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LEED 2009 for Existing Buildings: Operations & Maintenance

WE PREREQUISITE 1: MINIMUM INDOOR PLUMBING FIXTURE AND FITTING EFFICIENCY

All fields and uploads are required unless otherwise noted.

THRESHOLD ATTEMPTED

Points Attempted: 0

See the LEEDuser Template

ALL OPTIONS

Upload WEp1-1. Provide a copy of the policy mandating an economic assessment of conversion to high-performance plumbing fixtures and fittings as part of any future indoor plumbing renovation.

Upload *Files: 1*

Select one of the following:

- ○ **LEED Design & Construction Streamlined Path:** The project building earned a prerequisite or at least one point for water use reduction under LEED for New Construction, LEED for Core and Shell, or LEED for Schools.
- ○ Initial new construction of the building was completed on or after January 1, 1994.
- ○ All relevant fixtures and fittings installed or replaced after January 1, 1994.
- ◉ **Performance Calculation:** A water use performance calculation will be completed to demonstrate compliance.

Note: To earn WE Credit 2, complete either the LEED Design & Construction Streamlined Path option OR the Performance Calculation option; other streamlined paths are not applicable to WE Credit 2. Content highlighted in yellow above is linked to WE Credit 2.

STEP 1: Choose the most applicable option. It is simple to complete the credit for for Options 1 – 3. Option 4 is most common, and is more complex to complete. See the following slides for completing Option 4.

PERFORMANCE CALCULATION

Refer to the additional guidance document in the Credit Resources section of LEED Online for more information about documenting compliance with WEp1 and WEc2.

Note: Content highlighted in yellow below is linked to WE Credit 2.

Table WEp1-1. Daily Occupancy

Note: Content below is linked from PI Form 3 for reference only. These values should inform, but not necessarily parallel, the numbers entered in Table WEp1-2. Fixture Groups Definition.

Save Form

FTE	Average Transients (Visitors)	Average Retail Customers	Residents	Total
1,384	100	20	0	1,504

This info will automatically populate from PIf3.

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STEP 2: If all of the plumbing fixtures and fixtures in the project building are uniform, and have similar usage patterns:

Fixture Groups Introduction: This table allows for project occupants to be organized in a way that best represents fixture usage patterns in the project. Occupants can be grouped together or separated into sub-groups at the option of the project team. The usage groups defined must be derived from daily occupancy data for the project building. Accordingly, all project occupants, as recorded in the Daily Occupancy tables from PI Form 3: Occupant and Usage Data must be represented in the Table. Fixture Groups Definition below. All residential occupants should be represented separately from non-residential occupants. Refer to the additional guidance document in the Credit Resources sectior

Lump all of the fixtures in the building into one fixture group

Table WEp1-2. Fixture Groups Definition

Group Name	# of Fixtures Replaced before Jan-93	# of Fixtures Replaced after Jan-93	Annual Days of Operation	FTE	Transients (Student/ Visitor)	Retail Customers	Residents	% Female	% Male
Whole Building	275	607	365	2029	150	0	0	50	50
Total fixtures	275	607							

Add Row | Delete Row

This ratio should be left alone, unless there's a strong justification for changing it (e.g. an all boy's school)

Briefly describe the inputs in the Table. Fixture Groups Definition. Explain the methodology used to define each fixture group, as well as the derivation of data in each row. Additionally, provide a detailed explanation if the default gender ratio is not used.

There is one fixture group for the entire building because the flush/flow rate for each fixture family is the same throughout the facility, and there are no special usage patterns that need to be accounted for.

Explain why you chose the fixture groups the way that you did. This will help the reviewer understand if you created appropriate fixture groups or not. If you changed the male/ female ratio, be sure to explain why here.

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STEP 2: If there is a mix-match of plumbing fixtures and fittings in the project building, and/or the usage patterns significantly vary from one place in the building to the next:

FIXTURE GROUPS INTRODUCTION

Organize project occupants in a way that best represents fixture usage patterns in the project. O
together or separated into sub-groups. Usage groups must be derived from daily occupancy dat
Accordingly, all project occupants, as documented in the "Occupant Information" section of PI Form
the Table WEp1-2. Fixture Groups Definition below. All residential occupants should be represe
residential occupants.

Create separate fixture group for subsets of the building based on similar types of fixtures or usage patterns

Table WEp1-2. Fixture Groups Definition

Group Name	# of Fixtures Replaced before Jan-94	# of Fixtures Replaced after Jan-94	Annual Days of Operation	FTE	Transients (Visitors)	Retail Customers	Residents	% Female	% Male		
Basement		32	260	56	1			50	50	+	-
Floor 1	16		260	25	2	51		50	50	+	-
Floor 2	16	0	260	43	5			50	50	+	-
Floor 3	14	0	260	26	1			50	50	+	-
Floor 4	16		260	19	1			50	50	+	-
Total fixtures	62	32									

This ratio should be left alone, unless there's a strong justification for changing it (e.g. an all boy's school)

Briefly describe the inputs in the Table WEp1-2 above. Explain the methodology used to define each fixture group, as well as the derivation of data in each row. Additionally, provide a detailed explanation if the default gender ratio is not used.

There are several different kinds of plumbing fixtures and fittings in the building, as the building has undergone several renovations. Therefore a fixture group was created for each floor of the building. Also, the usage patterns for the Floor 1 retail space is significantly different than the other floors of the building.

Explain why you chose the fixture groups the way that you did. This will help the reviewer understand if you created appropriate fixture groups or not.

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STEP 3: Enter the flush fixtures (e.g. Water Closet or Urinal) for <u>each</u> fixture group. If within a fixture group there are fixtures with different flush rates, use a weighted average flush rate (see next slide)

Table WEp1-3. Flush Fixture Data

Enter flush fixture data for each fixture group defined in the Table WEp1-2 above. Click "Calculate" in the summary section of the table to perform the water savings calculations. "Calculate" must be clicked after any or all the data is entered in the table to refresh the calculated values and obtain accurate information.

Fixture Groups							Flush Rate (GPF)		Annual Water Consumption (kGal)			
Select	Display	Fixture ID[1]	Fixture Family	Fixture Type	Default	Total Daily Uses[2]	Baseline	Installed[3]	IPC / UPC Baseline	Performance Case		
Basement	Basement		Water Closet	IPC/UPC (Conventi	☒	112	1.6	1.6	46.59	46.59	+	-
Basement	Basement		Urinal	IPC/UPC (Conventi	☒	56	1	1.5	14.56	21.84	+	-
Floor 1	Floor 1		Water Closet	IPC/UPC (Conventi	☒	58	1.6	3.18	24.13	47.95	+	-
Floor 1	Floor 1		Urinal	IPC/UPC (Conventi	☒	28	1	1.6	7.28	11.65	+	-
Floor 2	Floor 2		Water Closet	IPC/UPC (Conventi	☒	88	1.6	3.12	36.61	71.39	+	-
Floor 2	Floor 2		Urinal	IPC/UPC (Conventi	☒	44	1	1.3	11.44	14.87	+	-
Floor 3	Floor 3		Water Closet	IPC/UPC (Conventi	☒	52	1.6	3.12	21.63	42.18	+	-
Floor 3	Floor 3		Urinal	IPC/UPC (Conventi	☒	26	1	1.3	6.76	8.79	+	-
Floor 4	Floor 4		Water Closet	IPC/UPC (Conventi	☒	38	1.6	3.5	15.81	34.58	+	-
Floor 4	Floor 4		Urinal	IPC/UPC (Conventi	☒	19	1	1.6	4.94	7.9	+	-
Total calculated flush fixture water use annual volume, baseline case (kGal)								189.75				
Total calculated flush fixture water use annual volume, performance case (kGal)								307.74	Calculate			
Percent reduction of water use in flush fixtures (%)								-62.18				

1 Define a reference name or descriptor that can be used to identify each fixture family/type.
2 May be modified for special circumstances. Deselect the "Default" checkbox to enter modified Total Daily Uses value. Default assumes urinals are installed. Refer to the additional guidance document in the Credit Resources section which includes information about fixture groups that do not include urinals.
3 To account for dual-flush fixtures, enter a weighted average flush rate.

Enter the flush rate or the weighted average flush rate for each fixture type

Click the "Calculate" button to get the flush fixture results

If you have fixtures with different flush/flow rates in the same fixture group, use the weighted flush/flow average.

EX. If Fixture Group "2nd Floor" has 4 water closets with 3.5 gpf, and 1 with 1.6 gpf. The weighted average to use in the Credit Form will be:

$$\frac{(4 \times 3.5) + (1 \times 1.6)}{(4 + 1)} = 3.12 \text{ gpf}$$

*Additional documentation showing how the weighted averages were calculated should be uploaded.

1st Floor	QTY.	Flow/Flush Rate	
Water Closets	5	3.5	
	1	1.6	
		3.18	*weighted avg.*
Urinals	2	1.6	
		1.6	*weighted avg.*
Lav Faucets	6	2.2	
	1	0.5	
		1.96	*weighted avg.*
Kitchen Sink Faucets	1	2.2	
		2.2	*weighted avg.*
2nd Floor			
Water Closets	4	3.5	
	1	1.6	
		3.12	*weighted avg.*
Urinals	1	1.6	
	1	1	
		1.3	*weighted avg.*
Lav Faucets	1	1.5	
	1	1	
	5	2.2	
		1.93	*weighted avg.*
Kitchen Sink Faucets	1	2	
		2	*weighted avg.*
3rd Floor			
Water Closets	4	3.5	
	1	1.6	
		3.12	*weighted avg.*
Urinals	1	1	
	1	1.6	
		1.3	*weighted avg.*
Lav Faucets	2	1.5	
	3	2	
	1	2.2	
		1.87	*weighted avg.*
Kitchen Sink Faucets	1	2	
		2	*weighted avg.*

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STEP 4: Repeat STEP 3 for flow fixture types (e.g. lavatory faucet, kitchen sink, shower) in all fixture groups

Table WEp1-4. Flow Fixture Data

Enter flow fixture data for each fixture group defined in the Table WEp1-2 above. Click "Calculate" in the summary section of the table to perform the water savings calculations. "Calculate" must be clicked after any or all the data is entered in the table to refresh the calculated values and obtain accurate information.

Fixture Groups								Flow Rate (GPM / GPC)		Annual Water Consumption (kGal)			
Select	Display	Fixture ID[1]	Fixture Family	Fixture Type	Default	Total Daily Uses[2]	Duration (Secs)[3]	Baseline	Installed[4]	IPC / UPC Baseline	Performance Case		
Basemer	Basement		Public Lavatory	IPC/UPC (Conv	☒	169	30	0.5	0.5	10.99	10.99	+	-
Basemer	Basement		Kitchen Sink	IPC/UPC (Conv	☒	56	15	2.2	1.5	8.01	5.46	+	-
Basemer	Basement		Shower	IPC/UPC (Conv	☒	6	300	2.5	2.5	19.5	19.5	+	-
Floor 1	Floor 1		Public Lavatory	IPC/UPC (Conv	☒	86	30	0.5	0.5	5.59	5.59	+	-
Floor 1	Floor 1		Kitchen Sink	IPC/UPC (Conv	☒	25	15	2.2	1.5	3.58	2.44	+	-
Floor 2	Floor 2		Public Lavatory	IPC/UPC (Conv	☒	132	30	0.5	0.5	8.58	8.58	+	-
Floor 2	Floor 2		Kitchen Sink	IPC/UPC (Conv	☒	43	15	2.2	1.5	6.15	4.19	+	-
Floor 3	Floor 3		Public Lavatory	IPC/UPC (Conv	☒	79	30	0.5	0.5	5.14	5.14	+	-
Floor 3	Floor 3		Kitchen Sink	IPC/UPC (Conv	☒	26	15	2.2	1.5	3.72	2.54	+	-
Floor 4	Floor 4		Public Lavatory	IPC/UPC (Conv	☒	58	30	0.5	0.5	3.77	3.77	+	-
Floor 4	Floor 4		Kitchen Sink	IPC/UPC (Conv	☒	19	15	2.2	1.5	2.72	1.85	+	-
Total calculated flow fixture water use annual volume, baseline case (kGal)									77.75				
Total calculated flow fixture water use annual volume, performance case (kGal)									70.05				
Percent reduction of water use in flow fixtures (%)									9.9				

Calculate

1 Define a reference name or descriptor that can be used to identify each fixture family/type.
2 May be modified for special circumstances. Deselect the "Default" checkbox in order to insert the modified Total Daily Uses value.
3 May be modified for special circumstances. Provide a narrative in the Special Circumstances section below to justify modifications.
4 When using the metering lavatory faucet, please convert all flow rates in gallons per minute (GPM) to gallons per cycle (GPC) based on duration from the product specifications.

Enter the flow rate or the weighted average flush rate for each fixture type

Click the "Calculate" button to get the flow fixture results

STEP 5: Verify the flow/flush rates of fixture types that differ from code

Select one of the following:

- (●) Manufacturer or supplier data was available to verify flow rates for each flush fixture type that differs from UPC/IPC efficiency requirements.
- ( ) Manufacturer or supplier data was not available for each flush fixture type that differs from UPC/IPC efficiency requirements, so measured flush rates for at least 20% (by number of fixtures) of each type were used.
- ( ) All flow fixtures are listed as UPC/IPC (Conventional) fixture type in table above.

If fixture/fitting documentation is available, choose Option 1 and provide cut sheets for all fixtures/fittings that differ from code.

*In the weighted average cases, provide documentation for all of the fixture fittings within that weighted average that differ from the code gpf/gpm

Fixture Groups							Flush Rate (GPF)		Annual Water Consumption (kGal)		
Select	Display	Fixture ID[1]	Fixture Family	Fixture Type	Default	Total Daily Uses[2]	Baseline	Installed[3]	IPC / UPC Baseline	Performance Case	
Basement	Basement		Water Closet	IPC/UPC (Conventi	☒	112	1.6	1.6	46.59	46.59	+ -
Basement	Basement		Urinal	IPC/UPC (Conventi	☒	56	1	1.5	14.56	21.84	+ -
Floor 1	Floor 1		Water Closet	IPC/UPC (Conventi	☒	58	1.6	3.18	24.13	47.95	+ -
Floor 1	Floor 1		Urinal	IPC/UPC (Conventi	☒	28	1	1.6	7.28	11.65	+ -
Floor 2	Floor 2		Water Closet	IPC/UPC (Conventi	☒	88	1.6	3.12	36.61	71.39	+ -
Floor 2	Floor 2		Urinal	IPC/UPC (Conventi	☒	44	1	1.3	11.44	14.87	+ -
Floor 3	Floor 3		Water Closet	IPC/UPC (Conventi	☒	52	1.6	3.12	21.63	42.18	+ -
Floor 3	Floor 3		Urinal	IPC/UPC (Conventi	☒	26	1	1.3	6.76	8.79	+ -
Floor 4	Floor 4		Water Closet	IPC/UPC (Conventi	☒	38	1.6	3.5	15.81	34.58	+ -
Floor 4	Floor 4		Urinal	IPC/UPC (Conventi	☒	19	1	1.6	4.94	7.9	+ -
Total calculated flush fixture water use annual volume, baseline case (kGal)								189.75			
Total calculated flush fixture water use annual volume, performance case (kGal)								307.74	Calculate		
Percent reduction of water use in flush fixtures (%)								-62.18			

1 Define a reference name or descriptor that can be used to identify each fixture family/type.
2 May be modified for special circumstances. Deselect the "Default" checkbox to enter modified Total Daily Uses value. Default assumes urinals are installed. Refer to the additional guidance document in the Credit Resources section which includes information about fixture groups that do not include urinals.
3 To account for dual-flush fixtures, enter a weighted average flush rate.

STEP 5: Verify the flow/flush rates of fixture types that differ from code

Select one of the following:

- ○ Manufacturer or supplier data was available to verify flow rates for each flush fixture type that differs from UPC/IPC efficiency requirements.
- ● Manufacturer or supplier data was not available for each flush fixture type that differs from UPC/IPC efficiency requirements, so measured flush rates for at least 20% (by number of fixtures) of each type were used.
- ○ All flow fixtures are listed as UPC/IPC (Conventional) fixture type in table above.

If fixture/fitting documentation is NOT available, choose Option 2 and test the flush/flow at least 20% (by # of fixtures) of each fixture type. This can be a time consuming exercise.

Fixture Groups							Flush Rate (GPF)		Annual Water Consumption (kGal)		
Select	Display	Fixture ID[1]	Fixture Family	Fixture Type	Default	Total Daily Uses[2]	Baseline	Installed[3]	IPC / UPC Baseline	Performance Case	
Basement	Basement		Water Closet	IPC/UPC (Conventi	☒	112	1.6	1.6	46.59	46.59	+ -
Basement	Basement		Urinal	IPC/UPC (Conventi	☒	56	1	1.5	14.56	21.84	+ -
Floor 1	Floor 1		Water Closet	IPC/UPC (Conventi	☒	58	1.6	3.18	24.13	47.95	+ -
Floor 1	Floor 1		Urinal	IPC/UPC (Conventi	☒	28	1	1.6	7.28	11.65	+ -
Floor 2	Floor 2		Water Closet	IPC/UPC (Conventi	☒	88	1.6	3.12	36.61	71.39	+ -
Floor 2	Floor 2		Urinal	IPC/UPC (Conventi	☒	44	1	1.3	11.44	14.87	+ -
Floor 3	Floor 3		Water Closet	IPC/UPC (Conventi	☒	52	1.6	3.12	21.63	42.18	+ -
Floor 3	Floor 3		Urinal	IPC/UPC (Conventi	☒	26	1	1.3	6.76	8.79	+ -
Floor 4	Floor 4		Water Closet	IPC/UPC (Conventi	☒	38	1.6	3.5	15.81	34.58	+ -
Floor 4	Floor 4		Urinal	IPC/UPC (Conventi	☒	19	1	1.6	4.94	7.9	+ -
Total calculated flush fixture water use annual volume, baseline case (kGal)								189.75			
Total calculated flush fixture water use annual volume, performance case (kGal)								307.74	Calculate		
Percent reduction of water use in flush fixtures (%)								-62.18			

1 Define a reference name or descriptor that can be used to identify each fixture family/type.
2 May be modified for special circumstances. Deselect the "Default" checkbox to enter modified Total Daily Uses value. Default assumes urinals are installed. Refer to the additional guidance document in the Credit Resources section which includes information about fixture groups that do not include urinals.
3 To account for dual-flush fixtures, enter a weighted average flush rate.

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HOW TO TEST FLOW/FLUSH RATES OF FIXTURES/FITTINGS

BEFORE TESTING:
Try to find the manufacturer and model stamped on the fixture itself. Sometimes the fixture stamps are hard to find, are not legible, or even are not there.

HOW TO TEST:
There is no official protocol for testing fixtures, but it can be done in the following ways. For a lavatory and kitchen sink faucets and showers, simply fill a bucket for 60 seconds. For wall-mounted urinals and water closets, ask the building engineer to assist you in disconnecting the plumbing from the flushometer and measure a flush of water into a bucket. It is recommended that each fixture be tested at least three times, to get a weighted average flow/flush rate. This is quite a process, so consider it a last resort if the fixture documentation can absolutely not be founds. Make sure to track all of your testing data in a well-organized spreadsheet and to upload that data to LEED Online, along with a detailed narrative describing your testing methodology.

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STEP 6: See the results

SUMMARY

Table WEp1-5. Flush & Flow Summary Statistics

IPC/UPC baseline annual water use (kGal)	267.5
Number of fixtures substantially completed before 1994	62
Number of fixtures substantially completed in 1994 or later	32
LEED-EB: O&M baseline multiplier (%)	146
LEED-EB: O&M annual water use, baseline case (kGal)	390.55
Calculated annual water use, performance case (kGal)	377.79
Percent water use reduction in all fixtures (%)	3.27

Note: The total calculated performance case must less than or equal to the LEED-EB: O&M baseline case to document compliance with WE Prerequisite 1.

In this case, the project building complies with the prerequisite, because there is an overall reduction from the baseline case. In order to earn points (10% = 1, 15% = 2, 20% = 3, 25% = 4, 30% = 5, 35% = 5 +EP), the project team may want to consider swapping out existing fixtures and fittings for more efficient ones.

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To earn points for WEc2, simply check that the information provided in WEp1 has auto-populated correctly in the WEc2 form.

LEED 2009 for Existing Buildings: Operations & Maintenance

WE CREDIT 2: ADDITIONAL INDOOR PLUMBING FIXTURE AND FITTING EFFICIENCY

Project # 1000006726 The Portland Building

All fields and uploads are required unless otherwise noted.

THRESHOLD ATTEMPTED

Points Attempted: 5 30% Reduction

ALL OPTIONS

The following sections have been derived from the compliance documented in WE Prerequisite 1: Minimum Indoor Plumbing Fixture and Fitting Efficiency. The WE Prerequisite 1 form must be completed using either the LEED Design & Construction Streamlined path OR the Performance Calculation. The following is a linked submittal.

Select one of the following:

- ○ **LEED Design and Construction Streamlined Path**: The project building earned a prerequisite or at least one point for water use reduction under LEED for New Construction, LEED for Core and Shell, or LEED for Schools.
- ◉ **Performance Calculation:** A water use performance calculation will be completed to demonstrate compliance.

PERFORMANCE CALCULATION

Table. Flush & Flow Summary Statistics

IPC/UPC baseline annual water use (kGal)	2395.84
Number of fixtures substantially completed before 1993	11
Number of fixtures substantially completed in 1993 or later	302
LEED-EB: O&M baseline multiplier (%)	121
LEED-EB: O&M annual water use, baseline case (kGal)	2898.97
Calculated annual water use, performance case (kGal)	1993.07
Percent water use reduction in all fixtures (%)	31.25

The reduction of water use must be at least 10% for 1 point, 15% for 2 points, 20% for 3 points, 25% for 4 points, and 30% for 5 points.

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