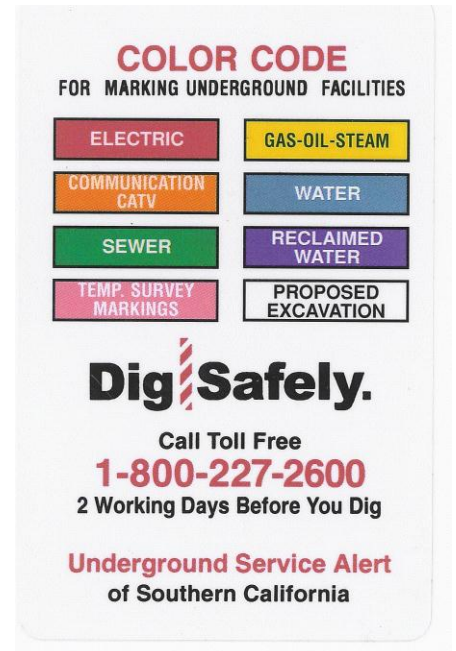


# Site Preparation

Underground Utilities are marked with paint or chalk:

|                         |      |        |
|-------------------------|------|--------|
| Boundaries of work area | ---- | White  |
| Gas Lines               | ---- | Yellow |
| Water Lines             | ---- | Blue   |
| Electrical Lines        | ---- | Red    |
| Communication Cables    | ---- | Orange |
| Sewer Lines             | ---- | Green  |
| Reclaimed Water         | ---- | Purple |



Always verify lot size and location of structures on property. The county recorders office or a local title company can provide copies of Plat Maps. Fences are not always on the property line.

Here are three property line problems that I've encountered this year. First on my 22<sup>nd</sup> street property the neighbors fence is 5 feet on my property, her drive way is almost 4 feet over the property line and her garage is more than a foot onto my property. This is an ongoing legal issue. The next is on my 18<sup>th</sup> street property when I replaced the fence, rather than assume the existing fence was on the property line I measured the width of the alley, and then measured the two homes next to mine to find the property lines. I was surprised to find that the house in the middle had moved the fences on each side of his lot over by about 2 feet, back in 1985 or 20 years previously. With the agreement of the owner I replaced the fence on the property line. However the fence and driveway on the other side have not been corrected and as the neighbor there is unpleasant. I take pleasure in knowing that she will most likely lose the property. The third example is the single family home that I sold on 7<sup>th</sup> Ave. A line of cypress trees were planted on the property line years before, and when a

## Sac City Property Management

fence was built it was offset from the cypress trees. With the result that a portion of the back fence was 2-1/2 feet onto the property that I owned. This was disclosed to the buyer and left unchanged.

Do not do work without building permits. I remodeled a bathroom for my sister last year without a permit. But one of the neighbors called the housing and dangerous buildings department. They red tagged the job site and stopped the work until a building permit was issued. We had an inspector come out the next day and we were required to change out the shower valve to pressure balanced valve, but otherwise was approved. However as punishment for not having a building permit, we were required to trim the porch roof back 2 feet or 3 feet from the property line.

In addition the building inspectors provide an invaluable resource in training and education.

Customer Service: Customer service Reps. should answer the phone with a smile. The Customers can hear that smile in the Reps. and will respond to it. Empathize with your customer. We cannot stress this point enough. Start the conversation with "How can we help you today?" This will help to diffuse the customer who is in a panic, over issues. It enables the customer to get directly to the point so that we can react with an appropriate and immediate response to their situation.

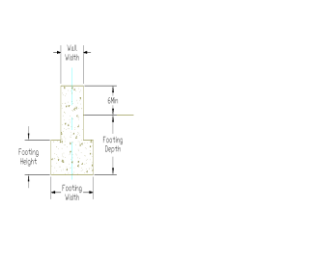
Put the customer at ease, consider sending an e-mail alert to each customer prior to the appointment that includes an introduction and a photo of the service technician. Technicians should show up at the customer's home in uniform with an identifying badge and booties on their shoes, to protect the customer's home.

# Foundations

## Foundation Footing and Wall Requirements:

2001 California Building Code, Table 18-I-C Foundations for stud bearing walls - Minimum requirements <sup>1,2,3</sup>

| Foundation Footings |               |                   |            |               |
|---------------------|---------------|-------------------|------------|---------------|
| Stories             | Footing Width | Footing Thickness | Wall Width | Footing Depth |
| 1                   | 12            | 6                 | 6          | 12            |
| 2                   | 15            | 7                 | 8          | 18            |
| 3                   | 18            | 8                 | 10         | 24            |



- 1) Where unusual conditions or frost conditions are found, footings and foundations shall be as required in section 1806.1
- 2) The ground under the floor may be excavated to the elevation of the top of the footing.
- 3) Interior bearing walls may be supported by isolated footings. The footing width and length shall be twice the width shown in this table and the footings shall not be spaced more than 6 feet on center.
- 4) Foundations may support a roof in addition to the stipulated number of floors. Foundations supporting roofs only shall be as required for supporting one floor.

**Footings and Foundations: Concrete in footings shall have a specified compressive strength of not less than 2,500 pounds per square inch (psi) (17237kPa) at 28 days.**

California, is seismic zones 3 and 4, the Sacramento area is seismic zone 3, the bay area is seismic zone 4

Foundation bolts in seismic zones 0-3 use ½" diameter bolts embedded 7" into reinforced concrete (15" un-reinforced concrete). Spacing no more than 72" single story and 48" two story apart. And between 4" to 12" of the end of the sill plates. No less than 2 bolts per sill plate regardless of length. Washers must be 2" X 2" X 3/16" thk plate washers.



Figure 9—Seismic zones in California. All of California is in seismic zone 3 or 4 on U.S. Geological Survey maps. There are four zones; the higher the number the higher the earthquake danger. Stronger standards for buildings in zones 3 and 4 have been adopted in the Uniform Building Code.

killed when the tsunami caused by the 1964 Alaskan earthquake hit Crescent City in northern California.

**Dam Failure**—Earthquake damage to a dam can cause a flood. A dam above the San Fernando Valley was damaged in the 1971 earthquake; if it had failed, it might have flooded the homes below, causing many deaths and injuries. Dam failure is unlikely. California has one of the world's most rigorous systems for building and inspecting dams.

### Earthquake Hazard Mapping

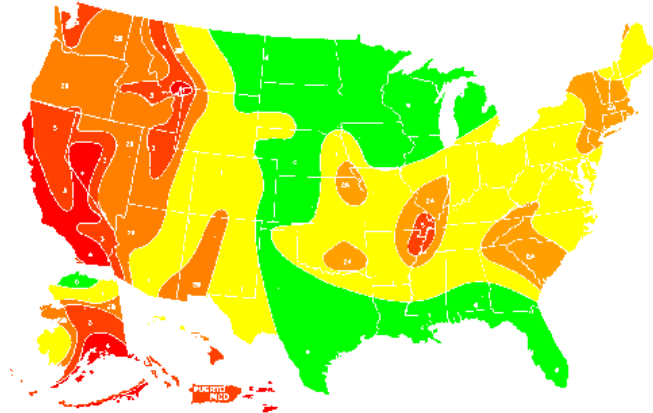
The state has endured several well-known, damaging earthquakes just in the decade starting with the Loma Prieta quake of 1989. For more than a century, scientists have tried to understand how the land below us works. They have made enormous progress in understanding, especially in mapping areas that have the highest probability of damaging effects from earthquakes. Three mapping programs are applying some of this knowledge to make Californians safer in earthquake country.

**National Seismic Zones**—The International Conference of Building Officials (ICBO) has designed a general map of the seismic hazards in the U.S. (see figure 9). The map uses lines to divide seismic zones on the basis of the likelihood of strong ground shaking. There are four zones. The higher the number the

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Steel bolts with a minimum nominal diameter of 5/8" shall be used in Seismic zone 4. Design Category E (2308.12.9)

Crawl space - minimum 12" below girders and 18" below floor joist.



### Foundation Piers:

Foundation piers minimum depth below grade 12" minimum height 6" above grade.

| Overlap Required, 30 X Bar Diameter |          |          |         |
|-------------------------------------|----------|----------|---------|
| Rebar                               | Diameter | Diameter | Overlap |
| #3                                  | 3/8"     | 0.375    | 11.25   |
| #4                                  | 1/2"     | 0.500    | 15.00   |
| #5                                  | 5/8"     | 0.625    | 18.75   |
| #6                                  | 3/4"     | 0.750    | 22.50   |

### Framing Notes:

Joists under bearing walls and partitions to be doubled. Double joists that are separated to provide space for installation of plumbing or vents must be solidly blocked with at least 2X lumber spaced no more than 48" on center.

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Support, joists must have at least 1-1/2" of bearing surface on wood or steel (3" on masonry)

| Span Table, Douglass Fir # 2 or Better              |         |                        |                         |
|---|---------|------------------------|-------------------------|
| Floor Joist, 40 lbs/Sq. Ft., L/360 Deflection Limit |         |                        |                         |
| Size  | Spacing | Span w/ finish Ceiling | Span w/o finish Ceiling |
| 2 X 6   | 12"     | 10'-5"                 | 10'-8"                  |
|   | 16"     | 9'-0"                  | 9'-9"                   |
|   | 24"     | 7'-4"                  | 8'-1"                   |
| 2 X 8   | 12"     | 13'-2"                 | 14'-1"                  |
|   | 16"     | 11'-5"                 | 12'-6"                  |
|   | 24"     | 9'-4"                  | 10'-2"                  |
| 2 X 10  | 12"     | 16'-0"                 | 17'-8"                  |
|   | 16"     | 13'-11"                | 15'-4"                  |
|   | 24"     | 11'-4"                 | 12'-6"                  |
| 2 X 12  | 12"     | 18'-8"                 | 20'-5"                  |
|   | 16"     | 16'-2"                 | 17'-9"                  |
|   | 24"     | 13'-2"                 | 14'-5"                  |

| Span Table Douglass Fir # 2 or Better                     |        |        |         |        |
|---|--------|--------|---------|--------|
| Ceiling Joist, 5 lbs/Sq. Ft. L.L., L/240 Deflection Limit |        |        |         |        |
| Spacing   | 2 X 4  | 2 X 6  | 2 X 8   | 2 X 10 |
| 16"   | 11'-2" | 17'-9" | 22'-10" | 26'-0" |
| 24"   | 9'-9"  | 14'-8" | 18'-7"  | 22'-9" |

| 2003 International Building Code |        | Table 2308.9.5                                     |      |      |       |      |    |
|----------------------------------|--------|--|------|------|-------|------|----|
| Table 2308.9.5                   |        | Header and Girder Spans for Exterior Bearing Walls |      |      |       |      |    |
| Building Width, Feet             |        | 20   |      | 28   |       | 36   |    |
| Header Supporting                | Size   | Span   | NJ   | Span | NJ    | Span | NJ |
| <b>Roof and Ceiling</b>          | 2-2X4  | 3-6  | 1    | 3-2  | 1     | 2-10 | 1  |
|                                  | 2-2X6  | 5-5  | 1    | 4-8  | 1     | 4-2  | 1  |
|                                  | 2-2X8  | 6-10   | 1    | 5-11 | 2     | 5-4  | 2  |
|                                  | 2-2X10 | 8-5  | 2    | 7-3  | 2     | 6-6  | 2  |
|                                  | 2-2X12 | 9-9  | 2    | 8-5  | 2     | 7-6  | 2  |
|                                  | 3-2X8  | 8-4  | 1    | 7-5  | 1     | 6-8  | 1  |
|                                  | 3-2X10 | 10-6   | 1    | 9-1  | 2     | 8-2  | 2  |
|                                  | 3-2X12 | 12-2   | 2    | 10-7 | 2     | 9-5  | 2  |
|                                  | 4-2X8  | 9-2  | 1    | 8-4  | 1     | 7-8  | 1  |
|                                  | 4-2X10 | 11-8   | 1    | 10-6 | 1     | 9-5  | 2  |
| 4-2X12                           | 14-1   | 1  | 12-2 | 2    | 10-11 | 2    |    |

## Sac City Property Management

| Table 2308.9.5                                       |                   | Header and Girder Spans for Exterior Bearing Walls |              |                |              |                 |              |
|--|-------------------|--|--------------|----------------|--------------|-----------------|--------------|
| Building Width, Feet                                 |                   | 20   |              | 28             |              | 36              |              |
| Header Supporting                                    | Size              | Span   | NJ           | Span           | NJ           | Span            | NJ           |
| <b>Roof and Ceiling &amp; 1 Center Bearing Floor</b> | 2-2X4             | 3-1  | 1            | 2-9            | 1            | -7              | 1            |
|  | 2-2X6             | 4-6  | 1            | 4-0            | 1            | 3-7             | 2            |
|  | 2-2X8             | 5-9  | 2            | 5-0            | 2            | 4-6             | 2            |
|  | 2-2X10            | 7-0  | 2            | 6-2            | 2            | 5-6             | 2            |
|  | <del>2-2X12</del> | <del>8-1</del>                                     | <del>2</del> | <del>7-1</del> | <del>2</del> | <del>6-5</del>  | <del>2</del> |
|  | 3-2X8             | 7-2  | 1            | 6-3            | 2            | 5-8             | 2            |
|  | 3-2X10            | 8-9  | 2            | 7-8            | 2            | 6-11            | 2            |
|  | 3-2X12            | 10-2   | 2            | 8-11           | 2            | 8-0             | 2            |
|  | 4-2X8             | 8-1  | 1            | 7-3            | 1            | 6-7             | 1            |
|  | 4-2X10            | 10-1   | 1            | 8-10           | 2            | 8-0             | 2            |
|  | 4-2X12            | 11-4   | 2            | 10-3           | 2            | 9-3             | 2            |
|  |                   | Header and Girder Spans for Exterior Bearing Walls |              |                |              |                 |              |
| Building Width, Feet                                 |                   | 20   |              | 28             |              | 36              |              |
| Header Supporting                                    | Size              | Span   | NJ           | Span           | NJ           | Span            | NJ           |
| <b>Roof and Ceiling &amp; 1 Clear Span Floor</b>     | 2-2X4             | 2-8  | 1            | 2-4            | 1            | 2-1             | 1            |
|  | 2-2X6             | 3-11   | 1            | 3-5            | 2            | 3-0             | 2            |
|  | <del>2-2X8</del>  | <del>5-0</del>                                     | <del>2</del> | <del>4-4</del> | <del>2</del> | <del>3-10</del> | <del>2</del> |
|  | 2-2X10            | 6-1  | 2            | 5-3            | 2            | 4-8             | 2            |
|  | 2-2X12            | 7-1  | 2            | 6-1            | 3            | 5-5             | 3            |
|  | 3-2X8             | 6-3  | 2            | 5-5            | 2            | 4-10            | 2            |
|  | 3-2X10            | 7-7  | 2            | 6-7            | 2            | 5-11            | 2            |
|  | 3-2X12            | 8-10   | 2            | 7-8            | 2            | 6-10            | 2            |
|  | 4-2X8             | 7-2  | 1            | 6-3            | 2            | 5-7             | 2            |
|  | 4-2X10            | 8-9  | 2            | 7-7            | 2            | 6-10            | 2            |
|  | 4-2X12            | 10-2   | 2            | 8-10           | 2            | 7-11            | 2            |

- a) Spans are given in feet and inches (ft-in)
- b) Tabulated values are for No. 2 grade lumber.
- c) Building width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.
- d) NJ - Number of jack studs required to support each end. Where the number of required jack studs equals one, the headers are permitted to be supported by an approved framing anchor attached to the full height wall stud and to the header.
- e) Use 30 pound per square foot ground snow load for cases in which the ground snow load is less than 30 pounds per square foot and the roof live load is equal to or less than 20 pounds per square foot.

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## Notching & Boring:

Board Holes: A hole not greater than 40% of the stud width may be bored in any wood stud. Bored holes not greater than 60% are permitted in non-bearing walls and partitions. Bored holes not greater than 60% are permitted in bearing walls provided that each bored stud is doubled and no more than two double studs are bored. In no case shall the edge of the bored hole be closer than 5/8" to the edge.

## Bored Holes

### Bearing Walls

40% for 2 X 4 = 1-3/8"  
40% for 2 X 6 = 2- 3/16"

### Non-Bearing Walls & Partitions

60% for 2 X 4 = 2-1/8"  
60% for 2 X 6 = 3- 5/16"

## Notches

### Bearing Walls

25% for 2 X 4 = 7/8"  
25% for 2 X 6 = 1- 3/8"

### Non-Bearing Walls & Partitions

40% for 2 X 4 = 1- 3/8"  
40% for 2 X 6 = 3- 5/16"

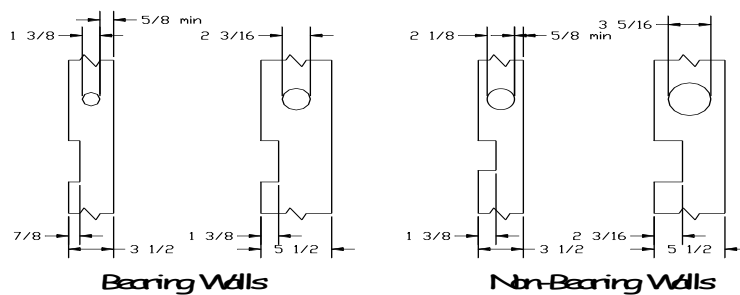
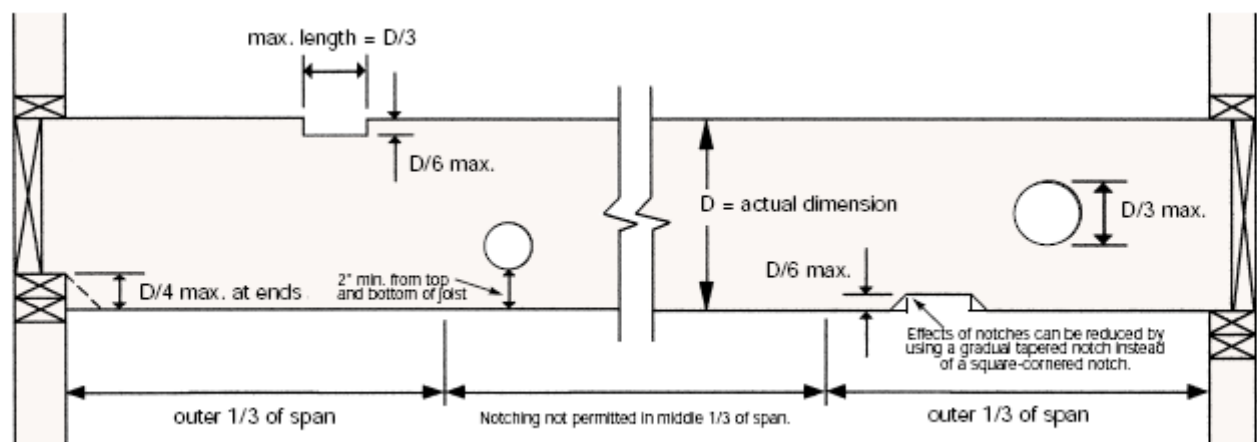


Fig. 1: Placement of Cuts in Floor Joists



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### Doors Rough Opening Dimensions:

| Door Dimensions | Width   | Height |
|-----------------|---------|--------|
| 18" X 80"       | 20-1/2" | 82"    |
| 20" X 80"       | 22-1/2" | 82"    |
| 24" X 80"       | 26-1/2" | 82"    |
| 28" X 80"       | 30-1/2" | 82"    |
| 30" X 80"       | 32-1/2" | 82"    |
| 32" X 80"       | 34-1/2" | 82"    |
| 36" X 80"       | 38-1/2" | 82"    |

### Sheathing:

Plywood, OSB (Orientated Strand Board) has different properties along the two axes due to the orientation of materials. The materials along their long axes, thus when used on floors or roofing the long dimension needs to be placed perpendicular to the supporting members. Material shall span at least two bays. Leave 1/8" space at panel edges and between panels to accommodate expansion.

| Nailing Schedule |  |   |
|------------------|--|---|
| 1.               | Joist to sill or girder, toenail             | 3-8d  |
| 2.               | Bridging to joist, toenail each end          | 2-8d  |
| 3.               | Sole plate to joist or blocking, face nail   | 16 d @ 16" o.c. Nail over joist to avoid having to drill through nails while running electrical or plumbing lines |
| 4.               | Top plate to stud, end nail                  | 2-16d   |
| 5.               | Stud to sole plate                           | 4-8d toe nail or 2-16d end nail   |
| 6.               | Double studs, face nail                      | 16d @ 24" o.c.  |
| 7.               | Doubled top plates, face nail                | 16d @ 16" o.c. Nail over studs to avoid having to drill through nails while running electrical or plumbing lines  |
| 8.               | Top plates laps and intersections, face nail | 2-16d   |

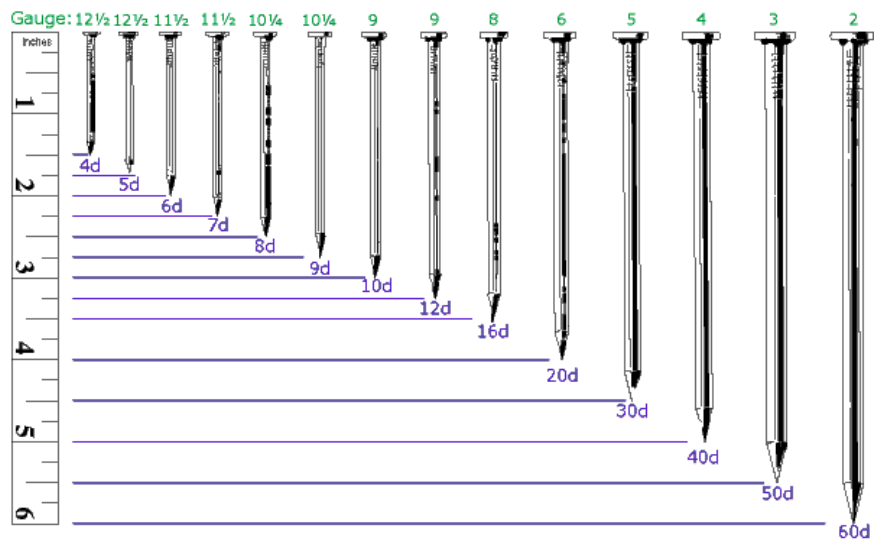


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|     |  |  |
|-----|--|--|
| 9.  | Continuous header, two pieces                  | 16d @ 16" o.c. at edges  |
| 10. | Ceiling joist to plate, toe nail               | 3-8d   |
| 11. | Continuous header to stud, toe nail            | 4-8d   |
| 12. | Ceiling joist, laps over partitions, face nail | 3-16d  |
| 13. | Ceiling joist to parallel rafters              | 3-16d  |
| 14. | Rafter plate, toe nail                         | 3-8d   |
| 15. | 1" brace to plates and studs, face nail        | 2-8d   |
| 16. | Built up corner studs                          | 16d @ 24" o.c.   |
| 17. | Built up girders and beams                     | 20d @ 32" o.c. at edges & staggered, 2-20d at ends and splices |
| 18. | plywood 1/2' thk or less                       | 6d or 2-1/2" X .131" nail @ 6" edges & 12" field               |
| 19. | Plywood 19/23" to 1" thk                       | 8d 2-1/2" X .131" nail @ 6" edges & 12" field                  |

### Nail Size

- 3d - 1-1/4" (~30 mm)
- 4d - 1-1/2" (~40 mm)
- 6d - 2" (~50 mm)
- 8d - 2-1/2" (~65 mm)
- 10d - 3" (~75 mm)
- 12d - 3-1/4" (~80 mm)
- 16d - 3-1/2" (~90 mm)
- 20d - 4" (~100 mm)
- 40d - 5" (~125 mm)
- 60d - 6" (~150 mm)



## Plumbing

## Sac City Property Management

Vacuum breakers are required on hose bibs to ensure that contaminated water is drawn in during a loss of water pressure.

Bath tub, laundry, and water heater are required to be plumbed with  $\frac{3}{4}$ " piping.

Kitchen and bathroom sinks should be run with  $\frac{1}{2}$ " plumbing to the full extent possible to reduce the amount of water that needs to be flushed from the piping on a demand for hot water,  $\frac{3}{4}$ " pipe has about twice the volume as  $\frac{1}{2}$ " pipe.

| Gas Piping Size table based on IRC T2412.3(1) |      |     |     |     |     |     |     |     |     |     |     |     |
|---|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Length  |      |     |     |     |     |     |     |     |     |     |     |     |
| Pipe  | 10   | 20  | 30  | 40  | 50  | 60  | 70  | 80  | 90  | 100 | 125 | 150 |
| Demand Capacity Cu. Ft./Hr.                   |      |     |     |     |     |     |     |     |     |     |     |     |
| 3/8"  | 95   | 65  | 52  | 45  | 40  | 36  | 33  | 31  | 29  | 27  | 24  | 22  |
| 1/2"  | 175  | 120 | 97  | 82  | 73  | 66  | 61  | 57  | 53  | 50  | 44  | 40  |
| 3/4"  | 360  | 250 | 200 | 170 | 151 | 138 | 125 | 118 | 110 | 103 | 93  | 84  |
| 1"  | 680  | 465 | 375 | 320 | 285 | 260 | 240 | 220 | 205 | 195 | 175 | 160 |
| 1-1/4"  | 1400 | 950 | 770 | 660 | 580 | 530 | 490 | 460 | 430 | 400 | 360 | 325 |

### ADD SPAN TABLE FOR PIPE SUPPORTS

#### **Closets:**

Closet depth 24" minimum

Clothes rod 72" to centerline from floor

#### **Egress Windows:**

44" max. sill height from floor

20" min. opening width

24" min. opening height

Minimum clear opening, 5.7 square feet (821 square inches)

|        |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Width  | 20    | 21    | 22    | 23    | 24    | 25    | 26    | 27    | 28    | 29    | 30    | 31    | 32    | 33    | 34    |
| Height | 41.05 | 39.10 | 37.32 | 35.70 | 34.21 | 32.84 | 31.58 | 30.41 | 29.32 | 28.31 | 27.37 | 26.48 | 25.66 | 24.88 | 24.15 |

## **Hopper**

Hopper windows are hinged at the bottom and open inward. Hinged windows such as hoppers generally have lower air leakage rates than sliding windows from the same manufacturer because the sash closes by

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pressing against the frame. Screens are placed on the exterior of the window unit. The entire window area can be opened.

## Awning

Awning windows are hinged at the top and open outward. Hinged windows such as awnings generally have lower air leakage rates than sliding windows from the same manufacturer because the sash closes by pressing against the frame. Screens are placed on the interior of the window unit. The entire window area can be opened.

## Casement

Casement windows are hinged at the sides. Hinged windows such as casements generally have lower air leakage rates than sliding windows from the same manufacturer because the sash closes by pressing against the frame. Casement windows project outward, providing significantly better ventilation than sliders of equal size. Because the sash protrudes from the plane of the wall, it can be controlled to catch passing breezes, but screens must be placed on the interior side. Virtually the entire casement window area can be opened, while sliders are limited to less than half of the window area.

## Slider

Both sashes slide horizontally in a double-sliding window. Only one sash slides in a single-sliding window. Ventilation area can vary from a small crack to an opening of one-half the total glass area.

## Single and Double Hung

In double-hung units, both sashes slide vertically. Only the bottom sash slides upward in a single-hung window. Ventilation area can vary from a small crack to an opening of one-half the total glass area.

## Drywall-

Kitchen use Green Board (water resistant drywall) near sink and behind dishwasher.

Bathroom use green-board on walls, normal drywall on ceiling.  
Green board not rated for use on ceiling due to it's higher density (weight).

Drywall when used as sheer panel, must use nails, 7" spacing in field, 1-1/4" for 1/2" thick drywall and 1-5/8" for 5/8" thick sheet rock.

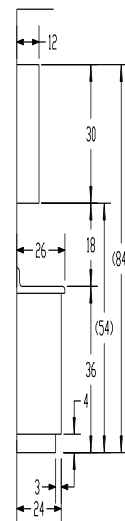
## Kitchen

Counter height 36" nominal

Clearance between upper cabinets and counter top 18"

Provide 2X6 blocking to attach cabinets at 36" and 82" from finished floor, measure to top of blocking.

Vent hood 24" above stovetop.



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Provide Plug circuit for vent hood or microwave 74" above finished floor, if installing a microwave it is recommended to have an independent circuit provided.

Counters larger than 12" must have receptacle

No point along counters more than 24" from receptacle.

Max. receptacle spacing 48"

Dishwasher width 24" Nominal

Stove width 30" Nominal

Stove supply with 220 Volt-50 Amp (3 wire plus ground) and 110 Volt-20Amp receptacles

### **Kitchen Circuits needed**

2 counter top circuits, must be GFCI protected, no lighting allowed on this circuit including under counter lighting. Not more than 4 receptacles are allowed for each small appliance circuit.

1 lighting

1 dishwasher, wire to be run even if dishwasher not to be installed

1 garbage disposal, wire to be run even if garbage disposal not to be installed.

Tie required on circuit breakers for dishwasher & garbage disposal.

Recommend that 12/3 Romex be used and a 20 Amp 220 Volt circuit breaker be used to ensure compliance.

### **Bathroom**

Plumbing Wall to be 2 X 6 framing.

Toilet Stack (vent to be 3" ABS minimum)

Bathroom width for tub 61-1/4"

Plywood height around tub 74" Cement board to extend 1" above plywood.

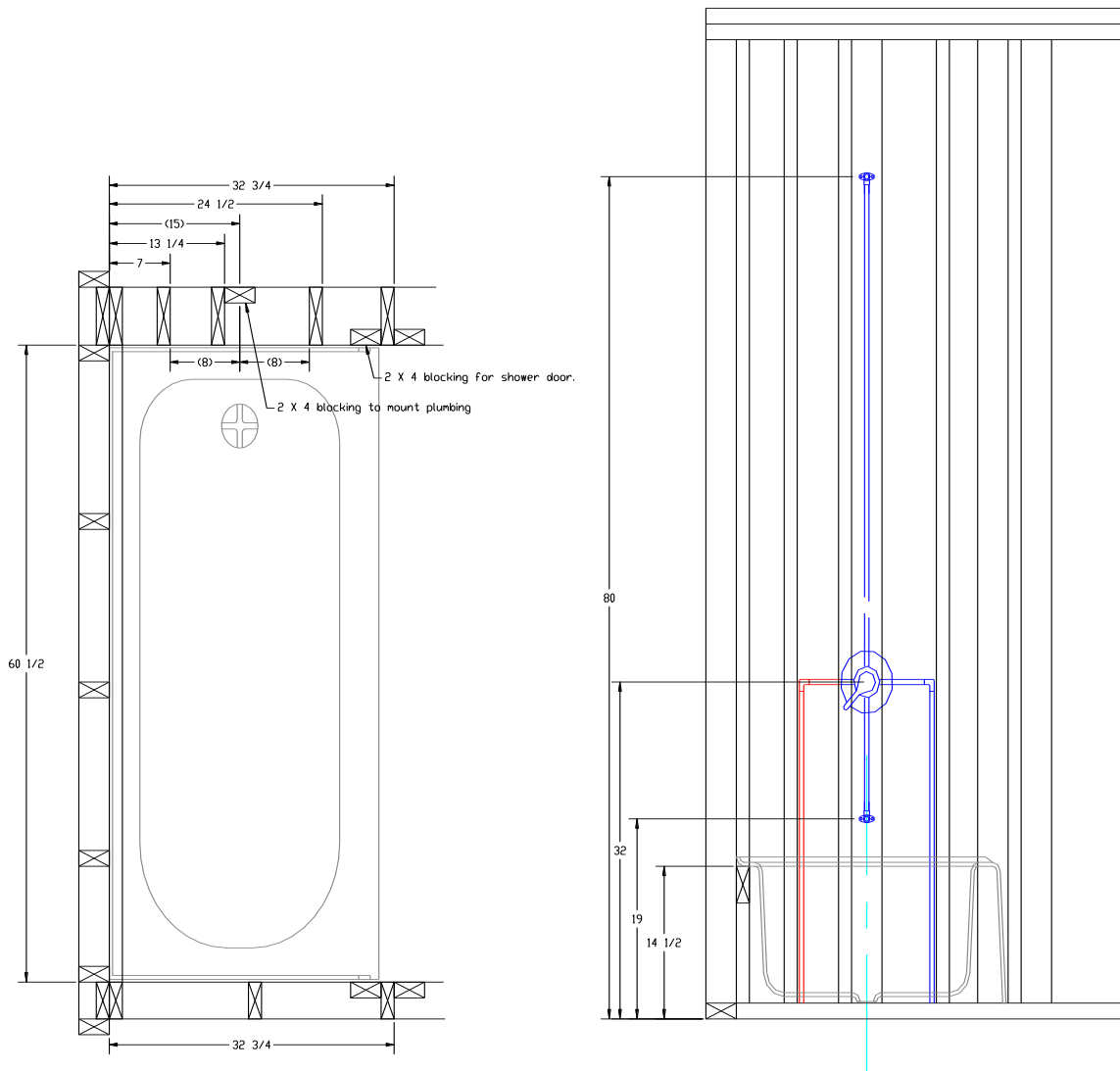
Moisture barrier (15# felt to be applied between plywood and cement board.

Ruberized window flashing to be used around openings (windows)

Window seals to have 10 degree slope towards tub to provide for drainage.

Toilet 15" clearance on each side from centerline of WC (30" total).

Toilet 12" from finished surface of wall to centerline of WC.



Bathroom requires separate 20-amp circuit, all receptacles are required to be GFCI protected.

Shower Head fitting height 80" from floor. Bathtub Framing- Place studs 8", 24" and 32" from the wall. This is to allow for placing the plumbing fixtures in the wall, ensure sufficient blocking added to support shower doors, drywall, and tile

Bathroom use green-board on walls, normal drywall on ceiling. Green board not rated for use on ceiling due to it's higher density (weight).

Medicine cabinets are typically 48" from the floor with a height of 24" and spaced at least 3" from the corner.

Window in shower enclosure with a sill height of 60" or less will need to be of tempered glass.

## Sac City Property Management

Provide 2X6 blocking to attach vanity to wall blocking to be 34" from finished floor. Measure to top of blocking.

Waste piping stub out to be 22" from finished floor to centerline of drainpipe (1-1/2" ABS)

Supply stub outs to be 20" from finished floor.

### **Waterheater**

Water heater stand 18" high. Water heaters may be installed in attics.

Tankless water heaters require 12" of clearance above and below the unit.

The standard BOSH (Aquistar) unit is 30" tall requiring a minimum access of 54" vertical clearance.

Electrical bond required between hot water pipe, cold water pipe and gas service at or near the water heater, must be inspectable (visible).

### **Laundry Room**

The laundry area shall have a 20 AMP circuit. This circuit shall be exclusively for the laundry receptacles and shall not be used for any lighting in this area.

Standpipe for clothes washing machine 30" above trap

Trap 6" min 18" max above floor 12" Nominal

Dryer 30 Amp 220 Volt receptacle (use 10/3 wire)

### **Stairway Notes:**

Total Run : sum of all unit runs, nosing not counted

Total Rise: Height finished floor to finished floor

General Rules:

1) Rise plus tread width = 17 to 18 inches.

2) Rise times tread width = 72" to 76"

3) Sum of two risers plus tread width = 24" to 25"

Rise: Nominal = 7-1/2"

Max = 8-1/4"

Minimum = 4"

## Sac City Property Management

IBC 1009.3 Max rise = 7-3/4"

Run Minimum = 9"

Headroom 6' 8" (80") IBC 1009.5.2

Handrails 34" to 38" above nosing 36" nominal (top of handrail) IBC 1009.11.1

Attic Access 20" X 30" and have at least 30" clear space above.

## Electrical

| Dedicated Electrical Circuits |          |         |           |
|-------------------------------|----------|---------|-----------|
| Circuit                       | Amperage | Voltage | Wire Size |
| Stove                         | 50       | 220     | 8/3       |
| HVAC                          | 30       | 220     | 10/3      |
| Dryer                         | 30       | 220     | 10/3      |
| Dishwasher / Garbage disposal | 20       | 110     | 12/3      |
| Receptacles                   | 20       | 110     | 12/2      |
| Smoke Detectors               | 15       | 110     | 14/3      |
| Lighting Power Feed           | 15       | 110     | 14/2      |
| Lighting Switch Remote        | 15       | 110     | 14/3      |

**Receptacles:** A maximum of 10 outlets are permitted on a typical 15 AMP circuit. A maximum of 13 outlets are permitted on a typical 20 AMP circuit.

### Exterior Receptacles:

Out door receptacles are required in the front and back of the dwelling. Receptacles can not be higher than 6'-6" from grade to be counted.

### Interior Receptacles:

Each room to be on its own circuit!!!

Per SCBS Kitchen exhaust fan not to be on small appliance branch circuit. Provide dedicated circuit, which will allow for expansion to an installed microwave fan if wanted.

## Sac City Property Management

### **Bedroom Receptacles:**

Bedroom Receptacles are required to be arc-fault protected.

### **Bathroom Circuits:**

Bathroom circuits can not feed loads outside of bathrooms. The circuit can provide power to other bathrooms provided no equipment is installed. If equipment is installed then the circuit may not provide power to other bathrooms.

### **Hallways and Stairways:**

Hallways and Stairways are required to have lighting provided (switched receptacles are not acceptable). Stairways of six or more steps are required to have a switch at each floor level.



# Sac City Property Management

## Garage Receptacles:

At least one Garage Receptacle is required, must be GFI protected.  
 Dedicated receptacles are not required to be GFI protected but must not have extra outlets available.

**CITY OF SACRAMENTO**

SUBMIT TWO COPIES

| THIS COPY SHALL BE ON JOB SITE AT ALL TIMES    |   |   | LOAD CALCULATION - N.E.C. 220-30  |               |  |  |
|--|---|---|---|---------------|--|--|
| CONTRACTOR/OWNER                               |   | JOB ADDRESS:                                  |   | TOTAL SQ. FT. |  |  |
| NUMBER   | ITEM  | WATTS   | Air conditioning example (Not heat pump)  |               |  |  |
|  | Sq. ft @ 3 watts per sq. ft.                              |   | Compressor 20 amps  |               |  |  |
|  | 20 Amp. Appliance circuits @ 1,500 watts each             |   | Fan 5 amps  |               |  |  |
|  | Range (Nameplate Rating = N.P.R.)                         |   | Unit Total Load - 25 amps x 240V  |               |  |  |
|  | Oven (N.P.R.)   |   | Electric Furnace @ N.P.R. - 6,000 watts X 65% = 3900 Watts  |               |  |  |
|  | Cooking Units (N.P.R.)                                    |   | Use 6000W, since it is larger.  |               |  |  |
|  | Water Heater (N.P.R.)                                     |   | <b>Heat Pump Note:</b><br>Be careful when doing load calculations where heat pumps are installed. The load for most heat pumps that are equipped with auxiliary heat strips will be larger under the demand for heat. For the purposes of load calculations only, on heat pumps, use 100% of the heat pump compressor and fans and 65% of auxiliary heat load to show total heat pump load.<br><br><b>Heat Pump Example</b><br>Compressor 20 Amps<br>Fans 5 amps<br><br>Heat Pump Load = 25A X 240V = 6,000<br>Aux. Heat Strip = 6,000W X 65% = 3,900W<br>Total Heat Pump Load = 9,900W |               |  |  |
|  | Dishwasher (N.P.R.)                                       |   |   |               |  |  |
|  | Disposal (N.P.R.)   |   |   |               |  |  |
|  | Washer [1500 watts min. - N.E.C. 220-16(b)]               |   |   |               |  |  |
|  | Dryer [5000 watts min. or N.P.R. if larger] N.E.C. 220-18 |   |   |               |  |  |
|  | Motors (N.P.R.)   |   |   |               |  |  |
|  | Other (N.P.R.)  |   |   |               |  |  |
|  | Other (N.P.R.)  |   |   |               |  |  |
| Air Conditioning Equipment                     |   | Sub-Total =                                   |   |               |  |  |
| Air Conditioning (cooling @ (N.P.R. X 100%)) = |   | (Loss 1st 10kW) - 10,000 @100% = 10,000 Watts |   |               |  |  |
| Electrical Heating @ (N.P.R.) X 65% =          |   | Remainder @ 40% @40% Watts                    |   |               |  |  |
| NOTE: USE THE LARGEST LOAD - HEAT OR COOL =    |   | Total Air Cond. and/or heat pump load = Watts |   |               |  |  |
| Heat pump (compressor & fans) X 100% =         |   | Total Service Load = Watts                    |   |               |  |  |
| Aux. heat strips (or elect. furnace) X 65% =   |   | Total Service Load watts + 240V = Amps        |   |               |  |  |
| Total Heat Pump Load =                         |   | Service Size                                  |   |               |  |  |
| NOTE = AMPS X CIRCUIT VOLTAGE = WATTS          |   |   |   |               |  |  |

Standard Method Load Calculation for Multifamily Dwellings

|  |   |   |
|--|---|---|
| <b>1</b> General Lighting and Receptacle Loads 220.12<br><i>Do not include open porches, garages, or unused or unfinished spaces not adaptable for future use.</i>   | $3 \times \frac{\text{sq ft outside dimensions}}{\text{(sq ft outside dimensions)}} \times \frac{\text{number of units}}{\text{(number of units)}} =$ | <b>1</b>  |
| <b>2</b> Small-Appliance Branch Circuits 220.52(A)<br><i>At least two small-appliance branch circuits must be included. 210.11(C)(1)</i>   | $1500 \times \frac{\text{minimum of two}}{\text{(minimum of two)}} \times \frac{\text{number of units}}{\text{(number of units)}} =$                  | <b>2</b>  |
| <b>3</b> Laundry Branch Circuit(s) 220.52(B)<br><i>Include at least one laundry branch circuit *unless meeting 210.52(F) Exception No. 1 or 2. 210.11(C)(2)</i>  | $1500 \times \frac{\text{minimum of one}}{\text{*(minimum of one)}} \times \frac{\text{number of units}}{\text{(number of units)}} =$                 | <b>3</b>  |
| <b>4</b> Add lines 1, 2, and 3   | <b>4</b>  | Lines 5 through 8 utilize the demand factors found in Table 220.42  |
| <b>5</b> _____ - 3000 =<br><i>(line 4)</i>   | <b>5</b><br><i>(if 117,000 or less, skip to line 8)</i>   | <b>6</b> _____ - 117,000 =<br><i>(line 5, if more than 117,000)</i>   |
| <b>7</b> _____ $\times 25\% =$<br><i>(line 6)</i>  | <b>7</b>  | <b>8</b> _____ $\times 35\% =$<br><i>(smaller of line 5 or 117,000)</i>                                     |
| <b>9</b> Total General Lighting and Receptacle Load  | $3000 + \frac{\text{line 7}}{\text{(line 7)}} + \frac{\text{line 8}}{\text{(line 8)}} =$  | <b>9</b>  |
| <b>10</b> Fastened-In-Place Appliances 220.53<br><i>Use the nameplate rating. Do not include electric ranges, clothes dryers, space-heating equipment, or air-conditioning equipment.</i>  | water heaters / _____<br>dishwashers / _____<br>disposers / _____<br>_____<br>_____   |   |
| If fewer than four units, put total volt-amperes on line 10.<br>If four or more units, multiply total volt-amperes by 75%.   |   | $\frac{\text{volt-amps of four or more}}{\text{(volt-amps of four or more)}} \times 75\% =$                 |
| <b>11</b> Clothes Dryers 220.54<br><i>(If present, otherwise skip to line 12.) Use 5000 watts or the nameplate rating, whichever is larger. (The neutral demand load is 70% for feeders. 220.61(B))</i>  |   | <b>11</b>   |
| <b>12</b> Ranges, Ovens, Cooktops, and Other Household Cooking Appliances Over 1750 Watts 220.55<br><i>(If present, otherwise skip to line 13.) Use Table 220.55 and all of the applicable Notes. (The neutral demand load is 70% for feeders. 220.61(B))</i>  |   | <b>12</b>   |
| <b>13</b> Heating or Air-Conditioning System (Compare the heat and A/C, and omit the smaller.) 220.60<br><i>Include the air handler when using either one. For heat pumps, include the compressor and the maximum amount of electric heat that can be energized while the compressor is running.</i>   |   | <b>13</b>   |
| <b>14</b> Largest Motor (one motor only) 220.50 and 430.24<br><i>Multiply the volt-amperes of the largest motor by 25%.</i>  | $\frac{\text{volt-amps of largest motor}}{\text{(volt-amps of largest motor)}} \times 25\% =$   | <b>14</b>   |
| <b>15</b> Total Volt-Ampere Demand Load: Add lines 9 through 14 to find the minimum required volt-amperes.   |   | <b>15</b>   |
| <b>16</b> Minimum Amperes<br><i>Divide the total volt-amperes by the voltage.</i>  | $\frac{\text{line 15}}{\text{(line 15)}} \div \frac{\text{voltage}}{\text{(voltage)}} =$  | <b>16</b><br><i>(minimum amperes)</i>   |
| <b>17</b> Minimum Size Service or Feeder 240.6(A)  |   | <b>17</b>   |
| <b>18</b> Size the Service or Feeder Conductors.<br><i>Use 310.15(B)(6) to find the service conductors up to 400 amperes. Ratings in excess of 400 amperes shall comply with Table 310.16. 310.15(B)(6) also applies to feeder conductors serving as the main power feeder.</i>  |   | <b>18</b><br><i>Minimum Size Conductors</i>   |
| <b>19</b> Size the Neutral Conductor. 220.61<br><i>310.15(B)(6) states that the neutral service or feeder conductor can be smaller than the ungrounded (hot) conductors, provided the requirements of 215.2, 220.61, and 230.42 are met. 250.24(C)(1) states that the neutral cannot be smaller than the required grounding electrode conductor specified in Table 250.66.</i> |   | <b>19</b><br><i>Minimum Size Neutral Conductor</i>  |
| <b>20</b> Size the Grounding Electrode Conductor (for Service). 250.66<br><i>Use line 18 to find the grounding electrode conductor in Table 250.66. Size the Equipment Grounding Conductor (for Feeder). 250.122. Use line 17 to find the equipment grounding conductor in Table 250.122. Equipment grounding conductor types are listed in 250.118.</i>                       |   | <b>20</b><br><i>Minimum Size Grounding Electrode Conductor . . . or . . . Equipment Grounding Conductor</i> |

**Smoke Detectors:**

Smoke detectors required in each bedroom and adjacent room location, i.e. inside and outside of each sleeping room.

Hard-wired smoke detectors to be powered from lighting circuit only. Do not provide independent circuit or tap off small appliance circuit. Code requires that power failure to be readily apparent to hard-wired smoke detectors. Use 14/3 wire, cover red wire with yellow tape to signify that it is a signal wire.

## Sac City Property Management

### Wire Ampacities (T310-16)

#### Copper Wire

|                   | TW,UF     | THHW,<br>THW,<br>THWN,<br>USE | THHN,<br>THHW,<br>THW-2,<br>THWN2,<br>USE-2 | GEC, (Ground Electrode Conductor) |                          |
|-------------------|-----------|-------------------------------|---|-----------------------------------|--------------------------|
| AWG,<br>wire size | 60C, 140F | 75C,<br>167F                  | 90C, 194F                                   | Temp Rating                       | Typical Uses             |
| 14                | 20        | 20                            | 25  | 8 - P                             | Lighting Circuits        |
| 12                | 25        | 25                            | 30  | 8 - P                             | Plug Circuits, 10 points |
| 10                | 30        | 35                            | 40  | 8 - P                             | Dryer, HVAC 30 AMP,      |
| 8                 | 40        | 50                            | 55  | 8 - P                             | Stove 50 AMP             |
| 6                 | 55        | 65                            | 75  | 8 - P                             |                          |
| 4                 | 70        | 85                            | 95  | 8 - P                             |                          |
| 3                 | 85        | 100                           | 110   | 8 - P                             |                          |
| 2                 | 95        | 115                           | 130   | 8 - P                             |                          |
| 1                 | 110       | 130                           | 150   | 6                                 |                          |
| 1/0               | 125       | 150                           | 170   | 6                                 |                          |
| 2/0               | 145       | 175                           | 195   | 4                                 |                          |
| 3/0               | 165       | 200                           | 225   | 4                                 |                          |
| 4/0               | 195       | 230                           | 260   | 2                                 |                          |
| 250               | 215       | 255                           | 290   | 1/0                               |                          |

P - 8AWG must be protected by raceway or armor  
6AGW no armor needed if not subject to damage

## Sac City Property Management

### Wire Ampacities (T310-16)

Aluminum

or Copper-Clad Aluminum

In race way or

cable

Neutral Wire may be one size

smaller

|                   | TW,UF     | RHW, THHW,<br>THW, THWN,<br>XHHW, USE | TBS, SA, SIS,<br>THHN, THHW,<br>THW-2, THWN-<br>2, RHH, RHW-2,<br>USE-2, XHH,<br>XHHW, XHHW-<br>2, ZW-2 |
|-------------------|-----------|---------------------------------------|---|
| AWG,<br>wire size | 60C, 140F | 75C, 167F                             | 90C, 194F   |
| 12*               | 20        | 20                                    | 25  |
| 10*               | 25        | 30                                    | 35  |
| 8                 | 30        | 40                                    | 45  |
| 6                 | 40        | 50                                    | 60  |
| 4                 | 55        | 65                                    | 75  |
| 3                 | 65        | 75                                    | 85  |
| 2                 | 75        | 90                                    | 100   |
| 1                 | 85        | 100                                   | 115   |
| 1/0               | 100       | 120                                   | 135   |
| 2/0               | 115       | 135                                   | 150   |
| 3/0               | 130       | 155                                   | 175   |
| 4/0               | 150       | 180                                   | 205   |
| 250               | 170       | 205                                   | 230   |
| 300               | 190       | 230                                   | 255   |
| 350               | 210       | 250                                   | 280   |
| 400               | 225       | 270                                   | 305   |
| 500               | 260       | 310                                   | 350   |

|                              |          |  |
|------------------------------|----------|--|
| Table 220.42                 | NEC 2005 |  |
| Lighting Load Demand Factors |          |  |

## Sac City Property Management

| Type of Occupancy   | Portion of Lighting Load to which Demand Factor Applies (watts) | Demand Factor (percent) |
|---|---|-------------------------|
| Dwelling Units  | First 3000 or less at   | 100%                    |
|   | From 3,001 to 120,000 at  | 35%                     |
|   | Remainder over 120,000 at                                       | 25%                     |
| Hospitals   | First 50,000 or less at   | 40%                     |
|   | Remainder over 50,000 at  | 20%                     |
| Hotels & Motels,<br>Includes Apartment<br>without cooking by<br>tenants | First 20,000 or less at   | 50%                     |
|   | From 20,001 to 100,000 at                                       | 40%                     |
|   | Remainder over 100,000 at                                       | 30%                     |
| Warehouses<br>(storage)   | First 12,500 or less at   | 100%                    |
|   | Remainder over 12,500 at  | 50%                     |
| All Others  | Total volt-amperes  | 100%                    |

# Sac City Property Management

## Service panel

neutral and ground must be bonded together.

## Sub-panels

neutral and grounds must be separated, Each must have it's own buss bar.  
Neutral must be isolated from enclosure, conduits, and grounds.

Walls greater than 24" in length required to have a receptacle

Hallways longer than 10' required to have a receptacle.

GFCI receptacle may be used to provide protection on two wire systems,  
GFCI receptacles will operate without a ground

## Insulation:

Insulation to be installed after Electrical and Plumbing inspections.

## Drawing Size Reference Table

US Architectural Drawing Sizes

US Engineering Drawing Sizes

| ARCH     | mm             | inches  |  | ANSI     | mm             | inches   |
|----------|----------------|---------|--|----------|----------------|----------|
| ARCH - A | 228.6 X 304.8  | 9 X 12  |  | ANSI - A | 215.9 X 279.4  | 8.5 X 11 |
| ARCH - B | 304.8 X 457.2  | 12 X 18 |  | ANSI - B | 279.4 X 431.8  | 11 X 17  |
| ARCH - C | 457.2 X 609.6  | 18 X 24 |  | ANSI - C | 431.8 X 558.8  | 17 X 22  |
| ARCH - D | 609.6 X 914.4  | 24 X 36 |  | ANSI - D | 558.8 X 863.6  | 22 X 34  |
| ARCH - E | 914.4 X 1219.2 | 36 X 48 |  | ANSI - E | 863.6 X 1117.6 | 34 X 44  |

Drawing Size Reference Table

Dead Loads: Consist of the weight of all building materials and fixed equipment incorporated into the building or structure.

Live Loads: Are those loads produced by the use and occupancy of the building or other structure and do not include dead load, construction load or environmental loads such as wind or snow loads

## Mortar and Grout:

## Sac City Property Management

a) Mortar - used to bond masonry products together. Composed of portland cement, sand, lime and water. Conforms to ASTM C270. Types M and S are used for exterior use, Types S or N used for interior load-bearing walls. Type O used for non-load-bearing interior walls.

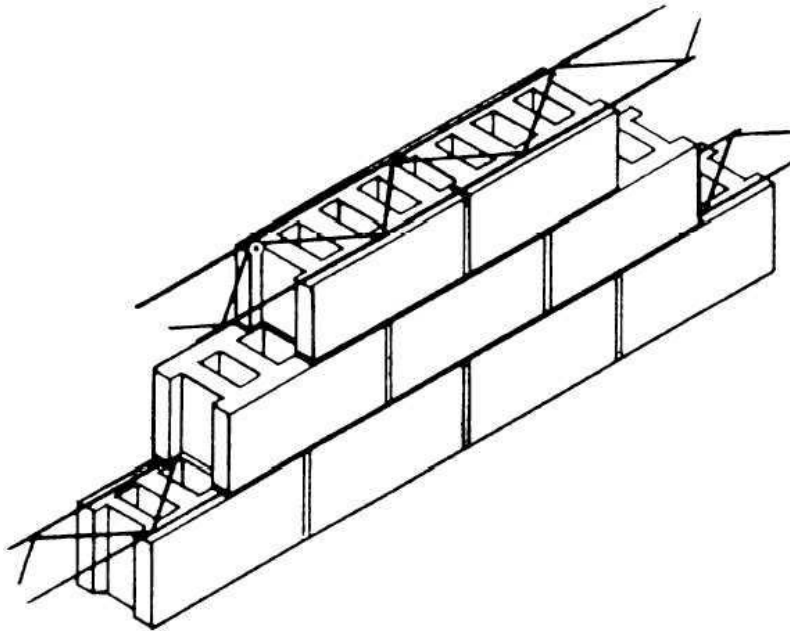
b) Grout - similar to mortar, except used as a filler, especially for vertically-reinforced walls. Specified as either fine-grained or coarse-grained. Conforms to ASTM C476.

### **Grades of CMU Block:**

- a. Grade "N" - Suitable for use above or below ground and exposed to weather.
- b. Grade "S" - Only for above ground, not exposed to weather.

### **Horizontal (Joint) CMU Wall Reinforcement:**

a.



- i. Purposes: To strengthen the wall against "bowing" in due to lateral pressure (earth, wind, seismic)
  - ii. To make the wall more ductile (i.e., less brittle) and hold it together in extreme events such as earthquake or hurricane.
- b. Horizontal joint reinforcement consists of heavy wire welded together to take the shape of a ladder (or truss), and is usually selected as follows:
- i. 10 Gage wire - for light duty interior or exterior applications
  - ii. 9 Gage wire - standard duty

## Sac City Property Management

- iii. 8 Gage - heavy duty for use in seismic or other high-stress applications
- iv. 3/16" diameter wire - extra heavy duty for extreme conditions
- c. Horizontal joint reinforcement placed in horizontal mortar joints as follows:
  - i. Placed in every CMU course if used for foundation wall
  - ii. Placed every 2 or 3 courses for above-ground walls (or more if necessary)

### 12. Vertical CMU Wall Reinforcement:

- a. Purpose - Greatly strengthen the wall to accommodate larger vertical loads as well as resist lateral loads.
- b. Vertical CMU wall reinforcement consists of inserting steel rebar (usually #4 or #5 rebar) into open cores of the wall, then filling those cores solid with a concrete-like grout.

