




Completed October 2024

# Our Condo

- Built in 1997 in the Gold Coast; a mid-rise building with 83 units of various sizes
- Enclosed 3-section garage with 136 Limited Common Element (LCE) parking spaces and **no existing electrical service or WiFi at any parking space location**
- No valet service, public parking or open parking spaces
- No information on the utility electric service capacity of the building
- No concept of how to pay for the infrastructure or operation
- Need 2/3 positive vote of owners to use more than $25K of condo funds

# Needed to define a “Use Case”

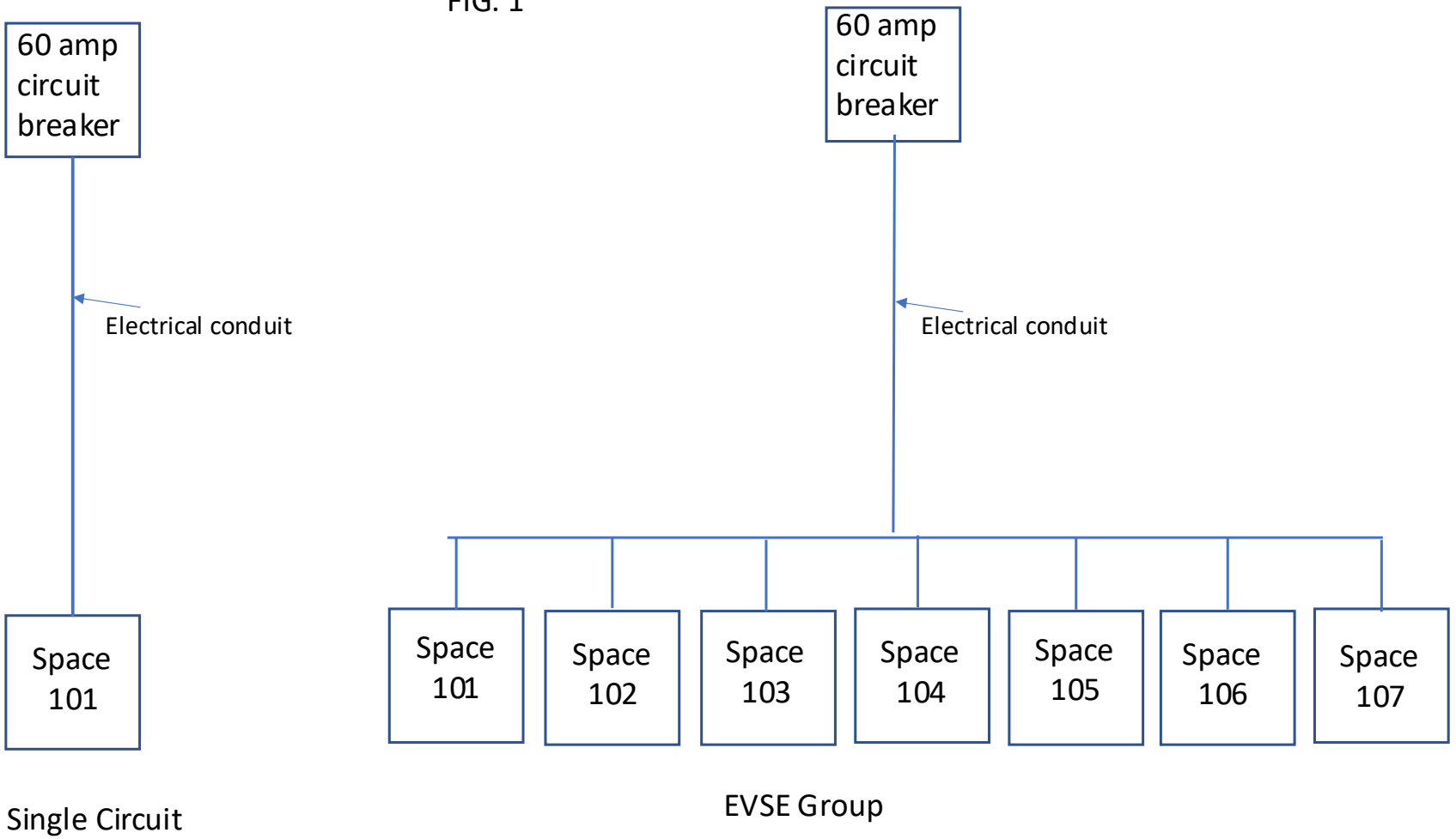
- We did a survey of owners to determine current driving patterns
  - **Yearly mileage** was the most relevant factor!
    - **Our survey** determined that the average driving mileage for our condo owners  is **10 miles per car per day** (3 kWh/day …power cost about $15/month)
  - Anticipated roughly 83 of 136 the  spaces to be eventually used for EV charging
  - Gradual adoption with perhaps 30% of the spaces having chargers within 5 years of completion.

| Feature | Benefit | Comment |
|---|---|---|
| **Plug and Play charging at every parking space** | No need to manage your charging individually | All monitoring and control functions performed without user interaction |
| **All cars re-charged overnight for average daily usage** | Efficient use of building power resources | We all need sleep :-) |
| **Flat charge of $25/month/space (starts when charger is installed)** | Eliminate costs and mark-up for managed billing (actual average electrical costs estimated about $15/month/car) | You can choose any charging network you want for on-the-road charging. No network needed for local charging. |
| **208vac junction box installed at each parking space -- "EV Ready"** | **Install EV charger only when you need it** | EV adoption will be gradual, but infrastructure needs to anticipate need without rebuilding |
| **Groups of 6 chargers on a 60-ampere branch circuit** | Substantially reduce infrastructure cost | Power sharing makes for efficient system design |

# Design Constraints

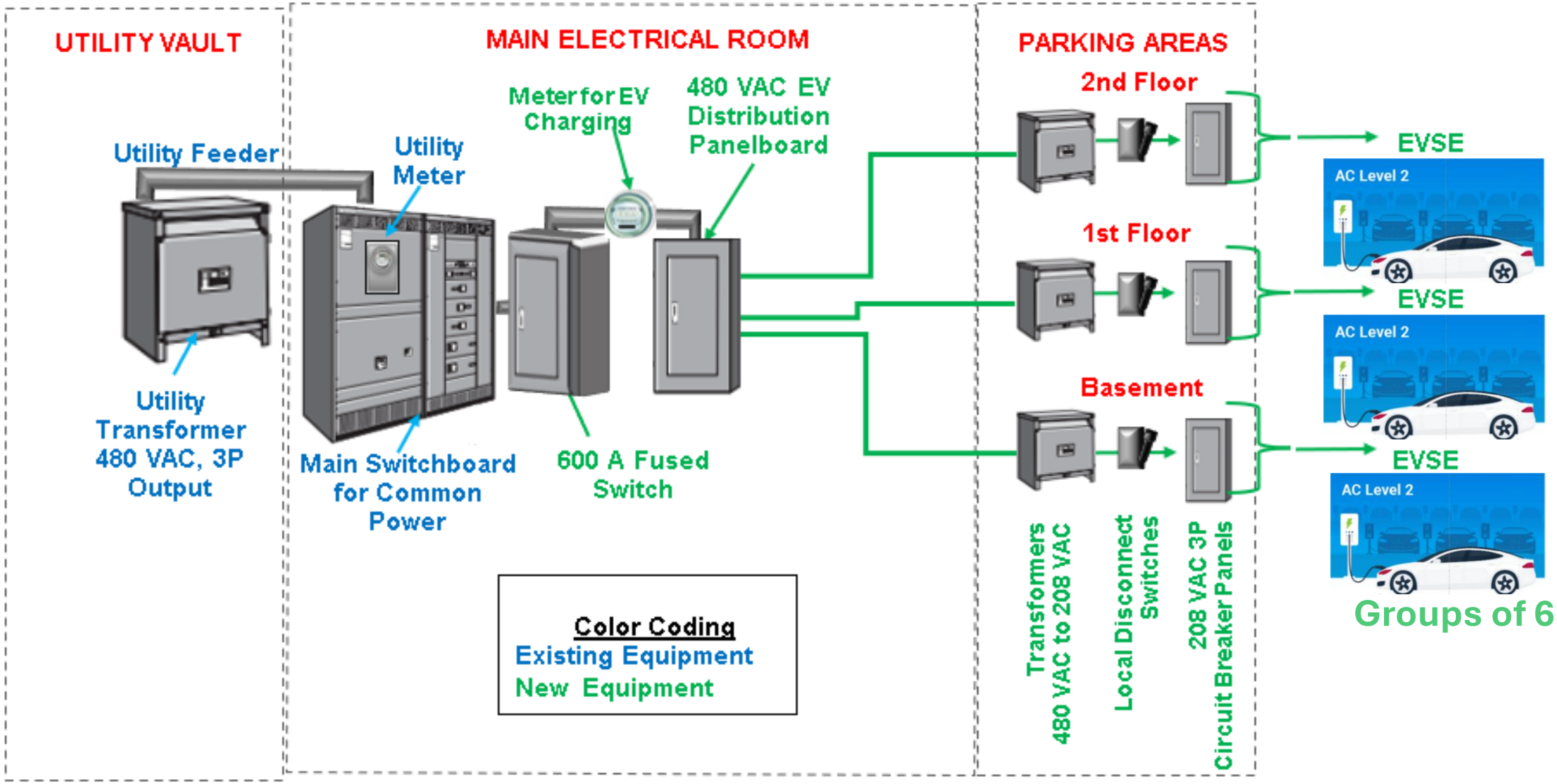
- **Recharging overnight** (8 hrs) for average daily use (about 2kW/hr). But maximum demand could be up to 10kW/hr for an L2 EVSE
  - Electrical Code requires that each 208VAC branch circuit be capable of 125% of the maximum current demand (in this case 60 ampere circuit breaker supplying 48 amperes (48 amps x 208VAC=10kW)
  - 136 parking spaces at 10kW per space= 1360kW ! **WOW!!!**
- If **power can be shared** between multiple EVSE based on the actual demand of the cars being charged, then the use case becomes more feasible
  - For several technical reasons up to 6 EVSE can be connected to a single electrical circuit reducing the number of circuits by a factor of 6
- Cost of the **shared Electrical Infrastructure** is Considerably Less

FIG. 1


60 amp circuit breaker
Electrical conduit
Space 101
Single Circuit
60 amp circuit breaker
Electrical conduit
Space 101
Space 102
Space 103
Space 104
Space 105
Space 106
Space 107
EVSE Group

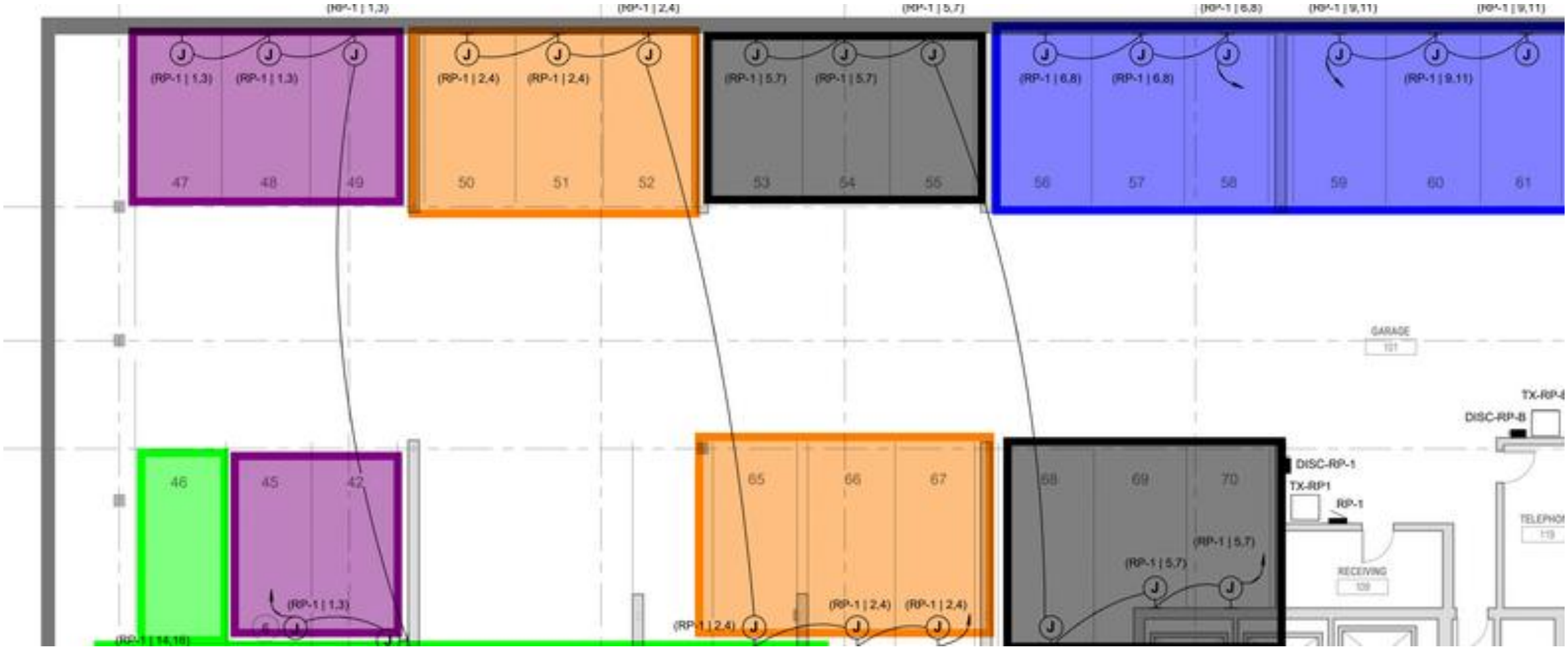
# Optimization Study

| # EVSE per group | # of EVSE Groups, N (branch circuits) | Minimum power per charger, P (kW) | Total Power Capacity Required N xP (kW) | 8 hour charging Capability (miles) | D (Total Wiring length), ft |
|---|---|---|---|---|---|
| 1 | 150 | 10 | 1500 | 240 | 11250 |
| 2 | 75 | 5 | 750 | 120 | 6414 |
| 3 | 50 | 3.3 | 500 | 79 | 5100 |
| 4 | 38 | 2.5 | 380 | 60 | 4389 |
| 5 | 30 | 2.0 | 300 | 48 | 3870 |
| 6 | 25 | 1.7 | 250 | 41 | 3583 |
| 7 | 22 | 1.4 | 220 | 34 | 3380 |
| 8 | 19 | 1.2 | 190 | 30 | 3320 |
| 9 | 17 | 1.1 | 170 | 26 | 3093 |
| 10 | 15 | 1.0 | 150 | 24 | 3015 |




graphic credit: Tim Milburn

# Portion of Garage Floor Plan

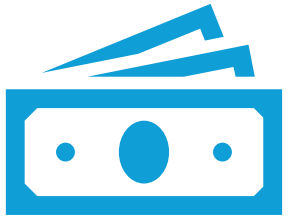


# Bottom Line

**Cost of EV Ready infrastructure at each parking space was $1800 before any rebate**

**Cost to install an EVSE ~$1000/space (when you want it)**

**No WiFi capability needed**



**No administrative costs**