



CITY OF HAYWARD

Hayward City Hall
777 B Street
Hayward, CA 94541
www.Hayward-CA.gov

File #: WS 22-020

DATE: June 14, 2022

TO: Mayor and City Council

FROM: Director of Public Works
Director of Development Services

SUBJECT

2023 Electrification Reach Code: Information and Discussion

RECOMMENDATION

That the Council reviews and comments on this report and provides direction to staff.

SUMMARY

Hayward's current Reach Code, a local amendment to the State Building Code, will expire on December 31, 2022. To continue the current requirements that prohibit or limit the use of natural gas in new buildings and to continue to require increased electric vehicle charging infrastructure, a new ordinance must be adopted. This report presents a framework and considerations for a new Reach Code that may be adopted this year. Staff is requesting Council feedback on the proposed Reach Code updates to help inform preparation of a draft ordinance.

ATTACHMENTS

Attachment I	Staff Report
Attachment II	EV Charging Requirements
Attachment III	EV Charging Glossary



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BACKGROUND

Building and vehicle electrification are both key strategies of Hayward’s Climate Action Plan. East Bay Community Energy is providing 100% renewable electricity to most Hayward customers and utilizing electric appliances in place of gas-fired appliances can greatly reduce greenhouse gas emissions in the building sector. In addition, the installation of Electric Vehicle (EV) charging infrastructure at the time of new construction is the most cost-effective approach to prepare for the increase in EV ownership that is coming.

On March 3, 2020¹, Council adopted a local amendment to the 2019 California Building Code known as a Reach Code. The Reach Code ordinance as well as checklists for builders and developers are available on the City’s website². The Code requires all new single-family homes and new low-rise multi-family buildings (up to 3 stories) to be all-electric. Non-residential and high-rise residential buildings can be either all-electric or mixed fuel (both electric and natural gas equipment). The Code also includes requirements for EV charging

¹ <https://hayward.legistar.com/LegislationDetail.aspx?ID=4345454&GUID=25134FC7-B7A3-4060-955A-F7A30A27567A&Options=&Search=>

² <https://www.hayward-ca.gov/reach-code>

infrastructure. When Hayward's Reach Code was adopted in March 2020, there were twenty-eight (28) such codes adopted by local jurisdictions throughout California. On May 27, 2022, the City of Los Angeles became the 55th local jurisdiction to adopt an electrification reach code.

The California Building Code is updated every three years. The 2019 California Building Code and Hayward's Reach Code will both expire on December 31, 2022. The 2022 CalGreen Code will take effect on January 1, 2023. In order to continue Hayward's current Reach Code requirements, a new Reach Code must be adopted this year to be effective along with the 2022 California Building Code in January 2023.

Staff is working closely with a Bay Area working group³ led by East Bay Community Energy (EBCE), Peninsula Clean Energy (PCE), Silicon Valley Clean Energy (SVCE), and their consultants to prepare Hayward's new Reach Code. The working group is developing model codes for local jurisdictions to consider. The draft model codes were used to develop preliminary considerations for Hayward's new Reach Code, which were presented to the Council Sustainability Committee (CSC) on March 14, 2022⁴. Following is a summary of the comments made by the CSC:

1. New Low Rise Residential Buildings – The CSC supported continuing the existing all-electric requirement for new Low Rise Residential Buildings.
2. New Accessory Dwelling (ADU) Units – The CSC supported ending the current exemption for ADUs smaller than 400 square feet but asked about how it may impact the cost of building an ADU (A cost-effectiveness study including an analysis for an all-electric ADU should be available soon).
3. New Non-residential & High-Rise Residential Buildings - The CSC supported staff's recommendation to remove the existing mixed-fuel pathway so that all new buildings would have to be all-electric. For new non-residential buildings, the Committee expressed support for flexibility – especially for industrial uses.
4. Existing Buildings – The CSC supported prohibiting gas extensions in older homes; however, doing so may make it difficult to build smaller attached ADUs. Regarding extensions of gas lines in older existing industrial buildings, the CSC asked staff to consult with the business community.
5. End of Flow – The CSC supported the concept of ending the flow of gas by 2045 but asked about the difficulty of enforcing such a policy and questioned community acceptance.
6. Existing Residential – The CSC agreed Hayward should wait for the California Air Resources Board (CARB) or the Bay Area Air Quality Management District (BAAQMD) to enact a ban on the sale of gas appliances. The BAAQMD has drafted

³ <https://bayareareachcodes.org/>

⁴ <https://hayward.legistar.com/LegislationDetail.aspx?ID=5523060&GUID=4A5988AD-D820-4426-9F53-9CC938F9C94F&Options=&Search=>

new rules for gas-fired furnaces and water heaters⁵ and on May 19, 2022, the District released a Notice of Preparation of an Environmental Impact Report for the proposed rules. If adopted as currently drafted, the rules would ban the sale of residential and commercial gas-fired space heaters and water heaters effective in 2027 through 2031 depending on equipment type and size. Such rules would limit the need for local jurisdictions to address existing buildings in reach codes.

7. EV Charging Requirements – The CSC would like to see robust requirements but asked for more information about the costs of developing charging infrastructure.

On May 9, 2022⁶, the CSC considered a report with additional information regarding options for new non-residential buildings as well as alternatives and costs associated with EV charging requirements. Staff recommended that items 4, 5 and 6 in the list above be deferred to the next code cycle as more research is needed to evaluate costs and equity implications. Committee members provided the following comments:

- The Code should include limited exceptions that would allow gas for restaurants and life science-related industrial uses.
- EV charging is going to be in high demand in the future and the Code should require higher levels of charging capacity at multi-family properties.

On May 26, 2022, the Planning Commission considered a report⁷ about the Reach Code update and had the following comments:

- A community member in attendance asked for clarification regarding the EV charging requirement for single family homes. The speaker noted that families can program their cars to charge at certain times and that only one charger is needed for two EVs.
 - Compliance with the requirement for two Level 2 EV Ready spaces can be achieved with one circuit that provides sufficient amperage. The two spaces could be served by one receptacle. Although the Code would not require installation of a charger, the homeowner could install one charger that can charge two vehicles simultaneously. Some chargers have integrated automatic load management so that when only one car is charging, it will receive more amps.
- Cooking - One Commissioner noted that single family residents can use an outdoor barbeque to cook outdoors when the grid is out and asked about a solution for people living in a high-rise apartment building.
 - Gas stoves should not be lit manually and should never be used when there's no electricity to provide for mechanical ventilation. The 2022 Energy Code requires some solar photovoltaic (PV) panels and battery storage for high-rise apartments, which should ameliorate power outages.

⁵ <https://www.baaqmd.gov/rules-and-compliance/rule-development/building-appliances>

⁶ <https://hayward.legistar.com/LegislationDetail.aspx?ID=5644449&GUID=373D251F-6874-4DC3-AF7B-299444A3DA9A&Options=&Search=>

⁷ <https://hayward.legistar.com/LegislationDetail.aspx?ID=5658536&GUID=EF329D60-09D7-4B60-B855-E277BB29823F&Options=&Search=>

- Can renewable natural gas be used for certain industrial uses?
 - Renewable natural gas (RNG) is typically captured methane from farms, landfills, or wastewater treatment plants. The estimated RNG production potential in the United States is a small fraction of the current natural gas used by industry. Use of RNG should be prioritized for power generation at the site of the gas generators, as the distribution system to get renewable gas to buildings is extremely expensive.
- The EV charging requirements can add a significant electrical load to a building. When considering the necessary capacity of the electrical panel, does the Electrical Code consider the presence of an automatic load management system (ALMS)?
 - Yes, accounting for ALMS is a best electrical engineering practice, and is assumed in cost models.
- Regulations can be very complex. Reach Code should be simple.
- Are different chargers needed for low versus high power Level 2 charging? What is the cost of each type of charger?
 - The cost of a low power (20-amp) Level 2 charger with one plug is approximately \$500.
 - The cost of a high power (40-amp) Level 2 charger with one plug is approximately \$700
 - The cost of a high power (40-amp) Level 2 charger with two plugs is approximately \$1,600
- During a power outage, many people try to cook with gas indoors or in other poorly ventilated areas, which is very dangerous and can be deadly. Training should be provided so that people know what to do and not do during an outage.
- Perhaps the cost savings associated with not installing gas in a new building can offset the cost of the EV charging required.
- More charging should be required for new commercial buildings.
- Some housing developments have EV Ready infrastructure and years after the people move in, there are still no chargers. Perhaps there should be a condition of approval to require installation of chargers.

DISCUSSION

Staff is seeking Council direction regarding the development of the new Reach Code. The ordinance is part of the City's overall strategy to address the climate crisis and will likely be included as one of many programs in the updated Climate Action Plan. Staff recommends a new Reach Code that will address the following:

- New Low Rise Residential Buildings
- New Accessory Dwelling Units (ADU)

- New Non-residential & High-Rise Residential Buildings
- EV Charging Requirements for New Construction

Existing and recommended Reach Code requirements are summarized in the table below.

	Current Reach Code (2020 - 2022)	2022 State Code (Effective Jan. 2023)	Recommended Reach Code (Effective Jan. 2023)
Low Rise Residential (three stories and less)	All-electric	Allows gas, but electric heat pumps are baseline for space/water heating. Requires electric readiness.	All-electric
Accessory Dwelling Units (ADUs)	All-electric Exempt if detached and less than 400 square feet.	Allows gas, but electric heat pumps are baseline for space/water heating. Requires electric readiness.	All-electric Detached ADUs <400sf TBD
High Rise Residential (more than three stories)	Electric Preferred	Allows gas, but electric heat pumps are baseline for space/water heating. Requires electric readiness.	All-electric
Mixed Use (Typically ground floor commercial with residential above)	Not addressed	Allows gas, but electric heat pumps are baseline for space/water heating in residential portion.	All-electric
Non-Residential	Electric Preferred	Allows gas	Allows gas. Requires electric readiness (pre-wiring, etc. to convert to all-electric)

New Low Rise Residential Buildings – Staff recommends maintaining the current requirements so that all new single-family homes and all new low-rise multi-family buildings (up to three stories) must be designed and constructed as all-electric. This portion of the current reach code has been very successful in that new all-electric residential buildings are cheaper to construct and operate compared to those with gas.

New Accessory Dwelling Units – The current reach code exempts ADUs less than 400 square feet, which means they can include natural gas appliances for water heating, space heating, etc. Smaller units were exempt primarily due to the extra space required for an electric heat pump water heater tank compared to gas-fired tankless water heater. While most cities’ reach codes do not exempt any detached ADUs and the model reach code does not

exempt small ADUs, staff is still researching this issue and will review the soon-to-be-released cost-effectiveness study for all-electric ADUs.

New Non-Residential and High-Rise Residential Buildings – The current Reach Code allows non-residential and high-rise residential buildings (four stories and taller) to be either all-electric or mixed-fuel. At the March 14 CSC meeting, staff recommended eliminating the mixed-fuel option. Staff recommends the new Reach Code require all buildings that include a residential use, including mixed use buildings, must be all-electric.

For new non-residential buildings, the CSC requested limited exceptions where gas may be used. Hayward’s Economic Development staff has also expressed support for the Reach Code and is interested in having exceptions – particularly for restaurants and life science-related industries. In response to this feedback, staff continued to research different approaches to incorporate flexibility and allow exceptions – potentially for certain industrial uses and restaurants.

Exceptions are also being explored in light of the California Environmental Quality Act (CEQA) and the goal to be carbon neutral by 2045. On April 20, 2022, the BAAQMD Board of Directors adopted new thresholds of significance for use in environmental analyses prepared pursuant to CEQA. The thresholds are used to determine when an environmental impact is considered “significant”. If an impact is considered significant and cannot be mitigated, the project is required to have an Environmental Impact Report prepared. While the previous thresholds were quantitative, such as a certain number of metric tons of carbon dioxide equivalent per year, the new thresholds are qualitative due to the state’s carbon neutrality goal. The new thresholds state that any new building must either:

1. Not include natural gas; or
2. Be consistent with a local Climate Action Plan (CAP).

The Reach Code can include exceptions for uses such as restaurants and certain industrial operations; however, in order for a project to avoid having a significant impact, Hayward’s CAP would need to identify a means for offsetting the greenhouse gas (GHG) emissions from the gas use by 2045. Staff is currently working with a consultant team on an update of the CAP and plans to find a way to allow some gas use while still maintaining a path toward carbon neutrality by 2045.

The CSC requested limited exceptions that would allow gas for restaurants and life science-related industrial uses, however crafting and implementing a code that exempts certain uses is complicated and implementing the code could put a strain on already-limited staff resources. After several internal discussions and meetings with consultants, staff is recommending a simpler approach for new non-residential buildings.

For this code cycle (2023 – 2025), staff recommends that the new Reach Code require any new non-residential building, to be “all-electric ready” so that the building can either:

- operate as all-electric initially; or

- convert to all-electric in the future.

The recommended approach would allow natural gas in new non-residential buildings, but those that do include gas would be pre-wired for easier conversion to all-electric in the future, which would help Hayward meet its goal of carbon neutrality by 2045. Following are staff's reasons for the recommended code requirements.

- Beginning in 2023, the California Energy Code will encourage electric space heating and electric water heating, so staff expects most new buildings will not include gas for space and water heating for small commercial buildings.
- Staff considered a potential Code requirement that would require all new buildings to have electric space heating and electric water heating. While the working group consultants have pointed out that all electric heating, ventilation, and air conditioning (HVAC) is possible and many large owners/operators of laboratory space have committed to all-electric, some developers of laboratory space have argued that gas is still required for cost-effective operation of HVAC, which requires large volumes of air changes. Given that Hayward seeks to attract new life science and biotechnology companies, staff feels that it is best to allow for flexibility.
- Exceptions that apply in limited cases would be difficult to articulate in an ordinance and would be time-consuming for Building Division staff to administer. The extra work would include questions prior to submitting an application, staff review of exception requests, and potential appeals.
- Most new industrial buildings are speculative and are built as "shell" buildings where and tenants are not known in advance. Maintaining flexibility in the Code allows for a wider variety of tenants.
- For new buildings that do include gas, the code can require "electric-readiness". This means that wiring, panel capacity, electrical receptacles and physical space are provided for future electric equipment. While the updated Climate Action Plan is still underway, requiring electric readiness would likely help Hayward create a plan that demonstrates a realistic pathway toward carbon neutrality by 2045.
- The Code adopted this year will be in place through the end of 2025. In 2025, the Reach Code can be re-evaluated and could modify the requirements that will take effect in January 2026.

EV Charging – Attachment II is a glossary of terms related to EV charging. On March 14, 2022, the CSC requested more information about the costs to install EV charging infrastructure. Attachment III includes potential requirements as well as cost estimates. While the new CalGreen code will require 40% of spaces to have Level 2 readiness, the new regional model code would require the remaining 60% of spaces to be Level 1 EV Ready. Staff is not recommending Level 1 chargers as an overnight charge providing 30 miles of range is not sufficient for many people. New EVs have large batteries that may make Level 1 charging obsolete in the next few years. Staff is recommending some combination of Level 2 charging readiness and Level 2 chargers.

Following are staff's recommendations for EV infrastructure to be required at the time of new construction:

Single-Family Residential

- Two Level 2 EV Ready spaces

Multi-Family Residential (market rate and affordable):

- 20% of units with parking spaces, High Power Level 2 EVSE;
- 80% of units with parking spaces, Low Power Level 2 EV Ready.

Non-Residential Office

- 20% of parking spaces, Level 2 EVSE
- 30% of parking spaces, Level 2 EV Capable

Non-Residential, Non-Office

- 10% of parking spaces, Level 2 EV EVSE
- 10% of parking spaces, Level 2 EV Capable

Attachment III includes two options (A and B) for EV charging requirements for multi-family properties. The recommended charging listed above is Option B while Option A would require more high-power Level 2 charging readiness. Both options were presented to the CSC on May 9, 2022 and to the Planning Commission on May 26, 2022. The CSC was mixed on their support for the two options and the Planning Commission indicated more support for Option B.

The EV charging requirements in the current Reach Code have been especially difficult for developers of affordable housing. Some recently approved affordable housing projects in Hayward have been completely exempted from the charging requirements due to concessions granted under the state's Density Bonus law.

Some have argued that there should be a lower requirement for affordable housing due to the constraints associated with developing and financing affordable projects. However, some have argued that that to ensure equity, people living in affordable housing should have access to the same level of EV charging as those who live in market rate housing. Option B is more similar to the model code recommended for affordable housing. If Option B is applied to both market rate and affordable, it would be a more equitable approach and it is a less expensive requirement for the developer. Option B is also a less expensive requirement compared to Hayward's current Reach Code.

As noted previously, some affordable housing developers have sought exemptions from the Reach Code requirements for EV charging. Beginning in January 2023, a project that is exempt from the Reach Code will need to comply with the updated state code, which will require:

- 10% of parking spaces must be Level 2 EV Capable,
- 25% of parking spaces must be Low Power Level 2 EV Ready, and
- 5% of parking spaces must be Level 2 EV Charging Stations

FISCAL IMPACT

Development of this year's Reach Code will not impact the City's General Fund. Time spent on research and writing of the Code will be completed by existing, budgeted staff. Enforcement of Hayward's current Reach Code has resulted in some impacts to staff as developers often have questions about compliance. Staff's recommendations for the new Reach Code, including the elimination of the mixed-fuel pathway with additional solar and energy efficiency requirements, are expected to result in a Code that is simpler and easier to enforce.

ECONOMIC IMPACT

Local amendments to the California Energy Code require documentation to ensure the proposed requirements are cost-effective. This year's Reach Code could be adopted as a stand-alone ordinance and not as an amendment to the Energy Code if it does not address energy efficiency. This approach would not require a cost-effectiveness study; however, the Statewide Codes & Standards Reach Codes team is preparing studies that may be used by local jurisdictions. Generally, the studies completed to date show that all-electric buildings are less costly to construct due to the avoided cost of installing gas infrastructure, but operational costs are higher compared to mixed-fuel buildings. However, if additional solar photovoltaic (PV) panels and/or energy efficiency measures are included, then an all-electric building is typically cost-effective over a 30-year period.

The requirements for EV charging infrastructure will increase the cost of construction; however, future residents or employees can benefit from the cost savings of operating an EV compared to a gasoline vehicle. In addition, significant savings can be realized when installing EV Capable and EV Ready circuits at the time of new construction as compared with the retrofit of an existing building or existing parking lot.

As shown in Attachment III, the estimated cost to install charging required by the 2022 CalGreen Code will cost approximately \$146,000 for a 100-unit multi-family project. It also shows that compliance with the recommended requirements, Option B, would cost approximately \$273,000 for a 100-unit building, or approximately 0.6% of the total construction cost. Option A would cost approximately \$398,000, or 0.8% of the total construction cost of the project. The key to keeping costs low is the installation of Automatic Load Management Systems (ALMS), which manage electrical loads across one or more electric vehicle chargers, circuits, or panels, and share electrical capacity and/or automatically manage power at each connection point. This allows several cars to remain plugged in overnight, but not all cars would be charged at the same time.

It is important to note that the costs noted above are just for panels, conduit, wiring and chargers and do not include costs for transformers or service upgrades as the need for such improvements will vary from site to site. Option A has the largest power requirements and the greatest likelihood of additional cost for transformers and service upgrades.

Additional cost estimates from a 2019 study⁸ prepared for Peninsula Clean Energy (PCE) and Silicon Valley Clean Energy (SVCE) are included in Attachment III. The study analyzed the costs for a 60-unit multi-family project; a 150-unit multi-family project; and an office building with 60 parking spaces. The study considered the cost of electrical service upgrades, electrical panels and transformers and includes the following key findings:

- Costs [for EV charging] for new construction were significantly lower, at almost four times as much per spot compared to the retrofit scenario. This indicates that increasing Code requirements for charging infrastructure could potentially save significant amounts of money to building owners in the new construction context rather than waiting for tenants to become interested in electric vehicles, at which point significant costs related to invasive demolition and electrical infrastructure replacement would be necessary.
- Transformer capacity limitations are not expected to occur very frequently and that even in the retrofit context most buildings should be able to meet the added load. For those that do not have significant capacity, utilizing lower power “Level 1” ports or load management may be promising options. However, transformer upgrades are more likely with the increased EV infrastructure requirements such as those for Level 2 charging.
- For larger new buildings in need of a second transformer and associated electrical infrastructure, the owner/developer would need to bear those costs estimated to be approximately \$50,000 (or significantly more in a retrofit context).
- Installing an EV Capable parking space means that wiring, etc., would need to be installed at later date. Installing an EV Ready space at the outset (installing a complete electrical circuit with wiring and circuit breakers) will achieve better economies of scale and avoid the overhead and time needed to hire an electrician. This includes the need for tenants to get approvals from building owners for an electrical wiring retrofit (as in the case of a condominium with a homeowner’s association). Similarly, installing charging equipment during new construction can be completed at a much lower cost than retrofitting later.

STRATEGIC ROADMAP

This agenda item supports the Strategic Priority to *Confront Climate Crisis & Champion Environmental Justice* as included in the Strategic Roadmap adopted May 3, 2022. Specifically, this item is related to implementation of the following projects:

- Project C1 Ban natural gas in new residential buildings (Completed with the March 2020 adoption of the Reach Code.)
- Project C2 Require EV charging infrastructure in new construction (Completed with the March 2020 adoption of the Reach Code.)
- Project C10 Explore feasibility of banning natural gas in non-residential (commercial) buildings.

⁸ https://bayareareachcodes.org/wp-content/uploads/2020/03/PCE_SVCE-EV-Infrastructure-Report-2019.11.05.pdf

SUSTAINABILITY FEATURES

The use of electric appliances in homes and businesses avoids indoor air pollution associated with the burning of natural gas. Ending the use of natural gas and providing the infrastructure needed for a transition to electric vehicles are both necessary to meet the City's long term GHG reduction goals, which include:

- 30% below 2005 levels by 2025
- 55% below 2005 levels by 2030
- work with the community to develop a plan that may result in the reduction of community based GHG emissions to achieve carbon neutrality by 2045.

ENVIRONMENTAL REVIEW

Staff anticipates the Reach Code, once finalized, will be found not to be a project under the requirements of the CEQA, together with related State CEQA Guidelines (collectively, "CEQA") because it has no potential for resulting in a physical change to the environment. The Ordinance may also be exempt from environmental review under CEQA Guidelines section 15308, because it is a regulatory action for the protection of the environment.

PUBLIC CONTACT

The Bay Area working group hosted two workshops for building industry stakeholders and community members on February 15 and 16, 2022. Staff sent an email to 658 builders and developers to let them know about these workshops and the March 14 CSC meeting. At the February workshops, attendees were generally supportive of reach codes. Specific comments included:

- Automatic Load Management (for EV charging) is critical and still new, and more education is needed.
- Multi-family property owners said they do not want to be in the EV charging business. They requested that EV charging be required such that it is on the utility's side of the electric meter.

In addition, in early 2022, staff reached out to six representatives of affordable housing developers and had phone conversations with three to review existing and potential EV charging requirements. Staff has conducted limited outreach for this first discussion on the 2023 Reach Code. Upon direction from the CSC, staff will continue to seek input from development and business stakeholders. Specifically, staff intends to engage with the Chamber of Commerce and industrial property developers before returning to the CSC with more refined recommendations.

On May 6, 2022, staff presented to the Hayward Chamber of Commerce's Government Relations Committee. The Chamber members' comments included:

- Questions about the capacity of the electrical grid and its ability to accommodate the increased load that will result from electrification.

- People still love to cook with gas.
- More direct outreach is needed to get the word out to business owners and multi-family property owners.

Finally, staff recently had conversations with four large commercial/industrial developers who indicated that most new buildings are developed on speculation and that they prefer to maximize flexibility to help with marketing the buildings to potential tenants.

NEXT STEPS

Upon Council direction, staff will continue to work with the Bay Area working group and stakeholders to prepare a draft reach code ordinance for Council's consideration. Following is a tentative timeline:

July 11, 2022	Present draft Reach Code Ordinance to CSC
October 2022	Council to consider adoption
January 2023	Reach Code takes effect along with the 2022 CA Building Code

Prepared by: Erik Pearson, Environmental Services Manager

Recommended by: Alex Ameri, Director of Public Works
Jennifer Ott, Assistant City Manager/Development Services Director

Approved by:

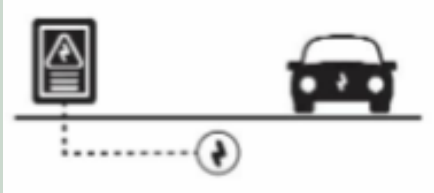
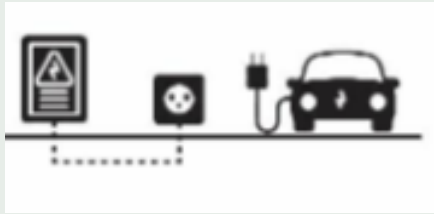



Kelly McAdoo, City Manager

Electric Vehicle Charger Types

<p>Level 1</p>		<p>15-20 Amp, 120 Volt (standard household outlet)</p> <p>Driving Distance provided: 3-4 miles/hour</p>
<p>Low Power Level 2</p>		<p>20 Amp, 208/240 Volt</p> <p>Driving Distance provided: 10-15 miles/hour</p>
<p>High Power Level 2</p>		<p>40+ Amp, 208/240 Volt</p> <p>Driving Distance provided: 25-30 miles/hour</p>
<p>DC Fast Charge</p>		<p>80-400 Amp, 200-600 Volt DC (direct current)</p> <p>Driving Distance provided: 125-1000 miles/hour</p>

EV Charging Infrastructure

<p>EV Capable</p>		<p>Raceway (conduit), electrical capacity (breaker space)</p>
<p>EV Ready</p>		<p>EV Capable + overcurrent protection devices, wiring and outlet (i.e. full circuit)</p>
<p>EVCI (electric vehicle charger installed)</p> <p>Also known as EVSE (electric vehicle supply equipment)</p>		<p>All equipment to deliver electricity to EV</p>

EV Charging – Requirements & Estimated Costs for New Multi-Family Development

	Hayward’s Current Reach Code (% of dwelling units)	2022 CalGreen (% of parking spaces)	2022 Model Reach Code	2022 Model Reach Code Affordable Housing	Option A	Option B (Recommended by Staff)	
Multi-Family	25% Level 2 EV Capable 75% Level 2 EV Ready	10% Level 2 EV Capable 25% <u>low power</u> Level 2 EV Ready 5% <u>high power</u> Level 2 EVSE	60% Level 1 EV Ready 40% <u>high power</u> Level 2 EVSE	60% Level 1 EV Ready 25% <u>low power</u> Level 2 EV Ready 15% <u>high power</u> Level 2 EVSE	60% <u>high power</u> Level 2 EV Ready 40% <u>high power</u> Level 2 EVSE	80% <u>low power</u> Level 2 EV Ready 20% <u>high power</u> Level 2 EVSE	
Costs for a 100-unit Multi-Family Project*	L1 Ready		60	60			
	L2 Capable	25	15				
	L2 Low Power Ready		38		25	80	
	L2 High Power Ready	75			60		
	L2 High Power EVSE		8	40	15	40	
	Total Ports	100	61	100	100	100	100
	Total Cost		\$146,421	\$194,185	\$175,635	\$397,801	\$273,079
	Cost/Port		\$2,400	\$1,942	\$1,756	\$3,978	\$2,731
	% of dwellings w/access	100%	40-60%	100%	100%	100%	100%
	% of total const. cost**		0.3%	0.4%	0.4%	0.8%	0.6%

* Costs are estimated for 2022 and do not include the cost of transformers or increase panel capacity. Assuming 1.5 parking spaces per dwelling unit.

** The “% of total construction cost” may be as high as double as what is when accounting for transformers, etc. This is especially true of ‘Option A’ which includes the highest power requirements.

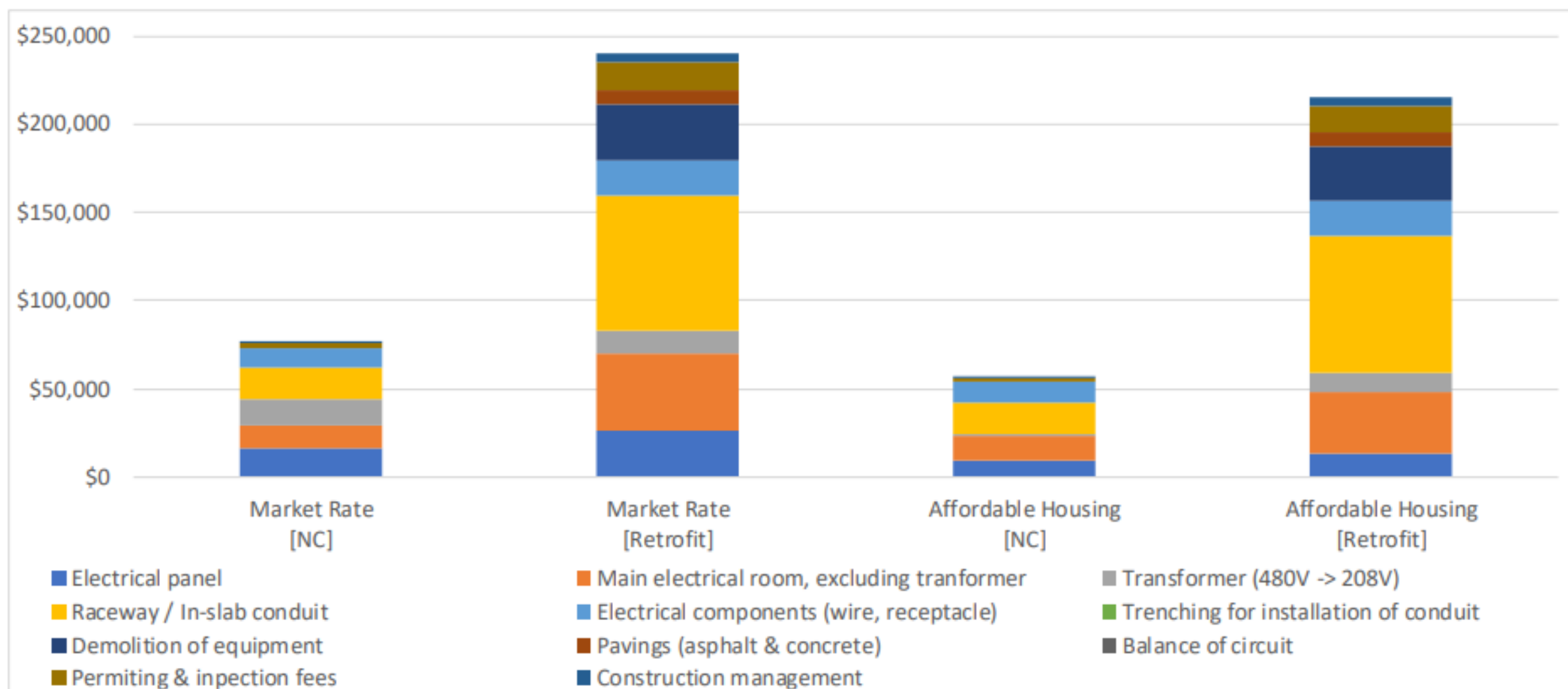
EV Charging – Requirements for Other Land Use Types

	2019 CalGreen	Hayward's Current Reach Code	2022 CalGreen	<i>Model Reach Code (potential requirements)</i>	<i>Recommended</i>
Single Family & Townhome	One Level 2 EV Capable for one parking space per dwelling unit	Two Level 2 EV Ready spaces per dwelling unit	<i>No changes from 2019 CalGreen</i>	One Level 2 EV Ready space One Level 1 EV Ready space	Two Level 2 EV Ready spaces per dwelling unit <i>No change from current Reach Code.</i>
Non-Res Office	6% Level 2 EV Capable	20% Level 2 EVSE; 30% Level 2 EV Capable	5% Level 2 EVCS; 10% Level 2 EV Capable	20% Level 2 EVSE; 30% Level 2 EV Capable	20% Level 2 EVSE; 30% Level 2 EV Capable <i>No change from current Reach Code.</i>
Non-Res Non-Office		15% Level 2 EVSE		10% Level 2 EVSE; 10% Level 2 EV Capable	10% Level 2 EVSE; 10% Level 2 EV Capable
Hotel/ Motel	NA	NA	NA	5% Level 2 EVSE; 25% <u>low power</u> Level 2 EV Ready	5% Level 2 EVSE; 25% <u>low power</u> Level 2 EV Ready

EV Charging Cost Estimates

The following cost estimates are from a 2019 study¹ prepared for Peninsula Clean Energy (PCE) and Silicon Valley Clean Energy (SVCE) analyzing the costs for: 1) a 60-unit multi-family project; 2) a 150-unit multi-family project; and 3) an office building with 60 parking spaces. The costs below are for EV Ready and do include costs for transformers. This study does not include costs for EVSE, and does not include and has a overall 20% contingency to account for ADA compliance. ADA can be a significant source of cost and in this study is only intended to capture a limited scope of ADA compliance.

Figure1. Cost Break-down for 60-unit Multi-family Residential Project



¹ https://bayareareachcodes.org/wp-content/uploads/2020/03/PCE_SVCE-EV-Infrastructure-Report-2019.11.05.pdf

Table 1. Estimated Incremental Cost of installing EV Infrastructure: 60-unit Multi-family Residential Project

Retrofit	60-Unit MUD			
	Market Rate [NC]	Market Rate [Retrofit]	Affordable Housing [NC]	Affordable Housing [Retrofit]
Level 2 Ports Added	9	9	0	0
Level 1 Ports Added	45	45	54	54
Electrical panel	\$15,960	\$26,008	\$9,289	\$13,004
Main electrical room, excluding transformer	\$13,609	\$43,911	\$14,055	\$35,193
Transformer (480V -> 208V)	\$14,164	\$12,743	\$1,081	\$10,897
Raceway / In-slab conduit	\$18,059	\$77,247	\$18,059	\$77,247
Electrical components (wire, receptacle)	\$11,366	\$20,131	\$11,307	\$20,049
Trenching for installation of conduit	\$0	\$0	\$0	\$0
Demolition of equipment	\$0	\$31,940	\$0	\$30,918
Pavings (asphalt & concrete)	\$0	\$7,889	\$0	\$7,889
Permitting & inspection fees	\$2,435	\$15,592	\$2,435	\$15,592
Construction management	\$549	\$4,449	\$403	\$4,264
TOTAL	\$76,142	\$239,909	\$56,629	\$215,051
TOTAL (Price per Port)	\$1,410	\$4,443	\$1,049	\$3,982

NC = New Construction

Figure2. Cost Break-down for 150-unit Multi-family Residential Project

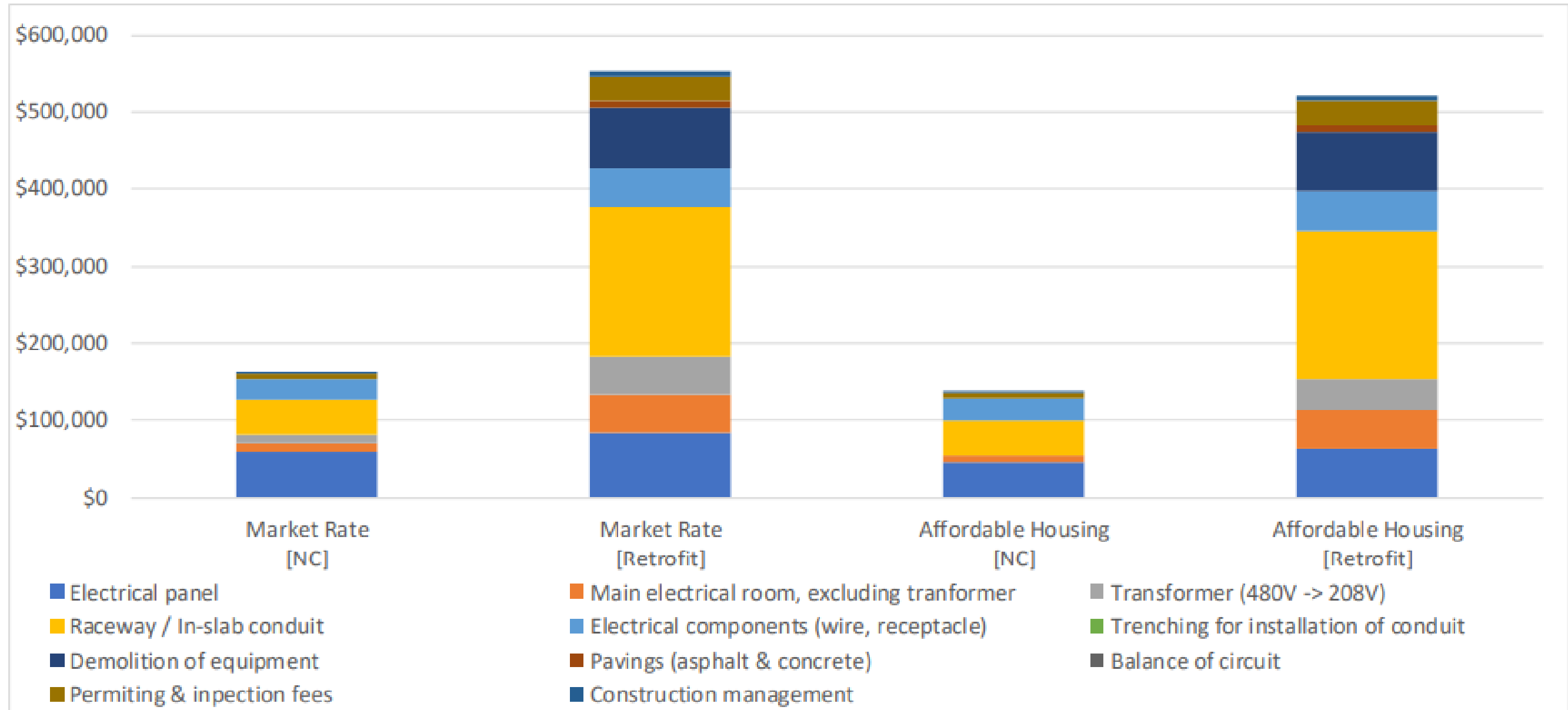


Table 2. Estimated Incremental Cost of installing EV Infrastructure: 150-unit Multi-family Residential Project

Retrofit	150-Unit MUD			
	Market Rate [NC]	Market Rate [Retrofit]	Affordable Housing [NC]	Affordable Housing [Retrofit]
Level 2 Ports Added	23	23	0	0
Level 1 Ports Added	112	112	135	135
Electrical panel	\$59,785	\$83,699	\$44,926	\$62,896
Main electrical room, excluding transformer	\$10,059	\$49,276	\$10,059	\$49,276
Transformer (480V -> 208V)	\$11,539	\$49,742	\$0	\$40,621
Raceway / In-slab conduit	\$45,147	\$193,116	\$45,147	\$193,116
Electrical components (wire, receptacle)	\$28,062	\$49,833	\$28,407	\$50,317
Trenching for installation of conduit	\$0	\$0	\$0	\$0
Demolition of equipment	\$0	\$79,850	\$0	\$77,294
Pavings (asphalt & concrete)	\$0	\$8,442	\$0	\$8,442
Permitting & inspection fees	\$5,798	\$33,069	\$5,798	\$33,069
Construction management	\$1,159	\$6,655	\$964	\$5,196
TOTAL	\$161,550	\$553,682	\$135,301	\$520,227
TOTAL (Price per Port)	\$1,197	\$4,101	\$1,002	\$3,854

NC = New Construction

Figure 3. Cost Break-down for Office Building with 60 Parking Spaces

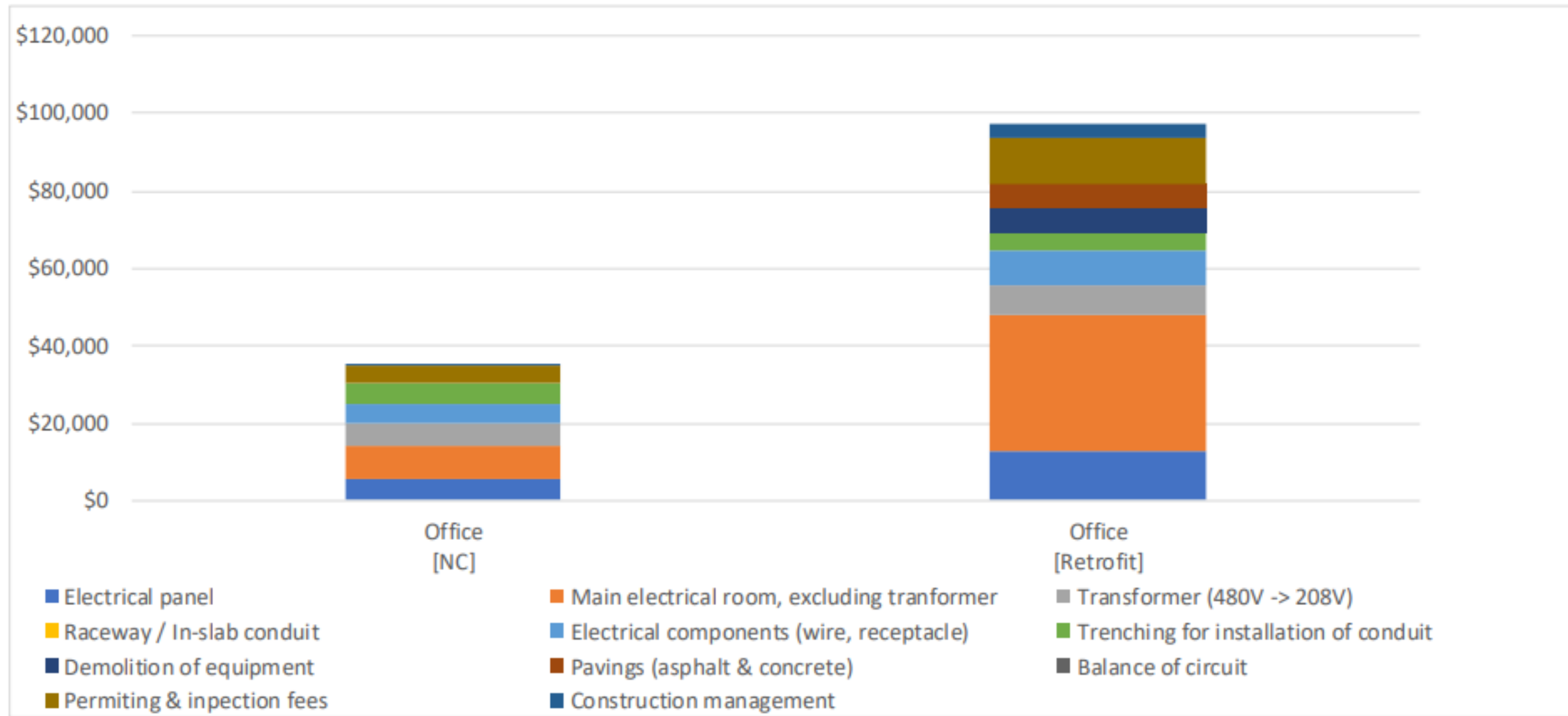


Table 3. Estimated Incremental Cost of installing EV Infrastructure: Office Building with 60 Parking Spaces

Retrofit	60-Space Office	
	Office [NC]	Office [Retrofit]
Level 2 Ports Added	2	2
Level 1 Ports Added	24	24
Electrical panel	\$5,571	\$13,004
Main electrical room, excluding transformer	\$8,558	\$35,005
Transformer (480V -> 208V)	\$5,748	\$7,786
Raceway / In-slab conduit	\$0	\$0
Electrical components (wire, receptacle)	\$5,285	\$9,031
Trenching for installation of conduit	\$5,133	\$4,562
Demolition of equipment	\$0	\$6,211
Pavings (asphalt & concrete)	\$0	\$6,305
Permitting & inspection fees	\$4,448	\$11,652
Construction management	\$227	\$3,414
TOTAL	\$34,971	\$96,970
TOTAL (Price per Port)	\$1,166	\$3,232

NC = New Construction