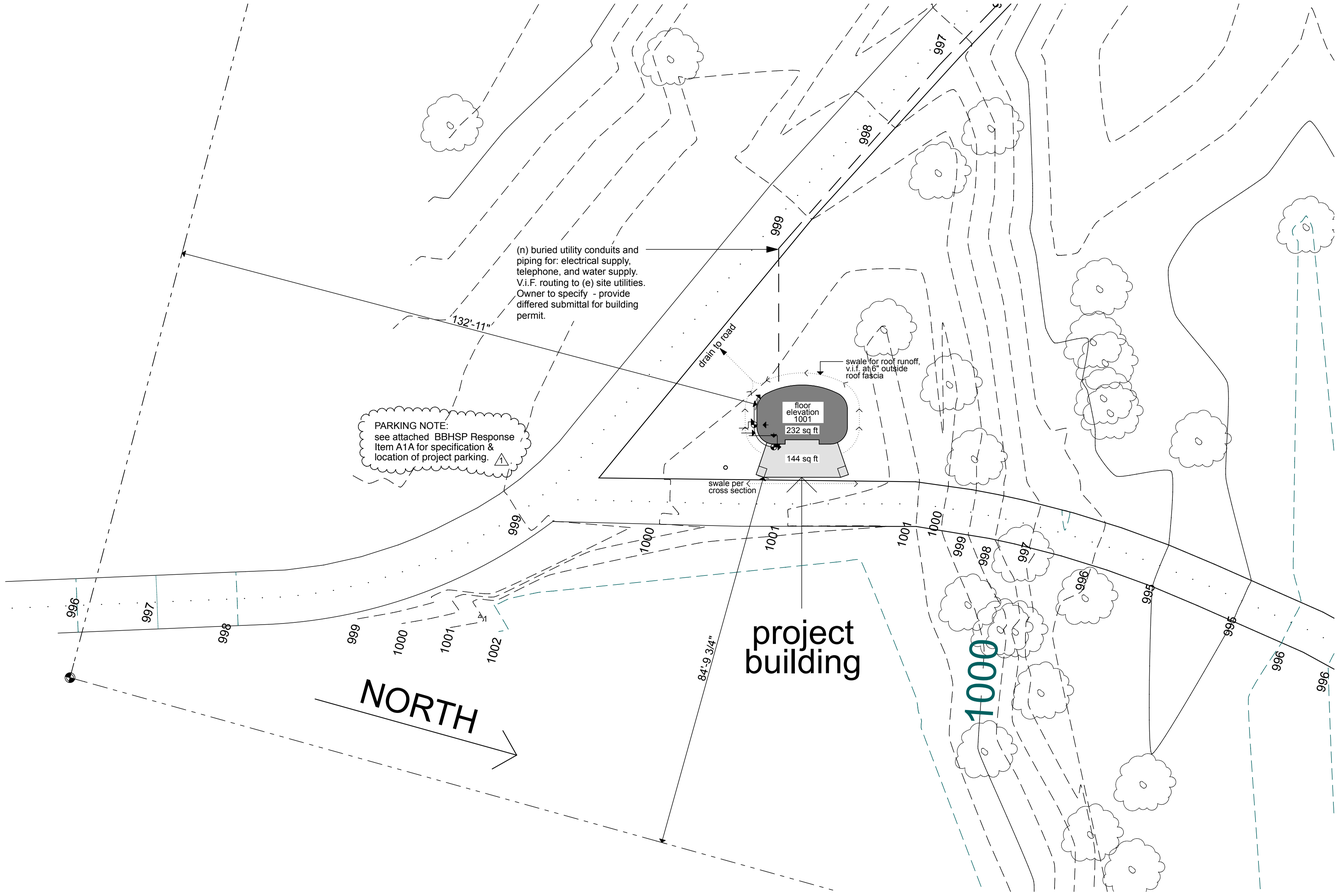
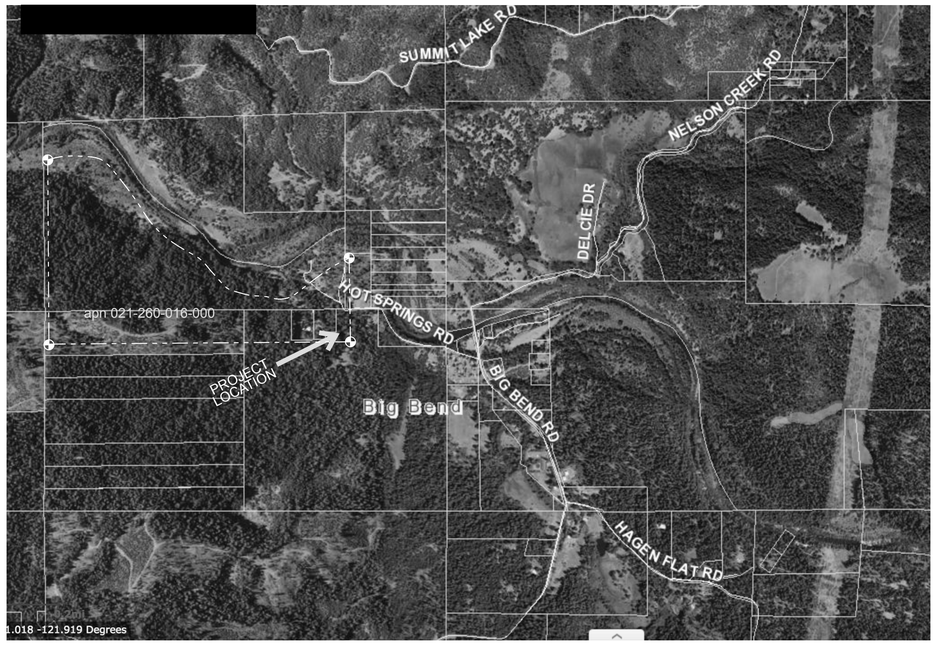


SITE PLAN at PROJECT LOCATION

SCALE: 1/16" = 1'-0"



2 VICINITY MAP 1:1.11

PROJECT DESCRIPTION:

The project consists of a NEW COMMERCIAL BUILDING to serve as a WELCOME HUT for BIG BEND HOT SPRINGS
25322 Health Way, Big Bend, CA 96011
The work involved will include:

1. The MINOR GRADING of the BUILDING SITE and IMMEDIATE VICINITY
2. CONSTRUCTION of a NEW COMMERCIAL BUILDING using the COB EARTH WALL building method.
3. The CONNECTION via NEW BURIED CONDUIT to the EXISTING SITE ELECTRICAL SERVICE.
4. The CONNECTION via NEW BURIED SUPPLY PIPING to the EXISTING SITE WATER SYSTEM.
5. A RECYCLE AREA per Cal Green Code Section 5.410.1 ⚠
6. PARKING to be according to the Big Bend Hot Springs Parking Lot Plan. Provided by the owner under a SEPARATE PERMIT.

GENERAL NOTES:
1. see project description above

2. All work is to comform to all applicable codes and ordinances.

3. All dimensions are as shown on the plans. Do not scale the drawings. In the event of a conflict in the drawings, the highest value of material, method or detail shall be used. Consult Project Architect regarding any ambiguities or unclear situations which may occur.

4. Contractor is responsible to verify with owner or architect all materials and products used on the project that have not been specifically called out.

5. All manufactured materials and equipment shall be installed according to the manufacturers specifications.

6. Discrepancies in the drawings or site conditions are to be brought to the attention of the Project Architect.

DEFERRED SUBMITTALS:

1. Structural Engineer letters of observation / approvals as described in Drawing S0.0 General Notes.
2. Disabled access parking and pathway Design and CD's.
3. Specifications for extension of (e) site utilities to project building.

PROJECT DATA
ACESSORS PARCEL NUMBER:
apn 021-260-016-000
ZONING: CR, and WILD LAND FIRE ZONE
OCCUPANCY : B
COMMERCIAL OFFICE / SERVICE USE
SITE AREA: 140 acres = 6098400 s.f.

BUILDING AREAS:
Floor Area:

(n) enclosed area	232 s.f.
(n) covered porch/patio	144 s.f.
TOTAL	376 s.f.

⚠ OCCUPANT LOAD = 5, per CBC

Paved Areas

Existing:	0 s.f.
New :	TBD

LOT COVERAGE FOOTPRINT :

Nine Existing Structures:	3528s.f.
New Service Building:	376 s.f.
TOTAL:	3904 s.f.
Percent of total site area:	0.0.064 %

CONSTRUCTION TYPE:
V-B (no sprinklers required)

APPROVAL CODES
This project shall comply with :

California Fire Code	2016 CFC
California Building Code	2016 CBC
California Plumbing Code	2016 CPC
California Electrical Code	2016 CEC
California Energy Code	2016 T24
California Green Building Standards Code	2016

NOTE: Shasta County Building Division enforces CBC Chapter 11B for disabled access compliance and does not review or approve plans for ADA compliance. Reference CBC Chapter 11B. ⚠

INDEX OF DRAWINGS:

ARCHITECTURAL

index
project description
general notes
site plan
project data
site data
code information

JOHN FORDICE - OTHER FISH ARCHITECT
1828 FIFTH STREET - BERKELEY - CA 94710
510 206 8758 - otherfish@comcast.net

WELCOME HUT - BIG BEND HOTSPRINGS
25322 Health Way, Big Bend, CA 96011

PLAN SET VERSION **V1.2**

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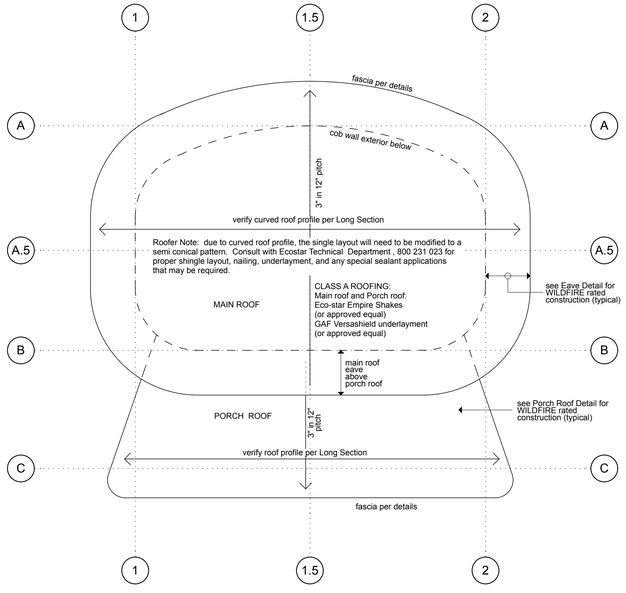
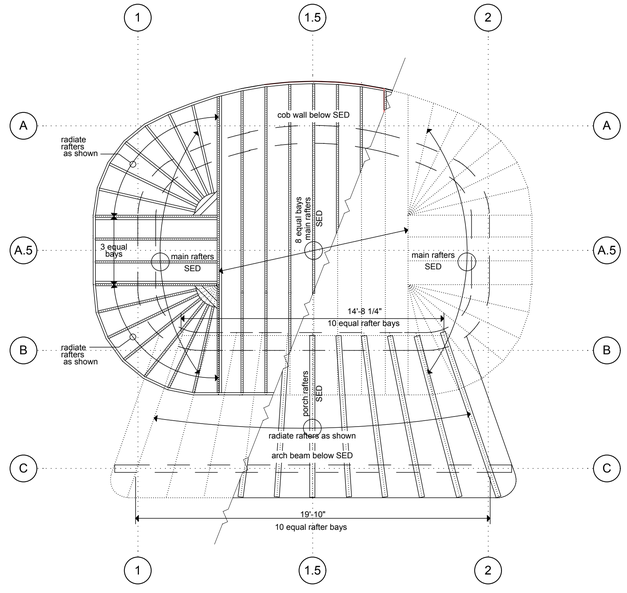
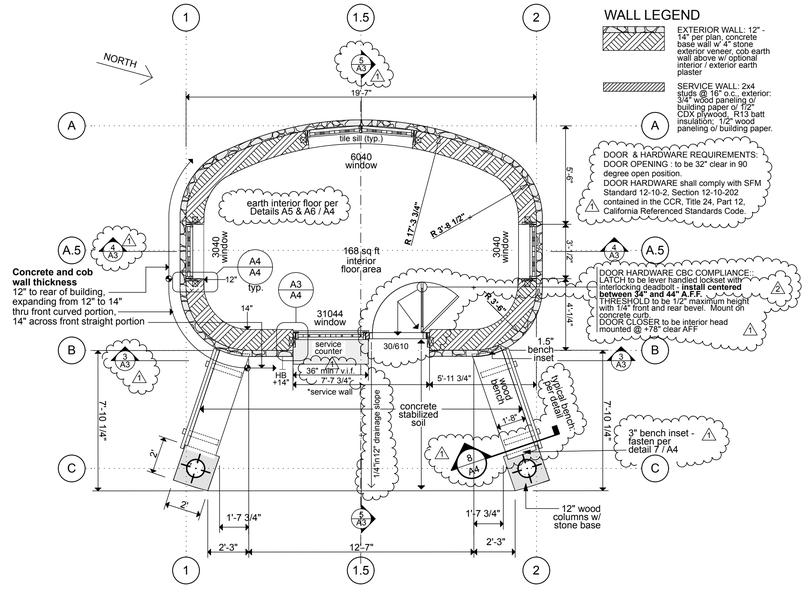


3 ROOF PLAN 1/4" = 1'-0"



2 ROOF RAFTER LAYOUT PLAN 1/4" = 1'-0"



1 FLOOR PLAN 1/4" = 1'-0"

floor plan
roof plan
roof rafter layout plan
wall legend

5/16/18

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PLAN SET VERSION **V1.2**

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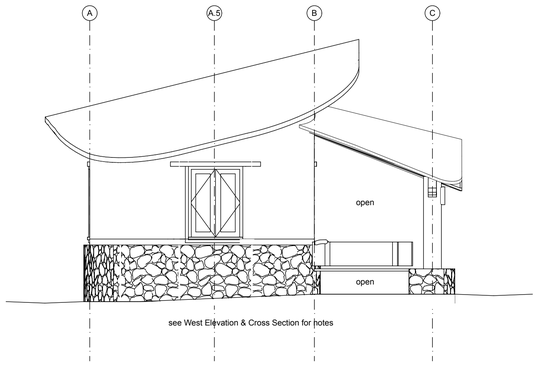
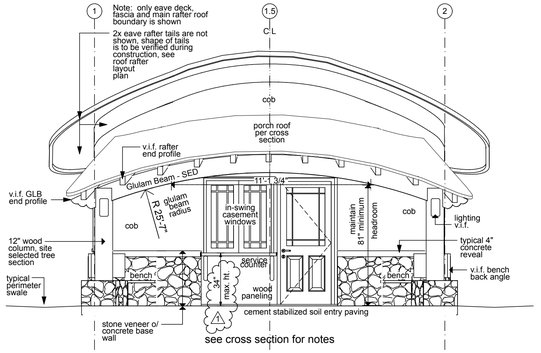
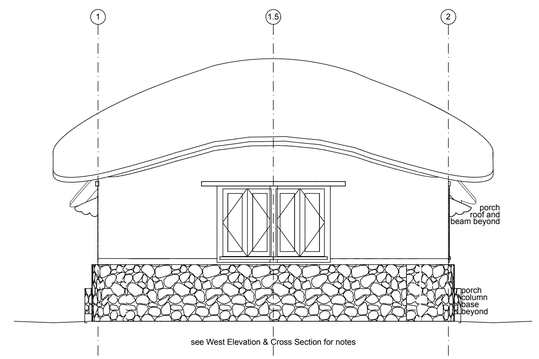


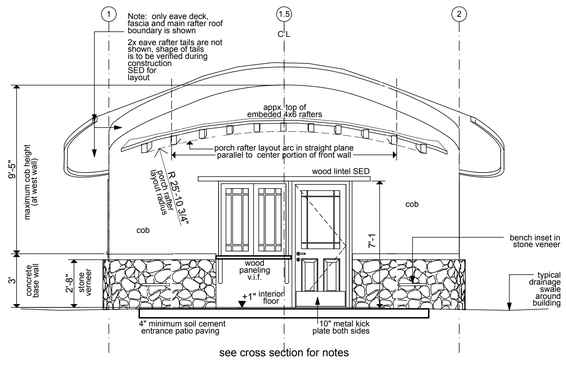
1 South Elevation 1/4" = 1'-0"



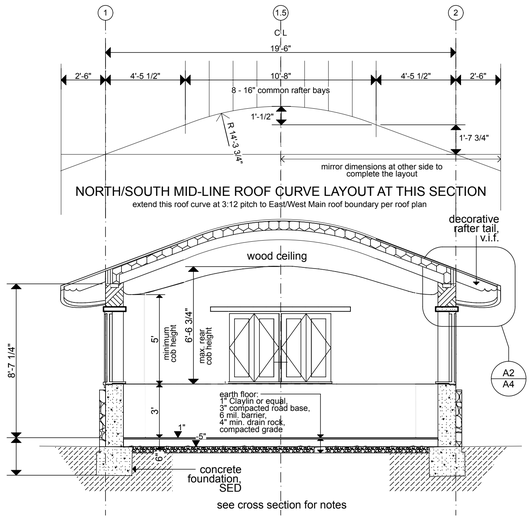
2 East elev w/ porch 1/4" = 1'-0"



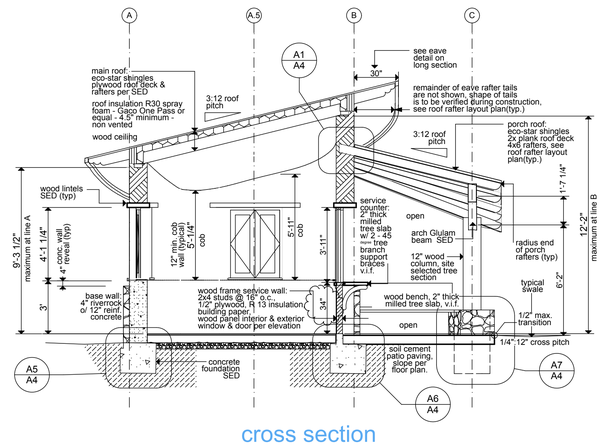
6 rear elev 1/4" = 1'-0"



3 East elev/sec 1/4" = 1'-0"



4 long section 1/4" = 1'-0"



5 cross section 1/4" = 1'-0"

elevations
sections

4/21/18

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PLAN SET VERSION **V1.2**

EMPIRE SHAKE™ EMPIRE PLUS™

Polymeric Shake Tile Roof System

This installation guide is written and provided for the use of professional roofing applicators and EcoStar™ Gold Star Authorized Applicators. Contact the technical department for information on warranty availability and the requirements and benefits of the Gold Star program.

SPECIAL NOTE: Empire Shake™ has been tested and listed with Underwriters Laboratories as a Class A and a Class C roofing material (UL 790). Empire Shake™ has been tested and listed by Underwriters Laboratories as a Class 4 impact resistance product (UL 2218). To maintain the requirements of these tests and their listings the roof system must be installed exactly as stated in this installation guide.

WARRANTIES*

EcoStar warrants this product to be free of manufactured defects at the time of shipment from EcoStar's factory. EcoStar will at its option either supply new product or pay the reasonable cost of replacement products found to be defective hereunder.

EcoStar's limited warranties are the only warranties extended by EcoStar with respect to its materials. There are no other warranties, including the implied warranties of merchantability and fitness for a particular purpose. EcoStar specifically disclaims liability for any incidental, consequential, or other damages, including but not limited to, loss of profits or damages to a structure or its contents, arising under any theory of law whatsoever.

The dollar value of EcoStar's liability and buyer's remedy under this limited warranty shall not exceed the purchase price of the EcoStar material in question.

SHADE VARIATION

All tiles come with a shade variation. This shade variation will occur from pallet to pallet and within individual pallets. Application of the product should not begin until **ALL** material has been delivered to the project site. Because of this shade variation the applicator must take precautions to insure that the various shades of the product are properly blended. Tiles must be taken from different pallets and bundles to guarantee consistency in application. Natural weathering will produce further shade variations, even in tiles appearing to be identical in color when new.

NOTE: EcoStar will not be responsible for the improper blending and application of the product. Contact EcoStar Customer Service for available factory blended options.

TEMPERATURE

It is recommended that the tiles not be stored in temperatures lower than 45˚ F since cold tiles will cause difficulty with the installation. If tiles have been stored in temperatures below 45˚ F they must be restored to a temperature above 45˚ F before installation. The tiles will expand and contract with temperature variations. If the tiles are applied while cold, special precautions must be taken to ensure a quality looking application. Proper spacing must be maintained throughout the project. For assistance with installations below 45˚ F please contact the technical department.

SUBSTRATE

The tiles should only be installed on a minimum of ½" plywood decking, 7/16" OSB or minimum ¾" tongue and groove decking with end gaps not exceeding ¼". Contact the technical department for approved alternatives. Under all circumstances, existing roof materials must be removed down to the deck prior to installation.

SLOPE

The tiles are not recommended for slopes less than 3/12. If lower slopes are desired, contact the technical department for review. On roof slopes less than 4/12, the tiles must be installed with a maximum 7" exposure. On roof slopes of 4/12 or greater, the tiles may be installed with a 7", 7½" or 8" exposure. On roof slopes of 6/12 or greater, tiles may be installed at a maximum 9" exposure.

UNDERLAYMENT

Glacier Guard™ or equal must be applied to all eaves, rake edges, hips, valleys, ridges and protrusions. If a Class C roof system has been specified, cover the remaining exposed deck with **Aqua Guard™** or equal. If a Class A roof has been specified, **GP Gypsum Corporation's DensDeck®** roof board may be used, or **GAF VersaShield®** underlayment. If VersaShield is used, it must be applied over the entire roof deck after the installation of the **Glacier Guard**. **Gold Star Warranty*** requires the use of the above mentioned EcoStar specified products.

FASTENERS

Stainless steel ring shank roofing nails are recommended for application of the tiles. **Gold Star Warranty*** application requires the use of **EcoStar Stainless Steel Ring Shank Fasteners**. Hand drive and pneumatic coil nails are available.

FLASHING MATERIAL

EcoStar recommends that flashing be either copper or stainless steel. Flashing metal, however, is not covered by any EcoStar warranty. Like materials should be used when fastening metal flashings.

SEALANTS

If local codes require the use of a shingle sealant, the only material approved for use with EcoStar tiles is Dow Corning 790 silicone sealant.

* See www.ecostarllc.com for available warranties.

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INSTALLATION GUIDE

Empire Shake & Empire Shake Plus

INSTALLATION STEPS

EcoStar makes every effort to maintain the quality and consistency of all products, however, shade variations will occur within all tile products. **Due to these shade variations it is extremely important that all members of the installation crew be aware of the fact that tiles must be blended between bundles and pallets.** The entire lot of material must be blended evenly in rotation until all material is used. EcoStar recommends that a member of the crew be assigned the responsibility of blending tiles and insuring that no shade patterning or blotching occurs. This can best be accomplished by blending all tiles before installation, and by making periodic inspections of the roof from the ground.

Empire Shake tiles are designed and manufactured to duplicate the look of natural wood shakes.

1. Install **Glacier Guard** in all valleys, eaves, rake edges, hips, ridges and protrusions. **Gold Star Warranty*** application requires the use of **Glacier Guard**.

2. Install a minimum of 30 lb. felt over the remaining area of the deck surface. If a Class C roof is required, the 30 lb. felt or equal must be UL Listed. **Gold Star Warranty*** application requires the use of **EcoStar's Aqua Guard** underlayment for a Class C roof system. If a Class A roof is required install **GAF VersaShield®** or equivalent over the entire deck including areas already covered by the **Glacier Guard**. **Gold Star Warranty*** application requires the use of **GAF VersaShield®** for a Class A roof system.

3. Install metal edging at eaves and rake edges. Any corrosion resistant metal edging is acceptable. Copper and stainless steel are recommended. It should be noted that all EcoStar Warranties do NOT cover metal flashing.

Note: When using copper and stainless steel flashing material the appropriate corresponding nails should be used.

4. A critical step is **BENDING**. Every tile that is installed must be bent in a downward arch before applying it to the roof deck. Whatever position the tile is in when fastened to the roof deck, is the position it will maintain. It is recommended that each member of the installation crew be instructed on how to bend the tile to insure that it lies flat when fastened to the roof deck. While grabbing the top of the tile (textured side up) with the right hand and the bottom edge of the tile with the left hand, bend the tile in a downward motion until the tile maintains arch. The tiles must be curved under when installing.

5. Beginning at the eave edge, install a starter row of tiles with two nails per tile (in location shown on tiles). 1 ½" long stainless steel ring shank roofing nails are recommended. **Gold Star Warranty*** application requires the use of **EcoStar Ring Shank Fasteners**. Maintain a minimum ¼" gap between starter tiles.

6. If a pneumatic nailer is utilized for application of the tiles, care should be taken to determine that the proper pressure and depth setting is being used. Nails can be over driven causing tiles to lift and diminish the quality of the installation.

7. The initial layer of tiles becomes the starter row. This layer will be completely covered by the next row to be installed. When installing Empire Shake Plus tiles, Empire Shake tiles must be used for the starter row. When the first course of tile is installed, tiles must be offset to cover the nails from the previous row. A minimum of ⅛" is required between tiles and between tiles and protrusions.

EMPIRE SHAKE IS NOT RECOMMENDED FOR SLOPES LESS THAN 3/12. ON ROOFS LESS THAN 6/12 AND GREATER THAN 3/12, EMPIRE SHAKE MUST BE INSTALLED WITH A MAXIMUM EXPOSURE OF 7". ON ROOFS 4/12 OR GREATER EMPIRE SHAKE TILES MAY BE INSTALLED WITH EITHER A 7", 7½" OR 8" EXPOSURE. ON SLOPES OF 6/12 OR GREATER, TILES CAN BE INSTALLED AT A MAXIMUM 9" EXPOSURE.

8. **CAUTION:** Do not install the tiles with an upward curl. Whatever position the tile is in when fastened to the roof deck, it will maintain that position. It is required that each member of the installation crew be instructed on how to bend the tile manually to insure that it lies flat when fastened to the roof deck.

9. As the tiles are installed up the roof, the tile must be cut at rake edges, valleys and protrusions. The tiles may be cut using a straight edge and a utility or roofing knife. Once the tile has been scored with a knife it can be snapped along the scored line. Empire Shake Plus tiles require the use of a saw to cut.

10. As the tiles are installed up the roof slope, it is recommended that lines be snapped horizontally. The horizontal lines will keep the tiles looking straight and uniform. **DO NOT USE RED CHALK. Red chalk will stain the tiles.**

11. **CAUTION:** As the tiles are installed up the slope of the roof, the installation should be constantly checked from the ground to ensure there is no patterning developing and proper blending is occurring. **Gold Star Warranty*** application requires that the Authorized Applicator correct any blending problems prior to issuance of the warranty.

12. Continue to install the tiles up the roof slope. Be sure to place the nails directly in the position noted on the tiles. Stainless steel ring shank nails are recommended. **Gold Star Warranty*** application requires the use of **EcoStar Ring Shank Fasteners**.

When using pneumatic nailing equipment, frequently check both the depth and pressure setting, so nails are not over driven, causing tiles to lift. Lifted tiles will diminish the aesthetic appearance of the finished roof system. The nail should not dent the tile.

Tiles can be slippery when wet, caution should be exhibited with early morning dew and after rain. EcoStar suggests the use of toe boards, OSHA approved harnesses and safety equipment at all times.

13. When all tiles have been applied to the roof slopes, the pre-formed **Empire Shake** Hip & Ridge tiles are applied to all hips and ridges. **Empire Shake Hip & Ridge tiles are always installed with a 6"exposure** with two 2" or 2½" nails per tile. The use of ridge vent will require 2½" nails. Before installing the **Empire Shake** Hip & Ridge tiles at the ridge, roof venting should be installed. Ridge venting systems are highly recommended. Mushroom cap style vents may be used, but ridge venting provides better venting and improves the aesthetic appearance of the roof system. **Gold Star Warranty*** covers **Ecostar EcoVent** if used.

14. As work progresses up roof slopes, care should be taken to minimize traffic over completed areas of the roof. The tiles will show any mud or dirt tracked across them. This will cause aesthetic issues with the completed appearance of the roof. It is the responsibility of the applicator or building owner to remove this mud or dirt. A mild detergent should be used in combination with a bucket of water to remove the mud or dirt. Clean water can then be used to finish the cleaning process. Do not use any chemicals or solvents without first checking with the EcoStar technical department. **EcoStar is not responsible for the cleaning of any tiles.**

* See www.ecostarllc.com for available warranties.

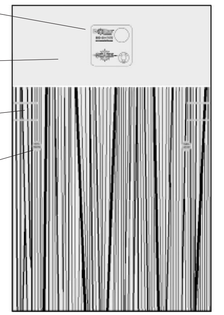
Empire Shake & Empire Shake Plus Installation Guide

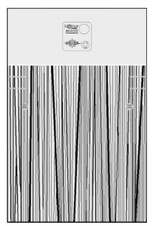
PRODUCT IDENTIFICATION
This area provides identification of the product and a toll-free contact telephone number for questions or assistance with the product and installation.

QUALITY INFORMATION
This area of the tile is used by the production department to denote the date the part was manufactured. This allows tracking of quality by production time.

INSTALLATION MEASUREMENT
Two marks are molded into every tile. When these marks are placed in alignment with the top edge of the previous row of tiles, proper tile exposure is provided automatically.

TILE FASTENING
Molded into each tile is a fastener locator. This assists during installation for proper positioning of the fastener. Each bundle of Empire Shake contains all three sizes of tile in 8 different surface textures. When installing the tiles, care needs to be taken to ensure that no pattern is created by the repetition of tiles.





Empire Shake
12" wide x 20" long x ⅜" nominal

Empire Shake Plus
12" wide x 20" long x ¾" nominal

Empire Shake
9" wide x 20" long x ⅜" nominal

Empire Shake Plus
9" wide x 20" long x ¾" nominal

Empire Shake
6" wide x 20" long x ⅜" nominal

Empire Shake Plus
6" wide x 20" long x ¾" nominal

Empire Shake & Empire Shake Plus Installation Guide

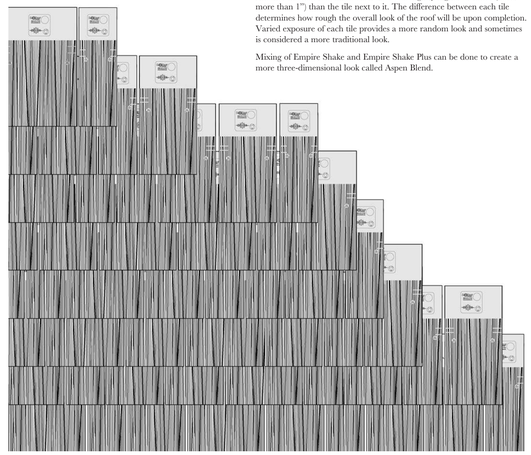
SPECIAL NOTE

There are a variety of installation styles used with natural wood shakes. The same is true of Empire Shake tiles and Empire Shake Plus tiles.

The drawing shows tiles being installed in a perfect or royal method. This method places the bottom of each tile in a straight line. This method sometimes uses straight edges to maintain the line. Use this method of installation when a contemporary look is required.

Another method is to allow each tile to be slightly higher or lower (never more than 1") than the tile next to it. The difference between each tile determines how rough the overall look of the roof will be upon completion. Varied exposure of each tile provides a more random look and sometimes is considered a more traditional look.

Mixing of Empire Shake and Empire Shake Plus can be done to create a more three-dimensional look called Aspen Blend.



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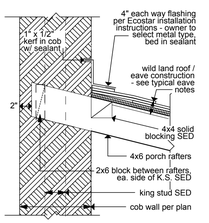
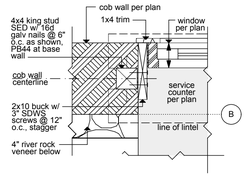
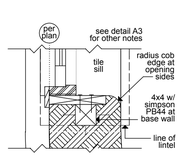
P/N-606006 ECO-EMPIRE SHAKE INSTALL GUIDE. This installation guide, effective 07/05/2017 supersedes all previous versions.







A3 COB at SERVICE WALL

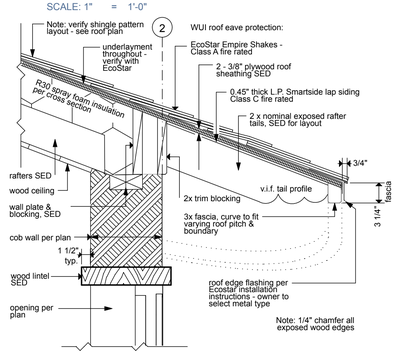
SCALE: 1" = 1'-0"

A4 WINDOW at COB WALL

SCALE: 1" = 1'-0"

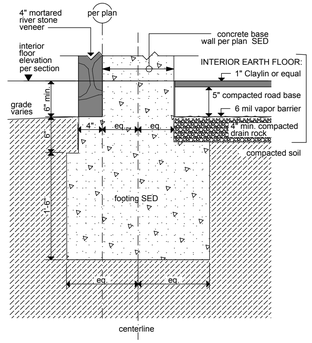
A1 PORCH ROOF AT COB WALL

SCALE: 1" = 1'-0"



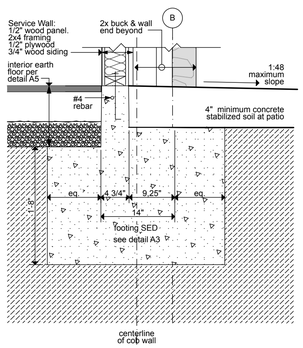
A2 TYPICAL EAVE DETAIL

SCALE: 1" = 1'-0"



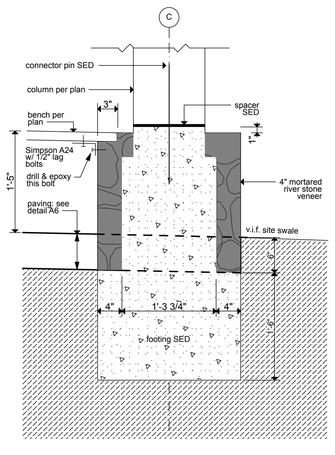
A5 TYPICAL PERIMETER FOOTING

SCALE: 1" = 1'-0"



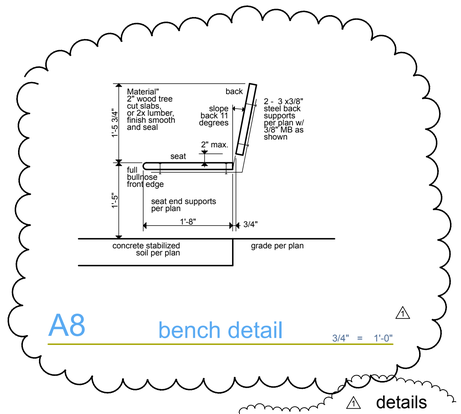
A6 FOOTING / FLOOR at SERVICE WALL

SCALE: 1" = 1'-0"



A7 COLUMN BASE at BENCH

1" = 1'-0"



A8 bench detail

3/4" = 1'-0"

⚠ details
roof shake installation
4/21/18

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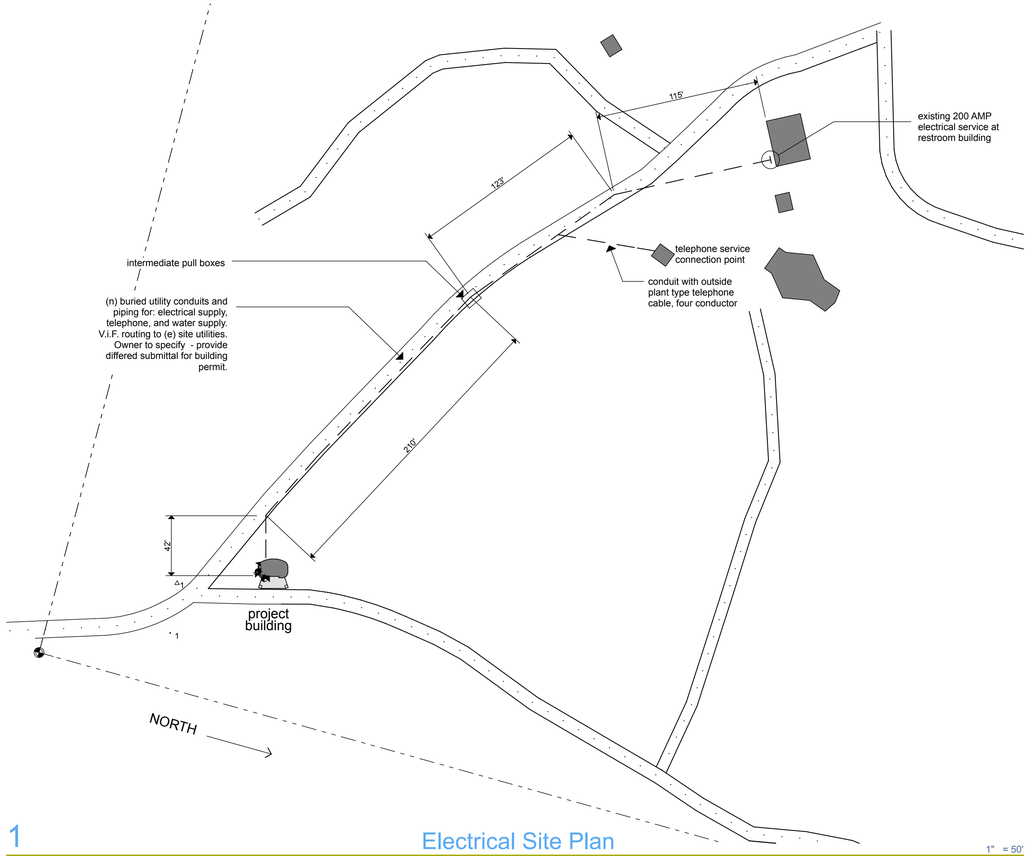
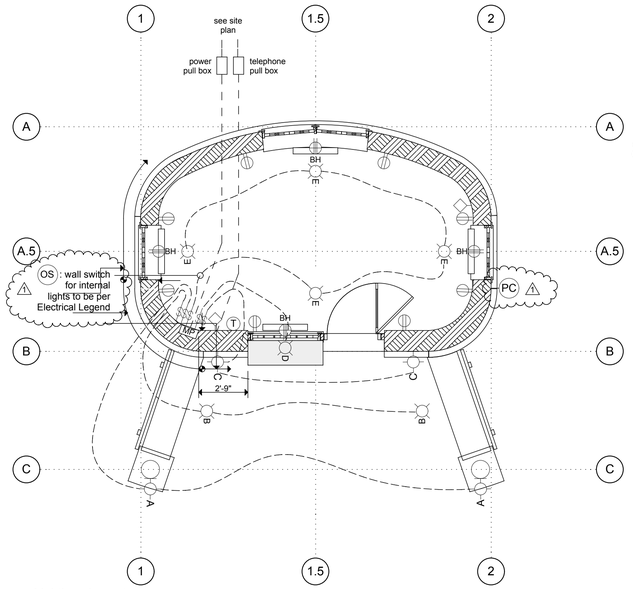


1 Electrical Site Plan 1" = 50'



Lighting plan notes

Provide hardwired indoor lighting not exceeding 0.50 Watts / sq. ft. installed power. The maximum power allowance for the main room is 110W. Refer to Energy Compliance Form NRCC-PRF-01-E, Section Q, Indoor Conditioned Lighting General Info (page 11 of 19). Lighting exceeding this amount must be equipped with daylight sensors to control automatic daylight dimming per 2016 Energy Code section 130.1(d).

Provide automatic shut off controls for all hardwired indoor lighting, such as a vacancy sensor switch, per 2016 Energy Code section 130.1(c).

Outdoor lighting that is hardwired shall be controlled according to 2016 Energy Code section 130.2, including maximum rated wattage of 30W/fixture [130.2(c)3 Exception 3]. Outdoor lighting shall be controlled by timeclock or photo sensor to automatically turn off during daylight hours.

CalGREEN Compliance Note: Exterior fixtures **A, B,** & **C** are to comply with BUG (backlight, uplight, glare) ratings in CalGREEN Code Table 5.106.8 ⚠

2 electrical / lighting floor plan 1/4" = 1'-0"

ELECTRICAL LEGEND and NOTES

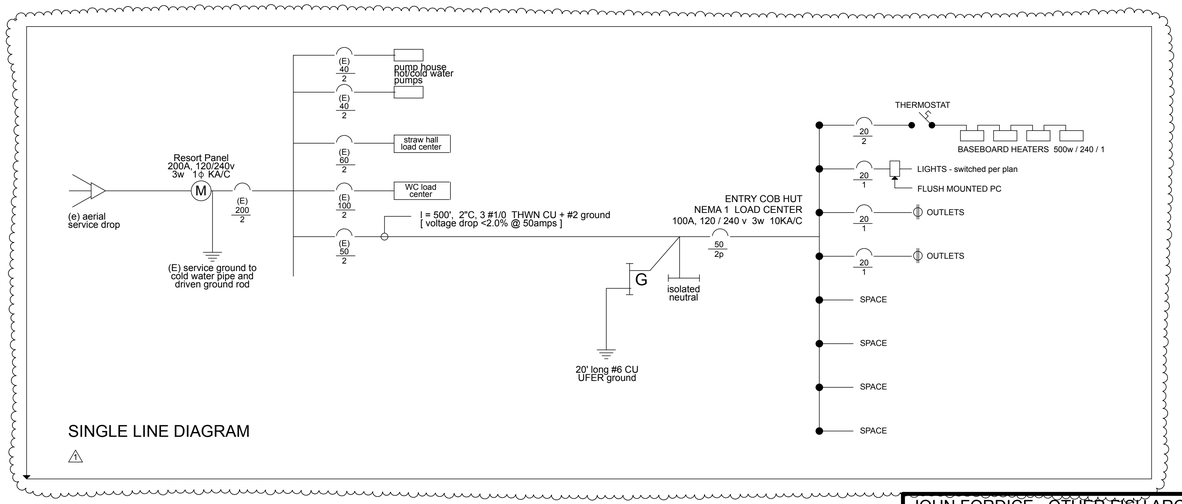
- duplex outlet , 120 v. , +14" AFF , conduit and box in concrete base wall, rated for use in concrete
- dimmer switch, 120 v., Lutron Maestro, install per Electrical Elevation
- ceiling mounted interior light fixture , 120 v.,1000 lumen LED , dimmer & occupancy switch compatible, Lightolier Slim Surface S7R, 3000K, 14watts / or equal architect approved
- lintel mounted exterior light fixture , surface mounted box , minimum drill lintel for wiring only, 40 to 200 lumen LED / owner select , dimmer & photocell switch compatible,
- C: wall mounted exterior sconce light fixture , owner verify height for sign illumination, 40 to 200 lumen LED / owner select , dimmer & photocell switch compatible, architect / owner design & approve. See CalGREEN Compliance in Lighting Plan Notes below. ⚠
- B: porch ceiling mounted exterior light fixture , surface mounted box , center between porch rafters , conceal wiring in adjacent beam , surface conduit from rafter to box, 100 to 200 lumen LED , dimmer & photocell switch compatible, architect / owner design & approve. See CalGREEN Compliance in Lighting Plan Notes below.
- A: column mounted exterior sconce light fixture , height per front elevation (VIF) , recess box in column , conceal wiring in column , beam and rafter, 100 to 200 lumen LED , dimmer & photocell switch compatible, architect / owner design & approve. See CalGREEN Compliance in Lighting Plan Notes below.
- BH: baseboard electrical heater , Cadet 05530 (or equal) , 500w, 240v. , 30" , built-in switch
- MP: 100 amp building electrical panel , recess in concrete and cob wall per height req't. , panel top at +48" AFF
- telephone jack , install wall box in concrete, + 14" AFF
- T: heater thermostat, Cadet TH106 or equal, 240v, install per Electrical Elevation
- PC: photocell lighting control, Intermatic Model K42K, install in upper roof eave blocking per plan
- OS: occupancy sensor, Lutron Maestro Occupancy Switch, ⚠

Electric heater notes

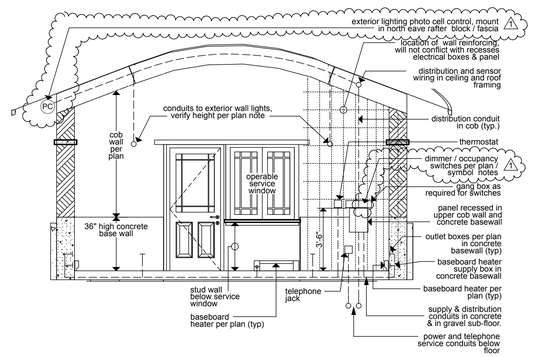
See spec sheet, http://cadetheat.com/products/baseboard-heaters/baseboard/2F500-1W

Heater is indicated on Title 24 Compliance Form NRCC-PRF-01-E, Section M. HVAC System Summary (page 9 of 19).

Heater shall be provided with a thermostat control per 2016 Energy Code section 120.2(b), and automatic shutoff control per 120.2(e) including one of the following:
A. An automatic time switch control device complying with Section 110.9, with an accessible manual override that allows operation of the system for up to 4 hours; or
B. An occupancy sensor; or
C. A 4-hour timer that can be manually operated.
D. Owners Option: Provide 1905 watt portable cord heater in lieu of baseboard heaters.



SINGLE LINE DIAGRAM ⚠



3 electrical section / elevation 1/4" = 1'-0"

electrical / lighting floor plan
⚠ electrical, site plan
electrical section / elevation
single-line diagram,
notes & specifications

4/21/18

A5

of 11

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PLAN SET VERSION **V1.2**

STATE OF CALIFORNIA – DEPARTMENT OF GENERAL SERVICES – BUILDING STANDARDS COMMISSION
CALGreen Verification Guidelines – Mandatory Measures Checklist
BSC CG-200 (Rev. 12/16)

CALGreen VERIFICATION GUIDELINES MANDATORY MEASURES CHECKLIST

Application: This checklist shall be used for nonresidential projects that meet one of the following: new construction, building additions of 1,000 sq. ft. or greater or building alterations with a permit valuation of $200,000 or more pursuant to *CALGreen* Section 301.3 AND do not trigger a Tier 1 or Tier 2 requirement:

Y = Yes (section has been selected and/or included)
N/A = Not Applicable (Code section does not apply to the project, mainly used for additions and alterations)
O = Other (provide explanation)
[N] = New construction pursuant to Section 301.3
[A] = Additions and/or alterations pursuant to Section 301.3

CHAPTER 5 DIVISIONS		SECTION TITLE	CODE SECTION	Y	N/A	O	Plan sheet, Spec or Attach Reference
DIVISION 5.1 Planning and Design	Mandatory	Storm Water Pollution Prevention w/ subsections	5.106.1 through 5.106.1.2	x			A6, A7
	Mandatory	Short Term Bicycle Parking	5.106.4.1.1		x		
	Mandatory	Long Term Bicycle Parking	5.106.4.1.2		x		
	Mandatory	Designated Parking For Clean Air Vehicles	5.106.5.2		x		
	Mandatory	Parking stall marking	5.106.5.2.1		x		
	Mandatory	Single (EV) Charging space requirements [N]	5.106.5.3.1		x		
	Mandatory	Multiple (EV) Charging space requirements [N]	5.106.5.3.2		x		
	Mandatory	EV charging space calculation [N] w/exceptions	5.106.5.3.3		x		
	Mandatory	[N] Identification	5.106.5.3.4		x		
	Mandatory	[N] Future charging spaces w/ notes 1-3	5.106.5.3.5		x		
	Mandatory	Light Pollution Reduction [N] w/ exceptions and note	5.106.8	x			A5, A6
	Mandatory	Grading and Paving w/exception for Additions and Alterations not altering the drainage path	5.106.10	x			A1, A2
DIVISION 5.2 Energy Efficiency	Mandatory	Meet the minimum Energy Efficiency Standard	5.201.1	x			A10, A11
DIVISION 5.3 Water Efficiency and Conservation	Mandatory	Separate Meters (new buildings or additions > 50,000 SF that consume more than 100 gal/day)	5.303.1.1		x		
	Mandatory	Separate Meters (for tenants in new buildings or additions that consume more than 1,000 gal/day)	5.303.1.2		x		
	Mandatory	Water closets shall not exceed 1.28 gallons per flush	5.303.3.1		x		
	Mandatory	Wall-mounted urinals shall not exceed 0.125 gpf	5.303.3.2.1		x		
	Mandatory	Floor-mounted urinals shall not exceed 0.5 gpf	5.303.3.2.2		x		
	Mandatory	Single showerhead shall have maximum flow rate of 2.0 gpm (gallons per minute) at 80 psi	5.303.3.3.1		x		
	Mandatory	Multiple showerheads serving one shower shall have a combined flow rate of 2.0 gpm at 80 psi	5.303.3.3.2		x		
	Mandatory	Nonresidential lavatory faucets	5.303.3.4.1		x		
	Mandatory	Kitchen faucets	5.303.3.4.2		x		
	Mandatory	Wash basins	5.303.3.4.3		x		
	Mandatory	Metering faucets	5.303.3.4.4		x		
	Mandatory	Metering faucets for wash fountains	5.303.3.4.5		x		
	Mandatory	Food waste disposers w/note	5.303.4.1		x		
	Mandatory	Areas of additions and alterations	5.303.5		x		
	Mandatory	Standards for plumbing fixtures and fittings	5.303.6		x		
	Mandatory	Outdoor water use in landscape areas equal to or greater than 500 square feet	5.304.2		x		
	Mandatory	Outdoor water use in rehabilitated landscape projects with areas equal to or greater than 2,500 square feet	5.304.3		x		
	Mandatory	Outdoor water use in landscape areas of 2,500 square feet or less	5.304.4		x		
	Mandatory	Graywater or rainwater use in landscaped areas	5.304.5		x		
DIVISION 5.4 Material Conservation and Resource Efficiency	Mandatory	Weather Protection	5.407.1	x			A3
	Mandatory	Moisture Control: sprinklers	5.407.2.1		x		
	Mandatory	Moisture Control: Exterior door protection	5.407.2.2.1	x			
	Mandatory	Moisture Control: Flashing	5.407.2.2.2	x			
	Mandatory	Construction waste management-comply with either: sections 5.408.1.1, 5.408.1.2, 5.408.1.3 or more stringent local ordinance	5.408.1.1, 5.408.1.2, 5.408.1.3	x			A6
	Mandatory	Construction waste management: Documentation w/notes	5.408.1.4	x			A6
	Mandatory	Universal Waste [A]	5.408.2		x		
	Mandatory	Excavated soil and land clearing debris w/ exception and notes	5.408.3	x			A6
	Mandatory	Recycling by Occupants w/ exception	5.410.1	x			A6
	Mandatory	Recycling by Occupants: Additions w/ exception	5.410.1.1		x		
	Mandatory	Recycling by Occupants: Sample ordinance	5.410.1.2		x		
	Mandatory	Commissioning new buildings (≥ 10,000 SF) [N] w/exceptions and notes	5.410.2		x		
	Mandatory	Owner's or Owner representative's Project Requirements (OPR) [N]	5.410.2.1		x		
	Mandatory	Basis of Design (BOD) [N]	5.410.2.2		x		
	Mandatory	Commissioning Plan [N]	5.410.2.3		x		
	Mandatory	Functional Performance Testing [N]	5.410.2.4		x		
	Mandatory	Documentation and Training [N]	5.410.2.5		x		
	Mandatory	Systems Manual [N]	5.410.2.5.1		x		
	Mandatory	Systems Operation Training) [N]	5.410.2.5.2		x		
	Mandatory	Commissioning Report [N]	5.410.2.6		x		
	Mandatory	Testing and adjusting for new buildings < 10,000 SF or new systems that serve additions or alterations.	5.410.4	x			A7
	Mandatory	System Testing Plan for HVAC, Lighting, water heating, renewable energy, landscape irrigation and water reuse.	5.410.4.2	x			A7
	Mandatory	Procedures for testing and adjusting	5.410.4.3	x			A6
	Mandatory	HVAC balancing	5.410.4.3.1		x		
	Mandatory	Reporting for testing and adjusting	5.410.4.4		x		
	Mandatory	Operation and Maintenance (O&M) Manual	5.410.4.5	x			A6
	Mandatory	Inspection and reports	5.410.4.5.1	x			A6
DIVISION 5.5 Environmental Quality	Mandatory	Fireplaces	5.503.1		x		
	Mandatory	Woodstoves	5.503.1.1		x		
	Mandatory	Temporary ventilation	5.504.1		x		
	Mandatory	Covering of ducts openings and protection of mechanical equipment during construction	5.504.3	x			A6
	Mandatory	Adhesives, sealants and caulks	5.504.4.1	x			A6
	Mandatory	Paints and coatings	5.504.4.3	x			A6
	Mandatory	Aerosol paints and coatings	5.504.4.3.1	x			A6
	Mandatory	Aerosol paints and coatings: Verification	5.504.4.3.2	x			A6
	Mandatory	Carpet systems	5.504.4.4		x		
	Mandatory	Carpet cushion	5.504.4.4.1		x		
	Mandatory	Carpet adhesive	5.504.4.4.2		x		
	Mandatory	Composite wood products	5.504.4.5	x			A6
	Mandatory	Composite wood products: Documentation	5.504.4.5.3	x			A6
	Mandatory	Resilient flooring systems	5.504.4.6		x		
	Mandatory	Resilient flooring: Verification of compliance	5.504.4.6.1		x		
	Mandatory	Filters w/ exceptions	5.504.5.3		x		
	Mandatory	Filters: Labeling	5.504.5.3.1		x		
	Mandatory	Environmental tobacco smoke (ETS) control	5.504.7	x			A6
	Mandatory	Indoor moisture control	5.505.1	x			A6
	Mandatory	Outside air delivery	5.506.1	x			A6
	Mandatory	Carbon dioxide (CO2) monitoring	5.506.2		x		
	Mandatory	Acoustical control w/ exception	5.507.4		x		
	Mandatory	Exterior noise transmission, prescriptive method w/ exceptions	5.507.4.1		x		
	Mandatory	Noise exposure where noise contours are not readily available	5.507.4.1.1		x		
	Mandatory	Performance method	5.507.4.2		x		
	Mandatory	Site features	5.507.4.2.1		x		
	Mandatory	Documentation of compliance	5.507.4.2.2		x		
	Mandatory	Interior sound transmission w/ note	5.507.4.3		x		
	Mandatory	Ozone depletion and greenhouse gas reductions	5.508.1		X		
	Mandatory	Chlorofluorocarbons (CFCs)	5.508.1.1		X		
	Mandatory	Halons	5.508.1.2		x		
	Mandatory	Supermarket refrigerant leak reduction for retail food stores 8,000 square feet or more sections 5.508.2 through 5.508.2.6.3	5.508.2 through 5.508.2.6.3		x		
		END OF MANDATORY PROVISIONS					

Documentation Author's /Responsible Designer's Declaration Statement Mandatory: I attest that this mandatory provisions checklist is accurate and complete.

Signature:

Company: Beyond Efficiency	Date: 2/20/18
Address: 710 Channing Way	License:
City/State/Zip Berkeley CA, 94702	License:

NOTE: See referenced CODE SECTIONS on subsequent drawings A7, A8, or A9.

cal green compliance
4/21/18

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PLAN SET VERSION **V1.2**

AIA|CC CALIFORNIA COUNCIL

2016 CALIFORNIA GREEN BUILDING STANDARDS CODE
NONRESIDENTIAL MANDATORY MEASURES, SHEET 1 (INCLUDING JANUARY 1, 2017 ERRATA)

INSPECTOR SIGNOFF

CHAPTER 3
GREEN BUILDING
SECTION 301 GENERAL

301.1 SCOPE. Buildings shall be designed to include the green building measures specified as mandatory in the application checklists contained in this code. Voluntary green building measures are also included in the application checklists and may be included in the design and construction of structures covered by this code, but are not required unless adopted by a city, county, or city and county as specified in Section 101.7.

301.3 NONRESIDENTIAL ADDITIONS AND ALTERATIONS. [BSC] The provisions of individual sections of Chapter 5 apply to newly constructed buildings, building additions of 1,000 square feet or greater, and/or building alterations with a permit valuation of $200,000 or above (for occupancies within the authority of California Building Standards Commission). Code sections relevant to additions and alterations shall only apply to the portions of the building being added or altered within the scope of the permitted work.

A code section will be designated by a banner to indicate where the code section only applies to newly constructed building [N] or to additions and alterations [A]. When the code section applies to both, no banner will be used.

301.3.1 Nonresidential additions and alterations that cause updates to plumbing fixtures only:

Note: On and after January 1, 2014, certain commercial real property, as defined in Civil Code Section 1101.3, shall have its noncompliant plumbing fixtures replaced with appropriate water-conserving plumbing fixtures under specific circumstances. See Civil Code Section 1101.1 *et seq.* for definitions, types of commercial real property affected, effective dates, circumstances necessitating replacement of noncompliant plumbing fixtures, and duties and responsibilities for ensuring compliance.

301.3,2 Waste Diversion. The requirements of Section 5.408 shall be required for additions and alterations whenever a permit is required for work.

301.4 PUBLIC SCHOOLS AND COMMUNITY COLLEGES. (see GBSC)
301.5 HEALTH FACILITIES. (see GBSC)

SECTION 302 MIXED OCCUPANCY BUILDINGS

302.1 MIXED OCCUPANCY BUILDINGS. In mixed occupancy buildings, each portion of a building shall comply with the specific green building measures applicable to each specific occupancy.

SECTION 303 PHASED PROJECTS

303.1 Phased projects. For shell buildings and others constructed for future tenant improvements, only those code measures relevant to the building components and systems considered to be new construction (or newly constructed) shall apply.

303.1.1 Tenant improvements. The provisions of this code shall apply only to the initial tenant or occupant improvements to a project. Subsequent tenant improvements shall comply with the scoping provisions in Section 301.3 non-residential additions and alterations.

ABBREVIATION DEFINITIONS:

HCD	Department of Housing and Community Development
BSC	California Building Standards Commission
DSA-SS	Division of the State Architect, Structural Safety
OSHPD	Office of Statewide Health Planning and Development
LR	Low Rise
HR	High Rise
AA	Additions and Alterations
N	New

CHAPTER 5
NONRESIDENTIAL MANDATORY MEASURES

DIVISION 5.1 PLANNING AND DESIGN

SECTION 5.101 GENERAL

5.101.1 Scope
The provisions of this chapter outline planning, design and development methods that include environmentally responsible site selection, building design, building siting and development to protect, restore and enhance the environmental quality of the site and respect the integrity of adjacent properties.

SECTION 5.102 DEFINITIONS

5.102.1 DEFINITIONS
The following terms are defined in Chapter 2 *(and are included here for reference)*

CUTOFF LUMINAIRES. Luminaires whose light distribution is such that the candela per 1000 lamp lumens does not numerically exceed 25 (2.5 percent) at an angle of 90 degrees above nadir, and 100 (10 percent) at a vertical angle of 80 degrees above nadir. This applies to all lateral angles around the luminaire.

LOW-EMITTING AND FUEL EFFICIENT VEHICLES.
Eligible vehicles are limited to the following:

1. Zero emission vehicle (ZEV), including neighborhood electric vehicles (NEV), partial zero emission vehicle (PZEV), advanced technology PZEV (AT ZEV) or CNG fueled (original equipment manufacturer only) regulated under Health and Safety Code section 43800 and CCR, Title 13, Sections 1961 and 1962.
2. High-efficiency vehicles, regulated by U.S. EPA, bearing High-Occupancy Vehicle (HOV) car pool lane stickers issued by the Department of Motor Vehicles.

NEIGHBORHOOD ELECTRIC VEHICLE (NEV). A motor vehicle that meets the definition of "low-speed vehicle" either in Section 385.5 of the Vehicle Code or in 49CFR571.500 (as it existed on July 1, 2000), and is certified to zero-emission vehicle standards.

TENANT-OCCUPANTS. Building occupants who inhabit a building during its normal hours of operation as permanent occupants, such as employees, as distinguished from customers and other transient visitors.

VANPOOL VEHICLE. Eligible vehicles are limited to any motor vehicle, other than a motortruck or truck tractor, designed for carrying more than 10 but not more than 15 persons including the driver, which is maintained and used primarily for the nonprofit work-related transportation of adults for the purpose of ridesharing.

Note: Source: Vehicle Code, Division 1, Section 668

ZEV. Any vehicle certified to zero-emission standards.

SECTION 5.106 SITE DEVELOPMENT

5.106.1 STORM WATER POLLUTION PREVENTION. Newly constructed projects and additions which disturb less than one acre of land shall prevent the pollution of storm water runoff from the construction activities through one or more of the following measures:

5.106.1.1 Local ordinance. Comply with a lawfully enacted storm water management and/or erosion control ordinance.

5.106.1.2 Best Management Practices (BMP). Prevent the loss of soil through wind or water erosion by implementing an effective combination of erosion and sediment control and good housekeeping BMP.

1. Soil loss BMP that should be considered for each project include, but are not limited to, the following:
   a. Scheduling construction activity.
   b. Preservation of natural features, vegetation and soil.
   c. Drainage swales or lined ditches to control stormwater flow.
   d. Mulching or hydroseeding to stabilize disturbed soils.
   e. Erosion control to protect slopes.
   f. Protection of storm drain inlets (gravel bags or catch basin inserts),
   g. Perimeter sediment control (perimeter silt fence, fiber rolls),
   h. Sediment trap or sediment basin to retain sediment on site.
   i. Stabilized construction exits.
   j. Wind erosion control.
   k. Other soil loss BMP acceptable to the enforcing agency.
2. Good housekeeping BMP to manage construction equipment, materials and wastes that should be considered for implementation as appropriate for each project include, but are not limited to, the following:
   a. Material handling and waste management.
   b. Building materials stockpile management.
   c. Management of washout areas (concrete, paints, stucco, etc.),
   d. Control of vehicle/equipment fueling to contractor's staging area.
   e. Vehicle and equipment cleaning performed off site.
   f. Spill prevention and control.
   g. Other housekeeping BMP acceptable to the enforcing agency.

INSPECTOR SIGNOFF

5.106.4 BICYCLE PARKING. For buildings within the authority of California Building Standards Commission as specified in Section 103, comply with Section 5.106.4.1. For buildings within the authority of the Division of the State Architect pursuant to Section 105, comply with Section 5.106.4.2

5.106.4.1 Bicycle parking. [BSC-CG] Comply with Sections 5.106.4.1.1 and 5.106.4.1.2; or meet the applicable local ordinance, whichever is stricter.

5.106.4.1.1 Short-term bicycle parking. If the project or an addition or alteration is anticipated to generate visitor traffic, provide permanently anchored bicycle racks within 200 feet of the visitors' entrance, readily visible to passers-by, for 5% of new visitor motorized vehicle parking spaces being added, with a minimum of one two-bike capacity rack.
Exception: Additions or alterations which add nine or less visitor vehicular parking spaces.

5.106.4.1.2 Long-term bicycle parking. For new buildings with 10 or more tenant-occupants or for additions or alterations that add 10 or more tenant-occupants or for additions or alterations that add 10 or more tenant vehicular parking spaces, provide secure bicycle parking for 5 percent of the tenant vehicle parking spaces being added, with a minimum of one space. Acceptable parking facilities shall be convenient from the street and shall meet one of the following:

1. Covered, lockable enclosures with permanently anchored racks for bicycles;
2. Lockable bicycle rooms with permanently anchored racks; or
3. Lockable, permanently anchored bicycle lockers.

Note: Additional information on recommended bicycle accommodations may be obtained from Sacramento Area Bicycle Advocates.

5.106.4.2 Bicycle parking. [DSA-SS] For public schools and community colleges, comply with Sections 5.106.4.2.1 and 5.106.4.2.2

5.106.4.2.1 Student bicycle parking. Provide permanently anchored bicycle racks conveniently accessed with a minimum of four two-bike capacity racks per new building.
5.106.4.2.2 Staff bicycle parking. Provide permanent, secure bicycle parking conveniently accessed with a minimum of two staff bicycle parking spaces per new building. Acceptable bicycle parking facilities shall be convenient from the street or staff parking area and shall meet one of the following:

1. Covered, lockable enclosures with permanently anchored racks for bicycles;
2. Lockable bicycle rooms with permanently anchored racks; or
3. Lockable, permanently anchored bicycle lockers.

5.106,5,2 DESIGNATED PARKING FOR CLEAN AIR VEHICLES. In new projects or additions or alterations that add 10 or more vehicular parking spaces, provide designated parking for any combination of low-emitting, fuel-efficient and carpool/van pool vehicles as follows:

TABLE 5.106.5.2 - PARKING

TOTAL NUMBER OF PARKING SPACES	NUMBER OF REQUIRED SPACES
0-9	0
10-25	1
25-50	3
51-75	6
76-100	8
101-150	11
151-200	16
201 AND OVER	AT LEAST 8% OF TOTAL

5.106.5.2.1 - Parking stall marking. Paint, in the paint used for stall striping, the following characters such that the lower edge of the last word aligns with the end of the stall striping and is visible beneath a parked vehicle: CLEAN AIR / VAN POOL / EV

Note: Vehicles bearing Clean Air Vehicle stickers from expired HOV lane programs may be considered eligible for designated parking spaces.

5.106.5.3 Electric vehicle (EV) charging. [N] Construction shall comply with Section 5.106.5.3.1 or Section 5.106.5.3.2 to facilitate future installation of electric vehicle supply equipment (EVSE). When EVSE(s) is/are installed, it shall be in accordance with the *California Building Code*, the California Energy Commission (CEC) and as follows:

5.106.5.3.1 Single charging space requirements. [N] When only a single charging space is required per Table 5.106.5.3.3, a raceway is required to be installed at the time of construction and shall be installed in accordance with the *California Electrical Code*. Construction plans and specifications shall include, but are not limited to, the following:

1. The type and location of the EVSE.
2. A listed raceway capable of accommodating a 208/240 -volt dedicated branch circuit.
3. The raceway shall not be less than trade size 1."
4. The raceway shall originate at a service panel or a subpanel serving the area, and shall terminate in close proximity to the proposed location of the charging equipment and listed suitable cabinet, box, enclosure or equivalent.
5. The service panel or subpanel shall have sufficient capacity to accommodate a minimum 40-ampere dedicated branch circuit for the future installation of the EVSE.

5.106.5.3.2 Multiple charging space requirements. [N] When multiple charging spaces are required per Table 5.106.5.3.3 raceway(s) is/are required to be installed at the time of construction and shall be installed in accordance with the *California Electrical Code*. Construction plans and specifications shall include, but are not limited to, the following:

1. The type and location of the EVSE.
2. The raceway(s) shall originate at a service panel or a subpanel(s) serving the area, and shall terminate in close proximity to the proposed location of the charging equipment and into listed suitable cabinet(s), box(es), enclosure(s) or equivalent.
3. Plan design shall be based upon 40-ampere minimum branch circuits.
4. Electrical calculations shall substantiate the design of the electrical system, to include the rating of equipment and any on-site distribution transformers and have sufficient capacity to simultaneously charge all required EVs at its full rated amperage.
5. The service panel or subpanel(s) shall have sufficient capacity to accommodate the required number of dedicated branch circuit(s) for the future installation of the EVSE.

5.106.5.3.3 EV charging space calculations. [N] Table 5.106.5.3.3 shall be used to determine if single or multiple charging space requirements apply for the future installation of EVSE.

Exceptions: On a case-by-case basis where the local enforcing agency has determined EV charging and infrastructure is not feasible based upon one or more of the following conditions:

1. Where there is insufficient electrical supply.
2. Where there is evidence suitable to the local enforcing agency substantiating that additional local utility infrastructure design requirements, directly related to the implementation of Section 5.106.5.3, may adversely impact the construction cost of the project.

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TABLE 5.106.5.3.3

TOTAL NUMBER OF PARKING SPACES	NUMBER OF REQUIRED SPACES
0-9	0
10-25	1
36-50	2
51-75	4
76-100	5
101-200	7
201 AND OVER	6% of total[1]

1. Calculation for spaces shall be rounded up to the nearest whole number.

5.106.5.3.4 [N] Identification. The service panel or subpanel(s) circuit directory shall identify the reserved overcurrent protective device space(s) for future EV charging as "EV CAPABLE". The raceway termination location shall be permanently and visibly marked as "EV CAPABLE".

5.106.5.3.5 [N] Future charging spaces qualify as designated parking as described in Section 5.106.5.2 Designated parking for clean air vehicles.
Notes:

1. The California Department of Transportation adopts and publishes the California Manual on Uniform Traffic Control Devices (California MUTCD) to provide uniform standards and specifications for all official traffic control devices in California. Zero Emission Vehicle Signs and Pavement Markings can be found in the New Policies & Directives number 13-01. www.dot.ca.gov/hq/traffops/policy/13-01.pdf.
2. See Vehicle Code Section 22511 for EV charging spaces signage in off-street parking facilities and for use of EV charging spaces.
3. The Governor's Office of Planning and Research published a Zero-Emission Vehicle Community Readiness Guidebook which provides helpful information for local governments, residents and businesses. www.opr.ca.gov/docs/ZEV_Guidebook.pdf.

5.106.8 LIGHT POLLUTION REDUCTION. [N] Outdoor lighting systems shall be designed and installed to comply with the following:

1. The minimum requirements in the California Energy Code for Lighting Zones 1-4 as defined in Chapter 10 of the California Administrative Code; and
2. Backlight, Uplight and Glare (BUG) ratings as defined in IES TM-15-11; and
3. Allowable BUG ratings not exceeding those shown in Table 5.106.8, or Comply with a local ordinance lawfully enacted pursuant to Section 101,7, whichever is more stringent,

Exceptions: [N]

1. Luminaires that qualify as exceptions in Section 140.7 of the California Energy Code.
2. Emergency lighting.
3. Building facade meeting the requirements in Table 140.7-B of the California Energy Code, Part 6.
4. Custom lighting features as allowed by the local enforcing agency, as permitted by Section 101.8 Alternate materials, designs and methods of construction.

Note: [N] See also California Building Code, Chapter 12, Section 1205.6 for college campus lighting requirements for parking facilities and walkways.

5.106.10 GRADING AND PAVING. Construction plans shall indicate how site grading or a drainage system will manage all surface water flows to keep water from entering buildings. Examples of methods to manage surface water include, but are not limited to, the following:

1. Swales.
2. Water collection and disposal systems.
3. French drains.
4. Water retention gardens.
5. Other water measures which keep surface water away from buildings and aid in groundwater recharge.

Exception: Additions and alterations not altering the drainage path.

TABLE 5.106.8 [N] MAXIMUM ALLOWABLE BACKLIGHT, UPLIGHT AND GLARE (BUG) RATINGS[1,2]

ALLOWABLE RATING	LIGHTING ZONE 1	LIGHTING ZONE 2	LIGHTING ZONE 3	LIGHTING ZONE 4
MAXIMUM ALLOWABLE BACKLIGHT RATING [3]				
Luminaire greater than 2 mounting heights (MH) from property line	No Limit	No Limit	No Limit	No Limit
Luminaire back hemisphere is 1-2 MH from property line	B2	B3	B4	B4
Luminaire back hemisphere is 0.5-1 MH from property line	B1	B2	B3	B3
Luminaire back hemisphere is less than 0.5 MH from property line	B0	B0	B1	B2
MAXIMUM ALLOWABLE UPLIGHT RATING				
For area lighting [4]	U0	U0	U0	U0
For all other outdoor lighting,including decorative luminaires	U1	U2	U3	U4
MAXIMUM ALLOWABLE GLARE RATING [5]				
Luminaire greater than 2 MH from property line	G1	G2	G3	G4
Luminaire front hemisphere is 1-2 MH from property line	G0	G1	G1	G2
Luminaire front hemisphere is 0.5-1 MH from property line	G0	G0	G1	G1
Luminaire back hemisphere is less than 0.5 MH from property line	G0	G0	G0	G1

1. IESNA Lighting Zones 0 and 5 are not applicable; refer to Lighting Zones as defined in the *California Energy Code* and Chapter 10 of the *California Administrative Code*.

2. For property lines that abut public walkways, bikeways, plazas and parking lots, the property line may be considered to be 5 feet beyond the actual property line for purpose of determining compliance with this section. For property lines that abut public roadways and public transit corridors, the property line may be considered to be the centerline of the public roadway or public transit corridor for the purpose of determining compliance with this section.

3. If the nearest property line is less than or equal to two mounting heights from the back hemisphere of the luminaire distribution, the applicable reduced Backlight rating shall be met.

4. General lighting luminaires in areas such as outdoor parking, sales or storage lots shall meet these reduced ratings. Decorative luminaires located in these areas shall meet *U*-value limits for "all other outdoor lighting".

5. If the nearest property line is less than or equal to two mounting heights from the front hemisphere of the luminaire distribution, the applicable reduced Glare rating shall be met.

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DIVISION 5.2 ENERGY EFFICIENCY

SECTION 5.201 GENERAL

5.201.1 Scope [BSC-CG]. ***California Energy Code [DSA-SS].*** For the purposes of mandatory energy efficiency standards in this code, the California Energy Commission will continue to adopt mandatory building standards.

DIVISION 5.3 WATER EFFICIENCY AND CONSERVATION

SECTION 5.301 GENERAL

5.301.1 Scope. The provisions of this chapter shall establish the means of conserving water use indoors, outdoors and in wastewater conveyance.

SECTION 5.302 DEFINITIONS

5.302.1 Definitions. The following terms are defined in Chapter 2 *(and are included here for reference)*

EVAPOTRANSPIRATION ADJUSTMENT FACTOR (ETAF) [DSA-SS]. An adjustment factor when applied to reference evapotranspiration that adjusts for plant factors and irrigation efficiency, which ae two major influences on the amount of water that needs to be applied to the landscape.

FOOTPRINT AREA [DSA-SS]. The total area of the furthest exterior wall of the structure projected to natural grade, not including exterior areas such as stairs, covered walkways, patios and decks.

METERING FAUCET. A self-closing faucet that dispenses a specific volume of water for each actuation cycle. The volume or cycle duration can be fixed or adjustable.

GRAYWATER. Pursuant to Health and Safety Code Section 17922.12, "graywater" means untreated wastewater that has not been contaminated by any toilet discharge, has not been affected by infectious, contaminated, or unhealthy bodily wastes, and does not present a threat from contamination by unhealthful processing, manufacturing, or operating wastes. "Graywater" includes, but is not limited to wastewater from bathtubs, showers, bathroom washbasins, clothes washing machines and laundry tubs, but does not include waste water from kitchen sinks or dishwashers.

MODEL WATER EFFICIENT LANDSCAPE ORDINANCE (MWELO). The California ordinance regulating landscape design, installation and maintenance practices that will ensure commercial, multifamily and other developer installed landscapes greater than 2500 square feet meet an irrigation water budget developed based on landscaped area and climatological parameters.

MODEL WATER EFFICIENT LANDSCAPE ORDINANCE (MWELO). [HCD] The California model ordinance (California Code of Regulations, Title 23, Division 2, Chapter 2.7), regulating landscape design, installation and maintenance practices. Local agencies are required to adopt the updated MWELO, or adopt a local ordinance at least as effective as the MWELO.

POTABLE WATER. Water that is drinkable and meets the U.S. Environmental Protection Agency (EPA) Drinking Water Standards, See definition in the California Plumbing Code, Part 5.

POTABLE WATER. [HCD] Water that is satisfactory for drinking, culinary, and domestic puroses, and meets the U.S. Environmental Protection Agency (EPA) Drinking Water Standards and the requirements of the Health Authority Having Jurisdiction.

RECYCLED WATER. Water which, as a result of treatment of waste, is suitable for a direct beneficial use or a controlled use that would not otherwise occur [Water Code Section 13050 (n)]. Simply put, recycled water is water treated to remove waste matter attaining a quality that is suitable to use the water again.

SUBMETER. A meter installed subordinate to a site meter. Usually used to measure water intended for one purpose, such as landscape irrigation. For the purposes of CALGreen, a dedicated meter may be considered a submeter.

WATER BUDGET. Is the estimated total landscape irrigation water use which shall not exceed the maximum applied water allowance calculated in accordance with the Department of Water Resources Model Efficient Landscape Ordinance (MWELO).

SECTION 5.303 INDOOR WATER USE

5.303.1 METERS. Separate submeters or metering devices shall be installed for the uses described in Sections 503,1,1 and 503,1,2.

5.303.1.1 Buildings in excess of 50,000 square feet. Separate submeters shall be installed as follows:

1. For each individual leased, rented or other tenant space within the building projected to consume more than 100 gal/day (380 L/day), including, but not limited to, spaces used for laundry or deaners, restaurant or food service, medical or dental office, laboratory, or beauty salon or barber shop.
2. Where separate submeters for individual building tenants are unfeasible, for water supplied to the following subsystems:
   a. Makeup water for cooling towers where flow through is greater than 500 gpm (30 L/s).
   b. Makeup water for evaporative coolers greater than 6 gpm (0,04 L/s),
   c. Steam and hot water boilers with energy input more than 500,000 Btu/h (147 kW).

5.303.1.2 Excess consumption. A separate submeter or metering device shall be provided for any tenant within a new building or within an addition that is projected to consume more than 1,000 gal/day.

5.303.3 WATER CONSERVING PLUMBING FIXTURES AND FITTINGS. Plumbing fixtures (water closets and urinals) and fittings (faucets and showerheads) shall comply with the following:

5.303.3.1 Water Closets. The effective flush volume of all water closets shall not exceed 1,28 gallons per flush. Tank-type water closets shall be certified to the performance criteria of the U.S. EPA WaterSense Specification for Tank-Type toilets.

Note: The effective flush volume of dual flush toilets is defined as the composite, average flush volume of two reduced flushes and one full flush.

5.303.3,2 Urinals. The effective flush volume of urinals shall not exceed 0,5 gallons per flush.

5.303.3.3 Showerheads.
5.303.3.3,1 Single showerhead. Showerheads shall have a maximum flow rate of not more than 2.0 gallons per minute at 80 psi. Showerheads shall be certified to the performance criteria of the U.S. EPA WaterSense Specification for Showerheads.

5.303.3.3.2 Multiple showerheads serving one shower. When a shower is served by more than one showerhead, the combined flow rate of all the showerheads and/or other shower outlets controlled by a single valve shall not exceed 2.0 gallons per minute at 80 psi, or the shower shall be designed to allow only one shower outlet to be in operation at a time.

Note: A hand-held shower shall be considered a showerhead.

5.303.3.4 Faucets and fountains.

5.303.3.4.1 Nonresidential Lavatory faucets. Lavatory faucets shall have a maximum flow rate of not more than 0.5 gallons per minute at 60 psi.

5.303.3.4.2 Kitchen faucets. Kitchen faucets shall have a maximum flow rate of not more than 1,8 gallons per minute at 60 psi. Kitchen faucets may temporarily increase the flow above the maximum rate, but not to exceed 2,2 gallons per minute at 60 psi, and must default to a maximum flow rate of 1,8 gallons per minute at 60 psi.

5.303.3.4.3 Wash fountains. Wash fountains shall have a maximum flow rate of not more than1,8 gallons per minute/20 [rim space (inches) at 60 psi].

5.303.3.4.4 Metering faucets. Metering faucets shall not deliver more than 0.20 gallons per cycle.

5.303.3.4.5 Metering faucets for wash fountains. Metering faucets for wash fountains shall have a maximum flow rate of not more than 0.20 gallons per minute/20 [rim space (inches) at 60 psi].

Note: Where complying faucets are unavailable, aerators or other means may be used to achieve reduction.

5.303.4 COMMERCIAL KITCHEN EQUIPMENT.

5.303.4.1 Food Waste Disposers. Disposers shall either modulate the use of water to no more than 1 gpm when the disposer is not in use (not actively grinding food waste/no-load) or shall automatically shut off after no more than 10 minutes of inactivity. Disposers shall use no more than 8 gpm of water.

Note: This code section does not affect local jurisdiction authority to prohibit or require disposer installation.

5.303.5 AREAS OF ADDITION OR ALTERATION. For those occupancies within the authority of the California Building Standards Commission as specified in Section 103, the provisions of Section 5.303.3 and 5.303.4 shall apply to new fixtures in additions or areas of alteration to the building.

5.303.6 STANDARDS FOR PLUMBING FIXTURES AND FITTINGS. Plumbing fixtures and fittings shall be installed in accordance with the *California Plumbing Code*, and shall meet the applicable standards referenced in Table 1701.1

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PLAN SET VERSION **V1.2**

⚠ cal green compliance
4/21/18

2016 CALIFORNIA GREEN BUILDING STANDARDS CODE
NONRESIDENTIAL MANDATORY MEASURES, SHEET 2 (INCLUDING JANUARY 1, 2017 ERRATA)

INSPECTOR SIGNOFF

SECTION 5.304 OUTDOOR WATER USE

5.304.1 SCOPE. The provisions of Section 5.304, Outdoor Water Use reference the mandatory Model Water Efficiency Landscape Ordinance (MWELO) contained within Chapter 2.7, Division 2, Title 23, California Code of Regulations.

5.304.2 OUTDOOR WATER USE IN LANDSCAPE AREAS EQUAL TO OR GREATER THAN 500 SQUARE FEET. When water is used for outdoor irrigation for new construction projects with an aggregate landscape area equal to or greater than 500 square feet requiring a building or landscape permit, plan check or design review, one of the following shall apply:

1. A local water efficient landscape ordinance that is, based on evidence in the record, at least as effective in conserving water as the updated model ordinance adopted by the Department of Water Resouces (DWR) per Government Code Section 65595(c).
2. The California Department of Water Resources Model Water Efficient Landscape Ordinance (MWELO) commencing with Section 490 of Chapter 2.7, Division 2, Title 23, California Code of Regulations.

5.304.3 OUTDOOR WATER USE IN REHABILITATED LANDSCAPE PROJECTS EQUAL TO OR GREATER THAN 2,500 SQUARE FEET. Rehabilitated landscape project with an aggregate landscape area equal to or greater than 2,500 square feet requiring a building or landscape permit, plan check, or design review shall comply with Section 5.304.2, Item 1 or 2.

5.304.4 OUTDOOR WATER USE IN LANDSCAPE AREAS OF 2,500 SQUARE FEET OR LESS. Any project with an aggregate area of 2,500 square feet of less may comply with the performance requirements of MWELO or conform to the prescriptive compliance measures contained in MWELO's Appendix D.

5.304.5 GRAYWATER OR RAINWATER USE IN LANDSCAPE AREAS. For projects using treated or untreated graywater or rainwater captured on site, any lot or parcel within the project that has less than 2,500 square feet of landscape and meets the lot or parcel's landscape water requirement (Estimate Total Water Use) entirely with treated or untreated graywater or through stored rainwater captured on site is subject only to Appendix D Section (5).

Notes:
1. DWR's Model Water Efficient Landscape Ordinance, definitions and supporting documents are available at the following link: http://water,ca,gov/waterusefficiency/landscapeordinance/
2. A water budget calculator is available at the following link: http://water.ca.gov/waterusefficiency/landscapeordinance/
3. The MWELO prescriptive compliance measure Appendix D may be found at the following link: http://water,ca,gov/waterusefficiency/landscapeordinance/ In addition, a copy of MWELO Appendix D may be found in Chapter 8 of this code.

5.304.6 OUTDOOR POTABLE WATER USE IN LANDSCAPE AREAS [DSA-SS]. For public schools and community colleges, landscape projects as described in Sections 5.304.6.1 and 5.304.6.2 shall comply with the California Department of Water Resources Model Water Efficient Landscape Ordinance (MWELO) commencing with Section 490 of Chapter 2,7, Division 2, Title 23, California Code of Regulations, except that the evapotranspiration adjustment factor (ETAF) shall be 0.65 with an additional water allowance for special landscape areas (SLA) of 0.35.

Exception: Any project with an aggregate landscape area of 2,500 square feet or less may comply with the prescriptive measures contained in Appendix D of MWELO.

5.304.6.1 Newly constructed landscapes. [DSA-SS] New construction projects with an aggregate landscape area equal to or greater than 500 square feet.

5.304.6.2 Rehabilitated landscapes. [DSA-SS] Rehabilitated landscape projects with an aggregate landscape area equal to or greater than 1,200 square feet.

5.304.3 IRRIGATION DESIGN. In new nonresidential construction with at least 1,000 but not more than 2,500 square feet of cumulative landscaped area (the level at which the MWELO applies), install irrigation controllers and sensors which include the following criteria, and meet manufacturer's recommendations.

5.304.3.1 Irrigation controllers. Automatic irrigation system controllers installed at the time of final inspection shall comply with the following:

1. Controllers shall be weather- or soil moisture-based controllers that automatically adjust irrigation in response to changes in plants' needs as weather conditions change.
2. Weather-based controllers without integral rain sensors or communication systems that account for local rainfall shall have a separate wired or wireless rain sensor which connects or communicates with the controller(s). Soil moisture-based controllers are not required to have rain sensor input.

Note: More information regarding irrigation controller function and specifications is available from the Irrigation Association.

DIVISION 5.4 MATERIAL CONSERVATION AND RESOURCE EFFICIENCY

SECTION 5.401 GENERAL

5.401.1 SCOPE. The provisions of this chapter shall outline means of achieving material conservation and resource efficiency through protection of buildings from exterior moisture, construction waste diversion, employment of techniques to reduce pollution through recycling of materials, and building commissioning or testing and adjusting.

SECTION 5.402 DEFINITIONS

5.402.1 DEFINITIONS. The following terms are defined in Chapter 2 *(and are included here for reference)*

ADJUST. To regulate fluid flow rate and air patterns at the terminal equipment, such as to reduce fan speed or adjust a damper.

BALANCE. To proportion flows within the distribution system, including sub-mains, branches and terminals, according to design quantities.

BUILDING COMMISSIONING. A systematic quality assurance process that spans the entire design and construction process, including verifying and documenting that building systems and components are planned, designed, installed, tested, operated and maintained to meet the owner's project requirements.

ORGANIC WASTE. Food waste, green waste, landscape and pruning wste, nonhazardous wood waste, and food soiled paper waste that is mixed in with food waste.

TEST. A procedure to determine quantitative performance of a system or equipment

SECTION 5.407 WATER RESISTANCE AND MOISTURE MANAGEMENT

5.407.1 WEATHER PROTECTION. Provide a weather-resistant exterior wall and foundation envelope as required by California Building Code Section 1403.2 (Weather Protection) and California Energy Code Section 150, (Mandatory Features and Devices), manufacturer's installation instructions or local ordinance, whichever is more stringent.

5.407.2 MOISTURE CONTROL. Employ moisture control measures by the following methods.

5.407.2.1 Sprinklers. Design and maintain landscape irrigation systems to prevent spray on structures.

5.407.2.2 Entries and openings. Design exterior entries and/or openings subject to foot traffic or wind-driven rain to prevent water intrusion into buildings as follows:

5.407.2.2.1 Exterior door protection. Primary exterior entries shall be covered to prevent water intrusion by using nonabsorbent floor and wall finishes within at least 2 feet around and perpendicular to such openings plus at least one of the following:

1. An installed awning at least 4 feet in depth,
2. The door is protected by a roof overhang at least 4 feet in depth,
3. The door is recessed at least 4 feet.
4. Other methods which provide equivalent protection.

5.407.2.2.2 Flashing. Install flashings integrated with a drainage plane.

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SECTION 5.408 CONSTRUCTION WASTE REDUCTION, DISPOSAL AND RECYCLING

5.408.1 CONSTRUCTION WASTE MANAGEMENT. Recycle and/or salvage for reuse a minimum of 65% of the non-hazardous construction and demolition waste in accordance with Section 5.408.1.1, 5.408.1.2 or 5.408.1.3; or meet a local construction and demolition waste management ordinance, whichever is more stringent.

5.408.1.1 Construction waste management plan. Where a local jurisdiction does not have a construction and demolition waste management ordinance, submit a construction waste management plan that:

1. Identifies the construction and demolition waste materials to be diverted from disposal by efficient usage, recycling, reuse on the project or salvage for future use or sale.
2. Determines if construction and demolition waste materials will be sorted on-site (source-separated) or bulk mixed (single stream).
3. Identifies diversion facilities where construction and demolition waste material collected will be taken.
4. Specifies that the amount of construction and demolition waste materials diverted shall be calculated by weight or volume, but not by both.

5.408.1.2 Waste Management Company. Utilize a waste management company that can provide verifiable documentation that the percentage of construction and demolition waste material diverted from the landfill complies with this section.

Note: The owner or contractor shall make the determination if the construction and demolition waste material will be diverted by a waste management company.

Exceptions to Sections 5.408.1.1 and 5.408.1.2:

1. Excavated soil and land-clearing debris.
2. Alternate waste reduction methods developed by working with local agencies if diversion or recycle facilities capable of compliance with this item do not exist.
3. Demolition waste meeting local ordinance or calculated in consideration of loacl recycleing facilities and markets.

5.408.1.3 Waste stream reduction alternative. The combined weight of new construction disposal that does not exceed two pounds per square foot of building area may be deemed to meet the 65% minimum requirement as approved by the enforcing agency.

5.408.1.4 Documentation. Documentation shall be provided to the enforcing agency which demonstrates compliance with Sections 5.408.1.1, through 5.408.1.3, The waste management plan shall be updated as necessary and shall be accessible during construction for examination by the enforcing agency.

Notes:

1. Sample forms found in "A Guide to the California Green Building Standards Code (Nonresidential)" located at www.bsc.ca.gov/Home/CALGreen.aspx may be used to assist in documenting compliance with the waste management plan.
2. Mixed construction and demolition debris processors can be located at the California Department of Resources Recycling and Recovery (CalRecycle).

5.408.2 UNIVERSAL WASTE. [A] Additions and alterations to a building or tenant space that meet the scoping provisions in Section 301.3 for nonresidential additions and alterations, shall require verification that Universal Waste items such as fluorescent lamps and ballast and mercury containing thermostats as well as other California prohibited Universal Waste materials are disposed of properly and are diverted from landfills. A list of prohibited Universal Waste materials shall be included in the construction documents.

Note: Refer to the Universal Waste Rule link at: http://www.dtsc.ca.gov/LawsRegsPolicies/Regs/upload/OEAR-A_REGS_UWR_FinalText.pdf

5.408.3 EXCAVATED SOIL AND LAND CLEARING DEBRIS. 100 percent of trees, stumps, rocks and associated vegetation and soils resulting primarily from land clearing shall be reused or recycled. For a phased project, such material may be stockpiled on site until the storage site is developed.

Exception: Reuse, either on or off-site, of vegetation or soil contaminated by disease or pest infestation.

Notes:

1. If contamination by disease or pest infestation is suspected, contact the County Agricultural Commissioner and follow its direction for recycling or disposal of the material.
2. For a map of know pest and/or disease quarantine zones, consult with the California Department of Food and Agriculture. (www.cdfa.ca.gov)

SECTION 5.410 BUILDING MAINTENANCE AND OPERATIONS

5.410.1 RECYCLING BY OCCUPANTS. Provide readily accessible areas that serve the entire building and are identified for the depositing, storage and collection of non-hazardous materials for recycling, including (at a minimum) paper, corrugated cardboard, glass, plastics, organic waste, and metals or meet a lawfully enacted local recycling ordinance, if more restrictive.

Exception: Rural jurisdictions that meet and apply for the exemption in Public Resources Code 42649.82 (a)(2)(A) et seq, shall also be exempt from the organic waste portion of this section.

5.410.1.1 Additions. All additions conducted within a 12-month period under single or multiple permits, resulting in an increase of 30% or more in floor area, shall provide recycling areas on site.

Exception: Additions within a tenant space resulting in less than a 30% increase in the tenant space floor area.

5.410.1.2 Sample ordinance. Space allocation for recycling areas shall comply with Chapter 18, Part 3, Division 30 of the *Public Resources Code*. Chapter 18 is known as the California Solid Waste Reuse and Recycling Access Act of 1991 (Act).

Note: A sample ordinance for use by local agencies may be found in Appendix A of the document at the CalRecycle's web site.

5.410.2 COMMISSIONING. [N] For new buildings 10,000 square feet and over, building commissioning shall be included in the design and construction processes of the building project to verify that the building systems and components meet the owner's or owner representative's project requirements. Commissioning shall be performed in accordance with this section by trained personnel with experience on projects of comparable size and complexity. All occupancies other than I-occupancies and L-occupancies shall comply with the California Energy Code as prescribed in California Energy Code Section 120.8. For I-occupancies that are not regulated by OSHPD or for I-occupancies and L-occupancies that are not regulated by the California Energy Code Section 100.0 Scope, all requirements in Sections 5.410.2 through 5.410.2.6 shall apply.

Commissioning requirements shall include:

1. Owner's or Owner representative's project requirements.
2. Basis of design.
3. Commissioning measures shown in the construction documents.
4. Commissioning plan.
5. Functional performance testing.
6. Documentation and training.
7. Commissioning report.

Exceptions:

1. Unconditioned warehouses of any size.
2. Areas less than 10,000 square feet used for offices or other conditioned accessory spaces within unconditioned warehouses.
3. Tenant improvements less than 10,000 square feet as described in Section 303,1,1.
4. Open parking garages of any size, or open parking garage areas, of any size, within a structure.

Note: For the purposes of this section, unconditioned shall mean a building, area, or room which does not provide heating and or air conditioning.

Informational Notes:

1. IAS AC 476 is an accreditation criteria for organizations providing training and/or certification of commissioning personnel. AC 476 is available to the Authority Having Jurisdiction as a reference for qualifications of commissioning personnel, AC 476 des not certify individuals to conduct functional performance tests or to adjust and balance systems.
2. Functional performance testing for heating, ventilation, air conditioning systems and lighting controls must be performed in compliance with the *California Energy Code*.

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5.410.2.1 Owner's or Owner Representative's Project Requirements (OPR). [N] The expectations and requirements of the building appropriate to its phase shall be documented before the design phase of the project begins. This documentation shall include the following:

1. Environmental and sustainability goals.
2. Energy efficiency goals.
3. Indoor environmental quality requirements,
4. Project program, including facility functions and hours of operation, and need for after hours operation.
5. Equipment and systems expectations.
6. Building occupant and operation and maintenance (O&M) personnel expectations.

5.410.2.2 Basis of Design (BOD). [N] A written explanation of how the design of the building systems meets the OPR shall be completed at the design phase of the building project. The Basis of Design document shall cover the following systems:

1. Heating, ventilation, air conditioning (HVAC) systems and controls.
2. Indoor lighting system and controls.
3. Water heating system,
4. Renewable energy systems,
5. Water reuse systems.

5.410.2.3 Commissioning plan. [N] Prior to permit issuance a commissioning plan shall be completed to document how the project will be commissioned. The commissioning plan shall include the following:

1. General project information.
2. Commissioning goals.
3. Systems to be commissioned. Plans to test systems and components shall include:
   a. An explanation of the original design intent,
   b. Equipment and systems to be tested, including the extent of tests,
   c. Functions to be tested,
   d. Conditions under which the test shall be performed,
   e. Measurable criteria for acceptable performance.
4. Commissioning team information,
5. Commissioning process activities, schedules and responsibilities. Plans for the completion of commissioning shall be included.

5.410.2.4 Functional performance testing. [N] Functional performance tests shall demonstrate the correct installation and operation of each component, system and system-to-system interface in accordance with the approved plans and specifications. Functional performance testing reports shall contain information addressing each of the building components tested, the testing methods utilized, and include any readings and adjustments made.

5.410.2.5 Documentation and training. [N] A Systems Manual and Systems Operations Training are required, including Occupational Safety and Health Act (OSHA) requirements in *California Code of Regulations* (CCR), Title 8, Section 5142, and other related regulations.

5.410.2.5.1 Systems manual. [N] Documentation of the operational aspects of the building shall be completed within the systems manual and delivered to the building owner or representative. The systems manual shall include the following:

1. Site information, including facility description, history and current requirements.
2. Site contact information.
3. Basic operations and maintenance, including general site operating procedures, basic troubleshooting, recommended maintenance requirements, site events log.
4. Major systems.
5. Site equipment inventory and maintenance notes.
6. A copy of verifications required by the enforcing agency or this code.
7. Other resources and documentation, if applicable.

5.410.2.5.2 Systems operations training. [N] A program for training of the appropriate maintenance staff for each equipment type and/or system shall be developed and documented in the commissioning report and shall include the following:

1. System/equipment overview (what it is, what it does and with what other systems and/or equipment it interfaces).
2. Review and demonstration of servicing/preventive maintenance.
3. Review of the information in the Systems Manual.
4. Review of the record drawings on the system/equipment.

5.410.2.6 Commissioning report. [N] A report of commissioning process activities undertaken through the design and construction phases of the building project shall be completed and provided to the owner or representative.

5.410.4 TESTING AND ADJUSTING. Testing and adjusting of systems shall be required for buildings less than 10,000 square feet or new systems to serve an addition or alteration subject to Section 303.1.

5.410.4.2 Systems. Develop a written plan of procedures for testing and adjusting systems. Systems to be included for testing and adjusting shall include at a minimum, as applicable to the project:

1. HVAC systems and controls.
2. Indoor and outdoor lighting and controls.
3. Water heating systems.
4. Renewable energy systems.
5. Landscape irrigation systems.
6. Water reuse systems.

5.410.4.3 Procedures. Perform testing and adjusting procedures in accordance with manufacturer's specifications and applicable standards on each system.

5.410.4.3.1 HVAC balancing. In addition to testing and adjusting, before a new space-conditioning system serving a building or space is operated for normal use, the system shall be balanced in accordance with the procedures defined by the Testing Adjusting and Balancing Bureau National Standards; the National Environmental Balancing Bureau Procedural Standards; Associated Air Balance Council National Standards or as approved by the enforcing agency.

5.410.4.4 Reporting. After completion of testing, adjusting and balancing, provide a final report of testing signed by the individual responsible for performing these services.

5.410.4.5 Operation and maintenance (O & M) manual. Provide the building owner or representative with detailed operating and maintenance instructions and copies of guaranties/warranties for each system. O & M instructions shall be consistent with OSHA requirements in CCR, Title 8, Section 5142, and other related regulations.

5.410.4.5.1 Inspections and reports. Include a copy of all inspection verifications and reports required by the enforcing agency.

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DIVISION 5.5 ENVIRONMENTAL QUALITY

SECTION 5.501 GENERAL

5.501.1 SCOPE. The provisions of this chapter shall outline means of reducing the quantity of air contaminants that are odorous, irritating, and/or harmful to the comfort and well-being of a building's installers, occupants and neighbors.

SECTION 5.502 DEFINITIONS

5.502.1 DEFINITIONS. The following terms are defined in Chapter 2 *(and are included here for reference)*

ARTERIAL HIGHWAY. A general term denoting a highway primarily for through traffic usually on a continuous route,

A-WEIGHTED SOUND LEVEL (dBA). The sound pressure level in decibels as measured on a sound level meter using the internationally standardized A-weighting filter or as computed from sound spectral data to which A-weighting adjustments have been made.

1 BTU/HOUR, British thermal units per hour, also referred to as Btu. The amount of heat required to raise one pound of water one degree Fahrenheit per hour, a common measure of heat transfer rate. A ton of refrigeration is 12,000 Btu, the amount of heat required to melt a ton (2,000 pounds) of ice at 32^{0} Fahrenheit.

COMMUNITY NOISE EQUIVALENT LEVEL (CNEL). A metric similar to the day-night average sound level (Ldn), except that a 5 decibel adjustment is added to the equivalent continuous sound exposure level for evening hours (7pm to 10pm) in addition to the 10 dB nighttime adjustment used in the Ldn.

COMPOSITE WOOD PRODUCTS. Composite wood products include hardwood plywood, particleboard and medium density fiberboard. "Composite wood products" does not include hardboard, structural plywood, structural panels, structural composite lumber, oriented strand board, glued laminated timber, timber, prefabricated wood I-joists or finger–jointed lumber, all as specified in California Code of Regulations (CCR), Title 17, Section 93120.1(a).

Note: See CCR, Title 17, Section 93120.1.

DAY-NIGHT AVERAGE SOUND LEVEL (Ldn). The A-weighted equivalent continuous sound exposure level for a 24-hour period with a 10 dB adjustment added to sound levels occurring during nighttime hours (10p.m. to 7 a.m.).

DECIBEL (db). A measure on a logarithmic scale of the magnitude of a particular quantity (such as sound pressure, sound power, sound intensity) with respect to a reference quantity.

ELECTRIC VEHICLE (EV). An automotive-type vehicle for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, electric motorcycles, and the like, primarily powered by an electric motor that draws current from a rechargeable storage battery, fuel cell, photovoltaic array, or other source of electric current. Plug-in hybrid electric vehicles (PHEV) are considered electric vehicles. For purposes of the *California Electrical Code*, off-road, self-propoelled electric vehicles, such as industrial trucks, hoists, lifts, transports, golf carts, airline ground support equipment, tractors, boats, and the like, are not included.

ELECTRIC VEHICLE CHARGING STATION(S) (EVCSj). One or more spaces intended for charging electric vehicles.

ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE). The conductors, including the ungrounded, grounded, and equipment grounding conductors and the electric vehicle connectors, attachment plugs, and all other fittings, devices, power outlets, or apparatus installed specifically for the purpose of transferring energy between the premises wiring and the electric vehicle.

ENERGY EQUIVALENT (NOISE) LEVEL (Leq). The level of a steady noise which would have the same energy as the fluctuating noise level integrated over the time of period of interest.

EXPRESSWAY. An arterial highway for through traffic which may have partial control of access, but which may or may not be divided or have grade separations at intersections.

FREEWAY. A divided arterial highway with full control of access and with grade separations at intersections.

GLOBAL WARMING POTENTIAL (GWP). The radiative forcing impact of one mass-based unit of a given greenhouse gas relative to an equivalent unit of carbon dioxide over a given period of time. Carbon dioxide is the reference compound with a GWP of one.

GLOBAL WARMING POTENTIAL VALUE (GWP VALUE). A 100-year GWP value published by the Intergovernmental Panel on Climate Change (IPCC) in either its Second Assessment Report (SAR) (IPCC, 1995); or its Fourth Assessment A-3 Report (AR4) (IPCC, 2007). The SAR GWP values are found in column "SAR (100-yr)" of Table 2.14.; the AR4 GWP values are found in column "100 yr" of Table 2.14.

HIGH-GWP REFRIGERANT. A compound used as a heat transfer fluid or gas that is: (a) a chlorofluorocarbon, a hdrochlorofluorocarbon, a hydrofluorocarbon, a perfluorocarbon, or any compound or blend of compounds, with a GWP value equal to or greater than 150, or (B) any ozone depleting substance as defined in Title 40 of the Code of Federal Regulations, Part 82, sec.82,3 (as amended March 10, 2009).

LONG RADIUS ELBOW. Pipe fitting installed between two lengths of pipe or tubing to allow a change of direction, with a radius 1.5 times the pipe diameter.

LOW-GWP REFRIGERANT. A compound used as a heat transfer fluid or gas that: (A) has a GWP value less than 150, and (B) is not an ozone depleting substance as defined in Title 40 of the Code of Federal Regulations, Part 82, sec.82.3 (as amended March 10, 2009).

MERV. Filter minimum efficiency reporting value, based on ASHRAE 52.2–1999.

MAXIMUM INCREMENTAL REACTIVITY (MIR). The maximum change in weight of ozone formed by adding a compound to the "Base REactive Organic Gas (ROG) Mixture" per weight of compound added, expressed to hundreths of a gram (g O^{3}/g ROC).

PRODUCT-WEIGHTED MIR (PWMIR). The sum of all weighted-MIR for all ingredients in a product subject to this article. The PWMIR is the total product reactivity expressed to hundredths of a gram of ozone formed per gram of product (excluding container and packaging).

PSIG. Pounds per square inch, guage.

REACTIVE ORGANIC COMPOUND (ROC). Any compound that has the potential, once emitted, to contribute to ozone formation in the troposphere.

SCHRADER ACCESS VALVES. Access fittings with a valve core installed.

SHORT RADIUS ELBOW. Pipe fitting installed between two lengths of pipe or tubing to allow a change of direction, with a radius 1.0 times the pipe diameter.

SUPERMARKET. For the purposes of Section 5.508.2, a supermarket is any retail food facility with 8,000 square feet or more conditioned area, and that utilizes either refrigerated display cases, or walk-in coolers or freezers connected to remote compressor units or condensing units.

VOC. A volatile organic compound broadly defined as a chemical compound based on carbon chains or rings with vapor pressures greater than 0.1 millimeters of mercury at room temperature. These compounds typically contain hydrogen and may contain oxygen, nitrogen and other elements. See CCR Title 17, Section 94508(a)

Note: Where specific regulations are cited from different agencies such as SCAQMD, ARB, etc., the VOC definition included in that specific regulation is the one that prevails for the specific measure in question.

SECTION 5.503 FIREPLACES

5.503.1 FIREPLACES. Install only a direct-vent sealed-combustion gas or sealed wood-burning fireplace, or a sealed woodstove or pellet stove, and refer to residential requirements in the California Energy Code, Title 24, Part 6, Subchapter 7, Section 150. Woodstoves, pellet stoves and fireplaces shall comply with applicable local ordinances.

5.503.1.1 Woodstoves. Woodstoves and pellet stoves shall comply with U,S, EPA New Source Performance Standards (NSPS) emission limits as applicable, and shall have a permanent label indicating they are certified to meet the emission limits.

SECTION 5.504 POLLUTANT CONTROL

5.504.1 TEMPORARY VENTILATION. The permanent HVAC system shall only be used during construction if necessary to condition the building or areas of addition or alteration within the required temperature range for material and equipment installation. If the HVAC system is used during construction, use return air filters with a Minimum Efficiency Reporting Value (MERV) of 8, based on ASHRAE 52.2-1999, or an average efficiency of 30% based on ASHRAE 52.1-1992 Replace all filters immediately prior to occupancy, or, if the building is occupied during alteration, at the conclusion of construction.

5.504.3 Covering of duct openings and protection of mechanical equipment during construction. At the time of rough installation, or during storage on the construction site and until final startup of the heating, cooling and ventilating equipment, all duct and other related air distribution component openings shall be covered with tape, plastic, sheet metal or other methods acceptable to the enforcing agency to reduce the amount of dust, water and debris which may collect in the system.

⚠ cal green compliance 4/21/18

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PLAN SET VERSION **V1.2**

2016 CALIFORNIA GREEN BUILDING STANDARDS CODE
NONRESIDENTIAL MANDATORY MEASURES, SHEET 3 (INCLUDING JANUARY 1, 2017 ERRATA)

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5.504.4 FINISH MATERIAL POLLUTANT CONTROL. Finish materials shall comply with Sections 5.504.4.1 through 5.504.4.6.

5.504.4.1 Adhesives, sealants and caulks. Adhesives, sealants, and caulks used on the project shall meet the requirements of the following standards:

1. Adhesives, adhesive bonding primers adhesive primers, sealants, sealant primers and caulks shall comply with local or regional air pollution control or air quality management district rules where applicable, or SCAQMD Rule 1168 VOC limits, as shown in Tables 5.504.4.1 and 5.504.4.2. Such products also shall comply with the Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene and trichloroethylene), except for aerosol products as specified in subsection 2, below.

2. Aerosol adhesives, and smaller unit sizes of adhesives, and sealant or caulking compounds (in units of product, less packaging, which do not weigh more than one pound and do not consist of more than 16 fluid ounces) shall comply with statewide VOC standards and other requirements, including prohibitions on use of certain toxic compounds, of *California Code of Regulations*, Title 17, commencing with Section 94507.

TABLE 5.504.4.1 - ADHESIVE VOC LIMIT[1,2]

Less Water and Less Exempt Compounds in Grams per Liter

ARCHITECTURAL APPLICATIONS	CURRENT VOC LIMIT
INDOOR CARPET ADHESIVES	50
CARPET PAD ADHESIVES	50
OUTDOOR CARPET ADHESIVES	150
WOOD FLOORING ADHESIVES	100
RUBBER FLOOR ADHESIVES	60
SUBFLOOR ADHESIVES	50
CERAMIC TILE ADHESIVES	65
VCT & ASPHALT TILE ADHESIVES	50
DRYWALL & PANEL ADHESIVES	50
COVE BASE ADHESIVES	50
MULTIPURPOSE CONSTRUCTION ADHESIVES	70
STRUCTURAL GLAZING ADHESIVES	100
SINGLE-PLY ROOF MEMBRANE ADHESIVES	250
OTHER ADHESIVES NOT SPECIFICALLY LISTED	50
SPECIALTY APPLICATIONS	
PVC WELDING	510
CPVC WELDING	490
ABS WELDING	325
PLASTIC CEMENT WELDING	250
ADHESIVE PRIMER FOR PLASTIC	550
CONTACT ADHESIVE	80
SPECIAL PURPOSE CONTACT ADHESIVE	250
STRUCTURAL WOOD MEMBER ADHESIVE	140
TOP & TRIM ADHESIVE	250
SUBSTRATE SPECIFIC APPLICATIONS	
METAL TO METAL	30
PLASTIC FOAMS	50
POROUS MATERIAL (EXCEPT WOOD)	50
WOOD	30
FIBERGLASS	80

1. IF AN ADHESIVE IS USED TO BOND DISSIMILAR SUBSTRATES TOGETHER, THE ADHESIVE WITH THE HIGHEST VOC CONTENT SHALL BE ALLOWED.

2. FOR ADDITIONAL INFORMATION REGARDING METHODS TO MEASURE THE VOC CONTENT SPECIFIED IN THIS TABLE, SEE SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT RULE 1168, www.arb.ca.gov/DRDB/SC/CURHTML/R1168.PDF

TABLE 5.504.4.2 - SEALANT VOC LIMIT

Less Water and Less Exempt Compounds in Grams per Liter

SEALANTS	CURRENT VOC LIMIT
ARCHITECTURAL	250
MARINE DECK	760
NONMEMBRANE ROOF	300
ROADWAY	250
SINGLE-PLY ROOF MEMBRANE	450
OTHER	420
SEALANT PRIMERS	
ARCHITECTURAL	
NONPOROUS	250
POROUS	775
MODIFIED BITUMINOUS	500
MARINE DECK	760
OTHER	750

NOTE: FOR ADDITIONAL INFORMATION REGARDING METHODS TO MEASURE THE VOC CONTENT SPECIFIED IN THESE TABLES, SEE SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT RULE 1168.

5.504.4.3 Paints and coatings. Architectural paints and coatings shall comply with VOC limits in Table 1 of the ARB Architectural Coatings Suggested Control Measure, as shown in Table 5.504.4.3, unless more stringent local limits apply. The VOC content limit for coatings that do not meet the definitions for the specialty coatings categories listed in Table 5.504.4.3 shall be determined by classifying the coating as a Flat, Nonflat or Nonflat-High Gloss coating, based on its gloss, as defined in Subsections 4.21, 4.36 and 4.37 of the 2007 California Air Resources Board Suggested Control Measure, and the corresponding Flat, Nonflat or Nonflat-High Gloss VOC limit in Table 5.504.4.3 shall apply.

5.504.4.3.1 Aerosol Paints and coatings. Aerosol paints and coatings shall meet the PWMIR Limits for ROC in Section 94522(a)(3) and other requirements, including prohibitions on use of certain toxic compounds and ozone depleting substances, in Sections 94522(c)(2) and (d)(2) of *California Code of Regulations*, Title 17, commencing with Section 94520; and in areas under the jurisdiction of the Bay Area Air Quality Management District additionally comply with the percent VOC by weight of product limits of Regulation 8 Rule 49.

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TABLE 5.504.4.3 - VOC CONTENT LIMITS FOR ARCHITECTURAL COATINGS[2,3]

GRAMS OF VOC PER LITER OF COATING, LESS WATER & LESS EXEMPT COMPOUNDS

COATING CATEGORY	CURRENT VOC LIMIT
FLAT COATINGS	50
NONFLAT COATINGS	100
NONFLAT HIGH GLOSS COATINGS	150
SPECIALTY COATINGS	
ALUMINUM ROOF COATINGS	400
BASEMENT SPECIALTY COATINGS	400
BITUMINOUS ROOF COATINGS	50
BITUMINOUS ROOF PRIMERS	350
BOND BREAKERS	350
CONCRETE CURING COMPOUNDS	350
CONCRETE/MASONRY SEALERS	100
DRIVEWAY SEALERS	50
DRY FOG COATINGS	150
FAUX FINISHING COATINGS	350
FIRE RESISTIVE COATINGS	350
FLOOR COATINGS	100
FORM-RELEASE COMPOUNDS	250
GRAPHIC ARTS COATINGS (SIGN PAINTS)	500
HIGH-TEMPERATURE COATINGS	420
INDUSTRIAL MAINTENANCE COATINGS	250
LOW SOLIDS COATINGS[1]	120
MAGNESITE CEMENT COATINGS	450
MASTIC TEXTURE COATINGS	100
METALLIC PIGMENTED COATINGS	500
MULTICOLOR COATINGS	250
PRETREATMENT WASH PRIMERS	420
PRIMERS, SEALERS, & UNDERCOATERS	100
REACTIVE PENETRATING SEALERS	350
RECYCLED COATINGS	250
ROOF COATINGS	50
RUST PREVENTATIVE COATINGS	250
SHELLACS:	
CLEAR	730
OPAQUE	550
SPECIALTY PRIMERS, SEALERS & UNDERCOATERS	100
STAINS	250
STONE CONSOLIDANTS	450
SWIMMING POOL COATINGS	340
TRAFFIC MARKING COATINGS	100
TUB & TILE REFINISH COATINGS	420
WATERPROOFING MEMBRANES	250
WOOD COATINGS	275
WOOD PRESERVATIVES	350
ZINC-RICH PRIMERS	340

1. GRAMS OF VOC PER LITER OF COATING, INCLUDING WATER & EXEMPT COMPOUNDS

2. THE SPECIFIED LIMITS REMAIN IN EFFECT UNLESS REVISED LIMITS ARE LISTED IN SUBSEQUENT COLUMNS IN THE TABLE.

3. VALUES IN THIS TABLE ARE DERIVED FROM THOSE SPECIFIED BY THE CALIFORNIA AIR RESOURCES BOARD, ARCHITECTURAL COATINGS SUGGESTED CONTROL MEASURE, FEB, 1, 2008, MORE INFORMATION IS AVAILABLE FROM THE AIR RESOURCES BOARD.

5.504.4.3.2 Verification. Verification of compliance with this section shall be provided at the request of the enforcing agency. Documentation may include, but is not limited to, the following:

1. Manufacturer's product specification
2. Field verification of on-site product containers

5.504.4.4 Carpet Systems. All carpet installed in the building interior shall meet at least one of the testing and product requirements:

1. Carpet and Rug Institute's Green Label Plus Program.
2. Compliant with the VOC-emission limits and testing requirements specified in the California Department of Public Health Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1, February 2010 (also known as CDPH Standard Method V1.1 or Specification 01350).
3. NSF/ANSI 140 at the Gold level or higher;
4. Scientific Certifications Systems Sustainable Choice; or
5. Compliant with the Collaborative for High Performance Schools California (CA-CHPS) Criteria Interpretation for EQ 7.0 and EQ 7.1 (formerly EQ 2.2) dated July 2012 and listed in the CHPS High Performance Product Database.

5.504.4.4.1 Carpet cushion. All carpet cushion installed in the building interior shall meet the requirements of the Carpet and Rug Institute Green Label program.

5.504.4.4.2 Carpet adhesive. All carpet adhesive shall meet the requirements of Table 5.504.4.1.

5.504.4.5 Composite wood products. Hardwood plywood, particleboard and medium density fiberboard composite wood products used on the interior or exterior of the buildings shall meet the requirements for formaldehyde as specified in ARB's Air Toxics Control Measure for Composite Wood (17 CCR 93120 et seq.). Those materials not exempted under the ATCM must meet the specified emission limits, as shown in Table 5.504.4.5.

5.504.4.5.3 Documentation. Verification of compliance with this section shall be provided as requested by the enforcing agency. Documentation shall include at least one of the following:

1. Product certifications and specifications.
2. Chain of custody certifications.
3. Product labeled and invoiced as meeting the Composite Wood Products regulation (see CCR, Title 17, Section 93120, et seq.).
4. Exterior grade products marked as meeting the PS-1 or PS-2 standards of the Engineered Wood Association, the Australian AS/NZS 2269 or European 636 3S standards.
5. Other methods acceptable to the enforcing agency.

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TABLE 5.504.4.5 - FORMALDEHYDE LIMITS[1]

MAXIMUM FORMALDEHYDE EMISSIONS IN PARTS PER MILLION

PRODUCT	CURRENT LIMIT
HARDWOOD PLYWOOD VENEER CORE	0.05
HARDWOOD PLYWOOD COMPOSITE CORE	0.05
PARTICLE BOARD	0.09
MEDIUM DENSITY FIBERBOARD	0.11
THIN MEDIUM DENSITY FIBERBOARD[2]	0.13

1. VALUES IN THIS TABLE ARE DERIVED FROM THOSE SPECIFIED BY THE CALIFORNIA AIR RESOURCES BOARD, AIR TOXICS CONTROL MEASURE FOR COMPOSITE WOOD AS TESTED IN ACCORDANCE WITH ASTM E 1333. FOR ADDITIONAL INFORMATION, SEE CALIFORNIA CODE OF REGULATIONS, TITLE 17, SECTIONS 93120 THROUGH 93120.12.

2. THIN MEDIUM DENSITY FIBERBOARD HAS A MAXIMUM THICKNESS OF 5/16 INCHES (8 MM).

5.504.4.6 Resilient flooring systems. For 80 percent of floor area receiving resilient flooring, installed resilient flooring shall meet at least one of the following:

1. Certified under the Resilient Floor Covering Institute (RFCI) FloorScore program;
2. Compliant with the VOC-emission limits and testing requirements specified in the California Department of Public Health's 2010 Standard Method for the Testing and Evaluation Chambers, Version 1.1, February 2010;
3. Compliant with the Collaborative for High Performance Schools California (CA-CHPS) Criteria Interpretation for EQ 7, and EQ 7.1 (formerly EQ 2.2) dated July 2012 and listed in the CHPS High Performance Product DataBase; or
4. Products certified under UL GREENGUARD Gold (formerly the Greenguard Children's & Schools Program).

5.504.4.6.1 Verification of compliance. Documentation shall be provided verifying that resilient flooring materials meet the pollutant emission limits.

5.504.5.3 Filters. In mechanically ventilated buildings, provide regularly occupied areas of the building with air filtration media for outside and return air that provides at least a Minimum Efficiency Reporting Value (MERV) of 8. MERV 8 filters shall be installed prior to occupancy, and recommendations for maintenance with filters of the same value shall be included in the operation and maintenance manual.

Exceptions:

1. An ASHRAE 10% to 15% efficiency filter shall be permitted for an HVAC unit meeting the 2013 California Energy Code having 60,000 Btu/h or less capacity per fan coil, if the energy use of the air delivery system is 0.4 W/cfm or less at design air flow.
2. Existing mechanical equipment.

5.504.7 ENVIRONMENTAL TOBACCO SMOKE (ETS) CONTROL. Where outdoor areas are provided for smoking, prohibit smoking within 25 feet of building entries, outdoor air intakes and operable windows and within the building as already prohibited by other laws or regulations; or as enforced by ordinances, regulations or policies of any city, county, city and county, California Community College, campus of the California State University, or campus of the University of California, whichever are more stringent. When ordinances, regulations or policies are not in place, post signage to inform building occupants of the prohibitions.

SECTION 5.505 INDOOR MOISTURE CONTROL

5.505.1 INDOOR MOISTURE CONTROL. Buildings shall meet or exceed the provisions of *California Building Code*, CCR, Title 24, Part 2, Sections 1203 (Ventilation) and Chapter 14 (Exterior Walls). For additional measures not applicable to low-rise residential occupancies, see Section 5.407.2 of this code.

SECTION 5.506 INDOOR AIR QUALITY

5.506.1 OUTSIDE AIR DELIVERY. For mechanically or naturally ventilated spaces in buildings, meet the minimum requirements of Section 120.1 (Requirements For Ventilation) of the *California Energy Code*, or the applicable local code, whichever is more stringent, and Division 1, Chapter 4 of CCR, Title 8.

5.506.2 CARBON DIOXIDE (CO_2) MONITORING. For buildings or additions equipped with demand control ventilation, CO_2 sensors and ventilation controls shall be specified and installed in accordance with the requirements of the California Energy Code, Section 120(c)(4).

SECTION 5.507 ENVIRONMENTAL COMFORT

5.507.4 ACOUSTICAL CONTROL. Employ building assemblies and components with Sound Transmission Class (STC) values determined in accordance with ASTM E 90 and ASTM E 413, or Outdoor-Indoor Sound Transmission Class (OITC) determined in accordance with ASTM E 1332, using either the prescriptive or performance method in Section 5.507.4.1 or 5.507.4.2.

Exception: Buildings with few or no occupants or where occupants are not likely to be affected by exterior noise, as determined by the enforcement authority, such as factories, stadiums, storage, enclosed parking structures and utility buildings.

Exception: [DSA-SS] For public schools and community colleges, the requirements of this section and all subsections apply only to new construction.

5.507.4.1 Exterior noise transmission, prescriptive method. Wall and roof-ceiling assemblies exposed to the noise source making up the building or addition envelope or altered envelope shall meet a composite STC rating of at least 50 or a composite OITC rating of no less than 40, with exterior windows of a minimum STC of 40 or OITC of 30 in the following locations:

1. Within the 65 CNEL noise contour of an airport.

   Exceptions:

   a. L_{dn} or CNEL for military airports shall be determined by the facility Air Installation Compatible Land Use Zone (AICUZ) plan.
   b. L_{dn} or CNEL for other airports and heliports for which a land use plan has not been developed shall be determined by the local general plan noise element.

2. Within the 65 CNEL or L_{dn} noise contour of a freeway or expressway, railroad, industrial source or fixed-guideway source as determined by the Noise Element of the General Plan.

5.507.4.1.1. Noise exposure where noise contours are not readily available. Buildings exposed to a noise level of 65 dB L_{eq} - 1-hr during any hour of operation shall have building, addition or alteration exterior wall and roof-ceiling assemblies exposed to the noise source meeting a composite STC rating of at least 45 (or OITC 35), with exterior windows of a minimum STC of 40 (or OITC 30).

5.507.4.2 Performance Method. For buildings located as defined in Section 5.507.4.1 or 5.507.4.1.1, wall and roof-ceiling assemblies exposed to the noise source making up the building or addition envelope or altered envelope shall be constructed to provide an interior noise environment attributable to exterior sources that does not exceed an hourly equivalent noise level (Leq-1Hr) of 50 dBA in occupied areas during any hour of operation.

5.507.4.2.1 Site Features. Exterior features such as sound walls or earth berms may be utilized as appropriate to the building, addition or alteration project to mitigate sound migration to the interior.

5.507.4.2.2 Documentation of Compliance. An acoustical analysis documenting complying interior sound levels shall be prepared by personnel approved by the architect or engineer of record.

5.507.4.3 Interior sound transmission. Wall and floor-ceiling assemblies separating tenant spaces and tenant spaces and public places shall have an STC of at least 40.

Note: Examples of assemblies and their various STC ratings may be found at the California Office of Noise Control: www.toolbase.org/PDF/CaseStudies/stc_icc_ratings.pdf.

SECTION 5.508 OUTDOOR AIR QUALITY

5.508.1 Ozone depletion and greenhouse gas reductions. Installations of HVAC, refrigeration and fire suppression equipment shall comply with Sections 5.508.1.1 and 5.508.1.2.

5.508.1.1 Chlorofluorocarbons (CFCs). Install HVAC, refrigeration and fire suppression equipment that do not contain CFCs.

5.508.1.2 Halons. Install HVAC, refrigeration and fire suppression equipment that do not contain Halons.

5.508.2 Supermarket refrigerant leak reduction. New commercial refrigeration systems shall comply with the provisions of this section when installed in retail food stores 8,000 square feet or more conditioned area, and that utilize either refrigerated display cases, or walk-in coolers or freezers connected to remote compressor units or condensing units. The leak reduction measures apply to refrigeration systems containing high-global-warming potential (high-GWP) refrigerants with a GWP of 150 or greater. New refrigeration systems include both new facilities and the replacement of existing refrigeration systems in existing facilities.

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Exception: Refrigeration systems containing low-global warming potential (low-GWP) refrigerant with a GWP value less than 150 are not subject to this section. Low-GWP refrigerants are nonozone-depleting refrigerants that include ammonia, carbon dioxide (CO_2), and potentially other refrigerants.

5.508.2.1 Refrigerant piping. Piping compliant with the California Mechanical Code shall be installed to be accessible for leak protection and repairs. Piping runs using threaded pipe, copper tubing with an outside diameter (OD) less than 1/4 inch, flared tubing connections and short radius elbows shall not be used in refrigerant systems except as noted below.

5.508.2.1.1 Threaded pipe. Threaded connections are permitted at the compressor rack.

5.508.2.1.2 Copper pipe. Copper tubing with an OD less than 1/4 inch may be used in systems with a refrigerant charge of 5 pounds or less.

5.508.2.1.2.1 Anchorage. One-fouth-inch OD tubing shall be securely clamped to a rigid base to keep vibration levels below 8 mils.

5.508.2.1.3 Flared tubing connections. Double-flared tubing connections may be used for pressure controls, valve pilot lines and oil.

Exception: Single-flared tubing connections may be used with a multiring seal coated with industrial sealant suitable for use with refrigerants and tightened in accordance with manufacturer's recommendations.

5.508.2.1.4 Elbows. Short radius elbows are only permitted where space limitations prohibit use of long radius elbows.

5.508.2.2 Valves. Valves Valves and fittings shall comply with the *California Mechanical Code* and as follows.

5.508.2.2.1 Pressure relief valves. For vessels containing high-GWP refrigerant, a rupture disc shall be installed between the outlet of the vessel and the inlet of the pressure relief valve.

5.508.2.2.1.1 Pressure detection. A pressure gauge, pressure transducer or other device shall be installed in the space between the rupture disc and the relief valve inlet to indicate a disc rupture or discharge of the relief valve.

5.508.2.2.2 Access valves. Only Schrader access valves with a brass or steel body are permitted for use.

5.508.2.2.2.1 Valve caps. For systems with a refrigerant charge of 5 pounds or more, valve caps shall be brass or steel and not plastic.

5.508.2.2.2.2 Seal caps. If designed for it, the cap shall have a neoprene O-ring in place.

5.508.2.2.2.2.1 Chain tethers. Chain tethers to fit ovr the stem are required for valves designed to have seal caps.

Exception: Valves with seal caps that are not removed from the valve during stem operation.

5.508.2.3 Refrigerated service cases. Refrigerated service cases holding food products containing vinegar and salt shall have evaporator coils of corrosion-reistant material, such as stainless steel, or be coated to prevent corrosion from these substances.

5.508.2.3.1 Coil coating. Consideration shall be given to the heat transfer efficiency of coil coating to maximize energy efficiency.

5.508.2.4 Refrigerant receivers. Refrigerant receivers with capacities greater than 200 pounds shall be fitted with a device tha indicates the level of refrigerant in the receiver.

5.508.2.5 Pressure testing. The system shall be pressure tested during installation prior to evacuation and charging.

5.508.2.5.1 Minimum pressure. The system shall be charged with regulated dry nitrogen and appropriate tracer gas to bring system pressure up to 300 psig minimum.

5.508.2.5.2 Leaks. Check the system for leaks, repair any leaks, and retest for pressure using the same gauge.

5.508.2.5.3 Allowable pressure change. The system shall stand, unaltered, for 24 hours with no more than a +/- one pound pressure change from 300 psig, measured with the same gauge.

5.508.2.6 Evacuation. The system shall be evacuated after pressure testing and prior to charging.

5.508.2.6.1 First vacuum. Pull a system vacuum down to at least 1000 microns (+/- 50 microns), and hold for 30 minutes.

5.508.2.6.2 Second vacuum. Pull a second system vacuum to a minimum of 500 microns and hold for 30 minutes.

5.508.2.6.3 Third vacuum. Pull a third vacuum down to a minimum of 300 microns, and hold for 24 hours with a maximum drift of 100 microns over a 24-hour period.

CHAPTER 7
INSTALLER & SPECIAL INSPECTOR QUALIFICATIONS

702 QUALIFICATIONS

702.1 INSTALLER TRAINING. HVAC system installers shall be trained and certified in the proper installation of HVAC systems including ducts and equipment by a nationally or regionally recognized training or certification program. Uncertified persons may perform HVAC installations when under the direct supervision and responsibility of a person trained and certified to install HVAC systems or contractor licensed to install HVAC systems. Examples of acceptable HVAC training and certification programs include but are not limited to the following:

1. State certified apprenticeship programs.
2. Public utility training programs.
3. Training programs sponsored by trade, labor or statewide energy consulting or verification organizations.
4. Programs sponsored by manufacturing organizations.
5. Other programs acceptable to the enforcing agency.

702.2 SPECIAL INSPECTION [HCD]. When required by the enforcing agency, the owner or the responsible entity acting as the owner's agent shall employ one or more special inspectors to provide inspection or other duties necessary to substantiate compliance with this code. Special inspectors shall demonstrate competence to the satisfaction of the enforcing agency for the particular type of inspection or task to be performed. In addition to other certifications or qualifications acceptable to the enforcing agency, the following certifications or education may be considered by the enforcing agency when evaluating the qualifications of a special inspector:

1. Certification by a national or regional green building program or standard publisher.
2. Certification by a statewide energy consulting or verification organization, such as HERS raters, building performance contractors, and home energy auditors.
3. Successful completion of a third party apprentice training program in the appropriate trade.
4. Other programs acceptable to the enforcing agency.

Notes:

1. Special inspectors shall be independent entities with no financial interest in the materials or the project they are inspecting for compliance with this code.
2. HERS raters are special inspectors certified by the California Energy Commission (CEC) to rate homes in California according to the Home Energy Rating System (HERS).

[BSC-CG] When required by the enforcing agency, the owner or the responsible entity acting as the owner's agent shall employ one or more special inspectors to provide inspection or other duties necessary to substantiate compliance with this code. Special inspectors shall demonstrate competence to the satisfaction of the enforcing agency for the particular type of inspection or task to be performed. In addition, the special inspector shall have a certification from a recognized state, national or international association, as determined by the local agency. The area of certification shall be closely related to the primary job function, as determined by the local agency.

Note: Special inspectors shall be independent entities with no financial interest in the materials or the project they are inspecting for compliance with this code.

703 VERIFICATIONS

703.1 DOCUMENTATION. Documentation used to show compliance with this code shall include but is not limited to, construction documents, plans, specifications, builder or installer certification, inspection reports, or other methods acceptable to the enforcing agency which demonstrate substantial conformance. When specific documentation or special inspection is necessary to verify compliance, that method of compliance will be specified in the appropriate section or identified applicable checklist.

JOHN FORDICE - OTHER FISH ARCHITECT
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WELCOME HUT - BIG BEND HOTSPRINGS
25322 Health Way, Big Bend, CA 96011

PLAN SET VERSION **V1.2**

⚠ cal green compliance
4/21/18

Project Name:	Big Bend Welcome Hut	NRCC-PRF-01-E	Page 1 of 19
Project Address:	25322 Health Way Big Bend 96001	Calculation Date/Time:	16:50, Fri, Apr 28, 2017
Compliance Scope:	NewComplete	Input File Name:	Big Bend Welcome Hut_170428.cibd16

A. PROJECT GENERAL INFORMATION

1.	Project Location (city)	Big Bend	8.	Standards Version	Compliance2016
2.	CA Zip Code	96001	9.	Compliance Software (version)	CBECC-Com 2016.2.1 (868)
3.	Climate Zone	11	10.	Building Orientation (deg)	(N) 0 deg
4.	Total Conditioned Floor Area in Scope	219 ft²	11.	Permitted Scope of Work	NewComplete
5.	Total Unconditioned Floor Area	0 ft²	12.	Building Type(s)	Nonresidential
6.	Total # of Stories (Habitable Above Grade)	1	13	Gas Type	Propane
7.	Total # of dwelling units	0			

B. COMPLIANCE RESULTS FOR PERFORMANCE COMPONENTS (Annual TDV Energy Use, kBtu/ft ²-yr) **§ 140.1**

BUILDING COMPLIES

1. Energy Component	2. Standard Design (TDV)	3. Proposed Design (TDV)	4. Compliance Margin (TDV)	5. Percent Better than Standard
Space Heating	56.84	123.52	-66.68	-117.3%
Space Cooling	1.26	--	1.26	--
Indoor Fans	89.66	2.34	87.32	97.4%
Heat Rejection	--	--	--	--
Pumps & Misc.	--	--	--	--
Domestic Hot Water	13.41	13.41	--	0.0%
Indoor Lighting	55.39	27.70	27.69	50.0%
COMPLIANCE TOTAL	**216.56**	**166.97**	**49.59**	**22.9%**
Receptacle	107.32	107.32	0.0	0.0%
Process	--	--	--	--
Other Ltg	--	--	--	--
TOTAL	**323.88**	**274.29**	**49.6**	**15.3%**

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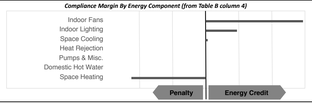
C. PRIORITY PLAN CHECK/ INSPECTION ITEMS (in order of highest to lowest TDV energy savings)

1st	Indoor Fans: Check envelope and mechanical
2nd	Indoor Lighting: Check lighting
3rd	Space Cooling: Check envelope and mechanical
4th	Heat Rejection: Check envelope and mechanical
5th	Pumps & Misc.: Check mechanical
6th	Domestic Hot Water: Check mechanical
7th	Space Heating: Check envelope and mechanical

Compliance Margin By Energy Component (from Table B column 4)



D. EXCEPTIONAL CONDITIONS

The building does not include service water heating. Verify that service water heating is not required and is not included in the design.

Significant modeling approximations have been used to represent the building design. Such approximations are common and an expected part of energy modeling. However, such approximations should have thermodynamically similar results in the model and in the completed building. Ensure that a narrative has been provided. Review the narrative and ensure the modeling approximations are appropriate. Some approximations may not be appropriate. In such cases, the Exceptional Design Compliance procedure should be used. An example would be modeling of thermal storage by modifying the efficiency of heating and cooling equipment

E. HERS VERIFICATION

This Section Does Not Apply

F. ADDITIONAL REMARKS

The Software does not have capability to model Cob wall. Concrete wall (80lb/ft2) has been used which has similar properties to match the values of the wall assemly in the project.

The Software requires a mechanical ventilation system even if the Proposed design uses natural (passive) ventilation. A dummy ventilation system is provided in the compliance model to meet the software requirements.

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G. COMPLIANCE PATH & CERTIFICATE OF COMPLIANCE SUMMARY

Identify which building components use the performance or prescriptive path for compliance. "NA"= not in project

For components that utilize the performance path, indicate the sheet number that includes mandatory notes on plans.

Building Component	Compliance Path	Compliance Forms *(required for submittal)*	Location of Mandatory Notes on Plans
Envelope	☒ Performance	NRCC-PRF-ENV-DETAILS (section of the NRCC-PRF-01-E)	
	☐ Prescriptive	NRCC-ENV-01 / 02 / 03 / 04 / 05 / 06-E	
	☐ NA		
Mechanical	☒ Performance	NRCC-PRF-MCH-DETAILS (section of the NRCC-PRF-01-E)	
	☐ Prescriptive	NRCC-MCH-01 / 02 / 03 / 04 / 05 / 06 / 07-E	
	☐ NA		
Domestic Hot Water	☐ Performance	NRCC-PRF-PLB-DETAILS (section of the NRCC-PRF-01-E)	
	☐ Prescriptive	NRCC-PLB-01-E	
	☒ NA		
Lighting (Indoor Conditioned)	☒ Performance	NRCC-PRF-LTI-DETAILS (section of the NRCC-PRF-01-E)	
	☐ Prescriptive	NRCC-LTI-01 / 02 / 03 / 04 / 05-E	
	☐ NA		
Covered Process: Commercial Kitchens	☐ Performance	S2 (section of the NRCC-PRF-01-E)	
	☐ Prescriptive	NRCC-PRC-01/ 03-E	
	☒ NA		
Covered Process: Computer Rooms	☐ Performance	S3 (section of the NRCC-PRF-01-E)	
	☐ Prescriptive	NRCC-PRC-01/ 04-E	
	☒ NA		
Covered Process: Laboratory Exhaust	☐ Performance	S4 (section of the NRCC-PRF-01-E)	
	☐ Prescriptive	NRCC-PRC-01/ 09-E	
	☒ NA		

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G. COMPLIANCE PATH & CERTIFICATE OF COMPLIANCE SUMMARY

The following building components are only eligible for prescriptive compliance. Indicate which are relevant to the project.

The following building components may have mandatory requirements per Part 6. Indicate which are relevant to the project.

Yes	NA	Prescriptive Requirement	Compliance Forms	Yes	NA	Mandatory Requirement	Compliance Forms
☐	☒	Lighting (Indoor Unconditioned) §140.6	NRCC-LTI-01 / 02 / 03 / 04 / 05-E	☐	☒	Commissioning: §120.8 Simple Systems	NRCC-CXR-01 / 02 / 03 / 05-E
				☐	☒	Complex Systems	NRCC-CXR-01 / 02 / 04 / 05-E
☐	☒	Lighting (Outdoor) §140.7	NRCC-LTO-01 / 02 / 03-E	☐	☒	Electrical: §130.5	NRCC-ELC-01-E
☐	☒	Lighting (Sign) §140.8	NRCC-LTS-01-E	☐	☒	Solar Ready: §110.10	NRCC-SRA-01 / 02-E
☐	☒	Solar Thermal Water Heating: §140.5	NRCC-STH-01-E	☐	☒	Covered Process: §120.6 Parking Garage	NRCC-PRC-01-E
				☐	☒	Commercial Refrigeration	NRCC-PRC-02-E
				☐	☒	Warehouse Refrigeration	NRCC-PRC-05-E
				☐	☒	Compressed Air	NRCC-PRC-06/07/08-E
				☐	☒	Process Boilers	NRCC-PRC-10-E
							NRCC-PRC-11-E

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H. CERTIFICATE OF INSTALLATION, CERTIFICATE OF ACCEPTANCE & CERTIFICATE OF VERIFICATION SUMMARY (NRCI/NRCA/NRCV) – Documentation Author to indicate which Certificates must be submitted for the features to be recognized for compliance (Retain copies and verify forms are completed and signed to post in field for Field Inspector to verify). See Tables G. and H. in MCH and LTI Details Sections for Acceptance Tests and forms by equipment.

Confirmed

Building Component	Compliance Forms *(required for submittal)*	Pass	Fail
Envelope	☒ NRCI-ENV-01-E - For all buildings	☐	☐
	☒ NRCA-ENV-03-F - NFRC label verification for fenestration	☐	☐
Mechanical	☐ NRCI-MCH-01-E - For all buildings with Mechanical Systems	☐	☐
	☐ NRCA-MCH-02-A- Outdoor Air	☐	☐
	☐ NRCA-MCH-03-A – Constant Volume Single-Zone HVAC	☐	☐
	☐ NRCA-MCH-04-H- Air Distribution Duct Leakage	☐	☐
	☐ NRCA-MCH-05-A- Air Economizer Controls	☐	☐
	☐ NRCA-MCH-06-A- Demand Control Ventilation	☐	☐
	☐ NRCA-MCH-07-A – Supply Fan Variable Flow Controls	☐	☐
	☐ NRCA-MCH-08-A- Valve Leakage Test	☐	☐
	☐ NRCA-MCH-09-A – Supply Water Temp Reset Controls	☐	☐
	☐ NRCA-MCH-10-A- Hydronic System Variable Flow Controls	☐	☐
	☐ NRCA-MCH-11-A – Auto Demand Shed Controls	☐	☐
	☐ NRCA-MCH-12-A- Packaged Direct Expansion Units	☐	☐
	☐ NRCA-MCH-13-A- Air Handling Units and Zone Terminal Units	☐	☐
	☐ NRCA-MCH-14-A- Distributed Energy Storage	☐	☐
	☐ NRCA-MCH-15-A – Thermal Energy Storage	☐	☐
	☐ NRCA-MCH-16-A- Supply Air Temp Reset Controls	☐	☐
	☐ NRCA-MCH-17-A – Condensate Water Temp Reset Controls	☐	☐
	☐ NRCA-MCH-18-A- Energy Management Controls Systems	☐	☐
	☐ NRCV-MCH-04-H- Duct Leakage Test	☐	☐

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Confirmed

Building Component	Compliance Forms *(required for submittal)*	Pass	Fail
Plumbing	☐ NRCI-PLB-01-E - For all buildings with Plumbing Systems	☐	☐
	☐ NRCI-PLB-02-E - required on central systems in high-rise residential, hotel/motel application.	☐	☐
	☐ NRCI-PLB-03-E - Single dwelling unit systems in high-rise residential, hotel/motel application.	☐	☐
	☐ NRCI-PLB-21-E - HERS verified central systems in high-rise residential, hotel/motel application.	☐	☐
	☐ NRCI-PLB-22-E - HERS verified single dwelling unit systems in high-rise residential, hotel/motel application.	☐	☐
	☐ NRCV-PLB-21-H- HERS verified central systems in high-rise residential, hotel/motel application.	☐	☐
	☐ NRCV-PLB-22-H - HERS verified single dwelling unit systems in high-rise residential, hotel/motel application.	☐	☐
	☐ NRCI-STH-01-E - Any solar water heating	☐	☐
Indoor Lighting	☐ NRCI-LTI-01-E - For all buildings	☐	☐
	☐ NRCI-LTI-02-E - Lighting control system, or for an Energy Management Control System (EMCS)	☐	☐
	☐ NRCI-LTI-03-E - Line-voltage track lighting integral current limiter, or for a supplementary overcurrent protection panel used to energize only line-voltage track lighting	☐	☐
	☐ NRCI-LTI-04-E - Two interlocked systems serving an auditorium, a convention center, a conference room, or a theater	☐	☐
	☐ NRCI-LTI-05-E - Lighting Control Credit Power Adjustment Factor (PAF)	☐	☐
	☐ NRCI-LTI-06-E - Additional wattage installed in a video conferencing studio	☐	☐
	☐ NRCA-LTI-02-A - Occupancy sensors and automatic time switch controls.	☐	☐
	☐ NRCA-LTI-03-A - Automatic daylighting controls	☐	☐
	☐ NRCA-LTI-04-A - Demand responsive lighting controls	☐	☐
Outdoor Lighting	☐ NRCI-LTO-01-E – Outdoor Lighting	☐	☐
	☐ NRCI-LTO-02-E- EMCS Lighting Control System	☐	☐
	☐ NRCA-LTO-02-A - Outdoor Lighting Control	☐	☐
Sign Lighting	☐ NRCI-LTS-01-E – Sign Lighting	☐	☐
Electrical	☐ NRCI-ELC-01-E - Electrical Power Distribution	☐	☐
Photovoltaic	☐ NRCI-SPV-01-E Photovoltaic Systems	☐	☐

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H. CERTIFICATE OF INSTALLATION, CERTIFICATE OF ACCEPTANCE & CERTIFICATE OF VERIFICATION SUMMARY (NRCI/NRCA/NRCV) – Documentation Author to indicate which Certificates must be submitted for the features to be recognized for compliance (Retain copies and verify forms are completed and signed to post in field for Field Inspector to verify). See Tables G. and H. in MCH and LTI Details Sections for Acceptance Tests and forms by equipment.

Confirmed

Building Component	Compliance Forms *(required for submittal)*	Pass	Fail
Covered Process	☐ NRCI-PRC-01-E Refrigerated Warehouse	☐	☐
	☐ NRCA-PRC-01-F - Compressed Air Systems	☐	☐
	☐ NRCA-PRC-02-F - Kitchen Exhaust	☐	☐
	☐ NRCA-PRC-03-F- Garage Exhaust	☐	☐
	☐ NRCA-PRC-04-F- Refrigerated Warehouse- Evaporator Fan Motor Controls	☐	☐
	☐ NRCA-PRC-05-F- Refrigerated Warehouse- Evaporative Condenser Controls	☐	☐
	☐ NRCA-PRC-06-F- Refrigerated Warehouse- Air Cooled Condenser Controls	☐	☐
	☐ NRCA-PRC-07F- Refrigerated Warehouse- Variable Speed Compressor	☐	☐
	☐ NRCA-PRC-08-F- Electrical Resistance Underslab Heating System	☐	☐

I. ENVELOPE GENERAL INFORMATION (See NRCC-PRF-ENV-DETAILS for more information)

						Confirmed	
1.	Total Conditioned Floor Area	219 ft²	5.	Number of Floors Above Grade	1	Pass	Fail
2.	Total Unconditioned Floor Area	0 ft²	6.	Number of Floors Below Grade	0		
3.	Addition Conditioned Floor Area	0 ft²					
4.	Addition Unconditioned Floor Area	0 ft²					

7. Opaque Surfaces & Orientation	8. Total Gross Surface Area	9. Total Fenestration Area	10. Window to Wall Ratio	Pass	Fail
North Wall	77 ft²	12 ft²	15.7%	☐	☐
East Wall	141 ft²	24 ft²	17.0%	☐	☐
South Wall	77 ft²	12 ft²	15.7%	☐	☐
West Wall	183 ft²	37 ft²	20.3%	☐	☐
Total	**477 ft²**	**85 ft²**	**17.8%**	☐	☐
Roof	226 ft²	0 ft²	00.0%	☐	☐

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J. FENESTRATION ASSEMBLY SUMMARY **§ 110.6** **Confirmed**

1. Fenestration Assembly Name / Tag or I.D.	2. Fenestration Type / Product Type / Frame Type	3. Certification Method[1]	4. Assembly Method	5. Area (ft²)	6. Overall U-factor	7. Overall SHGC	8. Overall VT	9. Status[2]	Pass	Fail
Placeholder Operable Window	VerticalFenestration OperableWindow N/A	NFRC Rated	Manufactured	85	0.38	0.30	0.54	N	☐	☐

[1] Newly installed fenestration shall have a certified NFRC Label Certificate or use the CEC default tables found in Table 110.6-A and Table 110.6-B. Center of Glass (COG) values are for the glass only, determined by the manufacturer, and are shown for ease of verification. Site-built fenestration values are calculated per Nonresidential Appendix NA6 and are used in the analysis.

[2] Status: N- New, A – Altered, E – Existing

Taking compliance credit for fenestration shading devices? (If "Yes", see NRCC-PRF-ENV-DETAILS for more information) No

K. OPAQUE SURFACE ASSEMBLY SUMMARY **§ 120.7/ § 140.3** **Confirmed**

1. Surface Name	2. Surface Type	3. Area (ft²)	4. Framing Type	5. Cavity R-Value	6. Continuous R-Value	7. U-Factor / F-Factor / C-Factor	8. Status[1]	Pass	Fail
Earth Floor	UndergroundFloor	219	NA	0	NA	F-Factor: 0.730	N	☐	☐
Cob Wall	ExteriorWall	283	NA	0	NA	U-Factor: 0.243	N	☐	☐
Roof Assembly	Roof	226	Wood	30	NA	U-Factor: 0.036	N	☐	☐
Concrete with Stone Veneer	ExteriorWall	133	NA	0	NA	U-Factor: 0.323	N	☐	☐
2x4 insulated wall	ExteriorWall	61	Wood	13	NA	U-Factor: 0.107	N	☐	☐

[1] Status: N- New, A – Altered, E – Existing

L. ROOFING PRODUCT SUMMARY **§ 140.3** **Confirmed**

1. Product Type	2. Product Density (lb/ft²)	3. Aged Solar Reflectance	4. Thermal Emittance	5. SRI	6. Cool Roof Credit	7. Roofing Product Description	Pass	Fail
Roof Assembly	4.725	0.08	0.75	NA	No	NA	☐	☐

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M. HVAC SYSTEM SUMMARY (see NRCC-PRF-MCH-DETAILS for more information) **§ 110.1 / § 110.2**

Dry System Equipment [1] (Fan & Economizer info included below in Table N) — **Confirmed**

1. Equip Name	2. Equip Type	3. System Type (Simple [2] or Complex [3])	4. Qty	5. Total Heating Output (kBtu/h)	6. Supp Heat Source (Y/N)	7. Supp Heat Output (kBtuh)	8. Total Cooling Output (kBtu/h)	9. Efficiency: Cooling	9. Efficiency: Heating	10. Acceptance Testing Required? (Y/N) [4]	11. Status[5]	Pass	Fail
Natural Ventilation	HV (NA)	Simple	1	0	No	0	0	NA	NA	No	N	☐	☐
Electric Resistance Heat	Baseboard (NA)	Simple	1	10	No	0	0	NA	NA	No	N	☐	☐

Wet System Equipment [2] — *Pumps* — **Confirmed**

12. Equip Name	13. Equip Type	14. Qty	15. Vol (gal)	16. Rated Capacity (kBtu/h)	17. Efficiency	18. Standby Loss	19. Tank Ext. R Value	20. Qty	21. GPM	22. HP	23. VSD (Y/N)	24. Status[5]	Pass	Fail
NonResBaseWaterHeater	Storage	1	0	0	EF: 0.675	NA	NA	NA	NA	NA	No	N	☐	☐
BaseResWtrHtr	Storage	1	0		EF: 0.820	NA	12.0	NA	NA	(kW)	NA	N	☐	☐

[1] Dry System Equipment includes furnaces, air handling units, heat pumps, etc.
[2] Wet System Equipment includes boilers, chillers, cooling towers, water heaters, etc.
[3] Simple Systems must complete NRCC-CXR-03-E commissioning design review form
[4] Complex Systems must complete NRCC-CXR-04-E commissioning design review form
[5] N summary of which acceptance tests are applicable is provided in NRCC-PRF-MCH-DETAILS
[5] Status: N - New, A – Altered, E – Existing

Discrepancy between modeled and designed equipment sizing? (If "Yes", see Table F. "Additional Remarks" for an explanation) No

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N. ECONOMIZER & FAN SYSTEMS SUMMARY[1] **§ 140.4** **Confirmed**

1. Equip Name	2. Outside Air CFM	3. Supply Fan CFM	3. Supply Fan HP	3. Supply Fan BHP	3. Supply Fan TSP (inch WC)	3. Supply Fan Control	4. Return Fan CFM	4. Return Fan HP	4. Return Fan BHP	4. Return Fan TSP (inch WC)	4. Return Fan Control	5. Economizer Type (if present)	Pass	Fail
Natural Ventilation	33	33	0.125	0.004	0.40	ConstantVolume	NA	NA	NA	NA	NA	NoEconomizer	☐	☐
Electric Resistance Heat	0	NaN	NaN	NA									☐	☐

[1] Mechanical ventilation calculations and exhaust fans are included in the NRCC-PRF-MCH-DETAILS section

O. EQUIPMENT CONTROLS **§ 120.2** **Confirmed**

1. Equip Name	2. Equip Type	3. Controls	Pass	Fail
Natural Ventilation	HV	No DCV Controls No Economizer No Supply Air Temp. Control No Optimum Start No Evaporative Cooler	☐	☐
NonResBaseSHWSystem	Service Hot Water, Primary Only	Fixed Temperature Control, No DDC	☐	☐

P. SYSTEM DISTRIBUTION SUMMARY **§ 120.4/ § 140.4(l)**

		Dry System Distribution				Confirmed	
1. Equip Name	2. Equip Type	3. Duct Leakage and Sealing Required per 140.4(l)	4. Duct Leakage will be verified per NA1 and NA2	5. Ducts: Insulation R-Value	5. Ducts: Location	Pass	Fail
Natural Ventilation	HV	No	No	0	Conditioned	☐	☐
Electric Resistance Heat	Baseboard	No	No	0	None	☐	☐

Does the Project Include Zonal Systems? (If "Yes", see NRCC-PRF-MCH-DETAILS for system information)	Yes
Does the Project Include a Solar Hot Water System? (If "Yes", see NRCC-PRF-MCH-DETAILS for system information)	No

Project Name:	Big Bend Welcome Hut	NRCC-PRF-01-E	Page 11 of 19
Project Address:	25322 Health Way Big Bend 96001	Calculation Date/Time:	16:50, Fri, Apr 28, 2017
Compliance Scope:	NewComplete	Input File Name:	Big Bend Welcome Hut_170428.cibd16

Multifamily or Hotel/ Motel Occupancy? (If "Yes", see NRCC-PRF-MCH-DETAILS for DHW system information) No

Q. INDOOR CONDITIONED LIGHTING GENERAL INFO (see NRCC-PRF-LTI-DETAILS for more info)[3] **§ 140.6** **Confirmed**

1. Occupancy Type [1]	2. Conditioned Floor Area [2] (ft²)	3. Installed Lighting Power (Watts)	4. Lighting Control Credits (Watts)	5. Additional (Custom) Allowance: Area Category Footnotes (Watts)	5. Additional (Custom) Allowance: Tailored Method (Watts)	Pass	Fail
Office (250 square feet in floor area or less)	219	110	0	0	0	☐	☐
Building Totals:	**219**	**110**	**0**	**0**	**0**		

[1] See Table 140.6-C
[2] See NRCC-LTI-01-E for unconditioned spaces
[3] Lighting information for existing spaces modeled is not included in the table

R. INDOOR CONDITIONED LIGHTING SCHEDULE (Adapted from NRCC-LTI-01-E)[1] **§ 130.0**

This Section Does Not Apply

[1] If lighting power densities were used in the compliance model Building Departments will need to check prescriptive forms for Luminaire Schedule details.

S1. COVERED PROCESS SUMMARY – ENCLOSED PARKING GARAGES **§ 140.9**

This Section Does Not Apply

S2. COVERED PROCESS SUMMARY – COMMERCIAL KITCHENS **§ 140.9**

This Section Does Not Apply

S3. COVERED PROCESS SUMMARY – COMPUTER ROOMS **§ 140.9**

This Section Does Not Apply

S4. COVERED PROCESS SUMMARY – LABORATORY EXHAUSTS **§ 140.9**

This Section Does Not Apply

Project Name:	Big Bend Welcome Hut	NRCC-PRF-01-E	Page 12 of 19
Project Address:	25322 Health Way Big Bend 96001	Calculation Date/Time:	16:50, Fri, Apr 28, 2017
Compliance Scope:	NewComplete	Input File Name:	Big Bend Welcome Hut_170428.cibd16

T. UNMET LOAD HOURS

Thermal Zone Name	Cooling Unmet Load Hour Limit for Thermal Zone	Proposed Cooling Unmet Load Hours	Heating Unmet Load Hour Limit for Thermal Zone	Proposed Heating Unmet Load Hours
Main Room	150	0	150	1360.25

U. ENERGY USE SUMMARY

Energy Component	Standard Design Site (MWh)	Proposed Design Site (MWh)	Margin (MWh)	Standard Design Site (MBtu)	Proposed Design Site (MBtu)	Margin (MBtu)
Space Heating	--	1.6	--	4.1	--	--
Space Cooling	0.0	--	--	--	--	--
Indoor Fans	0.9	0.0	--	--	--	--
Heat Rejection	--	--	--	--	--	--
Pumps & Misc.	--	--	--	--	--	--
Domestic Hot Water	--	--	--	1.1	1.1	0.0
Indoor Lighting	0.5	0.2	0.3	--	--	--
COMPLIANCE TOTAL	**1.4**	**1.8**	**-0.4**	**5.2**	**1.1**	**4.1**
Receptacle	0.9	0.9	0.0	--	--	--
Process	--	--	--	--	--	--
Other Ltg	--	--	--	--	--	--
TOTAL	**2.3**	**2.7**	**-0.4**	**5.2**	**1.1**	**4.1**

energy compliance report

4/21/18

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WELCOME HUT - BIG BEND HOTSPRINGS
25322 Health Way, Big Bend, CA 96011

PLAN SET VERSION **V1.2**

DOCUMENTATION AUTHOR'S DECLARATION STATEMENT		**§ 10-103**
I certify that this Certificate of Compliance documentation is accurate and complete.		
Documentation Author Name: Dan Johnson	Signature:	
Company: Beyond Efficiency Inc.		
Address: 710 Channing Way	Signature Date: 4/28/17	
City/State/Zip: Berkeley CA 94710	CEA Identification (if applicable): N/A	
Phone: 415-236-1333		

RESPONSIBLE PERSON'S DECLARATION STATEMENT			
I certify the following under penalty of perjury, under the laws of the State of California:			
1	I hereby affirm that I am eligible under the provisions of Division 3 of the Business and Professions Code to sign this document as the person responsible for its preparation; and that I am licensed in the State of California as a civil engineer, mechanical engineer, electrical engineer, or I am a licensed architect.		
2	I affirm that I am eligible under the provisions of Division 3 of the Business and Professions Code by section 5537.2 or 6737.3 to sign this document as the person responsible for its preparation; and that I am a licensed contractor performing this work.		
3	I affirm that I am eligible under Division 3 of the Business and Professions Code to sign this document because it pertains to a structure or type of work described as exempt pursuant to Business and Professions Code Sections 5537, 5538 and 6737.1.		
Responsible Envelope Designer Name: John Fordice		Signature:	
Company: John Fordice			
Address: 1828 Fifth Street		Date Signed:	
City/State/Zip: Berkeley CA 94710		Declaration Statement Type:	
Phone:		Title:	License #:
Responsible Lighting Designer Name: John Fordice		Signature:	
Company: John Fordice			
Address: 1828 Fifth Street		Date Signed:	
City/State/Zip: Berkeley CA 94710		Declaration Statement Type:	
Phone:		Title:	License #:
Responsible Mechanical Designer Name: John Fordice		Signature:	
Company: John Fordice			
Address: 1828 Fifth Street		Date Signed:	
City/State/Zip: Berkeley CA 94710		Declaration Statement Type:	
Phone:		Title:	License #:

NRCC-PRF-ENV-DETAILS -SECTION START-

A. OPAQUE SURFACE ASSEMBLY DETAILS — Confirmed: Pass ☐ Fail ☐

1. Surface Name	2. Surface Type	3. Description of Assembly Layers	4. Notes
Earth Floor	UndergroundFloor	Slab Type = UnheatedSlabOnGrade Insulation Orientation = None Insulation R-Value = R0	
Cob Wall	ExteriorWall	Concrete - 80 lb/ft3 - 12 in.	
Roof Assembly	Roof	Wood shingles - plain and plastic film faced - 3/4 in. Plywood - 1/2 in. Wood framed roof, 16in. OC, 9.25in., R-30 Gypsum Board - 5/8 in.	
Concrete with Stone Veneer	ExteriorWall	Stone - 1 in. Stone - 1 in. Stone - 1 in. Stone - 1 in. Concrete - 100 lb/ft3 - 12 in.	
2x4 insulated wall	ExteriorWall	Wood framed wall, 24in. OC, 3.5in., R-13	

B. OVERHANG DETAILS (Adapted from NRCC-ENV-02-E)

This Section Does Not Apply

C. OPAQUE DOOR SUMMARY

This Section Does Not Apply

NRCC-PRF-MCH-DETAILS -SECTION START-

A. MECHANICAL VENTILATION AND REHEAT *(Adapted from 2013-NRCC-MCH-03-E)* — Confirmed: Pass ☐ Fail ☐

CONDITIONED ZONE NAME	HEATING/COOLING SYSTEM ID	1. DESIGN AIR FLOWS: DESIGN PRIMARY AIR FLOW (CFM)	DESIGN PRIMARY MINIMUM AIR FLOW (CFM)	MINIMUM PRIMARY AIR FLOW FRACTION	MAXIMUM HEATING AIR FLOW (CFM)	MAXIMUM HEATING AIR FLOW FRACTION	2. VENTILATION (§ 120.1): DCV CONTROL (Y/N)	VENT SYSTEM ID	CONDITIONED AREA (ft2)	MIN. OUTDOOR AREA (CFM/ft2)	DESIGN MAX OP PEOPLE	MIN. OUTDOOR VENTILATION (CFM/person)	REQ'D VENT AIR FLOW (CFM)	DESIGN VENT AIR FLOW (CFM)	TRANSFER AIRFLOW (CFM)	DCV (Y/N)	Dynamic Window Interlock § 140.4(r) (Y/N)
Main Room	Electric Resistance Heat	33	NA	NA	NA	NA	N	Natural Ventilation	219	NA	1	30.0	33	33	NA	N	N
								TOTAL	219		NA		NA	NA	NA		

B. ZONAL SYSTEM AND TERMINAL UNIT SUMMARY — § 140.4

1. System ID	2. System Type	3. Qty	4. Rated Capacity (kBtuh): Heating	4. Rated Capacity (kBtuh): Cooling	5. Economizer	6. Zone Name	7. Airflow (cfm): Design	7. Airflow (cfm): Min.	7. Airflow (cfm): Min. Ratio	8. Fan: BHP	8. Fan: Cycles	8. Fan: ECM Motor	Confirmed: Pass	Confirmed: Fail
Supply Grille	Uncontrolled	1	NA	NA	NA	Main Room	33	NA	NA	NA	NA	☐	☐	☐

C. EXHAUST FAN SUMMARY

This Section Does Not Apply

D. DHW EQUIPMENT SUMMARY – *(Adapted from NRCC-PLB-01)*

This Section Does Not Apply

E. MULTI-FAMILY CENTRAL DHW SYSTEM DETAILS

This Section Does Not Apply

F. SOLAR HOT WATER HEATING SUMMARY (Adapted from NRCC-STH-01)

This Section Does Not Apply

G. MECHANICAL HVAC ACCEPTANCE TESTS & FORMS *(Adapted from 2013-NRCC-MCH-01-E)* — § RA4

Declaration of Required Acceptance Certificates (NRCA) – Acceptance Certificates that may be submitted. (Retain copies and verify forms are completed and signed to post in field for Field Inspector to verify).

Test Description		MCH-02A	MCH-03A	MCH-04A	MCH-05A	MCH-06A	MCH-07A	MCH-08A	MCH-09A	MCH-10A	MCH-11A	MCH-12A	MCH-13A	MCH-14A	MCH-15A	MCH-16A	MCH-17A	MCH-18A	Confirmed: Pass	Confirmed: Fail
Equipment Requiring Testing or Verification	# of units	Outdoor Air	Single Zone Unitary	Air Dist. Ducts	Economizer Controls	DCV	Supply Fan VSD	Valve leakage	Supply Water Temp. Reset	HYd. Variable Flow Control	Auto Demand Shed Control	FDD for VAV Units	Auto Open & Close Outdoor Air & Dist. Energy Storage DX AC	TES Systems	Supply Air Temp. Reset	Condenser Water Reset Controls	ECMS			
NonResBase SHWSystem	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	☐	☐
Natural Ventilation	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	☐	☐
Electric Resistance Heat	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	☐	☐

H. EVAPORATIVE COOLER SUMMARY

This Section Does Not Apply

NRCC-PRF-LTI-DETAILS -SECTION START-

A. INDOOR CONDITIONED LIGHTING CONTROL CREDITS (Adapted from NRCC-LTI-02-E) — § 140.6

This Section Does Not Apply

B. INDOOR CONDITIONED LIGHTING MANDATORY LIGHTING CONTROLS (Adapted from NRCC-LTI-02-E) — § 130.1

Lighting Control Credits Schedule (includes all lighting controls installed in conditioned space to meet mandatory requirements per §130.1)			Standards Compliance (√ all that apply or "E" if exempt)					√ if Acceptance Test Required	Confirmed: Pass	Confirmed: Fail
Location in Building	Type/Description of Lighting Control (i.e., occupancy sensor, dimming, automatic daylighting control, etc.)	# of Units	§130.1(a)	§130.1(b)	§130.1(c)	§130.1(d)	§130.1(e)			
Space 1	Occupancy Sensor	1	NA	NA	X	NA	NA	NA	☐	☐
Space 1	Manual control	1	X	NA	NA	NA	NA	NA	☐	☐
Space 1	Daylighting Sensor	1	NA	NA	NA	X	NA	NA	☐	☐

§130.1(a) = Manual area controls; §130.0(b) = Multi Level; §130.1(c) = Auto Shut-Off; §130.1(d) = Mandatory Daylight; §130.1(e) = Demand Responsive

C. TAILORED METHOD CONDITIONED LIGHTING POWER ALLOWANCE SUMMARY AND CHECKLIST (Adapted from NRCC-LTI-04-E) — § 140.6

General lighting power (see Table D)	0
General lighting power from special function areas (see Table E)	NA
Additional "use it or lose it" (See Table G)	0
Total watts	0

D. GENERAL LIGHTING POWER (Adapted from NRCC-LTI-04-E) — § 140.6-D

This Section Does Not Apply

E. GENERAL LIGHTING FROM SPECIAL FUNCTION AREAS (Adapted from NRCC-LTI-04-E) — § 140.6(c) 3H

Room Number	Primary Function Area	Illuminance Value (LUX)	Room Cavity Ratio (Table G)	Allowed LPD	Floor Area (ft²)	Allowed Watts	Confirmed: Pass	Confirmed: Fail
NA	NA	NA	NA	NA	NA	NA	☐	☐

Note: Tailored Method for Special Function Areas is not currently implemented

F. ROOM CAVITY RATIO (Adapted from NRCC-LTI-04-E)

Rectangular Spaces						Confirmed	
Room Number	Task/Activity Description	Room Length (ft)	Room Width (ft)	Room Cavity Height (ft)	RCR	Pass	Fail
NA	NA	NA	NA	NA	NA	☐	☐

Non-Rectangular Spaces

This Section Does Not Apply

Note: All applicable spaces are listed under the Non-Rectangular Spaces table

G. ADDITIONAL "USE IT OR LOSE IT" (Adapted from NRCC-LTI-04-E)

1. Wall Display	2. Combined Floor Display and Task Lighting	3. Combined Ornamental and Special Effects Lighting	4. Very Valuable Merchandise	Allowed Watts	Confirmed: Pass	Confirmed: Fail
0	0	0	0	**0**	☐	☐

5. Wall Display

This Section Does Not Apply

6. Floor Display and Task Lighting

This Section Does Not Apply

7. Combined Ornamental and Special Effects Lighting

This Section Does Not Apply

8. Very Valuable Merchandise

This Section Does Not Apply

H. INDOOR & OUTDOOR LIGHTING ACCEPTANCE TESTS & FORMS (Adapted from NRCC-LTI-01-E and NRCC-LTO-01-E) — § 130.4

Declaration of Required Acceptance Certificates (NRCA) –Acceptance Certificates that must be verified in the field. (Retain copies and verify forms are completed and signed to post in field for Field Inspector to verify).

Test Description		Indoor			Outdoor	Confirmed: Pass	Confirmed: Fail
		NRCA-LTI-02-A	NRCA-LTI-03-A	NRCA-LTI-04-A	NRCA-LTO-02-A		
Equipment Requiring Testing or Verification	# of units	Occ Sensors / Auto Time Switch	Auto Daylight	Demand Responsive	Outdoor Controls		
Occupant Sensors	1	☐	☐	☐	☐	☐	☐
Automatic Time Switch		☐	☐	☐	☐	☐	☐
Automatic Daylighting	n/a	☐	☐	☐	☐	☐	☐
Demand Responsive		☐	☐	☐	☐	☐	☐
Outdoor Controls		☐	☐	☐	☐	☐	☐

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PLAN SET VERSION **V1.2**

GENERAL NOTES

SCOPE

THE SCOPE OF WORK INCLUDES A NEW WELCOME HUT

COORDINATION

ALL FEATURES OF CONSTRUCTION NOT FULLY SHOWN SHALL BE OF THE SAME TYPE AND CHARACTER AS SHOWN FOR SIMILAR CONDITIONS. ALL SITE CONDITIONS, DIMENSIONS, ELEVATIONS, ETC. SHALL BE VERIFIED BEFORE STARTING WORK. ANY DISCREPANCIES SHALL BE REPORTED TO THE STRUCTURAL ENGINEER BEFORE PROCEEDING. IN THE EVENT OF ANY DISCREPANCIES BETWEEN STRUCTURAL DRAWINGS AND ARCHITECTURAL, MECHANICAL, OR PLUMBING DRAWINGS, NOTIFY THE ARCHITECT BEFORE PROCEEDING.

IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE ADEQUATE BRACING, SHORING, AND SUPPORT OF ALL TEMPORARY CONSTRUCTION, TEMPORARY EXCAVATION, AND PARTIALLY COMPLETED PORTIONS OF THE BUILDING; SUCH BRACING, SHORING AND SUPPORT MUST INSURE THE SAFETY OF THE ADJACENT PROPERTY AND OF ANY PERSONS WHO MAY COME IN CONTACT WITH THE PROJECT.

CODES AND STANDARDS

DESIGN IS BASED ON THE CALIFORNIA BUILDING CODE, 2016 EDITION. ALL CONSTRUCTION SHALL CONFORM TO APPLICABLE SECTIONS OF THIS CODE.

COB DESIGN IS BASED ON THE SUBMITTED ALTERNATE MATERIALS AND METHODS REQUEST FOR A STEEL REINFORCED COB WALL SYSTEM.

LIVE LOADS

ROOF LIVE	20 PSF
FLOOR LIVE	40 PSF

SEISMIC DESIGN

Ie	1.0
Ss	0.855
S1	0.325
SITE CLASS	D
Sds	0.660
Sd1	0.379
SEISMIC DESIGN CATEGORY	D
Cs	0.101
R	1.5
ANALYSIS PROCEDURE	EQUIVALENT LATERAL FORCE
REDUNDANCY FACTOR	1.3

WIND DESIGN

BASIC WIND SPEED, V	110 MPH
Iw	1.0
EXPOSURE	B

MAIN WIND-FORCE RESISTING SYSTEMS
ANALYSIS PROCEDURE — METHOD 2, RIGID, LOW-RISE, h < or = 60 FT

COMPONENTS & CLADDING
ANALYSIS PROCEDURE — METHOD 2, LOW-RISE, h < or = 60 FT

SNOW DESIGN (1)

70 PSF

SUBMITTALS

THE FOLLOWING SHALL BE SUBMITTED TO THE ENGINEERS FOR REVIEW.

CONTRACTOR PROPOSED CHANGES IN PRODUCTS, MATERIALS, EQUIPMENT, AND METHODS OF CONSTRUCTION FROM THOSE SPECIFIED ON THE STRUCTURAL DRAWINGS.

STRUCTURAL OBSERVATION

STRUCTURAL OBSERVATION WILL BE PROVIDED IN ACCORDANCE WITH CBC 2016, CHAPTER 17. THE CONTRACTOR SHALL NOTIFY THE ENGINEERS AT LEAST 48 HOURS IN ADVANCE OF TIME WHEN WORK THAT REQUIRES STRUCTURAL OBSERVATION WILL BE COMPLETED.

THE FOLLOWING STRUCTURAL OBSERVATIONS SHALL BE PERFORMED:

-CONCRETE AND REINFORCING STEEL BEFORE PLACEMENT OF CONCRETE:
  -REINFORCING STEEL
  -EMBEDDED ANCHORS

-WOOD FRAMING BEFORE FINISHES ARE APPLIED:
  -GENERAL WOOD FRAMING
  -DIAPHRAGMS, AND CONNECTIONS

-COB
  -INSPECTION OF THE MIXING AND PLACING OF EACH UNIQUE COB MIX DESIGN SHALL BE PERFORMED BY THE PROJECT ENGINEER OR OTHER PERSONS WITH SUFFICIENT KNOWLEDGE AND EXPERIENCE WITH COB CONSTRUCTION APPROVED BY THE PROJECT ENGINEER. A MINIMUM OF (2) MIX AND PLACEMENT INSPECTIONS ARE REQUIRED FOR THIS PROJECT. FURTHER INSPECTIONS ARE AT THE DISCRETION OF THE PROJECT ENGINEER.

  -INSPECTION PROCEDURE TO BE DOCUMENTED USING PHOTO OR VIDEO ALONG WITH BRIEF WRITTEN REPORT:

  1.) DOCUMENT THAT THE MIX DESIGN REQUIREMENTS DESCRIBED ABOVE UNDER "MATERIAL DESCRIPTION" HAVE BEEN MET.

  2.) DOCUMENT THAT THE PLACEMENT OF THE COB IS CONDUCTED USING ACCEPTED APPROPRIATE TECHNIQUES.

  3.) CONFIRM THAT THE SPEED OF APPLICATION OF CURRENT AND PREVIOUS LAYERS WERE WITHIN THE MOISTURE BALANCE TO ALLOW FOR APPROPRIATE INTEGRATION INTO LAYERS BELOW AND PLUMBNESS AND STRUCTURAL INTEGRITY AS HEIGHT IS GAINED. A REASONABLE AMOUNT OF OUT-OF-PLANE MATERIAL IS PERMITTED TO BE REMOVED WITH VERTICAL SAWING TECHNIQUES.

SPECIAL INSPECTION (1)

SPECIAL INSPECTION SHALL BE PROVIDED IN ACCORDANCE WITH CBC 2016, CHAPTER 17. A SPECIAL INSPECTOR SHALL BE ENGAGED TO PROVIDE SPECIAL INSPECTIONS. UNLESS OTHERWISE SPECIFICALLY INDICATED, THE ENGINEERS SHALL NOT PROVIDE SPECIAL INSPECTION.

A MINIMUM OF TWO PERIODIC INSPECTIONS OF THE COB MIX DURING MIXING AND PLACEMENT IS DESCRIBED IN THE COB SPECIFICATIONS BELOW AND SHALL BE PERFORMED BY THE PROJECT ENGINEER OR OTHER PERSONS WITH SUFFICIENT KNOWLEDGE AND EXPERIENCE WITH COB CONSTRUCTION APPOINTED BY THE PROJECT ENGINEER.

FOUNDATIONS

SPREAD FOOTINGS SHALL BEAR ON UNDISTURBED SOIL, ENGINEERED FILL, OR ROCK. FOOTING DESIGN IS BASED ON A MAXIMUM ALLOWABLE SOIL BEARING PRESSURE OF 1500 PSF DEAD PLUS LIVE, AND 2000 PSF TOTAL LOADS, INCLUDING WIND OR SEISMIC.

WATERPROOFING

WHERE STRUCTURAL DETAILS INDICATE ANY WATERPROOFING OR VENTILATION ITEMS, THEY ARE SCHEMATIC ONLY AND FOR THE PURPOSE OF ASSISTING IN SHOWING A COMPLETE STRUCTURAL DETAIL. REFER ONLY TO ARCHITECTURAL PLANS AND SPECIFICATIONS FOR THE COMPLETE DESCRIPTION OF ALL REQUIRED WATERPROOFING AND VENTILATION SYSTEMS.

CONCRETE

CONCRETE WORK SHALL CONFORM TO THE REQUIREMENTS OF ACI 301-16 AND ACI 318-14. CONCRETE SHALL BE NORMAL WEIGHT AND SHALL BE REINFORCED UNLESS OTHERWISE NOTED. CONCRETE SHALL HAVE A MINIMUM 28 DAY ULTIMATE COMPRESSIVE STRENGTH (F'c) OF 2,500 PSI UNLESS OTHERWISE NOTED.

NOTIFY THE STRUCTURAL ENGINEER AT LEAST 48 HOURS BEFORE PLACING CONCRETE. NO CONCRETE SHALL BE PLACED BEFORE THE STRUCTURAL ENGINEER HAS OBSERVED THE REINFORCING STEEL OR WAIVED SUCH INSPECTION.

CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 5 SACKS PER CUBIC YARD AND A SLUMP OF 3 TO 4 INCHES. ALL CONCRETE SHALL BE CONSOLIDATED WITH A MECHANICAL VIBRATOR. A MAXIMUM FLY ASH POZZOLAN SUBSTITUTION FOR PORTLAND CEMENT OF 50% MAY BE USED BUT NOT EXCEEDED.

REINFORCING STEEL

REINFORCING STEEL SHALL CONFORM TO ASTM A615, GRADE 40 FOR #3 AND 4 STIRRUPS AND TIES, GRADE 60 FOR ALL OTHERS.

REINFORCING BARS NOTED OR SHOWN AS CONTINUOUS SHALL RUN IN AS LONG LENGTHS AS PRACTICAL. IN SLAB AND BEAMS LOCATE TOP BAR SPLICES MIDWAY BETWEEN SUPPORTS, BOTTOM BAR SPLICES AT SUPPORTS. BEND AND SPLICE BARS AS NOTED IN THE DETAILS.

UNLESS OTHERWISE NOTED, THE FOLLOWING MINIMUM CONCRETE COVER SHALL BE PROVIDED FOR REINFORCEMENT:

CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH:	3"
CONCRETE EXPOSED TO EARTH OR WEATHER:	2"
CONCRETE NOT EXPOSED TO WEATHER OR IN CONTACT WITH GROUND	
SLABS AND WALLS:	1"
BEAMS AND COLUMNS:	1½"

STONE VENEER ANCHORAGE (1)

STONE VENEER SHALL BE ANCHORED TO CONCRETE PER CBC 2016, SECTION 1405.7. ANCHOR TIES SHALL NOT BE LESS THAN 0.1055" CORROSION-RESISTANT WIRE, OR APPROVED EQUAL, FORMED BEYOND THE BASE OF THE BACKING. THE LESS OF THE LOOPS SHALL BE NOT LESS THAN 6" IN LENGTH BENT AT RIGHT ANGLES AND LAID IN THE MORTAR JOINT, AND SPACED SO THAT THE EYES OR LOOPS ATE 12" MAXIMUM ON CENTER IN BOTH DIRECTIONS. THERE SHALL BE PROVIDED NOT LESS THAN A 0.1055" CORROSION-RESISTANT WIRE TIE, OR APPROVED EQUAL, THREADED THROUGH THE EXPOSED LOOPS FOR EVERY TWO SQUARE FEET OF STONE VENEER. THIS TIE SHALL BE A LOOP HAVING LEGS NOT LESS THAN 15" IN LENGTH BENT SO THAT THE TIE WILL LIE IN THE STONE VENEER MORTAR JOINT. THE LAST 2" OF EACH WIRE LEG SHALL HAVE A RIGHT-ANGLE BEND. 1" MINIMUM THICKNESS OF CEMENT GROUT SHALL BE PLACED BETWEEN THE CONCRETE AND THE STONE VENEER.

STRUCTURAL STEEL

BOLTS AND ROD SHALL CONFORM TO THE FOLLOWING:
ANCHOR RODS SHALL CONFORM TO ASTM F1554 GR. 36
THREADED ROD SHALL CONFORM TO ASTM A36

CARPENTRY

MOISTURE CONTENT AND PROTECTION

ALL FRAMING SHALL HAVE A MOISTURE CONTENT BELOW 19% MAXIMUM UPON INSTALLATION. FINISHES SHALL NOT BE INSTALLED OVER DIMENSIONAL LUMBER FRAMING UNTIL MOISTURE CONTENT IS BELOW 12% MAXIMUM.

MATERIALS SHALL BE PROPERLY STORED ON THE JOB SITE. MATERIALS SHALL BE STORED OFF OF THE GROUND, AND PROTECTED FROM EXPOSURE TO THE ELEMENTS.

PRESERVATIVE TREATMENT

FRAMING MEMBERS EXPOSED TO WEATHER OR IN CONTACT WITH CONCRETE, BUT NOT IN CONTACT WITH THE GROUND SHALL BE PRESSURE TREATED IN ACCORDANCE WITH AWPA STANDARD U1 & M4.

DIMENSIONAL LUMBER

DIMENSIONAL LUMBER SHALL CONFORM TO THE FOLLOWING MINIMUM GRADES AND SHALL BE DOUGLAS FIR AS FOLLOWS:

-SILLS AND LEDGERS ON CONCRETE OR CONCRETE BLOCK - DOUGLAS FIR - PRESSURE TREATED WITH AN APPROVED PRESERVATIVE.
-RAFTERS, STUDS, PLATES, BLOCKING, ETC. - NO.2 OR BETTER, U.O.N.
-POSTS 4" AND WIDER, JOISTS AND BEAMS - NO.2, U.O.N.

MANUFACTURED LUMBER

TJI'S, PARALLAMS (PSL'S), MICROLLAMS (LVL'S), AND TIMBERSTRAND (LSL) ARE MANUFACTURED BY ILEVEL WEYERHAEUSER. USE 2.0E PARALLAM PSL AND 1.9E MICROLLAM LVL.

STRUCTURAL GLUED LAMINATED WOOD MEMBERS (GLULAMS)

"GLULAMS," (GL) SHALL BE MANUFACTURED FROM SPECIES AND GRADES OF LUMBER WHICH WILL PRODUCE DESIGN VALUES EQUAL TO OR EXCEEDING THE FOLLOWING, WHEN LOADED PERPENDICULAR TO THE WIDE FACES OF THE LAMINATIONS:

BENDING (Fb)	-TENSION ON TENSION FACE:	2400 PSI
	-TENSION ON COMPRESSION FACE:	1850 PSI
HORIZONTAL SHEAR (Fv):		265 PSI
COMPRESSION PERPENDICULAR TO THE GRAIN		
ON THE TENSION FACE (Fc PERP):		650 PSI
MODULUS OF ELASTICITY (E):		1,800,000 PSI

DESIGN AND CONSTRUCTION SHALL CONFORM TO ANSI STANDARD A190.1 AND ASTM STANDARD D3737-85.

CARPENTRY CONT.

SHEATHING

WOOD SHTG PANELS SHALL CONFORM TO PS 1-07 OR PS 2-04, EXPOSURE 1, WHICH CAN INCLUDE PWD AND OSB. FLOOR AND ROOF SHEATHING SHALL BE PLACED WITH LONG AXIS OF PANELS PERPENDICULAR TO SUPPORTS AND WITH STAGGERED END JOINTS.

ROOF - BLOCKED 2-LAYERS OF $\frac{3}{4}$" PLYWOOD @ 16 O.C. APA RATED, UON. NAIL ALL SUPPORTED EDGES WITH 10d @ $2\frac{1}{2}$"; ALL OTHER INTERMEDIATE BEARINGS WITH 10d @ 12". OFFSET PANEL GRID IN ONE DIRECTION. WHERE DIAPHRAGMS ARE BLOCKED NAIL ALL PANEL EDGES W/ MIN 10d @ 4", UON.

FASTENERS

ALL WOOD CONNECTIONS SHALL BE IN ACCORDANCE WITH TABLE 2304.9.1 OF THE CBC. NAILS SHALL BE COMMON WIRE NAILS U.O.N. BOLTS AND LAG SCREWS BEARING ON WOOD SHALL HAVE WASHERS. SILLS OR PLATES SHALL BE BOLTED TO CONCRETE WITH 5/8" DIAMETER BOLTS WITH 3X3X1/4" WASHERS, EMBEDDED 7" MINIMUM AT 4'-0" MAXIMUM ON CENTER, U.O.N.

FASTENERS FOR INTERIOR APPLICATIONS PENETRATING PRESSURE-TREATED LUMBER SHALL BE HOT DIPPED ZINC-COATING GALVANIZED WITH A MINIMUM ASTM A 653 TYPE G185 COATING OR STAINLESS STEEL. FASTENERS EXPOSED TO WEATHER INCLUDING EXTERIOR APPLICATIONS OF PRESSURE-TREATED LUMBER, SHALL USE STAINLESS STEEL FASTENERS.

METAL FRAMING ANCHORS SHALL BE MANUFACTURED BY SIMPSON STRONG-TIE COMPANY OR EQUAL. JOIST HANGERS SHALL BE "U" SERIES U.O.N. ON DRAWINGS.

STRUCTURAL COB:

(1) DESIGN IS BASED ON THE SUBMITTED ALTERNATE MATERIALS AND METHODS REQUEST FOR A STEEL REINFORCED COB WALL SYSTEM. STEEL REINFORCED COB WALL SYSTEM HAS BEEN DEIGNED AS A STANDARD GRADE EARTH WALL WITH LIMITED DUCTILITY.

CLAY SHALL BE SOURCED FROM THE BUILDING SITE

THE FOLLOWING ACTIONS MUST BE TAKEN FOR EACH COB MIX DESIGN:

-MINIMUM 20% OF THE TOTAL SOIL AND SAND COMBINATION IN THE COB MIXTURE MUST BE MADE OF CLAY PARTICLES <0.002MM.

-THE COB MIXTURE SHALL BE WITHIN 10% OF THE FOLLOWING RATIOS, UNLESS UNIQUE CHARACTERISTICS ARE EXPRESSED IN SIEVING AND RATIO ALTERATIONS ARE APPROVED BY THE ENGINEER. THE COB MIXTURE SHALL BE WITHIN 10% OF THE FOLLOWING RATIOS, BY VOLUME: 2 PART CLAY BEARING SOIL: 3 PART COARSE SAND: 1/2 PART STRAW. VOLUME SHALL BE COMPARED BY PLACEMENT IN BUCKETS OF THE SAME SIZE. A MODERATE PRESSURE SHALL BE APPLIED TO THE STRAW WHILE FILLING THE BUCKET. STRAW SHALL NOT BE COMPRESSED TO THE POINT OF SHATTER FOR THE SAKE OF VOLUME MEASUREMENTS.

-ALL MATERIALS IN THE COB MATRIX MUST BE EVENLY MIXED.

-(3) 1'-0"X1'-0"X1'-0" SAMPLE BLOCKS SHALL BE WEIGHED AND TESTED IN COMPRESSION BY A THIRD PARTY AGENCY. THE RESULTS ARE TO BE SENT TO THE PROJECT ENGINEER FOR APPROVAL. THE AVERAGE COMPRESSIVE STRENGTH SHALL BE 70 PSI OR GREATER.

-(3) 6"X1'-0"X3'-0" SAMPLE BLOCKS LAID FLAT SHALL BE WEIGHTED AND TESTED IN BENDING FOR MODULUS OF RUPTURE BY A THIRD PARTY AGENCY. THE RESULTS ARE TO BE SENT TO THE PROJECT ENGINEER FOR APPROVAL. THE AVERAGE MODULUS OF RUPTURE SHALL BE 110 PSI OR GREATER.

(1) -(3) 12"X12"X5" THICK SAMPLE BLOCKS SHALL BE MADE AND CURED 28 DAYS. DROP 100ml OF WATER 16" TO SLOPED FACE OF TEST BRICK OVER A PERIOD OF 20 MINUTES MINIMUM TO 60 MINUTES MAXIMUM. DRY THE BRICK AND INSPECT THE BRICK SURFACE FOR ANY OF THE FOLLOWING ITEMS: CRAZING OR STAR TYPE CRACK PATTERNS, LOCAL SWELLING, FRETTING (LOSS OF LAYERS OF SOIL), EFFLORESCENCE. ANY ONE OF THESE ARE GROUNDS FOR REJECTING THE MIX. THE PIT DEPTH SHALL THEN BE MEASURED, AND THE ERODIBILITY INDEX DETERMINED FROM THE TABLE BELOW:

PIT DEPTH, D	ERODABILITY INDEX
0 < D < 0.2"	2
0.2" < D < 0.4"	3
0.4" < D < 0.6"	4
0.6" ≤ D	5 (FAIL)

A REPORT CONTAINING PHOTOS AND VIDEO SHALL BE MADE OF THE EROSION TEST AND SENT TO THE PROJECT ENGINEER FOR APPROVAL.

THE MIX IS APPLIED TO THE WALL IN "LIFTS" OR LAYERS, AND EACH LAYER IS WORKED INTO THE LAYER UNDERNEATH TO CREATE A CONTINUOUS WALL FABRIC WITHOUT JOINTS. TOP 1" INTEGRATION AREA OF EACH SUCCESSIVE WALL LIFT IS TO BE MAINTAINED IN A MOIST YET FIRM PLASTIC STATE BETWEEN LIFTS. BUILDER TO INTEGRATE EACH SUCCESSIVE LIFT INTO THIS TOP PLASTIC 1" INTEGRATION AREA.

(1) CONTROL JOINTS SHALL BE CONSTRUCTED EXTENDING VERTICALLY FROM THE CORNERS OF ALL WINDOW AND DOOR OPENINGS PER DETAIL 15/S4.0 AND THE ELEVATION ON SHEET S2.0.

SHEET LIST

MATERIAL LEGEND

	CONCRETE
	FOOTING
	WOOD BEAM
	RAFTER OR JOIST
☒	WOOD POST ABOVE. DBL STUD OR 4X4, U.O.N.
☐	WOOD POST BELOW DBL STUD OR 4X4, U.O.N.
	COB

ABBREVIATIONS

AB	ANCHOR BOLT
ABV	ABOVE
ADDL	ADDITIONAL
APPROX	APPROXIMATE
ALT	ALTERNATE
ARCH	ARCHITECT
ATR	ALL-THREAD ROD
BLW	BELOW
BLDG	BUILDING
BLKG	BLOCKING
BM	BEAM
BN	BOUNDARY NAIL
BTWN	BETWEEN
BOT	BOTTOM
BP	BEARING PLATE
CBC	CALIFORNIA BUILDING CODE
CJ	CONSTRUCTION JOINT; CONTROL JOINT
CL	CENTER LINE
CLR	CLEAR
CMU	CONCRETE MASONRY UNITS
CSK	COUNTERSINK
COL	COLUMN
CONC	CONCRETE
CONT	CONTINUOUS
D	PENNY (NAIL SIZE)
DIA	DIAMETER
DIMS	DIMENSIONS
DBL	DOUBLE
DET	DETAIL
DF	DOUGLAS FIR
DTP	DOUBLE TOP PLATE
DWG	DRAWING
(E)	EXISTING
EA	EACH
EB	EXPANSION BOLT
EF	EACH FACE
EJ	EXPANSION JOINT
EL	ELEVATION
EN	EDGE NAIL
ENGR	ENGINEER
EO	EVERY OTHER
EQ	EQUAL
ES	EACH SIDE
EW	EACH WAY
EXT	EXTERIOR
FDN	FOUNDATION
FIN	FINISH
FN	FIELD NAIL
FOC	FACE OF CONCRETE
FOS	FACE OF STUD
FS	FAR SIDE
FTG	FOOTING
GA	GAUGE
GALV	GALVANIZED
GB	GRADE BEAM
GLT	GLUED-LAMINATED TIMBER
GB	GRADE BEAM
GYP BD	GYPSUM WALL BOARD
HDG	HOT DIP GALVANIZED
HDR	HEADER
HF	HARDY FRAME
HGR	HANGER
HORZ	HORIZONTAL
HSB	HIGH STRENGTH BOLTS
HSS	HOLLOW STRUCTURAL SECTION
HT	HEIGHT
ID	INSIDE DIAMETER
INT	INTERIOR
JST	JOIST
L	ANGLE SECTION
LLH	LONG LEG VERTICAL
LLV	LONG LEG VERTICAL
LONG	LONGITUDINAL
LSL	LAMINATED STRAND LUMBER
LVL	LAMINATED VENEER LUMBER
MANUF	MANUFACTURER
MAX	MAXIMUM
MB	MACHINE BOLT
MIN	MINIMUM
(N)	NEW
N/A	NOT APPLICABLE
NO	NUMBER
NS	NEAR SIDE
NTS	NOT TO SCALE
O/	OVER
OC	ON CENTER
OD	OUTSIDE DIAMETER
OH	OPPOSITE HAND
OPNG	OPENING
OSB	ORIENTED STRAND BOARD
PAF	POWDER ACTUATED FASTENERS
PEN	PENETRATION
PERF	PERFORATED
PERP	PERPENDICULAR
PL	PLATE
PSL	PARALLEL STRAND LUMBER
PSWS	PER SHEAR WALL SCHEDULE
PT	PRESSURE TREATED
PVC	POLYVINYL CHLORIDE
PWD	PLYWOOD
RDWD	REDWOOD
REINF	REINFORCEMENT
RFT	RAFTER
REQD	REQUIRED
RET	RETAINING
RO	ROUGH OPENING
SAD	SEE ARCHITECTURAL DRAWINGS
SCD	SEE CIVIL DRAWINGS
SCHED	SCHEDULE
SLD	SEE LANDSCAPE DRAWINGS
SMD	SEE MECHANICAL DRAWINGS
SHT	SHEET
SHTG	SHEATHING
SIM	SIMILAR
SOG	SLAB ON GRADE
SQ	SQUARE
SS	SELECT STRUCTURAL; STAINLESS STEEL
STD	STANDARD
STL	STEEL
STIFF	STIFFENER
SW	SHEAR WALL
SYM	SYMMETRICAL
T&B	TOP AND BOTTOM
TD	TIE-DOWN
T&G	TONGUE AND GROOVE
THRD	THREADED
TN	TOE-NAIL
TOS	TOP OF SLAB; TOP OF STEEL
TYP	TYPICAL
UON	UNLESS OTHERWISE NOTED
VB	VAPOR BARRIER
VERT	VERTICAL
VIF	VERIFY IN FIELD
W	WIDE FLAQNGE SECTION
W/	WITH
WP	WORKING POINT
WPM	WATERPROOF MEMBRANE
WS	WOOD SCREW
WWR	WELDED WIRE REINFORCEMENT
#	SIZE OF REINFORCING BAR
@	AT (SPACING)

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NEW WELCOME HUT

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GENERAL NOTES

Sheet:

S0.0

Shasta County

DEPARTMENT OF RESOURCE MANAGEMENT
1855 Placer Street, Redding, CA 96001

Richard W. Simon, AICP
Director
Dale J. Fletcher, CBO
Building Official

Alternate Materials and Methods Request

Name _____ APN: _____ BP#_____

Pursuant to Section 17923 and 17951 of the California Health and Safety Code and the Adopted codes, a building department may approve the use of alternate materials and methods not specifically prescribed in the code. The Building Official may approve such alternate, provided there is evidence that the alternate is found to be at least the equivalent of that prescribed by the code in suitability, strength, effectiveness, fire resistance, durability, safety, and sanitation.

The Property Owner and/or Contractor shall defend, hold harmless and indemnify Shasta County, against all claims, suits, actions, costs, expenses (including but not limited to reasonable attorneys fees of County Counsel and counsel retained by County, expert fees, litigation costs, and investigation costs), damages, judgments or decrees by reason of any person's or persons' bodily injury, including death, or property being damaged do to the use and installation of the alternative material or method.

Project: BIG BEND HOT SPRINGS WELCOME HUT Project Address: 25322 HEALTH WAY, BIG BEND

Proposed Alternate: COB EARTHEN WALL SYSTEMS.

Code Section(s): MOST SIMILAR TO ADOBE CONSTRUCTION AS DEFINED IN CBC CHAPTERS 2A, 21 (SECTION 2109.2.4 ACI530(SECTION 5.1.2).

Justification of Equivalence can include: manufacturer's approvals, testing, certifications, and technical data. For specific materials that require special training include documentation of the training (Attach additional information as needed)

PLEASE REFER TO THE ATTACHED DOCUMENTATION.

Print Owner's Name: _____ Signature: _____ Date: _____

*Contractor/Design Professional: License # _____ Date: _____

Print Name: _____ Signature: _____

*Contractor information is always required when a product requires specific industry training.

County Use Only Approved Denied

Comments: _____

Division Manager Signature _____ Date _____

☐ Suite 150
AIR QUALITY MANAGEMENT DISTRICT
(530) 225-5674
(530) 225-5237

☒ Suite 150
BUILDING DIVISION
(530) 225-5532
FAX (530) 245-6468

☐ Suite 105
PLANNING DIVISION
(530) 225-5532
FAX (530) 245-6468

☐ Suite 264
ENVIRONMENTAL HEALTH
(530) 225-5789
FAX (530) 225-5817

☐ Suite 230
ADMINISTRATION & COMMUNITY EDUCATION
(530) 225-5789
FAX (530) 225-5817

Toll Free Access Within Shasta County 1-800-528-2850

Steel Reinforced Cob Wall System AMMR

SUBJECT OF ALTERNATIVE. Steel Reinforced Structural Wall System

CODE REQUIREMENTS
2016 California Building Code Chapter 21: Masonry

ALTERNATE PROPOSAL
Steel reinforced earthen cob wall system designed to current New Zealand Earthen Building Code Standards with certain limitations and restrictions as laid forth below:

1. The system is applicable to a single-story Risk Category II building with an area not exceeding 500 s.f.

2. The reinforced earthen wall height : thickness (*h/t*) ratio shall not exceed 10, and the walls shall be 10"-thick, minimum.

3. Unreinforced earthen wall systems will not be permitted.

   Straw added to the soil mixture will not be considered as reinforcement. Reinforcement shall be steel, as defined by NZS 4297, Section 2.1; NZS 4298, Sections 1.3 and 2.6.1; and TMS 602, Section 2.4.

4. The structure shall be designed for ***limited ductility*** per NZS 4297. NZS 4297 requirements are similar to CBC-compliant special reinforced masonry shear walls (e.g. – shear strength of wall must be capable of resisting corresponding shear at 125% of wall's in-plane bending strength). In-plane shear strength of the system is derived from the horizontal reinforcement only, neglecting soil strength.

5. The design team will submit:

   a. A complete preconstruction testing program; and

   b. A complete construction testing and inspection program per CBC Chapter 17. This program shall be based on NZS 4298.

6. The system's load demands (superimposed gravity and lateral loads) shall be determined using the provisions of CBC Chapter 16 and ASCE 7-10, as modified below:

   a. The building's period may be calculated per NZS 1170.5, Section 4.1.2 (Rayleigh Method) or per ASCE 7-10, Section 12.8.2.1.

   b. The design spectral acceleration, C(T), determined by NZS 1170.5 Eqn. 3.1(1) is equal to either S_{DS} or S_{D1} as determined from current USGS mapping. For the subject low-rise construction, S_{DS} will likely be the controlling parameter.

   c. The seismic base shear coefficient shall be determined using NZS 1170.5, Section 5.2.1.1. Per NZS 4297, Section 4.7.2.1, the structural ductility factor (μ) = 2.0 (limited-ductility) and the structural performance factor (S_p) = 0.67. Since the building period will be about 0.1 seconds, the coefficient K_C is 1. 14

      The term (K_μ / S_p) is equivalent to the response modification factor (R) used in ASCE 7. In this case, the equivalent response modification factor is 1.7.

7. The load demands on the system shall be combined and applied per NZS 1170.0, Section 4 and NZS 1170.5, Section 5.

8. The system's capacity (ability to resist load demands) shall be determined using the provisions of NZS 4297 and NZS 4298.

9. The system's detailing must comply with NZS 4297 (e.g. – reinforcement anchorage). Minimum reinforcing steel as required for special reinforced masonry shear walls in TMS 402-13, 7.3.2.6 shall be provided.

10. Foundations shall be designed per CBC Chapter 18.

11. Out-of-plane anchorage of the earthen walls to the roof diaphragm shall comply with the provisions of ASCE 7-10, Section 12.11.

12. The roof diaphragm shall be designed and detailed per CBC 1613 and ASCE 7-10, Section 12.10.

13. Other requirements and modifications, as determined during structural plan check of project design.

JUSTIFICATION

ASTM E2392/E2392M – 10, Standard Guide for Design of Earthen Wall Building Systems, 7.1.1 states that "Engineering design of unstabilized earthen walls can make use of these New Zealand Standards: NZ97, NZ98, and NZ99." New Zealand contains high seismic zones which makes their current earthen building codes very valuable to earthen wall design in California. This report references the following New Zealand codes:

- NZS 4297, Engineering Design of Earthen Buildings
- NZS 4298, Materials and Workmanship for Earthen Buildings

Surveys of earthen building construction in New Zealand following the Sept. 2010 M7.1 (MMI VIII and greater) earthquake in Canterbury revealed reinforced earthen structures that were designed and constructed in conformance with New Zealand Standards performed well:

http://www.standards.co.nz/touchstone/building/2010/dec/earth-buildings-surveyed-following-canterbury-earthquake/

A similar survey performed after the 2011 Christchurch earthquake (M6.3, MMI up to VIII) again revealed that properly-designed, reinforced earthen construction performed well:

http://www.nzsee.org.nz/db/SpecialIssue/44(4)0358.pdf

An additional report describing earthen building performance in both earthquakes is found at this link:

http://www.civil.mrt.ac.lk/conference/ICSECM_2011/SEC-11-89.pdf

References

1. ASTM E2392/E2392M – 10, Standard Guide for Design of Earthen Wall Building Systems, ASTM International, West Conshohocken, Pennsylvania.
2. NZS 4297 (1998). Engineering Design of Earthen Buildings, Standards New Zealand, Wellington, New Zealand.
3. NZS 4298 (1998). Materials and Workmanship for Earthen Buildings, Standards New Zealand, Wellington, New Zealand.
4. NZS 1170.5 (2004). Structural Design Actions Part 5, Earthquake Actions – New Zealand, Standards New Zealand, Wellington, New Zealand.
5. http://www.standards.co.nz/touchstone/building/2010/dec/earth-buildings-surveyed-following-canterbury-earthquake/
6. http://www.nzsee.org.nz/db/SpecialIssue/44(4)0358.pdf
7. http://www.civil.mrt.ac.lk/conference/ICSECM_2011/SEC-11-89.pdf

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NEW WELCOME HUT

Big Bend Hot Springs, CA

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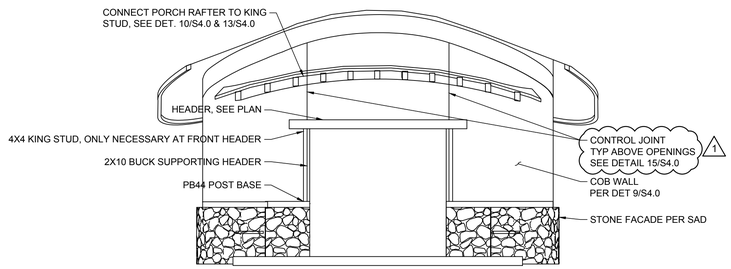
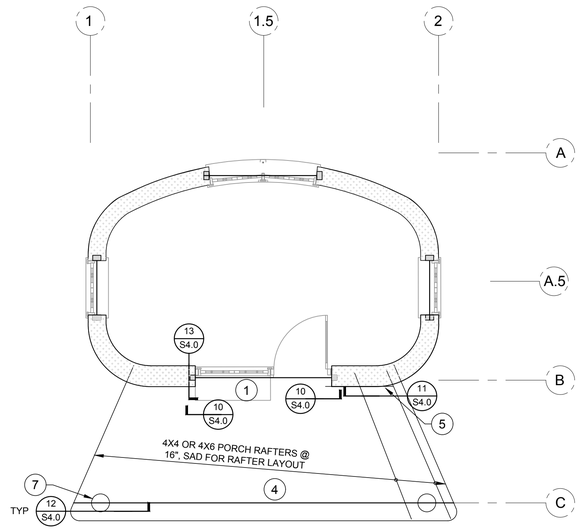
Sheet: S1.0



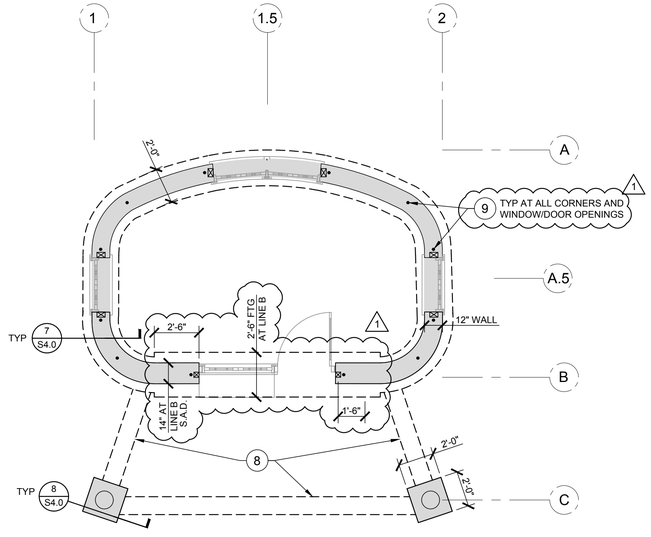
FRONT ELEVATION

¼" = 1'-0" 0 2' 4' 8' 12' REF NORTH



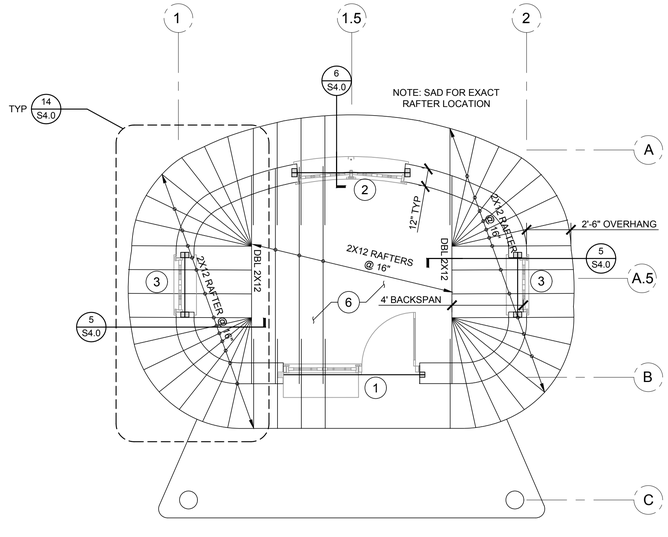
PORCH ROOF FRAMING PLAN

¼" = 1'-0" 0 2' 4' 8' 12' REF NORTH



FOUNDATION PLAN

¼" = 1'-0" 0 2' 4' 8' 12' REF NORTH



ROOF FRAMING PLAN

¼" = 1'-0" 0 2' 4' 8' 12' REF NORTH

SHEET NOTES

1	HEADER ABOVE SERVICE WINDOW, USE 14X8 DF#2 OR 14"X5¼" PSL, INSTALL FLAT	
2	HEADER ABOVE REAR WINDOW, USE 14X6 DF#2 OR 14"X3½" PSL, INSTALL FLAT	
3	HEADER ABOVE SIDE WINDOW, USE 14X3 DF#2 OR 14"X1½" LVL, INSTALLED FLAT	
4	USE 5½"X11¾" 20F-V3 GLU LAM BEAM SHALL BE PRESSURE TREATED WITH PRESERVATIVE OR BE MANUFACTURED FROM NATURALLY DURABLE OR PRESERVATIVE-TREATED WOOD	
5	INSTALL 4X4 BLOCKS BETWEEN ALL PORCH RAFTERS W/ 4-16d TOENAILS	11 S4.0
6	ROOF SHTG, SEE GENERAL NOTES	
7	8"Ø MIN NATURAL TREE WOOD COLUMN	
8	OPTIONAL: 12" SQ CONCRETE GRADE BEAM CONNECTING FOUNDATIONS. STEEL REINFORCEMENT AS FOLLOWS: 2-#4 LONGITUDINAL BARS T & B W/ #3 TIES @ 12"	
9	AT WINDOW/DOOR OPENINGS AND CORNERS, ANCHOR ROD TO BE EMBEDDED 8" INTO FOOTING. SEE DETAIL	11 S4.0

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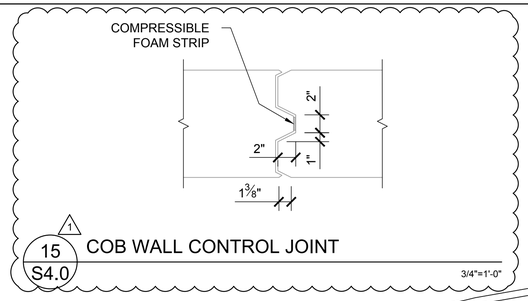
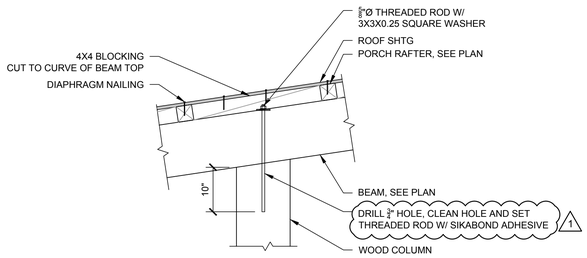
FOUNDATION & ROOF FRAMING PLANS

Sheet: S2.0



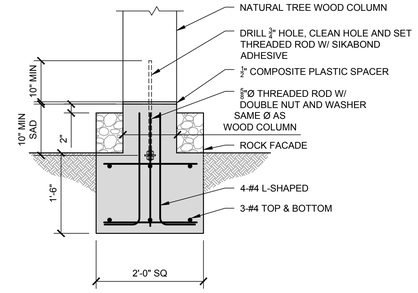
15 S4.0 COB WALL CONTROL JOINT

3/4"=1'-0"



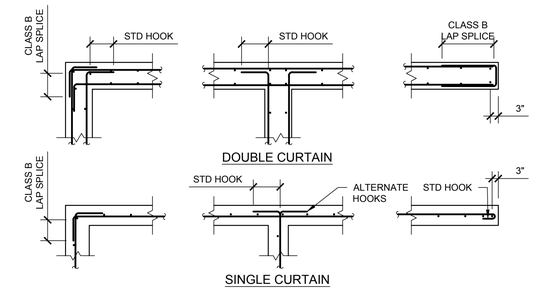
12 S4.0 WOOD COLUMN CONNECTION TO BEAM

3/4"=1'-0"



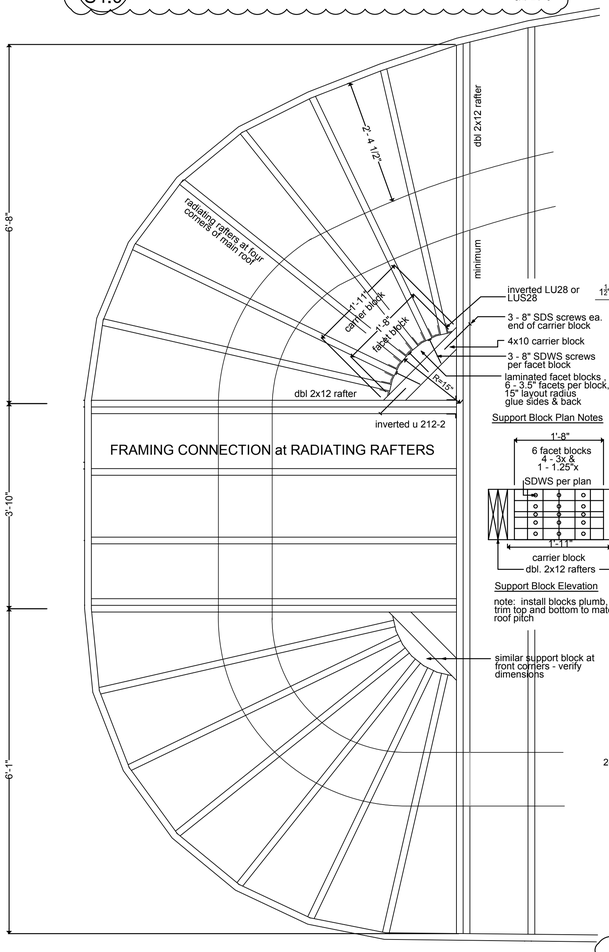
8 S4.0 WOOD COLUMN AT CONC PAD

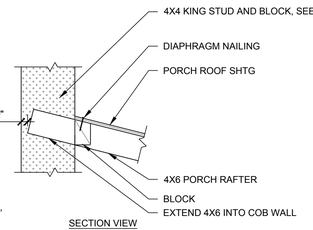
3/4"=1'-0"



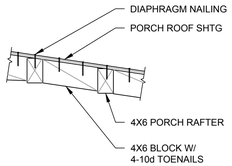
4 S4.0 CONC REINF AT CORNERS & INTERSECTIONS

NOT TO SCALE





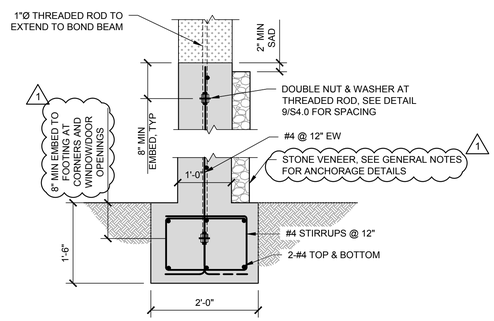
SECTION VIEW



ELEVATION VIEW

11 S4.0 PORCH RAFTER DIAPHRAGM CONNECTION

3/4"=1'-0"



7 S4.0 CONC FOOTING

3/4"=1'-0"

BAR SIZE	CLASS B SPLICE (in)		CLASS A SPLICE (ld) (in)	
	TOP BARS	OTHER BARS	TOP BARS	OTHER BARS
F'c = 2500psi				
#3	31	24	24	18
#4	41	32	32	24
#5	51	39	39	30

NOTES:

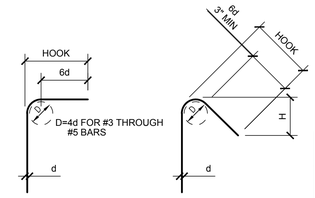
1. LAP SPLICE LENGTHS ARE BASED ON ACI 318-08 12.2.2, GR. 60 STEEL AND NORMAL WEIGHT AGGREGATE. CLEAR SPACING OF BARS BEING DEVELOPED OR SPLICED NOT LESS THAN 2db AND CLEAR COVER NOT LESS THAN db.

2. CLASS A SPLICES ARE LIMITED TO CASES WHERE ONE-HALF OR LESS OF THE TOTAL REINFORCEMENT IS SPLICED WITHIN THE REQUIRED LAP LENGTH (STAGGERED SPLICE). FOR WALLS THE SPLICES SHALL ALSO BE STAGGERED WITH RESPECT TO THE OPPOSITE CURTAIN.

3. TOP BARS ARE BARS WITH MORE THAN 12" OF CONCRETE POURED BELOW THE BARS.

3 S4.0 TENSION LAP SPLICES

NOT TO SCALE



90° HOOK

135° SEISMIC HOOK

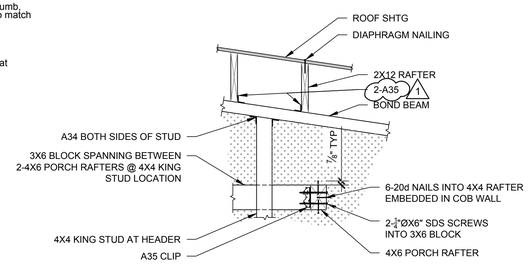
BAR SIZE	D	HOOK		H APPROX.
		90°	135°	
#3	1½"	4"	4½"	3"
#4	2"	4½"	4½"	3"
#5	2½"	6"	6"	3¾"

Support Block Plan Notes

Support Block Elevation

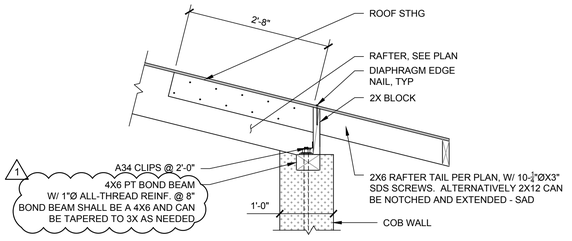
note: install blocks plumb, trim top and bottom to match roof pitch

similar support block at front corners - verify dimensions



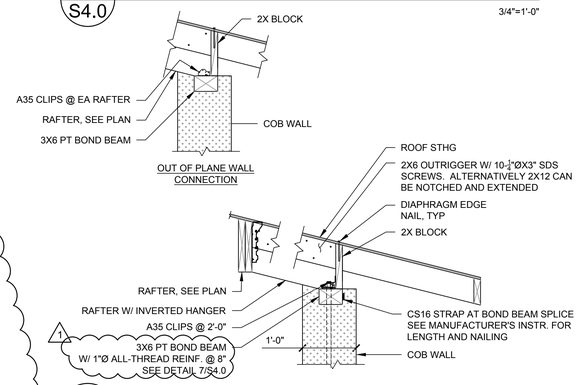
10 S4.0 KING STUD CONNECTIONS

3/4"=1'-0"



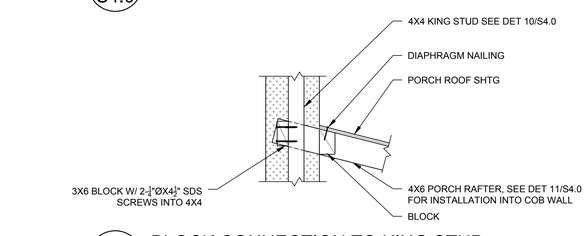
6 S4.0 WALL CONNECTION TO ROOF

3/4"=1'-0"



5 S4.0 WALL CONNECTION TO ROOF

3/4"=1'-0"

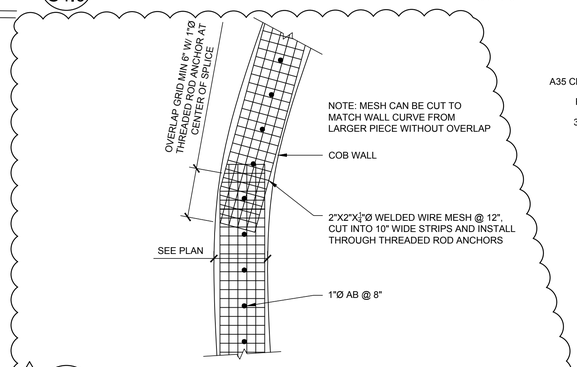


14 S4.0 PLAN VIEW OF RAFTER CONNECTION

3/4"=1'-0"

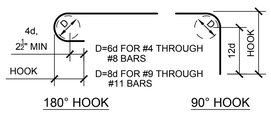
13 S4.0 BLOCK CONNECTION TO KING STUD

3/4"=1'-0"



2 9 S4.0 PLAN VIEW OF BASALT MESH

3/4"=1'-0"



180° HOOK

90° HOOK

BAR SIZE	D	HOOK	
		180°	90°
#3	2¼"	4"	6"
#4	3"	4½"	8"
#5	3¾"	5"	10"
#6	4½"	6"	1'-0"
#7	5¼"	7"	1'-2"
#8	6"	8"	1'-4"
#9	9½"	10½"	1'-7"

1 S4.0 STANDARD HOOKS

NOT TO SCALE

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ANTHONY P. DEVITE No. 80715 Exp. 3/31/19 CIVIL STATE OF CALIFORNIA

NEW WELCOME HUT

Big Bend Hot Springs, CA

Revision:	
Version V1.1	
1 PLAN CHECK	04.03.2018
2 PLAN CHECK 2	05.16.2018
Date:	08.16.17
Scale:	AS NOTED
Drawn:	JB/APD
Job:	1500

DETAILS

Sheet: S4.0