

BayREN Codes & Standards Training

Improving Energy Code Compliance in Low-rise New Construction

Coordinating Plan Check and Field Inspection
for Residential New Construction



BAY Regional
AREA Energy
Network

Understanding the forms 1-2-3

- There is a clear, intentional sequence to the documents:
 1. Document what is ***required***
 2. Document what was ***installed***
 3. Document what was ***verified***
- When these three *kinds* of documentation match, the process was successful.
- Note: Not all installed features need to be third party verified.

Step 1 – Document What is Required

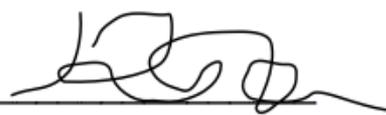
- This first compliance document is called the:

**CF1R – Certificate of
*Compliance***

CF1R
**Certificate of
Compliance**

"What's Required"

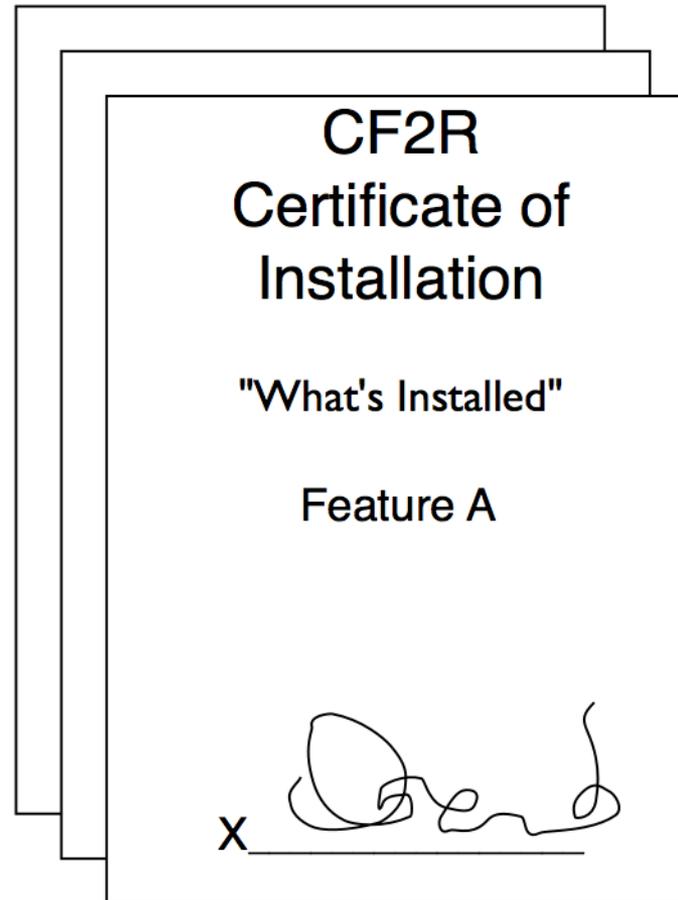
Feature A
Feature B
Feature C
Feature D*
Feature E*

X 

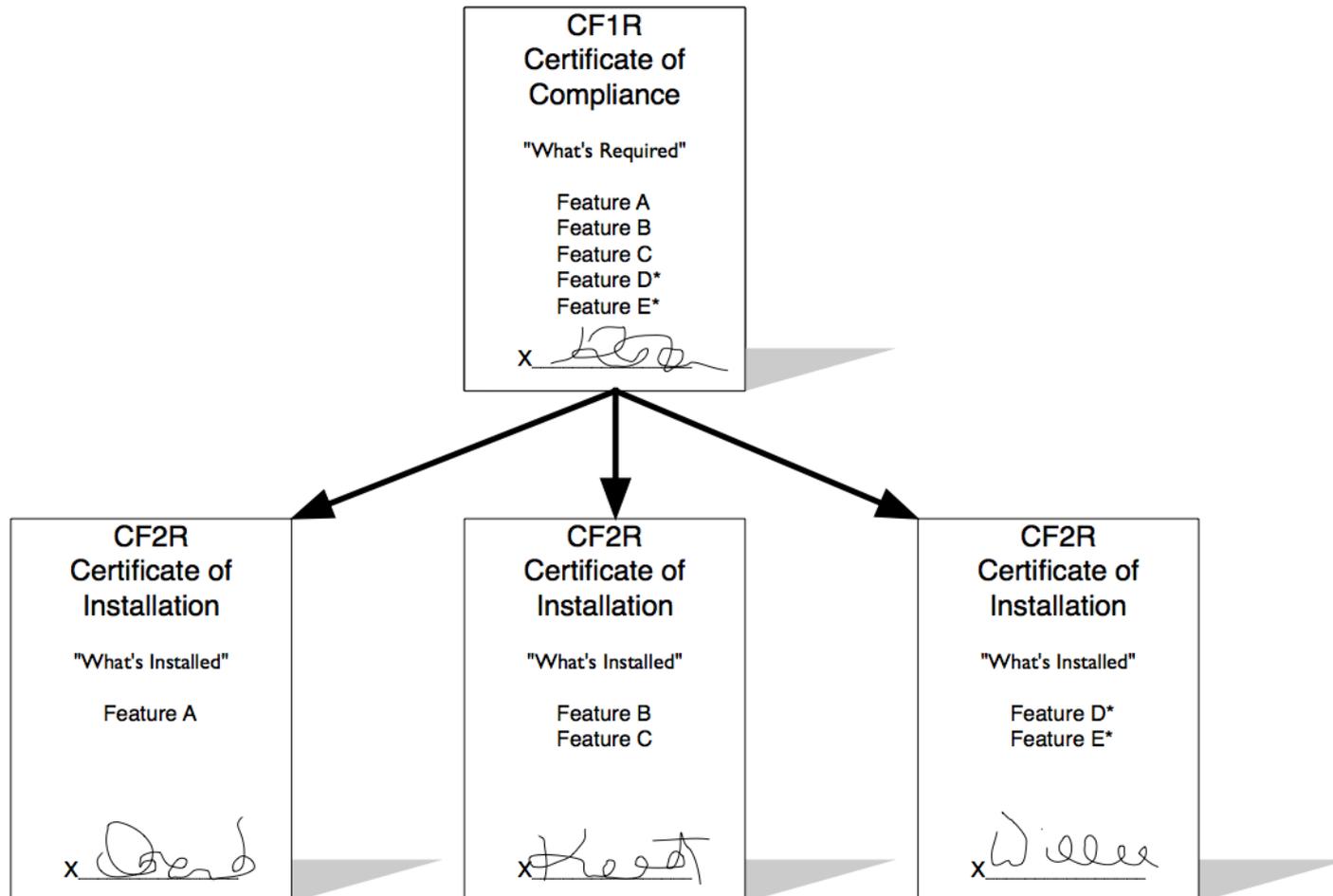
Step 2 – Document What is Installed

- This second compliance document is called the:

**CF2R – Certificate of
*Installation***



Step 2 – Document What is Installed



Step 3 – Document What is Verified

- This third compliance document is called the:
CF3R – Certificate of Verification

CF3R
Certificate of Verification

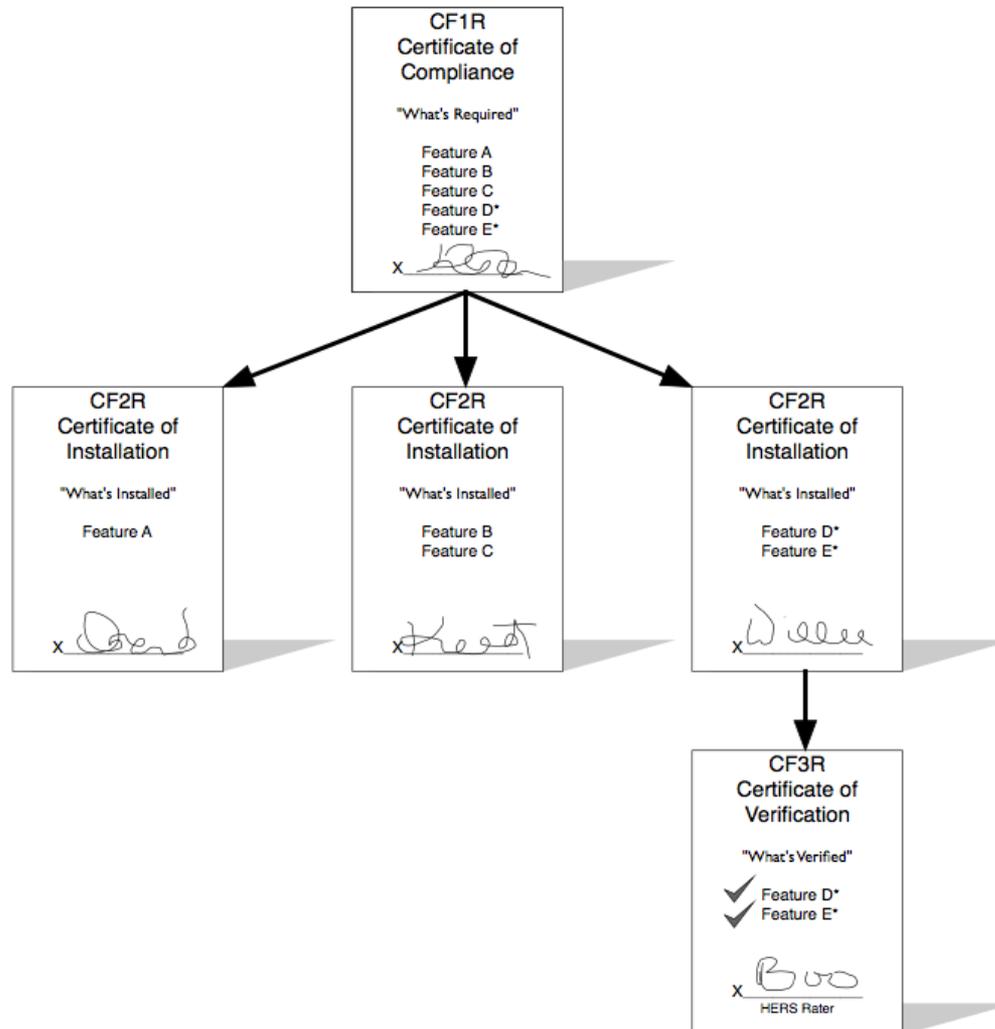
"What's Verified"

✓ Feature D*

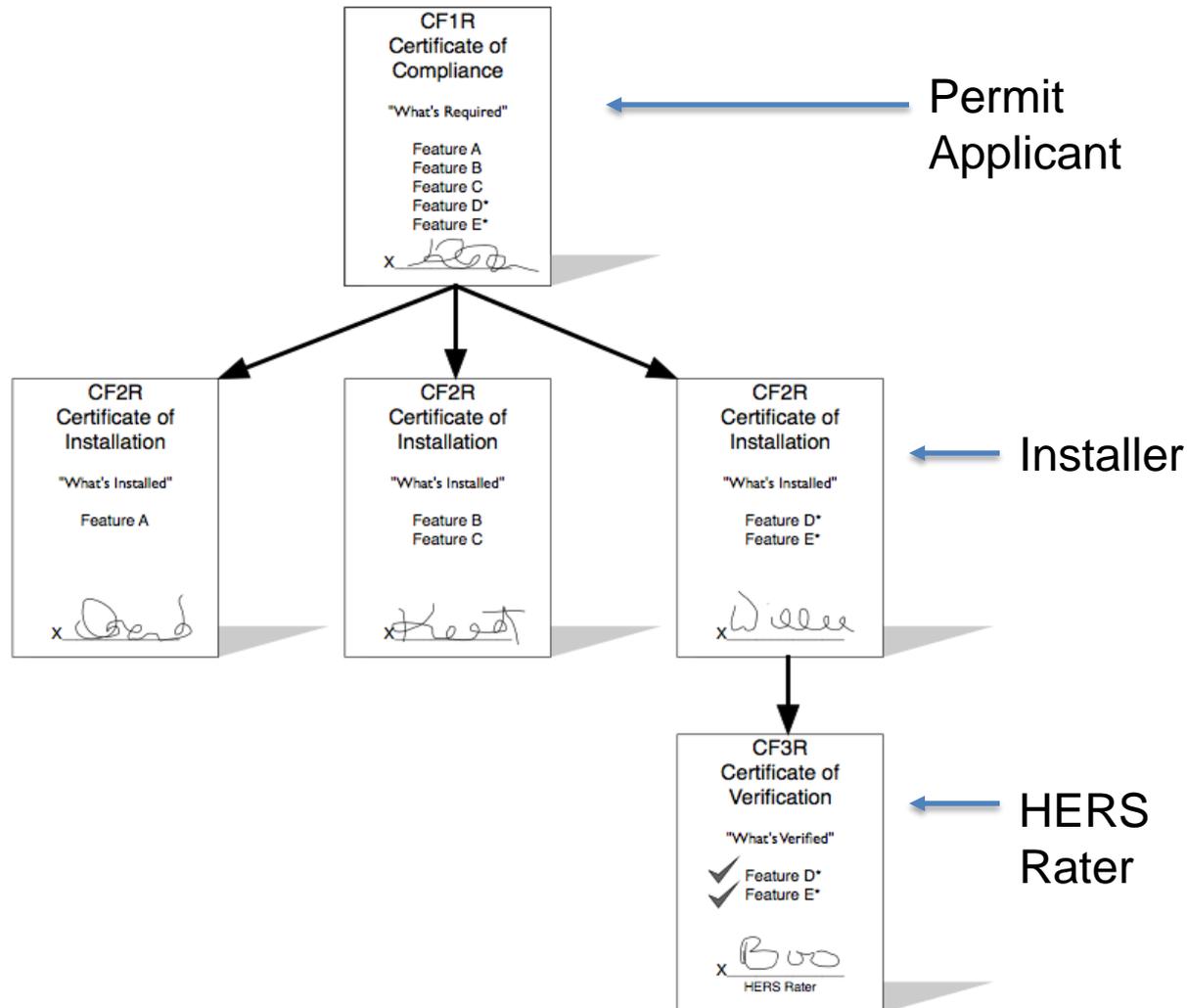
✓ Feature E*

X 
HERS Rater

Step 3 – Document What is Verified

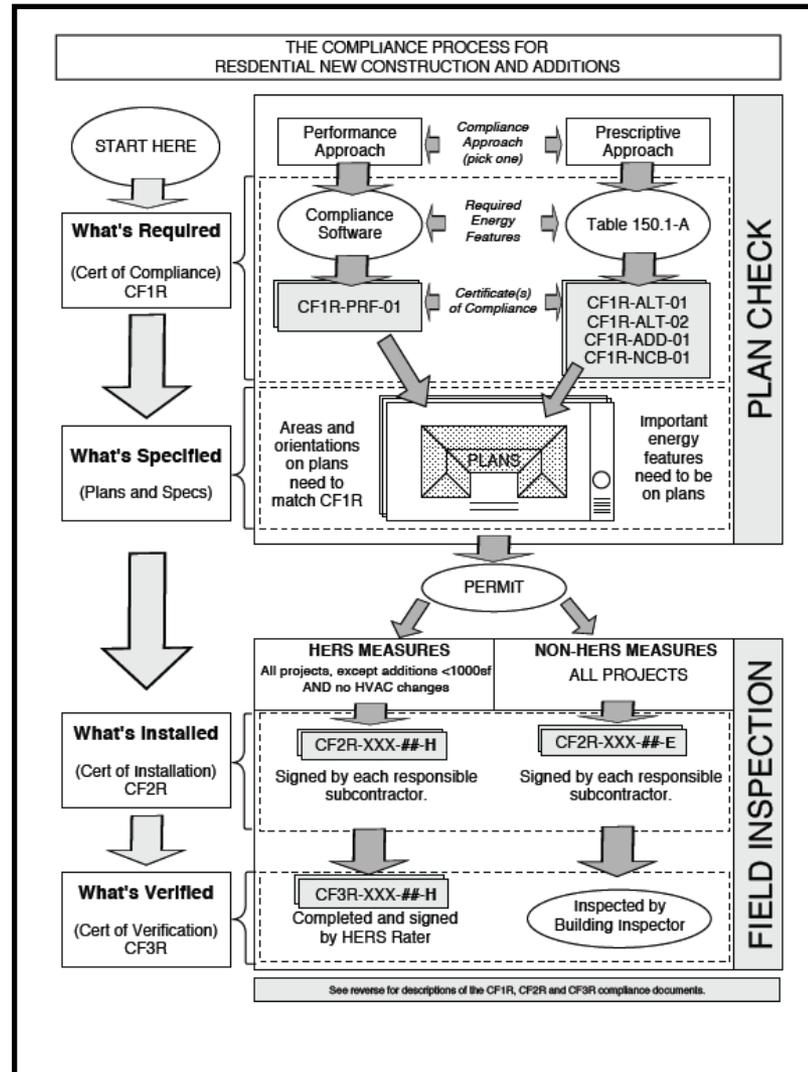


Understanding the forms 1-2-3



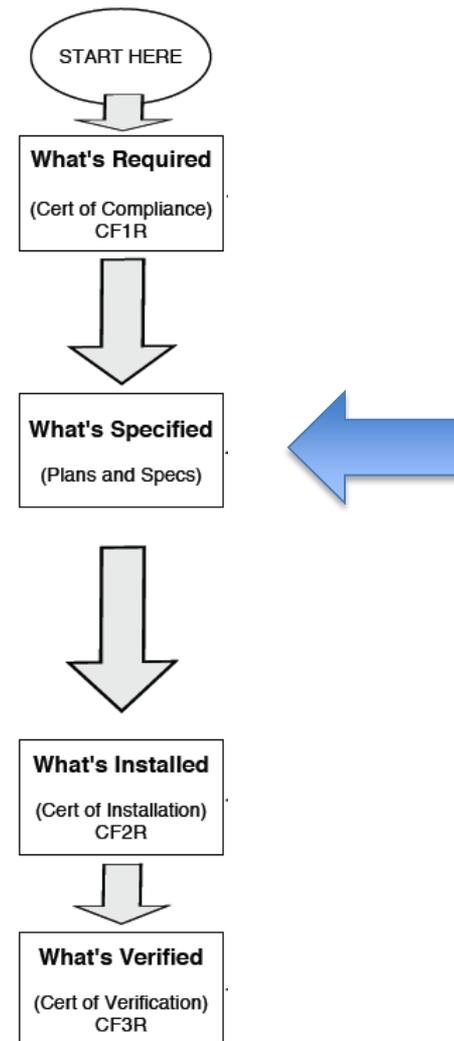
Compliance Process Flow Diagram

Refer to full-size copy provided with your handouts.

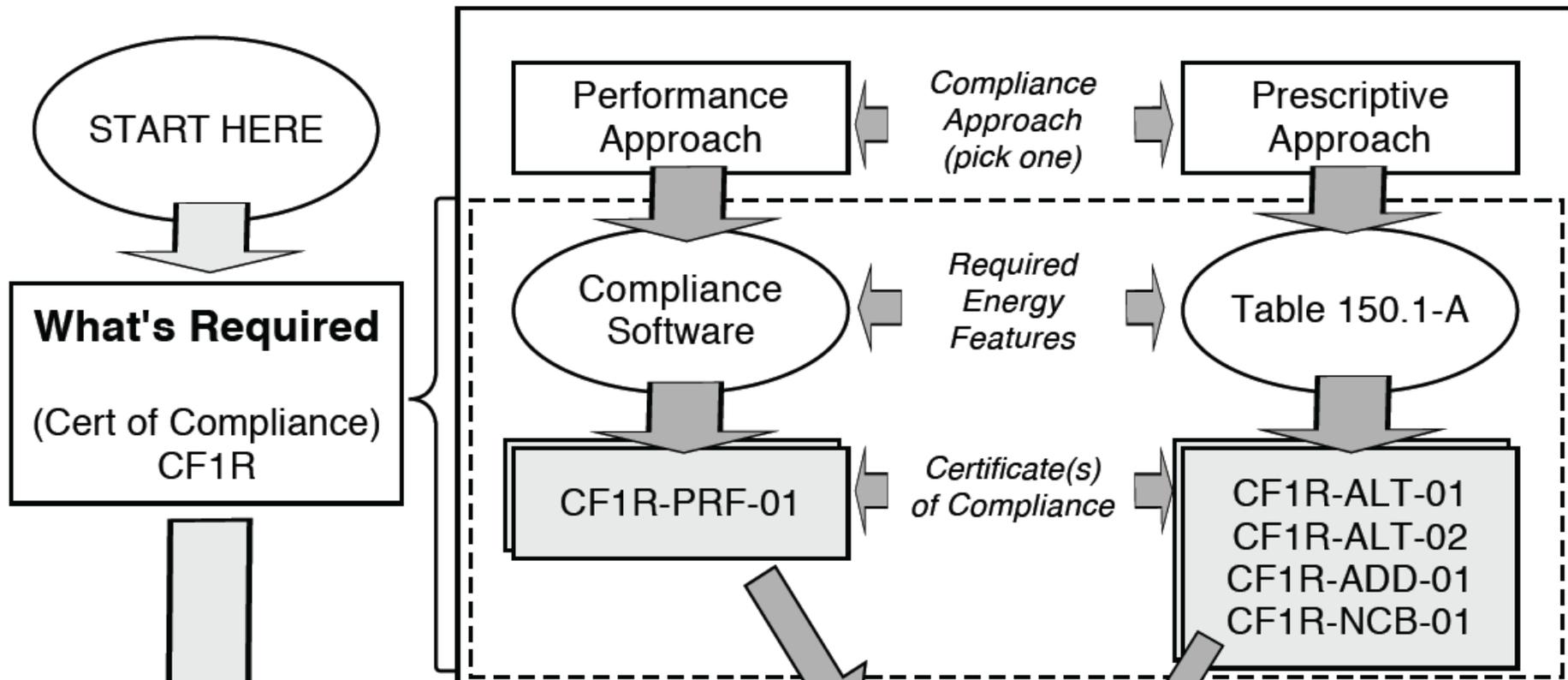


Compliance Process Flow Diagram

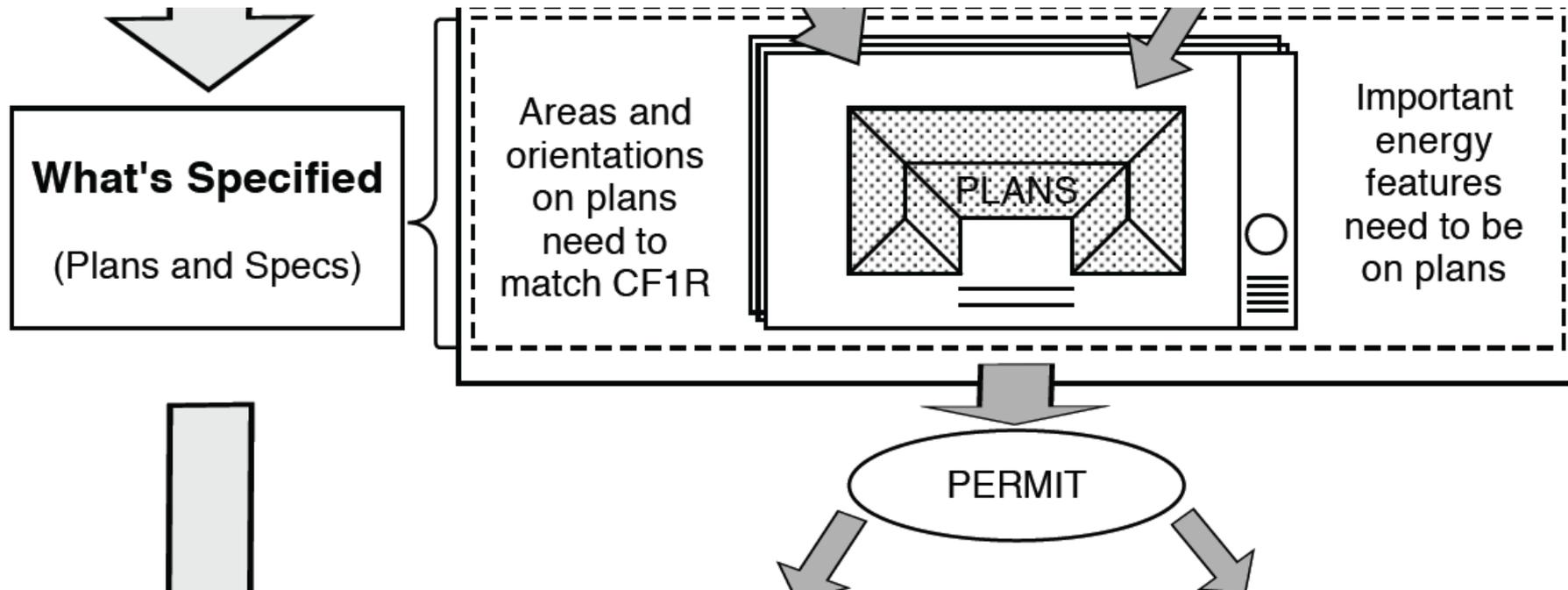
- Notice that the forms (CF1R, CF2R, and CF3R) are there, with an intermediate step of ensuring specifications on the plans.
- Notice that they are divided into Plan Check and Field Inspection steps.



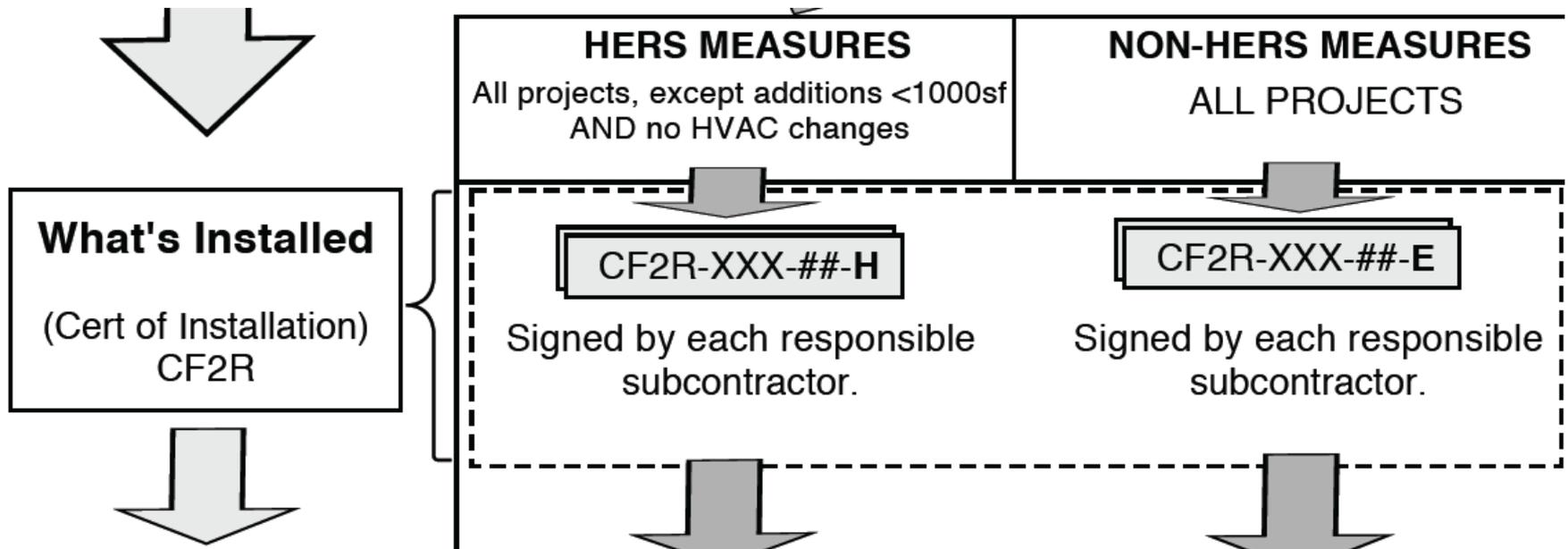
Compliance Process Flow Diagram



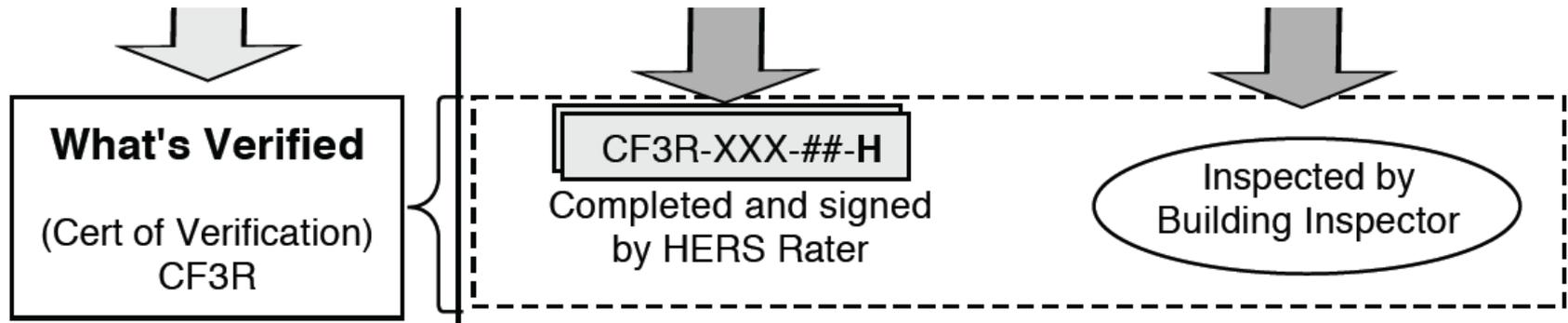
Compliance Process Flow Diagram



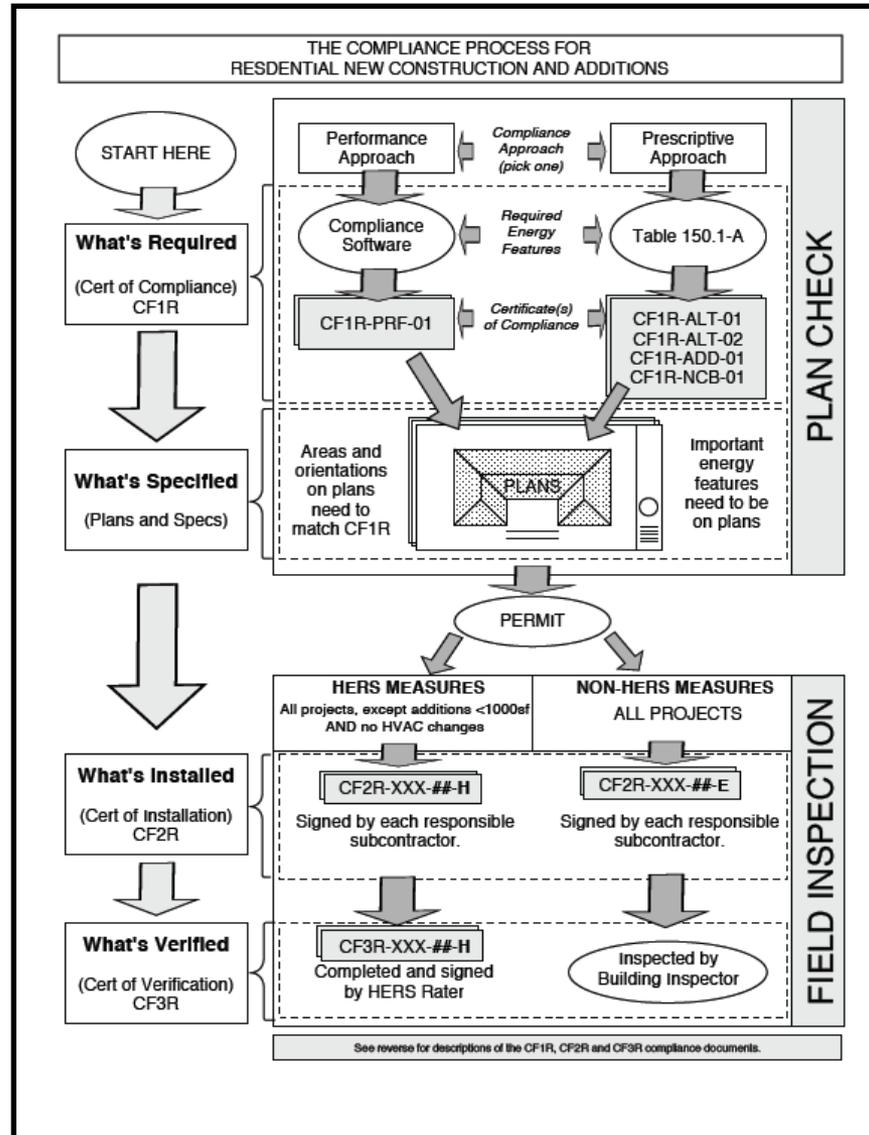
Compliance Process Flow Diagram



Compliance Process Flow Diagram



Compliance Process Flow Diagram



Compliance Process Flow Diagram (Reverse Side)

CF1R – Certificates of Compliance

- **CF1R-ALT-01:** Used to demonstrate compliance for non-HVAC alterations (roof, windows, walls, etc.)
- **CF1R-ALT-02:** Used to demonstrate compliance for HVAC alterations. (change-outs, cut ins, reducts, etc.)
- **CF1R-ADD-01-E:** Used when the *prescriptive* approach is used to demonstrate compliance for additions less than or equal to 1000 square feet. See example in Appendix.
- **CF1R-NCB-01-E:** Used when the *prescriptive* approach is used to demonstrate compliance for newly constructed homes and additions over 1000 square feet.
- **CF1R-PRF-01-E:** Used when the *performance* approach is used to demonstrate compliance for any kind of project.

Compliance Process Flow Diagram (Reverse Side)

CF-2R – Certificates of Installation – Non-HERS Measures (-E)

- CF2R-ENV-01-E: fenestration (windows, skylights, etc.)
- CF2R-ENV-02-E: air sealing features (weather stripping, caulking, backdraft dampers, etc.)
- CF2R-ENV-03-E: insulation
- CF2R-ENV-04-E: roofing products
- CF2R-LTG-01-E: lighting features
- CF2R-MCH-01-E: mechanical systems (HVAC)
- CF2R-MCH-02-E: whole house fan
- CF2R-MCH-04-E: evaporative coolers
- CF2R-PLB-01-E: Multi-family central hot water distribution systems
- CF2R-PLB-02-E: Single-family central hot water distribution systems
- CF2R-PLB-03-E: Pool and spa heating systems

Compliance Process Flow Diagram (Reverse Side)

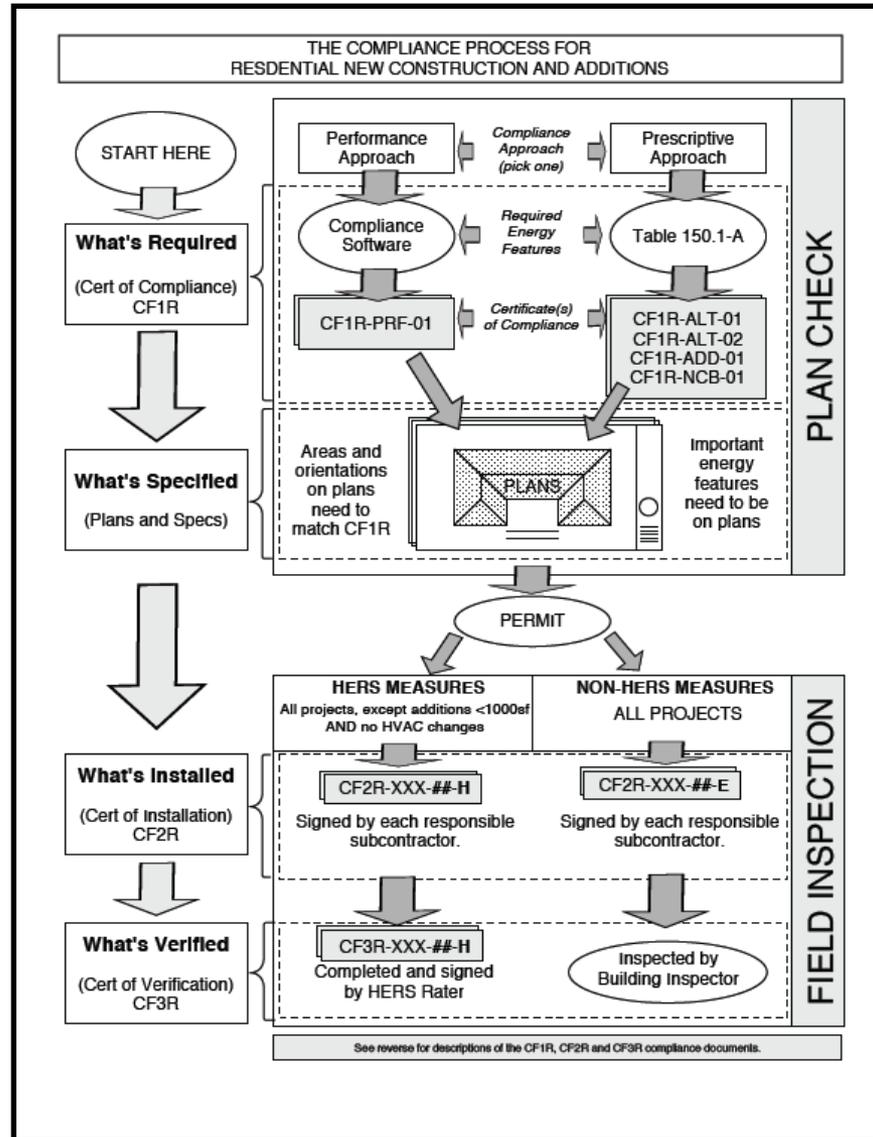
CF-2R – Certificates of Installation – HERS Measures (-H)

- CF2R-ENV-20-H: Envelope air leakage (blower door test)
- CF2R-ENV-21-H: QII Framing Stage (batt, loose fill, etc.)
- CF2R-ENV-22-H: QII Ceiling Air Barrier
- CF2R-ENV-23-H: QII Insulation Stage
- CF2R-ENV-24-H: QII Framing Stage (SIP & ICF)
- CF2R-MCH-20-H: sealed ducts*
- CF2R-MCH-21-H: Supply duct location verification
- CF2R-MCH-22-H: HVAC system fan efficacy (fan watt draw)*
- CF2R-MCH-23-H: HVAC system fan airflow*
- CF2R-MCH-24-H: Blower door, when infiltration used to meet whole house ventilation
- CF2R-MCH-25-H: HVAC system refrigerant charge*
- CF2R-MCH-26-H: Rated system verification (High SEER/EER)
- CF2R-MCH-27-H: ventilation to the ASHRAE 62.2 standard
- CF2R-MCH-28-H: Return Duct sizing table verification (alternative to airflow/Fan watt draw test)
- CF2R-MCH-29-H: Supply duct surface are and buried ducts verification
- CF2R-PLB-21-H: Multi-family central hot water distribution systems
- CF2R-PLB-21-H: Single-family central hot water distribution systems

Compliance Process Flow Diagram (Reverse Side)

- For each CF2R-XXX-##-H there is a corresponding CF3R-XXX-##-H, Certificate of Verification
- The HERS registry will make sure the correct HERS documents (CF2R and CF3R) get used and completed.

Compliance Process Flow Diagram



What to Verify on a CF1R

- Refer also to the “What to Verify on a CF1R” checklist tool provided in your handouts.
- You can also refer to the sample CF1R provided in your handouts.



What to Verify on a CF1R

Project Name: _____ Date: _____

- HIGH
Priority
 - **General Information Section**
 - Climate Zone
 - Project Scope (new, addition, etc.)
 - Total Conditioned Floor area
 - Front Orientation (degrees or “Cardinal” if master plan)
 - Number of Dwelling Units
 - Number of Stories
 - Glazing percentage (Anything over 20% is more than standard and penalized)
- HIGH
Priority
 - **Compliance Results Section**
 - “Building Complies” Statement
 - “Building Incorporates HERS Features” Statement
 - “Building Incorporates Special Features” Statement
 - TIP: Compliance Margin and Percent**
 - <1% = no margin for error
 - >15% = possible Energy Star or reach code
- MED
Priority
 - **Required Special Features Section**
 - Worth tracking, if listed
 - **Project HERS Features**
 - Quick Check (HERS features listed in various sections)
 - **Building Features Information Section**
 - Quick Check (No need to spend much time.)
 - **Zone Information Section**
 - Quick Check (note: dwelling units are not required to be divided into zones unless served by equipment of different types or efficiencies)
- MED
Priority
 - **Opaque Surfaces Section**
 - Lists all unique walls, floors, ceiling, etc.
 - Cathedral ceilings, windows, doors and slab floors are detailed in later sections.
 - Column 03 “Construction” references a later section that details each surface type.
 - Quick Check azimuth/orientations, areas and tilts.
 - All sides of house should be listed (unless attached to conditioned space).
 - Roof area should make sense relative to floor area.
 - Wall areas should be reasonable (perimeter of house x average ceiling height).

bayren.org/codes
codes@bayren.org
January 15, 2015

What to Verify on a CF1R



▪ **General Information Section**

- Climate Zone
- Project Scope (new, addition, etc.)
- Total Conditioned Floor area
- Front Orientation (degrees or “Cardinal” if master plan)
- Number of Dwelling Units
- Number of Stories
- Glazing percentage (Anything over 20% is more than standard and penalized)

| GENERAL INFORMATION | | | | | |
|---------------------|---|-------------------|----|----------------------------------|-------------------------|
| 01 | Project Name | Residence | | | |
| 02 | Calculation Description | Title 24 Analysis | | | |
| 03 | Project Location | | | | |
| 04 | A City | Menlo Park | 05 | Standards Version | Compliance 2014 |
| 06 | Zip code | 94025 | 07 | Compliance Manager Version | BEMCmpMgr 2013-2 (595c) |
| 08 | Climate Zone | CZ3 | 09 | Software Version | EnergyPro 6.2 |
| 10 | Building Type | Single Family | 11 | Front Orientation (deg/Cardinal) | 213 |
| 12 | Project Scope | Newly Constructed | 13 | Number of Dwelling Units | 1 |
| 14 | Total Cond. Floor Area (FT ²) | 3843 | 15 | Number of Zones | 2 |
| 16 | Slab Area (FT ²) | 0 | 17 | Number of Stories | 2 |
| 18 | Addition Cond. Floor Area | NA | 19 | Natural Gas Available | Yes |
| 20 | Addition Slab Area (FT ²) | NA | 21 | Glazing Percentage (%) | 16.1% |

What to Verify on a CF1R

HIGH Priority

- Compliance Results Section

- “Building Complies” Statement
- “Building Incorporates HERS Features” Statement
- “Building Incorporates Special Features” Statement
- TIP: Compliance Margin and Percent**
 - <1% = no margin for error
 - >15% = possible Energy Star or reach code

| COMPLIANCE RESULTS | | | | |
|-------------------------|---|-----------------|-------------------|---------------------|
| 01 | Building Complies with Computer Performance | | | |
| 02 | This building incorporates features that require field testing and/or verification by a certified HERS rater under the supervision of a CEC-approved HERS provider. | | | |
| 03 | This building incorporates one or more Special Features shown below | | | |
| ENERGY USE SUMMARY | | | | |
| 04 | 05 | 06 | 07 | 08 |
| Energy Use (KTDV/ft) | Standard Design | Proposed Design | Compliance Margin | Percent Improvement |
| Space Heating | 10.63 | 10.46 | 0.17 | 1.6% |
| Space Cooling | 1.05 | 1.90 | -0.85 | -81.0% |
| IAQ Ventilation | 1.01 | 1.01 | 0.00 | 0.0% |
| Water Heating | 8.81 | 7.88 | 0.93 | 10.6% |
| Photovoltaic Offset | ---- | 0.00 | 0.00 | ---- |
| Compliance Energy Total | 21.50 | 21.25 | 0.25 | 1.2% |

What to Verify on a CF1R

MED
Priority

- **Required Special Features Section**

- Worth tracking, if listed

| REQUIRED SPECIAL FEATURES  | |
|--|--------------|
| The following are features that must be installed as condition for meeting the modeled energy performance for this computer analysis. | |
| <ul style="list-style-type: none"> • Non-standard roof reflectance • Cathedral Ceiling • Window overhangs and/or fins | List varies. |

- **Project HERS Features**

- Quick Check (HERS features listed in various sections)

- **Building Features Information Section**

- Quick Check (No need to spend much time.)

- **Zone Information Section**

- Quick Check (note: dwelling units are not *required* to be divided into zones unless served by equipment of different *types* or *efficiencies*)

What to Verify on a CF1R



- **Opaque Surfaces Section**

- Lists all unique walls, floors, ceiling, etc.
- Cathedral ceilings, windows, doors and slab floors are detailed in later sections.
- Column 03 “Construction” references a later section that details each surface type.
 - Quick Check azimuth/orientations, areas and tilts.
 - All sides of house should be listed (unless attached to conditioned space).
 - Roof area should make sense relative to floor area.
 - Wall areas should be reasonable (perimeter of house x average ceiling height).

| OPAQUE SURFACES | | | | | | | |
|------------------|-------------|-----------------------|---------|-------------|-------------------------------|--------------------------------|-----------|
| 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 |
| Name | Zone | Construction | Azimuth | Orientation | Gross Area (ft ²) | Window Area (ft ²) | Tilt(deg) |
| Front Wall | Main Floor | R-21 Wall | 213 | Front | 285 | 38 | 90 |
| Left Wall | Main Floor | R-15 Wall | 303 | Left | 440 | 51 | 90 |
| Rear Wall | Main Floor | R-15 Wall | 33 | Back | 783 | 249.968 | 90 |
| Right Wall | Main Floor | R-15 Wall | 123 | Right | 290 | 21.3 | 90 |
| Left Front Wall | Main Floor | R-15 Wall | 258 | 45 | 20 | 9 | 90 |
| Right Front Wall | Main Floor | R-15 Wall | 168 | 315 | 20 | 9 | 90 |
| Front 2 x 4 Wall | Main Floor | R-13 Wall1 | 213 | Front | 95 | 18 | 90 |
| Roof | Main Floor | R-38 Roof Attic | | | 391 | | |
| Raised Floor | Main Floor | R-30 Floor Crawlspace | | | 2216 | | |
| Front Wall 2 | Inner Floor | R-21 Wall | 213 | Front | 435 | 57 | 90 |

What to Verify on a CF1R

- **Attic Section**

MED Priority

- If **radiant barrier** is specified, installation is important and should be tracked through process (plan check and field inspection).
- If **cool roof** is specified, reflectance and emittance are important and should be tracked through process (plan check and field inspection).

| ATTIC | | | | | | |
|-------|-----------------|-----------|------------------|----------------|-----------------|-----------|
| 01 | 02 | 03 | 04 | 05 | 06 | 07 |
| Name | Construction | Roof Rise | Roof Reflectance | Roof Emittance | Radiant Barrier | Cool Roof |
| Attic | Attic Roof Cons | 8 | 0.1 | 0.85 | Yes | No |

What to Verify on a CF1R

▪ **Windows Section - VERY IMPORTANT**

HIGH Priority

- Check Areas and Orientations against plans.
- Check U-Factor and SHGC against NFRC labels in field.
- Tip: If you are limited on time, check the window area for the orientation with the most glass area.**

| WINDOWS | | | | | | | | | |
|----------------|--------|-------------------------------|-----------|-------------|------------|-------------------------|----------|------|------------------|
| 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 |
| Name | Type | Surface (Orientation-Azimuth) | Width(ft) | Height (ft) | Multiplier | Area (ft ²) | U-factor | SHGC | Exterior Shading |
| Window | Window | Front Wall (Front-213) | ---- | ---- | 1 | 28.0 | 0.30 | 0.67 | |
| Window in Door | Window | Front Wall (Front-213) | ---- | ---- | 1 | 10.0 | 0.55 | 0.67 | |
| Window 2 | Window | Left Wall (Left-303) | ---- | ---- | 1 | 51.0 | 0.30 | 0.67 | |
| Window 3 | Window | Rear Wall (Back-33) | ---- | ---- | 1 | 90.0 | 0.30 | 0.67 | |
| 10080 | Window | Rear Wall (Back-33) | 10.0 | 8.0 | 1 | 80.0 | 0.30 | 0.67 | |
| 10080 2 | Window | Rear Wall (Back-33) | 12.0 | 8.0 | 0.833 | 80.0 | 0.30 | 0.67 | |
| Window 4 | Window | Right Wall (Right-123) | ---- | ---- | 1 | 21.3 | 0.30 | 0.67 | |
| Window 5 | Window | Left Front Wall (Left-25R) | ---- | ---- | 1 | 9.0 | 0.30 | 0.67 | |

What to Verify on a CF1R

- Overhangs and Side Fins Section

- If modeled, they have a significant impact on compliance.
- Verify against plans.
- Verify in field.
 - Depth is the most important dimension

MED
Priority

| OVERHANGS AND FINS | | | | | | | | | | | | | |
|--------------------|----------|---------|-------------|--------------|----------|----------|--------|-------|--------|-----------|--------|--------|--------|
| 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 |
| | Overhang | | | | | Left Fin | | | | Right Fin | | | |
| Window | Depth | Dist Up | Left Extent | Right Extent | Flap Ht. | Depth | Top Up | DistL | Bot Up | Depth | Top Up | Dist R | Bot Up |
| 10080 | 10 | 1 | 2.8 | 2.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10080 2 | 11.5 | 1 | 1.8 | 1.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5080 | 1 | 0.3 | 4.9 | 6 | 0 | 7.5 | 0 | 4.9 | 0 | 0 | 0 | 0 | 0 |
| 6050 | 1 | 0.3 | 1.7 | 1.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3030 | 2.3 | 0.3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5050 | 1 | 0.3 | 5.7 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

What to Verify on a CF1R

■ Opaque Surface Constructions Section



- Match construction name in column 01 to column 03 of the previously discussed “Opaque Surfaces” section.
- Look for unusual assemblies (24 o.c., etc).
- Note cavity **and** sheathing (continuous) R-values.
- No U-factors shown! (hopefully will be added to later versions)
 - Use Appendix JA4, if needed.

| OPAQUE SURFACE CONSTRUCTIONS | | | | | |
|------------------------------|------------------------|---------------------|---|----------------------|--|
| 01 | 02 | 03 | 04 | 05 | 06 |
| Construction Name | Surface Type | Construction Type | Framing | Total Cavity R-value | Assembly Layers |
| Attic Roof Cons | Attic Roofs | Wood Framed Ceiling | 2x4 Top Chord of Roof Truss @ 24 in. O.C. | | <ul style="list-style-type: none"> • Roofing: Light Roof (Asphalt Shingle) • Above Deck Insulation - no insulation - • Roof Deck: Wood Siding/sheathing/decking • Cavity: - no insulation - • Inside Finish: - select inside finish - |
| R-0 Roof Attic | Ceilings (below attic) | Wood Framed Ceiling | 2x4 @ 24 in. O.C. | | <ul style="list-style-type: none"> • Attic Floor: - no attic floor - • Cavity: - no insulation - • Sheathing/Insulation - no sheathing/insul. - • Inside Finish: Gypsum Board |
| R-13 Wall | Interior Walls | Wood Framed Wall | 2x4 @ 16 in. O.C. | R 13 | <ul style="list-style-type: none"> • Inside Finish: Gypsum Board • Sheathing/Insulation: - no sheathing/insul. - • Cavity: R 13 • Sheathing/Insulation: - no sheathing/insul. - • Other Side Finish: Gypsum Board |
| R-30 Floor Crawspace | Floors Over Crawspace | Wood Framed Floor | 2x10 @ 16 in. O.C. | R 25 | <ul style="list-style-type: none"> • Floor Surface: Carpeted • Concrete Fill: - no concrete fill - • Floor Deck: Wood Siding/sheathing/decking • Cavity: R 25 • Sheathing/Insulation: - no sheathing/insul. - • Exterior Finish: - select finish - |
| | | | | | <ul style="list-style-type: none"> • Inside Finish: Gypsum Board |

What to Verify on a CF1R

- **Slab Floors Section**
 - Quick Check

- **Building Envelope HERS Verification Section**
 - If any are listed you know that a special inspector will be in charge of that feature (Will need CF3Rs.)
 - Quality Insulation Installation (QII)
 - Building Envelope Air Leakage
 - “ACH@50 Pa” is the target for the blower door test, if required.

MED Priority

| BUILDING ENVELOPE - HERS VERIFICATION | | | |
|---------------------------------------|---|-------------------------------|-------------|
| 01 | 02 | 03 | 04 |
| Quality Insulation Installation(QII) | Quality Installation of Spray Foam Insulation | Building Envelope Air Leakage | ACH @ 50 Pa |
| Not Required | Not Required | Not Required | --- |

What to Verify on a CF1R

- Water Heating Systems and Water Heaters Sections

- Very important, especially in mild climates (see WH compliance margin in Compliance Results Section).
- Verify all information in field: type, number, volume, efficiencies

HIGH Priority

| WATER HEATING SYSTEMS | | | |
|-----------------------|---|-------------------|--------------------|
| 01 | 02 | 03 | 04 |
| Name | Distribution Type | Number of Heaters | Solar Fraction (%) |
| DHW Sys 1 | Recirculation, Demand Control Push Button | 1 | 0.0% |

| WATER HEATERS | | | | | | | |
|---------------|---------------------|---------------|-------------------|-----------------------------|--------------|----------------------------------|-------------------------|
| 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 |
| Name | Heater Element Type | Tank Type | Tank Volume (gal) | Energy Factor or Efficiency | Input Rating | Tank Exterior Insulation R-value | Standby Loss (Fraction) |
| DHW Heater 1 | Natural Gas | Large Storage | 75 | 0.96 | 80000-Btu/hr | 0 | 0.0191 |

What to Verify on a CF1R

- Water Heating – HERS Verification Section

- If any HERS measures are listed you know that a special inspector will be in charge of checking those features (Will need CF3Rs.):
 - pipe insulation,
 - parallel piping/compact distribution/point-of-use
 - Recirculation with manual control/Recirculation with sensor control

MED Priority

| WATER HEATING - HERS VERIFICATION | | | | | | |
|-----------------------------------|-----------------|-----------------|----------------------|--------------|-----------------------------------|-----------------------------------|
| 01 | 02 | 03 | 04 | 05 | 06 | 07 |
| Name | Pipe Insulation | Parallel Piping | Compact Distribution | Point-of Use | Recirculation with Manual Control | Recirculation with Sensor Control |
| DHW Sys 1-hers-dhw | n/a | n/a | n/a | n/a | | n/a |

What to Verify on a CF1R

- HVAC Systems, Heating Systems and Cooling Systems Sections - Very Important

- Confirm duct locations on plans.
- Verify all information at field inspection:
 - system types
 - efficiencies

HIGH Priority

| HVAC SYSTEMS | | | | | | | | |
|--------------------|----------------------------------|---------------------|--------|---------------------|--------|---------------------------|------------|-------------------|
| 01 | 02 | 03 | | 04 | | 05 | 06 | 07 |
| Name | System Type | Heating System | | Cooling System | | Distribution System | Fan System | Floor Area Served |
| | | Name | Ducted | Name | Ducted | | | |
| HVAC System1 | Other Heating and Cooling System | Heating Component 1 | Yes | Cooling Component 1 | Yes | Air Distribution System 1 | HVAC Fan 1 | 2216 |
| Upper HVAC System2 | Other Heating and Cooling System | Heating Component 2 | Yes | Cooling Component 2 | Yes | Air Distribution System 2 | HVAC Fan 2 | 1627 |

| HVAC - HEATING SYSTEMS | | |
|------------------------|---|------------|
| 01 | 02 | 03 |
| Name | Type | Efficiency |
| Heating Component 1 | CntrlFurnace - Fuel-fired central furnace | 96 AFUE |
| Heating Component 2 | CntrlFurnace - Fuel-fired central furnace | 96 AFUE |

| HVAC - COOLING SYSTEMS | | | | |
|------------------------|--|------------|------|-------------------------------|
| 01 | 02 | 03 | 04 | 05 |
| Name | System Type | Efficiency | | HERS Verification |
| | | EER | SEER | |
| Cooling Component 1 | SplitAirCond - Split air conditioning system | 11.3 | 13 | Cooling Component 1-hers-cool |
| Cooling Component 2 | SplitAirCond - Split air conditioning system | 11.3 | 13 | Cooling Component 2-hers-cool |

What to Verify on a CF1R

- **HVAC Cooling HERS Verification Section**

- Verification of Airflow by HERS Rater will be required on all ducted systems with A/C. (Will need CF3Rs.)
- If so, Cooling System will be checked by Rater

MED
Priority

| HVAC COOLING - HERS VERIFICATION | | | | | |
|----------------------------------|------------------|----------------|--------------|---------------|-----------------------------|
| 01 | 02 | 03 | 04 | 05 | 06 |
| Name | Verified Airflow | Airflow Target | Verified EER | Verified SEER | Verified Refrigerant Charge |
| HVAC System1 SCSysRpt 1 | Required | 350 | 11.3 | --- | --- |
| Upper HVAC System2 SCSysRpt 1 | Required | 350 | 11.3 | --- | --- |

What to Verify on a CF1R

HIGH Priority

- HVAC Distribution and Distribution HERS Sections

- Verify duct location on plans
- Duct leakage testing required on all ducted systems >10 feet.
- If so, distribution system will be checked by Rater (Will need CF3Rs.)



| HVAC - DISTRIBUTION SYSTEMS | | | | | | | |
|-----------------------------|--------------------------------------|-------------------|--------------------|----------------------|-------------|-------------|-------------------------------------|
| 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 |
| Name | Type | Duct Leakage | Insulation R-value | Supply Duct Location | Return Duct | Bypass Duct | HERS Verification |
| Air Distribution System 1 | Ducts located in a crawl space | Sealed and tested | 6 | Crawl Space | Crawl Space | None | Air Distribution System 1-hers-dist |
| Air Distribution System 2 | Ducts located in unconditioned attic | Sealed and tested | 6 | Attic | Attic | None | Air Distribution System 2-hers-dist |

| HVAC DISTRIBUTION - HERS VERIFICATION | | | | | |
|---------------------------------------|---------------------------|-------------------------|------------------------|----------------------|--------------|
| 01 | 02 | 03 | 04 | 05 | 06 |
| Name | Duct Leakage Verification | Duct Leakage Target (%) | Verified Duct Location | Verified Duct Design | |
| | | | | Return | Supply |
| Air Distribution System 1-hers-dist | Required | 6.0 | Not Required | Not Required | Not Required |
| Air Distribution System 2-hers-dist | Required | 6.0 | Not Required | Not Required | Not Required |



What to Verify on a CF1R

- HVAC Fan Systems and Fan Systems HERS Sections

- Verification of Fan Watt Draw by HERS Rater will be required on all ducted systems with A/C.
- If so, Cooling System will be checked by Rater (Will need CF3Rs.)

MED Priority

| HVAC - FAN SYSTEMS | | | |
|--------------------|------------------------------|-----------------------|-------------------|
| 01 | 02 | 03 | 04 |
| Name | Type | Fan Power (Watts/CFM) | HERS Verification |
| HVAC Fan 1 | Single Speed PSC Furnace Fan | 0.58 | Required |
| HVAC Fan 2 | Single Speed PSC Furnace Fan | 0.58 | Required |

| HVAC FAN SYSTEMS - HERS VERIFICATION | | |
|--------------------------------------|----------------------|-------------------------------------|
| 01 | 02 | 03 |
| Name | VerifiedFanWatt Draw | Required Fan Efficiency (Watts/CFM) |
| HVAC Fan 1-hers-fan | Required | 0.58 |
| HVAC Fan 2-hers-fan | Required | 0.58 |

What to Verify on a CF1R

Indoor Air Quality Fans Section

MED
Priority

- IAQ airflow almost always checked by Rater. (Will need CF3Rs.)
- Spot ventilation (kitchen hood, bathroom fans, laundry rooms, etc.) **NOT** checked by Rater.

| IAQ (Indoor Air Quality) FANS | | | | |
|-------------------------------|---------|--------------|-------------------------------|-------------------|
| 01 | 02 | 03 | 04 | 05 |
| Name | IAQ CFM | IAQ Fan Type | IAQ Recovery Effectiveness(%) | HERS Verification |
| IAQ Fan | 83 | Exhaust | 0 | Required |

Cooling Ventilation - Special cooling credits

MED
Priority

- If listed, worth tracking and field verifying.
- Whole house fans
- Night ventilation

What to Verify on a CF1R

HIGH Priority

- **Declaration Statements** - Provide accountability in the event of future problems.
 - The single MOST IMPORTANT item to check is that the documents are signed and registered.
 - Digital Signatures are Legal

| DOCUMENTATION AUTHOR'S DECLARATION STATEMENT | |
|--|--|
| 1. I certify that this Certificate of Compliance documentation is accurate and complete. | |
| Documentation Author Name: [Redacted] | Documentation Author Signature: [Redacted] |
| Company: | Signature Date: 2014-08-12 20:39:30 |
| Address: | CEA/HERS Certification Identification (If applicable): [Redacted] |
| City/State/Zip: | Phone: |
| RESPONSIBLE PERSON'S DECLARATION STATEMENT | |
| I certify the following under penalty of perjury, under the laws of the State of California: | |
| <ol style="list-style-type: none"> 1. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design identified on this Certificate of Compliance. 2. I certify that the energy features and performance specifications identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations. 3. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application. | |
| Responsible Designer Name: | Responsible Designer Signature: [Redacted] |
| Company: | Date Signed: 2014-08-13 11:54:07 |
| Address: | License: |
| City/State/Zip: | Phone: |

Class Wrap-up

Final Questions and Class Evaluation

Contact information:

- BayREN Codes & Standards Program
 - www.bayren.org/codes
 - codes@bayren.org

Updated: 02/20/2015