

# EXHIBIT B: Recommended Draft



## Electric Vehicle Ready Code

Recommended Draft

December 2022



THE BUREAU OF  
**PLANNING &  
SUSTAINABILITY**

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## HOW TO COMMENT (TESTIFY):

The Bureau of Planning and Sustainability thanks you for taking the time to review the Recommended Draft of the EV – Ready Code Project. Your comments will inform the Portland City Council’s review of the Plan. Following a public hearing and consideration of amendments to the proposal, the City Council will vote on adoption of the Plan.

### Find more information and supporting materials

at: <https://www.portland.gov/bps/planning/ev-ready>

Written testimony on the Recommended Draft is **due by 5:00pm on January 25, 2023**, unless extended by City Council

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vehicle parking areas while maintaining landscaped setbacks that provide a variety of benefits, such as screening of vehicle areas from sidewalks and space for trees to grow and for stormwater to be absorbed.

The PSC heard testimony and discussed the growing popularity of electric bikes (E-bikes), and whether this proposal should address accommodating their charging needs. During discussion, staff pointed out that the 2020 zoning amendments for long-term bicycle parking required areas with at least 20 bike spaces to provide access to an electrical outlet. We discussed whether it would be feasible to require electrical outlet access for short-term bike parking. During the discussion, staff pointed out the variety of places that short-term bike parking can be installed (meaning a one size fits all code solution is not optimal), the variety of types of E-bike batteries (many have removable battery options), and the limited benefit for charging at a short-term bike rack (leaving charger & cord unattended may be unrealistic). These variations make it difficult to create a development standard that would benefit E-bike users without creating unintended consequences. As a result, no amendment for additional E-bike charging access is recommended. However, the PSC agreed to include E-bike chargers to the list of improvements that do not count toward the thresholds that trigger nonconforming upgrades. Similar to staff's proposal to not count EV chargers, this addition would encourage the voluntary installation of E-bike chargers. The PSC members also recommend that BPS staff continue to monitor the growing use of E-bikes and battery technology to determine future charging solutions.

The PSC recognizes that these regulations are an initial step in developing a robust infrastructure to accommodate electric vehicles. These regulatory amendments must be complemented by programs currently being developed by the Bureau of Transportation, utility companies and other State and Federal agencies to ensure that chargers can be provided throughout the region that are accessible to all range of incomes and abilities. We look forward to hearing updates on the progress of these programs.

In conclusion, we recommend the EV Ready Code Project for adoption by City Council. It creates the regulatory steps to develop a network of EV chargers and infrastructure, aligns city regulations and state rules, and complements Portland's efforts to reduce carbon emissions.

Respectfully submitted,



Steph Routh  
Chair



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Appendix A. *EV Ready Economic Analysis (2021)*

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# Section I: Project Summary

## Introduction

The Bureau of Planning and Sustainability (BPS) is proposing to amend Portland City Code, Title 33 (Planning and Zoning) to require all new multi-dwelling and mixed-use development with five or more units – that include onsite parking – to provide electric vehicle (EV)-ready charging infrastructure.

## Project Summary

In 2021 the Oregon legislature passed House Bill 2180, which required an update to the Oregon Structural Specialty Code, the building code that applies to commercial structures. These new rules require that 20% of parking spaces in newly constructed, privately owned commercial buildings – as well as multi-dwelling and mixed-use buildings with five or more residential units – provide electrical conduit and options for service capacity to support electric vehicle charging (known as EV-ready). The legislation also allows a municipality to go above and beyond the 20% requirement for these building types by a “process concerning land use.” The State Building Code Division (BCD) approved these new rules into their code effective July 1, 2022. Parallel to this process, the Department of Land Conservation and Development (DLCDD) led the [Climate-Friendly and Equitable Communities Rulemaking](#) process, which augments HB2180 provisions into new rules addressing climate-friendly and equitable land use and transportation planning. This work was part of Executive Order 20-04 signed by Governor Brown. The DLCDD rules increase the required percentage of EV-ready parking spaces for mixed-use development to 40%. The City’s EV Ready Code Project brings our Zoning Code into alignment with these new state regulations, while further augmenting minimum requirements based on years of study and outreach begun by the City in 2017.

This report contains amendments to the Portland City Zoning Code (Title 33) to complement changes to State law and local discussions. These amendments will clarify land use requirements and standards for the installation of EV-ready infrastructure in new buildings. These development standards will also provide guidance for voluntary EV installations within existing parking areas. The changes make it easier for someone to install charging equipment/stations in the future or retrofit existing parking facilities. The code amendments, however, do not create any new requirements for minimum parking amounts; projects that are currently exempt from parking requirements will continue to be exempt and the amendments will not apply to those projects. The amendments only dictate the amount of EV-ready spaces in situations where new parking spaces are provided for the development types that were subject to the legislative bill.

### Zoning Code changes:

1. Require developments with five or more new dwelling units, when including parking spaces, to provide electric vehicle-ready infrastructure as follows:
  - 100% of parking spaces when six or fewer spaces are provided; or
  - 50% of parking space (minimum six) when more than six spaces are provided.
2. Add development standards (e.g., placement) for all EV-ready installations.
3. Clarify how EV-ready installations are categorized in land use code; they are generally an accessory use, and in infrequent situations, could be a primary use.

4. Target certain incentives for structured parking to include EV chargers.
5. Exclude the cost of EV improvements from the value of the site's improvements, for the purpose of triggering nonconforming upgrades.

**Related Building Code provision:**

While the amended Zoning Code language regulates the number of parking spaces that must provide EV-ready infrastructure, the provisions in OAR 918-460-0200 (Building Codes Division) contain the requirements for what EV-ready infrastructure means, while the Oregon Structure Specialty Code is the mechanism under which plans will be reviewed. In general, EV-ready requirements would include conduit and designated space within the building (or a designated location on the property, for installing remote service) for current or future electrical service capacity to support at least a Level 2 EV charger.

## Planning and Sustainability Commission Recommendation

The PSC recommends that City Council:

- Adopt this report as findings and legislative intent, and
- Amend Title 33, Planning and Zoning, as reflected in this report.

# Section II: Background and Context

## Authorization

In 2017, via the adoption of the City of Portland EV Strategy [Resolution No. 37255], Portland City Council directed BPS staff to explore EV parking and charging infrastructure requirements in new multifamily and commercial construction projects that include parking. In November 2019, City Council passed Ordinance #189769 directing BPS to scope updates to City code that address changing mobility needs, including mobility hubs and EV charging stations. While city staff were scoping the options for these local regulations, the legislature and state agencies began creating their own set of requirements, including options through State codes and rules. For some of the amendments, due to a preexisting preemption, the City needed to wait for the State work in order to implement our local policies.

## Purpose

The Electric Vehicle (EV) Ready Code Project amendments are part of the bureau's work to reduce carbon emissions in the city. These amendments are intended to implement key elements of the City of Portland's [adopted Electric Vehicle Strategy](#), [Portland 2035 Transportation System Plan](#), [2035 Comprehensive Plan's Policy 9.6](#) and [2022-2025 Climate Emergency Work Plan](#). In addition, the amendments are responsive to recent State legislation, [House Bill 2180](#) (2021), which directed the State Building Code Division (BCD) to amend state building code to require that new construction of certain buildings include electrical conduit and charging capacity options to supply 20 percent of parking spaces. This was implemented on 7/1/22 through OAR 918-460-0200. Lastly, the amendments work to augment the Department of Land Conservation and Development's [Climate Friendly and Equitable Communities Rulemaking](#), which developed an administrative rule (OAR 660-12-0410) increasing the minimum requirement for new construction up to 40 percent in urban areas. This project advances both city policies and state provisions.

## Why is electrical charging infrastructure important?

The City of Portland has adopted policy direction to support the use of electric vehicles. While policy direction also prioritizes walking, bicycling, transit, and shared vehicles over private cars, it clearly prioritizes zero-emission vehicles over fossil-fueled private cars for their higher efficiency and reduced air quality impacts.

Research shows that access to convenient charging is a key factor in whether to buy an electric vehicle. Requiring developers to provide, at a minimum, the electrical conduit needed for future charging equipment/stations with new parking will save substantial costs on future charging station installation, which can increase charging convenience leading to increased usage of EVs. In Oregon, developers can choose different options to address current or future electrical capacity needs, which will allow growth potential as demand increases. The recently updated provisions in OAR 918-460-0200 (Building Codes Division) contain the requirements for what EV-ready infrastructure means, while the Oregon Structure Specialty Code is the mechanism under which plans will be reviewed. In general, EV-ready requirements would include conduit and designated space within the building (or a designated location on the property, for installing remote service) for current or future electrical service capacity to support at least a Level 2 EV charger.

Electric vehicles are typically charged at home, work, or publicly accessible charging stations. But installing the necessary infrastructure to support EV charging after a building has been constructed can be cost prohibitive. So, we need to ensure that buildings are designed to include infrastructure to support future installation of EV chargers. This concept is known as “EV readiness.” The average lifespan of a building is 60 years, whereas many automakers anticipate moving toward all-electric vehicle manufacturing in the next 20 years. Ensuring that a building is EV-ready at the time of construction supports a climate-friendly future and minimizes future retrofit-related costs.

Adoption of electric vehicle use is slowed by lack of familiarity and concerns about the availability of charging infrastructure. Ensuring that infrastructure is provided in new development, particularly in multi-dwelling buildings, enables people to choose electric over fossil-fueled vehicles when they purchase or lease a new vehicle.

## Equity

EVs were once rare and were only owned by a few, usually higher income, early adopters. According to Oregon State’s Department of Transportation (ODOT) and Department of Energy (ODOE), a decade ago there were fewer than 1,000 electric vehicles registered in Oregon. As of the end of April 2022, there are more than 50,000 electric vehicles <sup>1</sup>on Oregon roads. These vehicles can now be purchased on either the new or used market. EVs are expected to become even more accessible and affordable over time. Due to policy changes and the market response to those changes, it is anticipated that it will become increasingly difficult to access a traditional internal combustion engine (ICE) vehicle. Most vehicle manufacturers are ramping up the sale of EVs and many States have committed to phase out the sale of passenger ICE vehicles by 2030 or 2035. States around the country are phasing out the sale of internal combustion engine/gas-fueled vehicles. Examples include:

- California is phasing out all ICE vehicle sales by 2035.
- Oregon Department of Environmental Quality (DEQ) recently voted to pass a similar phase out by 2035.
- In March of 2022, Washington banned the sale of non-EV cars and light duty trucks by 2030.
- In Sept. 2021, New York banned non-zero emission cars and light duty trucks by 2035.

Oregon's Governor Kate Brown has indicated that she plans to follow suite. Rhode Island, North Carolina, New Mexico, New Jersey, Massachusetts, Maine, Hawaii, and Connecticut are also expected to follow suit. The European Union (EU) has also committed to this ban.

Available Federal and State incentives have resulted in price parity between EVs and ICE vehicles. Used EVs are currently available and will become even more prevalent over time as more new EV model options become available. Oregon offers some of the country’s most generous EV rebates to income-qualified Oregonians. Oregon offers the following EV rebates:

- Up to \$7500 for income qualified applicants for a new EV
- Up to \$5000 on a used EV for income qualified applicants

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<sup>1</sup> Oregon Department of Energy, Oregon Department of Energy, Mar. 2022, [www.oregon.gov/energy/Data-and-Reports/Pages/Oregon-Electric-Vehicle-Dashboard.aspx](http://www.oregon.gov/energy/Data-and-Reports/Pages/Oregon-Electric-Vehicle-Dashboard.aspx).

Federal Tax credits offer up to an additional \$7500 when purchasing a qualifying new EV. The Inflation Reduction Act will expand federal incentives to include up to a \$4000 credit for qualifying used EVs. As of January 28, 2022, the lowest price used EV for sale in Oregon was a 2013 Nissan Leaf for under \$6000<sup>2</sup>. Making use of the \$5000 Oregon EV rebate would reduce the price of the vehicle to under \$1000. The Portland Clean Energy Fund (PCEF) supports a Metropolitan Family Services program offering low-interest loans and grants for low-income Portlanders purchase of new or used EVs, or electric bikes. This loan or grant can be stacked with State rebates and federal incentives. At this point in time, purchasing a used EV is feasible for low-income Portlanders. Additionally, EVs are cheaper to own than ICE vehicles due to less expensive fuel and maintenance costs. Modeling shows that EV owners save an average of \$6,000 over the vehicle’s lifetime. <sup>3</sup>

Due to the amount of savings associated with owning an EV, low-income Portlanders can benefit from owning an EV rather than an older gas vehicle. However, it is unrealistic for them to access an EV without convenient and affordable access to EV charging.

Access to charging that is reliable, convenient, and affordable is critical to enabling EV ownership. Some sources estimate that more than 80% of charging occurs at home.<sup>4</sup> However, rental housing tenants often lack the ability to access or install a charger where they park at home due to a lack of dedicated off-street parking, an inability to afford the expense of charger installation, or a property owner’s unwillingness to install a charger.

Approximately 36% of households in the United States are renters, so access to EV-charging facilities in multifamily housing is key to ensuring equitable access. In Portland, the percentage of renters is higher than the national average, exceeding 47% of households. Renters also represent a greater portion of low- and moderate-income (LMI) and Black, Indigenous, and People of Color (BIPOC) households.<sup>5</sup> To date, these households have largely been unable to benefit from electric vehicles.

Currently, most EV owners are higher income single-family homeowners that can install a private, dedicated charger at home. Many LMI and BIPOC households face challenges in attaining the resources needed to benefit from the cost savings associated with EVs and participate in the clean energy transition as a result of structural and institutional racism. Without targeted interventions, these groups are at risk of remaining locked out of the EV transition, and the economic benefits that can be derived; additionally, ambitious climate targets and EV deployment goals will not be achieved/realized unless EVs are accessible to more households.

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<sup>2</sup> “Oregon Electric Vehicle Trends.” Recurrent, Recurrent, 2022, [www.recurrentauto.com/research/oregon-electric-vehicle-trends?utm\\_source=linkedin&utm\\_medium=social&utm\\_campaign=brand](https://www.recurrentauto.com/research/oregon-electric-vehicle-trends?utm_source=linkedin&utm_medium=social&utm_campaign=brand). Accessed 8 Aug. 2022.

<sup>3</sup> Orvis, Robbie. “Most Electric Vehicles are Cheaper to Own Off the Lot than Gas Cars.” Energy Innovation Policy & Technology LLC, Energy Innovation Policy and Technology LLC, May 2022, [energyinnovation.org/wp-content/uploads/2022/05/Most-Electric-Vehicles-Are-Cheaper-Off-the-Lot-Than-Gas-Cars-From-Day-One.pdf](https://energyinnovation.org/wp-content/uploads/2022/05/Most-Electric-Vehicles-Are-Cheaper-Off-the-Lot-Than-Gas-Cars-From-Day-One.pdf).

<sup>4</sup> Office of Energy Efficiency & Renewable Energy. (n.d.). Charging at Home. United States Department of Energy. Retrieved from: <https://www.energy.gov/eere/electricvehicles/charging-home>

<sup>5</sup> Joint Center for Housing Studies of Harvard University. (2017). Renter Households. Retrieved from: [https://www.jchs.harvard.edu/sites/default/files/02\\_harvard\\_jchs\\_americas\\_rental\\_housing\\_2017.pdf](https://www.jchs.harvard.edu/sites/default/files/02_harvard_jchs_americas_rental_housing_2017.pdf)

Renters who do own EVs may be limited in future housing choices based on proximity to EV charging. This is particularly problematic for renters because they tend to move more frequently than homeowners. Targeted action is also needed to ensure that structural and distributional inequities are corrected as communities transition to cleaner technologies. By focusing on the renter population, this project seeks to expand access to EV charging for these traditionally underserved communities.

Portland's EV-Ready requirements will facilitate access to EV charging infrastructure for residents of multi-dwelling units to ensure that the EV-related infrastructure, which is expensive to add after construction, is distributed equitably among new construction residential projects. This code update will future-proof buildings that are anticipated to be around for the next 50-80 years. Recognizing that on-site parking can be a limited resource, our amendments require a higher percentage of EV-ready spaces for smaller residential parking areas which could allow for the potential to share the charging facility and unbundle the parking spaces from the unit.

### **Portland Bureau of Transportation (PBOT) EV Charging Related Projects**

To prepare for upcoming demand and to facilitate the transition to zero emission vehicles there will need to be ample charging available on private land as well as in the right-of-way (ROW). PBOT is working on the following complementary efforts which will permit EV charging in the ROW, as a means to expand access to EV charging to further facilitate the transition.

#### **Residential:**

- Level 1 charging electrical cords are allowed to cross the sidewalk when accompanied with an ADA accessible cord cover.

#### **Neighborhood Centers:**

- PBOT staff are working to design a permit program that allows utilities and charging companies to locate publicly accessible Level 2 chargers in the ROW near neighborhood commercial centers. The goal is to have at least one charger per neighborhood center in Portland.

More information on PBOT EV charging related projects can be found on [PBOT's Electric Vehicles web page](#).

### **Economic impact considerations**

During the summer 2021, BPS commissioned an *EV Ready Economic Analysis Report* by Johnson Economics as part of the code concepts analysis phase. The Johnson Economics' *EV Ready Economic Analysis (2021)* in the appendix outlines how the installation of EV conduit could affect housing affordability. The estimated impact on overall development cost associated with EV-ready infrastructure is expected to be modest relative to the overall cost of development.

The economic study considered the impacts at the time when the code amendments would have moved EV-ready space requirements from 20% to 50% of parking spaces for new mixed-use and multi-dwelling development permits. This resulted in an average cost per space ranging from \$800 to \$4,700, depending upon the technical requirements and project-specific variables. However, it should be noted that with the more recent state rules imposed through the Climate Friendly and Equitable Communities rulemaking done by the DLCDC (see page 1), the additional Portland requirement is actually only a 10% increase, from the 40% mandated by DLCDC to the 50% required in Portland. It should also be noted that

the Economic Analysis was completed at a point in time when staff thought the electrical capacity was going to be part of the State baseline requirement. However, the electrical capacity, to support Level 2 chargers, is not included as part of State’s Building Code requirement. Therefore the estimates in the economic analysis for construction costs and impact on rents, are an overestimate of the final regulatory requirement.

According to the economic analysis, the additional cost of adding conduits to support Level 2 EV chargers, would need to be offset by increased revenue, which could be offset by user charges if the infrastructure was demanded in the market. The additional cost would more likely be reflected in marginally higher rent levels and/or lower underlying land values. The impact of this mandate on rent levels is expected to be below 1% for new construction. The economic analysis concludes that these changes have less impact when required for new construction than as part of a rehab/retrofit of an existing building.

The analysis also highlights a significant difference in cost between installing dedicated circuits and load management (shared) EV-ready infrastructure, and that dedicated infrastructure is much more expensive than shared systems (Table 1). The State EV-Ready requirement allows developers to install load management (shared) systems which allows developers to take advantage of those savings if they so choose. It is also anticipated that per space cost averages may go down as the number of outfitted parking spaces go up through economies of scale.

	Estimated Costs		
	Low	High	Average
<b>Cost per EV Space</b>			
<i>Dedicated</i>	\$3,667	\$4,791	\$4,229
<i>Shared</i>	\$824	\$1,902	\$1,363
<b>Incremental Cost/Unit</b>			
<i>Dedicated</i>	\$550	\$1,582	\$1,066
<i>Shared</i>	\$185	\$622	\$404
<b>Baseline Costs</b>	\$275,000	\$375,000	\$325,000
<b>% Shift in Costs</b>			
<i>Dedicated</i>	0.20%	0.42%	0.33%
<i>Shared</i>	0.07%	0.17%	0.12%

### Utility Support to Offset EV-Ready Costs for Affordable Housing Projects Impacted by Code Change

Portland General Electric (PGE) and Pacific Power are planning to offer funding support, upon Oregon Public Utility Commission (OPUC) and stakeholder approval, to a group of affordable housing builders to offset costs associated with EV-Ready requirements for new construction of multi-dwelling projects. Funding will be prioritized for projects that have already identified budgets and will be impacted in the early phase of EV-Ready building code implementation.

Additionally, both electric utilities offer rebates to support the purchase of residential Level 2 EV chargers for multi-dwelling buildings with a focus on low and moderate-income housing developments:

- [PGE offers up to \\$2,300 per port for income-eligible multifamily properties](#) for Level 2 EV chargers.
- PacifiCorp [offers rebates up to \\$3000/port](#) for EV charging infrastructure in multifamily dwellings.

Both utilities are exploring how to better support installation of EV charging equipment in multi-dwelling residential buildings and will be proposing strategies in their upcoming Transportation Electrification plans for Oregon.

## **State agencies: Regulatory changes and coordination**

At the legislative level, the passage of HB2180 creates opportunities for the State codes and rules to become more lenient for local alternatives. While the recent adopted legislation and subsequent DLCD rulemaking creates a statewide threshold, it allows local jurisdictions to exceed these thresholds for certain forms of development. This project follows through on this allowance, while also providing greater clarification for how EV chargers are to be regulated through city development standards.

Before these changes, Oregon OAR 918-020-0380 Electric Vehicle Ready Parking (2017) only required new construction of parking facilities with 50 or more open parking spaces to make five (5) percent of the parking spaces ready for future installation of EV charging stations.

The updated State regulation, authorized by HB 2180 and codified through ORS 455.417 and OAR 918-460-0200 (Building Codes Division)(effective July 1, 2022) requires the installation of conduit and electrical service capacity options to support the current or future installation of a minimum Level 2 EV charging station for at least 20% of the vehicle parking spaces at newly constructed commercial buildings under private ownership, multifamily residential buildings with five or more dwelling units and mixed-use buildings with privately owned commercial space and five or more dwelling units. The legislation allows local municipalities to require EV-readiness in more than 20% of parking spaces through a process concerning land use.

In response to Governor Brown's Executive Order 20-04 to reduce climate pollution, the Department of Land Conservation and Development (DLCD) launched its Climate-Friendly and Equitable Communities Rulemaking in September 2020 and adopted permanent rules at the meeting of the Land Conservation and Development Commission's July 2022 meeting.

The new DLCD rules require many communities including Portland (and Metro) to change their local transportation and land use plans to ensure Oregonians have more safe, comfortable ways to get around, and don't have to drive long distances to meet their daily needs. The rules also aim to improve equity, and help community transportation, housing, and planning. Specific to electric vehicles, the DLCD rules require new housing and mixed-use development to include electric conduit (pipes) for 40% of parking spots for the multi-dwelling and mixed-use buildings containing at least five units. The capacity options are based on the Building Codes, readying these sites to add wiring and charging stations to support EVs as the market expands. These rules expand on the building code requirements from HB2180 and apply to urban jurisdictions statewide. City staff had ongoing discussions with DLCD staff to ensure that the changes adopted in the rule making were consistent with the intent of state legislation/building code and with our regulatory scoping work at the local level.

The changes at the State level were proposed and ultimately approved at the same time that BPS staff were developing the local EV-ready regulations. During this development, staff planned to increase the EV-ready requirement above the initial provisions dictated by the original legislation. The City's initial EV-ready proposals throughout the draft phase have been to require 50% of parking provided for new multi-dwelling and mixed-use buildings, with higher percentages for EV-ready when limited on-site parking of less than 12 spaces are provided, up to 100% for 6 or fewer spaces. This higher ratio



acknowledges that a greater percentage of people in Multnomah County than elsewhere in the state have purchased electric vehicles. While Multnomah County represents approximately 20% of the state population, the County has nearly 30% of the registered EVs<sup>6</sup>. However, with the recent DLCD rules, the increase from the state land use minimum requirement to the local requirement is 10%, from 40% to 50% for most parking areas service residential uses.

## **American Disability Act (ADA)**

The State building code – rather than a city or county zoning code – requires the minimum number of ADA parking spaces, as well as the dimensional and signage requirements for them. ADA parking requirements are codified in the State of Oregon’s [Oregon Revised Statute \(ORS\) 447.233](#) and the [Oregon Structural Specialty Code, Chapter 11 – Accessibility](#). The City of Portland and all other Oregon cities and counties defer to these state regulations for ADA requirements. For accessible parking, City of Portland BDS Plans Examiners specifically look at Oregon Structural Specialty Code, Chapter 11 – Accessibility, Table 1106.1 Accessible Parking Spaces for the minimum number of accessible spaces.

## **Coordination with City bureaus**

Project staff have worked with several City bureaus (see the Acknowledgements page) throughout the project. Coordination has ranged from formal participation with the Enabling Tenants Access to EV Charging meetings and the Technical Advisory Planning Series public meetings to discussions with the City’s building officials and electrical code experts to ensure that this proposal is consistent and parallel with the work being done by the State Building Codes Division. The building and code experts were especially helpful in ensuring that the direction laid out by House Bill 2180 and augmented by the DLCD was accurately turned into implementable regulations within the Oregon Administrative Rules (OAR). Project staff also included other members of the Bureau of Development Services (BDS) and Portland Bureau of Transportation (PBOT) to review the concept and these amendments and follow up discussions.

## **Topics not pursued for amendments**

Some topics were brought up by stakeholders and discussed internally with City bureaus, but resulted in no amendments pursued for this project. These topics included mobility hubs through discussions with Transportation (PBOT) and signage regulations as they pertain to EV charging units with Development Service (BDS).

## **Addressing Mobility Hubs**

During project scoping and initial outreach discussions, there were suggestions to clarify the use category of a site that dedicates space to active and alternative transportation options and facilitates EV charging. These areas are often called “mobility hubs” within subject literature.

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<sup>6</sup> Oregon Department of Energy, Oregon Department of Energy, Mar. 2022, [www.oregon.gov/energy/Data-and-Reports/Pages/Oregon-Electric-Vehicle-Dashboard.aspx](http://www.oregon.gov/energy/Data-and-Reports/Pages/Oregon-Electric-Vehicle-Dashboard.aspx).

Through research and discussions with PBOT, it was found that examples of mobility hubs most often consist of multi-modal transportation stations and areas of transit and trip making transfers. When these are located in the right-of-way, they are subject to Title 17 and reviewed by PBOT, and not through the Zoning Code. If these are located on a site outside of the right-of-way, they generally fall under the existing use categories, “Basic Utilities” (which include mass transit stops and light rail stations) or “Community Services” (which include park-and-ride facilities). Elements of a mobility hub may also be incorporated as accessory development (EV and bike parking, etc.) to the primary uses on the site.

PBOT is working to incorporate the concepts of mobility hubs into their planning process and have engaged with the consultant Alta Planning to come up with a series of typologies for mobility hubs. This work may feed into amendments to PBOTs current regulations in Title 16 and 17, or their Administrative Rules.

However, within the Zoning Code, the mobility hub concept is already addressed through the existing use categories that include multi-modal transit facilities mentioned above. Development standards, with the amendments included in this document, address site planning and parking of EVs and their chargers. As a result, the term mobility hub is not being added to the Zoning Code.

EV charging technology may improve over time to the point where a charge can be made in a matter of minutes, similar to the filling up of a gas tank. If a quick EV-charging facility is set up for vehicles to line up to access an EV-charging station terminal within a queueing line, this facility would be classified as a Quick Vehicle Servicing use and subject to the same drive-through facility standards as a gas station. However, EV chargers that are incorporated into a parking space are considered part of the parking area and not considered a drive-through, even if the parking space has a time limitation. The Zoning Code is being updated to address EV-charging facilities, as they may occur in the future, that operate like a gas/filling station.

### **Sign Code Regulations**

Generally, EV chargers include some form of text or advertising on them to attract attention, and because the signs are often visible outside the site, they may be subject to the regulations of signs under Title 32, Signs and Related Regulations. The idea of proposing sign exemptions or regulations specific to EV-charging signage was discussed with implementation staff from the Bureau of Development Services (BDS) who work on sign permits along with PBOT staff. While the need for a more holistic sign code update continues to be present, concerns about developing such specific regulations without a larger sign code discussion remain. Since a rewrite of the sign code is outside the scope of this project, no amendments related to Title 32 are suggested at this time. BDS staff will continue to review and monitor signage related to EV chargers as they currently apply. In addition, signs required by federal, state, or local law as well as directional signs are allowed within certain size limitations.

# Section III: Relationship to the Comprehensive Plan

## Comprehensive Plan Guiding Principles

The EV Ready Code Project helps implement the 2035 Comprehensive Plan in the following ways. More detailed findings on the Goals and Policies of the Comprehensive Plan are found in Exhibit A

**Economic Prosperity.** *Support a low-carbon economy and foster employment growth, competitiveness, and equitably-distributed household prosperity.*

This project advances this principle by supporting low-carbon transportation options for Portlanders that reside in multi-dwelling housing and mixed-use development with five or more units in buildings built after the code updates go into effect. Transportation is the second highest-household cost. The average cost to operate an EV in the United States is \$485 per year, while the average for a gasoline-powered vehicle is \$1,117. The exact price difference depends on gas and electric rates where you live, plus the type of car you drive.<sup>7</sup> These standards support lower-cost and climate friendly transportation options, which can provide tangible economic benefits to individuals and households across Portland.

**Human Health.** *Avoid or minimize negative health impacts and improve opportunities for Portlanders to lead healthy, active lives.*

This project advances this principle by supporting the use of electric vehicles as a form of transportation. Expanding the use of electric vehicles in large metropolitan areas could reduce health harms from tailpipe emissions, which contain nitrogen dioxide (NO<sub>2</sub>), fine particulate matter (PM<sub>2.5</sub>) and other harmful compounds.<sup>8</sup> BIPOC and low-income communities are disproportionately exposed to poor air quality due to lower income housing often being located near highways and busy roads. This project helps facilitate vehicle electrification by requiring EV-ready conduit and greater access to charging in new development; and, further vehicle electrification is an opportunity to achieve large public health benefits.

**Environmental Health.** *Weave nature into the city and foster a healthy environment that sustains people, neighborhoods, and fish and wildlife. Recognize the intrinsic value of nature and sustain the ecosystem services of Portland's air, water, and land.*

This project advances this principle by increasing the supply of EV-ready parking, which supports EV use, a low-carbon transportation option. Climate change threatens not just Oregon's natural treasures, but also Portlanders' jobs and health. Forty-three percent of all local carbon

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<sup>7</sup> Energy Sage, "Costs and benefits of electric cars vs. conventional vehicles,"

<https://www.energysage.com/electric-vehicles/costs-and-benefits-evs/evs-vs-fossil-fuel-vehicles/>, (2021)

<sup>8</sup> ScienceDirect, "Assessing the health impacts of electric vehicles through air pollution in the United States," <https://www.sciencedirect.com/science/article/pii/S016041202031970X?via%3Dihub>, (2020)

emissions come from transportation sources. Utilizing vehicle electrification (fuel-shifting) is one of the key strategies to reduce carbon emissions from the transportation sector.

**Equity.** *Promote equity and environmental justice by reducing disparities, minimizing burdens, extending community benefits, increasing the amount of affordable housing, affirmatively furthering fair housing, proactively fighting displacement, and improving socio-economic opportunities for underserved and underrepresented populations. Intentionally engage underserved and underrepresented populations in decisions that affect them. Specifically recognize, address, and prevent repetition of the injustices suffered by communities of color throughout Portland’s history.*

This project advances this principle by establishing standards for EV charging access that consider the needs of people with different tenure, income, abilities and by requiring, rather than relying on the market, EV-ready parking in new development. Additionally, the standards were developed based on considerable feedback and engagement with a wide variety of stakeholders, including residents of multi-dwelling buildings, affordable housing developers, community-based organizations, and the Portland Housing Bureau. The project worked to balance the City goals of providing more affordable housing and supporting affordable, environmentally friendly transportation options.

Currently, most EV owners are higher income single-family homeowners that can install a private, dedicated charger at home, while many LMI and BIPOC households face challenges in attaining the resources needed to benefit from the cost savings associated with EVs and participate in the clean energy transition as a result of structural and institutional racism. Without targeted interventions, these groups are at risk of remaining locked out of the EV transition, and the economic benefits that can be derived; additionally, ambitious climate targets and EV deployment goals will not be achieved/realized unless EVs are accessible to more households.

Additionally, renters who do own EVs may be limited in future housing choices based on proximity to EV charging. This is particularly problematic for renters because they tend to move more frequently than homeowners. Targeted action is also needed to ensure that structural and distributional inequities are corrected as communities transition to cleaner technologies. By focusing on the renter population, this project seeks to expand access to EV charging for these traditionally underserved communities.

Portland’s EV-Ready requirements will facilitate access to EV charging infrastructure for residents of multi-dwelling units to ensure that the EV-related infrastructure, which is expensive to add after construction, is distributed equitably among new construction residential projects. These code updates will future-proof buildings that are anticipated to be around for the next 50-80 years. Recognizing that on-site parking can be a limited resource, our amendments require a higher percentage of EV-ready spaces for smaller residential parking areas which could allow for the potential to share the charging facility and unbundle the parking spaces from the unit.

**Resilience.** *Reduce risk and improve the ability of individuals, communities, economic systems, and the natural and built environments to withstand, recover from, and adapt to changes from natural hazards, human-made disasters, climate change, and economic shifts.*

This project advances this principle in that the promotion of an increase in EV-ready access enables more EV adoption—the kind of accelerated adoption that encourages those in the car market to shift from fuel-powered to EV sales as well as the use of low-carbon transportation options. Fundamentally, the number of private vehicles must decrease, the distance travelled must shrink, and alternative forms of electric transport (including electric buses, electric-scooters and electric bikes) must substitute for car trips. Making the city more attractive for walking and cycling is also an important strategy to reduce carbon from the transportation sector and to develop a low-carbon, resilient infrastructure system for Portland. Yet, for those that choose or must drive, shifting to electric vehicles is a necessary part of the transition. To mitigate climate change, an increasing number of governors are mandating a phase-out of gas-powered vehicle sales. The vehicle market is also trending towards producing more efficient vehicles. EV charging infrastructure is currently needed to fuel existing vehicles and will become even more important in the next three to five years and beyond.

## Comprehensive Plan Goals and Policies

The 2035 Comprehensive Plan includes goals and policy language designed to support and further the guiding principles. The EV Ready Code Project primarily supports Chapter 9: Transportation. However, the project also supports the closely linked goals and policies around development, urban form, and the environment, which span the following chapters of the Comprehensive Plan: Chapter 3, Urban Form; Chapter 4, Design and Development; Chapter 5, Housing; Chapter 6, Economic Development; Chapter 7, Environment and Watershed Health; and Chapter 10, Land Use Designations and Zoning.

Key Comprehensive Plan goals and policies supported by the EV Ready Code Project are listed below.

### Community Engagement

**Goal 2.B: Social justice and equity.** The City of Portland seeks social justice by expanding choice and opportunity for all community members, recognizing a special responsibility to identify and engage, as genuine partners, under-served and under-represented communities in planning, investment, implementation, and enforcement processes, particularly those with potential to be adversely affected by the results of decisions. The City actively works to improve its planning and investment-related decisions to achieve equitable distribution of burdens and benefits and address past injustices.

**Policy 2.3 Extend benefits.** Ensure plans and investments promote environmental justice by extending the community benefits associated with environmental assets, land use, and public investments to communities of color, low-income populations, and other under-served or under-represented groups impacted by the decision. Maximize economic, cultural, political, and environmental benefits through ongoing partnerships.

**Policy 2.4 Eliminate burdens.** Ensure plans and investments eliminate associated disproportionate burdens (e.g., adverse environmental, economic, or community impacts) for to communities of color, low-income populations, and other under-served or under-represented groups impacted by the decision.

**2.4.a.** Minimize or mitigate disproportionate burdens in cases where they cannot be eliminated.

**2.4.b.** Use plans and investments to address disproportionate burdens of previous decisions.

## Urban Form

**Goal 3.A: A city designed for people.** Portland’s built environment is designed to serve the needs and aspirations of all Portlanders, promoting prosperity, health, equity, and resiliency. New development, redevelopment, and public investments reduce disparities and encourage social interaction to create a healthy connected city.

**Goal 3.B: A climate and hazard resilient urban form.** Portland’s compact urban form, sustainable building development practices, green infrastructure, and active transportation system reduce carbon emissions, reduce natural hazard risks and impacts, and improve resilience to the effects of climate change.

**Policy 3.3 Equitable development.** Guide development, growth, and public facility investment to reduce disparities; encourage equitable access to opportunities, mitigate the impacts of development on income disparity, displacement and housing affordability; and produce positive outcomes for all Portlanders.

**3.3.a.** Anticipate, avoid, reduce, and mitigate negative public facility and development impacts, especially where those impacts inequitably burden communities of color, under-served and under-represented communities, and other vulnerable populations.

**3.3.b.** Make needed investments in areas that are deficient in public facilities to reduce disparities and increase equity. Accompany these investments with proactive measures to avoid displacement and increase affordable housing.

**3.3.c.** Encourage use of plans, agreements, incentives, and other tools to promote equitable outcomes from development projects that benefit from public facility investments.

**3.3.d.** Incorporate requirements in the Zoning Code to provide public and community benefits as a condition of development projects to receive increased development allowances.

**3.3.e.** When private property value is increased by public plans and investments, require development to address or mitigate displacement impacts and impacts on affordability, in ways that are related and roughly proportional to these impacts.

**3.3.f.** Coordinate housing, economic development, and public facility plans and investments to create an integrated community development approach to restore communities impacted by past decisions. See Policy 5.18.

**3.3.g.** Encourage developers to engage directly with a broad range of impacted communities to identify potential impacts of private development projects, develop mitigation measures, and provide community benefits to address adverse impacts.

**Policy 3.4 All ages and abilities.** Strive for a built environment designed to provide a safe, healthful, and attractive environment for people of all ages and abilities.

## Design and Development

**Goal 4.C: Human and environmental health.** Neighborhoods and development are efficiently designed and built to enhance human and environmental health: they protect safety and livability; support local access to healthy food; limit negative impacts on water, hydrology, and air quality; reduce carbon emissions; encourage active and sustainable design; protect wildlife; address urban heat islands; and integrate nature and the built environment.

**Policy 4.19 Resource efficient and healthy residential design and development.** Support resource efficient and healthy residential design and development.

**Policy 4.24 Drive-through facilities.** Prohibit drive through facilities in the Central City, and limit new development of new ones in the Inner Ring Districts and centers in order to support a pedestrian-oriented environment.

**Policy 4.34 Auto-oriented facilities, uses, and exterior displays.** Minimize the adverse impacts of highways, auto-oriented uses, vehicle areas, drive-through areas, signage, and exterior display and storage areas on adjacent residential uses.

**Policy 4.69 Reduce carbon emissions.** Encourage a development pattern that minimizes carbon emissions from building and transportation energy use.

## **Housing**

**Goal 5.C: Healthy connected city.** Portlanders live in safe, healthy housing that provides convenient access to jobs and to goods and services that meet daily needs. This housing is connected to the rest of the city and region by safe, convenient, and affordable multimodal transportation.

**Policy 5.9 Accessible design for all.** Encourage new construction and retrofitting to create physically-accessible housing to meet the needs of older adults and people with disabilities, especially in centers, station areas, and other places that are proximate to services and transit.

**Policy 5.12 Impact analysis.** Evaluate plans and investments, significant new infrastructure, and significant new development to identify potential disparate impacts on housing choice, access, and affordability for protected classes and low-income households. Identify and implement strategies to mitigate the anticipated impacts.

**Policy 5.15 Gentrification/displacement risk.** Evaluate plans and investments, significant new infrastructure, and significant new development for the potential to increase housing costs for, or cause displacement of communities of color, low- and moderate-income households, and renters. Identify and implement strategies to mitigate the anticipated impacts.

**Policy 5.19 Aging in Place.** Encourage a range of housing options and supportive environments to enable older adults to remain in their communities as their needs change (emphasis on supportive environments)

**Policy 5.36 Impact of regulations on affordability.** Evaluate how existing and new regulations affect private development of affordable housing, and minimize negative impacts where possible. Avoid regulations that facilitate economically-exclusive neighborhoods.

## **Environment and Watershed Health**

**Goal 7.A: Climate.** Carbon emissions are reduced to 50 percent below 1990 levels by 2035.

## Public Facilities and Services

**Goal 8.M: Energy infrastructure and services.** Residents, businesses, and institutions are served by reliable energy infrastructure that provides efficient, low-carbon, affordable energy through decision-making based on integrated resource planning.

**Policy 8.34 Resource efficiency.** Reduce the energy and resource use, waste, and carbon emissions from facilities necessary to serve designated land uses to meet adopted City goals and targets.

**Policy 8.125 Energy efficiency.** Promote efficient and sustainable production and use of energy resources by residents and businesses, including low-carbon renewable energy sources, district energy systems, and distributed generation, through land use plans, zoning, and other legislative land use decisions.

## Transportation

**Goal 9.D: Environmentally sustainable.** The transportation system increasingly uses active transportation, renewable energy, or electricity from renewable sources, achieves adopted carbon reduction targets, and reduces air pollution, water pollution, noise, and Portlanders' reliance on private vehicles.

**Policy 9.9 Accessible and age-friendly transportation system.** Ensure that transportation facilities are accessible to people of all ages and abilities, and that all improvements to the transportation system (traffic, transit, bicycle, and pedestrian) in the public right-of-way comply with the Americans with Disabilities Act of 1990. Improve and adapt the transportation system to better meet the needs of the most vulnerable users, including the young, older adults, and people with different abilities.

**Policy 9.39 Automobile efficiency.** Coordinate land use and transportation plans and programs with other public and private stakeholders to encourage vehicle technology innovation, shifts toward electric and other cleaner, more energy-efficient vehicles and fuels, integration of smart vehicle technology with intelligent transportation systems, and greater use of options such as car-share, carpool, and taxi.

**Policy 9.68 New mobility priorities and outcomes.** Facilitate new mobility vehicles and services with the lowest climate and congestion impacts and greatest equity benefits; with priority to vehicles that are fleet/shared ownership, fully automated, electric and, for passenger vehicles, shared by multiple passengers.

**Policy 9.69 New mobility tools.** Use a full range of tools to ensure that new mobility vehicles and services and private data communications devices installed in the City right-of-way contribute to achieving Comprehensive Plan and Transportation System Plan goals and policies.



# Section IV: Public Involvement

Development of the EV Ready Code Project concepts and the resulting Zoning Code amendments were informed by a range of public involvement activities.

## Enabling Tenant Access to EV Charging Community Stakeholders

In 2020, the Bureau of Planning and Sustainability received a grant from the Urban Sustainability Directors Network (USDN) Innovation Fund for the “Enabling Tenant Access to EV Charging” project. This work informed the initial scoping of the EV Ready Code Project. The intent of the Enabling Tenant Access to EV Charging project was to provide cities with stakeholder-tested and context-grounded strategies that local governments can use to overcome barriers and enable access to EV charging for renters, in their cities, particularly those in Low-and-Moderate Income (LMI) households and Black, Indigenous, and People of Color (BIPOC) communities.

Four core USDN cities from the U.S. were involved throughout the Enabling Tenant Access to EV Charging project, as well as seven U.S. and Canadian observer cities who participated in calls and project progress conversations. Portland, OR joined Burlington, VT, Somerville, MA, Cambridge, MA as the core USDN cities.

The Enabling Tenant Access to EV Charging Project supported a facilitated early discussion with a Portland stakeholder group in January through April 2020 to do the following:

- Develop a shared understanding of an equity lens and framework for the project.
- Identify key project issues and identify the communities that are impacted.

## Enabling Tenant Access to EV Charging Key Equity Goals

One of the reasons why low-income people and communities of color are impacted more than the general population by COVID-19 is due to underlining health conditions such as asthma, lung infections, and other respiratory diseases that are exacerbated, and often caused, by exposure to poor transportation-related air quality.

This work to advance EV-ready buildings was done in partnership with BIPOC representatives and staff from community organizations representing underserved Portlanders to ensure lived experience, needs and ideas were considered as we developed the proposals.

The following key equity goals were developed by project staff and reviewed by the Enabling Tenant Access to EV Charging stakeholders to provide the overarching framework direction for any City-initiated regulatory and programmatic recommendations.

- **Expand EV access.** Everyone, especially renters, low-income people, and communities of color, should be able to use electric vehicles to access future jobs, education, and services.
- **Inclusion in technology advances.** As governments develop more aggressive clean fuel requirements and vehicle manufacturing companies’ phase-out internal combustion engines,

low-income people and communities of color should not be left out of the future transportation system.

- **Public health and air quality.** Low-income people and communities of color are disproportionately exposed to transportation-related air pollution due to both residential segregation and the siting of multi-dwelling housing near freeway air pollution sheds. Low-income people and communities of color should not be disproportionately exposed to poor air quality.
- **Reduced household costs.** Low-income people and communities of color benefit the most from EVs. The fuel and maintenance cost savings associated with EVs are more significant for low-income households compared to medium and higher income households. See the Equity Section of this document on page 4 for more information on savings associated with using and owning an EV. Low-income people and communities of color should be able to benefit from the reduced fuel and maintenance costs associated with using electric vehicles.

## Technical Advisory Planning Series

To facilitate a conversation among various interested parties, BPS re-convened participants in the Enabling Tenant Access to EV Charging stakeholder group and held a series of public meetings from January through June 2021.

The technical advisory planning series participants consisted of engaged external stakeholders including representatives from: EV-related businesses, utilities, and community organizations, to inform the scoping and direction of the project and to discuss how to increase EV charging access to renters. Community organization involvement included representatives from Verde, Hacienda CDC, Portland Tenants United and Imagine Black. BPS provided \$300 per meeting to these four organizations to support their participation.

The purpose of convening this planning series was for the participants to provide early input to BPS in developing the general concepts of the code amendments. Then BPS staff worked closely with the Portland Bureau of Transportation (PBOT) and the Bureau of Development Services (BDS) staff to develop the actual code amendments in this document. At the June 2021 meeting, the following Code Concepts were reviewed and largely incorporated except as noted by the italicized text after each concept below:

- **Code Concept #1:** Clarify how EV-ready installations are categorized in land use code (e.g., primary versus accessory use)
- **Code Concept #2:** Add development standards (e.g., placement, signage)
- **Code Concept #3:** Define what use category a mobility hub is in accordance with the Transportation System Plan's (TSP) New Mobility policies – *Project staff is not making any changes to the code regarding this concept. Please see Section II for further information.*
- **Code Concept #4:** Multi-dwelling and mixed-use with five units or more
  - 100% parking spaces are EV-ready for up to 6 spaces
  - 50% of parking spaces for parking lots with 7 or more spaces
- **Code Concept #5:** Commercial – *Project staff notes that this is already addressed in the adopted HB 2180.*
  - 20% of parking spaces are EV-ready

- **Code Concept #6:** Adding EV charging installation to qualify for structure parking Floor Area Ratio (FAR) discount
- **Code Concept #7:** Non-conforming: EV infrastructure costs are not counted towards non-conforming upgrades thresholds
- **Code Concept #8:** For recreational fields for organized sports, schools and school sites, and other conditional uses, when adding EV infrastructure costs to the list of exterior improvements that are exempt for work allowed without a conditional use review
- **Code Concept #9:** Areas with parking minimums are an opportunity to expand car-share requirement to include electric vehicles and related EV-ready infrastructure
- **Code Concept #10:** Areas in Central City that require short-term/carpool parking are an opportunity to require EV infrastructure
- **Code Concept #11:** Ensure commercial parking provide EV-ready infrastructure
- **Code Concept #12:** Sign Code – *Project staff is not making any amendments to the sign code. See Section #1 for further information.*

## EV Experience Interviews

In February through June 2021, several Portland BIPOC residents of multi-dwelling housing with current or prior ownership of personal electric vehicles were interviewed. The questions were designed to receive information about the following topic areas:

**Ownership and usability information** – Purpose of these questions is to understand the type of vehicle, and EV infrastructure needed to support the vehicle, to inform future requirements of charging infrastructure for EV code projects.

**Charging information** – Purpose of these questions is to understand charging needs and patterns of the EV users and the availability of charging infrastructure in their neighborhood.

**Design information** – Questions to inform the ideal design and placement of charging infrastructure.

**Safety information** – Questions understand safety and accessibility issues around charging stations.

### Key takeaways:

- Finding functional and less expensive EV chargers around the city is a huge concern for EV owners.
- Most multi-dwelling buildings around Portland do not have EV charging infrastructure as evident from the EV owner’s experience.
- Offsite charging located a few blocks away is a concern for the EV owners, concerns include people stealing batteries, meddling with the charging process or removing the car from the charger.
- Lack of reliable charging infrastructure in rental apartments or duplexes forces EV owners to give up the EVs.
- EV owners who have tried to work with their rental housing management to get charging infrastructure on site were unable to get the requested amenity for use.

- Some of the interviewees shared having/asking for an EV charging station is an extra perk that the building management may or may not provide.
- Ownership of the EV affects the decision for where to live or rent an apartment around Portland; however, owners are not able to find many suitable options for rental housing with an EV charging station within the building or complex.
- Newer apartments that include charging infrastructure advertise them to attract EV owners to rent in those apartments.
- Most EV owners suggest that having a mix of DC fast chargers (that takes about 30 min to charge) and the typical Level 2 charger (takes about 4-6 hrs. to charge a car) in multi-unit apartment building would be ideal. This would allow enough time for folks to keep the car parked at the charging station, although DC fast chargers could have the requirement to move the car frequently to allow efficient shared use of the charging infrastructure..
- In terms of design and accessibility, interviewees believe having charging stations that do not time out quickly when activated would give enough time for a person who has accessibility issues (for e.g., on a wheelchair) to pull the cord and plug in to the vehicle to begin charging.
- Interviewees experienced anxiety when using charging stations that are not explicitly visible or are hidden behind the trees. When chargers are not readily visible, it is difficult for the EV owners to find and use them. Lighting was a primary accessibility concern and most EV owners agreed/suggested having adequate lighting at the charging station is the most beneficial safety feature.
- Maintaining the installed EV chargers to make sure they are functional and running was very important for the interviewees. Some sort of accountability that would make sure the chargers are running and not broken would give people less range anxiety and more confidence with EV charging infrastructure.
- Standardized charging stations that are not super expensive to use and do not require a variety of different apps to operate but rather could be activated via a standard app would be ideal for the EV users.

***“Just like you don’t expect gas stations to be located in a hidden spot behind the bushes or trees, and they are visible and well lit, the charging stations should also be located in a similar fashion. Especially for people who might be more vulnerable such as people with mobility issues, elderly and women (I have heard other women say that quite often).”***

***-- One EV owner was quoted.***

## **EV Ready Economic Analysis Interviews**

BPS hired Johnson Economics to conduct an economic analysis of the EV Ready Code Project’s initial code concept. The economic analysis includes an assessment of the anticipated marginal impact of a range of EV-ready infrastructure requirements on residential and commercial construction. Johnson Economics used simplified financial analysis tools to assess the expected impact of draft EV-Ready requirements on variables such as product pricing, investment returns, and overall production levels.

A secondary analysis included an estimation of the demographic characteristics of impacted populations, including breakdowns by income level. This was supplemented by interviews with affordable housing providers and local developers. The research also looks at available income-qualified rebates and available infrastructure grants.

In August through October 2021, a series of interviews was conducted by Johnson Economics to provide additional context. Interviewees included public agency staff in other jurisdictions, electrical engineers, utilities, and developers.

Everyone that was interviewed expressed an expectation that electric vehicle adoption is likely to increase significantly over the next decade, and that there would likely be an increased need for property owners to accommodate these demands. There was less consensus regarding the scale of adoption as well as longer term sustained charging patterns. This is an evolving technology (particularly for batteries) and there is a high level of uncertainty regarding how vehicle charging needs will be accommodated. Some felt that the eventual pattern would favor fewer higher-rate charging stations, with faster charging times supporting centralized fueling stations similar to current gas stations. On the other end of the spectrum some saw slow overnight charging as a future solution, requiring only three prong outlets and less expensive limited additional infrastructure. Recognizing the high level of uncertainty many respondents stressed a need for flexibility in requirements. The EV-Ready Code Project's Recommended Draft includes a requirement to install conduit to support Level 2 Chargers, which is a medium level of charging that is faster than Level 1 chargers but slower than fast chargers.

## **Discussion Draft Public Input**

The Discussion Draft, published on April 29, 2022, served as the first opportunity for the public to review and comment on the draft Zoning Code regulations. Prior to that date, the public had opportunities to review and respond to the concepts that guided the Zoning Code regulations.

The public review period of the Discussion Draft was from April 29 through June 17, 2022. During this period, staff used a variety of approaches for community members to learn about the Discussion Draft proposals and provide comments, including:

- A news blog post emailed to project list and hosted on project website.
- Posts on social media, including Facebook, Nextdoor, and Twitter.
- Articles and editorials in local newspapers, online newspapers, and local blog platforms.
- Presentations and discussions at five meetings of community organizations.
- Several additional in-person or phone meetings with developers, architects, State and local agencies, and interested parties.

Several recurring themes emerged in the comments received, including:

- Housing affordability and EV parking in affordable housing
- Concerns that the percentage of required EV-ready parking was too high, while others expressed that EV-ready parking should be required at 100% of any on-site parking
- Feedback on specific development standards, such as, landscaping and screening, lighting, etc.
- Further suggestions on incentives
- Flexibility in implementation
- Letting the market forces drive the provision of EV parking

## **Proposed Draft: Notification, Testimony and Public Hearing.**

The EV – Ready Code Project Proposed Draft of amendments was released on August 9, 2022, as well as a public notice of the September 13<sup>th</sup>, 2022 Planning and Sustainability Commission (PSC) hearing. Notice of PSC hearing was also mailed to over 350 individuals who were either had commented on the Discussion Draft or had requested to be notified of all legislative projects (known as the legislative list. In addition, an email to provide notice of the draft release and PSC hearing was sent to approximately 150 contacts who had expressed interest in the project or who had served on any of the stakeholder or technical committees. The MapApp was open to receive written testimony in advance of the hearing. Information on the release and upcoming hearing was also posted to the project website and on Planning and Sustainability blog releases.

The PSC received 9 pieces of written testimony through the MapApp. At the hearing, three people testified in person or virtually. As a result of the testimony, the PSC held a work session to discuss potential amendments, including providing greater flexibility for locating chargers in perimeter landscaping and a consideration for any new provisions specific to electric bike charging. At the conclusion of their discussions, the PSC made the decision to forward their recommendation of staff's proposal with an amendment to allow EV chargers and their equipment to be partially located 2-feet into the required parking lot perimeter landscaping strip.

## **Recommended Draft: Notification, Testimony and Public Hearing.**

The EV – Ready Code Project Recommended Draft of amendments is to be released at the end of December, early January along with a notice of City Council Hearing. The Council hearing is scheduled for January 25, 2023. The MapApp will be reopened to accept written testimony. The City Council hearing will allow in-person and video testimony at the hearing providing several opportunities to testify at the hearing.

# Section V: Zoning Code Amendments

This section presents the Zoning code amendments. The section is formatted to facilitate readability by showing the code amendments on the right-hand pages and related commentary describing the amendments on the facing left-hand pages.

Language to be added to City codes is indicated by underlined text and language to be removed is indicated by ~~strikethrough~~ text. Language to remain the same is indicated by plain text.

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## Commentary

**33.110.245.D** This amendment clarifies that a detached structure that holds the electrical conduit and charger is an uncovered vertical structure (see example photo) generally as it applies to single-dwelling development. If the equipment is located within a parking area, it would instead be subject to the standards in 33.266.130. This provision is intended to cover plugs and cables located adjacent to driveways or other vehicle areas on a residential property.

These structures would likely meet the size allowance that would allow them to be in required setbacks (Item D.2.a is shown for this provision). However, as these structures are intended to provide charging opportunities to a vehicle parked on site, a new regulation is added requiring that the chargers be within 5-feet of driveways or other vehicle areas. This only applies to Level 2 or higher chargers which generally draw greater power and need a 220/240-volt connection. A Level 1 charger uses standard outlets and power cords resulting in less risk, and it is not required to be proximate to the vehicle area/driveway.





## 33.110 Single-Dwelling Zones

# 110

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### 33.110.245 Detached and Connected Accessory Structures

- A. Purpose.** This section regulates detached and connected structures that are incidental to primary buildings to prevent them from becoming the predominant element of the site. The standards limit the height and bulk of these structures, promote compatibility of design for larger structures, provide for necessary access around larger structures, help maintain privacy between abutting lots, and maintain open front setbacks.
- B-C.** [No change]
- D. Detached uncovered vertical structures.** Detached uncovered vertical structures are items such as flag poles, trellises, arbors and other garden structures, play structures, antennas, satellite receiving dishes, detached structures that hold electric vehicle chargers, and lamp posts. The following standards apply to detached uncovered vertical structures. Fences are addressed in 33.110.275:
1. Height. Except as follows, the maximum height allowed for all detached uncovered vertical structures is 20 feet:
    - a. Antennas, utility power poles, and public safety facilities are exempt from the height limit.
    - b. Flagpoles are subject to the height limit of the base zone for primary structures.
    - c. Detached small wind turbines are subject to the standards of 33.299, Wind Turbines.
  2. Setbacks. Except as follows, detached uncovered vertical structures are subject to required building setbacks:
    - a. Detached uncovered vertical structures that are no larger than 3 feet in width, depth, or diameter and no taller than 8 feet are allowed in required building setbacks.
    - b-d. [No change]
  3. Additional standard for detached uncovered vertical structures that hold electric vehicle chargers. In addition to Paragraphs 1. and 2. above, a detached uncovered vertical structure that holds at least a Level 2 electric vehicle charger must be located so that the electric vehicle charger is within 5 feet of a vehicle area.

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## Commentary

**33.120.210.B** The floor area ratio standard currently allows up to 0.5 to 1 of floor area to be discounted from the total allowed as an incentive for providing structured parking over surface parking. This amendment adds the requirement that at least 50% of the parking spaces, or a minimum of 6 spaces, within the structured parking provide electric vehicle charging capacity with at least a Level 2 charger in order to take advantage of the discount. The amendment is intended to encourage the addition of electric vehicle chargers in the structured parking spaces. The provision would most likely be used during the construction of a new building, or through an addition.

## 33.120 Multi-Dwelling Zones

# 120

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### 33.120.210 Floor Area Ratio

- A. Purpose.** Floor area ratios (FARs) regulate the amount of use (the intensity) allowed on a site. FARs provide a means to match the potential amount of uses with the desired character of the area and the provision of public services. FARs also work with the height, setback, and building coverage standards to control the overall bulk of development.
- B. FAR standard.** The maximum floor area ratios are stated in Table 120-3 and apply to all uses and development. In the RM4 zone the maximum FAR is 4 to 1, except in Historic Districts and Conservation Districts, where the maximum FAR is 3 to 1. Floor area ratio is not applicable in the RMP zone. There is no maximum limit on the number of dwelling units within the allowable floor area, but the units must comply with all building and housing code requirements. Additional floor area may be allowed through bonus options described in Section 33.120.211, or transferred as described in Subsection D. Maximum FAR does not apply to one alteration or addition of up to 250 square feet when the alteration or addition is to a primary structure that received final inspection at least 5 years ago. This exception is allowed once every 5 years. Adjustments to the maximum floor area ratios are prohibited. Floor area does not include the following:
1. Floor area for structured parking when at least 50 percent, or 6, of the parking spaces in the structure, whichever is greater, have at least a Level 2 charger adjacent to the space and required long term bicycle parking not located in a dwelling unit, up to a maximum FAR of 0.5 to 1; and
  2. Floor area for required long term bicycle parking that is not located in a dwelling unit, up to a maximum of 0.5 to 1; and
  - ~~3.~~ Floor area for indoor common area used to meet the requirements of Section 33.120.240.
- C-D.** [No change]

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## Commentary

**33.120.280.D** This amendment clarifies that a detached structure that holds the electrical conduit and charger is an uncovered vertical structure (see example photo in 33.110). If the equipment is located within a parking area, it would instead be subject to the standards in 33.266.130. This provision is intended to cover plugs and cables located adjacent to driveways or other vehicle areas on a residential property.

These structures would likely meet the size allowance that would allow them to be in required setbacks (Item D.2.a is shown for this provision). However, as these structures are intended to provide charging opportunities to a vehicle parked on site, a new regulation is added requiring that the chargers be within 5-feet of driveways or other vehicle areas. However, this only applies to Level 2 or higher chargers which generally draw greater power and need a 220/240-volt connection. A Level 1 charger uses standard outlets and power cords resulting in less risk, and it is not required to be proximate to the vehicle area/driveway.

### 33.120.280 Detached Accessory Structures

- A. Purpose.** This section regulates detached structures that are incidental to primary buildings to prevent them from becoming the predominant element of the site. The standards limit the height and bulk of the structures and promote compatibility of design for larger accessory structures when they are in conjunction with single-dwelling development. The standards provide for necessary access around structures, help maintain privacy to abutting lots, provide flexibility for the location of accessory structures, and maintain open front yard areas.
- B-C.** [No change]
- D. Detached uncovered vertical structures.** Vertical structures are items such as flag poles, trellises, arbors, and other garden structures, play structures, antennas, satellite receiving dishes, detached structures that hold electric vehicle chargers, and lamp posts. The following standards apply to uncovered vertical structures. Fences are addressed in Section 33.120.285 below:
1. Height. Except as follows, the maximum height allowed for all detached uncovered vertical structures is the maximum height of the base zone. The maximum height allowed for detached uncovered vertical structures that are accessory to a house, attached house, duplex, attached duplex or manufactured home on an individual lot is 20 feet:
    - a. Antennas, utility power poles, and public safety facilities are exempt from height limits.
    - b. Flagpoles are subject to the height limit of the base zone for primary structures.
    - c. Detached small wind turbines are subject to the standards of 33.299.
  2. Setbacks. Except as follows, detached uncovered vertical structures are subject to the required building setbacks:
    - a. Detached uncovered vertical structures that are no larger than 3 feet in width, depth, or diameter and no taller than 8 feet are allowed in required building setback.
    - b-d. [No change]
  3. Additional standard for detached uncovered vertical structures that hold electric vehicle chargers. In addition to Paragraphs 1. and 2. above, a detached uncovered vertical structure that holds at least a Level 2 electric vehicle charger must be located so that the electric vehicle charger is within 5 feet of a vehicle area.

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## Commentary

**33.130.205.B** The floor area ratio standard currently allows up to 0.5 to 1 of floor area to be discounted from the total allowed as an incentive for providing structured parking over surface parking. This amendment adds the requirement that at least 50% of the parking spaces, or a minimum of 6 spaces, within the structured parking provide electric vehicle charging capacity with at least a Level 2 charger in order to take advantage of the discount. The amendment is intended to encourage the addition of electric vehicle chargers in the structured parking spaces. The provision would most likely be used during the construction of a new building, or through an addition.

## 33.130 Commercial/Mixed Use Zones

# 130

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### 33.130.205 Floor Area Ratio

- A. Purpose.** Floor area ratios (FARs) regulate the amount of use (the intensity) allowed on a site. FARs provide a means to match the potential amount of uses with the desired character of the area and the provision of public services. FARs also work with the height, setback, and building coverage standards to control the overall bulk of development. The bonus FAR options allow additional floor area as an incentive for providing affordable housing.
- B. FAR standard.** The maximum floor area ratios are stated in Table 130-2 and apply to all uses and development. Additional floor area may be allowed through bonus options, as described in Section 33.130.212, or transferred from historic resources per Subsection C. Adjustments to the maximum floor area ratios are prohibited. Except in the CR zone, floor area does not include the following:
1. Floor area for structured parking when at least 50 percent, or 6, of the parking spaces in the structure, whichever is greater, have at least a Level 2 charger adjacent to the space ~~and required long term bicycle parking not located in a dwelling unit~~, up to a maximum FAR of 0.5 to 1; ~~and~~
  2. Floor area for required long term bicycle parking that is not located in a dwelling unit, up to a maximum of 0.5 to 1; and
  - ~~23.~~ Floor area for indoor common area used to meet the requirements of Section 33.130.228.
- C. [No change]**

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## Commentary

### 33.224.050 Stacking Lane Standards

#### A. Gasoline pumps and electric vehicle charging stations.

Current drive-through standards are focused on fuel stations and the needs for vehicle stacking lines at pumps. As electric vehicles become more ubiquitous, electric charging stations will become more common to satisfy the demand for quick charging. These charging stations may become more efficient so that cars will not need to be parked for an extended time to receive a charge. As charging times get reduced from current levels down to 5 to 10 minutes in the future, the nature of some charging areas will change from being accessory to parking spaces to those that incorporate drive-through operations similar to gas fueling stations. This amendment ensures that electric vehicle charging stations that include charging islands and vehicle queuing spots behind the islands, that are not integrated into parking spaces, are subject to the same development standards as gasoline fueling stations. These determinations are clarified within the definitions for drive-through facilities in 33.910 and for Quick Vehicle Service uses in 33.920. See the commentary and code for those sections.



## 33.224 Drive-Through Facilities

224

### 33.224.050 Stacking Lane Standards

These regulations ensure that there is adequate on-site maneuvering and circulation areas, ensure that stacking vehicles do not impede traffic on abutting streets, and that stacking lanes will not have nuisance impacts on abutting residential lands.

- A. **Gasoline pumps and electric vehicle chargers.** A minimum of 30 feet of stacking lane is required between the stacking lane entrance and the nearest gasoline pump or electric vehicle charger.
- B. **Other drive-through facilities.**
  - 1. Primary facilities. A minimum of 150 feet for a single stacking lane or 80 feet per lane when there is more than one stacking lane, is required for all other drive-through facilities. A stacking lane is measured between the stacking lane entrance and the service area.
  - 2. Accessory facilities. A stacking lane is not required for accessory facilities where vehicles do not routinely stack up while waiting for the service. Examples are window washing, air compressor, and vacuum cleaning stations.
- C. **Stacking lane design and layout.** Stacking lanes must be designed so that they do not interfere with parking and vehicle circulation. No part of a required stacking lane may encroach into the right-of-way. Stacking lanes may be curvilinear. See Subsection 33.930.030.C. for measurement information.
- D. **Stacking lanes identified.** All stacking lanes must be clearly identified, through the use of means such as striping, landscaping, and signs.

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## Commentary

### 33.258.070 Nonconforming Development

**D.2.a.** The nonconforming development on a site is required to be brought into conformance when a certain threshold of improvement is made to a property. The threshold for compliance is based on the value of the improvement. The threshold exempts some improvements that are either required through other codes or that provide a direct benefit to the city, such as ADA requirements, stormwater management facilities and energy efficiency improvements. This amendment adds installation of electric vehicle chargers and equipment to the list of items that do not count toward the threshold that triggers compliance with the nonconforming development section. This encourages the voluntary installation of EV chargers on an existing site. During discussions at the Planning and Sustainability Commission, the Commission voted to include E-bike chargers within this list to provide parity with the electric vehicle exemption since both provide a public benefit.

## 33.258 Nonconforming Situations

258

### 33.258.070 Nonconforming Development

#### A-C. [No change]

**D. Development that must be brought into conformance.** The regulations of this subsection are divided into two types of situations, depending upon whether the use is also nonconforming or not. These regulations apply except where superseded by more specific regulations in the code.

1. [No change]

2. Nonconforming development with an existing nonconforming use, allowed use, limited use, or conditional use. Nonconforming development associated with an existing nonconforming use, an allowed use, a limited use, or a conditional use, must meet the requirements stated below. When alterations are made that are over the threshold of Subparagraph D.2.a., the site must be brought into conformance with the development standards listed in Subparagraph D.2.b. The value of the alterations is based on the entire project, not individual building permits.

a. Thresholds triggering compliance. The standards of Subparagraph D.2.b., below, must be met when the value of the proposed alterations on the site, as determined by BDS, is more than \$330,800. The following alterations and improvements do not count toward the threshold:

(1-7) [No change];

(8) Landscaping required by 33.475.220; ~~and~~

(9) Removal or remediation of hazardous substances conducted under ORS 465.200-545 & 900' and-

(10) The installation of electric bike and electric vehicle chargers and accessory equipment.

b-d. [No change]

#### E-G. [No change]

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## Commentary

### 33.266.110 Minimum Required Parking Spaces

**33.266.110.A.** The purpose statement is amended to add information on the new minimum requirement for providing electrical infrastructure for the installation of electric vehicle chargers. While the chargers themselves aren't required as per state law, requiring the infrastructure ensures adequate charging in the future, especially when many automakers are contemplating moving to all EVs in the next 20 years.

**33.266.110.D. Required electric vehicle charging spaces.** This a new standard to establish parameters for a minimum number of spaces that will include electric conduit access for EV charging facilities. House Bill 2180 passed in 2021 established a statewide minimum for new parking spaces associated with private commercial buildings, and for mixed-use/residential development that includes over 5 dwelling units. 20 percent of all new parking spaces will need to have electrical conduit and electrical capacity options set up to be able to provide electric vehicle charging facilities now or in the future. This minimum was incorporated into the Oregon Administrative Rules (OAR) for building/electrical codes. In addition, the Department of Land Conservation and Development (DLCD) established rules that augment these requirements for multi-dwelling and mixed-use development so that 40% of parking spaces are EV-ready. House Bill 2180 also allows local jurisdictions to establish minimum EV "ready" requirements in excess of state rules for these development types through a jurisdiction's land use codes. Portland is creating a minimum requirement of 6 spaces or 50% of the total number of parking spaces, whichever is greater when multi-dwelling or mixed-use development with more than 5 dwelling units is proposed, and parking is provided for the dwelling units. In addition, a standard is added to clarify that any new Commercial Parking use (which is parking not associated with a specific use) provide a minimum of 20% of the total spaces for EV capability. The actual EV chargers and electrical capacity are not part of the requirement as the state law provided the flexibility for these chargers and required capacity to be addressed in the future, but the conduit requirements ensure that retrofitting the conduit isn't needed for the installations.

## 33.266 Parking, Loading, And Transportation And Parking Demand Management

266

### 33.266.110 Minimum Required Parking Spaces

- A. Purpose.** The purpose of required parking spaces is to provide enough on-site parking to accommodate the majority of traffic generated by the range of uses which might locate at the site over time. Sites that are located in close proximity to transit, have good street connectivity, and good pedestrian facilities may need little or no off-street parking. Parking requirements should be balanced with an active pedestrian network to minimize pedestrian, bicycle and vehicle conflicts as much as possible. Transit-supportive plazas and bicycle parking may be substituted for some required parking on a site to encourage transit use and bicycling by employees and visitors to the site. The required parking numbers correspond to broad use categories, not specific uses, in response to this long term emphasis. Provision of carpool parking, and locating it close to the building entrance, will encourage carpool use. Providing opportunities to install electric vehicle chargers within parking areas encourage electric vehicles as an alternative to vehicles that burn fossil fuels.
- B-C.** [No change]
- D. Required electric vehicle charging spaces.** For Commercial Parking uses and for sites with 5 or more dwelling units, the following standards must be met:
1. Commercial Parking. For Commercial Parking uses, at least 20 percent of the total number of parking spaces must include electrical conduit adjacent to the spaces that will allow for the installation of at least a Level 2 electric vehicle charger.
  2. In buildings with five or more dwelling units, if parking spaces are provided for any of the dwelling units, the following standards apply:
    - a. If between one and six spaces are provided for dwelling units, 100 percent of the spaces must include electrical conduit adjacent to the spaces that will allow for installation of at least a Level 2 electric vehicle charger.
    - b. If seven or more spaces are provided for dwelling units, 50 percent, or six, whichever is greater of the parking spaces provided must include electrical conduit adjacent to the spaces that will allow for installation of at least a Level 2 electric vehicle charger.
- ~~ED.~~ Exceptions to the minimum number of parking spaces.** [No change]

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## Commentary

### 33.266.130 Development Standards for All Other Development

#### A. Purpose.

This amendment expands the purpose statement for parking development standards to address EV charging facilities. The new bullet provides the purpose for the screening and location standards for locating EV chargers and equipment.

### 33.266.130 Development Standards for All Other Development

- A. Purpose.** The development standards promote vehicle areas that are safe and attractive for motorists and pedestrians. Vehicle area locations are restricted in some zones to promote the desired character of those zones.

Together with the transit street building setback standards in the base zone chapters, the vehicle area location regulations:

- Provide pedestrian access that is protected from auto traffic;
- Create an environment that is inviting to pedestrians and transit users, especially on transit streets and in Pedestrian Districts;
- Limit the prominence of vehicle areas along street frontages and create a strong relationship between buildings and the sidewalk;
- Create a sense of enclosure on transit and pedestrian street frontages; and
- Limit the size of paved parking area and the type of paving material allowed in order to limit increases in temperature associated with asphalt and reduce impacts from urban heat islands.

The parking area layout standards are intended to promote safe circulation within the parking area, provide for the effective management of stormwater runoff from vehicle areas, and provide for convenient entry and exit of vehicles. The setback and landscaping standards:

- Improve and soften the appearance of parking areas;
- Reduce the visual impact of parking areas from sidewalks, streets, and especially from adjacent residential zones;
- Provide flexibility to reduce the visual impacts of small residential parking lots;
- Direct traffic in parking areas;
- Shade and cool parking areas;
- Reduce the amount and rate of stormwater runoff from vehicle areas;
- Reduce pollution and temperature of stormwater runoff from vehicle areas; ~~and~~
- Decrease airborne and waterborne pollution; and
- Provide flexibility for locating electric vehicle chargers and equipment while limiting their impact on adjacent streets and lots.

- B. Where these standards apply.** The standards of this section apply to all vehicle areas whether required or excess parking, except for residential vehicle areas subject to the standards of 33.266.120.

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## Commentary

**33.266.130.G. Parking Area Setbacks and Landscaping.** This standard is amended to acknowledge the situations where protective bollards or other protection can be located in the perimeter landscaping area in conjunction with the EV chargers and equipment allowed with H.

**33.266.130.H. Electric vehicle chargers and equipment in parking areas.** These development standards clarify the allowed location for installation of EV charging facilities in parking areas, for both required facilities and those voluntarily installed. These standards provide guidance on where the EV charging facility can go within the parking lot and provides flexibility to place the chargers and equipment in the first two-foot portion of the required perimeter landscaping setback (normally a 5 or 10-foot width depending on zone).

Some EV charging terminals, especially those that offer high-speed commercial charging, can be accompanied by accessory electrical equipment and cabinets. These cabinets are similar to cabinets associated with mechanical equipment. The amendments clarify that the EV accessory equipment is subject to similar screening requirements as mechanical equipment cabinets.



**C-F.** No change

**G. Parking area setbacks and landscaping.**

1. All landscaping must comply with the standards of Chapter 33.248, Landscaping and Screening. Trees and shrubs must be fully protected from potential damage by vehicles.
2. Setbacks and perimeter landscaping.
  - a-b. [No change.]
  - c. Setbacks. The minimum required setbacks for surface parking areas are stated in Table 266-5. Unless allowed under 33.266.130.H, p~~Protective~~ curbs, tire stops, bollards or other protective barriers are not allowed within the minimum required setbacks.

<b>Table 266-5 Minimum Parking Area Setbacks and Landscaping</b>		
<b>Location</b>	<b>All zones except EG2 and IG2</b>	<b>EG2, IG2</b>
Lot line abutting street	5 ft. of L2	10 ft. of L2
Lot line abutting a C, E, I, or CI zone lot line	5 ft. of L2	5 ft. of L2
Lot line abutting a OS, R, or IR zone lot line	5 ft. of L3	10 ft. of L3

- d. [No change]
3. [No change]

**H. Electric vehicle chargers in parking areas.** Electric vehicle chargers, accessory equipment, and protective curbs, tire stops, bollards or other barriers needed to protect the charger or accessory equipment, may be located within parking areas, or adjacent to parking areas, subject to the following:

1. The chargers, accessory equipment, and protective barriers cannot be located more than 2 feet into required perimeter landscaping areas; and
2. The accessory equipment may be located anywhere on site but must be screened from the street and adjacent residential zones by walls, fences, or vegetation. Screening must comply with at least the L2 or F2 standards of Chapter 33.248, Landscaping and Screening, and be tall enough to screen the equipment.

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## Commentary

### 33.279.030 Alterations Allowed Without Conditional Use Review

- D. This amendment clarifies that the installation of EV chargers and equipment on the site of a recreation field should be treated similar to other minor improvements or features of a site, and its installation does not trigger a conditional use review.

### 33.281.050 Review Thresholds for Development

- A. **Allowed.** Similar to above, this clarifies that the installation of EV chargers and equipment does not trigger conditional use review on a school site.

## 33.279 Recreational Fields for Organized Sports

279

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### 33.279.030 Alterations Allowed Without Conditional Use Review

Alterations related to a recreational field for organized sports to the site that meet all of the following are allowed without a conditional use review provided the proposal meets all of the following thresholds.

- A-C. [No change]
- D. Does not increase the exterior improvement area by more than 1,500 square feet. Fences, handicap access ramps, on-site pedestrian circulation systems, Community Gardens, Market Gardens, electric vehicle chargers and equipment, and increases allowed by Subsections F. through H. below are exempt from this limitation;
- E-I. [No change]

## 33.281 Schools and School Sites

281

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### 33.281.050 Review Thresholds for Development

This section states when development related to schools and on school sites in the OS, R, and IR zones is allowed, when a conditional use review is required, and the type of procedure used. Recreational fields used for organized sports are subject to Chapter 33.279, Recreational Fields for Organized Sports.

- A. **Allowed.** Alterations to the site that meet all of the following are allowed without a conditional use review.
  - 1-3. [No change]
  - 4. Increases of exterior improvement areas up to 2,000 square feet. Fences, handicap access ramps, on-site pedestrian circulation systems, Community Gardens, Market Gardens, electric vehicle chargers and equipment, bicycle parking and increases allowed by Paragraphs A.6 and A.9 are exempt from this limitation;
  - 5-9. [No change]

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## Commentary

### 33.420.045 Items Exempt From This Chapter

#### B. Exterior Alterations

This amendment adds an exemption allowing EV chargers and equipment to be installed as an exterior alteration in areas within the Design overlay zone without triggering the requirements of the chapter. This is intended to encourage the installation of these systems, in conjunction with existing parking areas.

## 33.420 Design overlay zone

# 420

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### 33.420.045 Items Exempt From This Chapter

The following items are exempt from the regulations of this chapter:

**A. General exemptions: [No change]**

**B. Exterior alterations:**

1. Repair, maintenance, and replacement with comparable materials;
2. Exterior alterations to a structure required to meet the Americans With Disabilities Act's requirements, or as specified in Section 1113 of the Oregon Structural Specialty Code;
3. Exterior work activities associated with an Agriculture use;
4. Detached accessory structures when the structure has a building coverage no more than 300 square feet in area and is located at least 20 feet from all street lot lines, or located within an existing vehicle area;
5. Exterior alterations for parking lot landscaping, short-term bicycle parking, and pedestrian circulation systems when all relevant development standards of this Title are met;
6. Electric vehicle chargers and equipment.

Renumber 6.-10. to 7.-11.;

**C. [No change]**

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## Commentary

### 33.510.261 Parking Built After July 9, 2018

I.2 Carpool parking. Current regulations within the Central City require new parking for non-residential/hotel uses to include a proportion of their spaces allocated toward carpools. A minimum of 5 spaces or 5 percent of total spaces must be set aside for carpools. This amendment requires that at least 20 percent of the carpool spaces include access for EV charging facilities, to ensure that the EV capability is distributed proportionally between carpool and non-carpool spaces.

## 33.510 Central City Plan District

510

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### 33.510.261 Parking Built After July 9, 2018

A-H. [No change]

- I. **All parking built after July 9, 2018.** The regulations of this subsection apply to all new parking regardless of type.
  1. The applicant is required to report the number of constructed parking spaces to the Director of the Bureau of Transportation within 30 days of parking operations beginning.
  2. Carpool parking. The carpool regulations of this Paragraph do not apply to Residential uses or hotels.
    - a. Five spaces or five percent of the total number of parking spaces on the site, whichever is less, must be reserved for carpool use before 9:00 AM on weekdays. More spaces may be reserved, but they are not required;
    - b. The carpool spaces must be those closest to the building entrance or elevator, but not closer than the spaces for disabled parking; ~~and~~
    - c. At least twenty percent of the carpool spaces must include electrical conduit adjacent to the spaces that will allow for installation of at least a Level 2 electric vehicle charger; and
    - ed. Signs must be posted indicating that the spaces are reserved for carpool use before 9:00 AM on weekdays.
  - 3-4. [No change]

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## Commentary

I.5. Operation reports. All parking facilities in the Central City built after July 9, 2018 are required to provide operation reports to the Bureau of Transportation (PBOT). These reports include metrics on overall usage, permits and fees for regular and carpool parking. This amendment adds a monitoring requirement to include spaces that have current or future EV charging capabilities and what rates are being charged at spaces that provide EV charging facilities. Incorporating this data into future operation reports can help PBOT and the City determine the use of these spaces and the rates charged, in comparison with other parking spaces. The existing code is also amended so that reports for these facilities are generated by the same due date for PBOT to monitor. PBOT is responsible for providing the procedures for submitting the reports.



5. Operation reports. The applicant must provide operation reports to the Director of the Bureau of Transportation no later than December 31 each year~~upon request~~. The operation reports must be based on a sample of four days during every 12-month period, and must include the following information:
  - a. The number of parking spaces and the amount of net building area on the site.
  - b. A description of how the parking spaces were used in the following categories. Percentage of parking used for:
    - (1) Short-term (less than 4 hours);
    - (2) Long-term daily (four or more hours);
    - (3) Average number of monthly permits issued (other than carpool);~~and~~
    - (4) Number of signed monthly Carpool stalls in the facility;~~and~~
    - (5) Number of spaces that either include electrical conduit adjacent to the spaces that will allow for the installation of at least a Level 2 electric vehicle charger, or currently provide at least a Level 2 electric vehicle charger.
  - c. Rate schedule for:
    - (1) Hourly parking;
    - (2) Daily Maximum Rate;
    - (3) Evening Parking;
    - (4) Weekend Parking;
    - (5) Monthly parking;~~and~~
    - (6) Carpool parking;~~and~~
    - (7) Electric vehicle parking if different from above rates
  - d. The hours of operation on weekdays, Saturday, Sunday, and whether the facility is open during special events in the area.
6. [No change]

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## Commentary

### **33.815.040.B. Proposals that alter the development of an existing conditional use.**

- 1.f Similar to the amendments for recreational fields and schools, this amendment clarifies that the installation of EV chargers and equipment does not trigger conditional use review on a site with an existing conditional use.

## 33.815 Conditional Uses

815

### 33.815.040 Review Procedures

The procedure for reviewing conditional uses depends on how the proposal affects the use of, or the development on, the site. Subsection A, below, outlines the procedures for proposals that affect the use of the site while Subsection B outlines the procedures for proposals that affect the development or reduce the conditional use site boundary. Proposals may be subject to Subsection A or B or both. The review procedures of this section apply unless specifically stated otherwise in this Title. Proposals may also be subject to the provisions of 33.700.040, Reconsideration of Land Use Approvals.

**A. [No change]**

**B. Proposals that alter the development of an existing conditional use.** Alterations to the development on a site with an existing conditional use and reducing the boundary of a conditional use site may be allowed, require an adjustment, modification, or require a conditional use review, as follows:

1. Conditional use review not required. A conditional use review is not required for alterations to the site and reductions to the conditional use site boundary that comply with Subparagraphs a through h. All other alterations and boundary changes are subject to Paragraph 2, below. Alterations to development and reductions to the site boundary are allowed by right provided the proposal:

a-e. [No change]

- f. Does not increase the exterior improvement area by more than 2,000 square feet. Fences, handicap access ramps, and on-site pedestrian circulation systems, ground mounted solar panels, Community Gardens, Market Gardens, bicycle parking, electric vehicle chargers and equipment, and parking space increases allowed by 33.815.040.B.1.h, below, are exempt from this limitation;

g-h. [No change]

2. [No change]

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## Commentary

### 33.910.030 Definitions

#### **Drive-Through Facility.**

This amendment clarifies that an EV charging facility that is designed for quick vehicle charging and queuing similar to a gas station is defined as a drive-through facility. It includes stacking lanes behind each individual charging station similar to a gas pump. It also clarifies that situations where a vehicle may be getting charged while parked in a parking space is not classified as a drive-through facility. These amendments are intended to complement the changes to 33.920 to help classify the range of EV charging situations that city will encounter. EV charging facilities currently take 30 minutes to several hours to charge, which means that most chargers will be located in a parking space. However, future improvements in efficiency are likely to result in EV charging stations operating more closely to a standard gas station in terms of time spent at the charging island and vehicles lining up behind. This could allow for future drive-through style facilities.

## 33.910 Definitions

# 910

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### 33.910.030 Definitions

The definition of words with specific meaning in the zoning code are as follows:

**Drive-Through Facility.** A facility or structure that is designed to allow drivers to remain in their vehicles before and during an activity on the site. Drive-through facilities are a type of site development that is usually found in conjunction with a Quick Vehicle Servicing use or a Retail Sales And Service use. Drive-through facilities also include facilities designed for the rapid servicing of vehicles, where the drivers may or may not remain in their vehicles, but where the drivers usually either perform the service for themselves, or wait on the site for the service to be rendered. Drive-through facilities may serve the primary use of the site or may serve accessory uses. Examples are drive-up windows; menu boards; order boards or boxes; gas pump and electric vehicle charging islands; car wash facilities; auto service facilities, such as air compressor, water, and windshield washing stations; quick-lube or quick-oil change facilities; and drive-in theaters. Parking spaces used for customer pick-up or loading of goods or products purchased on-site, on the phone, or on-line from the establishment are not a drive-through facility. Parking spaces that include electric vehicle chargers and equipment are not a drive-through facility. Facilities designed for electric vehicle charging or the picking-up or loading of goods or products purchased from the establishment that include a stacking lane and a service area are a drive-through facility.

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## Commentary

### **33.920.220 Quick Vehicle Servicing**

The amendments to the Quick Vehicle Servicing use category add electric vehicle charging facilities as an example of a Quick Vehicle Servicing use, which occurs when the chargers are located with vehicle queuing. The amendment also clarifies when an EV charger is part of accessory parking. In many cases, EV charging facilities are incorporated into parking lots, partially because the vehicles must remain in the space for longer than a few minutes to get charged. However, if a charging facility functions as a drive-through, it will be a Quick Vehicle Service use.

## 33.920 Description of Use Categories

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### 33.920.220 Quick Vehicle Servicing

- A. Characteristics.** Quick Vehicle Servicing uses provide direct services for motor vehicles where the driver generally waits in the car before and while the service is performed. The development will include a drive-through facility, the area where the service is performed (see 33.910, Definitions.) Full-serve and mini-serve gas stations are always classified as a primary use (Quick Vehicle Servicing), rather than an accessory use, even when they are in conjunction with other uses.
- B. Accessory Uses.** Accessory uses may include auto repair, food membership distribution, and tire sales.
- C. Examples.** Examples include full-serve and mini-serve gas stations, unattended card key stations, electric vehicle charging stations, car washes, quick lubrication services, and Department of Environmental Quality vehicle emission test sites.
- D. Exceptions.**
1. Truck stops are classified as Industrial Service.
  2. Refueling facilities for the vehicles that belong to a specific use (fleet vehicles) which are on the site where the vehicles are kept, are accessory to the use.
  3. Electric vehicle chargers that are intended to be used while the car is parked in a parking space are not a Quick Vehicle Servicing use.

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## Commentary





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## About City of Portland Bureau of Planning and Sustainability

The Bureau of Planning and Sustainability (BPS) develops creative and practical solutions to enhance Portland's livability, preserve distinctive places, and plan for a resilient future.



THE BUREAU OF **PLANNING**  
& **SUSTAINABILITY**

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# EXHIBIT B: Appendix

## EV READY ECONOMIC ANALYSIS

PREPARED FOR  
THE CITY OF PORTLAND BUREAU OF PLANNING AND SUSTAINABILITY

DECEMBER 2021

**JOHNSON ECONOMICS, LLC**

621 SW Alder St, Suite 506  
Portland, Oregon 97205



**JOHNSON**  
ECONOMICS

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## I. EXECUTIVE SUMMARY

The EV Ready Code Project anticipates a series of changes to the development code that would mandate an increased level of electrical infrastructure to accommodate the installation of Level 2 charging stations. The intent of the EV Ready Code Project is to increase access to charging infrastructure by requiring investment during new construction. The State of Oregon (HB 2180) has already established requirements, and the focus of this analysis is on the proposed incremental increase in requirements relative to statewide mandates.

The cost of installing the conduit and electrical capacity to support Level 2 charging will be borne initially by the property owner and/or developer, but over time these costs will be borne by the market through some combination of higher rents and lower land values.

The literature reviewed includes a number of studies attempting to quantify the costs associated with providing EV Ready infrastructure and charging capacity. These show a significantly higher cost associated with redevelopment/rehab projects relative to new construction, with it more cost effective to provide infrastructure during initial construction. In addition, significant cost savings can be achieved with managed systems, which better match actual power needs with capacity provided. The average installed cost of required infrastructure will be a function of what is mandated. Costs can be significantly reduced by limiting the infrastructure requirements and allowing for managed power systems. Available forecasts of the electric vehicle market anticipate a compound annual growth rate (CAGR) ranging from 14% to 28% through 2027. Over the next fifteen years, electric vehicle demand could grow 11-fold.

The estimated impact on overall development cost associated with EV Ready infrastructure is expected to be significant but still modest relative to the overall cost of development. The proposed mandate will move EV Ready space requirements from 20% to 50% of parking spaces, with an average cost per space ranging from \$800 to \$4,800 per space depending upon the technical requirements and project-specific variables. The lower cost estimates reflect infrastructure only, with load management as opposed to dedicated circuits. The higher cost estimates reflect a dedicated circuit.

	Estimated Costs		
	Low	High	Average
Cost per EV Space			
<i>Dedicated</i>	\$3,667	\$4,791	\$4,229
<i>Shared</i>	\$824	\$1,902	\$1,363
Incremental Cost/Unit			
<i>Dedicated</i>	\$550	\$1,582	\$1,066
<i>Shared</i>	\$185	\$622	\$404
Baseline Costs	\$275,000	\$375,000	\$325,000
% Shift in Costs			
<i>Dedicated</i>	0.20%	0.42%	0.33%
<i>Shared</i>	0.07%	0.17%	0.12%

This additional cost would need to be offset by increased revenue, which would be possible through user charges if the infrastructure was demanded in the market but would more likely be reflected in marginally higher rent levels and/or lower underlying land values. The expected percentage impact of this mandate on rent levels is expected to be below 1.0% for new construction.

If implemented, the requirements in the new code would be expected to increase the overall access to EV Ready infrastructure by roughly 5% in the City of Portland by 2041. This may not reflect a net new



addition to the inventory as developers and property owners are likely to increase charging infrastructure significantly over time if the market forecasts are accurate.

## II. BACKGROUND AND ASSIGNMENT

Johnson Economics was retained to prepare an economic analysis of the Bureau of Planning and Sustainability's EV Ready Code Project. The EV Ready Code Project anticipates a series of changes to the development code that would mandate an increased level of electrical infrastructure to accommodate the installation of Level 2 charging stations.

This project includes an assessment of the anticipated marginal impact of a range of EV Ready infrastructure requirements on residential and commercial construction. We use simplified financial analysis tools to assess the expected impact on new mandated infrastructure on variables such as product pricing, investment returns, and overall production levels.

A secondary analysis includes an estimation of the demographic characteristics of impacted populations, including breakdowns by income level. Available demographic data is supplemented by interviews with affordable housing providers and local developers. The research also looks at available income-qualified rebates and available infrastructure grants.

The following table outlines some of the proposed actions being considered in the EV Ready code project:

USE TYPE	PROPOSED CHANGES
<b>Multi-dwelling and mixed-use</b>	100% up to 6 spaces EV Ready 50% of spaces for 7+ spaces EV Ready Electrical capacity and conduit to support level 2 charging
<b>INCENTIVES</b>	
<b>Structured Parking</b>	Condition added to provision that structured parking FAR up to 0.5:1 doesn't count, parking must now be EV Ready
<b>Car-share substitute for required parking</b>	Every car-sharing parking space provided would reduce parking requirement by spaces, up to 25% of spaces, must now also be EV Ready

The intent of the EV Ready Code Project is to increase access to charging infrastructure by requiring investment during new construction and/or renovation. The State of Oregon (HB 2180) has already established requirements that electric service capacity in new construction must be provided for a minimum of 20% of all parking spaces, for commercial properties and residential properties with five or more units. This analysis will assess the proposed incremental increase in requirements relative to statewide mandates. As a result, the focus is on projects with a residential component and the marginal impact of the proposed requirements above and beyond what is above the statewide mandate.



### III. BACKGROUND RESEARCH

#### LITERATURE REVIEW

There have been several useful studies completed in the last several years that are helpful for our analysis, primarily focused on establishing the cost of installing Electronic Vehicle (EV) infrastructure. The following reports were reviewed:

- Pike, Ed, and Kido, Cassidee, and Kamei, Evan, and DoVale, Kate, Energy Solutions, *Plug-In Electric Vehicle Infrastructure Cost Analysis Report for CALGreen Nonresidential Update*, California Electric Transportation Coalition, September 16, 2019
- Pike, Ed, and Steuben, Jeffrey, Energy Solutions, *Plug-In Electric Vehicle Infrastructure Cost-Effectiveness Report*, City of Oakland, July 20, 2016
- Salcido, VR, and Tillou, M, and Franconi, E, Pacific Northwest Regional Laboratory, *Electric Vehicle Charging for Residential and Commercial Energy Codes*, U.S. Department of Energy, July 2021
- Seattle Department of Construction & Inspections, *Directors' Report*, Electric Vehicle Readiness Ordinance, December 2018
- Pike, Ed, and Steuben, Jeffrey, and Kamei, Evan, Energy Solutions, *Plug-In Vehicle Infrastructure Cost-Effectiveness Report for San Francisco*, City and County of San Francisco, November 17, 2016
- McKinsey Center for Future Mobility, *Charging Ahead: Electric-Vehicle Infrastructure Demand*, October 2018
- Seattle Office of Sustainability & Environment, *Electric Vehicle Readiness*, Presentation to Seattle City Council Sustainability & Transportation Committee, April 2, 2019
- AES Engineering Ltd., *Electric Vehicle Charging Infrastructure in New Multifamily Developments – Requirement Options and Costing Analysis*, City of Richmond, BC, April 4, 2017

The cost of installing EV infrastructure varies by land use, construction type, and type of service. The most recent reliable cost estimates we found in the US was in the 2019 Energy Solutions report for CALGreen, which focused on nonresidential construction under CALGreen requirements (conduit and electrical panel capacity for 40 amp, 208/240-volt circuit(s) to support future installation of wiring and electric vehicle supply equipment (EVSE). This analysis produced cost estimates for new construction, alterations and additions, and a stand-alone retrofit.<sup>1</sup> Cost estimates are summarized in the tables to the right, with 2019 estimates

	EV Capable Costs/Parking Space		
	New	Rehab	Retrofit
Small Office/ Retail Surface Parking	\$905	\$925 - \$1,178	\$5,540
Medium Office/ School Surface Parking	\$901	\$928 - \$1,322	\$4,155
Large Office/Retail/ Hospital Enclosed Parking	\$739	\$741 - \$1,052	\$2,779
	EV Capable Costs/Parking Space 2021\$ <sup>s</sup>		
	New	Rehab	Retrofit
Small Office/ Retail Surface Parking	\$956	\$977 - \$1,244	\$5,850
Medium Office/ School Surface Parking	\$951	\$980 - \$1,396	\$4,387
Large Office/Retail/ Hospital Enclosed Parking	\$780	\$782 - \$1,111	\$2,934

<sup>1</sup> The rehab number reflects improvements done during other alterations and additions, such as repaving or rehabilitation of a building.



converted to 2021 dollars based on Mortenson’s construction cost index.

The Energy Solutions analysis indicates a significant cost advantage associated with providing EV infrastructure during initial construction vis-à-vis during a retrofit. Key cost factors associated with retrofits include the following: demolition and repair of surface parking; breaking and repairing walls; longer conduit runs; upgrading electrical service panels. The cost numbers do not include branch circuit wiring to EV ready parking spaces or EVSE equipment, as these are not required under CALGreen. The cost differential would likely not be affected by this, as the costs were primarily associated with installing the necessary level of electrical service as well as running conduit. The cost of wiring and EVSE equipment would likely be similar during initial construction or during a retrofit.

The 2017 AES Engineering report for the City of Richmond looked at cost differentials for installing EV infrastructure, with a focus on multi-unit residential buildings. The study used a definition of infrastructure that varied modestly from the Energy Solutions report in that it included cabling in the conduit. The analysis also looked at the impact of load management and load sharing technologies that reduce peak power demand and reduce electrical infrastructure costs. These technologies also provide the capability to control the time of use , which may be utilized to reduce the impact on utilities.

The following table summarizes the estimated cost to provide EV infrastructure from the AES report, with the conclusions converted to current US Dollars. The Level 2 dedicated infrastructure ranged from \$3,667 to \$4,791 per space, while load sharing options reduced that cost to \$487 to \$2,600 per space.

	Cost Estimates/Stall 2021 USD		
	L1	L2 Ded	L2 Share
High Rise - City Centre	\$2,287	\$4,791	\$1,204 - \$2,600
Mid Rise - City Centre	\$1,342	\$3,879	\$970 - \$1,990
Mid Rise - Outside CC	\$1,396	\$3,667	\$897 - \$1,691
Townhouse - Outside CC	\$200	\$4,207	\$487 - \$1,162

While there are clear cost savings associated with installing infrastructure during initial construction as opposed to a retrofit, providing EV infrastructure will still entail significant costs. A key variable in assessing the impact of these costs is the degree to which future demand supports utilization of this infrastructure for EVSE equipment. As a result, we also looked at forecasts of EV vehicle adoption. As would be expected with emerging technology, there is a wide variance in forecasts. It's also important to keep in mind that future forecasts of EVs are correlated with available EV charging infrastructure. An increased availability of chargers would be expected to support a more rapid adoption of EVs.

A 2018 report by the McKinsey Center for Future Mobility anticipates that the US will have roughly 18 million battery electric and plug-in hybrid vehicles on the road by 2030, with these vehicles representing an estimated 14% of overall sales by 2030.<sup>2</sup> Allied Market Research forecasted a 27.5% CAGR for electric

<sup>2</sup> McKinsey Center for Future Mobility, Charging Ahead: Electric-Vehicle Infrastructure Demand, October 2018





vehicles in North America through 2027<sup>3</sup>, while Inkwood Research forecasts a 23.15% CAGR through 2028.<sup>4</sup> BlueWeave Consulting forecasts a CAGR of over 14% in North America from 2021-2027.

## INTERVIEWS

A series of interviews was conducted to provide additional context. Interviewees included public agency staff in other jurisdictions, electrical engineers, utilities, and developers. This section provides a general summary of their input followed by some specific comments generally sorted by topic.

Everyone we interviewed expressed an expectation that electric vehicle adoption is likely to increase significantly over the next decade, and that there would likely be an increased need for property owners to accommodate these demands. There was less consensus regarding the scale of adoption as well as longer term sustained charging patterns. This is an evolving technology (particularly for batteries) and there is a high level of uncertainty regarding how vehicle charging needs will be accommodated. Some felt that the eventual pattern would favor fewer higher-rate charging stations, with faster charging times supporting centralized fueling stations similar to current gas stations. On the other end of the spectrum some saw slow overnight charging as a future solution, requiring only three prong outlets and limited additional infrastructure. Recognizing the high level of uncertainty and the risk of stranding investments in the incorrect infrastructure, many respondents stressed a need for flexibility in requirements. With current battery technology there will always be a need for L1 & L2 residential charging. Fast charging results in a quicker degradation of car batteries (<https://thenextweb.com/news/is-fast-charging-bad-ev-battery-degradation>) so primary reliance on fast chargers is not desirable.

We interviewed representatives from other jurisdictions on the West Coast that have implemented EV Ready programs. The primary intent of these programs is to facilitate a more rapid adoption of EV Vehicles in their jurisdictions to address climate goals. There was a concern that the relatively higher cost of installing EV infrastructure if not done during initial construction would limit access, particularly for lower-income households. Some jurisdictions have decided not to address renovation/retrofit in their initial efforts as the costs were much higher and the variability in costs was greater. The EV requirements also vary by jurisdiction, with many choosing to allow for power management solutions and shared circuits to reduce costs and electrical load. Many of the programs have limited the requirements to only providing portions of the infrastructure that are difficult and costly to do during a retrofit.

The development industry surveys saw this as an incremental increase in cost that would need to be reflected in higher rents or reduced land prices. Most of them expressed concern that the mandate was unnecessary and/or was mandating the wrong response. There was a strong preference for letting the

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<sup>3</sup> Singh, Abhay, Allied Market Research, Electric Vehicle Market by Type, Vehicle Class, and Vehicle Type: Global Opportunity Analysis and Industry Forecast, 2020-2027, April 2020

<sup>4</sup> Inkwood Research, Global Electric Vehicle Market Forecast, 2020-2028



market determine the need for this infrastructure, and that the new requirements would place inflationary pressure on rents and reduce the level of new construction in the City of Portland. There was concern that the cost impact would be worse when included with the cumulative impact of a broad range of mandates and requirements in the City of Portland.

### General Comments

- Code Language
  - Don't necessarily need to pull wires initially to realize cost savings
  - There is the potential that wires will be the wrong gauge
  - Copper and aluminum wiring is expensive, and can be salvaged<sup>5</sup>
- The size of service to the building is a major cost, and utilities may not allow that level of service if there is no associated demand.
  - The utilities responded that they would always allow a customer to install a larger service size to accommodate future loads, as long as it is within their service limits for secondary service. They also suggest installing a separate service for the EV charging loads when possible.
- The utilities can't overbuild, as they are regulated, and costs must be recovered in rates and approved by the PUC. The costs can't be shifted to the rate payer.
  - While the preceding comment was made by a utility company representative, we followed up with them on this and received additional clarification. The utilities will design the utility infrastructure (vaults, transformer pads/vaults, primary & secondary conduit) to accommodate full use of whatever service size is installed by the customer. They will size the electrical portion of the installed facilities for the anticipated demand load on that service (i.e., not including future EV loads), so the utility assets wouldn't be "overbuilt". Once the EV charging load is added, the utility can easily upgrade the transformer and wires because the utility infrastructure was designed for the full service size (accounting for the EV charging loads).
- The electrical code needs some work to understand the load requirements for these systems. There is not enough historical data to understand the requirements of these systems, particularly actively managed systems.
- The utility can put in all of the service capacity for a building, but the peak usage in practice is only about one third of the NEC calculated load. NEC allows for derating of EV charging load based on the number of chargers, which we believe to be fairly accurate in the real world.
- Building inspection has been an issue, as code requirements limit flexibility. There is a lot of excess capacity in electrical systems, but inspectors don't want to recognize.
- The State of Oregon allows for a 50% diversity factor for projects with multiple chargers.
- The proposed requirements are missing the point, and planning for yesterday's technology

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<sup>5</sup> It does not appear as though wiring is required as a result of HB 2180. If only the conduit is required, the cost of wiring should not be an issue related to these new requirements.



- Lucid Motors has announced ultra-high 900V+ electrical architecture, which the capability to charge at rates of up to 20 miles per minute. This can translate into 300 miles of range in just 20 minutes of charging. Tesla DC Superchargers can recharge up to 200 miles of range in 15 minutes at up to 250 kW. Kia's upcoming EV will provide roughly 300 miles of range with a sub-20-minute recharge time using an 800V system that can hit 250-kW. Porsche already has an 800 V system, while GM is planning 400V and 800V platforms that can add 100 miles of range in 10 minutes.
- The technology is changing rapidly, and projects need flexibility to assure that they will have the correct solution. If the City put this in the code next year, any projects subject to the code wouldn't be delivered until 2025 at the earliest. At this time, the technology will have advanced, and the appropriate EV investment may vary substantively from what is mandated.
- The most likely solution for the longer term now appears to be a limited number of fast charge stations with a smart scheduling system as opposed to overnight charging. Providing a more limited number of fast charging stations costs less and is preferred by tenants.
- This may represent a short-term view and we need to build for the future, but what will the future be?
- We will be put into a situation of spending money on a problem that doesn't exist.
- A really important point for multifamily (as opposed to office or retail) that many developers and jurisdictions miss is that the majority of spaces do not need to be Level 2 charging stations, which are more expensive to install and require more electrical capacity. Most electric car owners in Portland use Level 1 chargers at home, and these are slower for a full charge but most people leave their cars parked overnight anyways. These are much cheaper to install.
- I wish more jurisdictions saw this opportunity and required apartment/residential developers to install some limited number (i.e., 5%-10%) of parking stalls with Level 2 high-speed chargers, then required the balance of the spaces to be equipped with three-pronged outlet chargers or EV-ready.

#### Experience in Other Markets

- In Washington, the requirements were done at the State level by amending land use codes. This was done for all development types.
- Each charging stall was to be equipped with a Level 2 plug
- The amperage of service is critical. Plugs were required so that the utilities would provide the adequate level of service for assumed future needs.
- The City of Vancouver initially set up the program for new construction, as there are much more complex issues with retrofitting and remodeling.
- The requirement in Vancouver is 100% EV infrastructure with the exception of visitor parking
- The issue of EV readiness in older projects has been pushed farther out, as costs are much higher as is variability.
- The pricing in Vancouver for housing is very high, and as a result it is difficult to push additional costs to the market in terms of higher rents. New projects still need to compete with older stock.



- Vancouver's program was intended to support and accelerate EV vehicle adoption, and the hope is that lower income households will also benefit from EV ownership advantages.
- Gas prices in British Columbia are comparatively high (approximately \$7.00 per gallon) and electric power costs are low. This makes EV vehicles relatively more attractive.
- The program increased the requirement to Level 2 charging capabilities but offset these costs by allowing for energy management systems.
- Performance standards were reduced. The average driver in Vancouver was assumed to require 8 kwh per day to keep an electric vehicle charged, so the requirement was set at 12 kwh per space.
- Required charging infrastructure will not likely be needed for a while. In other words, developments are likely to have more charging infrastructure than demand for a period of time. This will allow for greater power availability if not all spaces are being used.
- The development community no longer pushes back against the mandates, particularly since the performance standards were changed to allow for managed power solutions.
- There has been a lot of overcompliance in Vancouver. Since the standards were introduced a total of approximately 11,000 spaces were required and developers delivered 17,000.
- There is a concern of favoring a particular technology, and the City' intent is to keep standards general enough to allow for multiple systems and technological innovation.

#### Cost of Installation

- California recently completed updated cost estimates in 2019
- The cost to install charger infrastructure is \$2,000 to \$5,000 per space in new construction
- Costs increase to \$12,000 to \$13,000 per space for retrofits
- Load management has a big impact on pricing
- Larger garages have the ability to power share, with reduces costs significantly.
- Utilities are hesitant to increase service sizes. Larger requirements can trip vault requirements, which increase costs substantially.
- There has been a lot of progress in managed power and chargers.
- Firm is involved in the design of EV systems
- The costs can be highly variable, and the code requirements are somewhat vague
- A Level 2 charger typically requires a 40 to 50-amp circuit, and provides approximately 20 miles of range per hour in charging
- Distributed systems can split a dedicated circuit, with software allowing a managed allocation of a 40-amp circuit. This limits the level of charging available to any one space on the system depending upon how many vehicles are charging
- Not every car needs to be charged every night, so the impact is likely limited.
- There is a construction challenge with surface parking lot installations terminating conduit prior to installing a charging station. There is no simple way to cap off the empty conduit.
- There has been an increased interest in providing EV infrastructure to "future proof" projects in anticipation of wider EV vehicle adoption.



- The cost to install a Level 2 charging station per space is approximately \$7,000 to \$9,500, which includes the conduit, wiring, breaker, installation, and station. The rough-in alone (providing vault capacity and conduit) is \$2,000 to \$2,500 per space for new construction (pricing is from R&O and R&H).

### Impacts on Development

- Interviews were conducted with the Master Builders Association to look for pain points of the requirements.
- Requiring infrastructure that is not needed requires the developer to sit on the cost until the market requires it.
- The Oregon Energy Code requirements are already adding costs, and developers see EV requirements as just adding on to these costs.
- Many developers have been putting charging stations in projects for the last decade, as it provides points for LEED Certification as well as some demand from tenants.
- Developers and/or property owners will not lose tenants for a lack of charging stations. If they are demanded by the tenants they will be provided.
- A recently completed project has 200 parking spaces, 8 of which have EV charging stations. At the current time there are only 5 electric vehicles using the garage.
- Charging doesn't need to happen every night for most tenants, maybe once per week. This can be easily scheduled for a lower number of fast charging stations.
- The City of Portland keeps adding costs to projects as well as making it more difficult to develop. The cumulative impact of the ongoing code and policy changes discourages anyone from developing housing in Portland.
- People will buy electric vehicles when they see the value proposition, and property owners will add the necessary infrastructure when needed. They won't lose tenants over this issue.
- The City should let the market figure it out and put their time and efforts into developing ultra-fast charging stations and infrastructure.
- The capital markets are interested in emerging EV usage patterns and are looking to assure that investments will remain competitive. They want flexibility as they are unsure as to what the future will look like.
- The market will have incentives to provide the correct type and number of spaces to meet demand. Buildings included charging infrastructure before requirements.
- Investments such as a larger transformer vault would provide flexibility while remaining capable of meeting multiple future scenarios.
- Rent levels are fixed for income-restricted projects, so there is no ability to recover additional costs through rents.
- Most affordable housing in an urban context does not provide any parking, so EV mandates will have no impact. Close in projects assume tenants use bikes or transit.
- If in a suburban context, parking ratios are quite small (0.2 to 0.3 per unit), and most of that parking is for staff as opposed to residents.



- It will be very difficult to make any market rate projects work in the City of Portland that are subject to the inclusionary housing mandates, and additional mandates will just make it less likely.
- None of their current projects have any charging stations, although there are some that are EV-Ready.
- Let the market create demand for these, if needed they will be provided
- OHCS has added some guidelines that require a developer of affordable housing to at least address their ability to provide solar and charging stations in new units
- The City of Portland should stop doing things that increase the cost of providing housing
- The increased cost will place an upward pressure on rents
- Increased costs will have to be offset by some combination of higher rents and lower land values. It is very unlikely in this market that land values will decrease substantively.
- Costs are usually passed on to residents through additional parking rent.
- The cost for additional power usage is almost always passed through to the tenant. When you use a third party, like ChargePoint or Sema Connect, the tenant pays the cost of charging plus the cost of electricity (the system includes a built-in metering system). The third party then pays back the community the cost of the electricity.
- A recent survey provided by Graystar of multifamily projects in the Portland metro area shows monthly fees ranging from \$20 to \$100 per month for access to charging stations. Most charging is provided through shared stations, with only a few chargers per project.

#### Equity Considerations

- Requiring the infrastructure would increase access and equity for lower income households
- Who owns the meter? If shared, how is the cost equitably allocated?
- Not many residents of low-income projects have EVs, as they are not really practical.
- EV infrastructure mandates could have a big impact on rehab and renovation projects, which are a large part of affordable housing. Adding EV stations in these projects would be unnecessary and add a lot of costs.

#### Available Offsets

- Clean fuel standard credits are generated and can be sold/transferred.

## IV. ASSESSMENT OF IMPACTS

As part of our analysis, we looked at the impact of the proposed new requirements from a financial perspective. A series of simplified pro formas were used to test the marginal impact of the incremental associated costs on project viability. Our approach assumes a threshold rate of acceptable return, which implies that changes in construction cost are reflected in some combination of higher rents (revenues) or reduced land values (costs).



The incremental increase in cost from the proposed requirements was derived from the cost estimates generated by CALGreen and the City of Richmond, previously outlined in the literature review section of this report.<sup>6</sup> Costs were assumed for either dedicated or shared infrastructure, with cost estimates ranging from \$800 to \$4,800 per parking space. This does not include the cost of providing the actual charging station, which was estimated to increase cost to between \$7,000 to \$10,000 per space. The analysis only considered the net increase in cost associated with the City's proposed code project, above and beyond the new statewide requirements.

The following charts show the expected impact of the requirements for a range of residential prototypes. Cost increases associated with the EV infrastructure requirement ranged from \$62,000 to \$394,000 in these projects. The marginal cost increase would be expected to increase total development cost by between 0.2% to 1.2%. Assuming that these types of projects would require a 6.50% return on cost, annual project income would need to increase from \$4,000 to \$26,000 to offset these additional costs. If the additional income requirement is applied across the entire inventory of units, the incremental increase in rent levels to offset this cost would be less than 1%. The incremental income requirement per unit line item reflects the marginal annual change in income required to maintain the same level of return.

Some of the developers interviewed indicated that projects have successfully found ways to directly monetize EV infrastructure investment through charging higher parking rates for dedicated circuits or charging for time at a rapid charge station.

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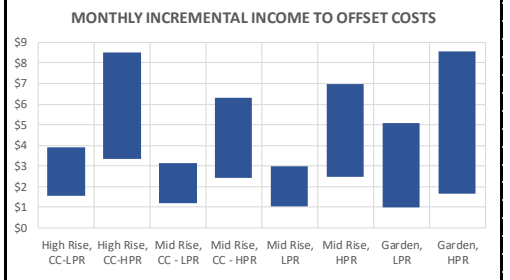
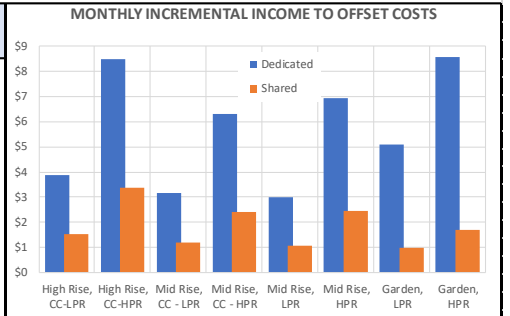
<sup>6</sup> The most reliable cost estimates available were from Oakland, CA and Richmond, BC. The report assumes that these costs are consistent with what would be experience in the City of Portland, there can be significant variance in construction costs across metropolitan areas. Overall construction costs in the Oakland area were estimated to be roughly 20% higher than those in Portland, while costs in Vancouver, BC were estimated to be only 1% higher. The CALGreen costs were used to establish the high end of the range, and as a result may overstate the top end cost impact.



## SUMMARY OF ESTIMATED IMPACTS ON PROJECT VIABILITY, RESIDENTIAL PROTOTYPES, BASELINE COSTS<sup>7</sup>

INCOME-DRIVEN IMPACT USING BASELINE ASSUMPTIONS								
PROJECT DETAILS	PROTOTYPE							
	High Rise CC-LPR	High Rise CC-HPR	Mid Rise CC - LPR	Mid Rise CC - HPR	Mid Rise LPR	Mid Rise HPR	Garden LPR	Garden HPR
Number of Units	220	220	180	180	60	60	250	250
Average SF/Unit	675	675	700	700	720	720	750	750
Average Rent/Month	\$2,363	\$2,363	\$2,065	\$2,065	\$1,872	\$1,872	\$1,388	\$1,388
Total Parking Spaces	110	242	90	180	30	70	188	313
<b>EV READY COSTS</b>								
Mandated EV Ready Spaces								
<i>Baseline</i>	22	49	18	36	6	14	38	63
<i>New Standards</i>	55	121	45	90	15	35	94	157
Marginal Change/Spaces	33	72	27	54	9	21	56	94
Average Cost/Space								
<i>Dedicated</i>	\$4,791	\$4,791	\$3,879	\$3,879	\$3,667	\$3,667	\$4,207	\$4,207
<i>Shared</i>	\$1,902	\$1,902	\$1,480	\$1,480	\$1,294	\$1,294	\$824	\$824
Marginal Cost Increase								
<i>Dedicated</i>	\$158,088	\$344,919	\$104,742	\$209,485	\$33,003	\$77,007	\$235,613	\$395,493
<i>Shared</i>	\$62,766	\$136,944	\$39,960	\$79,920	\$11,646	\$27,174	\$46,144	\$77,456
<b>IMPACTS ON REQUIRED RENTS</b>								
Assumed Capitalization Rate	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%
Required Annual Income to Offset Costs								
<i>Dedicated</i>	\$10,276	\$22,420	\$6,809	\$13,617	\$2,146	\$5,006	\$15,315	\$25,708
<i>Shared</i>	\$4,080	\$8,902	\$2,598	\$5,195	\$757	\$1,767	\$3,000	\$5,035
Incremental Income Requirement per Unit								
<i>Dedicated</i>	\$47	\$102	\$38	\$76	\$36	\$83	\$61	\$103
<i>Shared</i>	\$19	\$40	\$14	\$29	\$13	\$29	\$12	\$20
Incremental Income Per Unit/Per Month								
<i>Dedicated</i>	\$3.89	\$8.49	\$3.15	\$6.30	\$2.98	\$6.95	\$5.11	\$8.57
<i>Shared</i>	\$1.55	\$3.37	\$1.20	\$2.41	\$1.05	\$2.45	\$1.00	\$1.68
Percentage Increase Per Month								
<i>Dedicated</i>	0.16%	0.36%	0.15%	0.31%	0.16%	0.37%	0.37%	0.62%
<i>Shared</i>	0.07%	0.14%	0.06%	0.12%	0.06%	0.13%	0.07%	0.12%

SOURCE: Johnson Economics

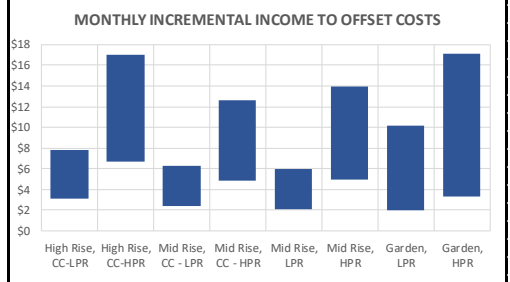
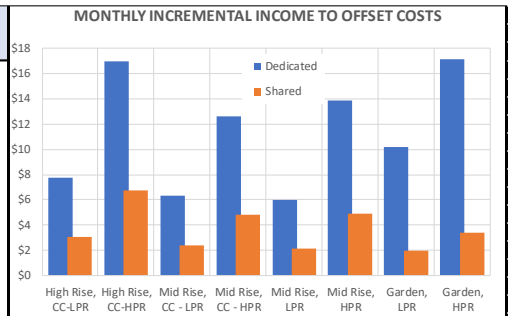


The same analysis was run doubling the cost assumptions, which also doubles the impact on rents assuming all of the cost is pushed forward to the market.

## SUMMARY OF ESTIMATED IMPACTS ON PROJECT VIABILITY, RESIDENTIAL PROTOTYPES, HIGH COSTS

INCOME-DRIVEN IMPACT USING BASELINE ASSUMPTIONS								
PROJECT DETAILS	PROTOTYPE							
	High Rise CC-LPR	High Rise CC-HPR	Mid Rise CC - LPR	Mid Rise CC - HPR	Mid Rise LPR	Mid Rise HPR	Garden LPR	Garden HPR
Number of Units	220	220	180	180	60	60	250	250
Average SF/Unit	675	675	700	700	720	720	750	750
Average Rent/Month	\$2,363	\$2,363	\$2,065	\$2,065	\$1,872	\$1,872	\$1,388	\$1,388
Total Parking Spaces	110	242	90	180	30	70	188	313
<b>EV READY COSTS</b>								
Mandated EV Ready Spaces								
<i>Baseline</i>	22	49	18	36	6	14	38	63
<i>New Standards</i>	55	121	45	90	15	35	94	157
Marginal Change/Spaces	33	72	27	54	9	21	56	94
Average Cost/Space								
<i>Dedicated</i>	\$9,581	\$9,581	\$7,759	\$7,759	\$7,334	\$7,334	\$8,415	\$8,415
<i>Shared</i>	\$3,804	\$3,804	\$2,960	\$2,960	\$2,588	\$2,588	\$1,648	\$1,648
Marginal Cost Increase								
<i>Dedicated</i>	\$316,176	\$689,839	\$209,485	\$418,969	\$66,006	\$154,014	\$471,226	\$790,987
<i>Shared</i>	\$125,532	\$273,888	\$79,920	\$159,840	\$23,292	\$54,348	\$92,288	\$154,912
<b>IMPACTS ON REQUIRED RENTS</b>								
Assumed Capitalization Rate	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%
Required Annual Income to Offset Costs								
<i>Dedicated</i>	\$20,552	\$44,840	\$13,617	\$27,233	\$4,291	\$10,011	\$30,630	\$51,415
<i>Shared</i>	\$8,160	\$17,803	\$5,195	\$10,390	\$1,514	\$3,533	\$5,999	\$10,070
Incremental Income Requirement per Unit								
<i>Dedicated</i>	\$93	\$204	\$76	\$151	\$72	\$167	\$123	\$206
<i>Shared</i>	\$37	\$81	\$29	\$58	\$25	\$59	\$24	\$40
Incremental Income Per Unit/Per Month								
<i>Dedicated</i>	\$7.78	\$16.98	\$6.30	\$12.61	\$5.96	\$13.90	\$10.21	\$17.14
<i>Shared</i>	\$3.09	\$6.74	\$2.41	\$4.81	\$2.10	\$4.91	\$2.00	\$3.36
Percentage Increase Per Month								
<i>Dedicated</i>	0.33%	0.72%	0.31%	0.61%	0.32%	0.74%	0.74%	1.23%
<i>Shared</i>	0.13%	0.29%	0.12%	0.23%	0.11%	0.26%	0.14%	0.24%

SOURCE: Johnson Economics



<sup>7</sup> LPR and HPR refer to low and high parking ratio prototypes.





As noted previously, increased costs can be shifted to the market through higher rents or deducted from land values as an alternative means of reducing costs. In our experience this is very difficult to do in the City of Portland as the market is highly competitive and property owners are often inflexible.

A similar analysis was done for a series of commercial and industrial prototypes. In this case we assumed a marginal cost of \$1,200 per space for a shared loop, increasing to \$4,800 for a dedicated circuit. These costs do not include the installation of a charging station, which would increase costs substantially. The capitalization rate for commercial and industrial was increased to 7.5%, reflecting the higher rates of return demanded for these product categories in the market.

### SUMMARY OF ESTIMATED IMPACTS ON PROJECT VIABILITY, COMMERCIAL AND INDUSTRIAL PROTOTYPES

	INCOME-DRIVEN IMPACT USING BASELINE ASSUMPTIONS					
	PROTOTYPE					
	Office High Rise	Office Mid/ Structure	Office Mid/ Surface	Office Low Rise	Indust. Distribution	Indust. Flex
<b>PROJECT DETAILS</b>						
Gross SF	300,000	150,000	80,000	12,000	48,000	13,000
Leasable SF	270,000	135,000	72,000	12,000	48,000	13,000
Lease Rate PSF/NNN	\$26.00	\$26.00	\$26.00	\$26.00	\$8.00	\$13.50
Total Parking Spaces	405	202	92	18	48	13
<b>EV READY COSTS</b>						
Mandated EV Ready Spaces						
<i>Baseline</i>	81	40	18	4	10	3
<i>New Standards</i>	81	40	18	4	10	3
Marginal Change/Spaces	0	0	0	0	0	0
Average Cost/Space						
<i>Dedicated</i>	\$4,800	\$4,800	\$4,800	\$4,800	\$4,800	\$4,800
<i>Shared</i>	\$1,200	\$1,200	\$1,200	\$1,200	\$1,200	\$1,200
Marginal Cost Increase						
<i>Dedicated</i>	\$0	\$0	\$0	\$0	\$0	\$0
<i>Shared</i>	\$0	\$0	\$0	\$0	\$0	\$0
<b>IMPACTS ON REQUIRED RENTS</b>						
Assumed Capitalization Rate	7.50%	7.50%	7.50%	7.50%	7.50%	7.50%
Required Annual Income to Offset Costs						
<i>Dedicated</i>	\$0	\$0	\$0	\$0	\$0	\$0
<i>Shared</i>	\$0	\$0	\$0	\$0	\$0	\$0
Incremental Income Requirement per SF						
<i>Dedicated</i>	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
<i>Shared</i>	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Percentage Increase Per Month						
<i>Dedicated</i>	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
<i>Shared</i>	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

SOURCE: Johnson Economics

As with the residential analysis, we looked at the marginal increase in lease rates that would be necessary to offset the mandated program requirements.

Our understanding is the current proposal sets the commercial rate at 20% of all parking, consistent with the new statewide requirements. This varies from the residential impact, where the City of Portland code would add incremental requirements beyond the statewide mandate. Since the proposed requirements



will be consistent with HB 2180 there is no anticipated net impact associated with the City's proposals for commercial space.

## EQUITY ISSUES

While the proposal is supportive of the City's climate goals, there is also hope that the mandated EV infrastructure investments will increase the access to EV charging facilities across the household income spectrum. As the number of EVs in the market increase and access to these vehicles becomes more competitive at lower price points through the new and used vehicle market, it is hoped that less affluent households will be able to benefit from the lower operational and maintenance costs of these vehicles.

The proposed regulations will impact new construction. These types of projects are expected to command generally higher rent levels and be occupied by disproportionately higher income tenants. Lower income residents are more likely to be housed in older as well as income-restricted projects. New income restricted projects are expected to provide limited if any parking, so access will not be substantively improved under the proposed code.

An equity concern is the potential for the increased costs to translate into higher market rent levels for lower income households. As outlined in the preceding section, the marginal impact on rents to offset anticipated costs associated with EV infrastructure is expected to be relatively small for new construction, but it would be greater for renovation/rehab projects which are often a source of affordable housing in the market. While assumed rent levels in our analysis were relatively high, the costs will be higher in a rehab building while the market rent levels will likely be lower. As a result, the percentage shift in necessary rents to offset costs will be higher.

Another potential equity concern that arises is the extent to which this requirement provides a benefit with more value to higher income residents, who are more likely to own electric vehicles in the short and intermediate term. The incremental cost of the infrastructure investment could potentially be reflected in higher lease rates, which would negatively impact lower income households that would not benefit from the charging infrastructure.

The average transportation spending per household is lower among lower-income households, while the percentage of income spent on transportation is significantly higher. A significant share of lower income households own no vehicles. While lower income households are typically assumed to purchase used vehicles, an estimated 39% of new sedans in the United States were purchased by households with incomes below \$50,000 per year. An estimated 90% of new car buyers own their home though, providing little overlap for lower income renter household buying new cars.<sup>8</sup> Over time it is expected that used EVs will become increasingly available on the market, with lower price points and a broader acceptance rate among lower income households.

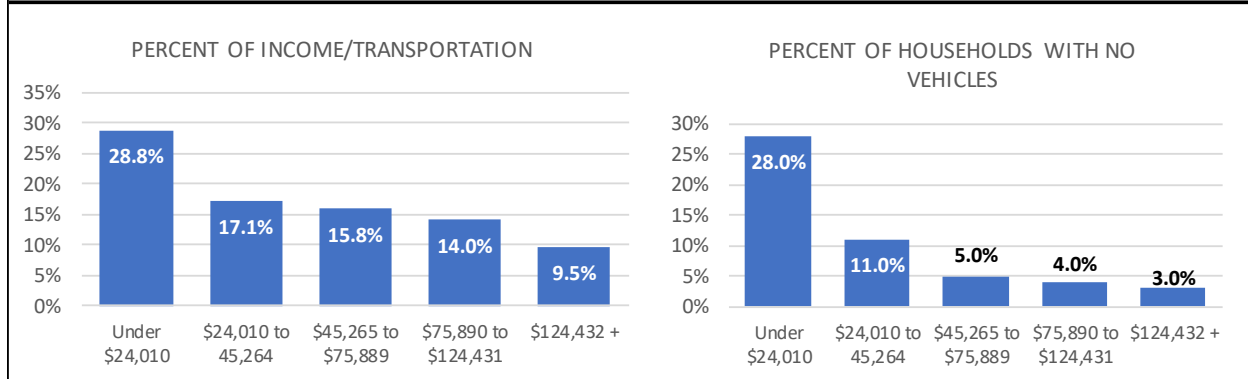
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<sup>8</sup> Hedges & Company, 2018 & 2019 model year vehicles.



## AVERAGE HOUSEHOLD TRANSPORTATION EXPENDITURES BY INCOME QUINTILE (2020)

Quintile	Average After Tax Income	Trans. Spending per Household	Trans. Spending/ % of Income	Vehicles per Household	Households with No Vehicles (%)
All Quintiles	\$74,949	\$9,826	13.1%	1.9	10.0%
First (\$0 to 24,009)	\$15,140	\$4,363	28.8%	1	28.0%
Second (\$24,010 to 45,264)	\$36,397	\$6,218	17.1%	1.6	11.0%
Third (\$45,265 to \$75,889)	\$58,001	\$9,189	15.8%	1.9	5.0%
Fourth (\$75,890 to \$124,431)	\$89,766	\$12,610	14.0%	2.3	4.0%
Fifth (\$124,432 +)	\$176,094	\$16,796	9.5%	2.7	3.0%



SOURCE: US Department of Labor Statistics, Table 1101, Quintiles of income before taxes, Consumer Expenditures Surveys

### PROJECTIONS

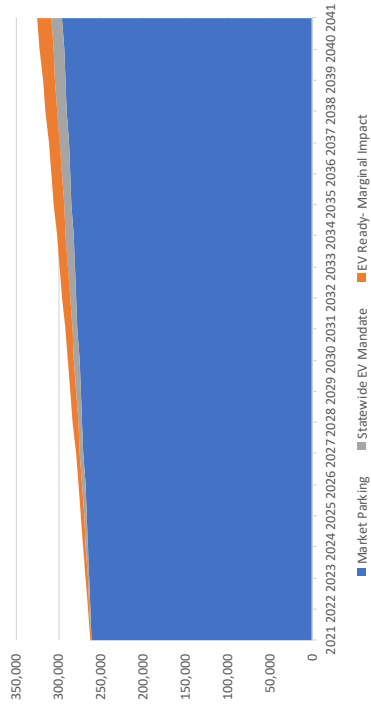
In order to better understand the impact of the program on the overall availability of EV ready spaces, we forecast housing starts through 2041 assuming a 1.1% annual expansion of the local housing base. Using these assumptions, and assuming parking ratios of 1.0 per unit for ownership and 0.7 per unit for rental units, the overall inventory of EV Ready spaces would increase by 16,900 from the City’s proposed new code. The program as proposed would be expected to increase the mandated number of EV Ready spaces in residential construction in the City of Portland more than two time what is currently mandated by the State of Oregon. An estimated 5.2% of total residential stock in the City of Portland would be expected to have EV ready spaces attributable to this program’s mandates, in addition to 4.2% from the statewide requirements.

The degree to which EV ready infrastructure can be truly attributed to the program is a function of the extent to which the market will provide these improvements without the requirement. At the current time, the mandate appears to be well in excess of what the market would provide. In the future this may not be the case, and the market install infrastructure well above the requirements. As summarized in the interviews, the market has provided 17,000 EV Ready spaces in Vancouver B.C. while the requirement through code was for only 11,000. The value proposition for EV’s in British Columbia is significantly better as fuel prices are roughly \$7.00 per gallon and electricity costs are low.

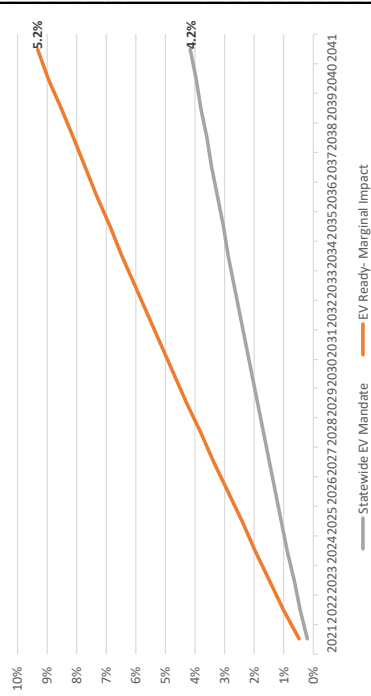


	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
<b>Total Residential Units 1/</b>																					
Ownership	161,820	163,600	165,399	167,219	169,058	170,918	172,798	174,699	176,620	178,563	180,527	182,513	184,521	186,551	188,603	190,677	192,775	194,895	197,039	199,207	201,398
Rental	143,180	144,755	146,348	147,957	149,585	151,230	152,894	154,576	156,276	157,995	159,733	161,490	163,266	165,062	166,878	168,714	170,570	172,446	174,343	176,260	178,199
Total	305,000	308,355	311,747	315,176	318,643	322,148	325,692	329,274	332,896	336,558	340,260	344,003	347,787	351,613	355,481	359,391	363,344	367,341	371,382	375,467	379,597
<b>Parking Spaces 2/</b>																					
Ownership	161,820	163,600	165,399	167,219	169,058	170,918	172,798	174,699	176,620	178,563	180,527	182,513	184,521	186,551	188,603	190,677	192,775	194,895	197,039	199,207	201,398
Rental	100,226	101,329	102,443	103,570	104,709	105,861	107,026	108,203	109,393	110,597	111,813	113,043	114,286	115,544	116,815	118,100	119,399	120,712	122,040	123,382	124,740
Total	262,046	264,928	267,843	270,789	273,768	276,779	279,824	282,902	286,014	289,160	292,340	295,556	298,807	302,094	305,417	308,777	312,173	315,607	319,079	322,589	326,137
<b>New Units</b>																					
Assumed Expansion Rate	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%
Ownership Units	1,780	1,800	1,819	1,839	1,860	1,880	1,901	1,922	1,943	1,964	1,986	2,008	2,030	2,052	2,075	2,097	2,121	2,144	2,167	2,191	2,215
Rental Units	1,575	1,592	1,610	1,628	1,645	1,664	1,682	1,700	1,719	1,738	1,757	1,776	1,796	1,816	1,836	1,856	1,876	1,897	1,918	1,939	1,960
Assumed Parking Ratio per Unit																					
Ownership Units	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Rental Units	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Net % EV Ready	45%	45%	45%	45%	45%	45%	45%	45%	45%	45%	45%	45%	45%	45%	45%	45%	45%	45%	45%	45%	45%
<b>EV Ready Spaces</b>																					
Ownership Units	801	810	819	828	837	846	855	865	874	884	894	903	913	923	934	944	954	965	975	986	997
Rental Units	496	502	507	513	518	524	530	536	541	547	553	560	566	572	578	585	591	598	604	611	617
Annual Total	1,297	1,311	1,326	1,340	1,355	1,370	1,385	1,400	1,416	1,431	1,447	1,463	1,479	1,495	1,512	1,528	1,545	1,562	1,579	1,597	1,614
Cumulative Total	1,297	2,609	3,934	5,275	6,630	8,000	9,385	10,785	12,201	13,633	15,080	16,543	18,022	19,517	21,029	22,557	24,103	25,665	27,244	28,841	30,456
% of All Parking	0.50%	0.98%	1.47%	1.95%	2.42%	2.89%	3.35%	3.81%	4.27%	4.71%	5.16%	5.60%	6.03%	6.46%	6.89%	7.31%	7.72%	8.13%	8.54%	8.94%	9.34%

RESIDENTIAL PARKING SUPPLY - PROJECTED THROUGH 2041  
Excluding Renovation/Rehab Impacts



PROJECTED % OF RESIDENTIAL PARKING SUPPLY MANDATED EV-READY  
Excluding Renovation/Rehab Impacts



1/ Derived based on the US Census, ACS 1-Year 2019 Estimate.  
2/ Based on the assumed parking ratios for new projects, which may not represent current parking inventory levels.