Exhibit 2/Tab 4/Schedule 1/page 11 of 21

Updated Appendix 2-BA/Fixed Asset Continuity Schedule

SUBJECT AREA: Fixed Asset Continuity

Preamble:

Revisions have been made to the forecasted 2021-2025 capital additions. Hydro Ottawa noted that the updated capital additions reflect 2019 actuals and updates to the MiGen project, as well as revisions to correspond with the originally submitted versions of 2021-2025 Appendix 2-BA: Fixed Asset Continuity Schedule. Hydro Ottawa summarized the originally submitted, revised, and updated 2021-2025 capital additions in the tables below.

Table 3 – AS ORIGINALLY SUBMITTED – 2021-2025 Summary of Capital Additions
(\$'000s)

Category	2021	2022	2023	2024	2025
System Access (net of contribution)	\$17,820	\$17,879	\$17,720	\$15,626	\$15,255
System Renewal and Service	\$71,138	\$92,858	\$50,671	\$59,601	\$82,071
General Plant excluding CCRAs	\$14,198	\$12,343	\$6,513	\$5,822	\$18,043
TOTAL CAPITAL ADDITIONS	\$103,156	\$123,080	\$74,905	\$81,049	\$115,369

Table 3 – AS REVISED – 2021-2025 Summary of Capital Additions (\$'000s)

Category	2021	2022	2023	2024	2025
System Access (net of contribution)	\$17,952	\$17,922	\$17,620	\$15,630	\$15,312
System Renewal and Service	\$67,766	\$90,299	\$54,420	\$59,767	\$81,904
General Plant excluding CCRAs	\$14,198	\$12,343	\$6,513	\$5,822	\$18,043
TOTAL CAPITAL ADDITIONS	\$99,916	\$120,564	\$78,554	\$81,218	\$115,259

Table 3 – UPDATED FOR 2019 ACTUALS – 2021-2025 Summary of Capital Additions
(\$'000s)

Category	2021	2022	2023	2024	2025
System Access (net of contribution)	\$17,952	\$17,922	\$17,620	\$15,630	\$15,312
System Renewal and Service	\$63,004	\$94,210	\$54,420	\$59,767	\$81,904
General Plant excluding CCRAs	\$14,198	\$12,343	\$6,513	\$5,822	\$18,043
TOTAL CAPITAL ADDITIONS	\$95,155	\$124,475	\$78,554	\$81,218	\$115,259

2 Question(s):

3

4 a) With respect to the updated Appendix 2-BA, please confirm additions in column E do not
5 include construction work in progress.

6

7 b) Please explain how Hydro Ottawa forecast the capital expenditures to in-service
8 additions conversion ratios.

9

10 c) Please provide the total proposed capital additions for 2021-2025 including CCRAs.

11

12 d) When comparing Table 3 (As Revised) and Table 3 (Updated for 2019 Actuals), changes
13 only exist in the System Renewal and Service category. Please clarify whether updates

1 to 2019 actual capital expenditures have any impact on those identified changes for
2 2021-2022 capital additions in System Renewal and Service.

3
4 **RESPONSE:**

5
6 a) Hydro Ottawa confirms that the additions in column E of the Updated Appendix 2-BA do
7 not include construction work in progress.

8
9 b) Hydro Ottawa does not use capital expenditures to in-service additions conversion
10 ratios. Capital expenditures are broadly divided into two categories of projects: discrete
11 and non-discrete. The in-service additions for discrete projects are considered to be the
12 cumulative spend on the project and are forecasted to occur in the period the asset is
13 scheduled to be energized or put into service. In-service additions for non-discrete
14 projects are largely forecasted to occur in the same period as the capital expenditure
15 occurs.

16
17 c) Table A provides the total proposed capital additions for 2021-2025 including CCRAs.
18 For details, please refer to 2021-2025 Appendix 2-BA - Fixed Asset Continuity Schedule,
19 filed as UPDATED Attachments 2-2-1:(F) to (J), respectively.

20
21 **Table A – 2021-2025 Summary of Capital Additions including CCRAs (\$'000s)**

Category	2021	2022	2023	2024	2025	Total
System Access (net of contribution)	\$17,952	\$17,922	\$17,620	\$15,630	\$15,312	\$84,436
System Renewal and Service	\$63,004	\$94,210	\$54,420	\$59,767	\$81,904	\$353,305
General Plant including CCRAs	\$65,422	\$12,553	\$6,613	\$7,953	\$25,343	\$117,883
TOTAL CAPITAL ADDITIONS	\$146,379	\$124,685	\$78,654	\$83,348	\$122,559	\$555,625

22
23 d) As part of the updates to the Application filed on May 5, 2020 to reflect 2019 actuals,
24 Hydro Ottawa updated actuals for the MiGen project. The update also impacted the

- 1 timeline and scope of this multi-year project, which changed the 2021-2022 capital
- 2 additions in System Renewal and System Service.

INTERROGATORY RESPONSE - OEB-188

U-Staff-3

EXHIBIT REFERENCE:

Updated Exhibit 4/Tab 1/Schedule 3/pp. 7-8 of 12

SUBJECT AREA: Compensation

Preamble:

The actual OM&A expenditures in 2019 were \$4.4 million lower than the forecasted amount. Hydro Ottawa provided explanations for the variance as follows:

- Compensation was below forecast by \$2.5 million
- Shared services fell \$0.8 million below the forecast
- A \$1.1 million reduction was achieved by cost control and cost deferral

Question(s):

a) OEB staff notes that Hydro Ottawa forecasted 5 more permanent FTEs for 2021 compared to the 2019 actual FTEs. Please explain what new permanent positions have been budgeted for 2021.

b) Please discuss whether the identified efficiencies related to the \$1.1 million savings (e.g. cost control in spills cleanup activities) are expected to continue in 2021-2025.

RESPONSE:

a) In reference to UPDATED Attachment 4-1-5(C): OEB Appendix 2-K - Employee Costs, 2021 Full Time Equivalent ("FTEs") of 615.6 have increased by 4.9 FTEs over 2019 actuals of 610.7. Of the 4.9 FTEs, 1.7 FTEs represent the new permanent Conservation

1 and Demand Management (“CDM”) positions that are no longer funded through the
2 Government of Ontario’s conservation framework. For details on these positions, please
3 see Exhibit 4-1-6: Conservation and Demand Management. The remaining 3.2 FTE
4 increase is largely explained by position vacancies in 2019 that were higher than the
5 budgeted vacancies in 2021.

6
7 b) The entire \$1.1M in cost savings realized in 2019 is not expected to continue in
8 2021-2025. As explained in UPDATED Exhibit 4-1-3: Operations, Maintenance and
9 Administration Program Costs, the \$1.1M reduction was achieved by a one-time saving
10 in bad debt expense, which dropped to its lowest level in four years. Please see the
11 response to interrogatory OEB-143 for more details. In addition, spending on vegetation
12 management was significantly lower in 2019 due to program delays caused by longer
13 than expected contract renewal negotiations. It is expected, however, that cost savings
14 from the reduction in postage expenses due to the e-billing initiative will continue in
15 2021-2025.

INTERROGATORY RESPONSE - OEB-189

U-Staff-4

EXHIBIT REFERENCE:

Updated Exhibit 3/Tab 2/Schedule 1/page 28 of 34

SUBJECT AREA: Other Revenue

Preamble:

Hydro Ottawa provided updates to the forecasted other revenues for 2021-2022. The updates are identified in the services to third parties category under Other Income and Deductions. The originally submitted and updated other revenues for this category is summarized in the table below.

Table 7 – AS ORIGINALLY SUBMITTED – Other Income and Deductions 2021-2025

(\$'000s)

Other Income and Deductions	Test Years				
	2021	2022	2023	2024	2025
Services to Third Parties (net of costs)	\$1,133	\$1,140	\$974	\$1,130	\$1,117
Property Rental Income	\$516	\$516	\$516	\$516	\$516
Gains and (Losses) on Disposal of Utility Property	(\$389)	(\$751)	(\$323)	(\$336)	(\$445)
SLA Services to Hydro Ottawa Affiliates	\$4,800	\$4,920	\$5,043	\$5,169	\$5,298
SLA Costs from Hydro Ottawa Affiliates	(\$3,991)	(\$4,091)	(\$4,193)	(\$4,298)	(\$4,406)
Interest and Dividend Income	\$0	\$0	\$0	\$0	\$0
TOTAL²⁰	\$2,069	\$1,733	\$2,017	\$2,181	\$2,081

Table 7 – UPDATED FOR 2019 ACTUALS – Other Income and Deductions 2021-2025

(\$'000s)

Other Income and Deductions	Test Years				
	2021	2022	2023	2024	2025
Services to Third Parties (net of costs)	\$1,170	\$1,097	\$974	\$1,130	\$1,117
Property Rental Income	\$516	\$516	\$516	\$516	\$516
Gains and (Losses) on Disposal of Utility Property	(\$389)	(\$751)	(\$323)	(\$336)	(\$445)
SLA Services to Hydro Ottawa Affiliates	\$4,800	\$4,920	\$5,043	\$5,169	\$5,298
SLA Costs from Hydro Ottawa Affiliates	(\$3,991)	(\$4,091)	(\$4,193)	(\$4,298)	(\$4,406)
Interest and Dividend Income	\$0	\$0	\$0	\$0	\$0
TOTAL²¹	\$2,105	\$1,691	\$2,017	\$2,181	\$2,081

1 Hydro Ottawa noted that the update in 2020-2022 was made as a result of the updated MiGen
2 project.

3

4 Question(s):

5

6 a) Please explain why the update to the MiGen project has an impact on the forecasted
7 other revenues.

8

9 **RESPONSE:**

10

11 a) The majority of the MiGen project costs are budgeted as capital expenditures, except for
12 some administration overhead that is non-capital. The non-capital costs are reported in
13 USoA 4330 Costs and Expense of Merchandising, while the funding for these
14 non-capital costs is reported in USoA 4325 Revenues from Merchandise. The two
15 accounts are netted and are budgeted in Other Income and Deductions in Other
16 Revenues. The update to the MiGen project shifted the timing of spending. As a result,
17 the forecasted 2020 spending of \$6K was delayed to 2021 and the net cost of \$42K in
18 2021 was moved to 2022.