Summer Gardens
Electric Vehicle Charging Stations
Project Program

Halifax County Condominium Corporation #130
1470 Summer Street, Halifax, Nova Scotia, B3H 3A3
Halifax, Nova Scotia

M&R Project No. 23-009

DRAFT VERSION

Issued: May 26, 2023

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Executive Summary

M&R Engineering has been retained by the Halifax County Condominium Corporation #130 (HCCC 130) to provide a Project Program for the implementation of electric vehicle (EV) charging station infrastructure at the Summer Gardens Condominium Complex on Summer Street in Halifax, NS. The Project Program will provide an overview on EV charging in a multi-unit residential application, outline the existing electrical infrastructure, the required changes to this infrastructure to implement wide scale EV charging, invoicing of residents and an order of magnitude cost estimate. The following Program has been prepared exclusively for HCCC 130 and M&R Engineering bears no liability for any use by third parties.

The property at 1470 Summer Street consists of a single twenty-one storey condominium tower with common ground area and a single below grade parking garage, pool, refuse disposal and service spaces. The site is located on Summer Street across from the Sacred Heart School of Halifax and was constructed in 1986. The building is governed by the Condo Corporation HCCC 130.

We trust that this report meets with the Corporations requirements for consideration and are prepared to review the objectives in further detail with the Condo Corporation. Should there be any further questions or concerns regarding the report or its recommendations, please do not hesitate to contact the undersigned.

Sincerely,

Tom Hopkin, P.Eng.
Electrical Engineer
M&R ENGINEERING

Introduction

The purpose of this report is to provide a Project Program for the implementation of electric vehicle (EV) charging station infrastructure at the Summer Gardens Condominium Complex in Halifax, NS. The Project Program will provide an overview on EV charging in a multi-unit residential application, outline the existing electrical infrastructure and the required changes to this infrastructure to implement wide scale EV charging. The Program will review the different types of electric vehicle charging stations, where they are typically deployed, and which station would be used as a standard of reference for this Program.

In the final sections of this report, we will review the means of load control for the EV stations and how the billing and invoicing for this proposed solution would be implemented. The report will also touch on the rebates and incentives currently available for the work outlined in this Program.

The Project Program will include an order of magnitude estimate of the cost associated with the program being proposed.

The following codes and standards are referenced within this report:

1. NBC 2015, National Building Code of Canada 2015.
2. CSA C22.1-18, Canadian Electrical Code, Part 1 2018.

M&R Engineering Report Summary 2020

In early 2020, M&R Engineering was approached by the Summer Gardens Condominium Corporation #130 with a request to provide a report on several electrical and mechanical issues. This included a feasibility review for replacing the hot water tanks with instantaneous hot water heaters, installing heat pumps in the individual units, and installing EV charging stations for the building’s residents. At the time of the report, M&R Engineering determined that based on the facility’s historical electrical demand, and by implementing Class II electric vehicle charging stations (EVCS), up to twenty-one (21) EVCS’s could potentially be installed and simultaneously charging electric vehicles. This could be achieved with minimal intervention into the building’s current electrical infrastructure.

In January 2023, the Condo Corporation reached out to M&R Engineering with an interest in further developing a Project Program which would explore in greater detail the required infrastructure for wide scale EV implementation for this building.

Target Goal for Project

There are currently 124 parking spots at 1470 Summer Street for the building's residents and visitors. The Program mandate is to provide electrical infrastructure to all 124 parking spaces. As the number of parking spaces exceeds the available electrical capacity for simultaneous EV charging, the Program will outline the power management strategy to permit all stations to be connected to the buildings electrical infrastructure without overloading the service. In addition, as the common elements electrical service has a single meter from the utility, the implemented solution will address a means to provide invoicing the building occupants who are charging their vehicle(s).

Electric Vehicle Charging

Electric vehicle charging is the process of providing electricity to a storage battery in an electric vehicle. This could include personal vehicles owned by the general public, fleet vehicles owned by companies or corporations, or transport trucks and construction vehicles. The industry for electric vehicles continues to advance day by day with automotive companies bringing new vehicles onto the market each year. Battery technology and overall vehicle efficiency continues to improve year over year and the range of electric vehicles is increasing.

The charging time for electric vehicles can vary greatly as different vehicles have a variety of battery sizes and different charging protocols or limits. The charge time also depends on the type of EVCS that is installed. In general, the industry recognizes that there are three different levels of charging related to electric vehicles.

- Level I charging station: Typically residential charging station, the vehicle plugs into a 120 volt / 15 amp receptacle. These stations typically deliver approximately 8km of charge per hour.
- Level II charging station: These stations can be installed in either residential or commercial applications. Commercial charging stations are nearly exclusively level II. These charging stations are typically 208 volt / 40 amp connections but can range as high as 80 amp connections, depending on the manufacturer. These units include a unique charging cable that plugs directly into the vehicle and can deliver approximately 95km of charge per hour. Refer to photo 1 below for an example of a standard level II charging station.
- Level III charging station: These stations are often referred to as "DC fast charging stations" and are typically deployed along highways at service stations for quickly recharging a vehicles battery when it is nearly depleted and requires a lot of charge in a short window. These units will often require 300 amps of power and can deliver as much as 400km of charge per hour.

Photo 1: Typical level II EV charging station.

Electric vehicle charging station manufacturers will typically offer two different types of EV charging stations, networked and stand-alone charging solutions. Networked stations receive an internet connection and utilize software to manage the operation of the EVCS. When an authorized user presents their credentials, either by key-fob or some form of payment system, the EVCS will enable the flow of power to the vehicle. These types of stations are typically deployed in commercial applications or at public locations such as shopping malls or business's and will allow for EV drivers to charge their vehicle under a stipulated rate.

Where the stations are all supplied from a common vendor, the units can also be networked together to permit load sharing on common electrical circuits. The software parameters can be adjusted to provide full charge when only one vehicle is connected and then throttle the delivered power to all vehicles when additional EVs plug in to the same circuit.

Standard charging stations do not require an internet connection. Quite simply put, when the electric vehicle is plugged in, power is delivered at 100% output until the battery is full. These charging stations are typically installed at private residences or at secured locations where only authorized people will use the charging station. Photo 1 above depicts a standard non-networked EVCS.

The Project Program for Summer Gardens is designed around the deployment of level II charging stations for all building occupants. For additional information on level II charging stations, please refer to Appendix A.

The technical performance criteria for the recommended electric vehicle charging station in this program are as follows:

- Level II charging station, non-networked
- Power requirements: 40 Amp, 208 Volt, 1 Phase
- Casing: NEMA 4X or equivalent, 100% aluminum, designed for indoor or outdoor installations
- Wall mounted with integral commercial grade cable and SAE J1772 connector

Overview of Electrical Infrastructure

The condominium tower Summer Gardens was constructed in 1986 and the majority of the base building electrical infrastructure appears to be original to the building construction. The building is served by six high-voltage utility transformers installed in an NSPI vault located on the P1 parking level. These six transformers provide two separate services to the building, a metered 600 amp, 347/600 volt, 3 phase, 4 wire service to feed the base building electrical requirements as well as a 4000 amp, 120/208 volt, 3 phase, 4 wire service that feeds a 3000 amp, plug-in style vertical bus duct assembly amongst other loads.

The buildings 600V service terminates at a at two cell 600A, 347/600V, 3PH, 4W switchgear assembly manufactured by Federal Pioneer, model S-4. The distribution section of this switchgear assembly sub-feeds lobby heaters, panelboard P1, mechanical splitter P5 in the mechanical penthouse, the generator transfer switch and emergency distribution, along with several zones of ramp heating that were previously electric and converted to hydronic. Refer to photo 2 below.

Photo 2: 600Volt main distribution switchboard.

The buildings 208V service terminates at a 4000A, 120/208V, 3PH, 4W switchgear assembly manufactured by Federal Pioneer, model S-4. The distribution section of this switchgear assembly sub-feeds a 3000A vertical bus duct assembly which sub-feeds to tenant meter centers located on every second level which feed the panelboards within each unit. The distribution section also feeds Panel P, a distribution panelboard which sub-feeds various house panels.

The core areas of the building, such as common areas and elevator lobbies, are fed from panelboards located in either the P1 main electrical room or the mechanical penthouse at the top of the building. The electrical distribution for mechanical heating and ventilation equipment are also located primarily in these two main service areas.

The proposed electrical infrastructure for EV charging for this site would connect to the "common elements" electrical meter, which is to say the 600volt building service. This service is metered by a utility meter in the main electrical room.

Proposed Electrical Infrastructure

To provide the electrical infrastructure for Summer Gardens for EV charging, the following changes would be required for the 600volt electrical service. A graphical representation of these proposed changes can be reviewed in Appendix B.

- Reconfigure the loads within the main switchboard to provide a space sufficiently sized to accommodate a 200amp / 600 volt / 3pole breaker within this board. This would require an interruption of power to the building to make these changes.
- A new 150kVA, 600 volt to 120/208volt step down transformer would be installed in the main electrical room and would be wired to the new breaker in the main switchboard.
- This transformer would feed an 800 amp, 120/208volt, 3phase, 4wire distribution panel that would be located in the parking garage, immediately outside the electrical room. The panel would be include five (5) 400 amp, 208volt, 3pole breakers to feed metered EV distribution panels.
- The first 400 amp, 208volt, 3phase metered EV distribution panel would be installed adjacent to the distribution panel noted above. An example of this type of system is the EVCMC from Intellimeter. Refer to Appendix C for additional information on this unit.
- A 40amp/208volt/1phase electrical circuit would be installed from the EV distribution panel out to all 124 parking stations within the building.

In the first year of implementation, the initial electrical infrastructure would include all items in the list above. Each EV distribution panel contains 30 relays in the panel and therefore can handle 30 EVCS's. This first panel would be installed on year one, permitting up to 30 occupants to purchase an EVCS. In ten years time, if the condominium corporation has an interest from building residents to exceed the 30 vehicle capacity, they would hire an electrician to install the second EV distribution panel and the networked backbone between the two panels.

As the majority of the electrical infrastructure or common elements of the distribution is to be paid for by the condominium corporation, the cost to the building residents is reduced to:

- Cost to purchase and install an EVCS
- Cost to connect the EVCS to the circuit at their parking stall
- Integration of electric circuit at main distribution panel

Load Management Platform

In order to provide EVCS for all 124 parking stalls on site, a load management platform is required to regulate the electrical load on this branch of distribution. The required infrastructure list above included notes on a load management platform. This system is a relay based platform with integral metering components. The system monitors the active connected load and closes or opens electrical relays to permit or restrict power from flowing to EVCS based on the system demand. The maximum demand parameters would be programmed into the software at time of commissioning.

An example of this type of system is the EVCMC Energy Management System from Intellimeter, which is the basis of design for this Program. This system includes all necessary metering and software to monitor the loads to each of the 30 internal relays and includes permissive settings to close and open relays as required to keep the load under the stipulated threshold. Additional information on this system can be found in Appendix C.

Billing / Invoicing

The power for the EVCS distribution system is to be connected to the current house or "common elements" meter in the main electrical room. The invoices for this are paid for by the condominium corporation. As a result, any additional power consumed on this service for the purposes of charging an EV would need to be monitored and a means of recovering this cost must be included.

The metering that is included in the load management platform is employed to not only turn relays on and off but will also monitor and record the total power and charge time for each EVCS. This total charge time can then be extracted by the condominium corporation in order to draw up invoices for tenants charging their vehicles to bill them for their usage. The condo corporation would set up a flat rate to charge tenants for the power usage for EV charging based on the utility rate at the time and any required recouperation required from the initial capital investment.

The condominium corporation can decide to out-source this invoicing to the metering agency, but this would include additional costs. The initial start up cost is $ 1000.00 from Intellimeter and then for every account they generate an invoice for, there is a monthly fee of $3.50 per meter.

The networked charging station solution would regulate the power flow to electric vehicles by throttling back the power output of the EVCS based on the total system demand. The disadvantage to this solution is that the condo corporation is not permitted to charge tenants a rate based on the actual power provided to the EV, i.e. rates based on kilowatt-hour consumption. The corporation can only charge based on the total time connected. Tenants could therefore potentially be billed for a 4-hour charge but only receive 50% output from their EVCS. This could lead to complaints of over-billing. For this reason, the program recommends proceeding with non-networked or standard electric vehicle charging stations.

Order of Magnitude Costing

The following estimate is considered a Class D estimate, which is to say the actual cost of construction is anticipated to be within +/- 20% of the noted value. A higher degree of accuracy can be achieved when a consultant has been engaged to provide a detailed design for this project.

Electrical Distribution Costs:	$ 345,000.00
Each additional EV Charging Management Controller (Installed & commissioned)	$ 50,000.00 - $65,000.00

Notes:
1. Taxes extra.
2. This estimate is completed in 2023 dollars and does not allow for escalation.
3. Professional engineering services are not included in this estimate.

This allows for conduit and wire to be installed to all 124 parking stalls in the building. If the condominium corporation decided to reduce this down to only providing conduit and wire to the first 30 spots around the building, the estimate above could be reduced by as much as $160,000.00.

Rebates and Incentives

The rebate program for the installation of electrical infrastructure for EV charging stations in Nova Scotia is managed by Efficiency Nova Scotia (ENS). The newly created rebate program was launched in 2023 and is just getting started. The rebate program includes two different rebate incentives for building owners and constructors, the EV Ready Charger Rebate Program and the EV Ready Plan. This Program has been created for the Summer Gardens condominium to meet the client’s requirements but also to comply with the EV Ready Plan outlined by ENS in order to receive a rebate for this work.

The current rebate structure from ENS for the EV Ready Plan will provide a rebate for 75% of the cost to develop the plan up to $4,000.00 for an existing multi-unit residential building (MURB). The condominium corporation will be eligible for this rebate. The associated paperwork for this rebate are included in Appendix D below.

The second part of the incentive program is the EV Ready Charger rebate which will provide financial assistance in the form of a rebate for 50% of the costs to install an eligible charging station. For existing MURB’s, this goes to a maximum of $3,000.00 per charging station to a maximum of $15,000.00 per building. Unfortunately, the current rebate program requires that the charging stations be a smart or networked product. These units cost more than standard charging stations and require a network fee be paid on a yearly basis. After reviewing this with representatives of the condominium corporation, it was decided that due to the restrictions this would place on the type of charging station, the increased per-unit cost and system network fees, the Program defined here will not target this rebate from ENS.

Conclusions and Recommendations

In conclusion, this report has found that it is feasible to install the electrical infrastructure to ensure that all building residents at Summer Gardens could opt to install an electric vehicle charging station in the future. Building residents would install level 2 charging stations which would provide a much faster charge rate over the basic residential level 1 charging station. With the recommended infrastructure in place, future tenant EV charging station installations will be made quickly and easily and can be completed in an orderly fashion.

While installing networked EV charging stations would result in some degree of rebates for the buildings occupants, it would only benefit the first handful of stations and would lock those and all future tenants into contracts with an external third party. As noted in the sections above, a networked solution could potentially result in complaints from tenants for over-billing for the actual power delivered to their vehicle.

The proposed solution in this report would permit the end users to purchase a level 2 EVCS from any vendor of their choice and the stations do not need to be networked, resulting in less up front capital cost to the EVCS owner. The means of power control also will result in 100% power output being delivered for the duration of the time the tenant has their EVCS running.

APPENDIX A:
Typical Level II Electric Vehicle Charging Station

FLO Home

G5 Model

240 V I 30 A I 7.2 kW

Extremely sturdy and made in Canada,
our residential charging station is valued
for its high reliability and construction quality.

Robust Casing	Durable Connector
Made of 100% aluminum with a highly resistant finish	High quality universal connector built to last 10 years +
Quality Cable	**Built-in Security**
25' commercial grade cable that ensures resilient flexibility -40 °C 50 °C	Safe for your electric vehicle and your home

3-Year
Limited Warranty

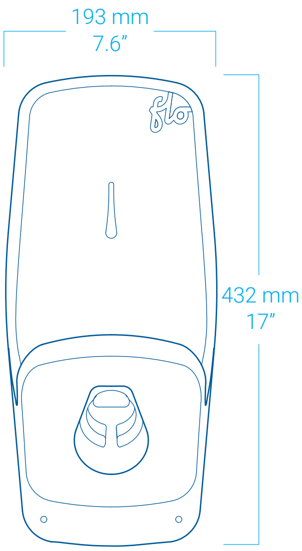
Made in Canada

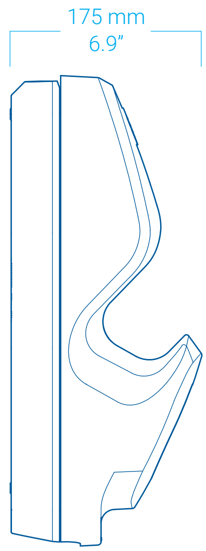
Certified

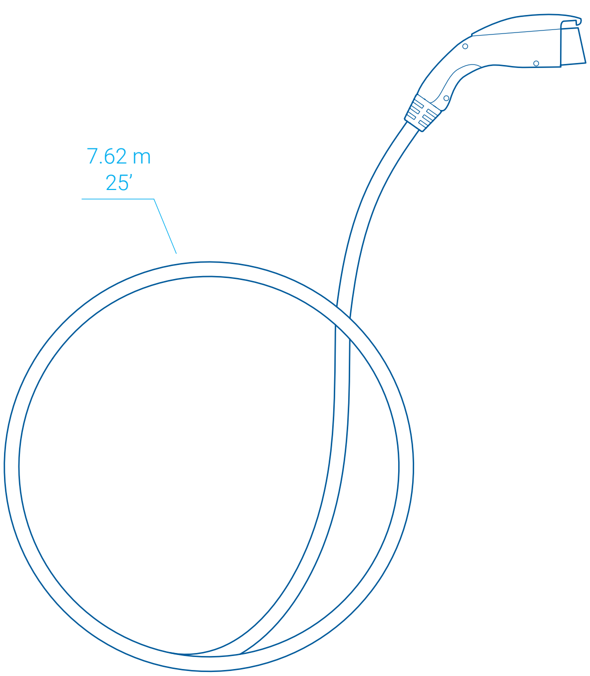
Designed and manufactured by AddÉnergie Technologies Inc.

FLO Home

Technical Specifications
G5 Model







Type
Level 2 Charging Station

Casing
100% aluminum
NEMA 4X certified
Designed for outdoor
or indoor installation

Finish
Carbon
with high resistance coating

Voltage
208 - 240 V @ 60 Hz

Output Current
30 A. Adjustable from 6
to 30 A via a rotary switch

Charging Power
6.2 - 7.2 kW

Cable
7.62 m / 25’
Commercial grade cable

Charging Connector
SAE J1772™ designed
to withstand 10,000+
charging cycles

Security Features
Integrated GFCI 20 mA,
3 reset attempts at 15-minute
intervals

Operating Temperature
-40 °C to 50 °C
-40 °F to 122 °F

Wall Bracket
Included

Installation
Must be installed by
a qualified electrician

Weight
11.18 kg / 24.65 lb

Limited Warranty
3 years

Model Number
FH-1-STA-G5-HY5G-FL1

Certification

c US

Conformity

CAN ICES-3 (B)/NMB-3(B)

Learn more
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1 855 543-8356

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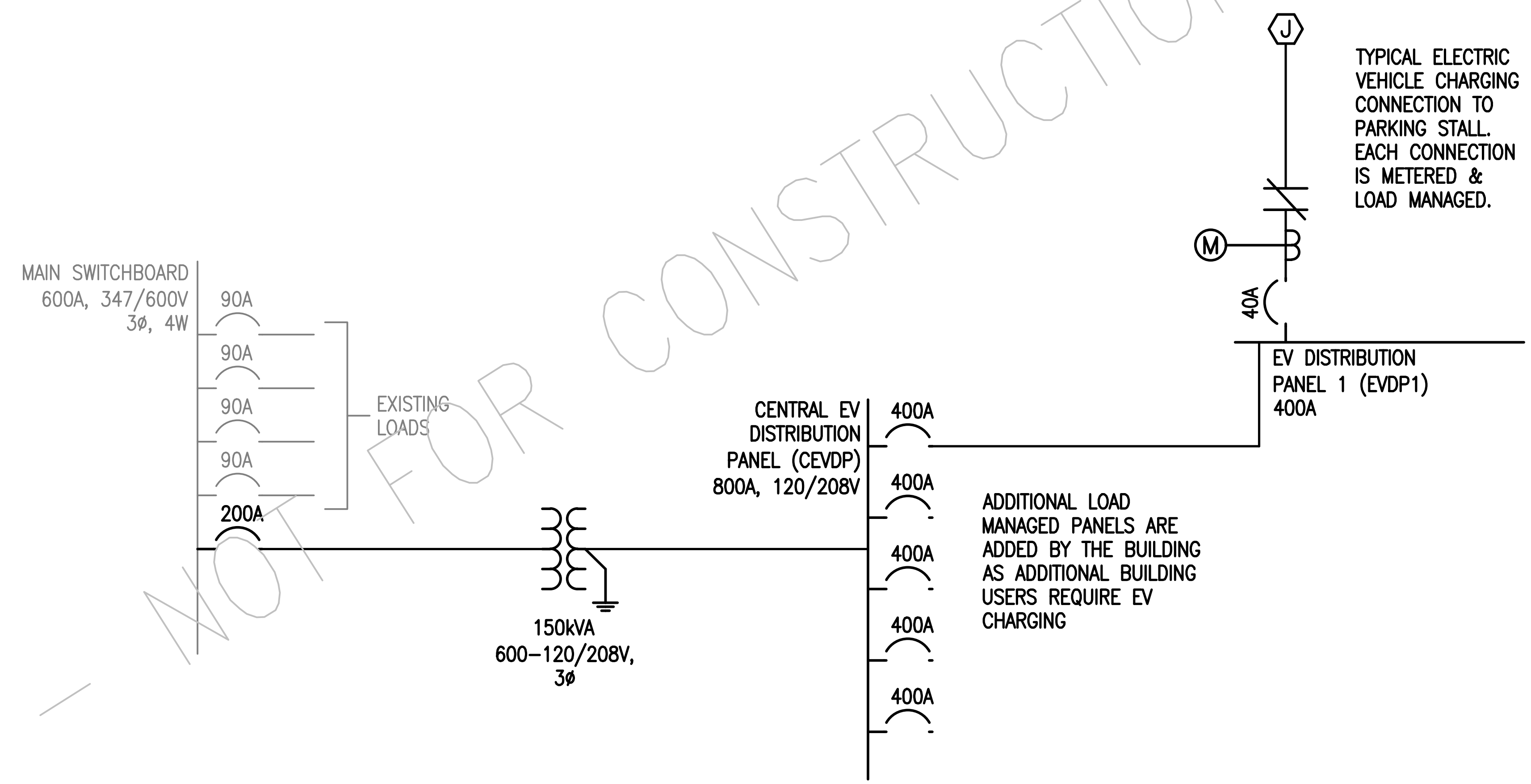
APPENDIX B:
Basic Single Line Diagram of System Modifications

SINGLE LINE

	BREAKER
	DIGITAL METERING
	TRANSFORMER
	CONTACTOR, NORMALLY CLOSED
	JUNCTION BOX



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STAMP:

PROJECT: SUMMER GARDENS CONDOMINIUM COMPLEX
1470 SUMMER STREET, HALIFAX, N.S.

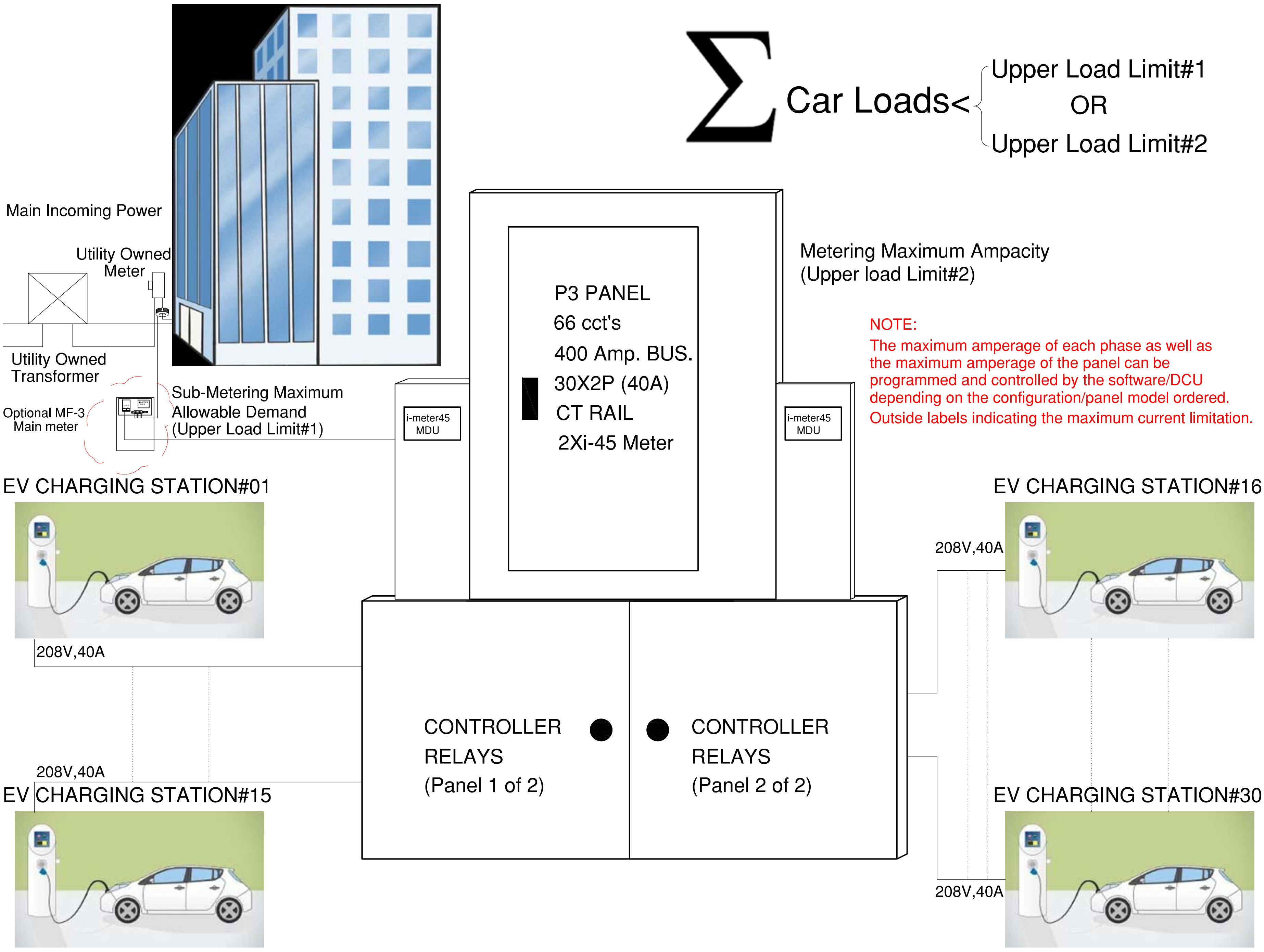
TITLE: PRELIMINARY SINGLE LINE DIAGRAM
ELECTRIC VEHICLE CHARGING INFRASTRUCTURE

SCALE: N.T.S.
DATE: 19/05/23
JOB NO.: 23–009
DWG. NO.: N/A

This drawing is not to be scaled

APPENDIX C:
Load Management Platform from Intellimeter

ICI01EVCMC-EMS-S-30 ENERGY MANAGEMENT SYSTEM



intellimeter CANADA INC.
Innovative Metering Solutions
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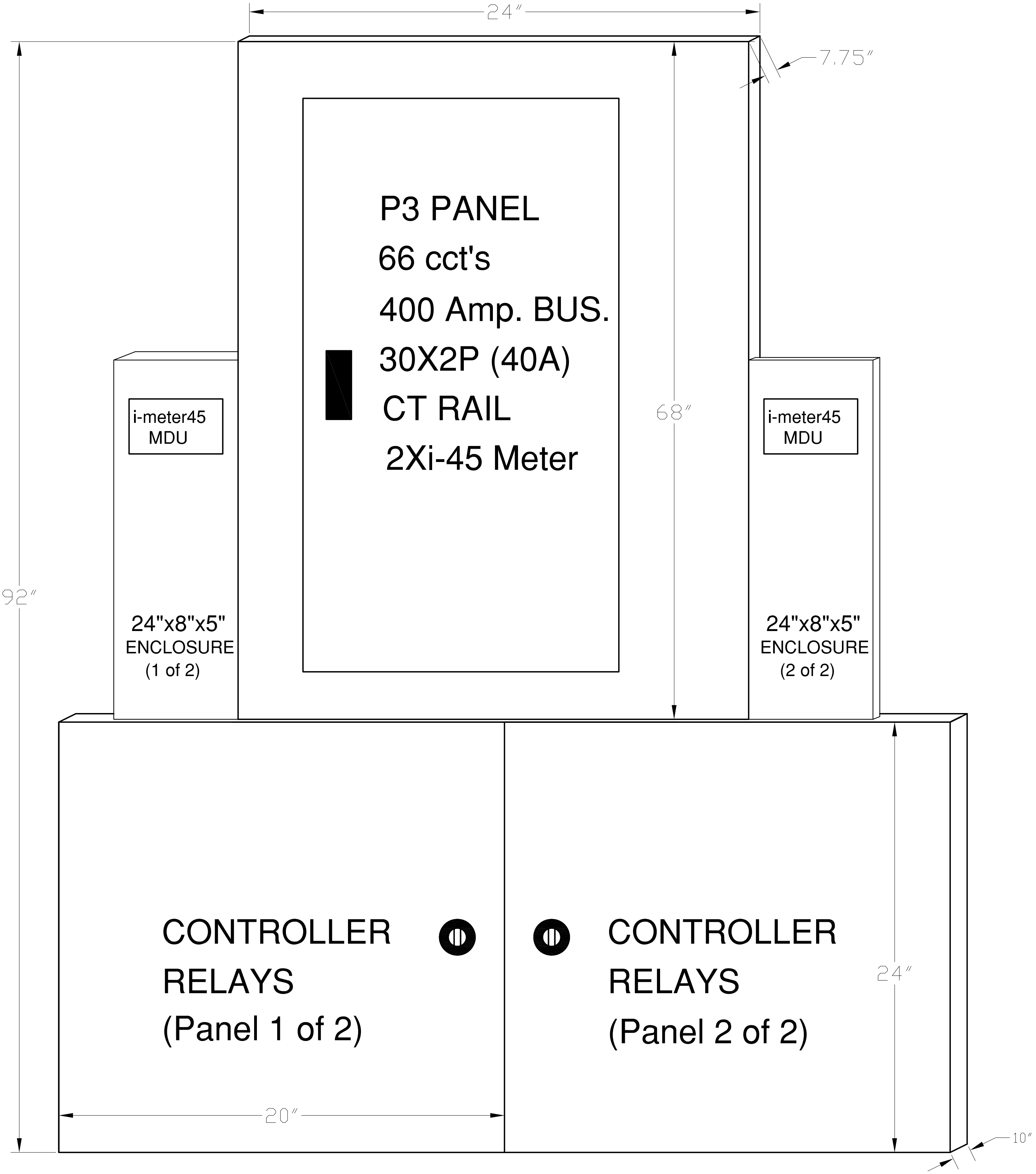
Pickering, Ontario L1W 3T9
Phone: (905) 839-9199
Fax: (905) 839-9198
intellimeter.on.ca

Project Name:	
Distributor:	
Engineer:	
P.O.#	
Contractor:	
Date: June 2022	Rev.
Project #:	
Drawing #:	
Drawn by: Hossein Pakbin	
Checked:	
Drawing:	

ICI01EVCMC-EMS-S-30 ENERGY MANAGEMENT SYSTEM

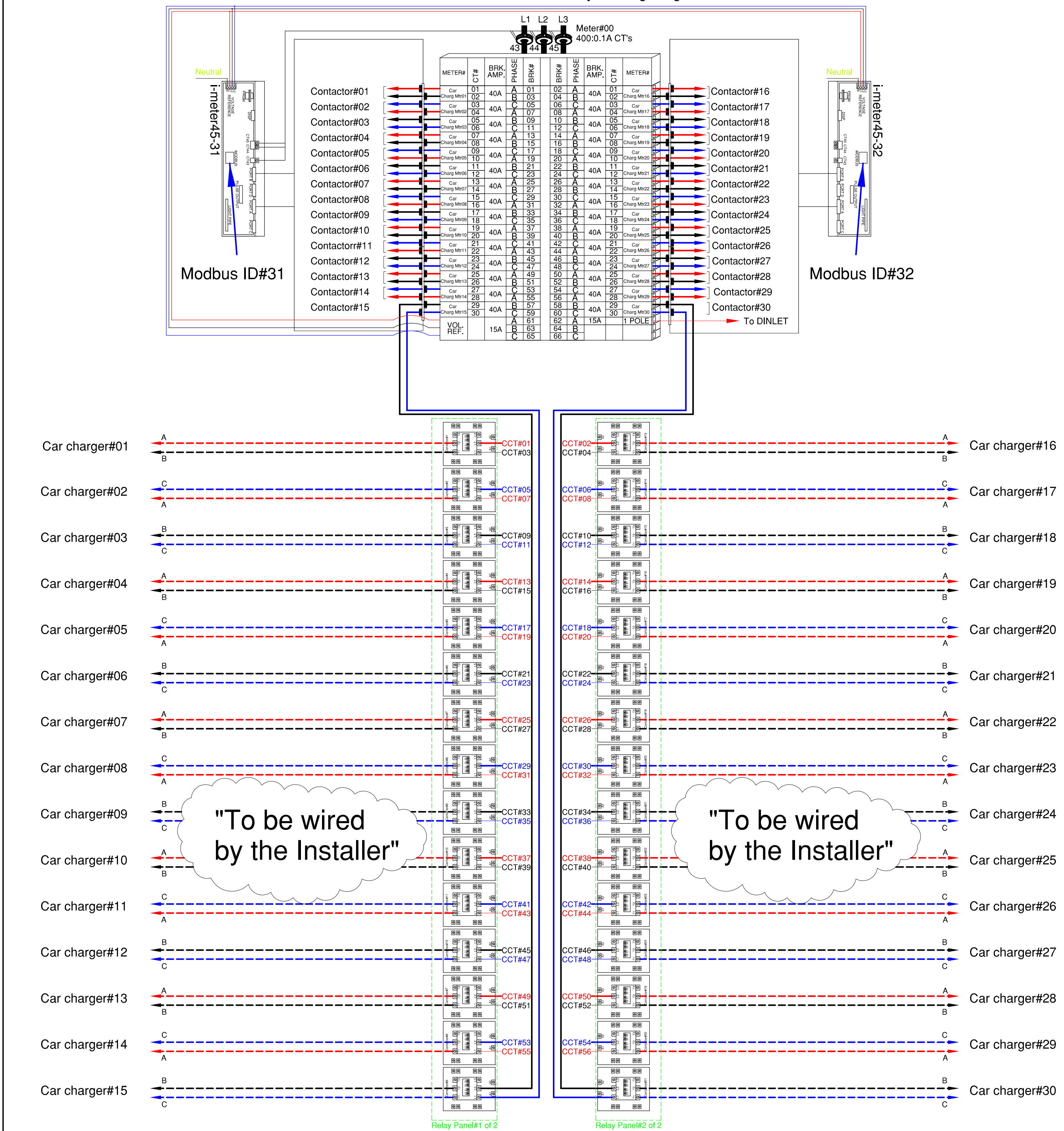
Enclosures Dimension



intellimeter CANADA INC.
Innovative Metering Solutions

Address	Project Name:	Distributor:	Engineer:	P.O.#	Date:	Rev.	Project#:	Drawing#:	Drawn by:	Checked:	Drawing:
1125 Squires Beach Road Pickering,Ontario L1W 3T9 Phone:(905) 839-9199 Fax:(905) 839-9198 intellimeter.on.ca					June 2022				Hossein Pakbin		

ICI01EVCMC-EMS-S-30 ENERGY MANAGEMENT SYSTEM
i-meter45 Meter and Power Relays Wiring Diagram



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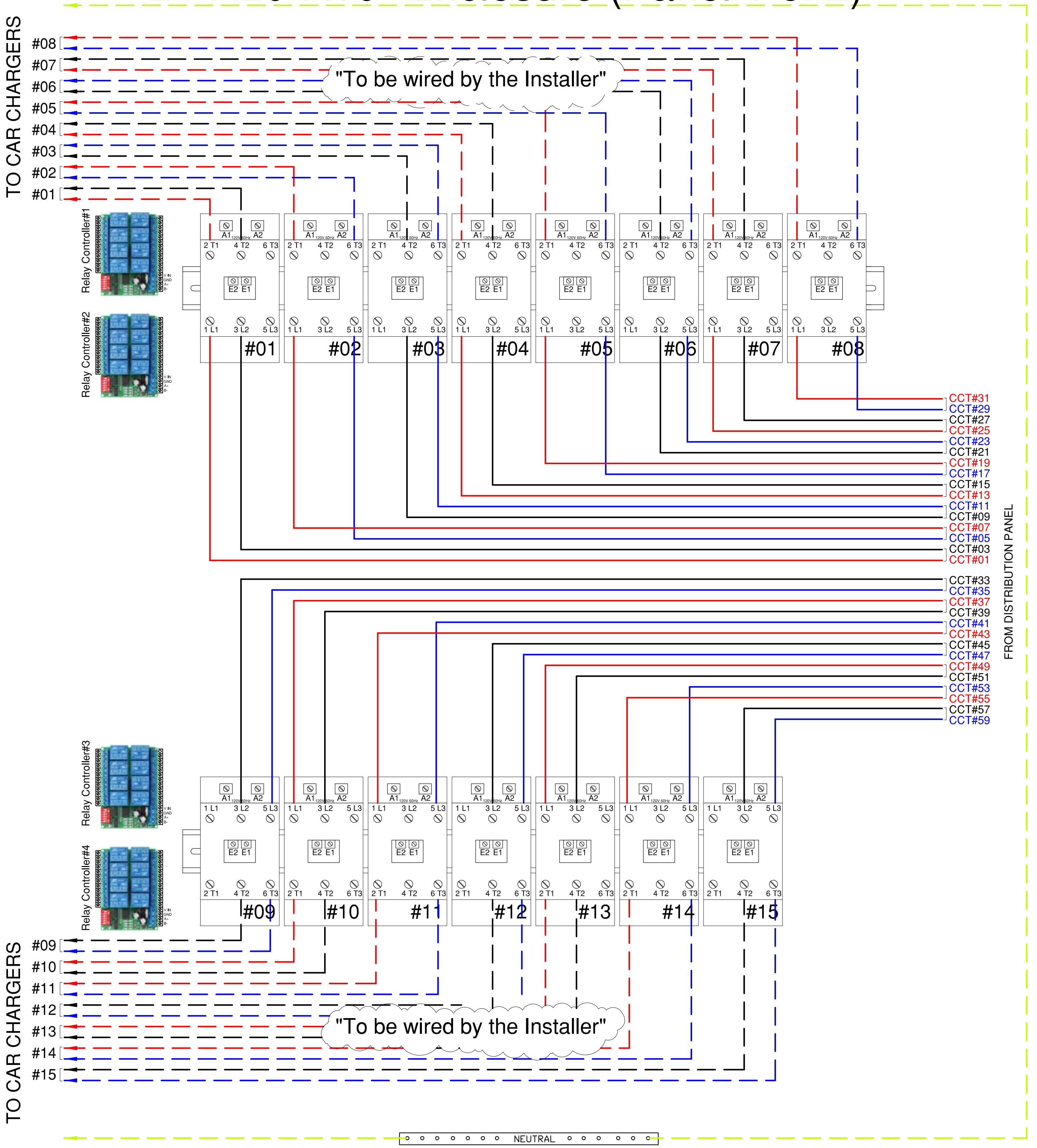
ICI01EVCMC-EMS-S-36 ENERGY MANAGEMENT SYSTEM

Contactor with Mechanical Latch Power Wiring Diagram

24"X20"X10" Enclosure (Panel 1 of 2)



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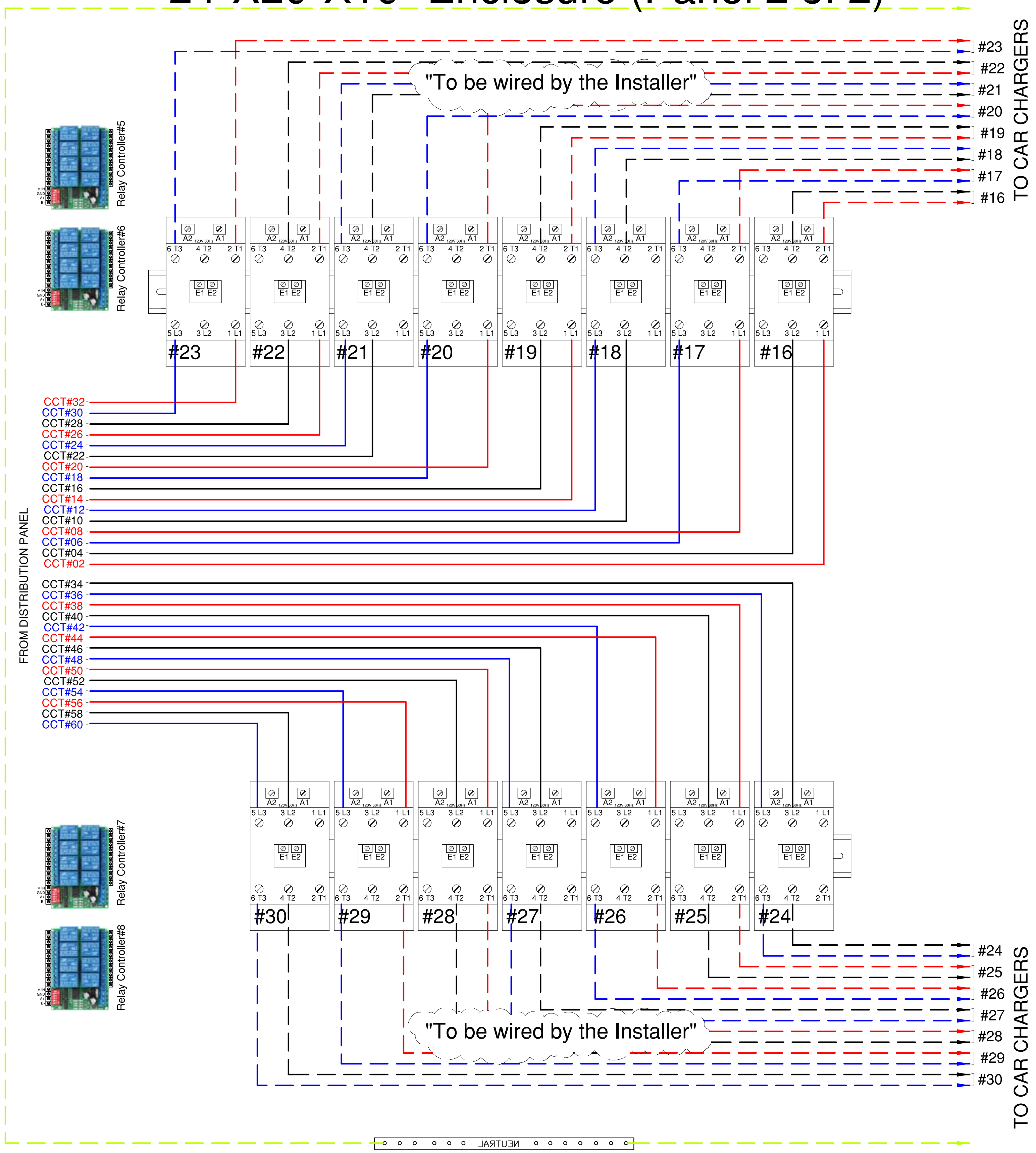
ICI01EVCMC-EMS-S-36 ENERGY MANAGEMENT SYSTEM

Contactor with Mechanical Latch Power Wiring Diagram

24"X20"X10" Enclosure (Panel 2 of 2)



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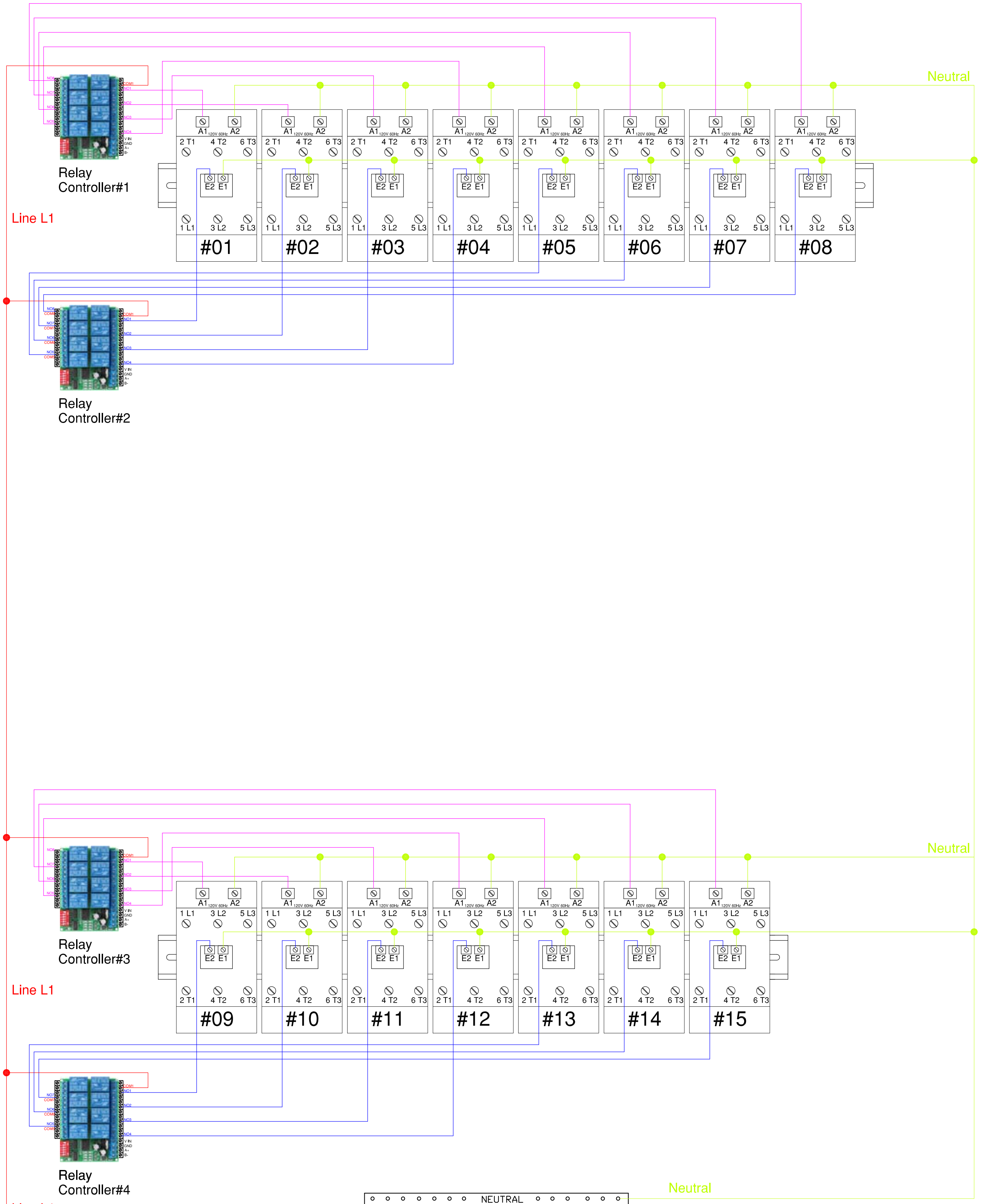
ICI01EVCMC-EMS-S-30 ENERGY MANAGEMENT SYSTEM
Contactor with Mechanical Latch to Relay board Wiring Diagram
24"X20"X10" Enclosure (Panel 1 of 2)



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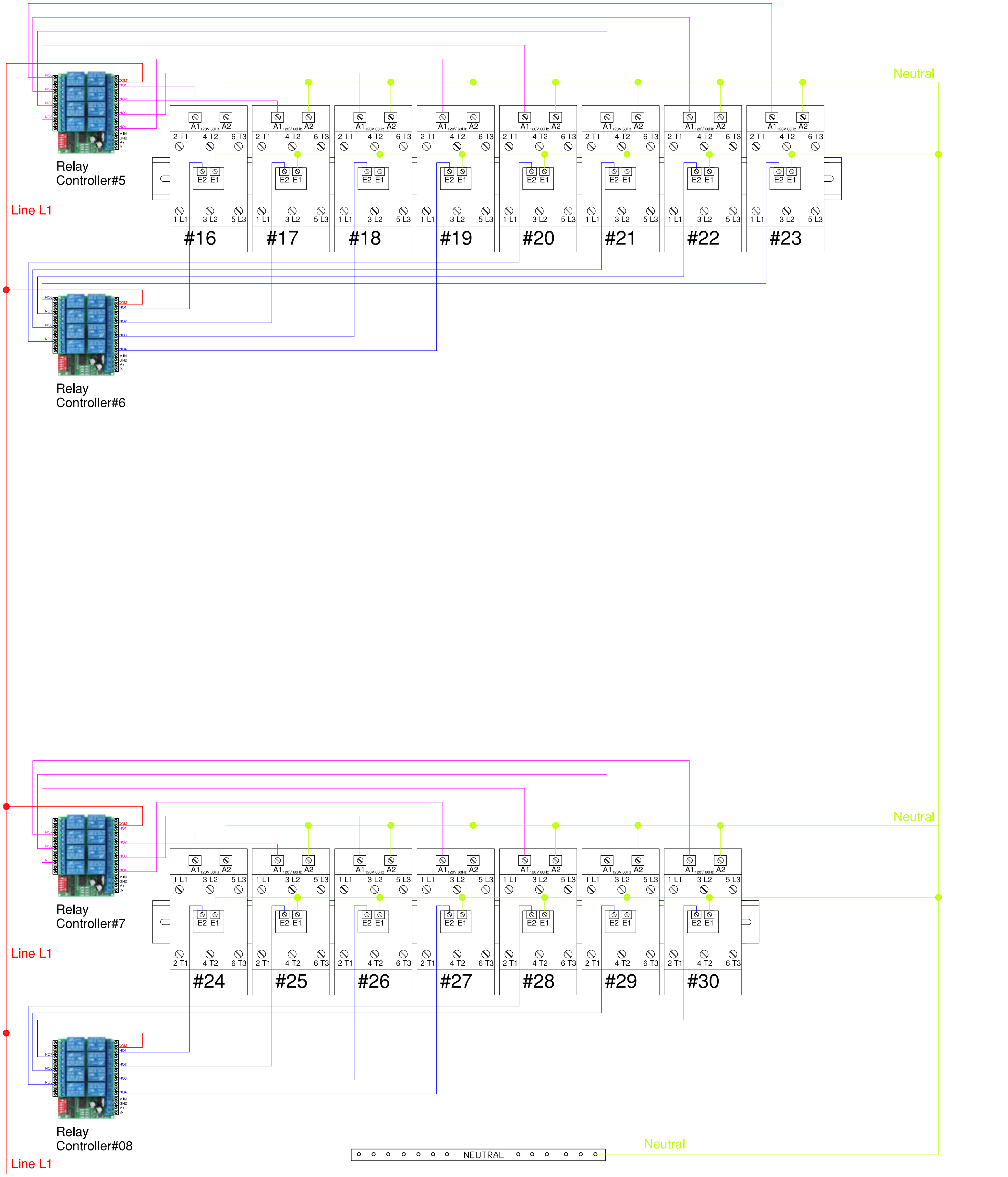
Contactor with Mechanical Latch to Relay board Wiring Diagram
24"X20"X10" Enclosure (Panel 2 of 2)



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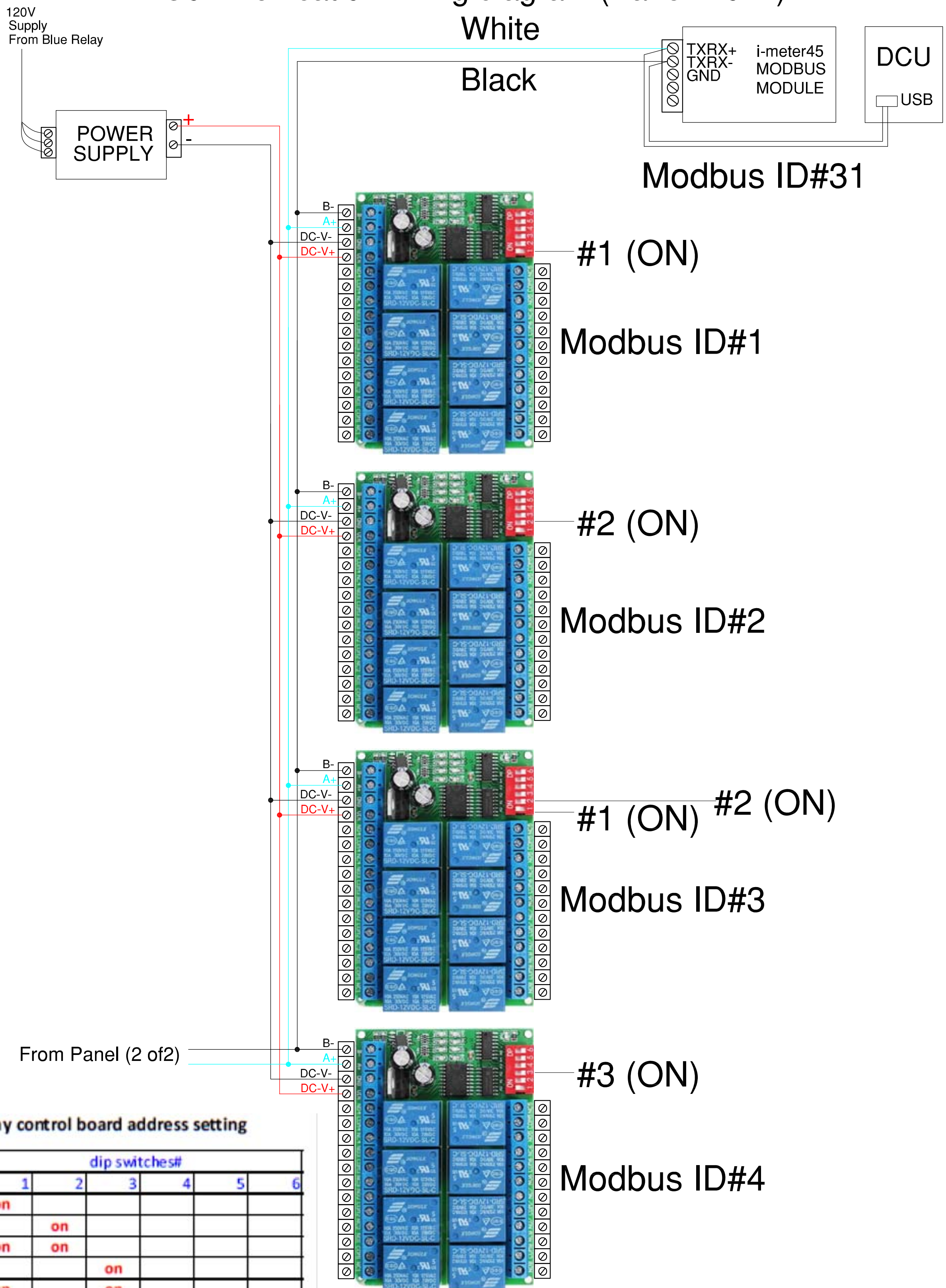
ICI01EVCMC-EMS-S-30 ENERGY MANAGEMENT SYSTEM

Communication wiring diagram (Panel 1 of 2)



relay control board address setting

board address	dip switches# 1	2	3	4	5	6
1	on					
2		on				
3	on	on				
4			on			
5	on		on			
6		on	on			
7	on	on	on			
8				on		
9	on			on		
10		on		on		

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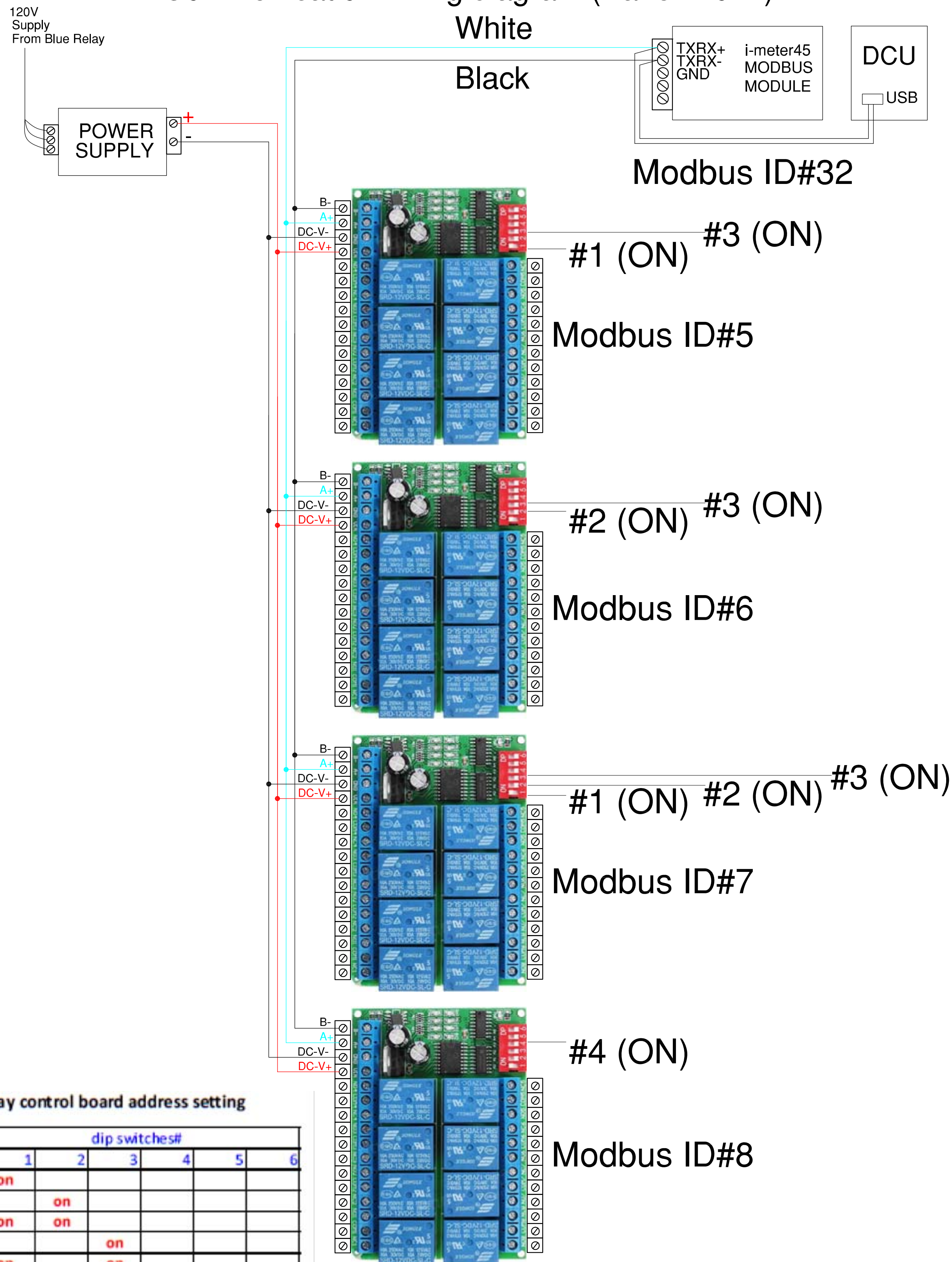
ICI01EVCMC-EMS-S-30 ENERGY MANAGEMENT SYSTEM

Communication wiring diagram (Panel 2 of 2)



relay control board address setting

board address	dip switches# 1	2	3	4	5	6
1	on					
2		on				
3	on	on				
4			on			
5	on		on			
6		on	on			
7	on	on	on			
8				on		
9	on			on		
10		on		on		

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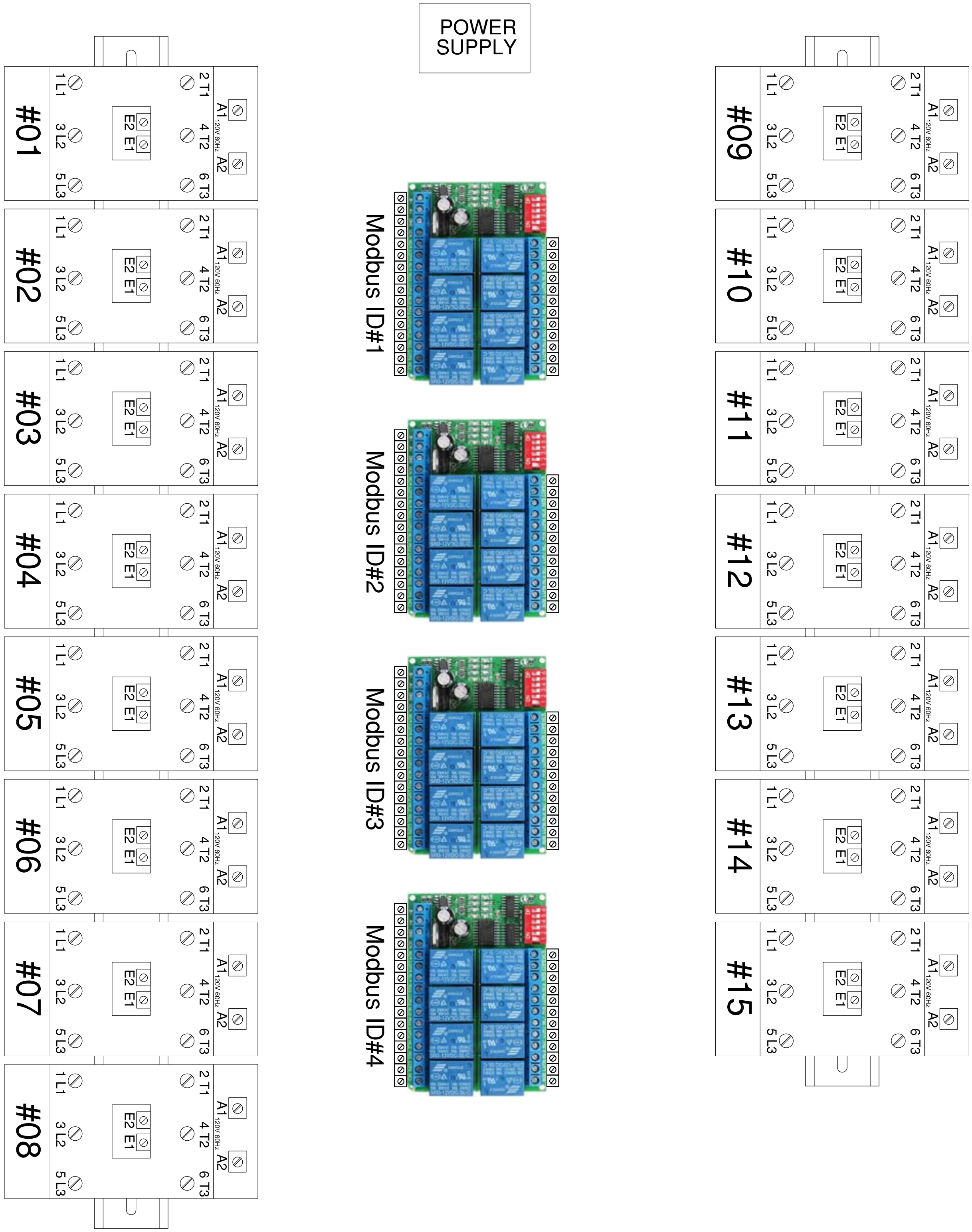
				June 2022				Hossein Pakbin		

ICI01EVCMC-EMS-S-30 ENERGY MANAGEMENT SYSTEM

Contactor with Mechanical Latch, Relay board and power Supply Layout

24"X20"X10" Enclosure (Panel 1 of 2)

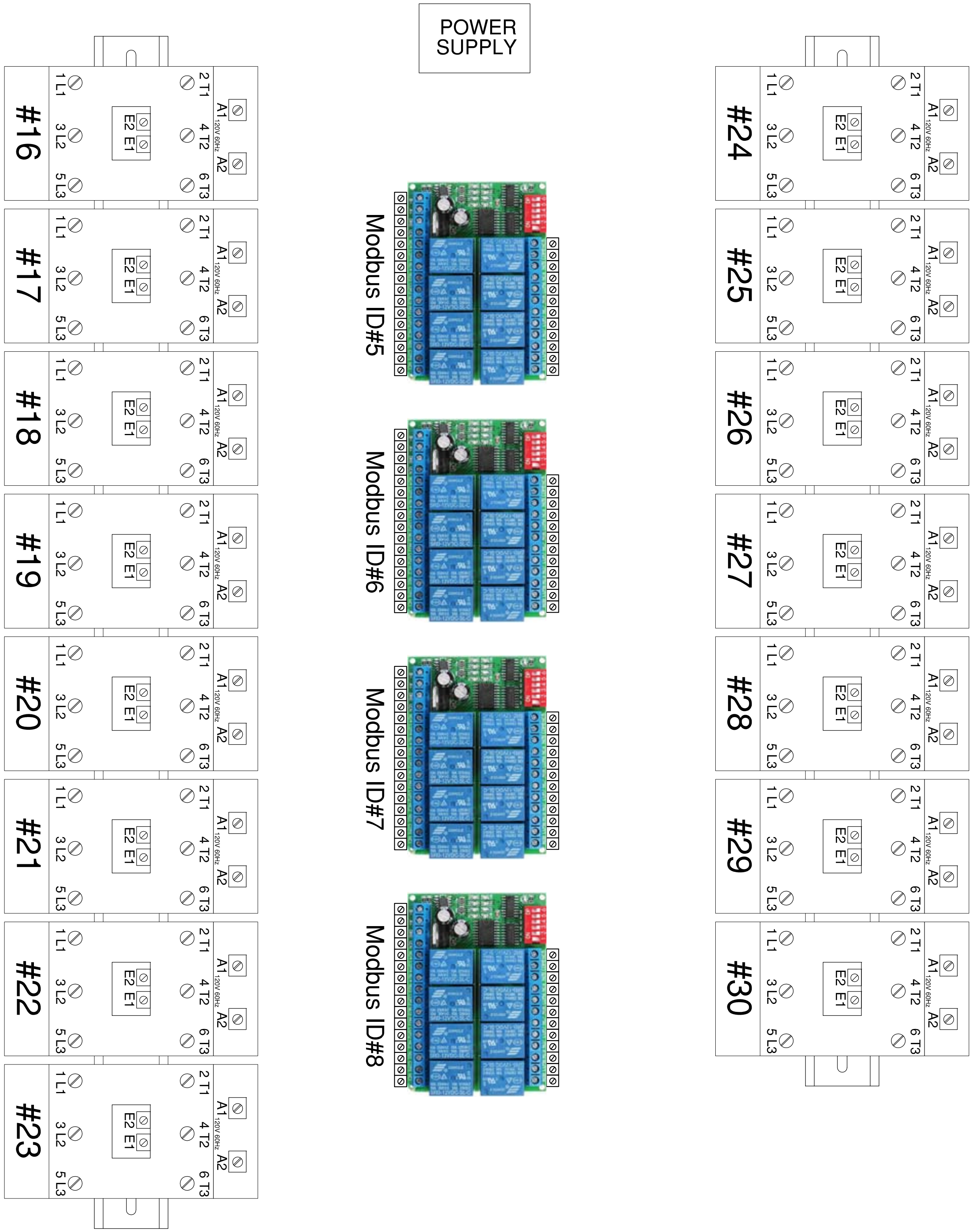


intellimeter CANADA INC. Innovative Metering Solutions	1125 Squires Beach Road Pickering,Ontario L1W 3T9 Phone:(905) 839-9199 Fax:(905) 839-9198 intellimeter.on.ca	Project Name:	Distributor:	Engineer:	P.O.#	Date:	Rev.	Project#:	Drawing#:	Drawn by:	Checked:	Drawing:
						June 2022				Hossein Pakbin		

ICI01EVCMC-EMS-S-30 ENERGY MANAGEMENT SYSTEM

Contactor with Mechanical Latch, Relay board and power Supply Layout

24"X20"X10" Enclosure (Panel 2 of 2)



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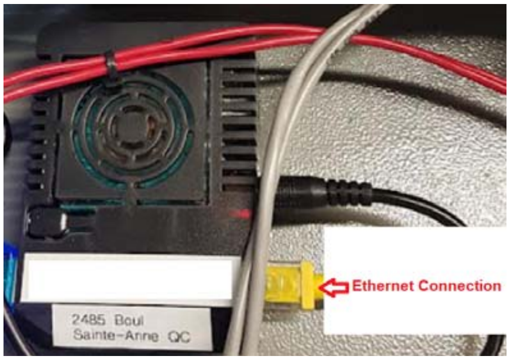
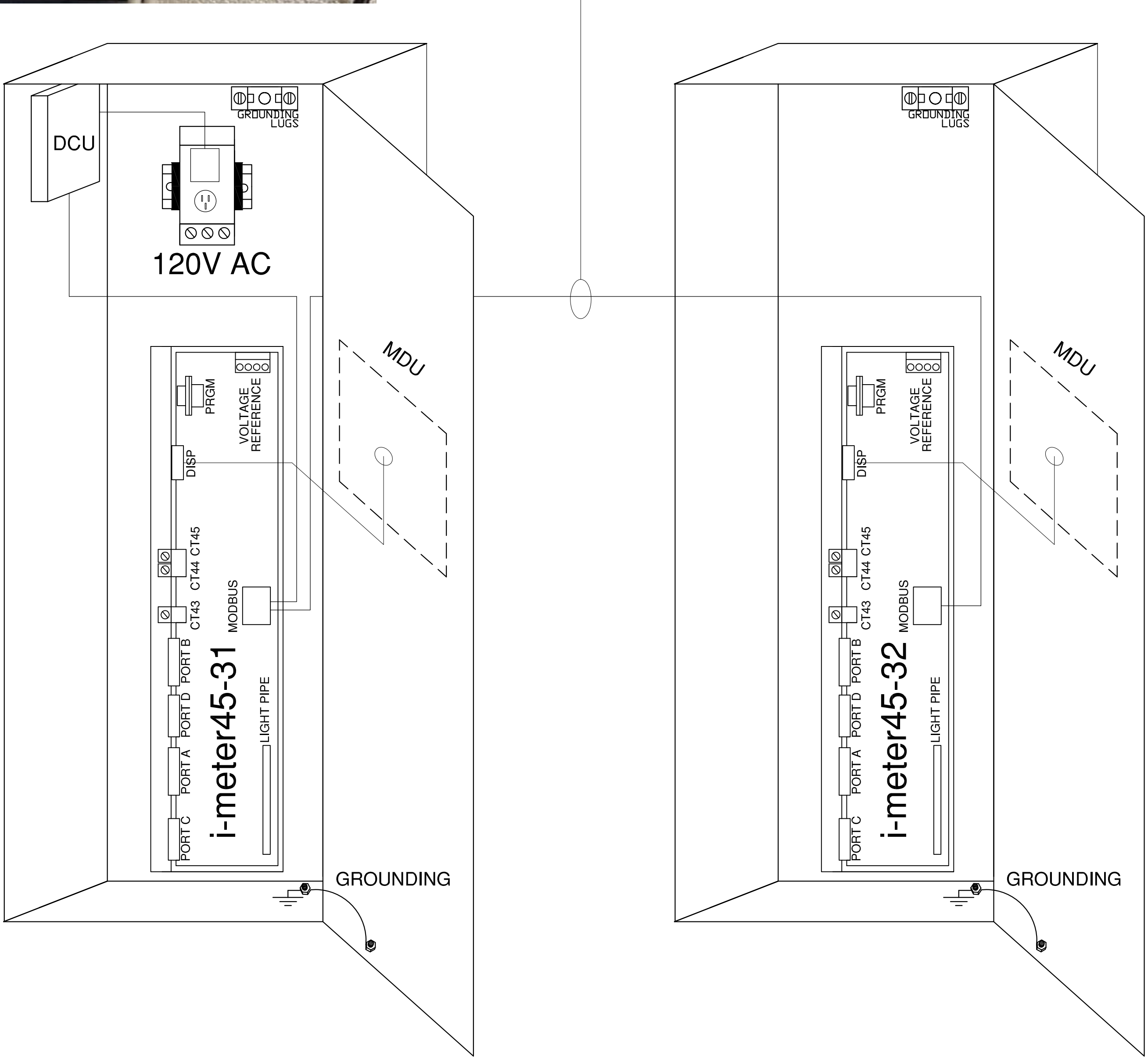
ICI01EVCMC-EMS-S-30 ENERGY MANAGEMENT SYSTEM

i-Meter45 ,Data Collection Unit (DCU) and Meter Display Unit (MDU) Layout





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APPENDIX D:
Completed Consultants Handbook for
Efficiency Nova Scotia Rebate

EV Ready Plan Consultant Workbook

This workbook provides a basis for an EV Ready Plan. The consultant will provide the applicant with an EV Ready Plan (in their own report format) and a copy of this workbook.

Your EV Ready Plan must include the following elements:

1. Property and Company Details

EV Ready Plan ID (provided by Efficiency Nova Scotia):	
a. Date the EV Ready Plan was prepared:	May 12, 2023
b. Building Address (EV Ready Plan is for this building):	
1470 Summer Street, Halifax, Nova Scotia, B3H 3A3	
c. Applicant Information	
Business Name	Halifax County Condominium Corporation #130

d. Building Contact		
Name	First: Daniel	Last: Campbell
Position	President, Board of Directors	
Contact Phone Number	902-422-4933	
Contact Email	dm.campbell@icloud.com	

e. EV Ready Consultant		
Name	First: Tom	Last: Hopkin
Qualification	Electrical Engineer	
Company Name	M&R Engineering Ltd.	
Contact Phone Number	902-422-7393	
Contact Email	thopkin@mreng.ca	

EV Ready Plan Consultant Workbook

☑	I understand the EV Ready Plan program requirements.
☑	I confirm the recommended solution provided in this EV Ready Plan complies with the program requirements, applicable electrical and building codes, standards and local bylaws.
☑	I have provided the applicant with a signed and stamped EV Ready Plan.

	Date	

2. Building Information

a. Project Type	
☑ Existing Building ☐ New Construction Building	
b. Building Type	
☐ Rental Building ☑ Condo Building ☐ Other If other, list:	
c. Number of residential units in the building:	118
d. Number of residential parking spaces:	124
e. Number of residential parking spaces to be made EV Ready:	124
f. Number of commercial/visitor parking spaces owned by the residential building:	6
g. Number of commercial/visitor parking spaces to be made EV Ready:	
h. Expected number of EVSE to be installed within one year:	Unknown
j. Additional information about the property:	

EV Ready Plan Consultant Workbook

3. Electrical Capacity Assessment

The electrical capacity assessment determines the current state of the existing main service of the building.

This assessment only includes the existing system and does not included any recommended electrical upgrades, or future EVSE loads.

All units of measure must be kilowatt (kW).

a. What is the existing electrical main service size (kW)?
623.5kW
b. What is the peak demand on the existing main service (kW)?
61kW
c. Describe how the peak kW demand was determined (provide additional information on electrical system if necessary).
Peak kW demand was determined from reviewing the historical consumption data for the condominium complex.
d. What is the spare capacity of the existing main, prior to EVSE installation (kW)?
562kW

EV Ready Plan Consultant Workbook

4. Charging Performance Assessment

A charging performance assessment determines the charging performance (kW) provided to each EV Ready parking space during an event where all EV Ready parking spaces are providing EV charging. Selecting a charging performance is typically a compromise between performance and implementation costs.

The charging performance (kW) should provide a sufficient recharge for an average commute of a building resident, should consider estimated commuting distances expected based on the building's location (urban/rural), factors for climate, average vehicle efficiencies, demographics, etc.

For this rebate program, each EV Ready parking space should provide a charging performance equal or greater than 1.9 kW (or 15.2 kWh over an eight-hour overnight period). A higher charging performance can be selected based on the assessment, and/or the owners desire to provide higher charging performance for building residents.

a. Describe the charging performance assessment you have utilized to determine the minimum charging performance for each parking space, including:

What is the estimated average daily distance travelled by vehicles for the building, and how was this determined.

Estimated total distance travelled per building occupant is 20km. This is based on a 2016 Long Form Census by Statistics Canada which showed that the average commute for Canadians is 8.7km. A return commute is therefore approximately 15-18km, with a contingency of 2-5km of additional driving.

Describe any guidelines, regulations, or standards used and why they were referenced. If you are using an alternative approach to determine charging performance, describe it here.

Stipulated approach listed in answer above.

b. What is the minimum kW required for each EV Ready parking space?
(e.g. minimum continuous KW, or kWh over an eight hour overnight period).

7kW

c. What is the estimated average kilometers charged per hour at this minimum kW level?

35km

EV Ready Plan Consultant Workbook

5. Recommended EV Ready Solution and Implementation Options

The EV Ready Plan must include one recommended solution that describes the building owner's preferred option for making the parking spaces EV Ready. In addition, the plan should include a recommendation on using a phased approach to installing infrastructure and charging stations in a manner that aligns with the recommended solution.

If a service upgrade is necessary for the recommended solution, the consultant should engage the electrical utility for information on potential upgrade options and associated cost estimates, etc. If some information cannot be obtained, the consultant should provide their best estimates, and recommendations based on their experience, and can contact Efficiency Nova Scotia with questions related to EV Ready Plan reports.

A single line diagram for the recommended EV charging system must be provided. This diagram should provide relevant details from the main electrical service to the EVSE. Any phased installation approach should be indicated on the single line diagram.

a. Provide a general description of the recommended EV Ready solution. For example: identify the electrical supply for the EVSE (is this a new or existing electrical supply, is this supply dedicated to EVSE use only, is the supply the existing common area power supply, or another shared suppy, etc), identify electrical panels (new or existing panels, dedicated to EVSE use only, etc.), and any other key components of the recommended charging system.
The main building 600V switchboard will have a 200A breaker unit installed to feed a new 150kVA step-down transformer. This transformer will sub-feed a distribution panel which will in turn sub-feed the metered relay panels. These relay panels will close/open the contacts to each EV charger based on the current EV system usage, restricting the maximum number of EV stations simultaneously connected to 20 stations.
b. What type of Electric Vehicle Energy Management System (EVEMS) arrangement is recommended and why was this chosen? For example: dynamic circuit-sharing, panel-sharing, monitoring at main electrical service, or other type.
The energy management system will be contained within the relay panel based Intellimeter distribution center, called the EVCMC (Electric Vehicle Charging Management Controller). This networked system will control and regulate the number of EV stations simultaneously connected so as to not overload the electrical infrastructure.

EV Ready Plan Consultant Workbook

c. Identify the EVSE to breaker ratio of the recommended solution (e.g., 5 chargers per 50A breaker). **Explain why this solution was chosen.**
1 EV station will be connected to each 40A/208V/1Pole breaker at the Intellimeter panel. This method is selected because each circuit in the EVCMC is independently controlled .
d. Describe the charging performance (kW) of the recommended solution. What is the minimum kW provided and under what conditions does this occur. Describe if and how the performance changes based on the number EVs charging at one time, or other factors. What is the maximum performance (kW) and under what conditions does this occur.
Each charger will receive 100% of its rated power for the duration of the charge period. The minimum kW provided is the rated output of the charger. This occurs at all times that the EV station is connected. The performance is not affected by the number of EV stations connected to the platform, it is a binary means of charging, either on or off.
e. What is the utility tariff (rate) supplying the EVSE? Is it the same rate for all EV Ready spaces?
Unknown and yes.
f. What is the total maximum potential EV charging system load based on the recommended solution (kW)?
140kW
g. What would be the main service spare capacity after EVSE installation (kW)?
422kW

EV Ready Plan Consultant Workbook

h. Describe if and how the existing service accommodate the recommended solution.

The existing service can accommodate the recommended solution.

j. Is a service upgrade required to accommodate the recommended solution? If so, describe the service upgrade required.

No a service upgrade is not required to accommodate the recommended solution.

If a service upgrade is required, was the electrical utility input included to determine feasibility and cost estimates?

☐ **Yes** ☐ **No**

k. If there are existing EV chargers installed, how they will be integrated into the new EV charging system, including load analysis and the effects on the main distribution.

There are no existing EV chargers installed on site.

l. Describe if and how the EVSE will impact the existing telecom/network infrastructure, and if the existing infrastructure can accommodate the recommended solution.

The existing telcom/network infrastructure will need 1 new data point for the Intellimeter system to connect to. Yes the existing infrastructure can handle this.

EV Ready Plan Consultant Workbook

m. Identify the costs associated with the telecom/network hardware and infrastructure required for the recommended solution. For designs where integration with an existing Energy Management System or establishment of a new Energy Management System is intended, the electrical infrastructure should include all communications equipment, control systems installation, licensing, and permitting required to operate the system.

The Intellimeter system will require one data point connection. The estimated cost for this connection is under $1000.00.

n. What EV charging network provider(s) and what Level 2 networked EVSE model(s) will be compatible with the recommended design solution? If multiple EVSE models are compatible, describe any requirements that they must meet in order to be compatible. Describe any requirements (for example: OCPP certification) that an EVSE must have in order to be compatible with the recommended solution.

This solution does not require an EV charging network provider, as stipulated above. The EVCS units will be standard, non-networked charging stations which will be connected to an intelligent/metered relay panel system for load control and management. As a result, any level II charging station rated for 40A/208V/1PH will be compatible with this system configuration.

o. Does this EV Ready Plan and the recommended solution meet the program requirements?

☐ Yes ☑ No

If not, the EV Ready Plan may still be eligible for rebates. Identify what requirements are not achieved, explain why meeting the requirement is not feasible.

As noted, this EV Ready solution we have built for this client will utilize relay based switching to control the EV station loads and manage the overall demand on the buildings electrical infrastructure. The EV stations deployed would be standard, non-networked stations, which is not compliant with the EV Rebate program.

EV Ready Plan Consultant Workbook

p. Provide a recommendation on implementing the recommended solution using phased approach. For example, describe if and how, EVSE can be added on existing infrastructure in a manner that aligns with the recommended solution. **Provide details for each phase, including the number of charging stations that can be added, their location, how they are supplied, electrical upgrades required, any other key details, etc.**
The client has the option to either design and deploy the electrical infrastructure for all 124 parking stalls in the building or a portion thereof. All conduit and wiring would be routed back to the main electrical where, in the adjacent parking garage, the new electrical distribution would be installed to support the EV infrastructure. Each of the EV relay stations can connect up to 30 EVCS. On day one, the condo corporation can install the first of these relay stations. In 15 years, if the total number of EVCS in the building is approaching the 30 unit limit, the condo corporation would then install the second relay station and network it with the first unit. This would allow for an additional 30 EVCS to be installed. The process would continue in this fashion.
q. Has an engineering single line diagram for the recommended solution been completed and provided to the applicant?
☑ Yes ☐ No

EV Ready Plan Consultant Workbook

6. Cost Estimates Sufficient for Budgeting Purposes

Provide a budgetary cost estimate for the recommended solution. Total project cost should include electrical infrastructure, telecom/network upgrades if required, and service upgrades if required. EVSE cost should not be included.

a. Total project cost (excluding taxes):	$345,000.00 (excluding professional engineering fees)

b. Provide a high level breakdown of the total project cost into building electrical infrastructure upgrades, telecom/network upgrades, main service upgrades. EVSE cost (if applicable) can be provided as a separate cost.

In addition to this summary breakdown, a detailed cost estimate can be attached as a separate document if available.

Additional breakdown of the total capital cost is not available as there are no service upgrades required in this solution. The estimate above includes all electrical infrastructure costs to distribute electrical circuits to all 124 parking stations and includes distribution panels, transformers, conductors, wiring and the electrical vehicle relay management system.

If a phased installation approach has been recommended, include budgetary costs for each of the phases that were provided.

To be determined.