



# Board of Adjustment

## Staff Report

**CASE NUMBER:** BA15-015                      PLN2015-00120  
**STAFF PLANNER:** Angelica Guevara  
**LOCATION/ADDRESS:** 2222 East Main Street  
**COUNCIL DISTRICT:** 2  
**OWNER:** National Retail Properties, LLC.  
**APPLICANT:** Michael Pate, Electric Guard Dog, LLC.

- REQUEST:**
1. A Variance to allow a fence to exceed the maximum height permitted;
  2. An interpretation of the term "electric fence" as found in Section 8-6-3(l)1 related to Prohibited Public Nuisances;
  3. The provisions related to "determining setbacks for yards" as found in Section 11-2-3(L);
  4. The provisions related to "maximum height of fences and freestanding walls" as found in Section 11-30-4(B); and
  5. An interpretation of the defined term "adjoining" as found in Chapter 87 of the Mesa Zoning Ordinance, all in the GC district.

### SUMMARY OF APPLICANT'S REQUEST

Several requests are involved with this application; the first is for a variance to allow a 10-foot tall fence where the maximum height is limited to 8-feet; the second request is for an interpretation of the term "electric fence" as related to a prohibited public nuisance; the additional requests relate to the following terms contained within the Zoning Ordinance: "determining setbacks for yards", "maximum height of fences and freestanding walls", and "adjoining" that are typically included in discussions regarding fence height, location, and setbacks.

The applicant has filed the request to be allowed to erect a 10-foot tall electric fence along the perimeter of the site. The site is approximately 26.4± acres and is owned by Camping World, an RV sales and service facility. The site is located on the north side of Main Street just east of Gilbert Road.

The applicant is requesting a formal interpretation from the Board of Adjustment.

### SITE CONTEXT

**CASE SITE:** RV sales and service facility – Zoned GC  
**NORTH:** Existing multi-residence use – Zoned RM-2 and RM-4  
**EAST:** (across 22<sup>nd</sup> Place) Existing multi-residence and RV sales/service – Zoned RM-2 and GC  
**SOUTH:** (across Main Street) Commercial uses – Zoned GC  
**WEST:** (across the Consolidated Canal) Existing multi-residence – Zoned RM-4

### SUMMARY

The applicant has expressed a need to secure the 26.4± acre RV sales and service facility. Due to the size of the RV's, it is not feasible to secure the RV's within a building. The applicant is proposing the installation of a 10-foot tall security fence consisting of steel and fiberglass poles and wires. The security fence would include 20, 12.5 gauge, galvanized steel wires running horizontally between the poles. The wires would be connected to a 12 volt battery powered solar electric grid. When touched, the wires would release a burst of voltage for duration of four-ten-thousandths of one second (.00004). The applicant has indicated the temporary pulse of

voltage is similar to a slap on the hand from a ruler. Warning signs in English and Spanish are proposed on the fence a minimum of 60 feet apart. The security fence would also include an audible deterrent consisting of sirens that are monitored and would only alarm when touched.

The applicant has indicated their security fence is safe. There have been no deaths or serious injuries since the inception of UL69 in 1939.

As justification for their request, the applicant has indicated the following:

1. Installation of a 10-foot tall nearly invisible secondary security fence would not be contrary to public interest.
2. Special circumstances and conditions exist, such as the following:
  - a. The existing perimeter fence ranges from 5 to 8 feet in height.
  - b. A security fence should be higher to effectively deter crime.
  - c. A 10 foot tall fence prevents perpetrators from jumping both fences in one motion as they would need to navigate two unequal barriers to access the property.
  - d. A 10-foot tall fence is more imposing to help deter someone from scaling it as 8-foot tall fences are tempting for criminals and can be breached.
  - e. The inventory is high value.
  - f. Due to the size and nature of the items, they must be stored outside.
  - g. The storage area is 3,750 linear feet in perimeter making it impossible for security guards to effectively and constantly monitor the entire lot.
  - h. The perimeter of the site is accessible via road frontage and dry flood basins. It is very easy to obtain access without being seen by patrolling Police or a neighborhood watch.
3. The literal interpretation of the provisions of the Zoning Ordinance would deprive the applicant of rights commonly enjoyed by other properties and would result in unnecessary hardship.
4. The variance is not being sought to relieve a self-imposed hardship as the business is reputable and in the appropriate zoning and complies with all other City Ordinances.
5. The variance is the minimum necessary to relieve a practical difficulty and resulting hardship that cameras and record crime can't prevent. Guards are unreliable as they may not show up for work, can fall asleep on the job, and at times are complicit in the criminal action. The Electric Guard Dog is the most reliable, most economical, and safest security application available.

#### STAFF ANALYSIS

Section 8-6-3(I)1 of the Mesa City Code provides prohibited public nuisances and includes the following:

*"The following acts, omissions, conditions, and things in or upon any land or structure in the City constitute public nuisances, the existence of which are hereby prohibited and declared to be unlawful:*

- I. The responsible party of any property shall not:*
  - 1. Erect or maintain, or allow anyone to erect or maintain, any electric fence;*
  - 2. Attach or allow anyone to attach to any fence such items as glass, nails, metal objects, or other materials in such a manner that is likely to injure any person who comes in contact with such object"*

Based on the information provided by the applicant indicating the security fence would include 20, 12.5 gauge, galvanized steel wires running horizontally between the poles which would be connected to a 12 volt battery,

that when touched, the wires would release a burst of voltage for duration of four-ten-thousandths of one second (.00004). The temporary pulse of voltage is similar to a slap on the hand from a ruler and warning signs in English and Spanish would be attached to the fence a minimum of 60 feet apart is indeed an electric fence and is therefore prohibited by the City of Mesa Code.

The interpretation to Title 8, Chapter 6 of the City Code regarding the proposed security fence has been determined to be an "electric fence" was made by the Development and Sustainability Department Director. As prescribed in Section 8-6-1(C and D), this item has been advertised and placed on the Board of Adjustment agenda for formal hearing and interpretation by the Board of Adjustment through an appeal filed by the applicant for this request.

The applicant has also requested a variance to allow the security fence to exceed the maximum height permitted of 8-feet with a 10-foot tall security fence.

Staff agrees that the site is a larger site with three sides having public access with large inventory stored outdoors making it more of a challenge to secure. But similar conditions exist throughout the City for every other RV and vehicle sales lot and they have managed to be able to provide adequate security of their inventory without needing a fence that exceeds 8-feet in height.

Staff is not supporting the variance as we do not believe there is sufficient justification provided to support the request. When analyzed against the review criteria, we do not believe there are special conditions or circumstances that apply to the property to help justify the request. In addition, the conditions cited by the property owner are self-imposed. The property owner has the option of securing their site with an 8-tall non-electrified security fence. The granting of the variance would constitute a special privilege or unusual favor to this property over other sites with similar use and zoning.

The requirements related to fence height apply only to fences or walls proposed at the property line or within the required setback. The perimeter setbacks for this site are as follows:

- The Main Street frontage has a 15-foot setback (measured from the future half street right-of-way line of 65-feet);
- The 22<sup>nd</sup> Place frontage has a 20-foot setback (measured from the half street right-of-way line of 30-feet);
- The north property line has a 20-foot setback; and
- The west property line has a 20-foot setback

Fences proposed in locations out of the setbacks mentioned above are not limited to 8-feet in height; fences within the buildable area of the site can be up to 30-feet in height as long as they are not electrified.

#### STAFF RECOMMENDATION

1. Staff recommends the Board deny the request for the variance to the fence height.
2. Staff recommends the Board **uphold and confirm** the interpretation of the Development and Sustainability Director related to the security fence constituting an electric fence and the additional provisions from the Zoning Code related to fence height, location, and setbacks.

### FINDINGS

- 1.1 The security fence proposed is an electric fence as it is proposed to include 20, 12.5 gauge, galvanized steel wires running horizontally between the poles which would be connected to a 12 volt battery, that when touched, the wires would release a burst of voltage for duration of four-ten-thousandths of one second (.00004). The temporary pulse of voltage is similar to a slap on the hand from a ruler and warning signs in English and Spanish would be attached to the fence a minimum of 60 feet apart.
- 1.2 Electric fences are prohibited by the City of Mesa Code Section 8-6-3(I).
- 1.3 The site is approximately 26.4± acres in area and is an RV sales and display facility on a site that does not have significant changes in grade elevations to justify a taller fence placed within the required setbacks.
- 1.4 Due to the size of the RV's the business owner has decided to display inventory outdoors.
- 1.5 Many existing RV and vehicle sales lots display inventory outdoors and do not require security fencing taller than 8-feet.
- 1.6 The site can be secured with an 8-foot tall security fence within the setback. A 10-foot tall fence is also permitted if it is placed in compliance with the required setback without needing a variance.
- 1.7 Fences up to 30-feet in height are permitted on the site as long as they are placed out of the setbacks.

### ORDINANCE REQUIREMENTS

Note: Bold font added to ordinance language below for emphasis

#### Mesa City Code 8-6-3(I) Prohibited Public Nuisances:

- (I) The responsible party of any property shall not:
  1. Erect or maintain, or allow anyone to erect or maintain, any electric fence;
  2. Attach or allow anyone to attach to any fence such items as glass, nails, metal objects, or other materials in such a manner that is likely to injure any person who comes in contact with such object;

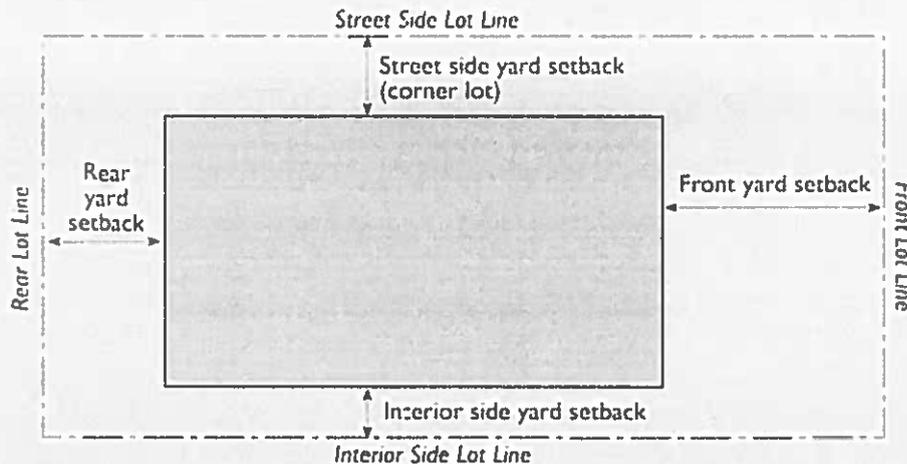
#### Mesa City Code Section 8-6-1(C and D) Purpose and Applicability:

- C. The Director of Development and Sustainability or Designee shall interpret Chapter 6: Prohibited Public Nuisances to the public, City departments, and other branches of government subject to the general and specific policies established by the City Council.
- D. Appeals of the interpretations of Chapter 6: Prohibited Public Nuisances shall be filed within 30 days of the date of the decision and shall be reviewed by the Board of Adjustment except when the requirement references the Building or Fire Codes or Regulations.

#### Zoning Ordinance, Sec. 11-2-3(L) "determining setbacks for yards"

- L. Determining Setbacks for Yards. A setback line defining a required yard is parallel to and at the specified distance from the corresponding front, side, or rear property line. The following special regulations for determining yards apply when a lot abuts a proposed street or alley.
  1. Yards Abutting Planned Street Expansions. If a property abuts an existing or proposed street for which the existing right-of-way is narrower than the right-of-way ultimately required for the street as determined by the City Council through the latest adopted transportation and/or street plan, the required setback shall be established from the future right-of-way rather than the property line. In the event that the street is not listed under the latest adopted transportation plan, the street width shall

be determined based on the street classification and right-of-way width requirements specified in Title 9, Chapter 6 of the Mesa City Code.



**Zoning Ordinance, Sec. 11-30-4(B) "Maximum Height of Fences and Freestanding Walls"**

- B. 1. **Maximum Height.**
  - a. **Front Yards and Required Street Side Yards.** No fence or freestanding wall within or along the exterior boundary of the required front yard shall exceed a height of 3.5-feet.
  - b. **Rear Yards and Interior Side Yards.** No fence or freestanding wall within or along the exterior boundary of the required interior side or rear yards shall exceed a height of 8-feet.
  - c. **Building Area.** When located in the buildable area, the maximum height for fences and freestanding walls is the maximum height allowable in the applicable district.
2. **Prohibited Fence Materials in Commercial and Employment Districts.**
  - a. **Chain Link and Wood.** Chain link may only be used when not visible from public view. Wood fencing is not allowed, except wood may be used in conjunction with metal frames for gates used in conjunction with required screening walls.
  - b. **Hazardous Materials.** The use of barbed wire, razor wire, embedded glass shards, ultra barrier, electrified and other hazardous fencing is prohibited in street-facing yards or where adjacent to any public right-of-way when placed at a height of less than 7-feet from the height of the adjacent sidewalk or natural grade.

**Zoning Ordinance, Chapter 87 – Definition of "adjoining"**

**Adjoining:** 2 or more lots or parcels of land sharing a common boundary line, or 2 or more objects in contact with each other. Lots or parcels of land which touch at corners only shall not be deemed adjoining. "Abut" or "abutting" and "contiguous" means the same as adjoining.

**The Electric Guard Dog**



**The #1 Theft Deterrent Service in the U.S.**

121 Executive Center Drive • Suite 230

Columbia, SC 29210

Phone: (803) 404-6189 | Fax: (803) 404-5378

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## Variance Justification – Camping World, Mesa AZ

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1. Presently the code does not allow for 10-foot high, security fencing. Installing a nearly invisible, secondary security fence which will be higher (10') than the existing fencing (wrought iron, chain link and cinder block) will not be contrary to public interest.
2. Special circumstance and conditions of the location dictate the height of the security fence be permitted at ten feet:
  - The perimeter security fence ranges from 5 – 8 feet.
  - The security fence should be considerably higher than the perimeter fence to effectively deter crime.
  - The 10' height prevents the perpetrators from simply hurdling both the perimeter fence and security fence as a single barrier in one continuous motion. They would be required to navigate two unequal barriers to access the property for purposes of criminal intent.
  - At 10-feet, the fence is more imposing to someone thinking about scaling it. We have experimented with different heights and have found shorter fences (8') to be too tempting to breach.
  - High value of inventory – both the equipment and the actual inventory of commercial goods.
  - Due to size and nature of items, they must be stored in an outside lot and cannot be protected inside a building.
  - As the storage area is 3750 linear feet in perimeter, it is not possible for security guards to effectively and constantly monitor the entire lot.
  - The entire perimeter is easily accessible via road frontage and dry flood basins. It is very easy to obtain access without being seen by patrolling Policemen or a neighborhood watch.
3. That literal interpretation of the provisions of the Zoning Ordinance would deprive the applicant of rights commonly enjoyed by other properties and under the provisions of the Ordinance would result in unnecessary undue hardship.
4. This variance is not being sought to relieve self-imposed hardships. The business is a reputable business, located in the appropriate zoning and complies with all other city ordinances.
5. The granting of the variance requested would not confer upon the applicant any special privilege that is denied by the Zoning Ordinance to other similar lands, structures or buildings in the same district as the general safety and welfare of the public is maintained, crime is prevented, and the City can police crime other than property break-ins and vandalism. The variance is the minimum necessary to relieve a practical difficulty and resulting hardship, cameras record crime and don't prevent it, guards are unreliable (don't show up for work, sleep on the job, and at times are complicit in the criminal action). The Electric Guard Dog is the most reliable, most economical, and safest security application available. In actuality the installation of the EGD will secure the variance property and increase the security of the surrounding properties and the immediate area by deterring the criminal element.



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## Variance Justification & Compatibility – Camping World, Mesa AZ

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1. Explain what special circumstances or conditions apply to this property that may not apply to other properties in this area or zoning district.
  - The perimeter security fence ranges from 5 – 8 feet.
  - The security fence should be considerably higher than the perimeter fence to effectively deter crime.
  - The 10' height prevents the perpetrators from simply hurdling both the perimeter fence and security fence as a single barrier in one continuous motion. They would be required to navigate two unequal barriers to access the property for purposes of criminal intent.
  - At 10-feet, the fence is more imposing to someone thinking about scaling it. We have experimented with different heights and have found shorter fences (8') to be too tempting to breach.
  - High value of inventory – both the equipment and the actual inventory of commercial goods.
    - High end leisure vehicles both for sale and owned by customers can be vandalized
    - Propane tanks, batteries, wheels & tires are easily pilfered and sold for profit
  - Due to size and nature of items, they must be stored in an outside lot and cannot be protected inside a building.
  - As the storage area is 3750 linear feet in perimeter, it is not possible for security guards to effectively and constantly monitor the entire lot.
  - The entire perimeter is easily accessible via road frontage and dry flood basins. It is very easy to obtain access without being seen by patrolling Policemen or a neighborhood watch.
2. Explain how the special circumstances or conditions cited in Question #1 originated. (Pre-existing or not self-imposed? Why or why not?)
  - The circumstances above are pre-existing; they are not inviting this type of criminal activity. Camping World's business model is such that it requires a large amount of acreage to allow for the ability to properly and safely secure their business inventory and that of their customer's property for the purpose of servicing.
3. Explain how strict compliance of the Zoning Ordinance would deprive the property of uses or development options available to other properties in the same zoning district.
  - The business has been the repeated victim of theft with unsustainable losses and strict compliance of the Zoning Ordinance would deprive the applicant of rights to safely secure the property. The current enforcement of the Ordinance would result in unnecessary and undue hardship and is not being sought to relieve self-imposed hardships. The business is a reputable business, located in the appropriate zoning and complies with all other city ordinances.
4. Explain why the requested variance will not grant special privilege or unusual favor to this property or development over the other sites with similar circumstances and zoning.
  - The granting of the variance requested would not confer upon the applicant any special privilege that is denied by the Zoning Ordinance to other similar lands, structures or buildings in the same district as the general safety and welfare of the public is maintained, crime is prevented, and the City can police crime other than property break-ins and vandalism. The variance is the minimum necessary to relieve a practical difficulty and resulting hardship, cameras record crime and don't prevent it, guards are unreliable (don't show up for work, sleep on the job, and at times are complicit in the criminal action). The Electric Guard Dog is the most reliable, most economical, and safest security application available. In actuality the installation of the EGD will secure the variance property and increase the security of the surrounding properties and the immediate area by deterring the criminal element.



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## Summary of Electric Guard Dog Security System

Our Electric Guard Dog security system is a primary low voltage (12V), battery powered (DC), independent of the electrical grid, self-contained system that has a variety of functions to it which make for a 100% medically safe and extremely effective crime deterrent. This system is 10' high and is placed approximately 4"-12" inside of the existing perimeter fence. It is comprised of 20, 12.5 gauge, galvanized steel wires which are run horizontally to the height of 10'. In our system the first layer of protection (visual deterrent) is our signage (located every 50') which advertises that it is an electric fence. This deters most would-be criminals.

The second layer of protection (audible deterrent) of our system is sirens. These sirens sound when an illegal criminal trespasser cuts the wires or places objects on them to insulate them so as to bypass the system. The sirens will automatically shut off after a set amount of time. This audible deterrent usually drives away most of the would-be criminals that are bold enough to proceed in spite of the aforementioned visual deterrent (signage). Included in this second layer of protection is that we monitor our systems. In the event of an alarm, a signal will be sent to our monitoring station, who in turn, contacts our clients to let them know they had an alarm event. Our system does not directly connect to emergency services.

The final layer of protection is our voltage. We have a burst of voltage (from the 12V battery) that has a duration of four-ten-thousandths of one second (.00004). If a criminal was bold enough to actually grab or touch our system, they will receive this temporary pulse of voltage which is akin to a slap on the hand from a ruler. This final layer of protection stops the remaining number of criminals that are not deterred by the other layers of protection.

Safety of these devices is unparalleled as no deaths or serious injuries have occurred since the inception of UL69 in 1939 with installations consistent with the UL69 Standard. This can be confirmed through Joel Hawk, Principal Engineer of UL69, Underwriters Laboratories. Bill Fulcher of OSHA, Leader of Enforcement Programs, maintains a data base of accidental death from all causes and no incidents have occurred directly related to the proper installation and operation of an electric fence consistent with the UL69 standards. With the inclusion of a perimeter buffer fence, for all electric security fences as specified in IEC 60335-2-76, the risk of accidental contact is substantially lowered.

Please also take a moment to look at our website, [www.electricguarddog.com](http://www.electricguarddog.com), you will find it helpful as well.

## STRUCTURAL CALCULATION

**PROJECT No.**  
**GS1300815**

**Fence Post and Solar Panel Support Post Analysis**

**OWNER / LOCATION:**

**Camping World  
2222 E Main Street  
Mesa, AZ 85213**

**CLIENT:**

**Electric Guard Dog  
121 Executive Center Dr, Suite 230  
Columbia, SC 29210**

**ENGINEER:**



Expires: 9-30-16

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**SUMMARY:**

This analysis is for poles for an Electric Fence.

Post size, post embedment depth, post hole diameter and backfill is given in the body of the calculation. The posts will be modeled as cantilevers that are fixed at the base.

**REFERENCES:**

1. 2012 Edition of the international Building Code
2. ASCE 7 - 10 Minimum Design Loads for Buildings and Other Structures  
American Society of Civil Engineers
3. AISC 14th Edition

**DESIGN INPUT VALUES:**

**Dimensions**

$L_{\text{post\_bndg}} := 120$  in Height of fence

**Design Loads for Building:**

Occ\_Category := "I"

**Wind Design Values:**

Fastest wind speed (3 second gust)

$V_{\text{wind}} := 105$  MPH

Wind Exposure:

$E_{\text{xposure}} := "C"$

**Footing and Post Hole Design Values:**

$q_{\text{soil}} := 1500$  psf Assumed soil vertical bearing capacity

$S_{\text{soil}} = 150$  psf Assumed soil lateral bearing capacity

$d_{\text{ia\_footing}} := 1.25$  ft post footing diameter

Concrete\_backfill = "Yes" Backfill in main posts

**(GO TO LAST PAGE FOR SUMMARY OF RESULTS)**

## WIND ANALYSIS:

Design per ASCE 7

$V_{wind} = 105$       Basic Wind Speed  
 $k_d := .85$       Wind Directionality Factor  
 $k_{zt} = 1.0$       Topographic Factor  
 $k_z = 0.850$       Wind Exposure Factor  
 $I_w = 1.00$       Importance factor

$q_h := .00256 \cdot k_z \cdot k_{zt} \cdot k_d \cdot V_{wind}^2 \cdot I_w$       Velocity Pressure

$q_h = 20.39$     psf

### Calculated Wind Pressures:

$d_{ia\_wire} := .1121in$

$C_f := 1.2$

$G_{fence} := .85$

$q_{wind} := q_h \cdot G_{fence} \cdot C_f$

$q_{wind} = 20.8$     psf

### Determine the Adequacy of the Primary Electric Fence Posts:

The analysis below will show the adequacy of the column.

Column\_1\_location := "corner\_posts"

Post\_spacing := 1000 ft

n\_wires := 20

$l_{c1} = 120$  in **Maximum Unbraced length of column**

$$M_{r\_wind\_c1} := \frac{q_{wind} \cdot \left( \frac{6.63}{12} \right) \cdot l_{c1}^2}{2} \cdot \frac{1}{1000}$$

$M_{r\_wind\_c1} = 6.9$  kip-in **Required moment capacity due to wind**

**Next, Check loads due to wire tension:**

$F_{wire\_tension} := 20.7$  lbs per wire

$$M_{wire\_tension\_DL} := F_{wire\_tension} \cdot n_{wires} \cdot \frac{l_{c1}}{2} \cdot \frac{1}{1000} \quad M_{wire\_tension\_DL} = 24.8 \text{ in-kip}$$

**Column information:** Column\_1 := "4dia40"

$t_{c1} = 0.24$  in **Thickness of column material**

$D_{c1} = 4.5$  in **Outside diameter of column section**

$F_{y\_c1} := 35$  ksi  $E_{steel} := 29000$  ksi

### Determine Allowable Axial Load:

$k_{c1} := 2.1$   $r_{c1} = 1.51$  in

$$S_{slenderness\_c1} := k_{c1} \cdot \frac{l_{c1}}{r_{c1}} \quad S_{slenderness\_c1} = 167 \quad \text{Slenderness ratio}$$

**Note:** Slenderness ratio is less than 200, thus OK.

Next, Check for compact, non-compact, or slender element section:

$$WT_{ratio\_cl} := \frac{D_{cl}}{t_{cl}} \quad WT_{ratio\_cl} = 19.0 \quad \text{Width-Thickness ratio}$$

$$NCS_{limit\_cl} := \left( \frac{.11 \cdot E_{steel}}{F_{y\_cl}} \right) \quad NCS_{limit\_cl} = 91.1 \quad \text{non-compact section limit}$$

$$SL_{limit\_cl} := 4.71 \cdot \left( \frac{E_{steel}}{F_{y\_cl}} \right)^{.5} \quad SL_{limit\_cl} = 135.6 \quad \text{Slenderness equation chooser limit (Equations E3-2, E-3, E7-2, E7-3)}$$

**Next Calculate Q:**

$$WT_{low\_limit\_cl} := \frac{.11 \cdot E_{steel}}{F_{y\_cl}} \quad WT_{low\_limit\_cl} = 91.1$$

$$WT_{high\_limit\_cl} := \frac{.45 \cdot E_{steel}}{F_{y\_cl}} \quad WT_{high\_limit\_cl} = 372.9$$

$$Q_{cl} := \frac{.038 \cdot E_{steel}}{F_{y\_cl} \cdot \left( \frac{D_{cl}}{t_{cl}} \right)} + \frac{2}{3} \quad Q_{cl} = 2.32$$

$$Q_{cl} := \text{if} \left[ \left( WT_{ratio\_cl} \leq WT_{high\_limit\_cl} \right), Q_{cl}, 1 \right]$$

$$Q_{cl} := \text{if} \left[ \left( WT_{low\_limit\_cl} \leq WT_{ratio\_cl} \right), Q_{cl}, 1 \right]$$

$$Q_{cl} := \text{if} \left[ \left( Q_{cl} \leq 1 \right), Q_{cl}, 1 \right]$$

$$Q_{cl} := \text{if} \left( WT_{ratio\_cl} \leq NCS_{limit\_cl}, 1, Q_{cl} \right)$$

$$Q_{cl} = 1.000$$

Note: Use this Q if the Width-thickness ratio is between high and low limits calculated above. Otherwise use Q=1.0 Also, Q cannot be greater than 1.0 because it is considered a reduction factor.

Note: If column is not a slender element section, then Q = 1.

**Next, determine allowed critical axial load.**

$$F_{e\_cl} := 3.1416^2 \cdot \frac{E_{steel}}{S_{lenderness\_cl}^2} \quad F_{e\_cl} = 10.27$$

$$F_{cr\_a\_cl} := Q_{cl} \cdot \left( 0.658 \cdot \frac{Q_{cl} \cdot F_{y\_cl}}{F_{e\_cl}} \right) \cdot F_{y\_cl} \quad F_{cr\_a\_cl} = 8.41 \quad \text{ksi}$$

$$F_{cr\_b\_cl} := 0.877 \cdot F_{e\_cl} \quad F_{cr\_b\_cl} = 9.01 \quad \text{ksi}$$

$$F_{cr\_cl} = 9.01 \quad \text{ksi (allowable compression stress)}$$

$$P_{n\_cl} := \frac{F_{cr\_cl} \cdot A_{cl}}{1.67} \quad \text{Equation E3-1, E7-1 (ASD)}$$

$$P_{n\_cl} = 17.1 \quad \text{kips Allowed axial load}$$

**Next, Determine Allowable Bending load:**

**Determine h/t and check for compact, non-compact, or slender element section: (flexure)**

$$WT_{fl\_ratio\_cl} = 19.0 \quad \text{Width-Thickness ratio}$$

$$CS_{fl\_limit\_cl} := 0.07 \cdot \left( \frac{E_{steel}}{F_{y\_cl}} \right) \quad CS_{fl\_limit\_cl} = 58.0 \quad \text{compact section limit}$$

$$NCS_{fl\_limit\_cl} := 0.31 \cdot \left( \frac{E_{steel}}{F_{y\_cl}} \right) \quad NCS_{fl\_limit\_cl} = 256.9 \quad \text{non-compact section limit}$$

**First, Determine allowable moment based on Yielding (a):**

$$M_{py\_cl} := Z_{c1} \cdot F_{y\_cl} \quad M_{py\_cl} = 150.90 \quad \text{kip-in} \quad \text{Allowable moment based on yielding}$$

**Next, Determine allowable moment for non-compact sections (b):**

$$M_{pfl\_nc\_cl} := \left( .021 \cdot \frac{E_{steel}}{WT_{fl\_ratio\_cl}} + F_{y\_cl} \right) \cdot S_{c1}$$

$$M_{pfl\_nc\_cl} = 215.61 \quad \text{kip-in} \quad \text{Allowable moment for non-compact sections}$$

**Next, Determine allowable moment for slender element sections (c):**

$$M_{pfl\_sl\_cl} := \left( \frac{.33E_{steel}}{WT_{fl\_ratio\_cl}} \right) \cdot S_{c1}$$

$$M_{pfl\_sl\_cl} = 1620.17 \quad \text{kip-in} \quad \text{Allowable moment for slender element sections}$$

**Note, Based on the values of the three calculations above, the allowable moment is:**

$$M_{a\_cl} = 150.90 \quad \text{kip-in} \quad \text{Allowable flexural moment}$$

**Next, check combined bending and axial load stresses:**

$$M_{cx\_cl} := \frac{M_{a\_cl}}{1.67} \quad M_{cx\_cl} = 90.36 \quad \text{kip-in} \quad \text{Available flexural moment (ASD)}$$

$$P_{n\_cl} = 17.1 \quad \text{kips} \quad \text{Allowed axial load (from above)}$$

**Determine Applied Axial Loads:**

$$P_{dead\_cl} := .500 \quad P_{dead\_cl} = 0.5 \quad \text{kips} \quad \text{Applied axial dead load}$$

**Next, Check all load cases that may control (ASD):**

$$Col\_usage_{cl} := \frac{P_{dead\_cl}}{P_{n\_cl}} + \left[ \frac{\left[ \left( M_{r\_wind\_cl} + M_{wire\_tension\_DL} \right)^2 + M_{wire\_tension\_DL}^2 \right]^{.5}}{M_{cx\_cl}} \right]^2$$

$$Col\_usage_{cl} = 0.23 \quad \text{Combined usage of column (Worst Load Case condition).} \quad \text{Note: Less than 1.00, thus OK.}$$

**EMBEDMENT FOR Primary Electric Fence Posts::**

Calculate the minimum required post embedment depth for lateral loading.

Concrete\_backfill = "Yes"

$V_a = 672$  lbf Lateral shear load at the groundline

$M_{tot} = 25779$  in-lb Moment at the groundline (based on combined wind and dead loads)

$d_{ia\_footing} = 1.25$  ft. Main post footing diameter

$S_{soil} = 150$  psf Lateral capacity of soil

$H_{post} := \frac{L_{post\_bndg}}{12 \cdot 2}$   $H_{post} = 5$  ft Height at which an equivalent lateral load is applied to determine required footing depth.

$d_{epth\_trial} = 4.5$  ft Trial depth of post hole to determine final required embedment depth.

$$S_{1\_ftg} := \frac{2S_{soil} \cdot d_{epth\_postnc}}{3} \cdot 1.33 \quad S_{1\_ftg} = 609$$

$$A := 2.34 \cdot \frac{P_{post}}{(S_{1\_ftg}) \cdot b_{post}} \quad A = 2.06$$

$$d_{epth\_linepost} := 0.5 \cdot A \cdot \left[ 1 + \left[ 1 + \left( \frac{4.36 \cdot H_{post}}{A} \right)^2 \right]^{0.5} \right]$$

The final post hole depth is determined by iterating to a final depth.

$d_{epth\_linepost} = 4.5$  ft. This is the minimum required post embedment depth for lateral loading

**Next, Check the poles for an Electric Fence Control / Solar Panel Support.**

$$\begin{aligned}
 d_{\text{ia\_footing}} &:= 1 \text{ ft post footing diameter} & q_h &= 20.39 \text{ psf} \\
 L_{\text{post\_bndg}} &:= 108 \text{ in Height of support} & C_{f\_panel} &:= 1.6 \\
 q_{\text{wind}} &= 20.8 \text{ psf Velocity Pressure} & q_{\text{wind\_panel}} &:= q_{\text{wind}} \cdot C_{f\_panel} \\
 & & q_{\text{wind\_panel}} &= 33.28 \text{ psf}
 \end{aligned}$$

Calculate the moment induced by the control boxes and the solar panels.

$$\begin{aligned}
 W_{\text{ind\_solar}} &:= q_{\text{wind\_panel}} \cdot 4.7 \text{ sf} & W_{\text{indCP}} &:= q_{\text{wind\_panel}} \cdot 3 \text{ sf} \\
 W_{\text{ind\_solar}} &= 156.41 \text{ lbs} & W_{\text{indCP}} &= 99.84 \text{ lbs}
 \end{aligned}$$

NOTE: The center of area of the solar panel will be at 121"  
 The center of area of the lowest control box will be 36"  
 The center of area of the middle control box will be 64"  
 The center of area of the top control box will be 92"

$$M_{\text{tot}} := \frac{W_{\text{ind\_solar}} \cdot 121 + W_{\text{indCP}} \cdot 36 + W_{\text{indCP}} \cdot 64 + W_{\text{indCP}} \cdot 92}{1000}$$

$$M_{\text{tot}} = 38.1 \text{ kip - inches}$$

NOTE : Use 3" diameter galvanized conduit. This section can be shown to have a section modulus of 2.3 in3 (S) and an allowable yield stress of 50 ksi.

Determine fiber stress:

$$f_b := \frac{M_{\text{tot}}}{2.3} \quad f_b = 16.56 \text{ ksi} < 50 \text{ ksi} \quad \text{OK}$$

Check slenderness:

$$\begin{aligned}
 k_{c1} &:= 2.1 & r &:= 1.16 \text{ in} & L_{\text{unsupported}} &:= L_{\text{post\_bndg}} & L_{\text{unsupported}} &= 108 \text{ in} \\
 S_{\text{slenderness\_c1}} &:= k_{c1} \cdot \frac{L_{\text{unsupported}}}{r} & S_{\text{slenderness\_c1}} &= 196 & \text{Slenderness ratio} & & &
 \end{aligned}$$

Note: Slenderness ratio is less than 200, thus OK.

**Footing Calculation For Electric Fence Control / Solar Panel Support Post:**

Calculate the required footing depth

NOTE: Determine the point load required to produce a equal moment .see above

$$P_{\text{post}} := \frac{M_{\text{tot}} \cdot 1000}{\frac{L_{\text{post\_bndg}}}{2}} \quad P_{\text{post}} = 705 \quad \text{lbs} \quad H_{\text{post}} := \frac{L_{\text{post\_bndg}}}{2 \cdot 12} \quad H_{\text{post}} = 4.5 \quad \text{ft}$$

$$S_{\text{soil}} = 150 \quad \text{psf} \quad \text{Assumed soil lateral bearing capacity}$$

$$b_{\text{post}} = 1 \quad \text{ft}$$

 $d_{\text{epth\_trial}} = 5.0 \quad \text{ft}$  Trial depth of post hole to determine final required embedment depth.

$$S_{1\_fg} := \frac{2S_{\text{soil}} \cdot d_{\text{epth\_postnc}}}{3} \cdot 1.33 \quad S_{1\_fg} = 662.3$$

$$A := 2.34 \cdot \frac{P_{\text{post}}}{(S_{1\_fg}) \cdot b_{\text{post}}} \quad A = 2.49$$

$$d_{\text{epth\_postnc}} := 0.5 \cdot A \cdot \left[ 1 + \left[ 1 + \left( \frac{4.36 \cdot H_{\text{post}}}{A} \right)^2 \right]^{0.5} \right]$$

 $d_{\text{epth\_postnc}} = 5.0$  This is the minimum required post embedment depth calculated for lateral loading.

NOTE: Use 5' - 6" embedment

**THE END**

**Board of Adjustment**

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**BA15-015**  
**2222 East Main Street**

# **Letters of Opposition**

**Staff Planner: Angelica Guevara**

## Angelica Guevara

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**From:** Wanda Anderson <wandagolfstoo@hotmail.com>  
**Sent:** Saturday, May 23, 2015 9:36 AM  
**To:** Angelica Guevara  
**Subject:** Campers World electric fence

Dear Ms. Guevara'

I live at 220 N 22nd Place in Mesa along the fence line to camper world. I am against putting in a 10 foot electric fence on their side of the wall. We have lived there for 5 years and never had any trouble. Also, it would be very insightly and make the area look like a ghetto. I have no objections to then putting up a 6 ft. fence that is not visible from our property. If it is electric, 5 or 6 feet should be ample anyways. Thank you for the opportunity to voice my opinion.

Yours truly,  
Wanda Anderson  
#1081, 220N 22nd Place,  
Mesa, Az.  
85213

## Angelica Guevara

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**From:** Nancy <nancy.ballard53@gmail.com>  
**Sent:** Thursday, May 07, 2015 5:09 PM  
**To:** Angelica Guevara  
**Subject:** Camping World variance request

RE: Case No. BA 15-015,2222 E.Main Street

Dear Ms Guevara:

We are writing to ask that the request by Camping World of 2222 E. Main Street to construct and use a 12-Volt battery operated, solar powered, 10-foot high security fence for the perimeter of their property be denied. We feel that it is too high for the neighbourhood and the streets of Mesa. Even if installed inside the existing perimeter fence it will still be visible from the street and neighbouring properties.

Thank-you for considering our opinions and request.

Nancy and Larry Ballard  
#1078 Del Camino  
220 Nth 22nd Place  
Mesa, AZ 85213

Box 832  
Invermere, BC Canada  
VOA 1K0

Sent from my iPad