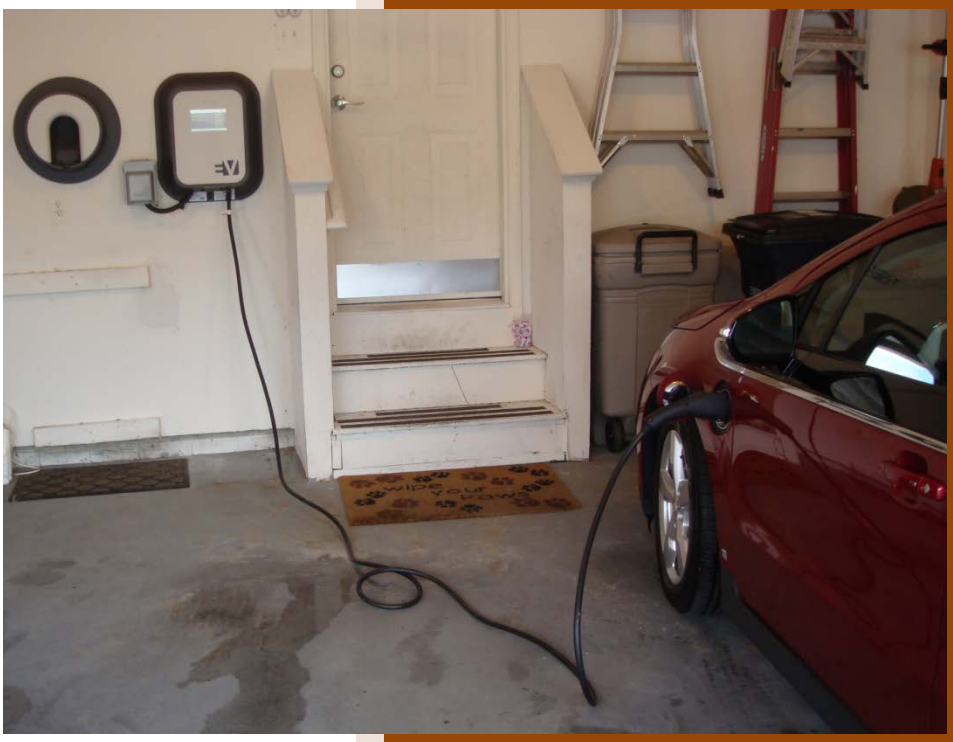
Residential EVSE Permit Process Best Practices



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Overview of Electric Vehicle Supply Equipment Permitting

Electric Vehicle Supply Equipment (EVSE) installations are a new and unfamiliar work order for electrical contractors and inspectors. The permitting process, while similar to other large electrical appliance installations for residential applications, can be unique and involves considerations specific to EVSE and plug-in electric vehicle (PEV) charging safety. Commercial installations may involve more complex installation processes (e.g., trenching, laying conduit, adhering to Americans with Disabilities Act requirements) and should include additional safety precautions and warning labels to protect users and curious observers. However, most residential installations are simple wall-mounted units inside a garage that can be connected to a single standard breaker in the electrical panel. Alternating Current (AC) level 1 EVSE[1] are the power equivalent of a typical household receptacle while AC level 2 EVSE are the power equivalent of an electric stove or clothes dryer.

The newness of EVSE permitting and the rush to get ready for a nationwide EV rollout has resulted in a haphazard assortment of permit prices, inspection wait times, and code/standard requirements.

Streamlining the EVSE permitting process for residential installations and using a standardized application form will have positive results for the authority having jurisdiction (AHJ) (usually either the Building Department or Fire Department), electrical inspector, and EV owner. Information obtained through the EV Project[i] indicates that the permitting timeline for residential EVSE installations has not been a problem, but there have been significant delays caused by the permitting process for commercial EVSE installations that may require load studies or zoning reviews.[ii] There is also a wide range of permitting costs across the U.S. and even within each region as shown in Table 1.

Table 1: Permit Fees for EV Project EVSE Installations [ii]

Region	Residential EVSE Installations				Commercial EVSE Installations			
	Counts of Permits	Average Permit Fee	Minimum Permit Fee	Maximum Permit Fee	Counts of Permits	Average Permit Fee	Minimum Permit Fee	Maximum Permit Fee
Arizona	66	$96.11	$26.25	$280.80	72	$228	$35	$542
Los Angeles	109	$83.99	$45.70	$218.76	17	$195	$67	$650
San Diego	496	$213.30	$12.00	$409.23	17	$361	$44	$821
Oregon	316	$40.98	$12.84	$355.04	102	$112	$14	$291
San Francisco	401	$147.57	$29.00	$500.00				
Tennessee	322	$47.15	$7.50	$108.00	159	$71	$19	$216
Texas					47	$150	$37	$775
Washington	497	$78.27	$27.70	$317.25	33	$189	$57	$590

[1] Society of Automotive Engineers J1772 defines alternating current (AC) level 1 at 120 volts (V) up to 16 amperes (A) and AC level 2 is 240V, up to 80A. Direct Current (DC) level 1 is 200-500V DC, up to 40A and DC level 2 is 200-500V DC, up to 200A.

There are common methods used to streamline residential EVSE permitting. These include labeling EVSE as "minor work", online permitting applications, self-inspections, and publishing installation guidelines. These methods are summarized below with in-practice examples listed in Table 2 and Table 3.

Minor Work

Several jurisdictions have chosen to label residential EVSE as "minor work", classifying it on the same level as a large electrical appliance. This implies that the EVSE installation will be straightforward, without much custom work or electrical service upgrades. Labeling it as minor work can lower the cost of the permit and the time required to execute the process. Some jurisdictions have a simplified residential EVSE permit form that can be used if specific conditions are met (e.g., installation is in a private garage, electrical service to the house is at least 200 amps, and EVSE does not exceed 200 amps).

Online Permitting

Online permitting is currently used for building and electrical permits, and many jurisdictions have chosen to extend it to residential EVSE permitting. An online permit is in most cases cheaper, faster, and simpler for the electrical inspectors and EV owners.

Self-Inspections

The jurisdiction maintains the authority and responsibility to conduct any inspections deemed necessary to protect public safety; however, due to the projected PEV volume, a qualified electrician could be approved to self-inspect the system and enable system operation in advance of jurisdiction inspection. Jurisdictions could also choose to conduct random or selective inspections at their discretion for qualified installers that have successfully installed a set number of residential EVSE with no issues found during the inspection.

Installation Guidelines

Several jurisdictions provide EVSE installation process guidelines for both homeowners and electrical contractors. This helps to further streamline the permitting and inspection process by clarifying the requirements. A large variety of documents have been published regarding this issue. NYSERDA and others have compiled best practices guides to siting and design which include more comprehensive guidelines for commercial installations that can widely vary in complexity, as well as handbooks targeted at residential single- and multi-family homeowners and renters.[iii,iv,v,vi] An EVSE load calculation worksheet is a valuable tool for installers to verify that the charger does not overload the existing electrical service and could also be used to estimate the impact that PEV charging might have on the electrical usage and cost for the customer.

Including a step in the permitting process to notify the local electric utility of the EVSE installation is another valuable consideration. Notification of EVSE installations helps electric utilities determine if the local distribution system is ready for the increased demand from additional localized PEV use. One approach could be to identify and provide the appropriate contact at the local electric utilities that the

permit applicant should contact and include a check box on the permit applications for this to be completed prior to a permit being issued. Alternatively, the jurisdiction could establish a procedure for providing a copy of every EVSE permit application to the local electric utility.

Examples of these best practices and other unique innovations are presented in the tables below.

Table 2: State-Wide Permitting Best Practices

Location	Description
New Hampshire[vii]	New Hampshire allows the homeowner to do the electrical work on their single-family residence without a permit.
New Jersey[viii]	New Jersey has determined that the installation of residential EVSE is considered "minor work". This means that the homeowner or electric contractor need only provide verbal notification to the local code enforcement agency prior to starting the installation. The permit application must then be subsequently filed within five days of the notification.
Oregon[ix]	Oregon has expanded its minor label program to include EVSE installations. Under the program, a licensed electrician purchases booklets of 10 minor installation labels. Eligible residential EVSE installations must be within sight of the electrical panel supplying the charging unit, have a branch circuit that does not exceed 40 amps/240 volts and are not located in a damp place. The installation labels are only about a tenth of the cost of a regular permit, and only a tenth of the installations get inspected.
Virginia[x]	Several Virginia jurisdictions have instituted online or same-day fax permitting procedures for EVSE.

Table 3: City-Specific Permitting Best Practices

Location	Description
Cary, NC[xi]	The Town of Cary has implemented an online permitting process which takes approximately 2 days to process.
Charlotte, NC[xii]	The Mecklenburg County Code Enforcement and the Building Development Commission in Charlotte introduced two "self-permitting" options, the Homeowner Internet Permits[xiii] (HIPs) and Trades Internet Permits[xiv] (TIPs). Mecklenburg County's Electric Car Initiative uses the TIP process for EVSE permit applications, reducing the permit turnaround time to 1–2 days.
Houston, TX[xv]	Houston applied its existing online express permitting process to EVSE installations. With this process, online permits are issued automatically and instantaneously for standard EVSE, and an inspection can be performed on the same day as installation.
Los Angeles, CA[xvi]	Los Angeles applied its existing online Express Permit system to EVSE installations. The system enables standard EVSE customers to receive a permit automatically and instantaneously. They are allowed to start using their EVSE immediately after installation and the inspection follows within 24 hours.
Milpitas, CA[xvii]	In Milpitas, single-family homeowners are not required to submit site plans when applying for an EVSE permit.
Raleigh, NC[xviii]	Raleigh applied its existing "stand alone" permitting and inspection process to EVSE installations. The permit is completed as the applicant is walked through the process by permitting personnel. Getting a permit takes about one hour, and inspections can be performed the day after installation. As a result, permitting, installation, and inspection

	process for a simple home-based EVSE project can be completed in as few as two days.
San Francisco, CA	The City of San Francisco's Department of Building Inspection issues same-day, over the counter permits for the necessary electrical work at a residence, and electricians registered with the Department of Building Inspection can obtain the permits instantly online.
Sunnyvale, CA[xix]	In Sunnyvale, homeowners can use an online application process for EVSE, provided the charger will be located inside a garage and can be connected to existing electrical panels.

Sample Permits

Sample permitting applications/forms accompany this document for guidance purposes.

The first document is a generic permitting template created by National Renewable Energy Laboratory and is posted on the U.S. Department of Energy (DOE) Alternative Fuels Data Center (AFDC) website. [xx] A set of requirements were chosen that could be used in most jurisdictions. Along with the basic permitting form structure, this template includes relevant codes compliance information and diagrams of typical EVSE installation setups. The layout is as follows: jurisdiction information, code requirements, certification statement, and a checklist.[xxi] Currently, Richmond, VA and the State of Massachusetts are using pieces of the template, while several others are considering its use. DOE recommends two pathways of use: use it "as is", or customize it with information pertinent to the individual jurisdiction.

The second permit form/application was created by the Office of the State Building Inspector in Connecticut. The permit form must be completed along with a Building Permit Application. Connecticut's form contains two key aspects found in the AFDC form, including the jurisdiction information and certification statement. There is no mention of EVSE-specific codes or requirements as seen in the AFDC template. Connecticut requires more information regarding the type of EVSE (manufacturer, type, charging level, and installation location) and also allows the form to be used for residential or commercial installations.

The City of Irvine Building and Safety program EVSE permit worksheet is the third document presented.[xxii] This form is similar, but simpler in both structure and content to Connecticut's permit form. Irvine's form is for residential use only, and includes an EVSE load calculation worksheet for use if the EVSE exceeds 20A. The restrictions on the use of this form for straightforward EVSE installations are similar to those of the state-wide programs used by Oregon and New Jersey that classify most residential EVSE installations as "minor work".

The final attachment is a Permitting and Inspections Guide for Residential EVSE, used in Cary, NC.[xxiii] Also included are screenshots from the online permit application.[xxiv] The Town of Cary is one of many jurisdictions that use their existing standard building permit, supplemented with additional information in a guide document, to apply for an EVSE permit. Cary issues online permits, which take approximately 2 days to process. This is a quick way to implement an EVSE permitting process without creating an entirely separate permitting process and application for EVSE.

Recommended Best Practices

Jurisdictions in New York State should adopt a simple form with an EVSE load calculation worksheet and a standard low fee for basic residential EVSE installations to make them safe and cost effective for building owners and the jurisdictions overseeing permitting. Standardized permitting forms and costs should also be established for more complicated residential and commercial EVSE installations with recommendations for installers to consult best practices guides for site design before installing EVSE. Online permit applications for both residential and commercial installations are encouraged and self-inspection of residential installations should be considered when appropriate.

References

[i] ECOtality, Inc. 2013. The EV Project. www.theevproject.com

[ii] Idaho National Laboratory. 2013. GITT 2013 - EV Project Charging Infrastructure Usage and Other Infrastructure Activities. avt.inl.gov/pdf/prog_info/GITT_March2013.pdf

[iii] WXY Architecture + Urban Design. 2012. Siting And Design Guidelines For Electric Vehicle Supply Equipment. www.transportationandclimate.org/sites/default/files/EV_Siting_and_Design_Guidelines.pdf

[iv] Sustainable Transportation Strategies. 2012. Site Design for Electric Vehicle Charging Stations. www.sustainabletransportationstrategies.com/wp-content/uploads/2012/09/Site-Design-for-EV-Charging-Stations-1.01.pdf

[v] Advanced Energy. 2011. Charging Station Installation Handbook for Electrical Contractors and Inspectors. www.advancedenergy.org/transportation/evse/Charging%20Handbook.pdf

[vi] Advanced Energy. 2011. Residential Charging Station Installation Handbook for Single- and Multi-Family Homeowners and Renters. www.advancedenergy.org/transportation/resources/MUD%20Handbook%20FINAL%20Web.pdf

[vii] Transportation and Climate Initiative. 2012. Creating EV-Ready Towns and Cities: A Guide to Planning and Policy Tools. Page 21 www.transportationandclimate.org/sites/default/files/EVSE_Planning_and_Policy_Tool_Guide.pdf

[viii] New Jersey Department of Environmental Protection SAGE. Installing a Residential Plug-in Electric Vehicle Charging Station. www.nj.gov/dep/sage/docs/ev-charging-stations.pdf

[ix] Oregon Building Codes Division. 2010. Minor Label Installation for Home-based EVSE. www.bcd.oregon.gov/notices/Adopted_Rules/2010/070110_electricvehiclesupplyequipment_pr.pdf

[x] Transportation and Climate Initiative. 2012. Creating EV-Ready Towns and Cities: A Guide to Planning and Policy Tools. Page 21 www.transportationandclimate.org/sites/default/files/EVSE_Planning_and_Policy_Tool_Guide.pdf

[xi] Town of Cary Inspections and Permits Department. Residential EVSE Permitting and Inspections Guide. www.townofcary.org/Assets/Inspections+$!26+Permits+Department/Inspections+and+Permits+Department+PDFs/Res+Electric+Vehicle+Guide+3-12.pdf

[xii] Metropolitan Washington Council of Governments. 2012. EVs in Metropolitan WA: Understanding the Region's Current EV Readiness and Options for Expanding Their Use. Page 53. ncrportal.mwcog.org/sites/surveys/EVP/COG%20EV%20Plan/MWCOG%20EV%20Report%209-19-2012.pdf

[xiii] Mecklendburg Couty Code Enforcement. Homeowner Internet Permits. luewebsf.mecklenburgcountync.gov/homeownrespermits/

[xiv] Mecklendburg Couty Code Enforcement. Trades Internet Permits. charmeck.org/mecklenburg/county/codeenforcement/contractors-tools/pages/trade%20internet%20permits.aspx

[xv] Alternative Fuels Data Center. 2011. Houston's PEV Activities and Processes. www.afdc.energy.gov/case/1003

[xvi] Alternative Fuels Data Center. 2011. Los Angeles' PEV Activities and Processes. www.afdc.energy.gov/case/1002

[xvii] City of Milpitas Building and Safety Department. EV Charging System in Single Family Residence Plan Review and Permitting Requirements. www.ci.milpitas.ca.gov/_pdfs/bld_electric_vehicle_charging_system.pdf

[xviii] Alternative Fuels Data Center. 2011. Raleigh, North Carolina's PEV Activities and Processes. www.afdc.energy.gov/case/1001

[xix] City of Sunnyvale Building and Planning Division. 2012. Electric Vehicle Chargers. sunnyvale.ca.gov/Portals/0/Sunnyvale/CDD/Residential/Electrical%20Car%20Chargers.pdf

[xx] Alternative Fuels Data Center. Permit for Charging Equipment Installation. www.afdc.energy.gov/pdfs/EV_charging_template.pdf

[xxi] Clean Cities. EVSE Residential Permit Template. www1.eere.energy.gov/cleancities/toolbox/pdfs/residential_permit_template.pdf

[xxii] City of Irvine Building and Safety. EVSE Over the Counter Permit Worksheet. www.cityofirvine.org/civica/filebank/blobdload.asp?BlobID=17661

[xxiii] Town of Cary Inspections and Permits Department. Permitting and Inspections Guide for Residential EVSE www.townofcary.org/Assets/Inspections+$!26+Permits+Department/Guides/Residential+Electric+Vehicle+Supply+Equipment+Guide.pdf

[xxiv] Town of Cary Inspections and Permits Department. Building Permits Online. click2gov.townofcary.org/Click2GovBP/Index.jsp

Permit for Charging Equipment Installation
Electric Vehicle Supply Equipment (EVSE)

Jurisdiction: ____, ____

Compliance with the following permit will allow the installation and operation of electric vehicle charging equipment at a residence in the ____, ____ jurisdiction. This permit addresses one of the following situations:

- Only an additional branch circuit would be added at the residence
- A hard-wired charging station would be installed at the residence. The attached requirements for wiring the charging station are taken directly out of the 2011 edition of the National Electrical Code® (NEC) NFPA 70, Article 625 Electric Vehicle Charging System. This article does not provide all of the information necessary for the installation of electric vehicle charging equipment. Please refer to the current edition of the electrical code adopted by the local jurisdiction for additional installation requirements. Reference to the 2011 NEC may be made at www.nfpa.org/70.

This permit contains a general reference to the NEC or electrical code used in the jurisdiction. All work and installed equipment will comply with the requirements of the NEC or the electrical code used in the jurisdiction. The jurisdiction maintains the authority/responsibility to conduct any inspections deemed necessary to protect public safety; however, due to the projected plug-in hybrid electric vehicle (PHEV) volume, it is suggested for consideration that a qualified electrician be approved to self-inspect the system enabling system operation in advance of jurisdiction inspection. The charging station installer shall also be responsible for notifying or coordinating any work with the utility company where needed.

Section 1 of the permit application requires basic identifying information be submitted. Note that there is a separate portion of the form requesting information on the property owner who may not be the individual requesting the installation.

Section 2 of the permit application identifies which code needs to be complied with depending on whether a branch circuit and meter or a hard-wired charging station is being installed.

The technical installation requirements address the following specific elements of electric vehicle charging station safety:

- Listing and labeling requirements
- Wiring methods
- Breakaway requirements
- Overcurrent protection
- Indoor siting
- Outdoor siting

Section 3 consists of standard certification statement that could be modified as needed by the jurisdiction. By signing the certification statement, the applicant agrees to comply with the standard permit conditions and other applicable requirements. This consent would give the jurisdiction the option of allowing the applicant to proceed with installation and operation of the charging equipment.

Section 4 of the document gives an example of a checklist the jurisdiction could develop to track key information on the application. The example under section 4 contains only a few items of the many that the jurisdiction might wish to track.

This permit package also includes a schematic drawing depicting a typical indoor installation. In this installation the wiring path follows the exterior of the structure, and the charging station is located indoors. The NEC® allows for interior wiring and outdoor installations. The purpose of the schematic is only to show how the charging station equipment could be arranged and is not intended to convey any permit requirements.

Application for Installation of Electric Vehicle Charging Equipment

NOTICE: The system must be installed in compliance with the National Electric Code® NFPA 70, Article 625 Electric Vehicle Charging System or applicable electrical code currently adopted and enforced within the jurisdiction of installation. All associated work with circuits, electrical service and meters shall be completed in compliance with NFPA 70, national electric code, or applicable electrical code currently adopted and enforced within the jurisdiction of installation.

Section 1: Permit Applicant Information

Name:			
Installation Street Address (P.O. box not acceptable):	Contact Person:		Phone Number: ( ) -
City:	County:	State:	ZIP Code:
Owner Name:	Street Address:		Phone Number: ( ) -
City:	State:		ZIP Code:
Submitter's Name/Company	Street Address:		Phone Number: ( ) -
City:	State:		ZIP Code:
General description of equipment to be installed:			

Section 2: Permit Code Information

Requirements for wiring a charging station are taken directly out of the 2011 edition of the National Electrical Code® (NEC) NFPA 70, Article 625 Electric Vehicle Charging System. This article does not provide all of the information necessary for the installation of electric vehicle charging equipment. Please refer to the current edition of the electrical code adopted by the local jurisdiction for additional installation requirements. Reference to the 2011 NEC may be made at www.nfpa.org/70.

NEC® Chapter or Article	DESCRIPTION
Chapter 2 and 3	**Branch Circuit** A new electrical box added on a branch circuit shall comply with NFPA 70 National Electrical Code® Chapter 2 Wiring and Protection and Chapter 3 Wiring Methods and Materials and all administrative requirements of the NEC or the electrical code in effect in the jurisdiction
625.4	**VOLTAGES** Unless other Voltages are specified, the nominal ac system voltages of 120, 120/240, 208Y/120, 240, 480Y/277, 480, 600Y/347, and 600 Volts shall be used to supply equipment
625.5	**LISTED OR LABELED** All electrical materials, devices, fittings, and associated equipment shall be listed or labeled.

625.9	**WIRING METHODS** The electric vehicle coupler shall comply with 625.9(A) through (F). (A) Polarization. The electric vehicle coupler shall be polarized unless part of a system identified and listed as suitable for the purpose. (B) Noninterchangeability. The electric vehicle coupler shall have a configuration that is noninterchangeable with wiring devices in other electrical systems. Nongrounding-type electric vehicle couplers shall not be interchangeable with grounding-type electric vehicle couplers. (C) Construction and Installation. The electric vehicle coupler shall be constructed and installed so as to guard against inadvertent contact by persons with parts made live from the electric vehicle supply equipment or the electric vehicle battery. (D) Unintentional Disconnection. The electric vehicle coupler shall be provided with a positive means to prevent unintentional disconnection. (E) Grounding Pole. The electric vehicle coupler shall be provided with a grounding pole, unless part of a system identified and listed as suitable for the purpose in accordance with Article 250. (F) Grounding Pole Requirements. If a grounding pole is provided, the electric vehicle coupler shall be so designed that the grounding pole connection is the first to make and the last to break contact.
625.13	**ELECTRIC VEHICLE SUPPLY EQUIPMENT** Electric vehicle supply equipment rated at 125 volts, single phase, 15 or 20 amperes or part of a system identified and listed as suitable for the purpose and meeting the requirements of 625.18, 625.19, and 625.29 shall be permitted to be cord-and-plug-connected. All other electric vehicle supply equipment shall be permanently connected and fastened in place. This equipment shall have no exposed live parts.
625.14	**Rating** Electric vehicle supply equipment shall have sufficient rating to supply the load served. For the purposes of this article, electric vehicle charging loads shall be considered to be continuous loads.
625.15	**Markings** The electric vehicle supply equipment shall comply with 625.15(A) through (C). (A) General. All electric vehicle supply equipment shall be marked by the manufacturer as follows: FOR USE WITH ELECTRIC VEHICLES (B) Ventilation Not Required. Where marking is required by 625.29(C), the electric vehicle supply equipment shall be clearly marked by the manufacturer as follows: VENTILATION NOT REQUIRED The marking shall be located so as to be clearly visible after installation. (C) Ventilation Required. Where marking is required by 625.29(D), the electric vehicle supply equipment shall be clearly marked by the manufacturer, “Ventilation Required.” The marking shall be located so as to be clearly visible after installation.
625.16	**Means of Coupling** The means of coupling to the electric vehicle shall be either conductive or inductive. Attachment plugs, electric vehicle connectors, and electric vehicle inlets shall be listed or labeled for the purpose.
625.17	**Cable** The electric vehicle supply equipment cable shall be Type EV, EVJ, EVE, EVJE, EVT, or EVJT flexible cable as specified in Article 400 and Table 400.4. Ampacities shall be as specified in Table 400.5(A)(1) for 10 AWG and smaller, and in Table 400.5(A)(2) for 8 AWG and larger. The overall length of the cable shall not exceed 7.5 m (25 ft) unless equipped with a cable management system that is listed as suitable for the purpose. Other cable types and assemblies listed as being suitable for the purpose, including optional hybrid communications, signal, and composite optical fiber cables, shall be permitted.
625.18	**Interlock** Electric vehicle supply equipment shall be provided with an interlock that de-energizes the electric vehicle connector and its cable whenever the electrical connector is uncoupled from the electric vehicle. An interlock shall not be required for portable cord-and-plug-connected electric vehicle supply equipment intended for connection to receptacle outlets rated at 125 volts, single phase, 15 and 20 amperes.
625.19	**Automatic De-Energization of Cable** The electric vehicle supply equipment or the cable-connector combination of the equipment shall be provided with an automatic means to de-energize the cable conductors and electric vehicle connector upon exposure to strain that could result in either cable rupture or separation of the cable from the electric connector and exposure of live parts. Automatic means to de-energize the cable conductors and electric vehicle connector shall not be required for portable cord-and-plug-connected electric vehicle supply equipment intended for connection to receptacle outlets rated at 125 volts, single phase, 15 and 20 amperes.
625.21	**Overcurrent Protection** Overcurrent protection for feeders and branch circuits supplying electric vehicle supply equipment shall be sized for continuous duty and shall have a rating of not less than 125 percent of the maximum load of the electric vehicle supply

	equipment. Where noncontinuous loads are supplied from the same feeder or branch circuit, the overcurrent device shall have a rating of not less than the sum of the noncontinuous loads plus 125 percent of the continuous loads.
625.22	**Personnel Protection System** The electric vehicle supply equipment shall have a listed system of protection against electric shock of personnel. The personnel protection system shall be composed of listed personnel protection devices and constructional features. Where cord-and-plug-connected electric vehicle supply equipment is used, the interrupting device of a listed personnel protection system shall be provided and shall be an integral part of the attachment plug or shall be located in the power supply cable not more than 300 mm (12 in.) from the attachment plug.
625.23	**Disconnecting Means** For electric vehicle supply equipment rated more than 60 amperes or more than 150 volts to ground, the disconnecting means shall be provided and installed in a readily accessible location. The disconnecting means shall be capable of being locked in the open position. The provision for locking or adding a lock to the disconnecting means shall be installed on or at the switch or circuit breaker used as the disconnecting means and shall remain in place with or without the lock installed. Portable means for adding a lock to the switch or circuit breaker shall not be permitted.
625.25	**Loss of Primary Source** Means shall be provided such that, upon loss of voltage from the utility or other electrical system(s), energy cannot be back fed through the electric vehicle and the supply equipment to the premises wiring system unless permitted by 625.26.
625.26	**Interactive Systems** Electric vehicle supply equipment and other parts of a system, either on-board or off-board the vehicle, that are identified for and intended to be interconnected to a vehicle and also serve as an optional standby system or an electric power production source or provide for bi-directional power feed shall be listed as suitable for that purpose. When used as an optional standby system, the requirements of Article 702 shall apply, and when used as an electric power production source, the requirements of Article 705 shall apply.
625.28	**Hazardous (Classified) Locations** Where electric vehicle supply equipment or wiring is installed in a hazardous (classified) location, the requirements of Articles 500 through 516 shall apply.
625.29	**Indoor Sites** Indoor sites shall include, but not be limited to, integral, attached, and detached residential garages; enclosed and underground parking structures; repair and nonrepair commercial garages; and agricultural buildings. (A) Location. The electric vehicle supply equipment shall be located to permit direct connection to the electric vehicle. (B) Height. Unless specifically listed for the purpose and location, the coupling means of the electric vehicle supply equipment shall be stored or located at a height of not less than 450 mm (18 in.) and not more than 1.2 m (4 ft) above the floor level. (C) Ventilation Not Required. Where electric vehicle nonvented storage batteries are used or where the electric vehicle supply equipment is listed or labeled as suitable for charging electric vehicles indoors without ventilation and marked in accordance with 625.15(B), mechanical ventilation shall not be required. (D) Ventilation Required. Where the electric vehicle supply equipment is listed or labeled as suitable for charging electric vehicles that require ventilation for indoor charging, and is marked in accordance with 625.15(C), mechanical ventilation, such as a fan, shall be provided. The ventilation shall include both supply and exhaust equipment and shall be permanently installed and located to intake from, and vent directly to, the outdoors. Positive pressure ventilation systems shall be permitted only in buildings or areas that have been specifically designed and approved for that application. Mechanical ventilation requirements shall be determined by one of the methods specified in 625.29(D)(1) through (D)(4). (1) Table Values. For supply voltages and currents specified in Table 625.29(D)(1) or Table 625.29(D)(2), the minimum ventilation requirements shall be as specified in Table 625.29(D)(1) or Table 625.29(D)(2) for each of the total number of electric vehicles that can be charged at one time. (2) Other Values. For supply voltages and currents other than specified in Table 625.29(D)(1) or Table 625.29(D)(2), the minimum ventilation requirements shall be calculated by means of general formulas stated in article 625.39(D)(2). (3) Engineered Systems. For an electric vehicle supply equipment ventilation system designed by a person qualified to perform such calculations as an integral part of a building's total ventilation system, the minimum ventilation requirements shall be permitted to be determined in accordance with calculations specified in the engineering study. (4) Supply Circuits. The supply circuit to the mechanical ventilation equipment shall be electrically interlocked with the electric vehicle supply equipment and shall remain energized during the entire electric vehicle charging cycle. Electric vehicle supply equipment shall be marked in accordance with 625.15. Electric vehicle supply equipment receptacles rated at 125 volts, single phase, 15 and 20 amperes shall be marked in accordance with 625.15(C) and shall be switched, and the mechanical ventilation system shall be electrically interlocked through the switch supply power to the receptacle.
625.30	**Outdoor Sites** Outdoor sites shall include but not be limited to residential carports and driveways, curbside, open parking structures, parking lots, and commercial charging facilities. (A) Location. The electric vehicle supply equipment shall be located to permit direct connection to the electric vehicle. (B) Height. Unless specifically listed for the purpose and location, the coupling means of electric vehicle supply equipment

	shall be stored or located at a height of not less than 600 mm (24 in.) and not more than 1.2 m (4 ft) above the parking surface.

Section 3: Certification Statement

I hereby certify that the electrical work described on this permit application shall be/has been installed in compliance with the conditions in this permit, National Electrical Code® (NEC) NFPA 70, Article 625 Electric Vehicle Charging System or applicable electrical code currently adopted and enforced within the jurisdiction of installation. Furthermore, all associated work with circuits, electrical service, and meters shall be/has been completed in compliance with NEC NFPA 70 or applicable electrical code currently adopted and enforced within the jurisdiction of installation. By agreeing to the above requirements, the licensee or owner shall be permitted to install and operate the charging station. The licensee also insures that appropriate load calculations have been done to insure that the residence has adequate electrical capacity to support electric vehicle charging equipment.

Existing circuits provided for garages may supply other loads and may not have sufficient capacity for electric vehicle charging equipment.

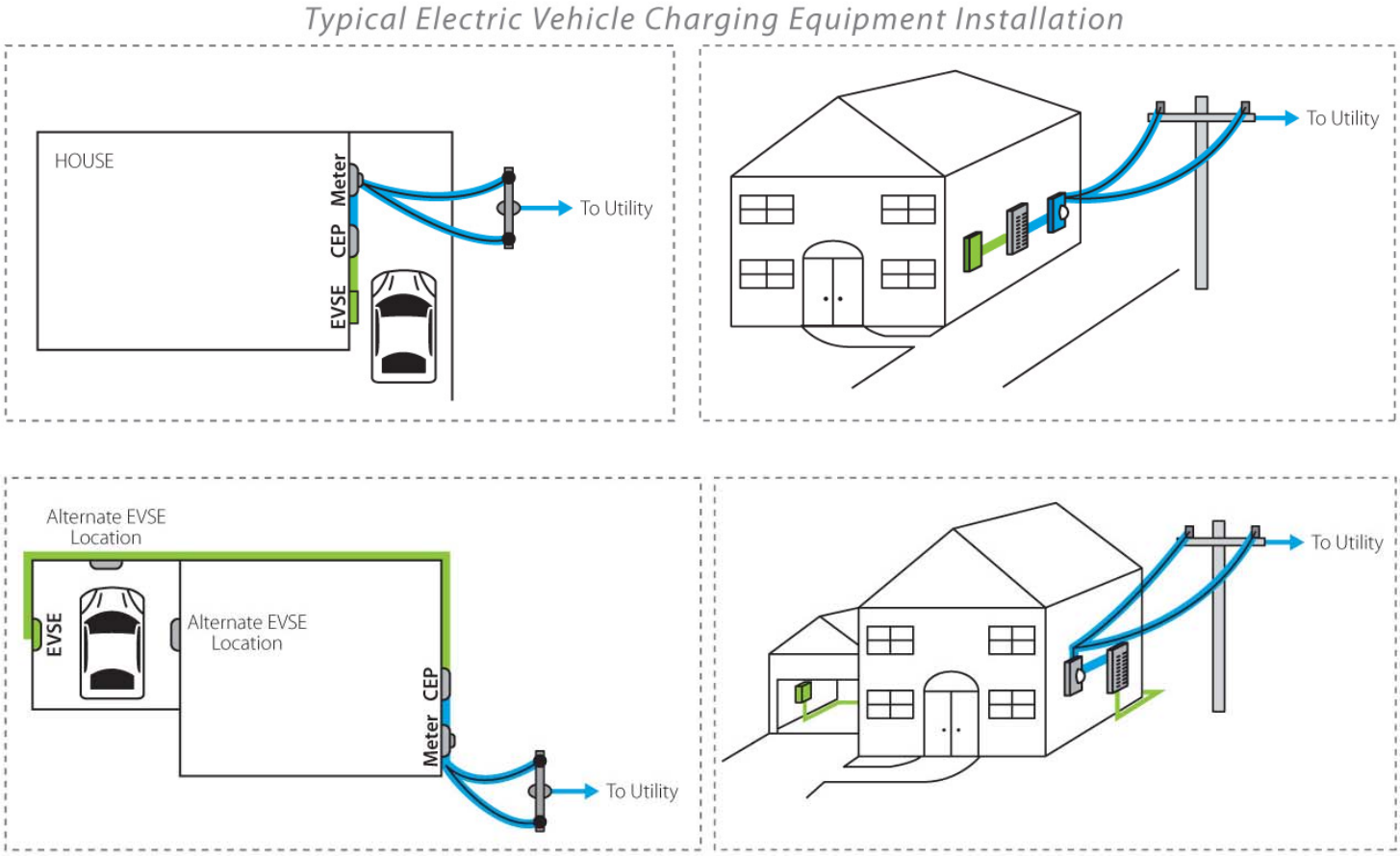
In some older installations, the residential electrical service may not have sufficient capacity to supply electric vehicle charging equipment. Capacity problems are likely to be encountered on 60 ampere services or on 100 ampere services with multiple 240 volt loads. In such cases load calculations must be performed to insure adequate capacity.

Section 4: Jurisdiction Checklist

Information each jurisdiction would add to permit:

- Date utility notified of work completed
- Information on installation sent to tax assessor
- Indoor/outdoor location
- Modification to existing service required
- Other items as determined by the jurisdiction

Figure 1. Typical Electric Vehicle Charging Equipment Installations



STATE OF CONNECTICUT

DEPARTMENT OF PUBLIC SAFETY
DIVISION OF FIRE, EMERGENCY AND BUILDING SERVICES
OFFICE OF THE STATE BUILDING INSPECTOR

Office of the State Building Inspector 2011 Code Enforcement Bulletin

To: Municipal Building Officials
Staff of the Office of the State Building Inspector

Copy: Director Robert J. Ross, Division of Fire Emergency & Building Services
State of Connecticut, Department of Public Safety

From: Lisa R. Humble. AIA, NCARB, State Building Inspector
Office of the State Building Inspector

Date: January 24, 2011

Bulletin: **Issue January #01-2011**

Subject: Electric Vehicle Charging (EVC) Station Uniform Permit Application

Enclosed is an "Electric Vehicle Charging (EVC) Station Uniform Permit Application".

This two page permit application is being distributed to Connecticut's Municipal Building Officials to comply with Connecticut's Electric Vehicle Infrastructure Council's goals as noted in Governor M. Jodi Rell's Executive Order #34. This application has been created to provide a streamlined permit process and a uniform support framework for the arrival of electric vehicles in Connecticut.

The enclosed "Electric Vehicle Charging (EVC) Station Uniform Permit Application" is requested to be completed by individuals requesting a Building Permit where their scope of work involves installing electrical construction support for an electric vehicle charging station.

It is requested that this application be completed in addition to each Municipal Building Official current Building Permit Application. The Municipal Building Officials are asked to distribute and request that permit applicants complete this application.

After completion of the following two page "Electric Vehicle Charging (EVC) Station Uniform Permit Application", each Municipal Building Official is requested to please provide a copy of this permit to the following:

1. Department of Consumer Protection, Trades and Practices Division,
   165 Capitol Ave., Hartford CT 06106
2. A copy to the "Local Municipal Fire Marshal's Office"
3. A copy to the "Local Electric Utility Company's Clearing Desk"

Electric Vehicle Charging (EVC) Station Uniform Permit Application

Date Stamp

Application Date: _____
Municipal Permit #:_____
Property Owner's Name: _____
Property Owner's Address: _____
Telephone: (_____)_____ Fax: (____) _____
Cell Phone: (_____) _____
Email Address: _____
Applicant's Name: _____
Contractor's Business Name: _____
Contractor's License #: _____
Address: _____
Telephone: (_____)_____Fax: (____) _____
Cell Phone: (_____)_____
Email Address: _____

Occupancy Type: Check One
RESIDENTIAL: □ One Family □ Two Family □ Three Family □ Multi Family
COMMERCIAL: Please describe: (i.e. Retail, Business, Parking Garage)

_____
_____

Manufacturer of Charging Station: _____

Location of Charging Station (i.e. Garage, Front or back of building)_____

Type of Charging Station: Wall mounted □ Pedestal type □

□ Level I (120 volts) □ Level II (208/240 volts) □ Level III (480 volts)

EXISTING SERVICE:
Size of Main Breaker:___ Amps Size of EV Branch Circuit ___Amps

SERVICE UPGRADE: □ 60 Amps to 100 Amps
□ 100 Amps to 200 Amps
□ 200 Amps to 400 Amps
Please describe if other:
_____

Size of Main Breaker: ____ Amps Size of EV Branch Circuit ____Amps

NEW SERVICE:
Size of Main Breaker: ____ Amps Size of EV Branch Circuit ____Amps
_____

Value of Work $_____
Total Fee Paid:_____ Paid By:_____

CERTIFICATION: I hereby certify that:

- □ **I am the owner of record of the named property OR**
- □ **The proposed work is authorized by the owner of record and I have been authorized to make this application as an authorized agent.**
- □ **I/We agree to conform to all applicable laws, regulations and ordinances.**

NOTICE: Any false statement made herein which I do not believe to be true and which statement is intended to mislead a public servant in the performance of his or her official function is punishable as a Class "A" misdemeanor pursuant to Connecticut General Statutes Section 53a-157b.

_____ OR _____
Property Owner Authorized Agent

_____ _____
Print Name Print Name

No work shall start until applicant has received the signed approved municipal permit

The following shall be provided if available:
Provide an appropriate map or plot plan showing location.
Global Positioning System (GPS) location/coordinates:_____

_____
PLEASE DO NOT WRITE BELOW THIS LINE, FOR TOWN USE ONLY

Building Official's Signature_____

Date of Approval_____

Conditions of Building Approval _____

****

The Municipal Building Official is requested to please provide a copy of this permit to the following:

1. **Department of Consumer Protection, Trades and Practices Division, 165 Capitol Ave., Hartford CT 06106**
2. **A copy to the "Local Municipal Fire Marshal's Office"**
3. **A copy to the "Local Electric Utility Company's Clearing Desk"**

COMMUNITY DEVELOPMENT
Building and Safety

ELECTRIC VEHICLE SERVICE EQUIPMENT OVER THE COUNTER PERMIT WORKSHEET

This worksheet may be used to obtain an electrical permit to install Electric Vehicle Service Equipment (EVSE) in a garage or carport serving a single family home, or within a private garage serving a condominium provided the electrical service or subpanel serving the installation is rated for 100 Amps or more.

NOTE:

1. Permits for battery chargers or EVSE installations within common area garages or parking areas require a plan to be submitted for review.
2. Installations served by an electrical service of subpanel rated for less than 100 Amps can not be permitted using this worksheet as justification, using the Standard Method of Part III Feeders and Service Load Calculations of Article 220 of the California Electrical Code is required.

PROJECT ADDRESS

THE PROPOSED INSTALLATION WILL SERVE (Check one)

☐ SINGLE FAMILY DWELLING; The location of the EVSE is within a private garage or carport.

☐ CONDOMINIUM; The location of the EVSE is within a private garage.

ELECTRIC SERVICE (Check the size of the electric service or subpanel serving the proposed installation)

☐ 100 Amps ☐ 200 Amps ☐ OTHER; Specify: _____

ELECTRIC VEHICLE SERVICE EQUIPMENT - The EVSE must be listed and installed per its listing and rated for outdoor use if not within an enclosed garage.

EVSE NAMEPLATE RATING (Check one)

☐ 20 Amps/120 volts ☐ 20 Amps/240 volts ☐ 40 Amps/240 volts

If the service size is 100 Amps or greater, and the EVSE does not exceed 20 Amps, no additional information is necessary.

If the EVSE exceeds 20 Amps, complete the following EVSE LOAD CALCULATION WORKSHEET to demonstrate the current electrical service or subpanel capacity is sufficient.

SIGNATURE _____ PRINT NAME _____

DATE _____

EVSE LOAD CALCULATION WORKSHEET

PROJECT ADDRESS

GENERAL LIGHTING LOAD Your home's square footage: _____ X 3 VA = _____

Small appliance branch circuits (2 min.) 1500 VA X _____ circuits _____

Laundry circuit 1500 VA X _____ circuit(s) _____

APPLICANCES AND EQUIPMENT - Values are minimums, use actual values if known to be greater. Enter N/A if not present at project site.

Microwave (in dedicated space)	*1300*	
Compactor	*1000*	
Dishwasher	*1200*	
Disposal	*800*	
Proposed EVSE circuit	*7200*	
Pool/Spa Pump 1 horsepower	*1920*	
Pool/Spa Pump 1.5horsepower	*2400*	
Pool/Spa Pump 2 horsepower	*2880*	

*Attach additional sheets if needed

Subtotal (A) _____

Subtotal (A) minus 10,000 VA _____ **X 0.40 =** _____

plus 10,000

Subtotal (B) _____

Total A/C Load, use nameplate rating or A/C circuit breaker rating (C) _____

D = (B) + (C) _____

Total demand is D / 240V = _____ Amps. If this value is less than the rating of the existing electrical service or subpanel NO service or subpanel upgrade is necessary. If the value is greater, an EVSE permit may only be issued if a panel upgrade is included with the work; a subpanel upgrade requires a plan submittal.

PLAN CHECKER NOTES

Town of Cary

Inspections & Permits Department
316 North Academy Street
Cary, NC 27513
(919) 469-4043 Fax: (919) 462-3840
Voice Response Unit: (919) 462-3800
Email: BuildingSafety@townofcary.org
www.townofcary.org

PERMITTING and INSPECTIONS GUIDE
FOR
RESIDENTIAL ELECTRIC VEHICLE SUPPLY EQUIPMENT

This guide is designed to assist those who wish to install Electric Vehicle Supply Equipment (EVSE), or EV charging stations, on residential sites.

FREQUENTLY ASKED QUESTIONS

Why are permits required for Electric Vehicle Supply Equipment (EVSE)?

State law (NCGS 160A-417) requires the permit, and obtaining the proper permits and inspections helps ensure that the equipment is properly installed to protect the health, safety, and welfare of our citizens.

Where can I find the rules for installing Electric Vehicle Supply Equipment (EVSE)?

Rules for the installation of EVSE can be found in the latest edition of the North Carolina Electrical Code (the National Electrical Code (NEC) with North Carolina Amendments). If the installation requires work done in another trade—such as mechanical for ventilation—that work must be done in accordance with the applicable NC Code.

HOW TO APPLY FOR A PERMIT

Apply for a permit in just two simple steps:

☐ **Have Your Equipment Plan**
- Equipment layout
- Electrical requirements for equipment
- Size of electrical service (proposed or existing)
- Ventilation requirements
- Provide all equipment and plan documents on-site at the time of inspection

☐ **Complete Permit Application Online**
- Enter all pertinent plan and equipment details in the Notes section of the online application
- Payment is required at the time of application for online permit applications

PROCESSING TIME

Processing time for EVSE online permit applications is approximately two business days from the submittal date of a complete and accurate application. Upon approval, your permit will be emailed to you.

FEES

The minimum permit fee ($60) is applied per trade.

The example below shows the permit fees for a *typical* residential EVSE installation:

Electrical Permit ($60) + Mechanical Permit* ($60) = <u>$120 Total Permit Fees</u>

*if ventilation is required

Actual fees may vary, depending upon the specific installation. For a complete listing of current fees and rates per the Town of Cary's approved budget, please visit the Inspections & Permits Web page at www.townofcary.org.

INSPECTIONS and DESIGN REQUIREMENTS

For your safety, EVSE installations are inspected to ensure that they are done in compliance with the applicable NC Codes and manufacturer's instructions. Inspections are required for:

(1) Electrical work

(2) Mechanical work, if any

The required inspections may vary depending upon the specific equipment and installation, such as mechanical work if ventilation is required, per the manufacturer's specifications.

It is the responsibility of both the owner and contractor to ensure that the installation is done in compliance with all applicable laws and regulations.

IMPORTANT!

- All electrical equipment must be listed and labeled by an approved testing agency.

Electrical work must comply with Article 625 of the National Electrical Code. Typical inspections are listed below. Other inspections may be required depending upon the specific equipment and installation instructions.

Electrical Groundwork Inspection (E100) includes, but is not limited to:

- Underground conduits or cables

Electrical Final Inspection (E300) includes, but is not limited to:

- Completed installation of all equipment

Please Note: An Electrical Rough-In Inspection (E200) is required if the items above would not be visible and accessible at the time of a final inspection. If you have any questions about what inspections your particular installation may require, please call Inspections & Permits at (919) 469-4043.

Mechanical work must comply with the current North Carolina Mechanical Code. Typical inspections are listed below. Other inspections may be required depending upon the specific equipment and installation instructions.

Mechanical Final Inspection (M300) includes, but is not limited to:

- Completed installation of all equipment and components of any ducted ventilation or exhaust system in accordance with the manufacturer's installation instructions and the NC Code.

Please Note: A Mechanical Rough-In Inspection (M200) is required if the items above would not be visible and accessible at the time of a final inspection. If you have any questions about what inspections your particular installation may require, please call Inspections & Permits at (919) 469-4043.

Town of Cary, NC Building Permits Online

- Home
- Select Permit
- Schedule / Cancel Inspections
- Submit Application
- Master Account
- Create Master Account
- Forgot PIN
- Forgot User Name
- Email Us

Submit an Application

There are two ways you can enter the location:

Street Address:

Street Number:
Street Direction:
Street Name: *required
Street Suffix:

Enter the owner's name:

(Example: Doe John)

Submit

Select from the following:
[list of closest matches]

Next

Address	Owner	Parcel
214 COLONIAL TOWNES CT	JOHN E AVERI	37-COLTWN
90 BAYOAK DR	JOHN ERIC RUE	TBD-MAYNAZ
609 AUSTIN AVE	JOHN ERNEST ELLIS	84-MDWMNT
109 S ATLEY LN	JOHN F & MAUREEN SHEA	102-WILPLA
105 GREENMONT LN	JOHN FERENCZI	TBD-PAXTON
7120 CAPULIN CREST DR	JOHN GARRISON	137-PKWSLK
109 MINT CT	JOHN GIBSON	34-EVRGRN
104 ARVO LN	JOHN GILLESPIE & AMBER SELF	114-BRKGRN
409 BATHGATE LN	JOHN GILLIGON	061-WESSEX

Town of Cary, NC Building Permits Online

- Home
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- Schedule / Cancel Inspections
- Submit Application
- Master Account
- Create Master Account
- Forgot PIN
- Forgot User Name
- Email Us

Submit an Application

IMPORTANT! If this work is part of a larger project, such as a remodel or renovation, please contact Customer Service at (919) 469-4043 and ask to speak with a Permit Technician.

Complete the following information.

Address:
Land ID #:
Name:
General Location:

*** Application Type:** ELEC - CHARGING STATION

*** Total Estimated Value:** (No decimals)

Notes:

☐ By checking this box, I fully understand that IF I am the owner of the residential property for which I am requesting this building permit, and I intend to self-perform any of the work covered under this permit, I must intend to personally occupy the building for at least 12 consecutive months following completion of construction in order to qualify for the owner's exemption from license requirements under G.S. 87-1. Under such circumstance, I am responsible for compliance with all applicable laws and requirements.

Continue Clear

Town of Cary, NC Building Permits Online

- Home
- Select Permit
- Schedule / Cancel Inspections
- Submit Application
- Master Account
- Create Master Account
- Forgot PIN
- Forgot User Name
- Email Us

Submit an Application

Complete the following information.

Address:
Land ID #:
Name:
General Location:

Please enter the contact information:

*** Contact Name:**
Address:
Zip:
*** Contact Phone:** ( ) -
*** Property Owner Phone:** ( ) -
*** E-mail:**

* denotes required field

Continue Clear