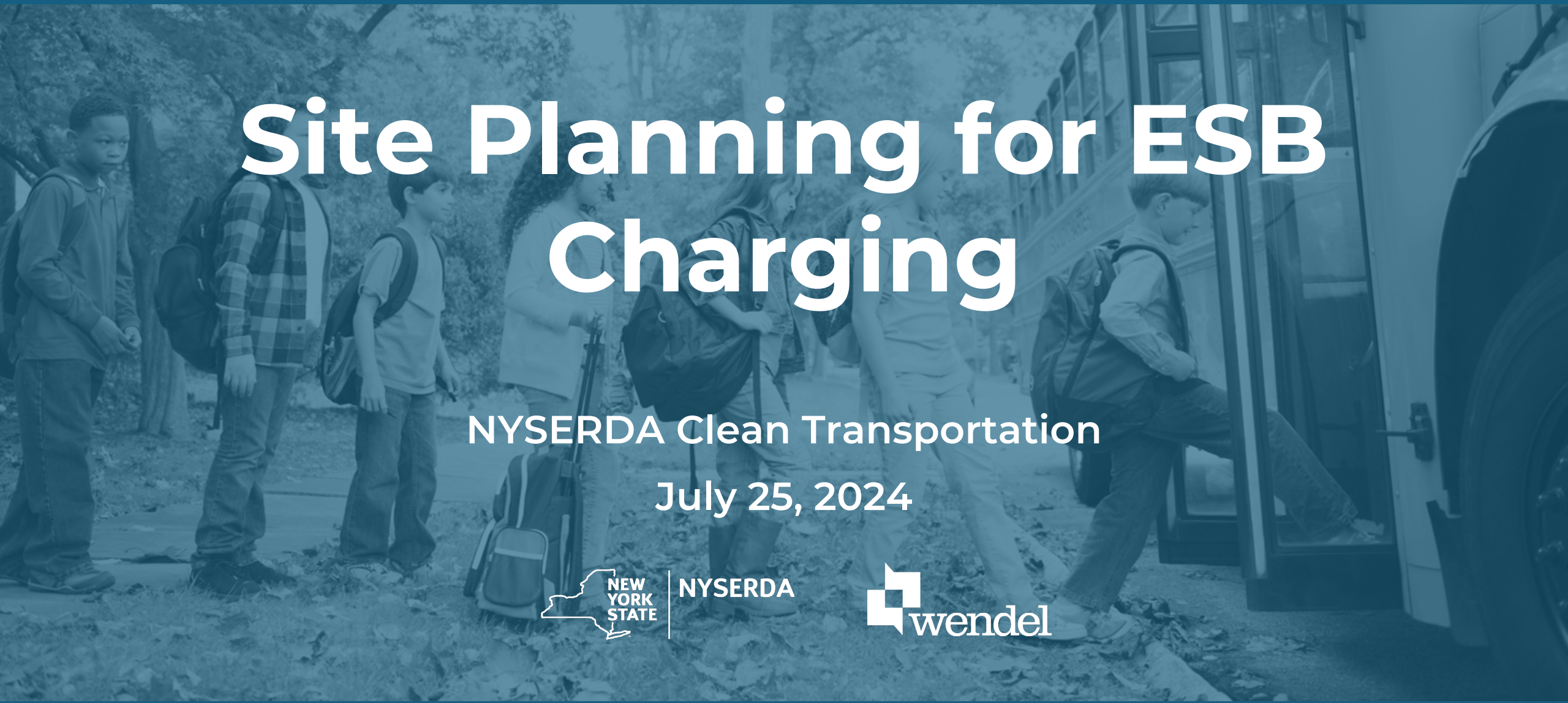
NYSBIP Webinar Series



Site Planning for ESB Charging

NYSERDA Clean Transportation

July 25, 2024

NEW YORK STATE | NYSERDA

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Topics for Discussion

- **Fleet Electrification Plan (FEP)**
- **Site Plan Inputs**
- **Utility Considerations**
- **Equipment Locations**
  - Transformers, Switchgear, Panelboards
  - Chargers and Dispensers
- **Potential Facility Upgrades**
  - Bus Lifting Equipment
  - Structural/Roof Considerations
  - Fire Protection
- **Phasing Plans**
- **Design and Construction**
  - Schedule
  - Cost

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NEW YORK STATE | NYSERDA

*NY School Bus Incentive Program & NY Truck

Development of a Fleet Electrification Plan (FEP)

The typical Fleet Electrification Plan consists of the following:

TASK 1: Data Collection

TASK 2: Route Analysis

TASK 3: Conceptual Charging Strategy

TASK 4: Electric Utility Analysis

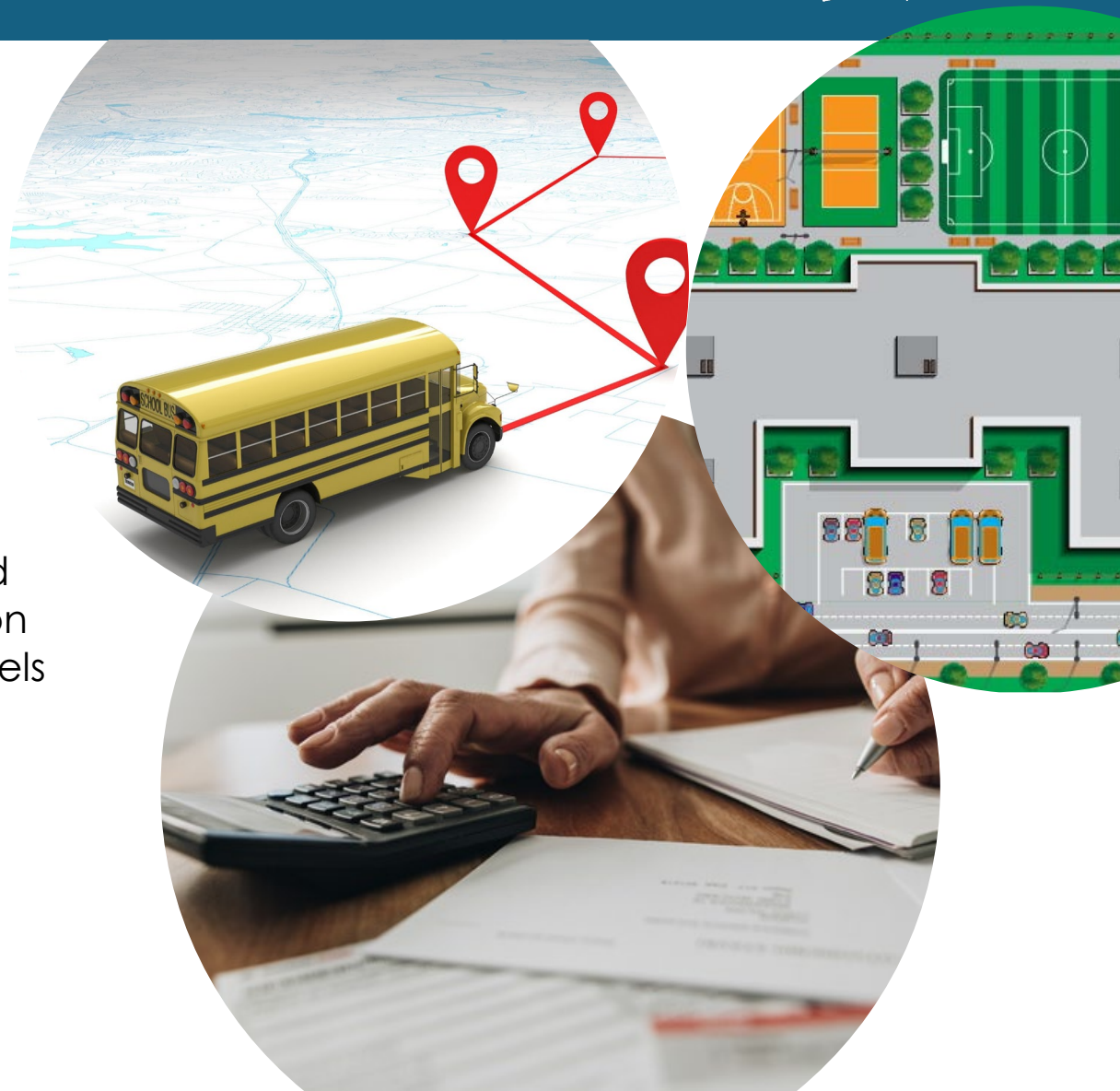
TASK 5: Concept Development and Phasing Plan

TASK 6: Phasing Plan Estimates

*NY School Bus Incentive Program & NY Truck Voucher Incentive Program

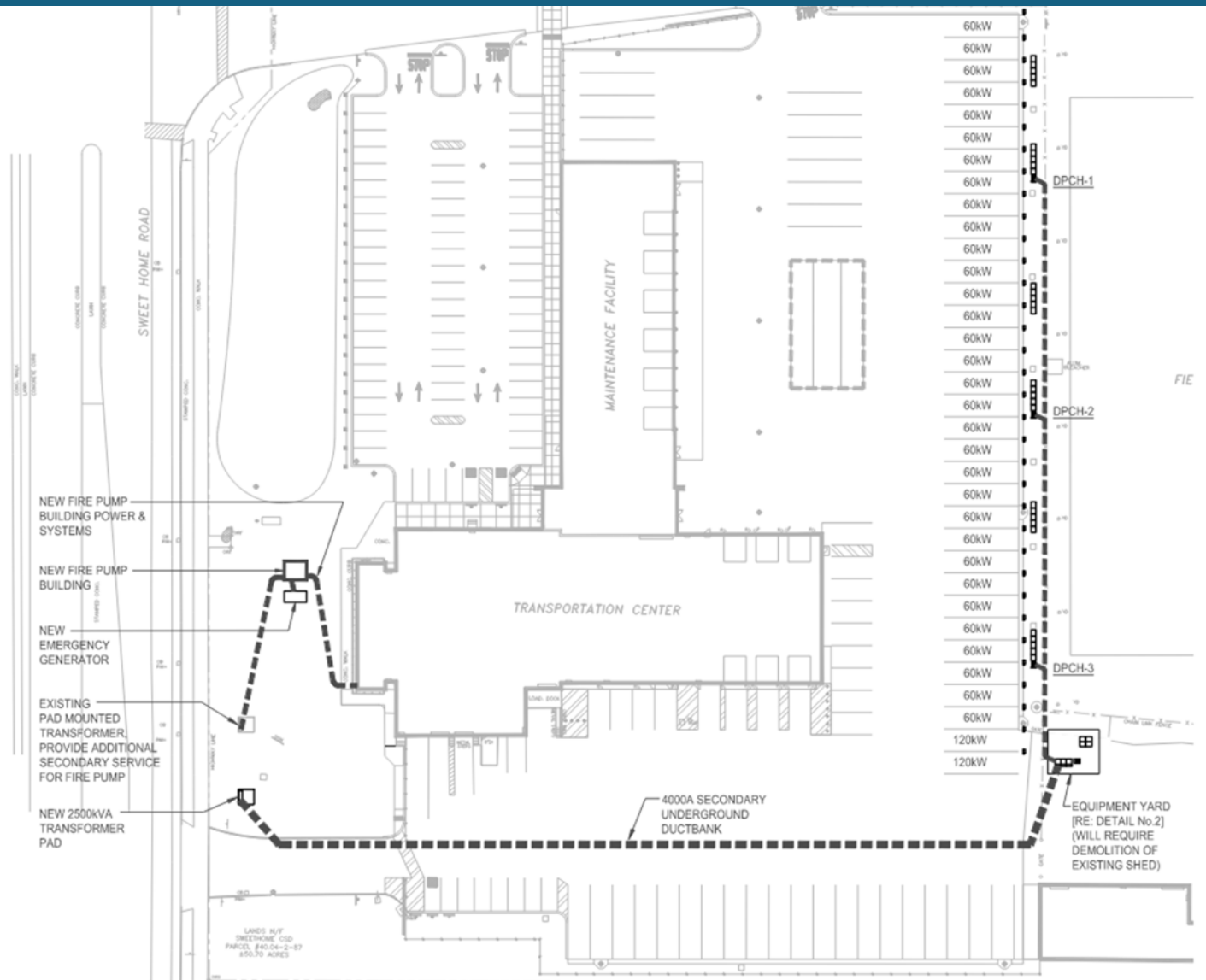
FEP Goals

- Provide path towards Zero Emission fleet by 2035 & ensure seamless transition
- Evaluate & recommend infrastructure upgrades
- Provide information to the District in order to make informed decisions regarding design/ implementation
- Reduction of energy loads and assist in conversion to carbon free fuels



Site Plan Inputs

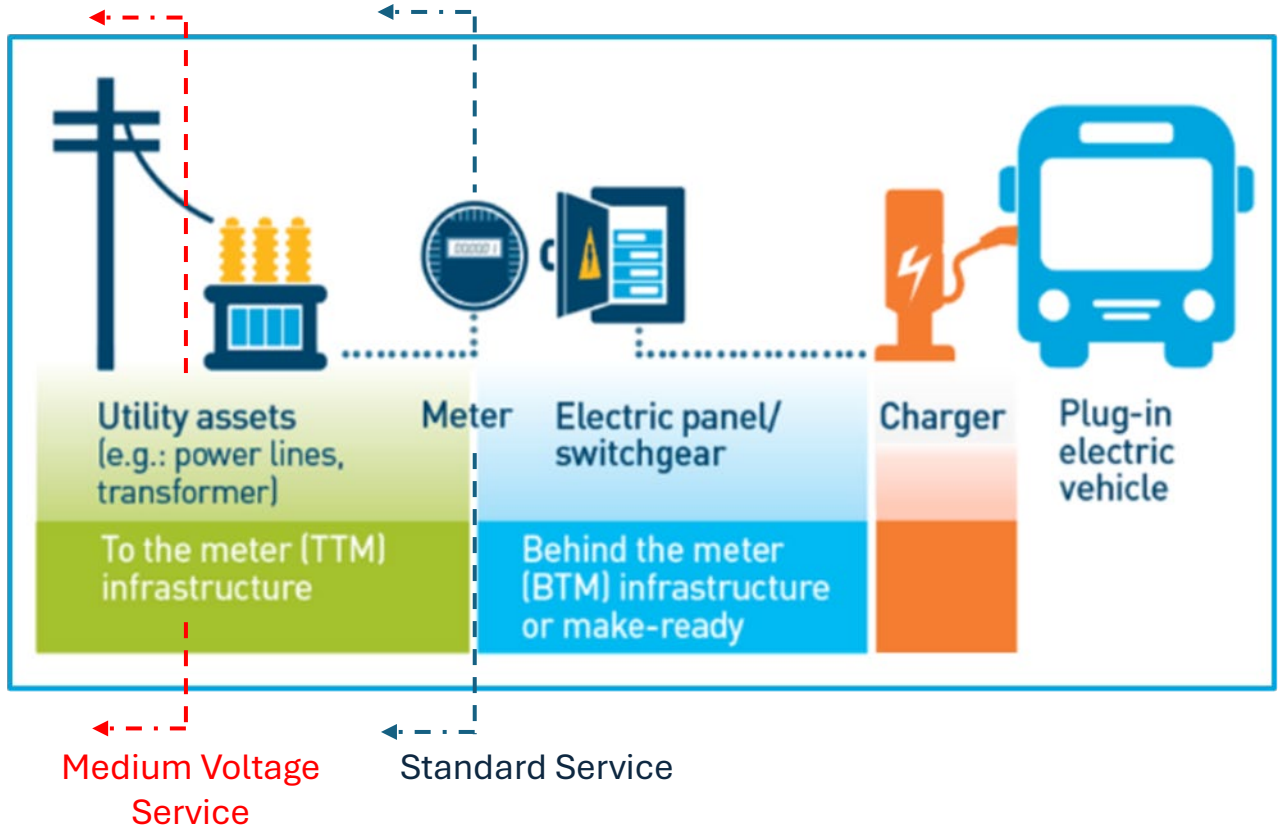
- **Bus fleet information** – fleet size, replacement schedule, bus types/size
- **Bus schedules and route data** – detailed bus routes, downtime
- **Bus parking/storage arrangements** – indoor/outdoor, location
- **Fueling** – current operational requirements for fueling
- **Utility data** – name of local utility, existing service size, and location, utility contact
- **Existing electrical distribution information**
- **Fire protection information**
- **Existing site plan**



Utility Considerations

- Charging battery electric buses requires additional power from the utility and will require utility upgrades.
- Level of charging may impact service levels
  - Large fleets may require medium voltage service from the utility
- Can the local utility supply the required power for this project? Large demand may require significant utility upgrades, impacting cost and schedule

  YES!
- What are the costs the district will incur to upgrade the utility infrastructure to serve facility?
  - Utility upgrades are chargeable to the customer requiring the upgrades. (up to 90% of these costs may be covered by Make Ready Programs)
  - Some charges may be able to be put in the utilities rate base if the upgrades benefit multiple utility customers

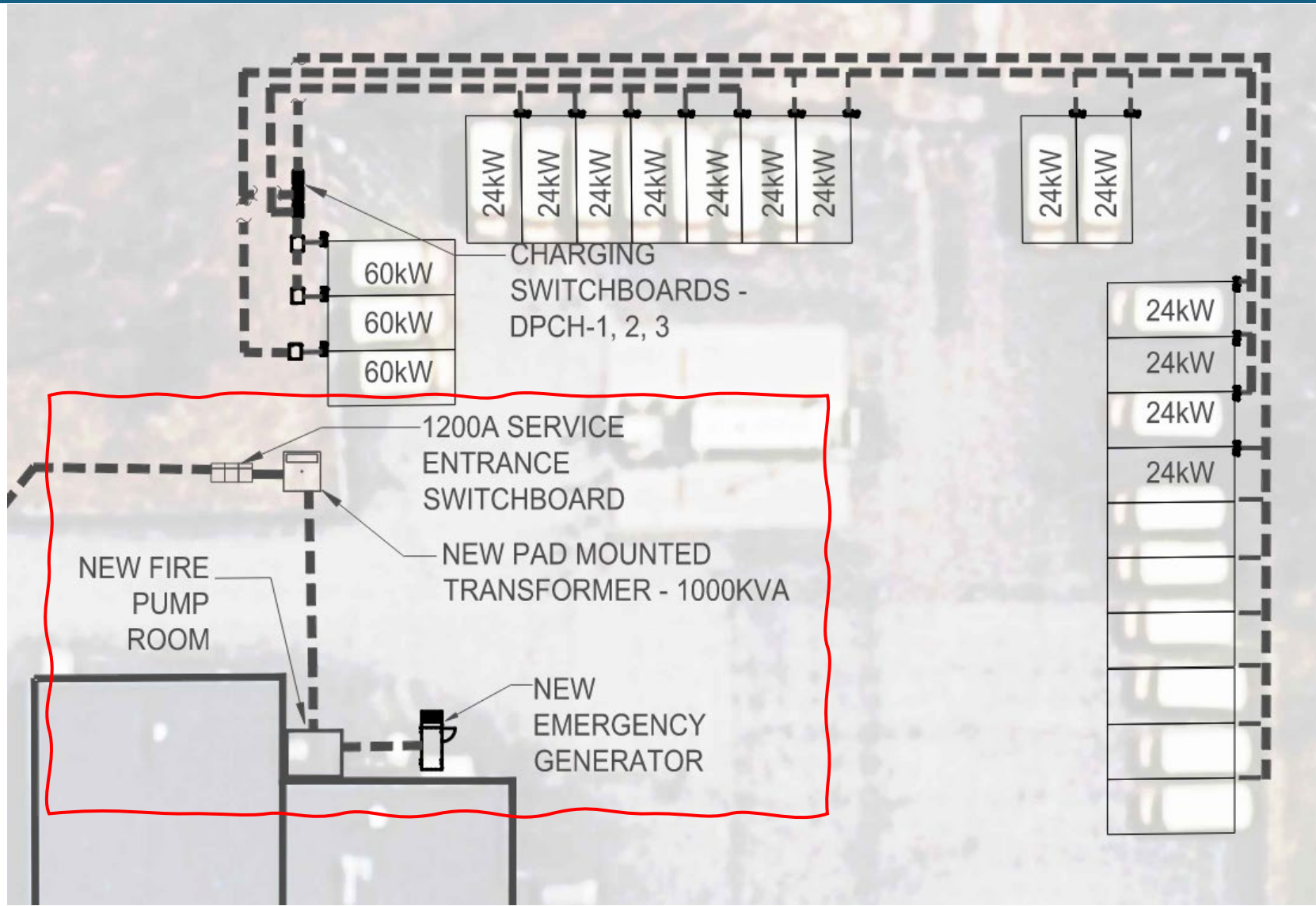


ENGAGE THE LOCAL UTILITY EARLY

Equipment Locations

Major supporting components

- **Pad mounted transformer –**
  - Utility owned/provided
- **Service entrance switchboard**
- **Charging switchboards**
- **Fire pump**
- **Emergency generator**



Major Distribution Equipment

Pad mounted transformer

Usually utility owned

75” W x 73” D x 73” H
9,800 lbs

Service entrance switchboard

10’ W x 30” D x 90” H
3,600 lbs
[3 sections]

Charging switchboard

28” W x 7.5” D x 41.25” H
400 amp 30 space
112 lbs

Fire Protection Equipment

0.70 GPM / square foot of water

Equipment Locations

Equipment Locations

Equipment Locations

Typical Chargers

ABB Terra DC Wallbox
24 kW Level 3 Charger
30.3” H x 23” W X 11.8” D

Camber Charger
Level 3 Charger
60/120/180 kW Output
79.2” H x 39.6” W X 31.2” D

Potential Facility Upgrades

Ventilation – A minimum amount required to meet code. Indoor charging – increased ventilation to remove excess heat.

Fire Protection – Enhanced fire protection to suppress flames and protect structure for lithium-Ion battery fires.

Lifting Equipment – Battery electric vehicles are significantly heavier than their fossil fuel counterparts.

Structural – Enhancements to building structures to handle dispensers, pantographs, cables and conduits.

O&M Standard Operating Procedures – Modifications to existing SOPs to handle battery electric vehicles, including fire prevention and safety measures.

Phasing Plans

Goal – To develop a phasing plan that achieves the following major goals:

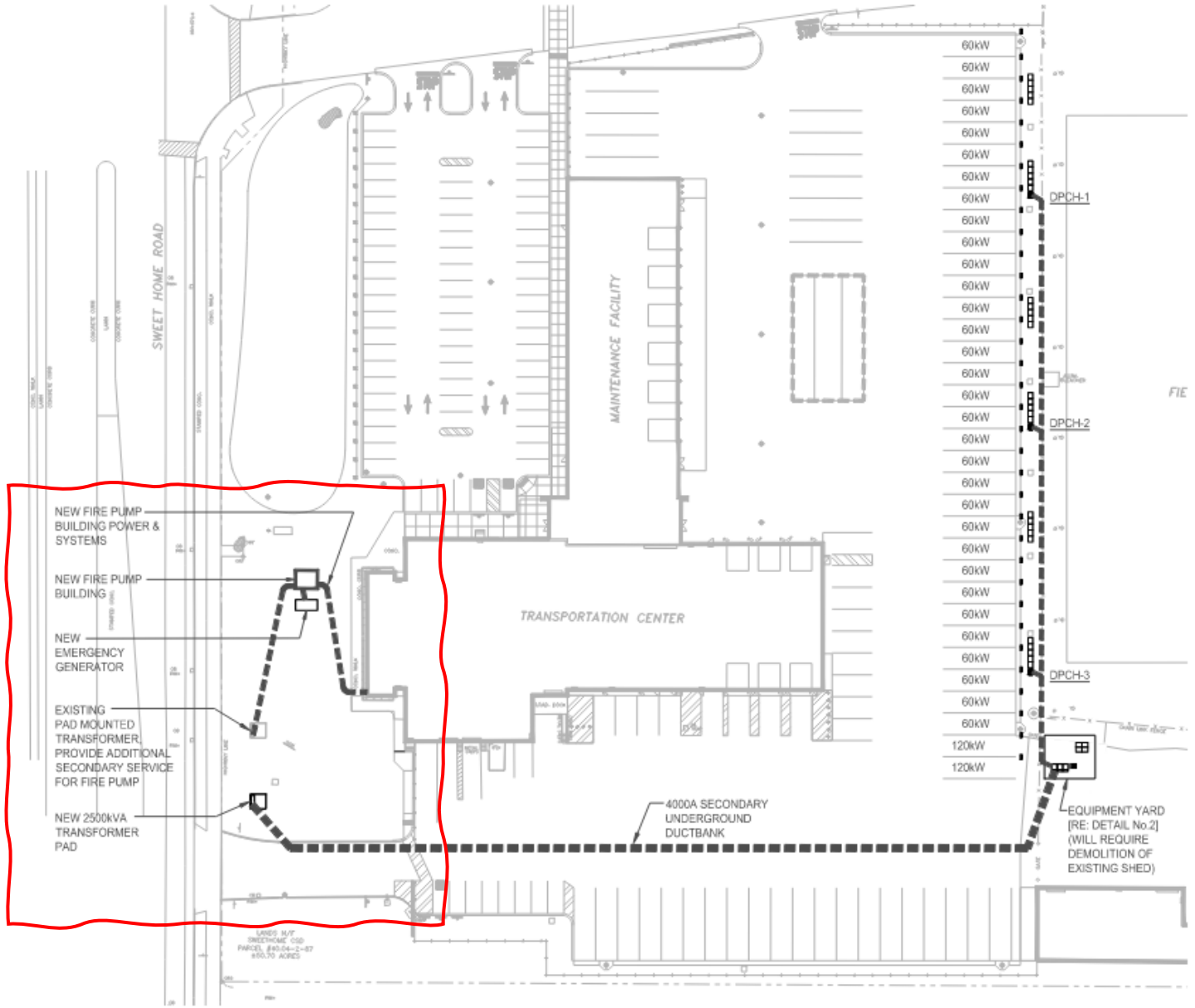
Mirrors bus procurement plan – Develop a plan that grows with the fleet – you do not need to do everything at once.

Meets funding objectives – Provides an estimate that can be used to develop a funding plan as well as local and state approvals.

Builds on previous steps – Does not require re-work or replacement of equipment purchased and installed in previous phases.

Having a plan and engaging stakeholders (utility, SED, School Boards) ***early*** will minimize costly issues moving forward and will future proof the transition to battery electric buses. This will also minimize site and operational disruption.

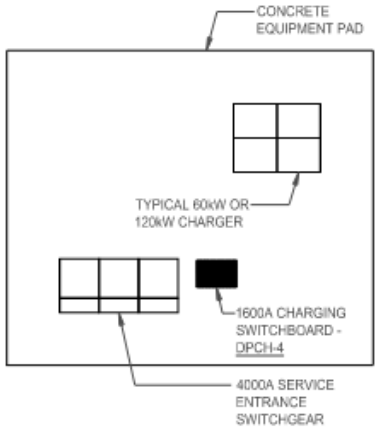
Design and construction takes time – developing a plan early in the process is critical to meeting goals.



1 BUS PARKING CHARGING LAYOUT
SCALE: 1"=30'-0"

CHARGER QUANTITY

PHASE 1	60kW PLUG-IN	32
	120kW PLUG-IN	2
	-	-
	TOTAL AFTER PHASE 1	34



2 SERVICE YARD LAYOUT
SCALE: 1"=10'-0"

CONCEPTUAL - NOT FOR CONSTRUCTION

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Sweet Home Central School District
Phase 1

Proj. No.	249802
Date	XX/XX/2023
Drawing Number	E1-PH1

NEW FIRE PUMP BUILDING POWER & SYSTEMS

NEW FIRE PUMP BUILDING

NEW EMERGENCY GENERATOR

EXISTING PAD MOUNTED TRANSFORMER, PROVIDE ADDITIONAL SECONDARY SERVICE FOR FIRE PUMP

NEW 2500kVA TRANSFORMER PAD

60kW
60kW
60kW
60kW
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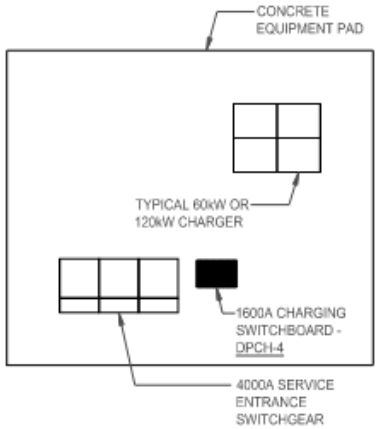
60kW
60kW
60kW
60kW
120kW
120kW

DPCH-1
DPCH-2
DPCH-3

EQUIPMENT YARD [RE: DETAIL No.2] (WILL REQUIRE DEMOLITION OF EXISTING SHED)

CHARGER QUANTITY

PHASE 1	60kW PLUG-IN	32
	120kW PLUG-IN	2
	-	-
	TOTAL AFTER PHASE 1	34



2 SERVICE YARD LAYOUT
SCALE: 1"=10'-0"

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Sweet Home Central School District
Phase 1

Proj. No.	249802
Date	XX/XX/2023
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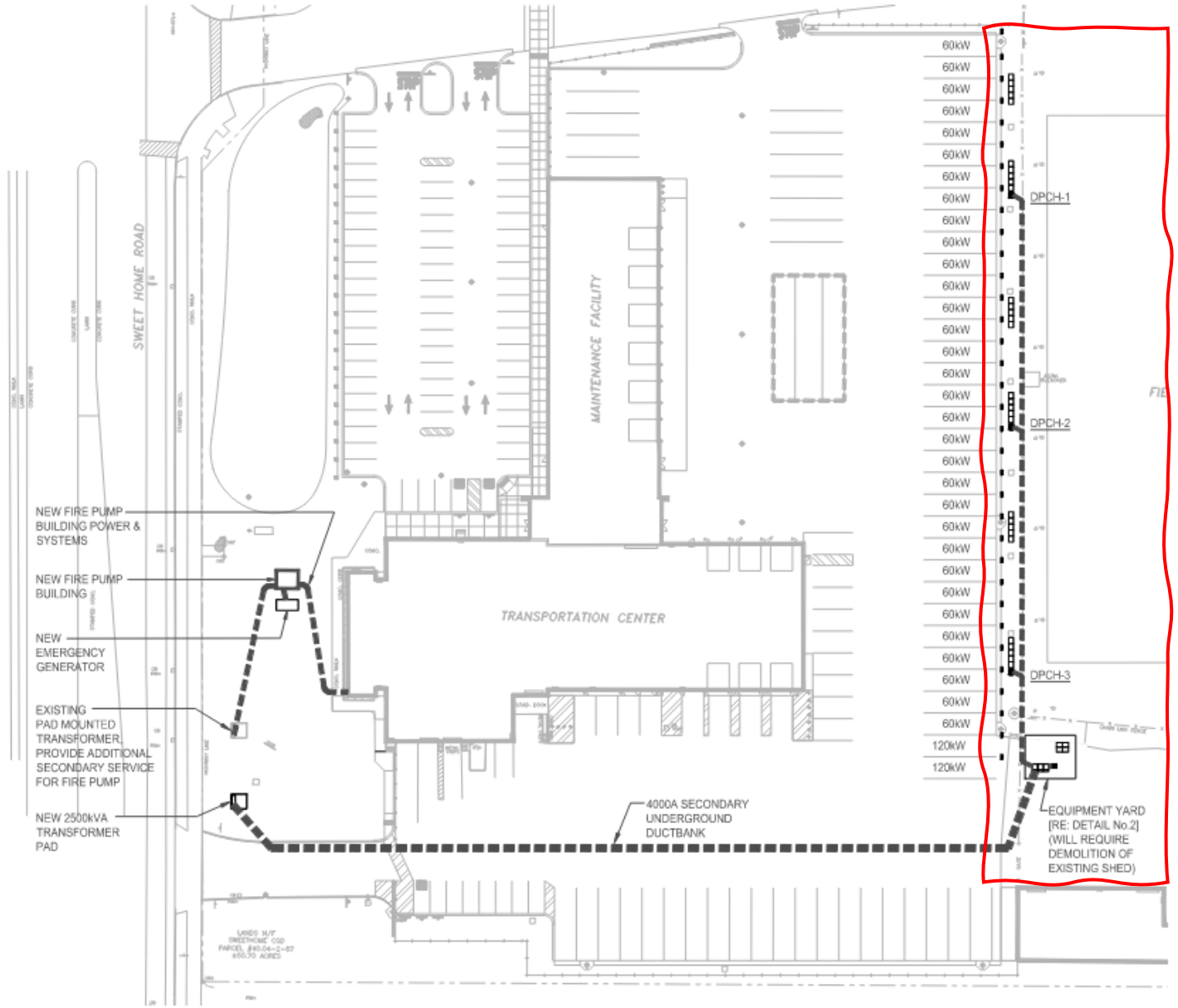
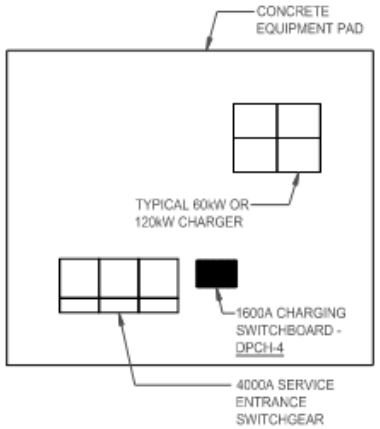


1 BUS PARKING CHARGING LAYOUT
SCALE: 1"=30'-0"

CHARGER QUANTITY

PHASE 1	60kW PLUG-IN	32
	120kW PLUG-IN	2
	-	-
	TOTAL AFTER PHASE 1	34



2 SERVICE YARD LAYOUT
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Sweet Home Central School District
Phase 1

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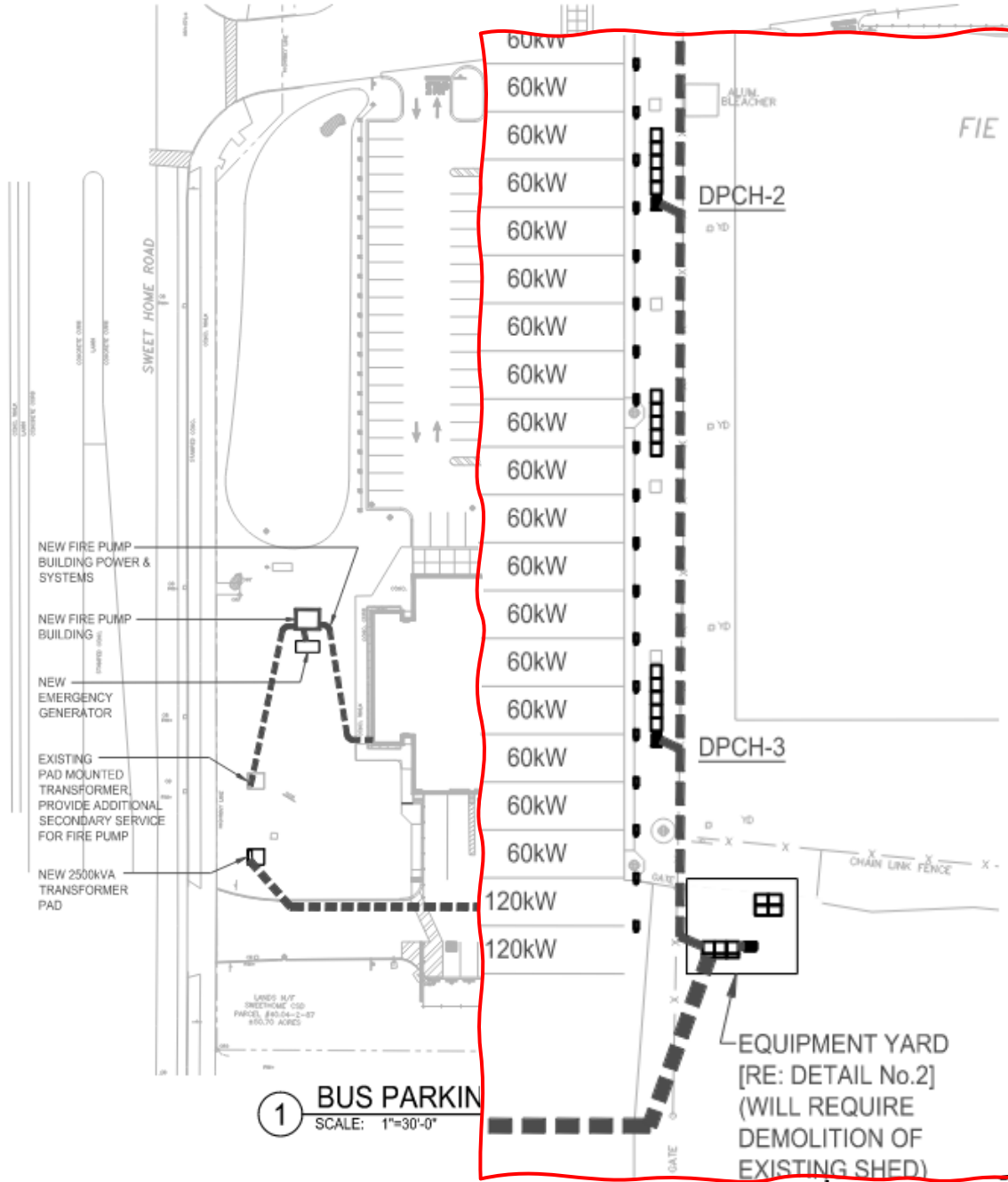
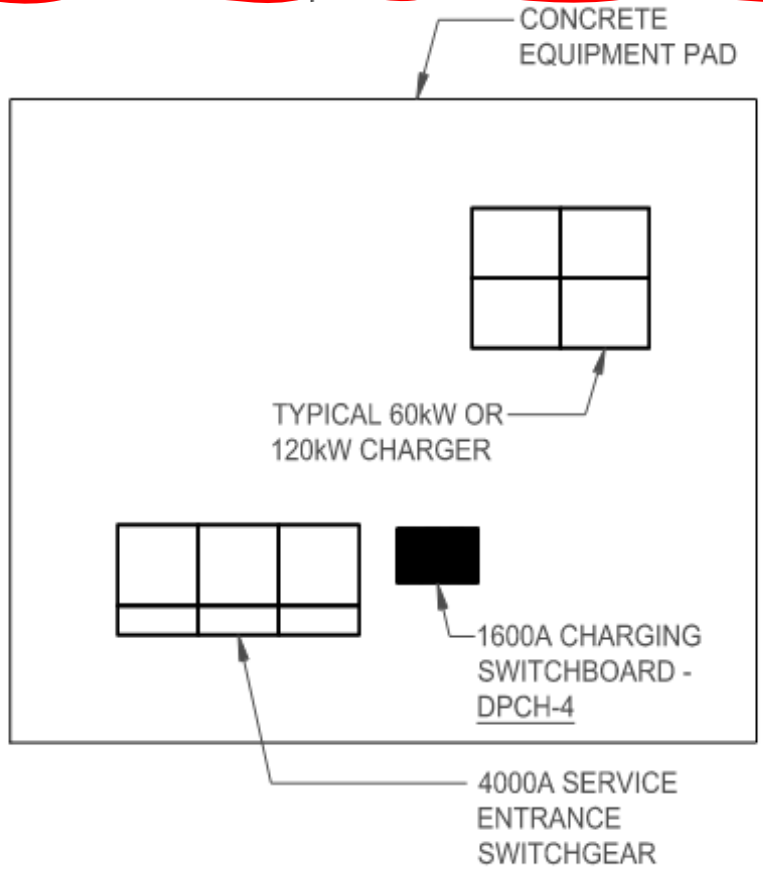


1 BUS PARKIN
SCALE: 1"=30'-0"



2 SERVICE YARD LAYOUT
SCALE: 1"=10'-0"

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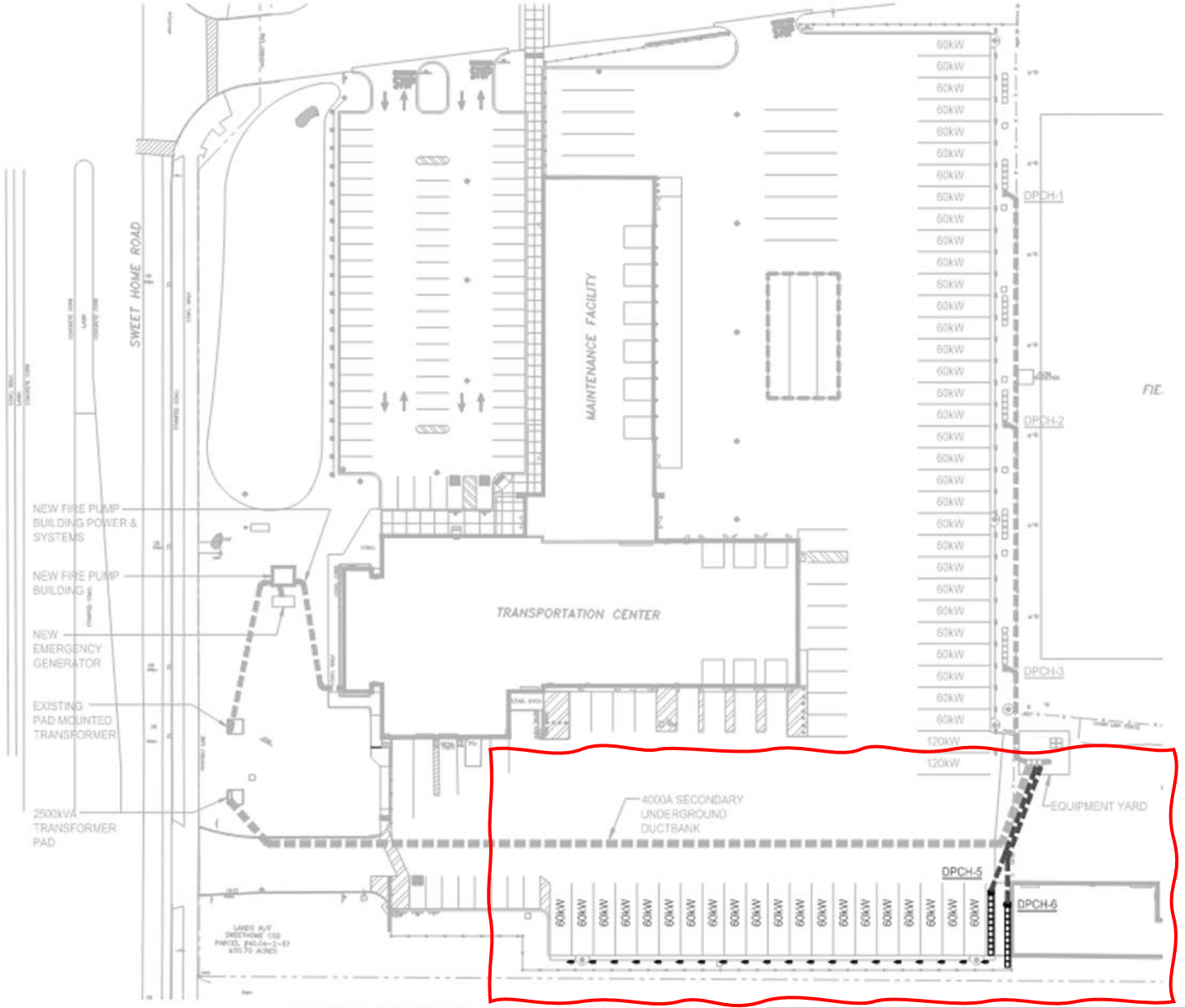
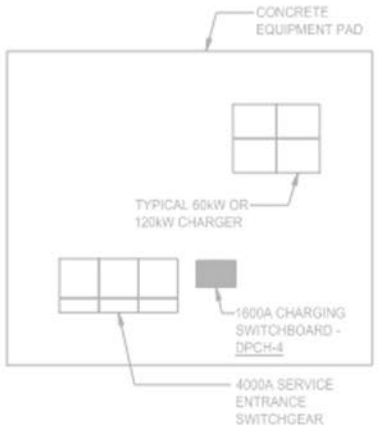
Phase 1

E1-PH1



CHARGER QUANTITY

PHASE 1	60kW PLUG-IN	32
	120kW PLUG-IN	2
	-	-
PHASE 2	60kW PLUG-IN	20
	120kW PLUG-IN	-
	-	-
	TOTAL AFTER PHASE 2	54



2 SERVICE YARD LAYOUT
SCALE: 1"=10'-0"

1 BUS PARKING CHARGING LAYOUT
SCALE: 1"=30'-0"

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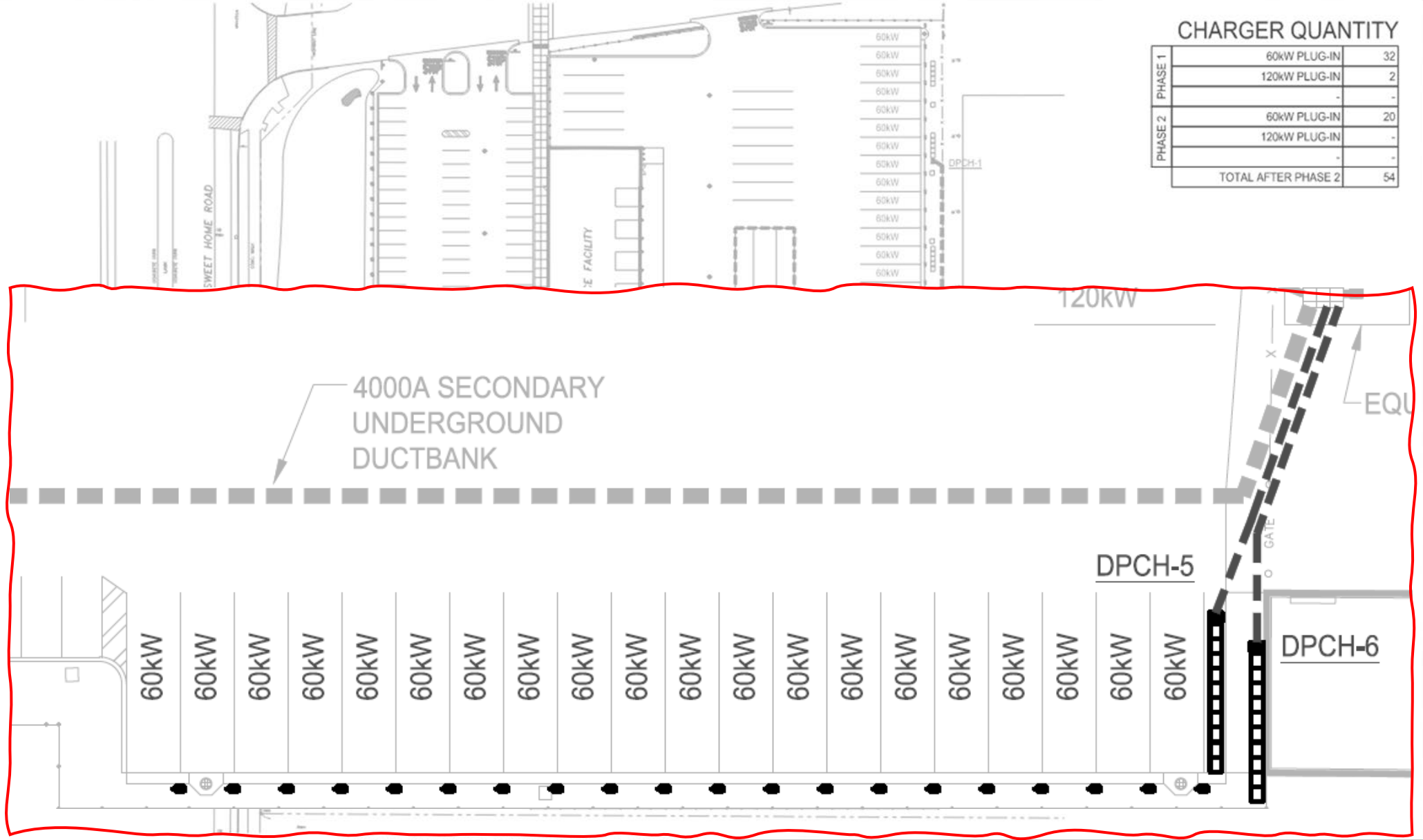
Sweet Home Central School District
Phase 2

Proj. No.	249802
Date	XX/XX/2023
Drawing Number	E2-PH2



CHARGER QUANTITY

PHASE 1	60kW PLUG-IN	32
	120kW PLUG-IN	2
	-	-
PHASE 2	60kW PLUG-IN	20
	120kW PLUG-IN	-
	-	-
	TOTAL AFTER PHASE 2	54

1 BUS PARKING CHARGING LAYOUT
SCALE: 1"=30'-0"

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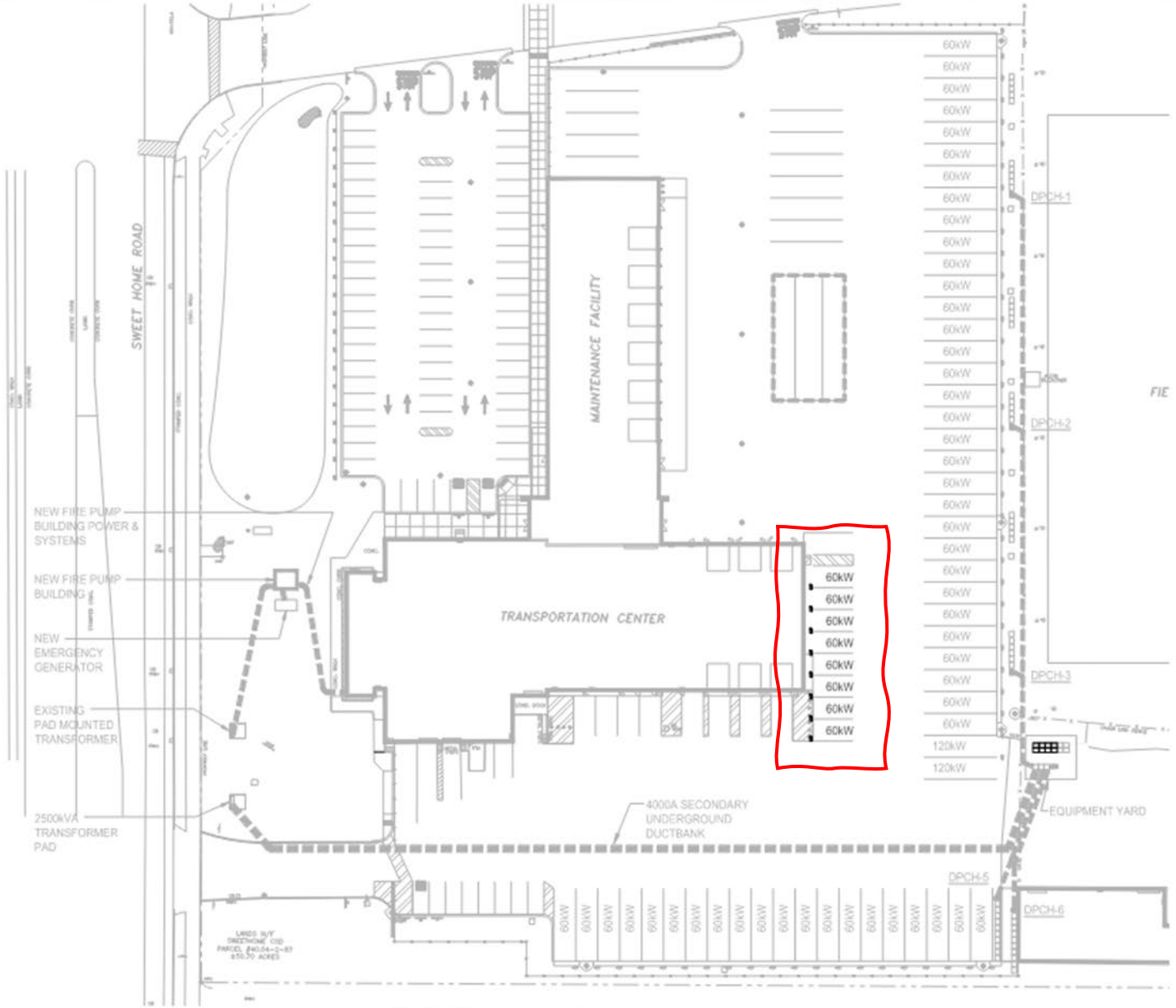
Sweet Home Central School District
Phase 2

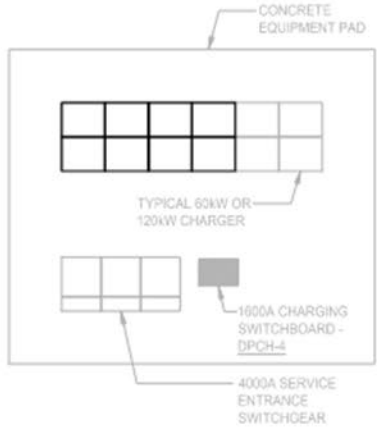
Proj. No. 249802
Date XX/XX/2023
Drawing Number E2-PH2



1 BUS PARKING CHARGING LAYOUT
SCALE: 1"=30'-0"

CHARGER QUANTITY

PHASE 1	60kW PLUG-IN	32
	120kW PLUG-IN	2
	-	-
PHASE 2	60kW PLUG-IN	20
	120kW PLUG-IN	-
	-	-
PHASE 3	60kW PLUG-IN	8
	120kW PLUG-IN	-
	-	-
	TOTAL AFTER PHASE 3	62



2 SERVICE YARD LAYOUT
SCALE: 1"=10'-0"

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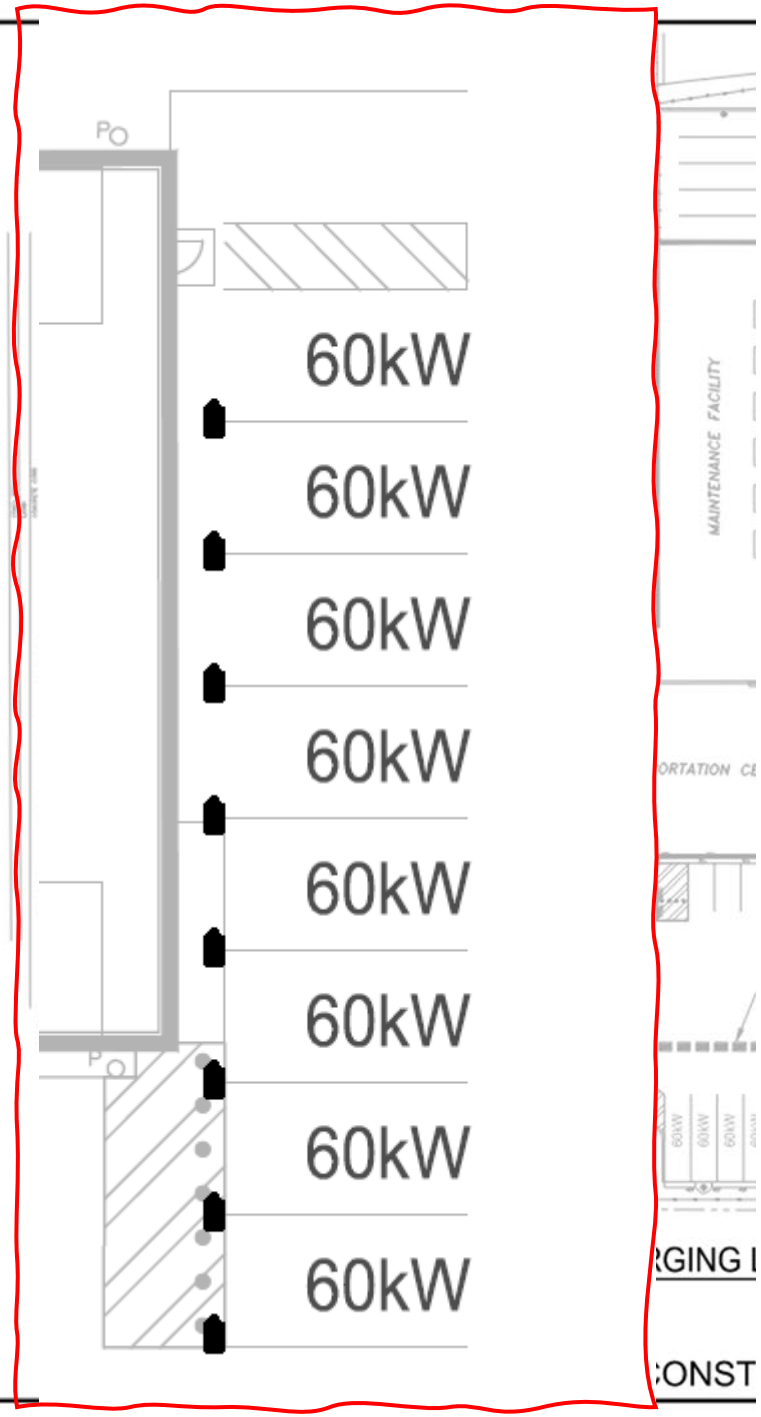
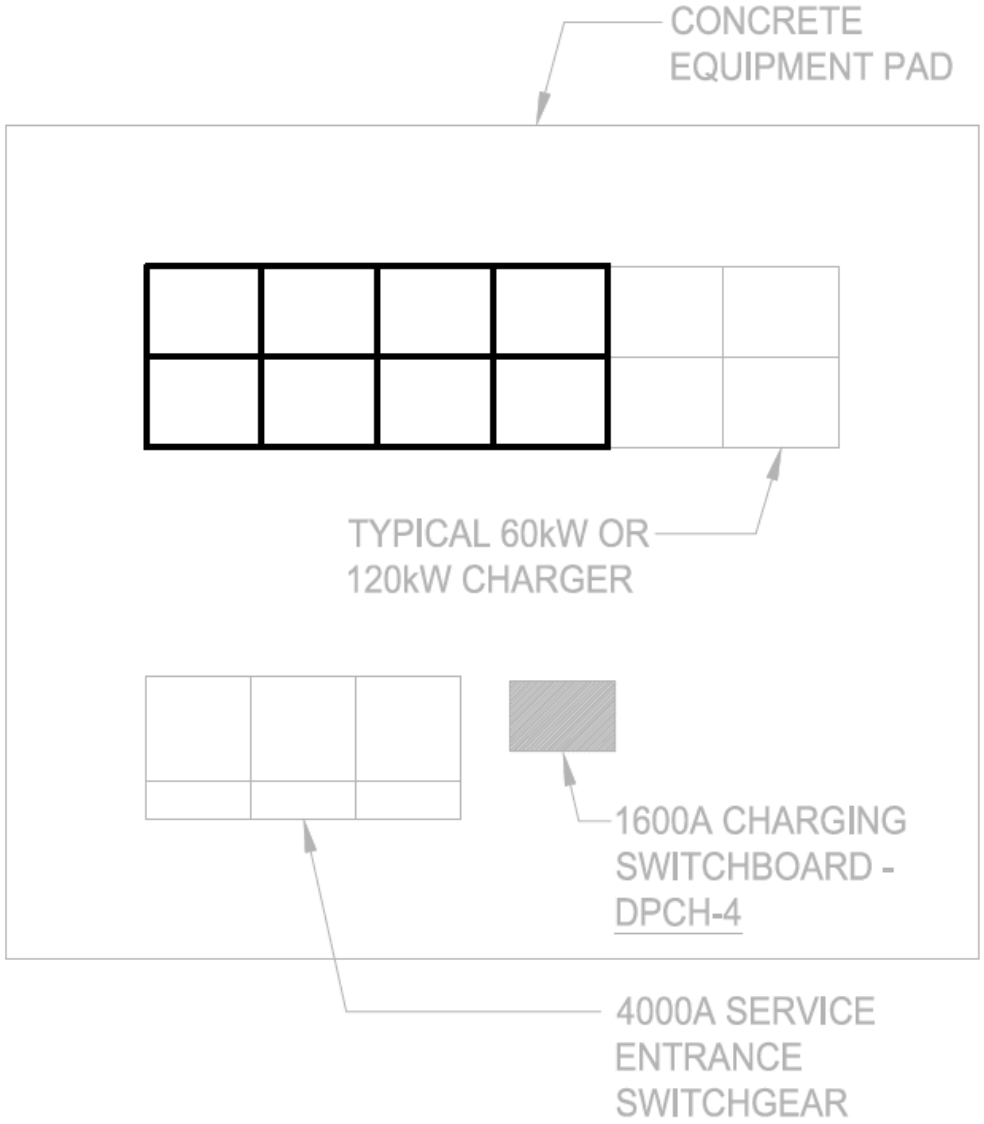
Phase 3

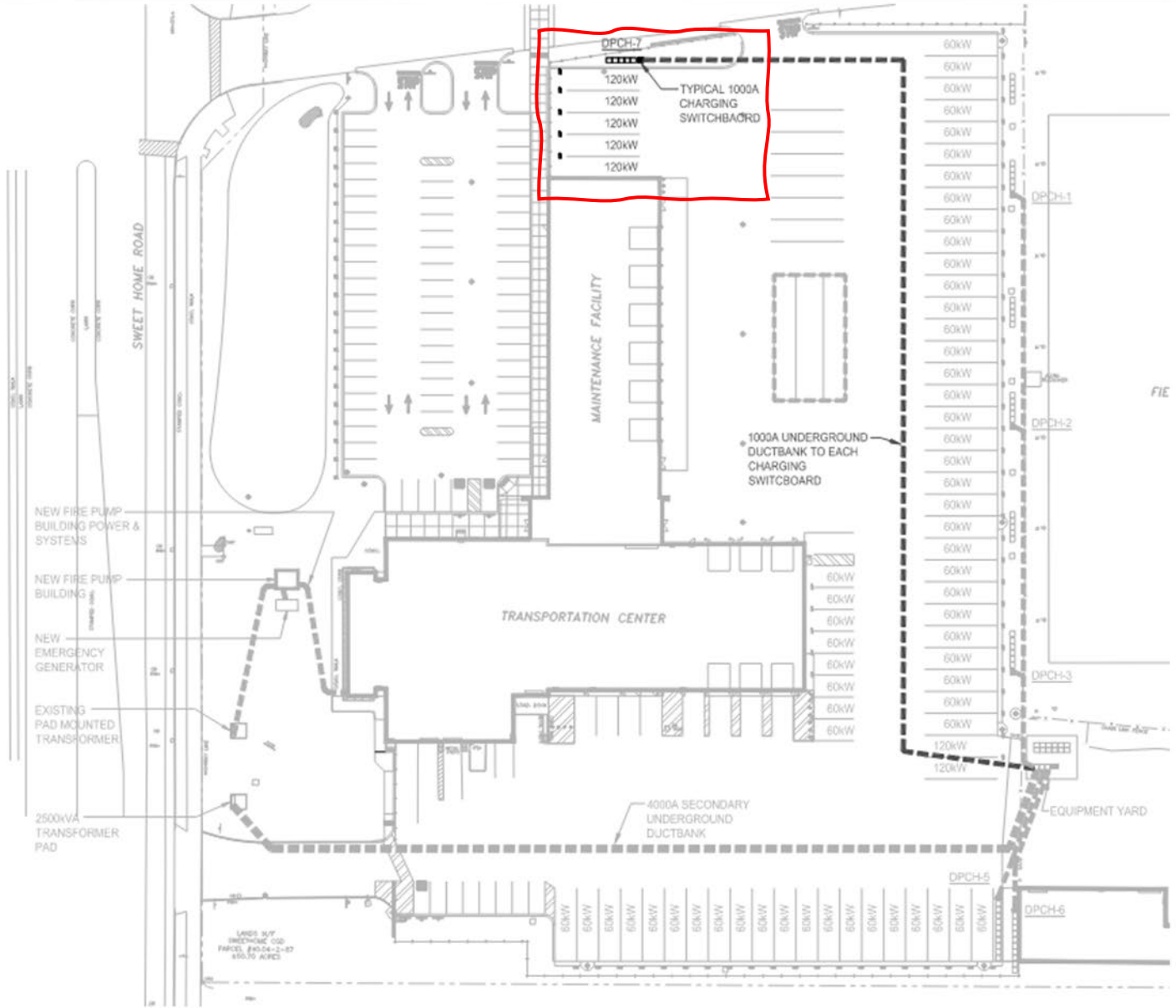
Proj. No.	249802
Date	XX/XX/2023
Drawing Number	E3-PH3





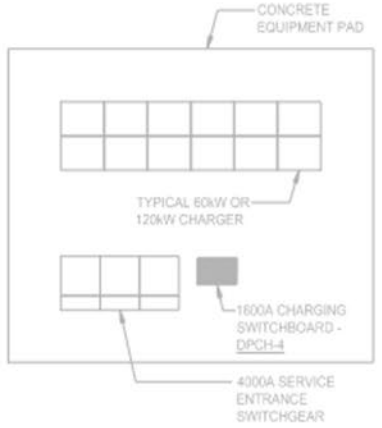
2 SERVICE YARD LAYOUT

SCALE: 1"=10'-0"



CHARGER QUANTITY

PHASE 1	60kW PLUG-IN	32
	120kW PLUG-IN	2
	-	-
PHASE 2	60kW PLUG-IN	20
	120kW PLUG-IN	-
	-	-
PHASE 3	60kW PLUG-IN	8
	120kW PLUG-IN	-
	-	-
PHASE 4	60kW PLUG-IN	-
	120kW PLUG-IN	5
	-	-
	TOTAL AFTER PHASE 4	67



2 SERVICE YARD LAYOUT
SCALE: 1"=10'-0"

1 BUS PARKING CHARGING LAYOUT
SCALE: 1"=30'-0"

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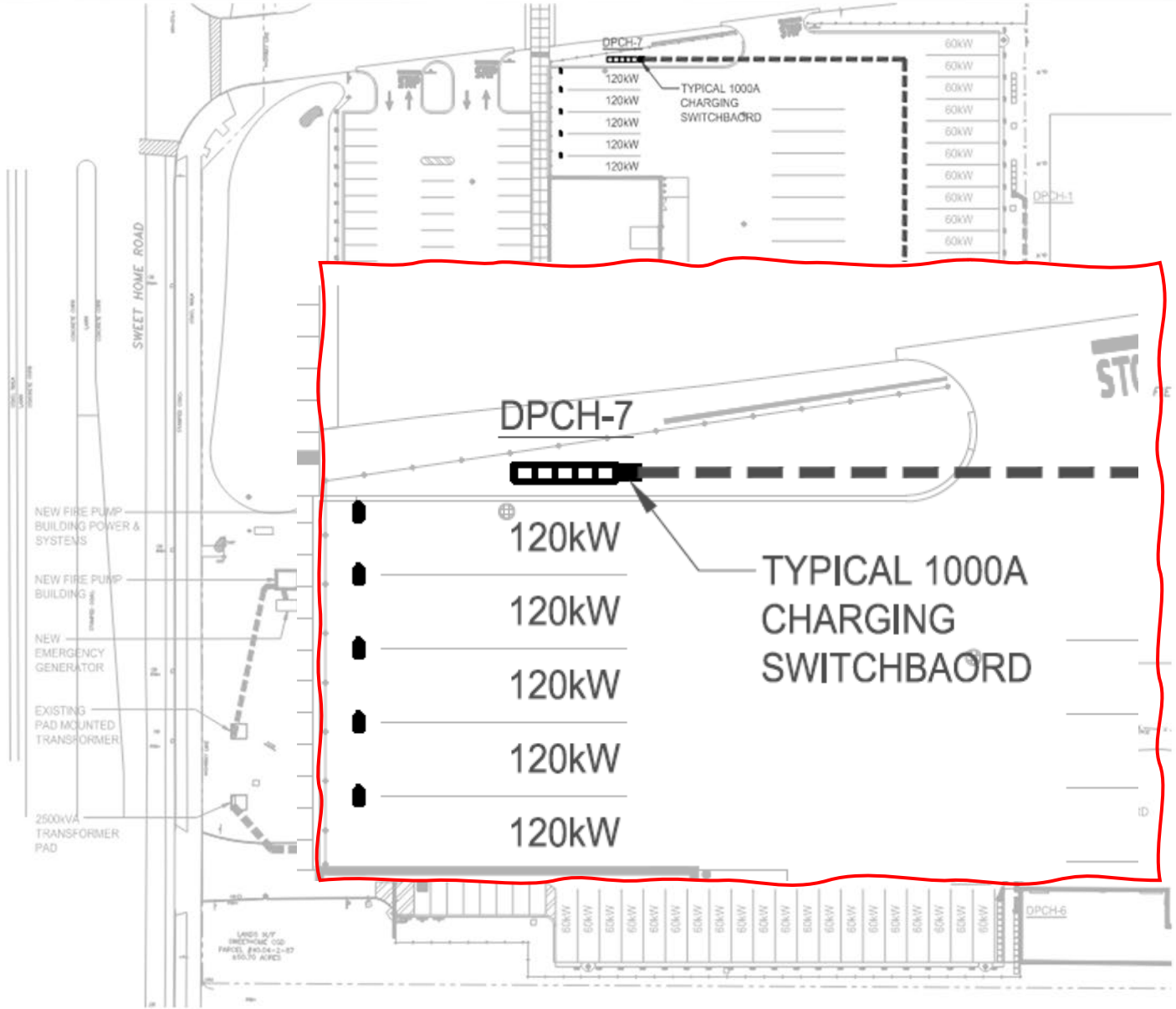
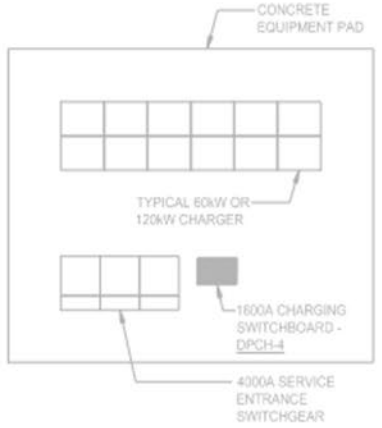
Sweet Home Central School District
Phase 4

Proj. No.	249802
Date	XX/XX/2023
Drawing Number	E4-PH4



CHARGER QUANTITY

PHASE 1	60kW PLUG-IN	32
	120kW PLUG-IN	2
	-	-
PHASE 2	60kW PLUG-IN	20
	120kW PLUG-IN	-
	-	-
PHASE 3	60kW PLUG-IN	8
	120kW PLUG-IN	-
	-	-
PHASE 4	60kW PLUG-IN	-
	120kW PLUG-IN	5
	-	-
	TOTAL AFTER PHASE 4	67



2 SERVICE YARD LAYOUT
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1 BUS PARKING CHARGING LAYOUT
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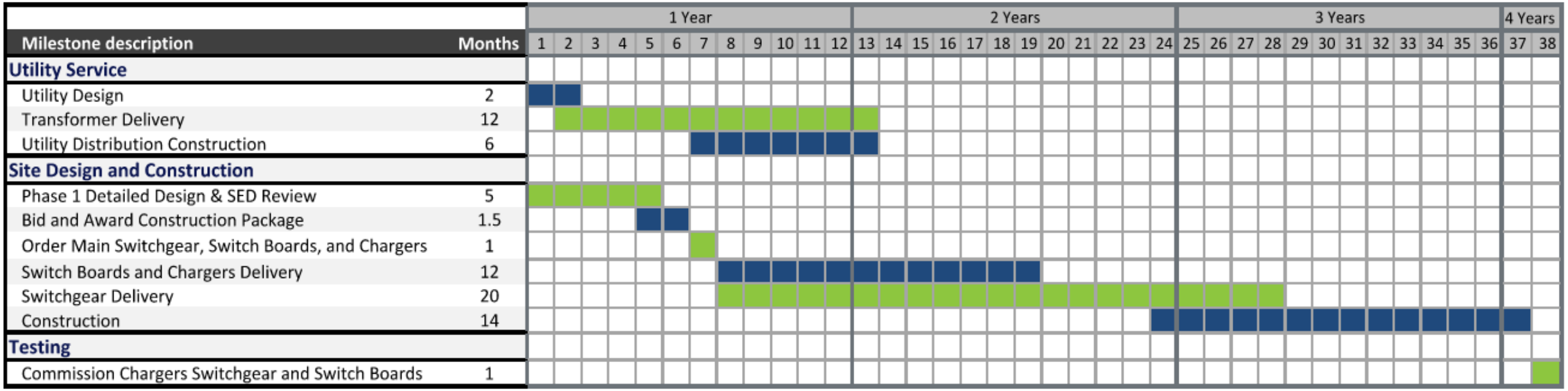
Sweet Home Central School District
Phase 4

Proj. No.	249802
Date	XX/XX/2023
Drawing Number	E4-PH4

Design and Construction Schedule Items

- **Detailed design** – 4 to 6 months
- **SED approvals** – 6 to 7 months, without expediting
- **Equipment lead times** – 16 to 20 months (switchgear predominantly)
- **Utility schedule** – depends on the extent of utility upgrades necessary to bring in power to the site.
- **Construction** – 12 to 18 months (Maybe longer in WNY due to new Bills stadium)

Schedule varies with size and complexity of the project (number of buses/sites). Funding approvals are not included in these estimates other than SED approvals.



Design and Construction Costs

- **Utility Upgrades** – New service entrance, transformer, potential system upgrades.
    - Up to 90% covered by utility make-ready program

- **Buses** – Battery electric buses are more expensive today than their diesel counterparts.
    - NYSBIP and EPA Clean School Bus Grants can offset a significant portion of the cost differential

- **Charging Infrastructure** – On-site distribution upgrades, Switchboards, charging switchboards, cabling, chargers, dispensers.
    - NYSBIP and EPA Clean School Bus Grants can offset a significant portion of the cost

- **Facility Upgrades** – Bus lifts, potential HVAC upgrades, etc.
    - SED aide eligible

- **Fire Protection Systems** – Fire pump house, fire pumps, emergency generator, plumbing and piping
    - SED aide eligible

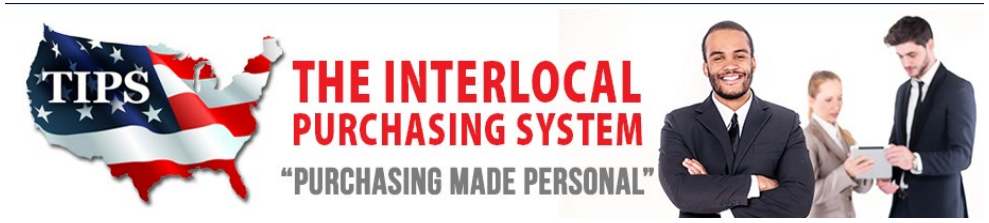
Design and Construction Delivery Methods

There are several different construction options available to school districts that want to continue to own and operate their fleet post conversion to battery electric buses

Traditional design/bid/build – School district contracts for all services directly and manages the entire process. Typically, is the longest duration of the various delivery methods.

Design/Build – School district contracts with a designer for a 30% design, then contracts with a design/builder who will finalize the design and construct the project. Design Builder manages the majority of the project. Usually a shorter duration for overall construction.

POTENTIAL OPTIONAL DELIVERY METHODS



Implementation Planning

- First Phase/Pilot
- Funding sources
  - NYSBIP
  - Make Ready
  - Capital Plan
  - SED Approach
- Approvals
  - School Board
  - Public Outreach
  - NYSERDA/SED

Design & Construction

- Detailed Design
  - Schedule
  - A/E Services
  - Estimates
- SED Approvals
- Permitting
- Bid Package Prep
- Bid Reviews
- Construction Mgmt.

NYSBIP Webinar Series

Thank you!

John Havrilla
Wendel
Director of Alternative Fuels
jhavrilla@wendelccompanies.com

Vincent Riscica
NYSERDA
Senior Project Manager
schoolbus@nyserda.ny.gov

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