



LEED 2009 for New Construction and Major Renovations

EA PREREQUISITE 2: MINIMUM ENERGY PERFORMANCE

Project # 1000005088 SFPUC Administration Office Building

All fields and uploads are required unless otherwise noted.

THRESHOLD ATTEMPTED

Points Attempted: 0

ALL OPTIONS

TARGET FINDER

The following fields are required, but the values have no bearing on EA Prerequisite 2 compliance. Use the Target Energy Performance Results calculator on the [ENERGY STAR website](#) to generate the values. If using prescriptive compliance paths (Options 2 or 3), leave the Design energy consumption and cost values blank in the Target Finder website, and set the Design values equal to the Target values in this form.

	Design	Target
Energy performance rating:	95	78
CO ₂ -eq emissions:	1,004 metric tons/year	1,568 metric tons/year
CO ₂ -eq emissions reduction:	55 %	30 %

Upload EA p2-1. Provide the Target Finder Energy Performance Results for the project building (a screen capture or other documentation containing the same information).(Optional)

Upload

Files: 0

The building is not able to get a Target Finder score because the tool does not support the primary building type of the project building.(Optional)

PREREQUISITE COMPLIANCE

Total gross square footage: 277,511 sf

Principal project building activity: Office: Government

Select a compliance path:

- Option 1. Whole Building Energy Simulation.** The project team will document improvement in the proposed building performance rating as compared to the baseline building performance rating per ASHRAE/IESNA Standard 90.1-2007 or California Title 24-2005 Part 6.

Save Form

- Option 2. Prescriptive Compliance Path: ASHRAE Advanced Energy Design Guide.** The project team will document compliance with the ASHRAE Advanced Energy Design Guide.
- Option 3. Prescriptive Compliance Path: Advanced Buildings Core Performance Guide.** The project team will document compliance with the Advanced Buildings™ Core Performance™ Guide.

OPTION 1. WHOLE BUILDING ENERGY SIMULATION

Complete the following sections:

- Section 1.1A - General Information
- Section 1.1B - Mandatory Requirements
- Section 1.2 - Space Summary
- Section 1.3 - Advisory Messages
- Section 1.4 - Comparison of Proposed Design Versus Baseline Design Energy Model Inputs
- Section 1.5 - Energy Type Summary
- Section 1.6 - On-Site Renewable Energy (if applicable)
- Section 1.7 - Exceptional Calculation Measure Summary (if applicable)
- Section 1.8 - Performance Rating Method Compliance Report
- Section 1.9A - Total Building Performance Summary
- Section 1.9B - Reports & Metrics

SECTION 1.1A - GENERAL INFORMATION

- Compliant energy simulation software:** The energy simulation software used for this project has all capabilities described in EITHER section "G2 Simulation General Requirements" in Appendix G of ASHRAE 90.1-2007 OR the analogous section of the alternative qualifying energy code used.
- Compliant energy modeling methodology:** Energy simulation runs for both the baseline and proposed building use the assumptions and modeling methodology described in EITHER ASHRAE 90.1-2007 Appendix G OR the analogous section of the alternative qualifying energy code used.

Simulation program:

eQuest

Principal heating source:

Fossil Fuel

Energy code used:

ASHRAE 90.1-2007

List the ASHRAE addenda used in the modeling assumptions, if any. (Optional)

Zip/Postal Code:

Weather file:

Climate zone:

List the climatic data from ASHRAE Standard 90.1-2007 Table D-1. Specify if another source is referenced for HDD & CDD data.

Heating Degree Days:

Cooling Degree Days:

HDD and CDD data source, if other than ASHRAE: (Optional)

New construction gross square footage:

Existing, renovated gross square footage:

Existing, unrenovated gross square footage:

Total gross square footage:

New construction percent: %

Existing renovation percent: %

Existing unrenovated percent: %

Gross square footage used in the energy model, if different than gross square footage above: (Optional)

SECTION 1.1B - MANDATORY REQUIREMENTS

For all elements included in the architect's scope of work for the project building, the project building design complies with all ASHRAE Standard 90.1-2007 mandatory provisions (Sections 5.4, 6.4, 7.4, 8.4, 9.4 and 10.4), and the information provided regarding the Proposed Case energy model in Section 1.4 is consistent with the Building Design.

Signatory: Michael Rossetto;Architect; November 30, 2011

Optional Signatory	
Initial here:	MMR
ARCHITECT	

For all elements included in the mechanical engineer's scope of work for the project building, the project building design complies with all ASHRAE Standard 90.1-2007 mandatory provisions (Sections 5.4, 6.4, 7.4, 8.4, 9.4 and 10.4), and the information provided regarding the Proposed Case energy model in Section 1.4 is consistent with the Building Design.

Signatory: Kirk Crowther;Energy Modeler; November 22, 2011

Optional Signatory	
Initial here:	KSC
MECHANICAL ENGINEER	

For all elements included in the electrical engineer's scope of work for the project building, the project building design complies with all ASHRAE Standard 90.1-2007 mandatory provisions (Sections 5.4, 6.4, 7.4, 8.4, 9.4 and 10.4), and the information provided regarding the Proposed Case energy model in Section 1.4 is consistent with the Building Design.

Signatory: Hamid Matinpour;Electrical Engineer; November 30, 2011

Optional Signatory	
Initial here:	HM
ELECTRICAL ENGINEER	

Upload the following [Interactive Compliance Forms](#): (Optional)

- Upload EA2-2. Building Envelope Compliance Documentation
- Upload EA2-3. HVAC Compliance Documentation
- Upload EA2-4. Lighting Compliance Documentation
- Upload EA2-5. Service Water Heating Compliance Documentation

SECTION 1.2 - SPACE SUMMARY

Table EA2-1. Space Usage Type

Space Name / Description	Space Usage Type	Space Size	Regularly Occupied GSF	Unconditioned GSF	Typical Hours in Operation (per week)
Conference/ Break Rm	Conference/ Break Rm	16,795	16,795	0	70
Corridor	Corridor	3,353	3,353	0	70
Infant - day care	Infant - day care	4,277	4,277	0	70
Lobby	Lobby	13,130	13,130	0	70
Office	Office	224,806	224,806	0	70
Restrooms	Restrooms	5,869	5,869	0	70
Utility	Utility	9,281	0	0	70

Total	277,511	268,230	0
Percentage of total (%)		96.66	0

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SECTION 1.3 - ADVISORY MESSAGES

Complete Table EAp2-2 based on information from the energy simulation output files.

Table EAp2-2. Advisory Messages

	Baseline Design (0° Rotation)	Proposed Design
Number of hours heating loads not met ¹	0	0
Number of hours cooling loads not met ¹	62	62
Total	62	62
Difference ² (Proposed design minus baseline design)		0
Number of warning messages	0	2
Number of error messages	0	0
Number of defaults overridden	0	0
Unmet load hours compliance	Y	

¹Baseline design and proposed design unmet load hours each may not exceed 300

²Unmet load hours for the proposed design may not exceed the baseline design by more than 50 hours.

SECTION 1.4 - COMPARISON OF PROPOSED DESIGN VERSUS BASELINE DESIGN ENERGY MODEL INPUTS

Download, complete, and upload "EAp2 Section 1.4 table.xls" (found under "Credit Resources") to document the Baseline and Proposed design energy model inputs for the project.

Documentation should be sufficient to justify the energy and cost savings numbers reported in the Performance Rating Table.

Upload EAp2-7. Provide the completed EAp2 Section 1.4 Tables available under "Credit Resources."

Upload

Files: 2

Save Form

SECTION 1.5 - ENERGY TYPE SUMMARY

List the energy types used by the project (i.e. electricity, natural gas, purchased chilled water or steam, etc.) for the Baseline and Proposed designs.

If revising the values in Table EAp2-3, reselect energy type in all affected rows in Table EAp2-4 and Table EAp2-5 to ensure that the revised values from Table EAp2-3 are propagated and that Table EAp2-4 and Table EAp2-5 calculations are refreshed.

Table EAp2-3. Energy Type Summary

Energy Type	Utility Company Name	Utility Rate and Description of rate structure ¹	Baseline Virtual Rate ² (\$ per unit energy)	Proposed Virtual Rate ² (\$ per unit energy)	Units of Energy	Units of Demand
Electricity	PG&E	0.1324 \$/kWh from http:	0.1324	0.1324	kWh	kW
Natural Gas	PG&E	0.8751 \$/therm from http:	0.8751	0.8751	therms	MBH
			0	0		

¹Describe the rate structure and list the local utility rate/s for the energy type. Per ASHRAE 90.1-2007 G2.4, project teams are allowed to use the state average energy prices published by DOE's EIA for commercial building customers, available on EIA's website (www.eia.gov). If project uses backup energy for on-site renewable energy, please specify the rate of backup source energy.

²List the virtual energy rate from the baseline and proposed design energy model results or from manual calculations. This rate is defined as defined as the total annual charge divided by the metered energy from the plant for each resource. Provide a narrative explaining demand reduction if the Proposed and Baseline rates vary significantly.

If the Proposed and Baseline rates vary significantly, describe the building input parameters (e.g. demand reduction measures) leading to the variation in energy rates, and provide detailed information regarding the utility rate structure including all demand and energy charges, and the seasonal and time-of-use structure of the utility tariff. (Required when Proposed & Baseline Rates vary by more than 10%)

Upload EAp2-8. Provide any documentation to support the proposed/baseline rate variance narrative. (Optional)

Files: 0

SECTION 1.6 - PERFORMANCE RATING METHOD COMPLIANCE REPORT

In Table EAp2-4, list each energy end use for the project (including all end uses reflected in the baseline and proposed designs). Then check whether the end-use is a process load, select the energy type, and list the energy consumption and peak demand for each end-use for all four Baseline Design orientations.

Fill out the Proposed Design energy consumption and peak demand for each end use in Table. Performance Rating - Performance Rating Method Compliance.

Table EAp2-4. Baseline Performance - Performance Rating Method Compliance

End Use	Process	Baseline Design Energy Type	Units of Annual Energy & Peak Demand		Baseline (0° rotation)	Baseline (90° rotation)	Baseline (180° rotation)	Baseline (270° rotation)	Baseline Building Results
Interior Lighting	☐	Electricity	Energy Use	kWh	900,977	900,977	900,977	900,977	900,977
			Demand	kW	250.1	250.1	250.1	250.1	250.1
Exterior Lighting	☐	Electricity	Energy Use	kWh	8,283	8,283	8,283	8,283	8,283
			Demand	kW	2.3	2.3	2.3	2.3	2.3
Space Heating	☐	Natural Gas	Energy Use	therms	19,299	18,445	18,771	17,878	18,598.25
			Demand	MBH	0.37	0.37	0.37	0.37	0.37
Space Cooling	☐	Electricity	Energy Use	kWh	359,034	363,757	360,280	360,639	360,927.5
			Demand	kW	327.6	337.6	332.2	335.8	333.3
Pumps	☐	Electricity	Energy Use	kWh	229,302	235,011	230,439	233,670	232,105.5
			Demand	kW	80.6	82.5	80.9	82.1	81.53
Heat Rejection	☐	Electricity	Energy Use	kWh	16,649	16,963	16,636	16,848	16,774
			Demand	kW	38.8	39.7	39	39.5	39.25
Fans-Interior	☐	Electricity	Energy Use	kWh	683,867	676,375	679,556	675,560	678,839.5
			Demand	kW	218.8	219.8	219.5	214.1	218.05
Fans - Parking Garage	☐	Electricity	Energy Use	kWh	0	0	0	0	0
			Demand	kW	0	0	0	0	0
Service Water Heating	☐	Natural Gas	Energy Use	therms	3,033	3,033	3,033	3,034	3,033.25
			Demand	MBH	0.01	0.01	0.01	0.01	0.01
Receptacle Equipment	☒	Electricity	Energy Use	kWh	2,240,693	2,240,693	2,240,693	2,240,693	2,240,693
			Demand	kW	458.8	458.8	458.8	458.8	458.8
Interior Lighting - Process	☒		Energy Use		0	0	0	0	0
			Demand		0	0	0	0	0
Refrigeration Equipment	☒		Energy Use		0	0	0	0	0
			Demand		0	0	0	0	0
Cooking	☒		Energy Use		0	0	0	0	0
			Demand		0	0	0	0	0

Industrial Process	✘		Energy Use		0	0	0	0	0
			Demand		0	0	0	0	0
Elevators and Escalators	✘		Energy Use		0	0	0	0	0
			Demand		0	0	0	0	0
Aux.	■	Natural Gas	Energy Use	therms	738	738	738	738	738
			Demand	MBH	0	0	0	0	0
	■		Energy Use						
			Demand						
Baseline Energy Totals			Total Energy Use (mBtu/yr)		17452.2	17377.91	17392.78	17302.92	17381.45
					Annual Process Energy (mBtu/yr)			7645.24	
					Process Energy Modeling Compliance ¹			Y	

1. Annual process energy costs must be at least 25% of the total energy costs for the proposed design. This form determines compliance using cost calculations from Section 1.9. Process Energy Costs should be modeled to accurately reflect the proposed building. Process Energy must be the same in the baseline and proposed cases, unless an exceptional calculation is used. Process energy costs must be at least 25% of the total baseline energy costs. Any exceptions must be supported by a narrative and/or other supporting documentation.

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Table EA2-5. Performance Rating - Performance Rating Method Compliance

End Use	Process	Baseline Building Units		Baseline Building Results	Proposed Design Energy Type	Units of Annual Energy & Peak Demand		Proposed Building Results	Percent Savings
Interior Lighting		Energy Use	kWh	900977	Electricity	Energy Use	kWh	443,188	50.81
		Demand	kW	250.1		Demand	kW	160.7	
Exterior Lighting		Energy Use	kWh	8283	Electricity	Energy Use	kWh	1,786	78.44
		Demand	kW	2.3		Demand	kW	0.5	
Space Heating		Energy Use	therms	18598.25	Natural Gas	Energy Use	therms	13,178	29.14
		Demand	MBH	0.37		Demand	MBH	0.25	
Space Cooling		Energy Use	kWh	360927.5	Electricity	Energy Use	kWh	135,224	62.53
		Demand	kW	333.3		Demand	kW	137.3	
Pumps		Energy Use	kWh	232105.5	Electricity	Energy Use	kWh	44,416	80.86
		Demand	kW	81.53		Demand	kW	21.9	
Heat Rejection		Energy Use	kWh	16774	Electricity	Energy Use	kWh	4,275	74.51
		Demand	kW	39.25		Demand	kW	29.8	
Fans-Interior		Energy Use	kWh	678839.5	Electricity	Energy Use	kWh	555,470	18.17
		Demand	kW	218.05		Demand	kW	139.3	

Save Form

Fans - Parking Garage		Energy Use	kWh	0	Natural Gas	Energy Use	therms	0	0
		Demand	kW	0		Demand	MBH	0	
Service Water Heating		Energy Use	therms	3033.25	Natural Gas	Energy Use	therms	2,459	18.93
		Demand	MBH	0.01		Demand	MBH	0.01	
Receptacle Equipment	X	Energy Use	kWh	2240693	Electricity	Energy Use	kWh	2,240,693	0
		Demand	kW	458.8		Demand	kW	458.8	
Interior Lighting - Process	X	Energy Use		0		Energy Use		0	0
		Demand		0		Demand		0	
Refrigeration Equipment	X	Energy Use		0		Energy Use		0	0
		Demand		0		Demand		0	
Cooking	X	Energy Use		0		Energy Use		0	0
		Demand		0		Demand		0	
Industrial Process	X	Energy Use		0		Energy Use		0	0
		Demand		0		Demand		0	
Elevators and Escalators	X	Energy Use		0		Energy Use		0	0
		Demand		0		Demand		0	
Aux.		Energy Use	therms	738		Energy Use		0	100
		Demand	MBH	0		Demand		0	
		Energy Use				Energy Use		0	0
		Demand				Demand		0	
Baseline Total Energy Use				17381.45	Proposed Total Energy Use		13249.98	MBtu/yr	
Baseline Process Energy				7645.24	Proposed Process Energy		7645.24	MBtu/yr	

Table EA2-6. Section 1.6 Energy Use Summary & Energy Savings

Energy Type	Units	Baseline Design	Proposed Design
Electricity	kWh	4,438,599.5	3,425,052
Natural Gas	therms	22,369.5	15,637
		0	0
Totals	MMBtu	17,381.45	13,249.98

SECTION 1.7 - EXCEPTIONAL CALCULATION MEASURE SUMMARY

Select one of the following

- The energy analysis includes exceptional calculation method(s) (ASHRAE 90.1-2007, G2.5).
- The energy analysis does not include exceptional calculation methods.

SECTION 1.8 - ON-SITE RENEWABLE ENERGY

Select one of the following

- The project uses on-site renewable energy produced on-site.
- The project does not use on-site renewable energy.

There are different methods for including renewable energy use data in calculations for EA Prerequisite 2/Credit 1. Please note that the same method has to be used for all the measures in this section.

Select one of the following:

- Automatic cost calculation:** The project team will base the Renewable Energy Cost on the "virtual" energy rate from the proposed design energy model results. (The calculated cost savings will automatically subtract from the proposed design energy model results when determining the Proposed Building Performance Rating.)
- Manual Cost Input:** the project team will analyze the Renewable Energy Cost for each on-site renewable source separately from the energy model based on local utility rate structures. Renewable Energy Costs are reported separately for each renewable source. (The calculated cost savings are automatically subtracted from the proposed design energy model results when determining the Proposed Building Performance Rating.) Use **Section 1.9A** Total Building Performance Summary - Manual Cost Input to input the cost values.
- Energy Model Includes Renewables:** On-site renewable energy is modeled directly in the energy model. Renewable Energy Cost is already credited in the proposed design energy model results (i.e. the energy model already reflects zero cost for on-site renewable energy, and this form will NOT subtract the Renewable Energy Cost a second time.)

Indicate the on-site renewable energy source(s) used, the backup energy type for each source (i.e. the fuel that is used when the renewable energy source is unavailable - ASHRAE 90.1-2007, Section G2.4), the rated capacity for the source, and the annual energy generated from each source.

Additionally, input the energy cost savings for each renewable energy source.

Table L-1. Renewable Energy Source Summary

Renewable Source	Renewable Energy Source Allocation	Renewable System Owner	Energy Type	Rated Capacity	Annual Energy Generated	Units	Annual Energy Cost (\$)
PV	On-Site only	Building Owner	Electricity	164	227,112	kWh	30,069.63
Wind Turbine	On-Site only	Building Owner	Electricity	1.2	5,801.9	kWh	768.17

¹Per ASHRAE 90.1 G2.1 Exception, baseline performance shall be based on the energy source used as backup energy or on the use of electricity if no backup energy source has been specified.

Table EA2-9. Section 1.8 Energy Use Summary & Energy Savings

Energy Type	Units	Baseline Case	Proposed Case
Electricity	kWh	0	232,913.9
Natural Gas		0	0
		0	0
Totals	MMBtu	0	794.7

SECTION 1.9A - TOTAL BUILDING PERFORMANCE SUMMARY

Table EAp2-10. Energy Use Summary: Total Building Energy Use Performance

Energy Type	Units	Baseline Case		Proposed Case			
		Process	Section 1.6 Energy Use	Section 1.6 Energy Use	Section 1.7 Energy Savings	Section 1.8 Ren Energy Savings	Total Energy Use
Electricity	kWh	2,240,693	4,438,599.5	3,425,052	0	232,913.9	3,192,138.1
Natural Gas	therms	0	22,369.5	15,637	0	0	15,637
		0	0	0	0	0	0
Totals	MMBtu	7,645.24	17,381.45	13,249.98	0	794.7	12,455.28
Energy use savings							28.34%

Table EAp2-11. Energy Cost Summary: Total Building Energy Cost Performance (Baseline Case)

Energy Type	Baseline Cost (\$) (0° rotation)	Baseline Cost (\$) (90° rotation)	Baseline Cost (\$) (180° rotation)	Baseline Cost (\$) (270° rotation)	Baseline Building Performance
Electricity	587,697	588,128	587,440	587,414	587,669.75
Natural gas	20,186	19,439	19,725	18,944	19,573.5
Totals	607,883	607,567	607,165	606,358	607,243.25

Table EAp2-12. Energy Cost Summary: Total Building Energy Cost Performance (Manual Cost Input)

Energy Type	Units	Baseline Case	Proposed Case
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Section 1.6 Energy Use		Process	Section 1.6 Energy Use	Section 1.6 Energy Use	Section 1.7 Energy Savings	Section 1.8 Ren Energy Savings	Total Energy Cost
Electricity	\$	296,667.75	587,669.75	453,476	0	30,837.8	422,638.2
Natural Gas	\$	0	19,573.5	13,682	0	0	13,682
	\$	0		0	0	0	0
Totals	\$	296,667.75	607,243.25	467,158	0	30,837.8	436,320.2
Baseline process energy costs as percent of total energy costs (%)			48.85	Energy cost savings			28.15%
EA Credit 1 points documented							9

Use the Automatic Cost Calculation path if the project uses automatic cost calculation under Section 1.7 or Section 1.8.

Automatic Cost Calculation: The project will generate the energy cost values using the virtual energy rate from Section 1.5: Energy Use Summary.

Table EAp2-13. Energy Cost Summary: Total Building Energy Cost Performance

Energy Type	Units	Baseline Case		Proposed Case			
Section 1.6 Energy Cost		Process	Section 1.6 Energy Cost	Section 1.6 Energy Cost	Section 1.7 Energy Savings	Section 1.8 Ren Energy Savings	Total Energy Cost
Electricity	\$	296,667.75	587,670.57	453,476.88	0	30,837.8	422,639.08
Natural Gas	\$	0	19,575.55	13,683.94	0	0	13,683.94
	\$	0	0	0	0	0	0
Totals	\$	296,667.75	607,246.12	467,160.82	0	30,837.8	436,323.02
Baseline process energy costs as percent of total energy costs (%)			48.85	Energy cost savings			28.15%
EA Credit 1 points documented							9

Section 1.9B - REPORTS AND METRICS

Table EAp2-14. Energy Use Intensity

	Baseline EUI	Proposed EUI
Electricity (kWh/sf)		
Interior Lighting	3.247	1.597
Space Heating	0	0
Space Cooling	1.301	0.487
Fans - Interior	2.446	2.002

Service Water Heating	0	0
Receptacle Equipment	8.074	8.074
Miscellaneous	0.926	0.182
Total	15.994	12.342

Natural Gas (kBtu/sf)

Space Heating	6.702	4.749
Service Water Heating	1.093	0.886

Total Energy Use Intensity (kBtu/sf)

Total	62.633	47.746
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Table EAp2-15. End Use Energy Percentage

	Baseline Case	Proposed Case	End Use Energy Savings (%)
Interior Lighting	17.688	11.412	37.817
Space Heating	1,070.043	994.638	1,311.883
Space Cooling	7.087	3.48	18.656
Fans - Interior	13.325	14.307	10.176
Service Water Heating	174.509	185.565	139.047
Receptacle Equipment	43.984	57.698	0
Miscellaneous	5.044	1.301	17.052

Input & Output Summaries from the Energy Model

Upload the summary report from the simulation program.

- Upload EAp2-11.** If the project used DOE2, eQuest & Visual DOE, provide the Input summary and the BEPS, BEPU, & ES-D reports.
- Upload EAp2-12.** If the project used EnergyPlus, provide the Input summary and the Annual Building Utility Performance Summary (ABUPS), System Summary, and the file that shows the annual energy cost by fuel source.
- Upload EAp2-13.** If the project team used EnergyPro, provide the Input summary and the Title 24 reports: PERF-1, ECON-1, & UTIL-1.
- Upload EAp2-14.** If the project team used HAP, provide the Input summary and the Annual Cost Summary, Unmet Load reports for all plants and systems (Building Zone Temperature Report), and Systems Energy Budget by Energy Source.
- Upload EAp2-15.** If the project team used Trace, provide the Input summary as well as the the Energy Consumption Summary, Energy Cost Budget/PRM Summary report, and Performance Rating Method Details.

Files: 7

- Upload EAp2-16.** For all other modeling software, upload supporting documents of similar scope and detail (input and output summaries.)

ADDITIONAL DETAILS

- Special circumstances preclude documentation of prerequisite compliance with the submittal requirements outlined in this form.
- The project team is using an alternative compliance approach in lieu of standard submittal paths.

SUMMARY

EA Prerequisite 2: Minimum Energy Performance Compliance Documented:

Y

Check Compliance

Note: Click "Check Compliance" to validate that the form meets the requirements. "Check Compliance" must be run after any changes are made to the form to ensure that "Compliance Documented" is accurate. Always press "Check Compliance" before saving the form. Fields are highlighted in red after "Check Compliance" is pressed are incomplete required fields. After entering information in those fields and pressing "Check Compliance" once more, the fields should return to their normal color