ESS & PV REQUIREMENT GUIDE for R-3/R-4 OCCUPANCIES

I. INTRODUCTION

A. **Purpose.** This guide is intended to provide and clarify the design and installation requirements of the Los Angeles County Fire Department for energy storage systems (ESS) and photovoltaic (PV) installations at properties of Group R-3 and R-4 occupancies, whether plans are submitted to the Fire Department, *or* one of the following processes is used:

- **EXPEDITED PERMIT Process:**

  Refers to the Building & Safety Department (B&S) program **where plans are NOT required**. The Fire Department (FIRE) honors this, and does not require plans either.

- **FIRE FAST-TRACK Process:**

  Refers to **where plan submittals are required by the Building & Safety Department (B&S), but FIRE does NOT require plans**.

  Exception: **ESS installations INSIDE *ATTACHED* GARAGES are NOT eligible** for the *Fire Fast-Track process* due to the complexity of fire detection options. This ESS-location option necessitates plan submittals to FIRE.

B. **Scope.** This document provides requirements for the following, as stated below, for properties of Group R-3/R-4 occupancies (where R-3 and R-4 are occupancy classifications defined in the Building and Fire Codes):

1. Energy Storage System (ESS) projects.
2. Electrical Disconnects and Placarding, both for ESS *and/or* for Photovoltaic (PV).
   - PV-only projects: See Page 6 and Appendix B, for Disconnects and Placarding.
   - Building-Integrated Photovoltaic (BIPV) systems: Contact the local Fire Prevention Division regional office. Certain designs require oversight regarding Ridge-Vent Openings (where used in the Wildland-Urban Interface), and Escape and Rescue Opening Pathways.

C. **Organization. THIS GUIDE IS SEPARATED INTO TWO PARTS:**

PART A – **INSTALLATION Requirements**

PART B – **ESS PLAN-PREPARATION Requirements**

- **PART B** guides in the preparation of plans (when required), which are then submitted electronically.
- **DISREGARD PART B** if using either the *Expedited Permitting Process* or the *Fire Fast-Track Process*.

  EXCEPTION: **ESS installations INSIDE *ATTACHED* GARAGES are NOT eligible for the *Fire Fast-Track Process*** due to the complexity of fire detection options. If not using the *Expedited Permit Process* for this ESS-location option: **Submit plans to FIRE**.

II. BACKGROUND

A. The Los Angeles County Fire Department (LACoFD) has historically delegated fire-official authority, for plan review and inspection of conventional residential solar-on-roof installations at R-3/R-4 dwellings to the jurisdictional building and safety department. This agreement, however, does not extend to the following requirements for the systems or system components outlined above in Section I-A.

In either case, the ultimate responsibility to uphold and enforce the LA County Fire Code rests with the LACoFD, as the Authority Having Jurisdiction (AHJ).

B. In the event that a Project Plan or Expedited Permit is approved in error, the following fire code section shall apply:

LA County Fire Code (LACFC) /California Fire Code (CFC) Section 105.3.6 states in part:

"Permits presuming to give authority to violate or cancel the provisions of this code or other ordinances of the jurisdiction shall not be valid**. The issuance of a permit based on construction documents and other data shall not prevent the fire code official from requiring the correction of errors in the construction documents and other data."**

C. The 2023 LACFC amendments can be accessed on the internet utilizing: https://library.municode.com/ca/los_angeles_county/codes/code_of_ordinances?nodeId=TIT32FICO. The LACFC amendments are listed in order of the 2022-CFC section each amends.

III. PROCEDURES FOR INSPECTION AND DOCUMENT SUBMITTAL

A. It is not within the scope of this document to convey the particular procedures by which Fire Department inspections are scheduled or conducted, nor to convey the procedure by which any necessary documents or fees are submitted.

For those procedures:

1. Refer to the **first page of the companion Checklist document**; and

2. Follow the **direction of the inspection office responsible for the Fire Department inspection**.

PART A

IV. INSTALLATION REQUIREMENTS FOR GROUP R-3/R-4 OCCUPANCIES

The following *select* LACFC excerpts* are provided for special reference. For the *full* list of LAC amendments to the CFC, see the link provided in Section II of this document, above.

*See *italicized [bracketed] clarifications* within the following code excerpts. Also see the "**AHJ Notes**" provided below certain code excerpts for commentary regarding enforcement of the provisions.

1207.11.2.1 SPACING:

Individual *[ESS]* units shall be separated from each other by at least **3 feet** (914 mm) of spacing unless smaller separation distances are documented *[by the manufacturer]* and approved *[by the AHJ]* to be adequate for the ESS model(s) in question based on large-scale fire testing, in accordance with *[LACFC]* Section 1207.1.5.

AHJ Note: This 3-foot separation requirement, applies in any direction between any two ESS units, regardless of their placement on the same wall, opposing walls, and/or separate but adjacent intersecting walls. Separation distances are to be measured along the surface plane of each wall; no through-the-wall calculated separation distance will be accepted.

"Unit" INTERIM CODE INTERPRETATION*:

*This interpretation is ***exclusively* for the purposes of Sections 1207.11.2.1 and 1207.11.4** of the 2023 LACFC.

In lieu of a clear definition of a **residential ESS "unit"**, and to provide clarity on the topic, LACoFD has determined that the following shall serve as an Interim Code Interpretation:

1. An ESS "unit" shall mean **a single grouping of** one or more complete UL-9540-listed residential ESS units, not to exceed an aggregate *nominal* capacity of **20 kWh in that grouping.**

   A "unit"/grouping may consist of more than one ESS unit only where the units are expressly allowed, by the **manufacturer's NRTL-approved installation instructions**, to be separated by less than 3 feet. **(Refer to *APPENDIX D*)**

2. If multiple UL-9540-listed ESS units are installed within a cabinet*, the cabinet shall be purpose-manufactured, approved by the manufacturer(s) for the specific UL-9540-listed ESS units being placed within, and minimize the amount of void space within [after the installation of the ESS unit(s) within] in which flammable/explosive gases can accumulate during a failure event.

   ***2022 CFC / 2023 LACFC Definition:**

ENERGY STORAGE SYSTEM CABINET: A cabinet containing components of the energy storage system that is included in the UL 9540 listing for the system. Personnel are not able to enter the enclosure other than reaching into access components for maintenance purposes.

3. In no case shall a reduction be allowed to the minimum requirements, nor separation distances, specified in the manufacturer's installation instructions, specifically those instructions that were approved by the nationally recognized testing laboratory (NRTL) that granted the UL-9540 listing to that make and model of ESS unit.

   (Summarily, the manufacturer cannot change or alter approved ESS installation instructions, without getting them re-approved by the NRTL.)

   a. This rule shall also pertain to the manufacturer's installation requirements regarding the placement of an ESS unit in relation to other units, etc.

   b. A grouping **shall not consist of a mixture of different makes and/or models** of UL-9540-listed residential ESS units unless specifically authorized by the aforementioned manufacturer's installation instructions.

(Refer to *APPENDIX D* for specific ESS unit/grouping layout details)

1207.11.3 LOCATION:

ESS ***shall be installed*** only in the following locations:

1. Inside detached garages.
2. Inside attached garages when separated from the dwelling unit living space and sleeping units in accordance with *[CRC]* Section R302.6.
3. Outdoors or on the outer side of the exterior building walls in accordance with *[LACFC]* Section 1207.11.3.1.

ESS ***shall not be installed*** inside any of the following locations:

1. Dwelling units, including accessory dwelling units (ADU's).
2. Sleeping units.
3. Spaces opening directly into sleeping rooms or units.
4. Closets.
5. Bathrooms.
6. Basements.
7. Accessory structures that are not garages.
8. Vaults

(Refer to the following pages for further, detailed guidance regarding *location* requirements for ESS *and* for associated Means of Disconnection and Fire Detection)

ESS/ PV DISCONNECTS AND ESS UNITS – REQUIRED LOCATION OF (ACCESS TO):

Code Extracts:

509.1.1 Utility and hazardous equipment identification.

…For the purposes of Sections 509 and 603, **both an energy storage system (ESS) and a photovoltaic (PV) system** shall each be considered **an electrical power source**, with electrical service equipment, and **an electrical hazard**.

(Refer to *APPENDIX B – DISCONNECT PLACARDING REQUIREMENTS* for details)

509.2 Equipment and disconnection-means access.

Approved access shall be provided and maintained for all fire protection system, utility, and hazardous equipment, as determined by the fire code official…including of required disconnection and/or attenuation means….

509.3 Disconnection means location.

…required disconnection and/or attenuation means for the sources of each hazard category shall be located together, in a location **approved by the fire code official**.

Where additional and/or remote means are necessary in order to accomplish this requirement, physical disconnection shall be achieved at the source of the hazard itself, such as by use of relay(s).

Required disconnection and/or attenuation means for electrical hazards shall be located

Within 6 feet (1829 mm) *of the* ***main service panel, on the same wall plane****,*

and

Maintained not separated from one another by walls, gates, fences, vegetation, or architectural features of the building*.*

For the purposes of required access to ESS unit(s) and to all ESS/ PV disconnects, LACoFD provides the following directives:

1. **APPROVED ACCESS for these purposes shall enable** all portions of an ESS unit *and* required disconnection or attenuation devices to be:
   - Directly reached for access, activation of disconnection devices, investigation, or fire-related activity;
   - Safely reached from grade or a finished surface; and
   - Reached without the aid of any permanent, temporary, or mobile climbing fixture, ladder, or device.

2. **FOR INTERIOR-INSTALLED ESS Unit(s)** (i.e., inside attached/detached garages):
   - Remote Disconnect Devices (RDD) shall be provided for any ESS unit located within a structure, and should be located per LACFC Section 509.3.
   - The RDD shall accomplish the disconnection at the location of the ESS power source(s).
   - The location of the RDD shall require approval of the Fire Department (AHJ).

1207.11.3.1 OUTDOORS or on Outer Side of Exterior Building Walls:

ESS *[units]* shall be permitted to be installed outdoors, or on the outer side of exterior building walls, when all of the following conditions are met, in addition to those otherwise required by *[LACFC]* Section 1207.11:

1. The ESS *[units]* shall be installed and maintained a minimum of **5 feet** (1524 mm) from all of the following:
   - 1.1. **Lot lines.**
   - 1.2. **Public ways.**
   - 1.3. **Other buildings.**
   - 1.4 **Stored combustible materials.**
   - 1.5 **Hazardous materials.**
2. The ESS *[units]* shall be installed and maintained a minimum of **10 feet** (3048 mm) from vegetation, as specified in *[LACFC]* Section 1207.5.7.
3. The ESS *[units]* shall be installed and maintained a minimum of **3 feet** (914 mm) from all doors, windows, operable openings, HVAC inlets and other penetrations directly or indirectly into habitable or occupiable spaces, or bathrooms.

AHJ Notes:

Item 1.1:
An alternative to the *full* 5-foot setback from property lines may be allowed, provided it is in strict compliance with ***APPENDIX F – PROPERTY-LINE SETBACK ALTERNATIVES***.

Item 2:
§1207.5.7 Vegetation control: Areas within 10 feet (3048 mm) on each side of new and existing outdoor ESS shall be cleared of combustible vegetation and other combustible growth. Single specimens of trees, shrubbery or cultivated ground cover such as green grass, ivy, succulents or similar plants used as ground cover shall be permitted to be exempt provided that they do not form a means of readily transmitting fire ***[subject to fire official approval]***.

Item 3:
The 3-foot separation requirements in Item 3, above, applies in any direction from an ESS unit to all doors, windows, and operable openings into buildings, regardless of their placement on the same wall, opposing walls, and/or separate but adjacent intersecting walls.

This also includes a minimum separation of 3 feet (914mm) from dwelling gas-meter regulators (2022 CMC §1308.7.4).

(Refer to *APPENDIX C – VENTS/OPENINGS AND PENETRATIONS* for details)

1207.11.4 ENERGY RATINGS:

Individual ESS units shall have a maximum rating of 20 kWh. The aggregate rating per Group R-3/R-4 occupancy shall not exceed:

1. 80 kWh in attached or detached garages.
2. 80 kWh on outer side of exterior building walls.
3. 80 kWh outdoors on the ground.

Energy capacity is the total energy capable of being stored (nameplate rating), not the usable energy rating…

AHJ Interpretation:

A maximum of **80 kWh** may be located in sum total of all indoor locations (i.e., in Location 1).

A maximum of **160 kWh** may be located in sum total of all exterior locations (i.e., in *any* combination of Location 2 and/or Location 3).

A total/aggregate of 240 kWh is permissible per total aggregate property.

1207.11.5.1 ELECTRICAL DISCONNECTS, SIGNAGE, and WORKING CLEARANCES:

In addition to any disconnects and signage required in accordance with the California Electrical Code, disconnects, signage, and access shall be provided in accordance with *[LACFC]* Section 509, et seq.

Access and working space shall be provided and maintained about all electrical equipment to permit ready and safe operation and maintenance of such equipment in accordance with *the California Electrical Code*, the manufacturer's instructions, and *[LACFC]* Section 603.

(Refer to *REQUIRED LOCATION OF (ACCESS TO) ESS UNITS AND ESS/ PV DISCONNECTS*, under Section 1207.11.3, above, for direction regarding approved locations for disconnects)

(Refer to *APPENDIX B – DISCONNECT PLACARDING REQUIREMENTS* for details)

1207.11.6 FIRE DETECTION:

ESS unit(s) installed **within attached garages** shall be protected by one of the following:

1. An approved *[self-contained]* heat alarm.
2. An approved heat detector that is a component of a fire alarm system in the residence that will activate a notification device that will alert the residents of an emergency.
3. A fire sprinkler, properly spaced and integrated to a residential fire sprinkler system outfitted with a flow detector that activates a notification device that will alert the residents of an emergency.

Notification in all three options *shall be provided in locations within dwelling units, sleeping units and attached garages.*

AHJ Notes:

Currently, **No Heat Alarm devices are Listed or CSFM-Approved** for placement within a garage.

Specifications for the above three Heat Detection options are governed by the LACFC Chapter 80 Referenced Standards. The referenced standards UL 539, UL 521, and NFPA 13D identify and require the **INTERMEDIATE** temperature rating for devices within non-fully insulated environments, including attached garages.

> UL-521 and -539 stipulate INTERMEDIATE rating for spaces that reach a maximum ceiling temperature of between 116°F and 155°F (47°C and 68°C).
>
> NFPA 13D stipulates INTERMEDIATE rating is required where “maximum ambient ceiling temperatures are between 101°F and 150°F (38°C and 65°C)”, including non-fully insulated environments, **including garages**.

Therefore, LACoFD requires Intermediate-rated Heat Alarms, Heat Detectors, and Fire-Sprinkler Heads installed in the uninsulated garage that comply with the following:

- **“Ambient”, or “Operating”, or “Installation” Temperature Rating** of the device:

  This maximum temperature rating shall be **at least 140°F** (79°C).

- **“Alarm” Temperature Rating (i.e., “Fixed-Temperature” Alarm)** of the device:

  This maximum temperature rating shall be **between 175°F and 249°F** (79–107°C).

(Refer to *APPENDIX E* for further detail regarding compliant fire detection)

Listed & Approved.

All required **heat alarm**, **detection**, and **notification devices** shall be:

- *Listed to the required product-listing standards for that type of device*;
- *Approved by the California State Fire Marshal (CSFM); and*
- *Installed and used within the parameters of their CSFM approval and listing.*

Application of devices outside their listing or approval voids said required listing and approval, and is strictly prohibited by law.

1207.11.7 PROTECTION FROM IMPACT:

ESS *[units]* installed in a location subject to vehicle damage in accordance with *[LACFC]* Sections 1207.11.7.1 through 1207.11.7.3 shall be provided with impact protection in accordance with *[LACFC]* Section 1207.11.7.4.

For the purposes of vehicle impact protection, an energy storage management system that controls an ESS, if located remotely from the ESS unit(s) it controls, shall be treated as an ESS unit.

EXCEPTION: Impact protection is not required for an ESS unit where no portion of the ESS unit is less than 36 inches (914 mm) above the finished floor, unless determined necessary per *[LACFC]* Section 1207.11.7.3.

(Refer to *APPENDIX A – IMPACT PROTECTION* for details)

1207.11.8 VENTILATION:

Indoor installations of ESS *[units]* that include batteries that produce hydrogen or other flammable gases during charging, discharging, or other normal use conditions shall be provided with exhaust ventilation in accordance with *[LACFC]* Section 1207.6.1.

AHJ Note: This section pertains to battery chemistries such as, but not limited to, lead-acid, which produces small amounts of hydrogen gas during normal functioning/use.

1207.11.9 TOXIC AND HIGHLY TOXIC GAS:

ESS that have the potential to release toxic or highly toxic gas during charging, discharging and normal use conditions shall not be installed within Group R-3 or R-4 occupancies.

PART B

V. ESS PLAN REQUIREMENTS FOR GROUP R-3/R-4 OCCUPANCIES

A. GENERAL

Where submittal of construction documents/plans is necessary, all plans shall be prepared and submitted to the County of Los Angeles Fire Department and shall be in compliance with the most current Los Angeles County Fire Code (LACFC).

All Fire-Department-required plans shall be submitted with title blocks, North arrows, scale(s) of drawing, and legends of symbols and abbreviations.

Plans shall be provided in sufficient scale and detail to reflect information necessary for Fire Department plan review while ensuring that layers and notes do not overlap or obstruct one another.

Required minimum scales:

- Site Plans ..... not smaller than 3/32" = 1'- 0"
- Floor Plans ..... not smaller than 3/16" = 1'- 0"
- Garage Floor Plans, Elevations, & Exterior Partial Wall Elevation plans ..... not smaller than 1/4" = 1'-0"

B. TITLE PAGE & NOTES

The following required **Fire Department Notes** and **Scope of Work** are to be listed separately and written verbatim.

1. **APPLICABLE-FIRE-CODE NOTE** (Verbatim)

   "**All work shall be in compliance with the most current Los Angeles County Fire Code (LACFC).**"

2. **ESS SCOPE OF WORK**

   An ESS Scope of Work section is required on all plans.

   The Scope of Work shall account for both:

   - New ESS unit(s) to be installed; as well as
   - Any Existing ESS unit(s) to remain in place.

(Refer to the next page for required content of this section)

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THE FOLLOWING SHALL BE PROVIDED on either PAGE 1 or 2 of submitted plans:

SCOPE OF WORK (Verbatim)

ESS SYSTEM:

- **Number and Type(s)/Chemistry of ESS Unit(s):** *(Provide # & Type, identifying both New and/vs. Existing)*
- **ESS-*Unit* Capacity (*Nominal* kWh, *per ESS unit*):** *(Provide Data. Use new line for each ESS model present)*
- **Total-*Site* Capacity (*Nominal* kWh, *total for site*):** *(Provide Data)*
- **ESS-Installation Location(s) for All ESS Units:** *(Provide Data)*

DISCONNECTS:

Minimum number of disconnects required (per the LACoFD Disconnect Placarding System and LACFC Location Requirements) to electrically disconnect *all* electrical power sources supplying the structure [Utility, ESS, PV, and other]: *(Provide Data)*

C. SITE PLANS

Site plans are required for all ESS installations and are to include Graphic locations with notations of all the following:

1. ESS Unit(s)
2. Utility Meter(s).
3. Required Disconnects (AC & DC).
4. Inverters.
5. Automatic Relays.
6. Load Centers.
7. "Rapid-Shutdown" (also known as "Hazard-Control") Initiation Devices.
8. Any other device pertinent to an ESS installation.

D. FLOOR PLANS & PARTIAL FLOOR PLAN DETAILS

Where plans are submitted, the following requirements shall apply, for the installation location(s) chosen: [See **next page**]

ESS & PV REQUIREMENT GUIDE for R-3/R-4 OCCUPANCIES

1. EXTERIOR-Installation Plans – Partial Floor Requirements:

a. A Partial Floor Plan Detail in lieu of overall floor plan can be provided to clearly identify that portion of a structure where ESS unit(s) are to be installed.

b. The following is required for such plan preparation:

i. Plan location shall be identified by cardinal direction (e.g., North Wall Plan).

ii. For all ESS units within 7 feet of any of the following code-specified features, plans shall fully depict the dimensions to the feature:

- **3-foot** separation is required from:
  - Another ESS unit.
  - A structure corner.
  - An intersecting wall.
  - Any door, window, operable opening into building*, or HVAC inlet.
- **5-foot** separation is required from:
  - A lot line.
  - Public way.
  - Another building.
  - Stored combustible material(s).
  - Hazardous material(s).

(Refer to *APPENDIX C – VENTS/OPENINGS AND PENETRATIONS)**

***OPERABLE OPENING into BUILDING** is defined by the AHJ as any opening, vent, or vent exhaust that leads to, or has direct or indirect access to a dwelling unit (e.g., whole-room exhaust vents, kitchen- or bathroom-exhaust vents, raised-foundation crawl spaces, and void spaces between walls/floors). All such AHJ-defined openings shall be depicted on a plan or detail, with dimensions from the opening to the nearest ESS unit(s).

iii. Location and identification of all disconnect devices, rapid-shutdown initiation switches, inverters, electrical panels or subpanels, and all other devices pertinent to the ESS-unit installation.

iv. Location, size, and height of all impact protection** as required.

(Refer to *APPENDIX A – IMPACT PROTECTION*)**

****IMPACT PROTECTION IS NOT REQUIRED** for an ESS unit where no portion of the ESS unit *is less than 36 inches above the finished floor* or adjacent driving surface, unless determined necessary by special circumstances. Impact protection for any ESS unit installation not specifically referenced in Appendix A shall be determined by the fire code official.

2. INTERIOR-Installation Plans — for Attached or Detached Garages:

a. Floor Plans shall depict all walls, to include all garage vehicle-entrance openings, return walls, doors, and windows.

b. **Installation in attached garages shall adhere to requirements in *APPENDIX E*.**

c. Provide exact interior dimensions of garage, including: return walls (length from the garage-interior corner to the garage vehicle-entrance opening) and dimensions from the same interior corner to nearest ESS unit. Repeat for each return wall as necessary.

d. Location of installed ESS unit(s), with exact dimensions between each unit.

For multiple ESS unit installations, provide exact dimension between each unit. The 3-foot separation requirement also applies to ESS units installed on separate but adjacent walls from each other.

(Refer to *APPENDIX D – SPACING/ GROUPING* for specific ESS unit/grouping layout details)

e. Location of exterior Remote Disconnect Devices (RDD) for all electrical-power-source equipment installed inside garage.

These shall be located within 6 feet (1829 mm) of the main service panel, as stated in LACFC Section 509.3.

f. Location and identification of all disconnect devices, rapid-shutdown initiation switches, inverters, electrical panels or subpanels, and all other devices pertinent to the ESS unit installation.

g. Location, size & height of all impact protection** as required.

(Refer to *APPENDIX A – IMPACT PROTECTION*)**

****IMPACT PROTECTION IS NOT REQUIRED** for an ESS unit where no portion of the ESS unit *is less than 36 inches above the finished floor* or adjacent driving surface, unless determined necessary by special circumstances. Impact protection for any ESS unit installation not specifically referenced in Appendix A shall be determined by the fire code official.

3. Required DISCONNECT SCHEDULE and Notes:

All Garage Floor Plans and Partial Floor Plan Details shall include an **Electrical Power Source Disconnect Schedule**, which identifies the minimum number of disconnects, as determined by the system designer and located in accordance with **LACFC Section 509**, required to disconnect all electrical power sources from the structure, per the **LACoFD Electrical Power Source Disconnect Placarding System**.

(Refer to *APPENDIX B – DISCONNECT PLACARDING REQUIREMENTS*)

This schedule shall account for both producing and storing power sources, as well as pre-wired inputs for power sources (such as a pre-wired input for generator power). The schedule will also be utilized to identify those locations where LACoFD placarding shall be placed.

Example of Disconnect Schedule:

NOTE: Footnotes do *not* need to be included.

	ELECTRICAL POWER SOURCE DISCONNECT SCHEDULE		
	ENERGY SOURCE[a]	**DISCONNECTION NUMBER (#X of Y)[b]**	**DISCONNECTION OPERATION/EQUIPMENT/ DEVICE[c]**
1	Utility Service	1 of 5	200A Main Breaker
2	ESS	2 of 5	30A Blade Disconnect
3	New Solar PV	3 of 5	30A Blade Disconnect
4	Existing Solar PV	4 of 5	Emergency Stop Button
5	Generator (Input)	5 of 5	Transfer Switch
6			

a. Include each source. Units *immediately* adjacent to one another and on the same feeder may use the same Disconnection Device.
b. List as the "#X of Y" designation to be used on the Placarding. List the Utility Service as "#1 of Y".
c. Examples: "30A breaker in New 150A generation loads panel", "30A Fused/Fusible Disconnect", "Emergency Stop Button", etc. Devices shall be listed and approved.

This schedule reflects the minimum number of disconnects required to disconnect all electrical power sources from the circuitry of the structure in accordance with LACFC Section 509 and the LACoFD Electrical Power Source Disconnect Placarding System.

E. WALL ELEVATIONS AND/OR DETAILS

Wall Elevations and/or Details for all ESS unit installations shall be required when items listed in **D.1**, **D.2**, and **D.3**, above, cannot be clearly drawn and dimensioned on any other plan. These items include, but are not limited to, operable openings into buildings defined by the AHJ, HVAC inlets, and any other associated installation equipment. Refer to requirements listed in **D.1**, **D.2**, and **D.3**, above. Also refer to ***APPENDIX C – VENTS/OPENINGS AND PENETRATIONS***.

VI. ADDITIONAL ASSISTANCE

For additional assistance regarding the plan preparation and submittal for ESS unit and/or BIPV system installations, please contact the local LACoFD Fire Prevention Division office.

APPENDIX A – IMPACT PROTECTION

I. INTRODUCTION

A. Purpose: To prevent unintentional vehicular impact of an energy storage system (ESS).

B. Scope: This document shall serve as a guideline for determining the necessity and requirements of impact protection for ESS at one- and two-family dwellings.

C. Authority: 2023 Los Angeles County Fire Code (LACFC), LACC Title 32, including Section 1207.11, or equivalent in later editions.

D. Definitions:

1. Approved — Acceptable to the fire code official.

2. Energy Storage Management System — An electronic system that protects energy storage systems from operating outside their safe operating parameters and disconnects electrical power to the ESS or places it in a safe condition if potentially hazardous temperatures or other conditions are detected.

3. Energy Storage System (ESS) — One or more devices, assembled together, capable of storing energy in order to supply electrical energy at a future time.

4. Return wall — A wall within a garage that runs in the same general direction as the vehicular opening to the garage. A return wall usually exists on one or both sides of the vehicular opening to the garage. See **Figure 1**.

II. RESPONSIBILITY

A. Contractors, installers, and designers are responsible for incorporating into their ESS submittals all details and requirements that are outlined in this regulation.

III. PROCEDURE

A. **Determination of Need for Impact Protection:**

Impact protection shall be required for any ESS unit* meeting the following location criteria:

APPENDIX A – IMPACT PROTECTION

*For the purposes of vehicle impact protection, an Energy Storage Management System that controls an ESS unit (see definitions), if located remotely from the ESS unit(s) it controls, shall be treated as an ESS unit.

Exception: Impact protection is not required for an ESS unit where no portion of the ESS unit is less than 36 inches (914 mm) above the finished floor, unless determined necessary per Item #3 – special circumstances, noted on page 7.

1. **Interior-Installed ESS.** For ESS unit(s) installed inside a garage (or similar structure):

   a. **"Within" the Driving Path.** Where the ESS unit is within a vehicular driving path, and/or located on/at a garage back wall that may be subject to impact damage, impact protection shall be provided. See **Figure 1** [2023 LACFC **FIGURE 1207.11.7.1(1)**].

   b. **Beyond the Return-Wall Protection.** Where the ESS unit is located on the "side" wall, at a distance from the inside corner of the building that is more than two times the interior length (L) of the return wall (i.e., >2L), impact protection shall be provided. See **Figure 1**.

      NOTE: The length of the garage-entrance return wall ("L") shall be measured from the inside corner where the return wall meets the adjacent "side" wall that runs roughly parallel to the driving path. See **Figure 1** [2023 LACFC **FIGURE 1207.11.7.1(1)**].

   c. **"Triangle" Rule.** Where any portion of the ESS unit is installed outside of a triangle created by connecting a point measured along the side wall that is two times the return-wall measurement to a second point where the return wall meets the vehicle garage-entrance opening, impact protection shall be provided. See **Figure 1** [2023 LACFC **FIGURE 1207.11.7.1(1)**].

      Exceptions to the "Triangle" Rule: Where the ESS unit is located within the "triangle" formed by the aforementioned points, but any of the following are true, impact protection requirements shall be evaluated on a case-by-case basis:

      1. L > 6 feet. See **Figure 2** [2023 LACFC **Figure 1207.11.7.1(2)**].

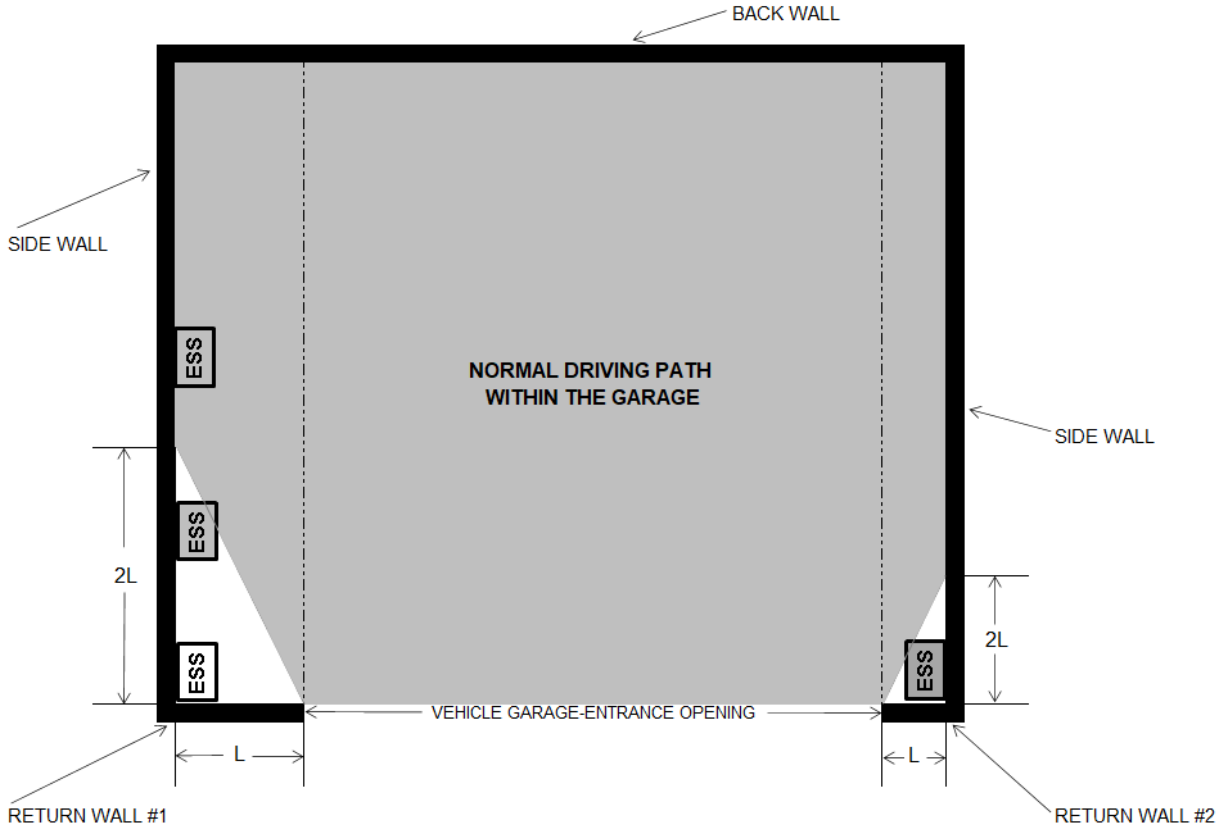
      2. The driving path within the garage is deeper than 25 feet. See **Figure 3** [**Figure 1207.11.7.1(3)**].

APPENDIX A – IMPACT PROTECTION

FIGURE 1 *[2023 LACFC **FIGURE 1207.11.7.1(1)**]*
GARAGE INTERIOR–INSTALLED ESS[a]

ASSUMPTIONS/CONDITIONS:

- **L ≤ 6 FEET**
  (If L > 6 feet, also see FIGURE 1207.11.7.1(2).)
- **DEPTH OF DRIVING PATH WITHIN THE GARAGE ≤ 25 FEET**
  (If Driving Path > 25 feet, also see FIGURE 1207.11.7.1(3).)



L = Interior length of the vehicle garage-entrance return wall.

ESS = ESS unit(s) subject to impact protection requirements.

ESS = ESS unit(s) *NOT* subject to impact protection requirements.

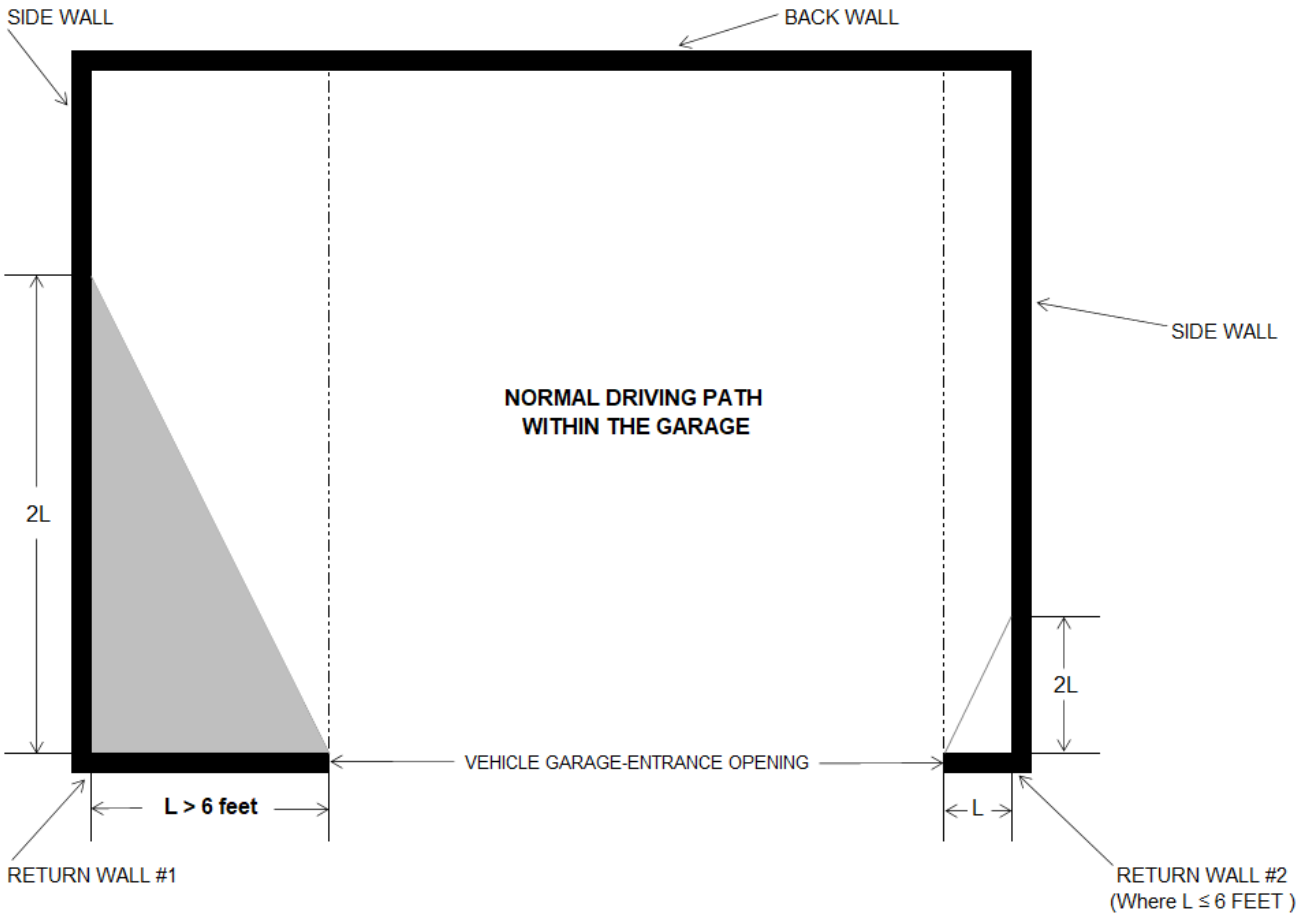
= Area subject to impact protection requirements.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

a. Impact protection is not required for an ESS unit (or for a remote Energy Storage Management System) that is entirely located 36 inches or greater above the finished driving surface.

Exception: Where determined necessary by the fire code official due to special circumstances.

FIGURE 2 *[2023 LACFC **FIGURE 1207.11.7.1(2)**]*
LONG GARAGE RETURN WALL[a,b]



L = Interior length of the vehicle garage-entrance return wall.

= Area subject to case-by-case evaluation.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

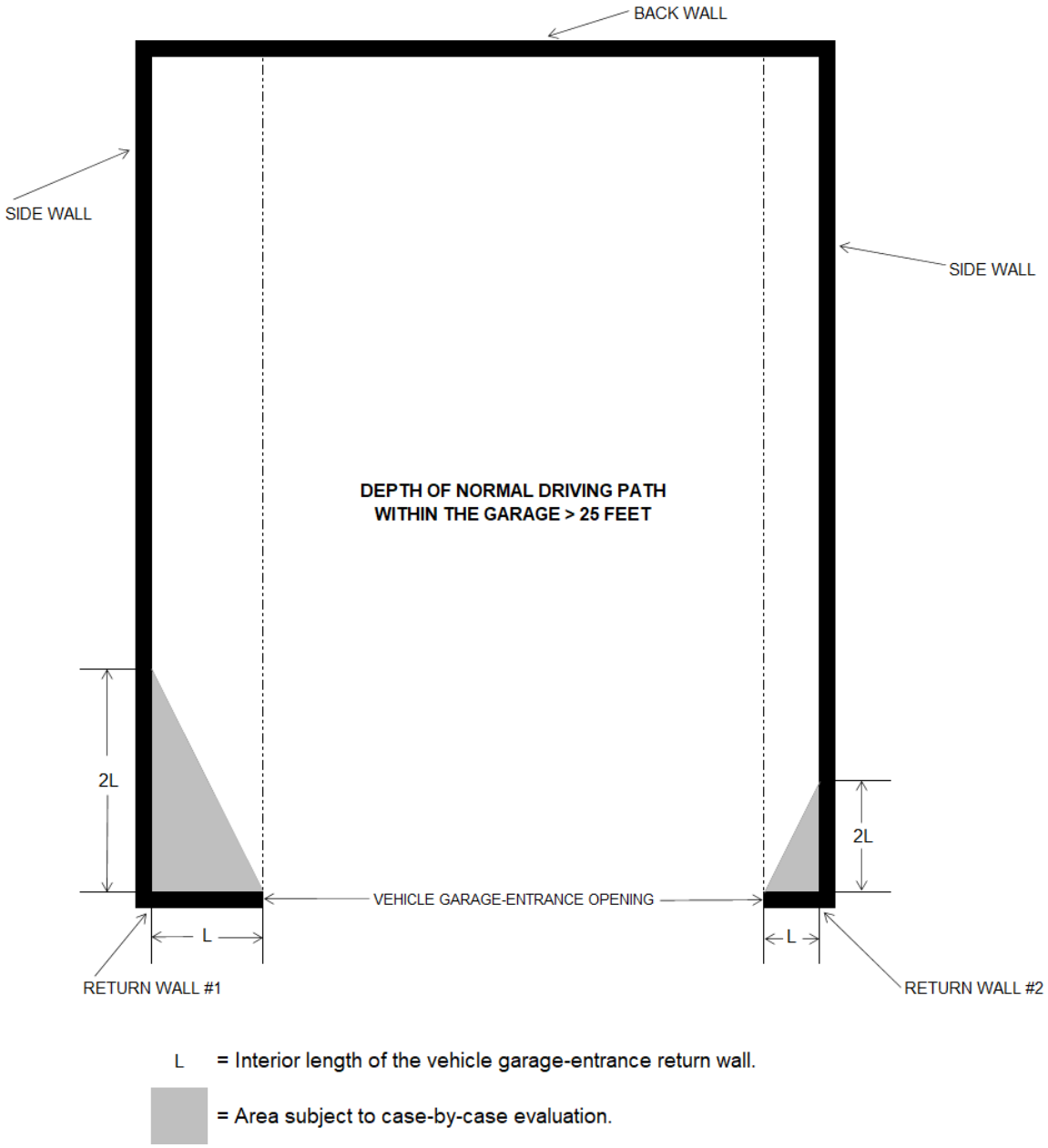
a. Impact protection is not required for an ESS unit (or for a remote Energy Storage Management System) that is entirely located 36 inches or greater above the finished driving surface.

Exception: Where determined necessary by the fire code official due to special circumstances.

b. Where this figure is applicable, this case-by-case evaluation shall be in addition to the requirements of LACFC Figure 1207.11.7.2.1(1).

APPENDIX A – IMPACT PROTECTION

FIGURE 3 *[2023 LACFC **FIGURE 1207.11.7.1(3)**]*
DEEP GARAGE[a,b]



For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

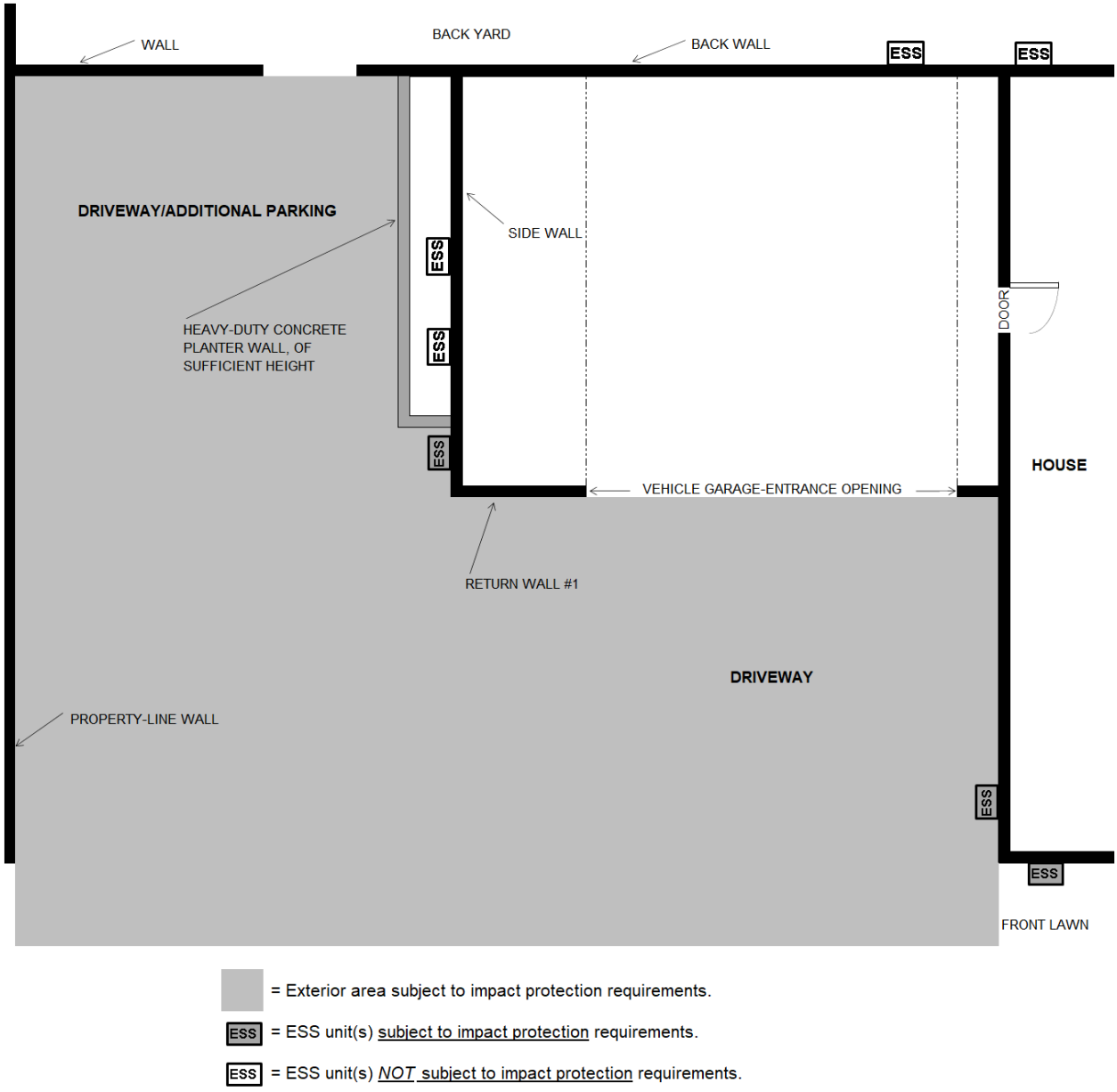
a. Impact protection is not required for an ESS unit (or for a remote Energy Storage Management System) that is entirely located 36 inches or greater above the finished driving surface.

Exception: Where determined necessary by the fire code official due to special circumstances.

b. Where this figure is applicable, this case-by-case evaluation shall be in addition to the requirements of LACFC Figure 1207.11.7.2.1(1).

2. **Exterior-Installed ESS.** Impact Protection shall be required for any ESS unit(s) that are located within 36" of the full width or depth/length of any vehicular path of travel, and subject to vehicular impact, per **Figure 4** [2023 LACFC **Figure 1207.11.7.2**].

FIGURE 4 *[2023 LACFC **FIGURE 1207.11.7.2**]*
EXTERIOR-INSTALLED ESS[a]



For SI: 1 inch = 25.4 mm.

a. Impact protection is not required for an ESS unit (or for a remote Energy Storage Management System) that is entirely located 36 inches or greater above the finished driving surface.

Exception: Where determined necessary by the fire code official due to special circumstances.

3. **Special Circumstances** [2023 LACFC **Section 1207.11.7.3**]. The need of impact protection for any ESS unit installation scenario not specifically addressed in this document, shall be determined by the fire code official.

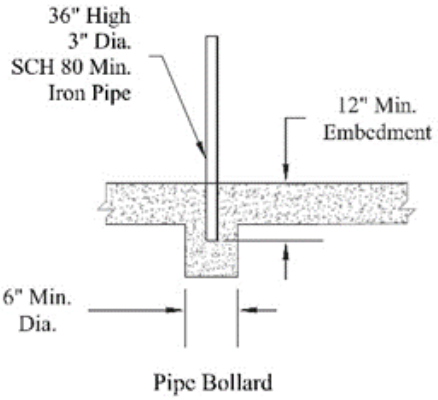
B. **Design and Spacing of Impact Protection** [2023 LACFC **Section 1207.11.7.4**]:

All impact protection shall be of the pipe-bollard type complying with LACFC Section 1207.11.7.4.1, or retrofit-bollard type complying with LACFC Section 1207.11.7.4.2, unless provided by other approved structures (e.g., concrete wall).

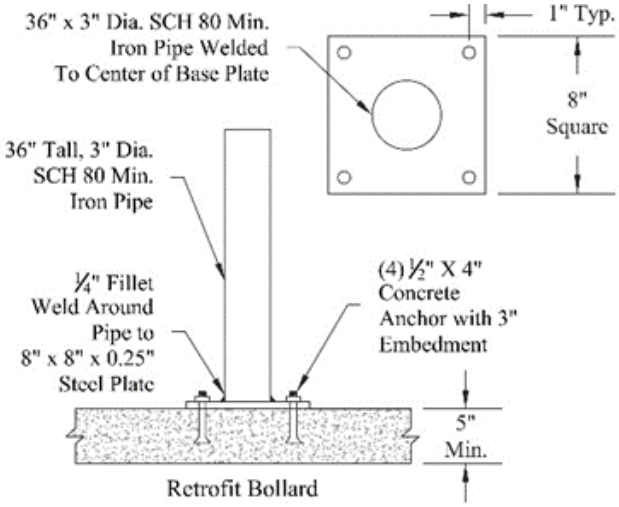
Spacing between bollards shall not exceed 4 feet (1219 mm) on center and be no closer than 6 inches (152 mm) from an ESS unit. Bollards shall not encroach upon the working clearances required by LACFC Sections 1207.11.5.1 and 603. The need for multiple bollards for an ESS unit or a series of ESS units shall be determined by the fire code official.

1. **Pipe Bollard** [2023 LACFC **Section 1207.11.7.4.1**]. Pipe-bollard type impact protection shall be 48 inches (1219 mm) in length, by 3 inches (76 mm) in diameter, schedule 80 steel pipe, embedded in a concrete pier 12 inches (304 mm) deep and 6 inches (152 mm) in diameter with 36 inches (914 mm) of pipe exposed, filled with concrete.

2. **Retrofit Bollard** [2023 LACFC **Section 1207.11.7.4.2**]. Retrofit-bollard type impact protection shall be 36 inches (914 mm) in height, by 3 inches (76 mm) in diameter, schedule 80 steel pipe fully welded to an 8-inch-square (203 mm) by ¼-inch-thick (6.4 mm) steel plate and bolted to a concrete floor by means of four $^1/_2$-inch (12.5 mm) by 4-inch (101 mm) steel anchor bolts. The anchor bolts shall be suitable for use in concrete and shall obtain a minimum of 3-inch (76 mm) nominal embedment per the manufacturer's installation instructions.



Pipe Bollard

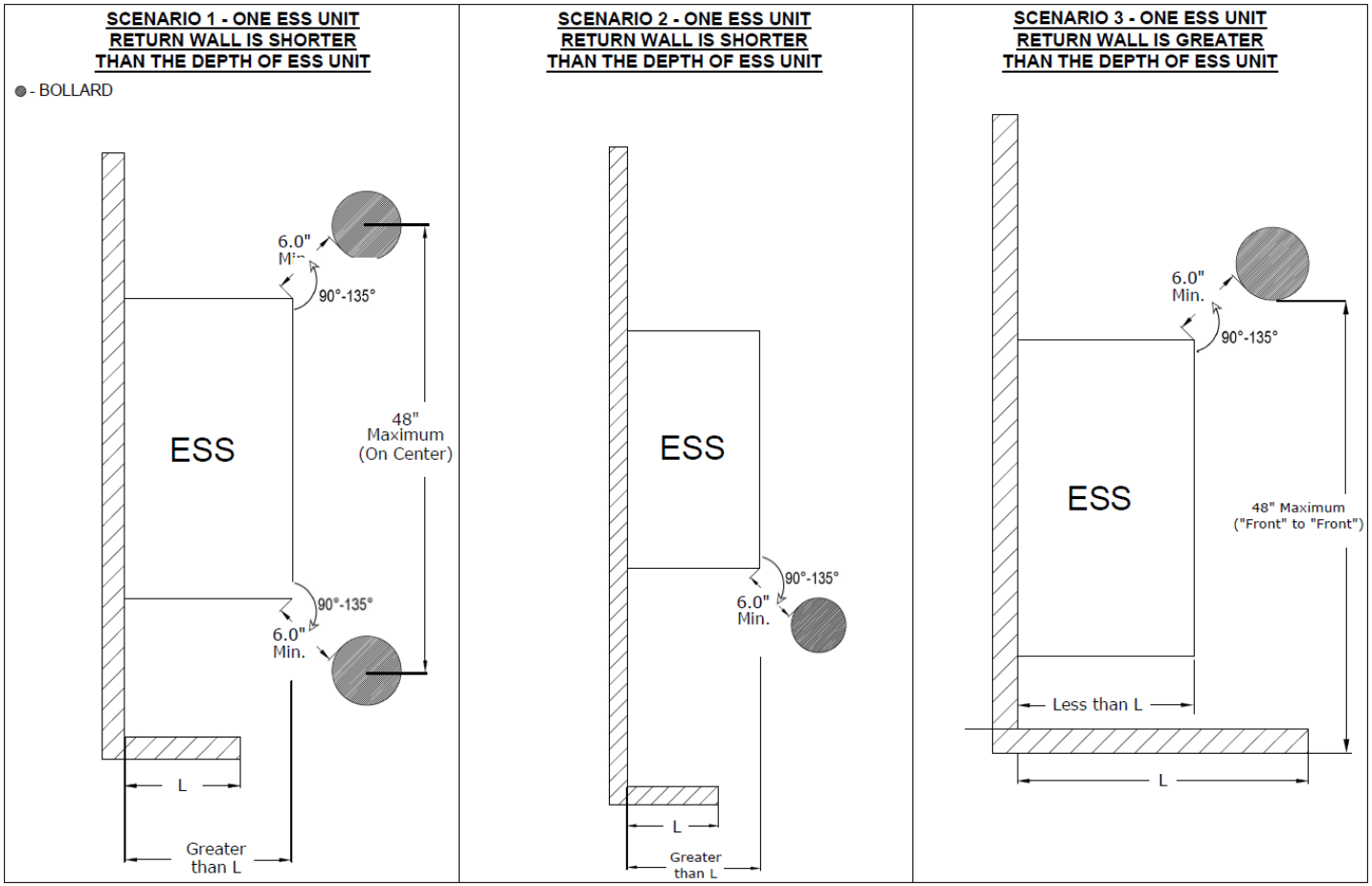


Retrofit Bollard

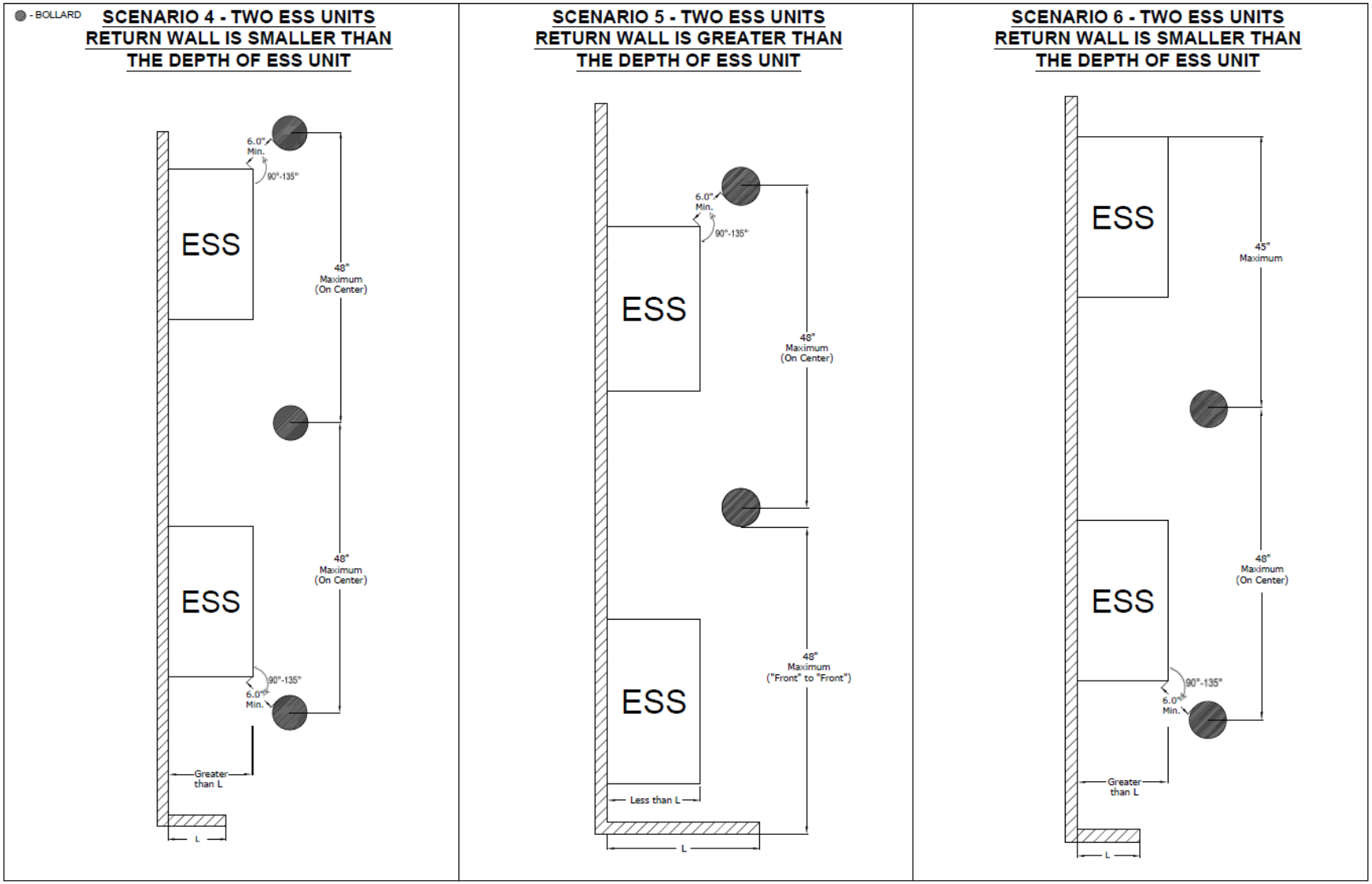
C. **Placement and Number of Bollards (Scenario Examples):**

When impact protection is required, the following illustrations may provide some guidance. These figures are merely guidelines. They are not intended to be comprehensive of all scenarios. Approval of means of impact protection is dependent upon several factors, including:

1. Size and shape of the garage.
2. Path(s) of vehicular travel.
3. Size and shape of ESS unit(s).
4. Means of service access to the ESS unit(s) (i.e., working-space clearances).



APPENDIX A – IMPACT PROTECTION



APPENDIX B – DISCONNECT PLACARDING REQUIREMENTS

I. INTRODUCTION

A. Purpose: To provide the public and contractors guidance for the application of the Los Angeles County Fire Department (LACoFD) Electrical Power Source Disconnect Placarding System at one- and two-family dwellings.

B. Scope: This regulation shall apply to one- and two-family dwellings in which Department review of a project is required or requested when such project involves a structure's electrical system, and the structure will be wired to be capable of receiving electricity from more than one power source. For the purposes of this regulation, a pre-wired optional auxiliary power source *input* shall constitute a wired capability to be served by more than one power source.

C. Authority: 2023 Los Angeles County Fire Code (LACFC), LACC Title 32, including Sections 102.8, 102.9, 104.1, 105.2, 509–509.3, 1201.2, 1205.4, 1207.4.1, and 1207.11.5.1; and 2022 California Electrical Code Sections 225.37, 230.70, 230.85, 705.10, and 705.20; or their equivalent in later editions.

D. Definitions:

1. Energy Storage System (ESS) — One or more devices, assembled together, capable of storing energy in order to supply electrical energy at a future time. When composed of batteries, this may also be referred to as a battery energy storage system (BESS) or a stationary storage battery system.

2. Photovoltaic (PV) — Referring to technology and equipment that converts solar energy into electrical energy for immediate use or storage for later use. Also referred to as solar panels and "Solar PV".

    a. BIPV (Building-Integrated Photovoltaic) — A category of PV technology that is distinguished by its incorporation of the PV cells within another element of the structure, such that the element serves two or more building functions (e.g., functioning as both a PV system and a portion of the building envelope or roof assembly).

3. "Rapid Shutdown" (RSD) — A function of a PV/BIPV system that attenuates/reduces the amount of electricity leaving PV/BIPV arrays. After initiation of the RSD function, the PV system continues to produce and transmit electricity, but at a lesser amount. May also be referred to as a "Hazard Control System" (HCS/PVHCS).

II. PROCEDURE

A. Criteria:

1. The LACoFD Electrical Power Source Disconnect Placarding System at one- and two-family dwellings is intended to disconnect all components of the structure (*and* as much of the conductors on/in the structure as possible) from all power sources capable of supplying electricity to a structure's electrical circuitry, for the purposes of removing electrocution hazards and electrical causes of ignition. This placarding system shall account for both producing and storing power sources, as well as pre-wired inputs for power sources (such as a pre-wired input for generator power).

2. The point of the physical disconnection in the flow of electricity from the power source should be as close as possible to the power source itself. The disconnect *initiation* device, such as a relay, may be mounted remotely when allowed by the Electrical Code.

3. Each placarded disconnect initiation device shall be accessible from the exterior of the structure(s).

4. Where any "Rapid Shutdown" or "Hazard Control System" functions are present at the site, an initiation device for each such function shall be included among the placarded disconnects.

5. Per **LACFC Section 509**:

> "Where multiple sources of the same category of hazard (e.g., categories of electrical hazards, of flammable gas hazards, etc.) serve a single building, required disconnection and/or attenuation means for the sources of each hazard category shall be located together, in a location approved by the fire code official. Where additional and/or remote means are necessary in order to accomplish this requirement, physical disconnection shall be achieved at the source of the hazard itself, such as by use of relay(s). Required disconnection and/or attenuation means for electrical hazards shall be located within 6 feet (1829 mm) of the main service panel, on the same wall plane, and maintained not separated from one another by walls, gates, fences, vegetation, or architectural features of the building.
>
> **Exception:** The fire code official shall have the authority to allow case-by-case exceptions where site or hazard constraints make a requirement impractical. Where such exceptions are granted, clear, permanent signage shall be provided in all cases. The color, content, number, and medium of the signage shall be as determined by the fire code official."

"Storage, trash and other materials or objects shall not be placed or kept in such a manner that would prevent such equipment and [required] means of disconnection and/or attenuation from being readily accessible."

B. Specifications and Placement of the Placards:

FIGURE 1 – EXTERIOR PLACARD
(i.e., PLACARD FOR WALLS AND/OR EXTERIOR OF ELECTRICAL PANELS/ENCLOSURES)

FIGURE 2 – PANEL-INTERIOR PLACARD
(i.e., PLACARD TO IDENTIFY SPECIFIC SWITCHES/BREAKERS WITHIN THE SAME PANEL)

1. Placard size and material:

   a. Exterior Placards (**FIGURE 1**) shall be a minimum 2 inches tall by 3.5 inches wide weather resistant plastic, with verbiage engraved.

   b. Panel-Interior Placards (**FIGURE 2**) shall be a minimum $^{7}/_{16}$ inches tall by ¾ inches wide weather resistant plastic, with verbiage engraved.

2. Color shall be red letters engraved into a yellow "background" with the verbiage as displayed.

3. Character type:

   a. Exterior Placards (**FIGURE 1**): Solid, all-capitals, in Arial font, minimum font size 24. "**F.D.**" and "**# X of Y**" shall be in bold type and minimum font size 28.

   b. Panel-Interior Placards (**FIGURE 2**): Solid, all-capitals, in Arial font, bold, minimum font size 24.

4. Attachment shall be by means of permanent epoxy that is material, weather, and surface compatible.

5. Verbiage and word arrangement shall be as pictured above, wherein "X" and "Y" are replaced with the appropriate numbers based upon the determination of a C-10 electrician (or other classification when a C-10 is not required for the scope of work being performed), with approval of the fire code official. All "X"'s shall account for the total number "Y" of essential switches and/or panels to be operated in order to completely disconnect the structure from all power sources (and activate rapid shutdown, when applicable; see below).

   As an option where multiple Exterior Placards are required on a single panel/enclosure, multiple "X"'s can be included on the same Exterior Placard. See illustrative examples below.

6. PV/BIPV "Rapid Shutdown" function activation: Where a PV system is equipped with a required "Rapid Shutdown", "Hazard Control System", or other similar safety feature, placards shall be included in the total number of placards ("Y") as necessary to ensure inclusion of any/all switches necessary to initiate each PV "Rapid Shutdown" or similar function for each PV system having one, new or existing.

7. Placard location(s):

   a. General: Placement locations shall be determined by a C-10 electrician (or other classification when a C-10 is not required for the scope of work being performed) and are subject to approval by the fire code official.

   b. Exterior Placards shall be placed onto the exterior of, or immediately adjacent to, each *panel/enclosure* or *standalone disconnect switch* that is necessary to be operated.

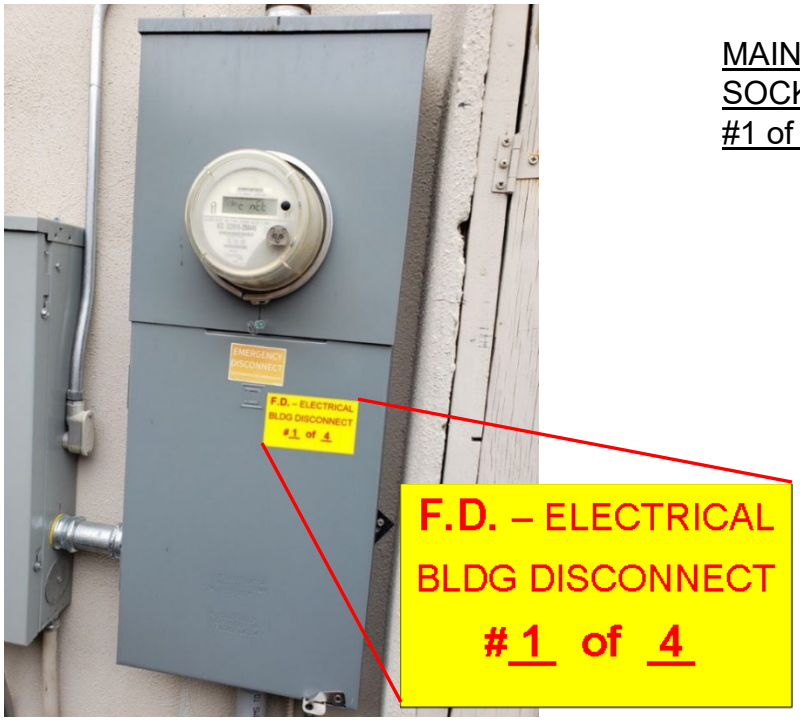
      Additional Exterior Placards may be required by the fire code official, such as when an enclosure houses multiple panels, or when more than the "Main" within a placarded panel is necessary to be operated.

   c. Panel-Interior Placards are required to be placed inside a panel to identify specific switches/ breakers when multiple switches within a single panel/enclosure are required to be operated.

   d. When the need for additional "X" of "Y" placards is unclear, the need for redundant disconnection-means placarding (i.e., additional "X"'s of "Y") shall be determined by the fire code official.

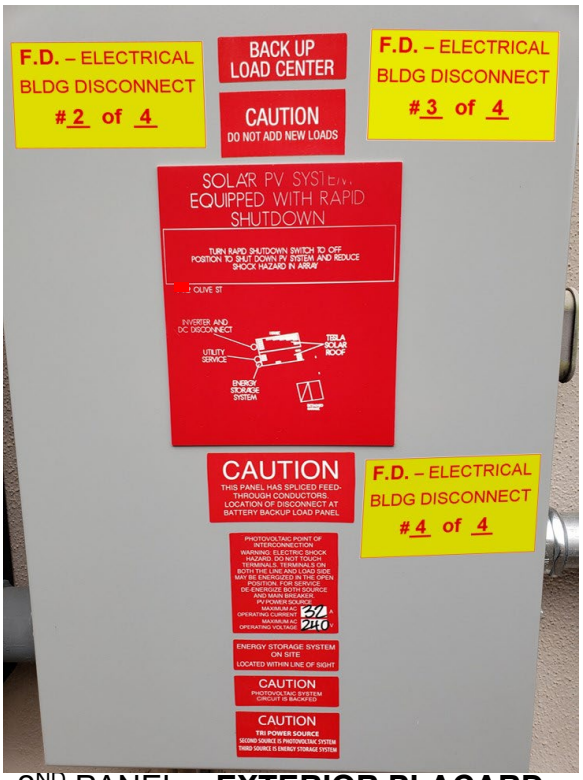
APPENDIX B – DISCONNECT PLACARDING REQUIREMENTS

C. Illustrative Examples:



MAIN PUBLIC-UTILITY METER-SOCKET PANEL (Exterior Placard - #1 of 4):

In this example, either operating the "Main" breaker in this panel *or* operating all the individual circuit breakers in this panel, will result in disconnecting the structure from the public-utility power source (the primary power source), but neither method will necessarily disconnect the entire structure from the *other* power sources supplying it (in this case 1 PV system, and 2 ESS units).



2ND PANEL – **EXTERIOR PLACARD OPTION 1**: *Multiple* Exterior Placards on a Panel/Enclosure

2ND PANEL – **EXTERIOR PLACARD OPTION 2**: *Combined* Exterior Placards on a Panel/Enclosure

APPENDIX B – DISCONNECT PLACARDING REQUIREMENTS

2ND PANEL – **PANEL-INTERIOR PLACARDS**:
Multiple Switches *Requiring* Operation within a *Single* Panel/Enclosure.

In this example, each of the placarded breaker sets serves as a disconnect for one of the three remaining power sources (1 PV and 2 ESS). The PV disconnect also initiates the PV RSD function. The Exterior Placard(s) identify the panel, while the Panel-Interior Placards then identify the specific switches within the panel.

This may be a *common* configuration, but there are countless possible configurations, including the locations of the individual power sources, their disconnects, and associated electrical panels; what circuitry a power source serves; and by what route.

The LACoFD Electrical Power Source Disconnect Placarding System allows for quickly locating and operating the disconnects, attenuating the PV power production, and achieving disconnections closest to the individual power sources.

APPENDIX B – DISCONNECT PLACARDING REQUIREMENTS

D. Disconnect Schedule Examples (For Where Plan Submittals Are Required):

Where a project requires submission of plan sets or construction documents to the Fire Department, a Disconnect Schedule such as that which follows shall be included.

Example* of Disconnect Schedule (Where Plans Are Required):

*Footnotes do *not* need to be included.

	ELECTRICAL POWER SOURCE DISCONNECT SCHEDULE		
	ENERGY SOURCE[a]	**DISCONNECTION NUMBER (#X of Y)[b]**	**DISCONNECTION OPERATION/EQUIPMENT/ DEVICE[c]**
1	Utility Service	1 of 5	200A Main Breaker
2	ESS	2 of 5	30A Blade Disconnect
3	New Solar PV	3 of 5	30A Blade Disconnect
4	Existing Solar PV	4 of 5	Emergency Stop Button
5	Generator (Input)	5 of 5	Transfer Switch
6			
7			
8			
9			
10			

a. Include each source. Units *immediately* adjacent to one another and on the same feeder may use the same Disconnection Device.

b. List as the "#X of Y" designation to be used on the Placarding. List the Utility Service as "#1 of Y".

c. Examples: "30A breaker in New 150A generation loads panel", "30A Fused/Fusible Disconnect", "Emergency Stop Button", etc. Devices shall be listed and approved.

This schedule reflects the minimum number of disconnects required to disconnect all electrical power sources from the circuitry of the structure in accordance with LACFC Section 509 and the LACoFD Electrical Power Source Disconnect Placarding System.

APPENDIX C – VENTS/OPENINGS AND PENETRATIONS

I. INTRODUCTION

A. Purpose: To provide the public, contractors, and County personnel guidance for the planning, document preparation, and installation of energy storage systems (ESS) unit(s) near or about vents and other openings.

B. Scope: This document shall apply to ESS units subject to 2023 Los Angeles County Fire Code (LACFC) Sections 1207.11.3.1 and 1207.8.4, and shall supersede 2022/2023 Residential Code Section R328.4, Item 3.

C. Authority: 2023 LACFC, LACC Title 32, Sections 102.8, 102.9, 104.1, 105.2, 1207.8.4, and 1207.11.3.1, or equivalent in later editions.

D. Definitions:

1. Energy Storage System (ESS) — One or more devices, assembled together, capable of storing energy in order to supply electrical energy at a future time.

2. Habitable Space — A space in a building for living, sleeping, eating or cooking. Bathrooms, toilet rooms, closets, halls, storage or utility spaces and similar areas are not considered habitable spaces.

3. Occupiable Space — A room or enclosed space designed for human occupancy in which individuals congregate for amusement, educational or similar purposes or in which occupants are engaged at labor, and which is equipped with means of egress and light and ventilation facilities for the purpose of human occupancy.

II. POLICY

A. As it pertains to ESS, ensuring appropriate criteria to address the safety of such systems in building and fire codes is an important part of protecting the public at large, building occupants, and emergency responders.

III. PROCEDURE

A. Regarding construction/installation plans and documents (where plan submission is not exempted): For the purposes of compliance with LACFC sections requiring separation of ESS units from doors, windows, operable openings, HVAC inlets and other penetrations, *all* such openings and penetrations shall be depicted on a

plan or detail, with dimensions from the opening or penetration to the nearest ESS unit(s).

B. For the purposes of requirements of separating ESS from vents and openings into the structure, **the ESS "units" from which separation shall be required are those units capable of presenting a smoke, fire, gas, or liquid hazard during normal use *or* failure** (hazards will vary depending on the design, technology, and chemistry being used in the ESS). In the case of ESS utilizing battery chemistries of the lithium-ion family (unless determined otherwise by the Fire Marshal based on large-scale fire testing for the particular model in question), the hazardous units of the system (i.e., those requiring separation distances) are any housing the *batteries*, as opposed to those that only contain electrical components. This is different from impact-protection requirements; impact protection is not only required for battery units but is *also* required for units that only house the battery-management components of the system.

C. **LACFC Section 1207.11.3.1, *Item 3**** applies to **Group R-3/R-4 occupancies, and Group-U occupancies accessory to a single R-3/R-4 occupancy**, when the ESS is installed outdoors, *or* on the outer side of exterior building walls. It specifies:

> For ESS "installed outdoors, or on the outer side of exterior building walls", the "ESS shall be installed and maintained a minimum of **3 feet** (914 mm) from all doors, windows, operable openings, HVAC inlets and other penetrations directly or indirectly into habitable or occupiable spaces, or bathrooms."
>
> *Note that this is only Item 3 of a list of requirements regarding this installation location option.

For the enforcement of **2023 LACFC Section 1207.11.3.1, Item 3,** at least **3 feet** (914 mm) of separation distance* shall be maintained between an ESS unit and any of the following vents or openings:

*In all cases the separation distance itself shall be measured from the vent to the ESS-unit surface that is closest to that vent.

1. Any vent or other opening located at an elevation that is above the *lowest* portion of the ESS unit.

2. Any vent or other opening located below the ESS unit that leads to any of the following:

   a. A raised-foundation crawl space of the structure containing the habitable or occupiable space, or a bathroom.

b. A basement or cellar located below the structure containing the habitable or occupiable space, or a bathroom.

c. A void space between or beneath walls or floors of any structure containing a habitable or occupiable space, or a bathroom.

This does *not* include a vent located below the ESS unit that is either of the following (i.e., the following two vents are exempted from separation-distance requirements when located below the ESS unit):

i. A vent directly through the exterior wall of the garage that is solely for ventilating general garage gases.

ii. An exhaust vent solely for an appliance or appliances located in the garage, where the exhaust does not pass through a separation wall separating the garage from a habitable space.

3. Any and all doors, including but not limited to any providing direct access to or egress from a garage, basement, or cellar.

4. Any and all windows, including but not limited to any serving a garage, basement, or cellar.

5. Any HVAC inlet *and/or* any through-the-wall HVAC unit (such as a "window unit").

D. **LACFC Section 1207.8.4, *Item 5**** applies to **all occupancies *other than* those subject to LACFC Section 1207.11.3.1**, and specifically only when ESS are installed outdoors *on* exterior walls of buildings. It specifies:

For ESS "installed outdoors on exterior walls of buildings", the "ESS shall be installed and maintained a minimum of **5 feet** (1524 mm) from all doors, windows, operable openings, HVAC inlets and other penetrations directly or indirectly into habitable or occupiable spaces, or bathrooms."

*Note that this is only Item 5 of a list of requirements regarding this installation location option.

While similar in content to 2023 LACFC Section 1207.11.3.1, Item 3, note that **2023 LACFC Section 1207.8.4, *Item 5***, applies to not only a much wider set of occupancies, but to a slightly more restrictive installation location in respect to the structure. Consequently, a greatly increased number of variables *and* potentials for fire and life hazards must be considered. Therefore, LACoFD provides slightly different direction for 2023 LACFC Section 1207.8.4, Item 5.

APPENDIX C – VENTS/OPENINGS AND PENETRATIONS

For the enforcement of **2023 LACFC Section 1207.8.4, *Item 5***, at least **5 feet** (1524 mm) of separation distance shall be maintained between an exterior-wall-mounted ESS unit and any of the following:

1. Any vent or other opening.

2. Any and all doors, including but not limited to any providing direct access to or egress from a garage, basement, or cellar.

3. Any and all windows, including but not limited to any serving a garage, basement, or cellar.

4. Any HVAC inlet *and/or* any through-the-wall HVAC unit (such as a "window unit").

> **Note: 2023 LACFC Section 1207.9.6, Item 1** (as well as 2022 California Fire Code Section 1207.9.6, Item 1) requires the following *much* greater separation distances of ESS from HVAC inlets and, where applicable, would supersede the above requirement:
>
> "ESS and associated equipment that are located in open parking garages…shall not be located within 50 feet (15 240 mm) of air inlets for building HVAC systems.
>
> **Exception:** This distance shall be permitted to be reduced to 25 feet (7620 mm) if the automatic fire alarm system monitoring the radiant-energy sensing detectors de-energizes the ventilation system connected to the air intakes upon detection of fire."

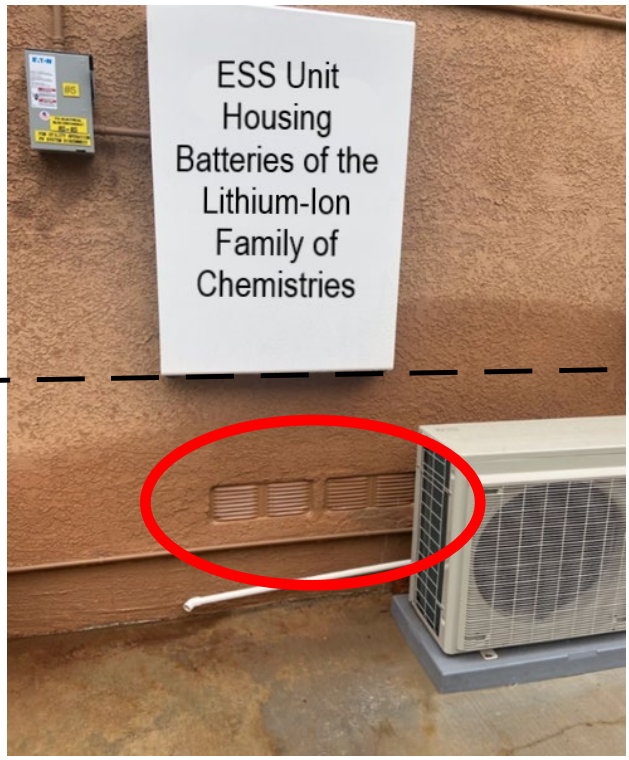
E. **Case Examples *for* Group R-3/R-4 occupancies, and Group-U occupancies accessory to a single R-3/R-4 occupancy*:**

> ***All* of the following vents require separation distance when located at an occupancy *other than*** Group R-3/R-4 occupancies, and Group-U occupancies accessory to a single R-3/R-4 occupancy.

The following list of examples is ***not* intended to represent a comprehensive set of cases or examples**. For such comprehensive direction, refer to the preceding portions of this document.

APPENDIX C – VENTS/OPENINGS AND PENETRATIONS

Line representing the elevation of the "lowest portion of the ESS unit."



EXAMPLE 1
(**for Group R-3/R-4 occupancies, and Group-U occupancies accessory to a single R-3/R-4 occupancy**).

1. Where the vent shown circled in Example 1 (**located *below* the subject ESS unit**) serves:

   a. As a vent directly through the exterior wall of the garage that is solely for ventilating general garage gases, separation ***shall not* be** required.

   b. As a vent leading to a raised-foundation crawl space of the structure containing the habitable or occupiable space, or a bathroom, separation ***shall be*** required.

   c. As a vent leading to a void space between or beneath walls or floors of any structure containing a habitable or occupiable space, or a bathroom, separation ***shall be*** required.

   d. As a vent leading to a basement or cellar located below the structure containing the habitable or occupiable space, or a bathroom, separation ***shall be*** required.

   Note: The *HVAC equipment* shown in the photograph (i.e., the air-conditioning system condensing unit) does not require separation therefrom because this condensing unit does not itself ventilate the

structure whatsoever. The only material passing from the condensing unit into the structure is a closed-use refrigerant, not ventilation air/gas.

EXAMPLE 2.
(**for Group R-3/R-4 occupancies, and Group-U occupancies accessory to a single R-3/R-4 occupancy**).

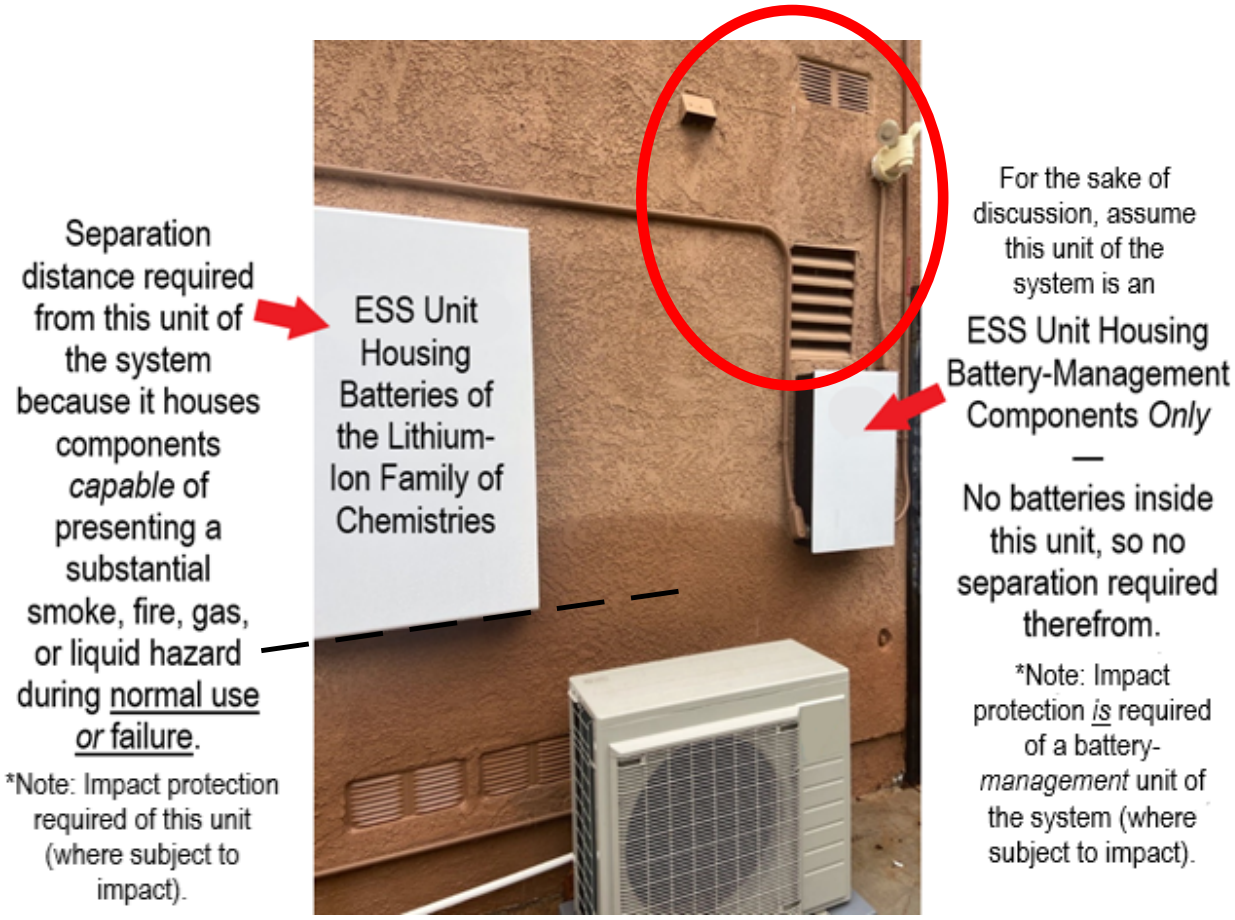
2. Where the vent shown in Example 2 is ***both*** **located below the subject ESS unit** ***and*** **serving solely as an exhaust vent for an appliance or appliances located in the garage**, where the exhaust does not pass through a separation wall separating the garage from a habitable space, separation **shall *not* be** required.

EXAMPLE 3.
(**for Group R-3/R-4 occupancies, and Group-U occupancies accessory to a single R-3/R-4 occupancy**).

3. Because the vent shown in Example 3 is located at an elevation that is **above the *lowest* portion of the ESS unit**, separation* **shall be** required.

*The separation *distance* shall be measured from the vent to the ESS-unit surface that is closest to that vent (which will not necessarily be the lowest surface of the ESS unit).

APPENDIX C – VENTS/OPENINGS AND PENETRATIONS



EXAMPLE 4.
(**for Group R-3/R-4 occupancies, and Group-U occupancies accessory to a single R-3/R-4 occupancy**).

4. Because the vents shown *circled* in Example 4 are located at an elevation that is **above the *lowest* portion of the ESS unit**, separation* **shall be** required.

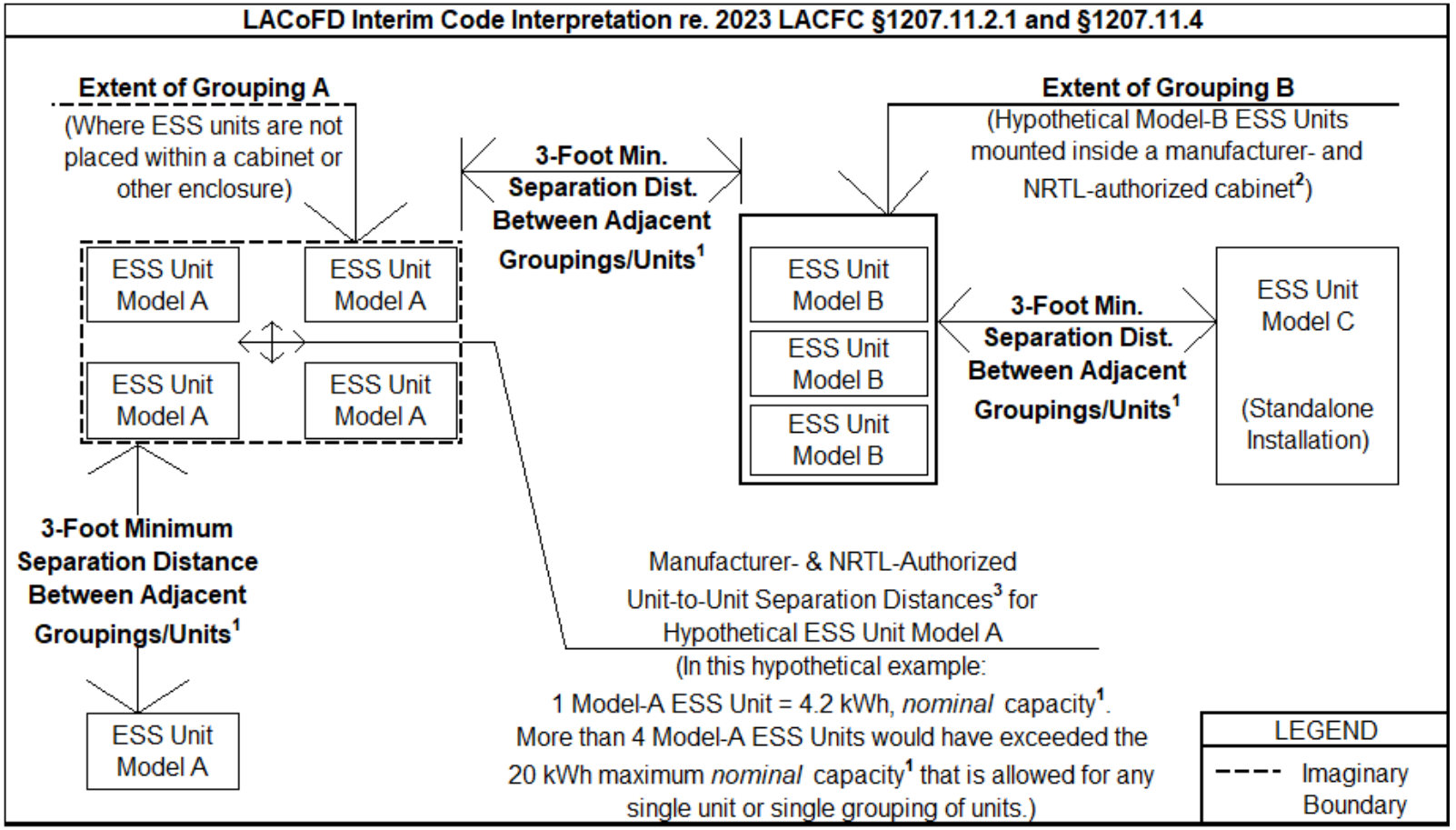
*The separation *distance* shall be measured from the vent to the ESS-unit surface that is closest to that vent (which will not necessarily be the lowest surface of the ESS unit).

APPENDIX C – VENTS/OPENINGS AND PENETRATIONS

EXAMPLE 5.
(**for Group R-3/R-4 occupancies, and Group-U occupancies accessory to a single R-3/R-4 occupancy**).

5. The vent/opening shown in Example 5 leads to a raised-foundation crawl space of a structure containing the habitable or occupiable space, or a bathroom. Therefore, separation from this vent/opening **shall be** required.

APPENDIX D – SPACING/ GROUPING



1. No individual grouping/unit shall exceed 20 kWh *nominal* capacity. Footnote "a" of Table 1207.1.1 (2022 CFC / 2023 LACFC):
   "a. Energy capacity is the total energy capable of being stored (nameplate rating), not the usable energy rating. For units rated in amp-hours, kWh shall equal rated voltage times amp-hour rating divided by 1,000."
2. Where a cabinet is used, the cabinet shall be purpose-manufactured, included and specified in the UL-9540 listing for the specific UL-9540-listed ESS units being placed within, and minimize the amount of void space within the cabinet [after the installation of the ESS unit(s) within] in which flammable/explosive gases can accumulate during a failure event.
3. In no case shall a reduction be allowed to the minimum requirements, nor separation distances, specified in the manufacturer's installation instructions. A grouping shall *not* consist of a mixture of different makes and/or models of UL-9540-listed residential ESS units unless specifically authorized by the aforementioned NRTL-approved manufacturer's installation instructions.

FIGURE 1: Grouping/Unit-to-Grouping/Unit Separations

APPENDIX E – DETECTION AND NOTIFICATION

DETECTION-OPTION *REQUIREMENT DETAILS*:

***All* 3 Options shall** comply with the following, in addition to their option-specific requirements:

a. Devices shall be both **Listed** *and* **CSFM Approved**.

b. Devices shall be installed in accordance with their manufacturer's installation instructions. Where, for any specific requirement, this document or the Fire Code is more restrictive thereof, the most restrictive specific requirement shall apply.

c. Heat Alarms, Heat Detectors, and Fire-Sprinkler Heads installed in the uninsulated garage shall comply with the following:

   i. **Ambient/ Operating/ Installation Temperature** of **at least 140°F** (79°C).

   ii. **Alarm/ Sprinkler-Activation Temperature Rating (i.e., "Fixed-Temperature" Alarm)** of **between 175°F and 249°F** (79–107°C).

   iii. All ESS in the garage shall be appropriately served by the necessary number of detection devices or fire-sprinkler heads.

d. **A Notification Device *shall* serve the garage,** and ***Another* Notification Device shall be provided in each dwelling unit** (or sleeping unit, if not a full dwelling unit) that is immediately adjacent to the attached garage, in accordance with the following:

   i. **Interconnection** between the detection device(s) in the garage and the notification device(s) in the dwelling/sleeping unit(s) shall be provided via wireless telemetry link or hard-wired means.

   ii. **Compatibility** between devices shall be in accordance with their listings.

   iii. Acceptable installation locations of the notification device within the immediately adjacent dwelling or sleeping unit include, but are not limited to, living rooms, kitchens, or hallways directly serving such habitable space(s) and not separated by a door(s). All locations are subject to approval by the fire code official.

   iv. A heat *alarm* is both a detection *and* a notification device, in one.

Option #1 **UL-539** Listed and **CSFM**-Approved **HEAT ALARM.**

- *Currently*, **no heat alarm devices are listed or CSFM-approved** for placement within an uninsulated garage. Until such time that they become available, this is not a viable option.

Option #2 **UL-521** Listed and **CSFM**-Approved **HEAT DETECTOR.**

- The detector(s) and associated notification device(s) shall be a component of a fire alarm system in the residence. 3rd-party alarm-system monitoring is not required. Combination security-and-fire alarm systems are permissible. **Fire-alarm plans shall be submitted**.

Option #3 **FIRE SPRINKLER SYSTEM.**

- The garage shall be fully sprinklered. The associated habitable space need not be sprinklered.
- A system flow detector shall be provided and achieve activation of the necessary notification device(s) in the associated habitable space(s). **Plans shall be submitted for new sprinkler system or one being upgraded, such as by addition of a flow device**.

APPENDIX F – PROPERTY-LINE SETBACK ALTERNATIVES

I. INTRODUCTION

A. Purpose: To provide **alternative means of compliance with the 5-foot property-line setback requirement** for energy storage systems (ESS) at properties of Group R-3 and/or R-4 occupancies.

B. Authority: 2023 Los Angeles County Fire Code (LACFC), LACC Title 32, including Section 1207.11.3.1, or equivalent in later editions.

II. CODE REQUIREMENT

A. **Item #1.1 of Section 1207.11.3.1** of the 2023 LACFC.
This section is specifically for energy storage systems (ESS) at properties of Group R-3 and R-4 occupancies. Item 1.1 of this code section defines the minimum separation distance between property lot lines and ESS units. The code reads:

> **1207.11.3.1 Outdoors or on outer side of exterior building walls.**
> ESS shall be permitted to be installed outdoors, or on the outer side of exterior building walls, when all of the following conditions are met, in addition to those otherwise required by Section 1207.11:
>
> 1. The ESS shall be installed and maintained a minimum of **5 feet** (1524 mm) from all of the following:
>   - 1.1. Lot lines.
>   - 1.2. Public ways.
>   - 1.3. Other buildings.
>   - 1.4. Stored combustible materials.
>   - 1.5. Hazardous materials.
> 2. The ESS shall be installed and maintained a minimum of **10 feet** (3048 mm) from vegetation, as specified in Section 1207.5.7.
> 3. The ESS shall be installed and maintained a minimum of **3 feet** (914 mm) from all doors, windows, operable openings, HVAC inlets and other penetrations directly or indirectly into habitable or occupiable spaces, or bathrooms.
>
> . . .

B. **Intent.** The minimum setback of the hazard [the ESS unit(s)] from the property line(s) is intended to provide for the following:

- Protection of adjacent properties from fire and non-ignited thermal-runaway cell-vent gases.
- Fire-fighting access and operational space.

APPENDIX F – PROPERTY-LINE SETBACK ALTERNATIVES

C. **Combustible Property-Line Barriers.** Recent testing and real-world fires have established and confirmed that combustible property-line fences/walls are an effective carrier of fire between structures on adjacent properties.

III. ACCEPTABLE ALTERNATIVE

A. Recognizing yards on both sides of the property line, fire-fighting access, and State-Code requirements for encroaching upon ESS setbacks, the LACoFD Office of the Fire Marshal has determined that:

1. **An ESS unit mounted to the building wall may be permitted to extend into the 5-foot minimum yard setback provided that:**

   a. The **depth of the ESS unit** from the building wall to which it is mounted does exceed **18 inches**.

   b. Any **property-line barrier** present within 5 feet of the ESS unit (i.e., fence, wall, etc.) shall have a ***noncombustible, nonmetallic* surface** in accordance with the following:

      i. This surface shall extend a minimum of **5 feet horizontally** beyond each edge of the ESS unit, for the full height of the fence or wall.

2. **Where a smaller, 3- or 4-foot setback has been allowed by the Building Department to be built (usually due to added sprinkler protection of the building over and above default code requirements), an ESS unit mounted to the building wall may be permitted to extend into the 3- or 4-foot yard setback provided that:**

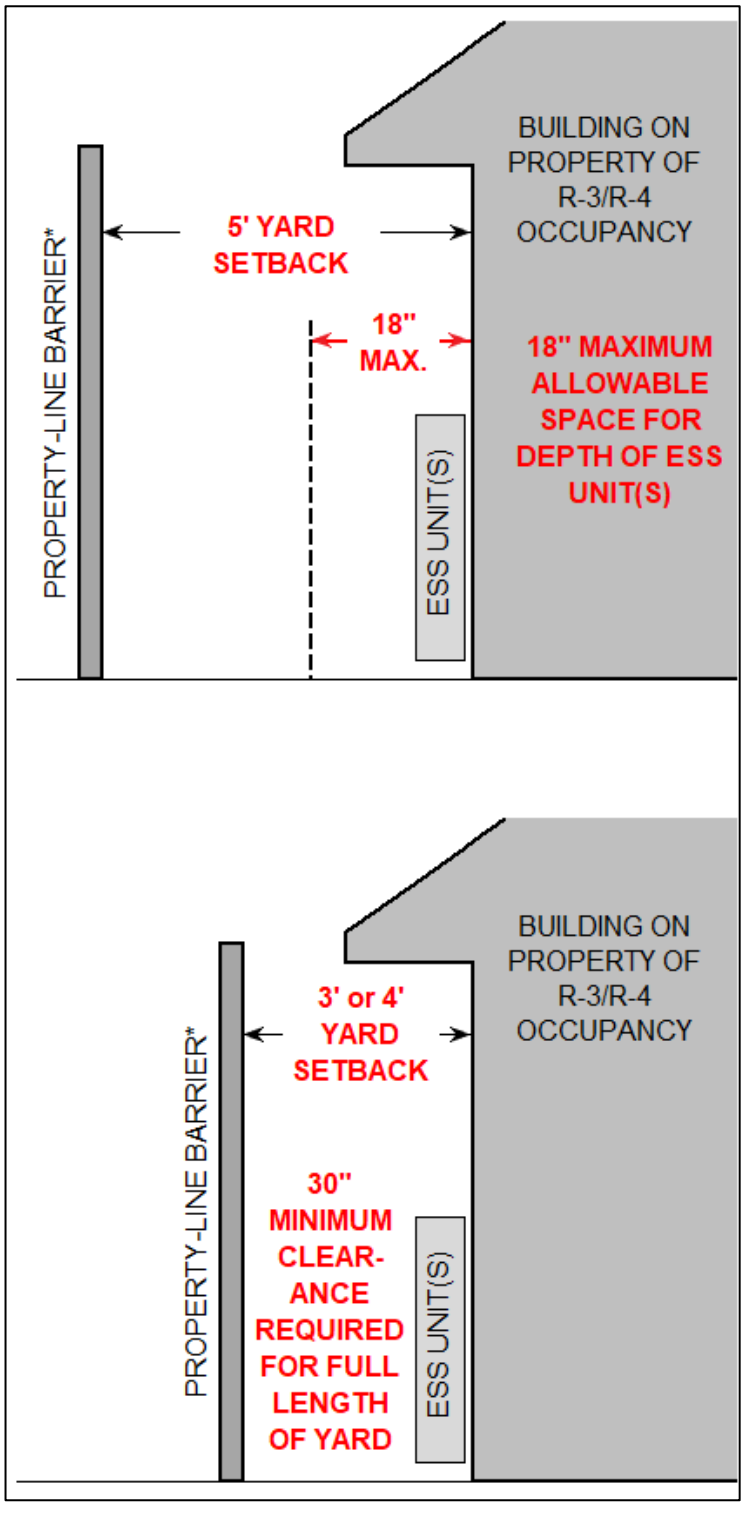
   a. The **width of the free-space clearance** shall be a minimum of **30 inches**, for the full length of the yard. This may limit the allowable depth of the ESS unit(s) from the building wall to which the ESS is mounted.

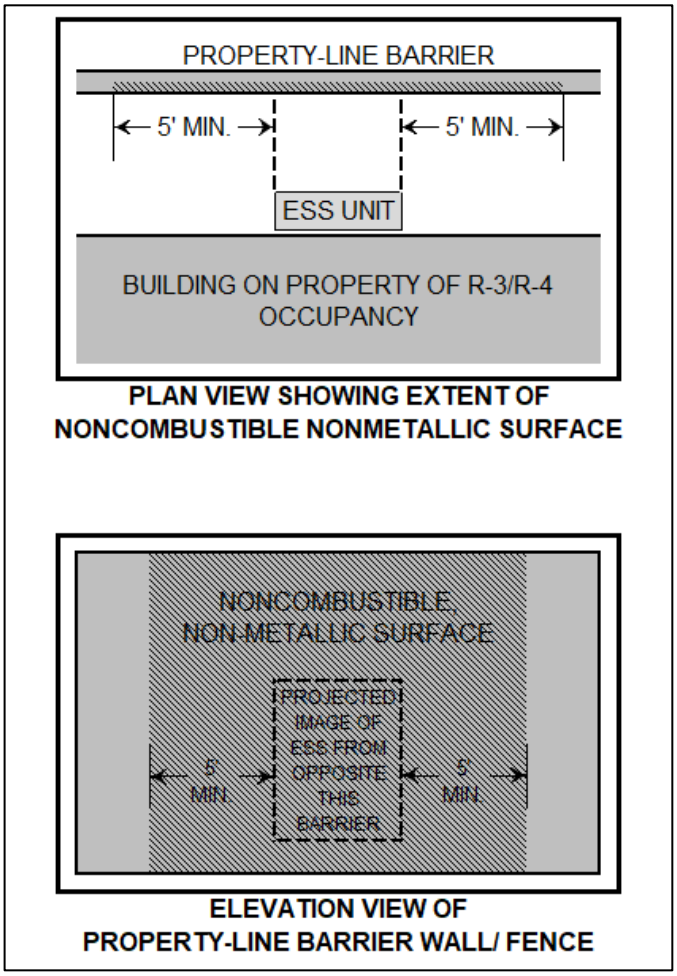
   b. Any **property-line barrier** present within 5 feet of the ESS unit (i.e., fence, wall, etc.) shall have a ***noncombustible, nonmetallic* surface** in accordance with the following:

      i. This surface shall extend a minimum of **5 feet horizontally** beyond each edge of the ESS unit, for the full height of the fence or wall.

B. **Figure References.** (See next page)

APPENDIX F – PROPERTY-LINE SETBACK ALTERNATIVES





PLAN VIEW SHOWING EXTENT OF NONCOMBUSTIBLE NONMETALLIC SURFACE

ELEVATION VIEW OF PROPERTY-LINE BARRIER WALL/ FENCE

*Any property-line barrier present within 5 feet of the ESS unit (i.e., fence, wall, etc.) shall have a *noncombustible, nonmetallic* surface in accordance with the following:

a. This surface shall extend a minimum of 5 feet horizontally beyond each edge of the ESS unit, for the full height of the fence or wall.

*Property-line measurement is to the property line itself, which may be beyond the *face* of the property-line barrier.