



# THE **WELL** BUILDING STANDARD®

v1 with Q3 2020 addenda



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# THE WELL BUILDING STANDARD® EXECUTIVE SUMMARY

## The WELL Building Standard (WELL) focuses on the people in the building.

Over the last decade, green building standards and standard-setting organizations have made significant strides towards the market transformation of the building industry, resulting in a rapid expansion of green buildings and environmentally conscious building practices throughout the world.

Over the same period, strategies to enhance human health and well-being have played a relatively small role in the evolution of building standards. We believe that the time has come to elevate human health and comfort to the forefront of building practices and reinvent buildings that are not only better for the planet, but also for people.

1. This is the first standard of its kind that focuses solely on the health and wellness of building occupants.
2. WELL identifies 100 performance metrics, design strategies, and policies that can be implemented by the owners, designers, engineers, contractors, users and operators of a building.
3. WELL is based on a thorough review of the existing research on the effects of spaces on individuals and has been advanced through a thorough scientific and technical review.
4. In order to achieve the requirements of the WELL Building Standard, the space must undergo a process that includes an on-site assessment and performance testing by a third party.



## A Wellness Standard for Buildings

The WELL Building Standard marries best practices in design and construction with evidence-based health and wellness interventions. It harnesses the built environment as a vehicle to support human health, well-being and comfort. WELL Certified™ spaces and developments can lead to a built environment that helps to improve the nutrition, fitness, mood, sleep, comfort and performance of its occupants. This is achieved in part by implementing strategies, programs and technologies designed to encourage healthy, more active lifestyles and reducing occupant exposure to harmful chemicals and pollutants.

This document presents the overall strategies, performance targets, certification and adherence steps required for projects to meet the WELL Building Standard. WELL Building Standard v1 is applicable for commercial and institutional buildings and WELL Certification can be applied to three project types:

1. New and Existing Buildings
2. New and Existing Interiors
3. Core and Shell

Pilot programs are available for other building sectors, including multifamily residences, retail and restaurants. Projects representing these building sectors are invited to join our ongoing pilot program.

## Updates to the WELL Building Standard

The WELL Building Standard is a dynamic rating system. As the intersection between design and human health evolves, we strongly believe in the importance of advancing alongside. The WELL Building Standard (WELL) v1.0 was launched in October 2014, and as part of the development process, updates to the standard incorporate early user feedback, including simplifications, language enhancements and additional clarifications to certain feature requirements.

# ORGANIZATIONAL STRUCTURE

WELL is the culmination of seven years of rigorous research in collaboration with leading physicians, scientists and industry professionals. The WELL Building Standard® was pioneered by Delos, is administered by the International WELL Building Institute™ (IWBI™), and is third-party certified through IWBI's collaboration with Green Business Certification Inc. (GBCI) – the certification body for the LEED Green Building Rating System.

## International WELL Building Institute, PBC (IWBI)

IWBI is a public benefit corporation whose mission is to improve human health and well-being through the built environment. Public benefit corporations like IWBI are an emerging U.S. structure for corporations committed to balancing public benefits with profitability – harnessing the power of private capital for greater good. IWBI administers the WELL Building Standard (WELL) – a performance-based system for measuring, certifying, and monitoring features of buildings that impact the health and wellbeing of the people who live, work, and learn in them. Fulfilling the vision of IWBI Founder Paul Scialla, IWBI has a pioneering altruistic capitalism model that will address social responsibility and demonstrate a sustainable model for philanthropy. IWBI has committed to direct 51% of net profits received from WELL Certification project fees toward charitable contributions and impact investment focused on health, wellness, and the built environment. IWBI was established by Delos in 2013 pursuant to a Clinton Global Initiative commitment to improve the way people live by developing spaces that enhance occupant health and quality of life by sharing the WELL Building Standard globally.

## Delos Living LLC

Delos® is pioneering the integration of health and wellness technologies into the places we live, work and learn. By placing health and wellness at the center of design, construction, technology and programming decisions, Delos is transforming our homes, offices, schools and other indoor environments into spaces that actively contribute to human health and well-being.

## Alignment with Green Building Standards

The WELL Building Standard is designed to work harmoniously with the LEED Green Building Rating System, the Living Building Challenge and other leading global green building standards. We encourage projects to pursue both WELL and standards that address environmental sustainability.

# WELLNESS – A COMPLEX ISSUE

Comprehensive and interdisciplinary approaches are necessary to meaningfully address the complex issues of human health and well-being. A narrow focus on select aspects of health is inadequate to the task. Many factors of the physical environment have a significant impact on day-to-day health and productivity, but it is often the interactions between multiple environmental factors that matter most. A growing body of research supports these claims but little has been done to translate research into practice. The WELL Building Standard® therefore draws from multiple disciplines of scientific study, and presents an integrated approach that reinvents the built environment around its occupants, transforming the places we live, work and learn into systems intended to promote and improve human health and well-being.

## Interactions Between Humans and the Built Environment

Traditional healthcare delivery systems primarily focus on addressing health after people have already become sick. With rising costs and the increased burden of chronic diseases such as diabetes, cardiovascular disease and cancer, people are turning to more lifestyle-oriented and preventative approaches to health. The WELL Building Standard is founded on the understanding that facets of our environment interact with personal, genetic and behavioral factors to shape our overall health and well-being. WELL recognizes that many behaviors are subconsciously dictated by external cues, and thus it carefully considers interactions between humans and the built environment that shape not only our physical health but also our behavior.

## The Basis for the WELL Building Standard

The WELL Building Standard v1 is the product of seven years of research and development culminating with an expert review process encompassing a scientific, practitioner and medical review. The WELL Building Standard was developed by integrating scientific and medical research and reviewing existing literature on environmental health, behavioral factors, health outcomes and demographic risk factors. By compiling leading practices in building design and management and referencing existing standards and best practice guidelines set by governmental and professional organizations, WELL works to harmonize and clarify existing thresholds and requirements. Where important issues have not been adequately addressed by the literature, the WELL Building Standard relies on expert consultation as the basis for defining performance requirements.

WELL is in large part performance-based; in most cases, specific, measurable “markers” (thresholds) are provided that must be met. In other cases, particular strategies are required, as strong evidence suggests there are benefits to implementation.

Overall, the WELL Building Standard is designed to comprehensively cover the various individual needs of building occupants while also building a common foundation for measuring wellness in the built environment.

## WELLographies™

A rich body of research supported the development of the underlying concepts and requirements of the WELL Building Standard. A review of this literature is described in a series of WELLography™ publications. The WELLographies will provide the content and references for all main topics that constitute the WELL Building Standard. WELLographies cite major regulatory guidelines, position statements from trusted organizations, medical and scientific literature and well-established best practice guidelines on the topics covered in WELL.

## Acknowledgements

We would like to thank all parties involved in the review of the WELL Building Standard and the supporting WELLographies. The WELL Building Standard has been evaluated by leading scientists, practitioners from the building industry and physicians from leading medical institutions.

Scientists were consulted to help prioritize the factors that contribute to wellness. In order to assess the applicability of WELL in practice, building professionals and other stakeholders were asked for input. We give special thanks to the Clinton Global Initiative, U.S. Green Building Council, International Living Future Institute, GBCI, Mayo Clinic and CBRE, who have given institutional support for our efforts.

IWBI is especially grateful for the support of Cleveland Clinic Wellness over the last few years. The organization has been an inspirational example of the effect that wellness policies can have on the health and well-being of the staff of an institution. Under the leadership of Dr. Michael F. Roizen, Cleveland Clinic Wellness has conducted a review of the WELL Building Standard and WELLographies.

A complete list of reviewers can be found in Appendix G and at [www.wellcertified.com](http://www.wellcertified.com).



# ORGANIZATION OF THE WELL BUILDING STANDARD®

The WELL Building Standard is organized into seven categories of wellness called Concepts: Air, Water, Nourishment, Light, Fitness, Comfort and Mind.

## WELL Building Standard Features, Parts and Requirements

The seven Concepts are comprised of 105 features. Every feature is intended to address specific aspects of occupant health, comfort or knowledge. Each feature is divided into parts, which are often tailored to a specific building type. This means that depending on the building type (e.g., New and Existing Interiors or Core and Shell), only certain parts of a given feature may be applicable. Within each part are one or more requirements, which dictate specific parameters or metrics to be met. In order for a project to receive credit for a particular feature, all of its applicable component parts specifications must be satisfied.

Features can be:

- Performance-based standards that allow flexibility in how a project meets acceptable quantified thresholds
- Prescriptive standards that require specific technologies, design strategies or protocols to be implemented

### Preconditions

Some WELL features are categorized as Preconditions—necessary for all levels of WELL Certification. These features represent the core of the WELL Building Standard. Preconditions can be thought of as the foundation for wellness in the built environment. It is important to note that for certification to be awarded, all applicable Preconditions must be met.

### Optimizations

Optimizations are not required to achieve Silver level certification, but create a flexible pathway towards Gold and Platinum level certification. These features include optional technologies, strategies, protocols and designs. IWBI recommends that all projects strive to achieve as many Optimizations as possible.

STANDARD VERSION	LEVEL OF ACHIEVEMENT	PRECONDITIONS THAT MUST BE ACHIEVED	OPTIMIZATIONS THAT MUST BE ACHIEVED
WELL Building Standard®	Silver Certification	All applicable	None
	Gold Certification	All applicable	40% of applicable
	Platinum Certification	All applicable	80% of applicable
WELL Pilot Standards	Silver Certification	All applicable	20% of applicable
	Gold Certification	All applicable	40% of applicable
	Platinum Certification	All applicable	80% of applicable

## **Not Applicable Features**

Features that are labeled as 'not applicable' (N/A) to a particular project type are not expected to be relevant to that project type. These features are not included in the project type's total optimization count in scoring. However, if a project finds that a 'not applicable' feature is indeed relevant and meets all of the feature's requirements, the project may receive credit for the achieved optimization without increasing the total applicable optimization count for scoring purposes.

## **Feature Intents in the WELL Building Standard**

Each WELL Building Standard feature is designed to address issues that impact the health, comfort or knowledge of occupants. Many features intended to improve health are supported by existing government standards or other standard-setting organizations. Some features are intended to change behavior through education and corporate culture, providing, for example, information and support for making positive lifestyle choices.

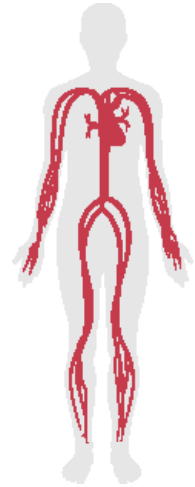
## **Wellness and Body Systems**

Each feature of the WELL Building Standard is ascribed to the human body systems that are intended to benefit from its implementation. This enables project teams to classify the intended benefits of each WELL feature and develop a comprehensive set of strategies. While there are different ways to group the body's various systems, the WELL Building Standard considers each feature's impact on the following categories of body systems:

## Cardiovascular System

The cardiovascular system consists of the heart, vessels and blood. Its primary function is to supply nutrients and remove waste from the body tissues. However, stress, unhealthy diets and lifestyle choices, and exposure to environmental pollutants can negatively impact cardiovascular health and lead to the development of chronic conditions that reduce quality of life.

The WELL Building Standard addresses factors that play a vital role in cardiovascular health: stress, nutrition, fitness and environmental pollutants. Comfort features mitigate stress and help to maintain hormonal balance in the body. Healthy diets and active lifestyles control body weight and strengthen the muscles of the heart. Elimination of environmental pollutants in air, such as tobacco and VOCs – which directly harm the heart and vessels – also contribute towards good cardiovascular health.



## Digestive System

The digestive system consists of the mouth, esophagus, stomach, small and large intestines, and the auxiliary organs – liver and pancreas – that produce digestive hormones and enzymes. This complex system is responsible for nutrient breakdown, absorption and assimilation. In addition, the gut is the largest reservoir of bacteria, which assist in digestion and play a role in immune health. These critical functions can be compromised by poor dietary habits and stress, as well as by microbes and environmental pollutants in the foods we eat and the surfaces that we touch.

The features of WELL support interventions that reduce factors that negatively impact digestive health. Comfort features mitigate stress, which affects the health and function of the microbiome. Proper diets help to limit the consumption of foods and substances that cause digestive discomfort and allergic reactions. Treatment of surfaces ensures that microbes and toxins do not enter our digestive system via our foods. Together, the features of WELL contribute towards maintaining optimal digestive and overall health.



## Endocrine System

The endocrine system is made up of hormone-secreting glands. Hormones are chemical compounds that regulate many important processes including growth, immunity, metabolism, reproduction, mood and digestion. Unfortunately, stress, environmental pollutants and many of today's foods and products contain chemicals that disrupt the function of the endocrine system and can cause a variety of health problems.

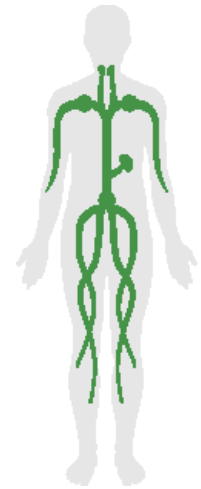
The features of the WELL Building Standard aim to mitigate or eliminate exposure to potentially harmful endocrine system disruptors. Comfort features help to reduce stress that can lead to chronic health conditions. Nourishment features limit the ingestion of compounds that mimic hormones and disrupt proper endocrine regulation. Elimination of environmental pollutants prevents the exposure to toxins and compounds that interfere with the endocrine regulation of many of the body's functions.



## Immune System

The immune system is a complex cohort of highly specialized cells, proteins, tissues and organs that make up the body's defense system against internal and foreign disease-causing agents. It is affected by the cumulative effect of toxins, poor sleep, nutrition and excessive stress. Failure to maintain proper immune function can increase the incidence of infections by bacterial and viral pathogens, and contribute towards the development of chronic conditions such as arthritis, diabetes, cardiovascular or respiratory disease and even cancer.

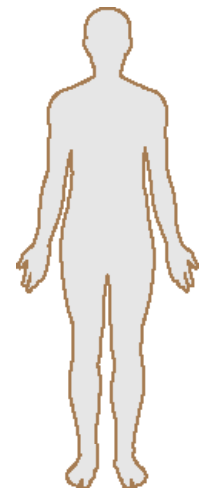
The features in the WELL Building Standard aim to promote and enhance immune health. The use of non-toxic materials limits the exposure to chemicals that weaken the immune function. Water and air filtration systems limit the exposure to bacterial and viral pathogens and allergens. In addition, WELL includes features that reduce stress and improve nutrition and fitness, which help strengthen the immune system.



## Integumentary System

The skin, hair and nails form the outer layer of the body, or the integumentary system. It functions to protect internal organs from impact, prevents water loss, regulates body temperature and protects the body against foreign pathogens and harmful toxins. The skin is also a host to a large community of symbiotic microorganisms that produce a moisturizing layer and aid in immune function.

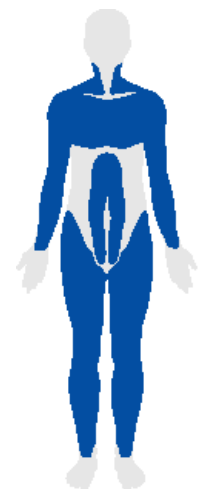
The WELL Building Standard helps to maintain integumentary system integrity, as this system provides the first line of defense against injury and/or infections. In addition, it requires that building materials are absent of toxins that could be harmful if absorbed through the body's outermost layers.



## Muscular System

The human muscular system is comprised of skeletal, smooth and cardiac muscle. It supports posture, movement, blood circulation and digestion. The muscular system is also responsible for generating heat through the contraction of muscles. Balanced diet and physical activity greatly affect muscular health, as they ensure that the muscles receive adequate nutrients for proper development and function.

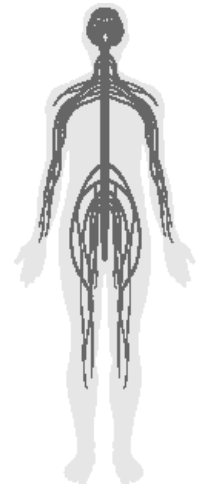
The WELL Building Standard contains features that are designed to encourage or enhance the opportunities for safe physical activity, promoting an active lifestyle. To complement this, ergonomic designs are intended to reduce the likelihood of ligament strain and muscular injuries. Other features promote the use of active furnishings or design principles that encourage small amounts of physical activity throughout the day and reduce sedentariness.



## Nervous System

The nervous system includes the central nervous system, made up of the brain and spinal cord, and the peripheral nervous system, composed of nerves. The nervous system is directly and indirectly responsible for controlling nearly every bodily process, including movement, cognitive processes and maintenance of vital organ functions.

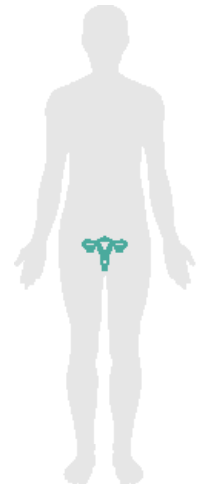
The WELL Building Standard places the utmost importance on supporting neurologic and cognitive function through a variety of interventions. Features work to limit the exposure to environmental toxins in air and water, encourage balanced diets and optimal levels of physical activity, and enhance sleep quality and mitigate stress through the implementation of a variety of comfort measures.



## Reproductive System

The reproductive system consists of hormone-secreting glands in the brain and the reproductive organs. Failure to maintain proper reproductive health can have negative consequences on overall health. Further, the effects of this system are broad-reaching and can have an impact on personal and prenatal health.

The WELL Building Standard introduces features intended to help protect reproductive health. Proper diet and exercise are two important factors that are addressed by WELL; these are complemented by ergonomic and toxin avoidance strategies that help support reproductive health.



## Respiratory System

The respiratory system includes the mouth, nose, diaphragm, the trachea and the airways that reach deep into the lungs. The respiratory system works in tandem with the circulatory system in order to provide oxygen and remove carbon dioxide from the body tissues.

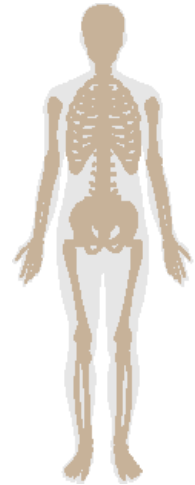
The features of the WELL Building Standard help to promote optimal respiratory system function by improving the quality of the air we breathe, limiting exposure to molds and microbes and by improving access to opportunities for greater fitness. Elimination of VOCs and particulate matter from ambient air helps to prevent direct damage to the lungs. Mitigation of molds and microbes reduces the incidence of infections and allergic reactions. Fitness features help to improve lung function and the overall strength of the respiratory system.



## Skeletal System

The skeletal system provides support and movement, protects internal organs against impact, stores minerals, produces blood cells and aids in hormone regulation. Similarly to the closely related muscular system, skeletal health is strongly affected by proper nutrition and adequate levels of physical activity.

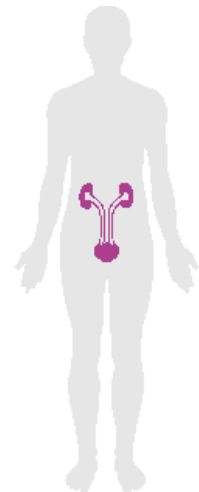
The WELL Building Standard is grounded in the latest research in universal design and ergonomics to improve posture and alignment and limit physical stress. In addition, features provide guidelines for fitness and nutrition that are designed to support skeletal system health and function.



## Urinary System

The urinary system consists of the kidneys, ureters, bladder and the urethra. The urinary system serves a number of critical functions, including the filtration of toxins, balance of blood pH and electrolytes, maintenance of blood pressure and the elimination of waste through urine. The kidneys are sensitive organs that can be damaged by exposure to toxins, chronic high blood pressure, and excessive quantities of alcohol or medications.

The features of the WELL Building Standard help to support urinary health by reducing stress and exposure to toxins and infection-causing pathogens. Comfort features that reduce stress prevent the likelihood of high blood pressure and hormone levels that negatively affect urinary function. Restriction of toxins and pathogens helps to limit the incidence of urinary infections and other potentially serious problems.



# PROJECT TYPES

The features of the WELL Building Standard® can be applied across many real estate sectors, but the version presented herein is applicable to commercial and institutional buildings. Furthermore, not all WELL features apply to all buildings, depending on the stage of construction. WELL v1 is therefore further organized into project types, which take into account the specific set of considerations that are unique to a particular building type or phase of construction. For WELL v1, there are three project types.

PROJECT TYPES	PRECONDITIONS	OPTIMIZATIONS	TOTAL
New and Existing Buildings	41	59	100
New and Existing Interiors	36	62	98
Core and Shell	26	28	54

## Core and Shell

WELL Certification is available for Core and Shell building projects seeking to implement fundamental features into the entire base building for the benefit of future tenants. The Core and Shell project type addresses the building structure, window locations and glazing, building proportions, heating, cooling and ventilation systems, and water quality. This project type also encourages consideration of the site in relation to amenities and opportunities for wellness.

Core and Shell is appropriate for projects in which at least 75% of the project area is occupied by one or more tenants and/or serves as common space in the building accessible to all tenants. Note that offices affiliated with the project owner but unrelated to the management of the project property may be considered a tenant so long as there is at least one additional tenant unaffiliated with the project owner. Independent of the portion of the building controlled by the owner, 100% of the building core and shell and all portions of the interior buildout or managed by the project owner are included in the project scope for design and operations. The Performance Verification Guidebook describes methods for on-site measurements and inspections.

## New and Existing Interiors

This project type is relevant for office projects only occupying a portion of the space in a building, or those that occupy an entire existing building not undergoing major renovation. In Core and Shell buildings that are WELL Certified™, some WELL features may already apply towards New and Existing Interiors certification, making certification easier. WELL Certification for tenants is also possible in buildings that have not first achieved Core and Shell certification.

## New and Existing Buildings

Entire buildings present opportunities for implementation of the greatest number of WELL features. This project type applies to new and existing buildings and addresses the full scope of project design and construction as well as aspects of building operations. It is relevant for office buildings where a minimum of 90% of the total floor area is occupied by the building owner and is operated by the same management (i.e., up to 10% of the building may be occupied by a different tenant or operated by different management). For example, a large office building may rent out the ground floor for retail or restaurant purposes; in these cases, the non-office area would not be subject to requirements of the WELL Building Standard or used in area calculations.

# PILOT PROGRAM

Given the unique opportunities and challenges presented by different building types, additional time and resources are needed to aggregate the necessary scientific and institutional support to refine the WELL Building Standard® to the specific needs of additional project types. As such, pilot programs are in development to test and refine how WELL can best apply to different space types. The WELL Building Standard is a continuously evolving program that is updated as improved evidence and technologies become available. The following pilot standards have been released:

## Current Pilots

### Multifamily Residential

Multifamily Residential applies specifically to projects with at least five dwelling units in a single building with common structural elements. Projects that qualify include apartments, condominiums, townhouses and other residential complexes within all market thresholds – affordable housing, market-rate and luxury. Single-family homes and duplexes are not part of the residential pilot.

### Educational Facilities

Places of learning, including elementary schools, middle schools, high schools and higher education facilities must provide for the needs of teachers and students of all ages. Educational Facilities applies to projects where dedicated staff are employed for instructional purposes, and students can be of any age. Courses may cover any range of topics, and facilities may be typified by fully scheduled days, or distinct classes that students enroll in at will.

### Retail

Retail centers, including boutique shops and big-box stores, are another opportunity to design and construct buildings to the WELL Building Standard. Retail spaces are unique in that they simultaneously house and cater to two distinct groups: the transient consumer and the staff, who spend many more hours in the facility. Retail applies to locations where consumers can view and purchase merchandise on-site, and staff are employed to assist in the sale of products. The Retail pilot standard is applicable to both owner- and tenant-occupied projects, and to both those in stand-alone buildings and those integrated into larger structures.

### Restaurant

Away-from-home meals constitute a significant source of nourishment for many, making restaurants a crucial place for health and wellness intervention. The design of eating spaces and the way foods are presented can subtly nudge occupants towards specific behaviors and help make healthy eating decisions. Restaurants applies to locations where a customer purchases food and dines on-site, and includes indoor or outdoor seating. The establishment may include wait staff that tend to customers, or be self-serve. The Restaurant pilot standard does not include take-out only establishments, or establishments whose primary source of revenue derives from the sale of alcoholic beverages. Further, the Restaurant pilot standard only applies to dining spaces—it does not cover kitchens in which food is prepared (see Commercial Kitchen).

### Commercial Kitchens

Commercial Kitchens applies to locations where cooks prepare food for other building users. The kitchen component of a space requires specific considerations relating to ventilation and contamination. It is not applicable to office kitchenettes or home kitchens. In general, spaces subject to local health inspection are likely to use this



pilot standard. Commercial Kitchen is always paired with another standard, such as Restaurant or Education. For example, the Commercial Kitchen pilot standard may be coupled with the Restaurant pilot standard to cover both the food preparation and customer dining spaces, respectively. This pilot standard may also be paired with WELL v1 for commercial and institutional offices if projects feature kitchens with associated food-service staff engaged in food preparation activities on-site.

## **Communities**

Communities include multiple buildings and diverse populations and must function to protect the health and wellbeing of both residents and visitors. WELL features address aspects relevant to the design and operations of the communities as well as WELL Certification of the buildings within them.

# WELL CERTIFICATION

Projects become certified if a sufficient number of features are satisfied. To maintain WELL Certification, projects must be recertified a minimum of every three years because building conditions can deteriorate over time to the point of adversely affecting the health and wellness of occupants.

The full process for WELL Certification is outlined in the Certification Guidebook.

## Project Registration

Projects seeking to achieve WELL Certification must be registered with IWBI through WELL Online, the official online registration and project management system for WELL. Project teams may register at any point as they progress through the design and development process. However, it is advantageous to register as close to the beginning of the process as possible so that strategies to meet the WELL Building Standard® can be integrated from the very beginning.

At registration, projects define the borders of project scope. The WELL boundary may not unreasonably exclude portions of the building, space, or site to give the project an advantage in complying with credit requirements. The WELL project must accurately communicate the scope of the certifying project in all promotional and descriptive materials and distinguish it from any non-certifying space. The WELL project should be defined by a clear boundary such that the WELL project is physically distinct from other interior spaces within the building. Regardless of boundary, WELL organizational protocol requirements (as defined within Appendix D) must be adopted by the entire entity seeking certification located in the project's building, such that an occupant's location within the building does not determine the availability of these protocol requirements.

The Following Features Contain WELL Organizational Protocol Requirements:

Feature 65 – Activity Incentive Programs

Feature 66 – Structured Fitness Opportunities

Feature 90 – Healthy Sleep Policy

Feature 91 – Business travel

Feature 92 – Building Health Policy

Feature 93 – Workplace Family Support

Feature 94 – Self-monitoring

Feature 95 – Stress and Addiction Treatment

Feature 96 – Altruism

Feature 98 – Organizational Transparency

## WELL Accredited Professionals

IWBI oversees the WELL Accredited Professional (WELL AP) program. WELL APs are trained on the conceptual and applied frameworks of WELL and experienced in its application on registered and certified WELL projects and can help guide projects to successful certification awards. Further information on the WELL AP program can be found in the WELL AP Candidate Handbook, on [wellcertified.com/resources/well-ap](http://wellcertified.com/resources/well-ap).

## Alternative Adherence Paths

WELL allows for innovative, alternate solutions for meeting requirements through the alternative adherence path process, as long as proposals still meet the intent of the requirement and are supported by cited scientific, medical and industry research. Project teams may propose an alternative for any requirement of WELL by submitting a completed alternative adherence path for review.

## Documentation Submission and Review

Verification that the requirements of the WELL Building Standard have been met necessitates detailed documentation. Project teams are expected to provide various documents attesting to the satisfaction of certain parts of features (See Appendix D for more information).

## Performance Verification

Since large parts of the WELL Building Standard are based on building conditions, IWBI uses Performance Verification as a process for on-site assessments. These inspections and measurements include tests related to air and water quality and sound and light levels. It is a process distinct from traditional building commissioning, and assures that the building is performing as intended in accordance to the WELL Building Standard.

Performance Verification is completed by an authorized WELL Performance Testing Agent who will usually spend one to three days in the building to validate the project's design documentation and to complete a series of performance tests, spot-checks and measurements spanning all WELL Concepts. Testing is completed according to IWBI's sampling protocols based on the size and type of the project, and samples are sent to third-party labs for analysis.

Any WELL feature is subject to verification on-site by a WELL Performance Testing Agent during Performance Verification—even those accounted for by documentation. The Performance Testing Agent may therefore provide additional documentation generated during spot-checks or spot-measurements for final consideration, in the form of an inspection document.

## Scoring

In evaluating adherence to the WELL Building Standard, a project's assessor will grade each Concept independently on a numerical scale. While this Concept-by-Concept analysis is used initially to ensure that all Preconditions per Concept are met, the final WELL Score is calculated based on the total Preconditions and Optimizations achieved across the board—not as a function of averaging independent Concept scores.

Failure to achieve any Precondition in any Concept will preclude the award of WELL Certification. If all Preconditions are satisfied, higher levels of certification award are possible. In evaluating award levels, all Optimization features are treated equally.

Concept scores and the overall WELL score are calculated as follows for the number of WELL features applicable to a specific project type:

Total Preconditions = TP

Preconditions Achieved = PA

Total Optimizations = TO

Optimizations Achieved = OA

Wellness Score = WS

**FAIL:** If  $\left(\frac{PA}{TP}\right) < 1$  then  $WS = \left(\frac{PA}{TP}\right) \times 5$  (rounded down to nearest whole number)

**PASS:** If  $\left(\frac{PA}{TP}\right) = 1$  then  $WS = 5 + \left(\frac{OA}{TO}\right) \times 5$  (rounded down to nearest whole number)

In making these calculations, Innovation and Not Applicable features are not included among the Total Optimizations (TO), though achieving them will increase Optimizations Achieved (OA).

The example below shows an office that successfully meets the requirements of the New and Existing Buildings project type. With all Preconditions met and 29 Optimizations met, it will receive the scores calculated as shown.

CONCEPT	PRECONDITIONS		OPTIMIZATIONS		CONCEPT SCORES
	APPLICABLE	ACHIEVED	APPLICABLE	ACHIEVED	
Air	12	12	17	3	5
Water	5	5	3	0	5
Nourishment	8	8	7	7	10
Light	4	4	7	2	6
Fitness	2	2	6	3	7
Comfort	5	5	7	2	6
Mind	5	5	12	12	10
Total and WELL Score	41	41	59	29	7

Lower scores (0 – 4) comprise the compulsory Precondition features; a score less than 5 would denote failure to meet the Preconditions in that Concept and thus failure for overall certification or compliance. Silver scores (5 – 6) mean that all compulsory Precondition features have been met in the Concept. Gold scores (7 – 8) and Platinum scores (9 – 10) comprise the non-compulsory Optimizations.

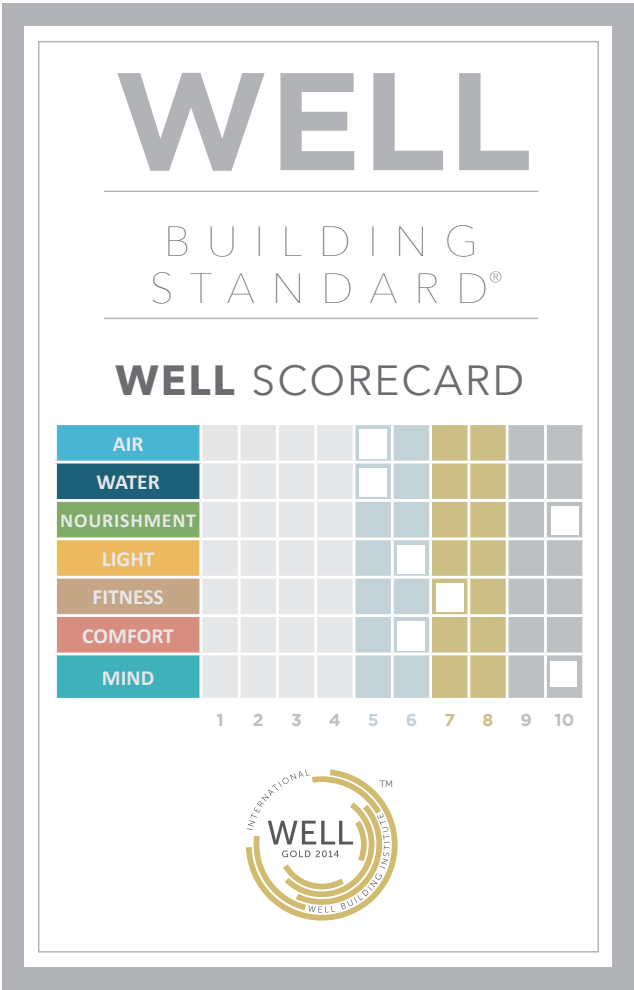
WELL Scorecard

The WELL Scorecard is the aggregate of all of the WELL Scores for each Concept. The scorecard shows Gold level certification for the previous building example.

Recertification Requirements

WELL Certification is valid for three years. In order to maintain a current certification, WELL Certified™ projects must undergo Performance Verification again and apply for recertification to verify that the building continues to perform in accordance with the requirements of the WELL Building Standard before the end of the three-year Certification period. During the Certification period, annual data must also be submitted for the features that require more frequent reporting.

Project scores may change at the time of recertification if additional improvements have been made or if WELL features have not been properly maintained. It is possible for the building's certification to be revoked if the quality of the interior environment declined considerably since initial certification. Projects may also submit evidence of achievement of additional features to improve their certification level at this time.



# WELL BUILDING STANDARD FEATURES MATRIX

This table shows which features are preconditions and optimizations for the different project types of the standard for commercial and institutional offices. Refer to the tables in the beginning of each concept for details about the applicability of specific parts.

		Core and Shell	New and Existing Interiors	New and Existing Buildings
<b>Air</b>				
01	Air quality standards	P	P	P
02	Smoking ban	P	P	P
03	Ventilation effectiveness	P	P	P
04	VOC reduction	P	P	P
05	Air filtration	P	P	P
06	Microbe and mold control	P	P	P
07	Construction pollution management	P	P	P
08	Healthy entrance	P	O	P
09	Cleaning protocol		P	P
10	Pesticide management	P		P
11	Fundamental material safety	P	P	P
12	Moisture management	P		P
13	Air flush		O	O
14	Air infiltration management	O	O	O
15	Increased ventilation	O	O	O
16	Humidity control		O	O
17	Direct source ventilation	O	O	O
18	Air quality monitoring and feedback		O	O
19	Operable windows	O	O	O
20	Outdoor air systems	O	O	O
21	Displacement ventilation		O	O
22	Pest control		O	O
23	Advanced air purification	O	O	O
24	Combustion minimization	O	O	O
25	Toxic material reduction		O	O
26	Enhanced material safety		O	O
27	Antimicrobial activity for surfaces		O	O
28	Cleanable environment		O	O
29	Cleaning equipment		O	O
<b>Water</b>				
30	Fundamental water quality	P	P	P
31	Inorganic contaminants	P	P	P
32	Organic contaminants	P	P	P
33	Agricultural contaminants	P	P	P
34	Public water additives	P	P	P
35	Periodic water quality testing		O	O
36	Water treatment	O	O	O
37	Drinking water promotion	O	O	O

		Core and Shell	New and Existing Interiors	New and Existing Buildings
Nourishment				
38	Fruits and vegetables		P	P
39	Processed foods	P	P	P
40	Food allergies	P	P	P
41	Hand washing		P	P
42	Food contamination		P	P
43	Artificial ingredients	O	P	P
44	Nutritional information	O	P	P
45	Food advertising	O	P	P
46	Safe food preparation materials		O	O
47	Serving sizes		O	O
48	Special diets		O	O
49	Responsible food production		O	O
50	Food storage		O	O
51	Food production	O	O	O
52	Mindful eating	O	O	O
Light				
53	Visual lighting design		P	P
54	Circadian lighting design		P	P
55	Electric light glare control	P	P	P
56	Solar glare control	O	P	P
57	Low-glare workstation design		O	O
58	Color quality		O	O
59	Surface design		O	O
60	Automated shading and dimming controls		O	O
61	Right to light	O	O	O
62	Daylight modeling	O	O	O
63	Daylighting fenestration	O	O	O
Fitness				
64	Interior fitness circulation	P	O	P
65	Activity incentive programs		P	P
66	Structured fitness opportunities		O	O
67	Exterior active design	O	O	O
68	Physical activity spaces	O	O	O
69	Active transportation support	O	O	O
70	Fitness equipment	O	O	O
71	Active furnishings		O	O
Comfort				
72	Accessible design	P	P	P
73	Ergonomics: visual and physical		P	P
74	Exterior noise intrusion	P	O	P
75	Internally generated noise	O	P	P
76	Thermal comfort	P	P	P
77	Olfactory comfort		O	O
78	Reverberation time		O	O
79	Sound masking		O	O
80	Sound reducing surfaces		O	O
81	Sound barriers		O	O
82	Individual thermal control		O	O
83	Radiant thermal comfort	O	O	O

		Core and Shell	New and Existing Interiors	New and Existing Buildings
Mind				
84	Health and wellness awareness	P	P	P
85	Integrative design	P	P	P
86	Post-occupancy surveys		P	P
87	Beauty and design I	P	P	P
88	Biophilia I - qualitative	O	P	P
89	Adaptable spaces		O	O
90	Healthy sleep policy		O	O
91	Business travel		O	O
92	Building health policy		O	O
93	Workplace family support		O	O
94	Self-monitoring		O	O
95	Stress and addiction treatment		O	O
96	Altruism		O	O
97	Material transparency	O	O	O
98	Organizational transparency		O	O
99	Beauty and design II	O	O	O
100	Biophilia II - quantitative	O	O	O
Innovation				
101	Innovation I	O	O	O
102	Innovation II	O	O	O
103	Innovation III	O	O	O
104	Innovation IV	O	O	O
105	Innovation V	O	O	O





# AIR

# BACKGROUND

Clean air is a critical component to our health. Air pollution is the number one environmental cause of premature mortality, contributing to 50,000 premature deaths annually in the United States and approximately 7 million, or one in eight premature deaths worldwide.

Globally, outdoor air quality is deteriorating due to pollution from traffic, construction, agricultural activity, combustion sources and particulate matter. Because ambient air diffuses easily, even distant sources of pollution have a huge impact on the more than 15,000 liters of air we breathe every day. Indoor air quality can be degraded by these outdoor sources, as well as by off-gassing from building materials, indoor combustion sources and water leaks. Poor ventilation practices can fail to address these sources, exposing us to volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs) and microbial pathogens. Another way in which indoor air quality may be diminished is via surfaces, which can accumulate airborne germs. All of these contaminants contribute to a range of negative health outcomes such as asthma, allergies and other upper respiratory illnesses. In addition, air quality issues can diminish work productivity and lead to sick building syndrome (SBS), where no disease or cause can be identified, yet acute health effects are linked to time spent in a building. SBS symptoms include various nonspecific symptoms such as eye, skin and airway irritation, as well as headache and fatigue.

The reactions people have to air pollutants vary widely and depend on multiple factors including the concentration of the contaminant, the rate of intake and the duration of exposure. Pollution source avoidance, proper ventilation and air filtration are some of the most effective means of achieving high indoor air quality. In the U.S., the Environmental Protection Agency (EPA) sets National Ambient Air Quality Standards (NAAQS) according to ongoing research and monitoring. These Standards have been credited with dramatic improvements in outdoor air quality, and create exposure limits based on both duration of exposure and concentration for the six major air pollutants: carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO<sub>2</sub>), ozone (O<sub>3</sub>), particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>) and sulfur dioxide (SO<sub>2</sub>). The WELL Building Standard® expands upon these requirements by incorporating standards from additional agencies, such as the World Health Organization (WHO). To help minimize transmission through contact with unsanitary surfaces, the WELL Building Standard provides an approach that combines the installation of appropriate materials with the implementation of effective protocols to regularly disinfect targeted areas.

In addition to limiting pollutant and contaminant concentrations, WELL incorporates best practices from industry organizations, whose guidelines are evidence-based and recommended by professionals. One such group is the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), which regularly updates its building handbook to include new techniques for enhancing air quality within buildings. Although ASHRAE is a technical society without a legal mandate, many state and local governments have modeled their codes based on ASHRAE's standards. In addition, the U.S. Green Building Council's LEED® program continues to set new standards for both air filtration and building material selection to improve air quality.

# INTENT

The WELL Building Standard for Air promotes clean air through reducing or minimizing the sources of indoor air pollution, requiring optimal indoor air quality to support the health well-being of building occupants.

## AIR FEATURE LEVEL MATRIX

	Core and Shell	New and Existing Interiors	New and Existing Buildings
<b>01 AIR QUALITY STANDARDS</b>			
1: Standards for Volatile Substances	P	P	P
2: Standards for Particulate Matter and Inorganic Gases	P	P	P
3: Radon	P	P	P
<b>02 SMOKING BAN</b>			
1: Indoor Smoking Ban	P	P	P
2: Outdoor Smoking Ban	P	-	P
<b>03 VENTILATION EFFECTIVENESS</b>			
1: Ventilation Design	P	P	P
2: Demand Controlled Ventilation	P	P	P
3: System Balancing	-	P	P
<b>04 VOC REDUCTION</b>			
1: Interior Paints and Coatings	P	P	P
2: Interior Adhesives and Sealants	P	P	P
3: Flooring	P	P	P
4: Insulation	P	P	P
5: Furniture and Furnishings	P	P	P
<b>05 AIR FILTRATION</b>			
1: Filter Accommodation	P	P	P
2: Particle Filtration	P	P	P
3: Air Filtration Maintenance	P	P	P
<b>06 MICROBE AND MOLD CONTROL</b>			
1: Cooling Coil Mold Reduction	P	P	P
2: Mold Inspections	P	P	P
<b>07 CONSTRUCTION POLLUTION MANAGEMENT</b>			
1: Duct Protection	P	P	P
2: Filter Replacement	P	P	P
3: Moisture Absorption Management	P	P	P
4: Dust Containment and Removal	P	P	P
<b>08 HEALTHY ENTRANCE</b>			
1: Entryway Walk-Off Systems	P	O	P
2: Entryway Air Seal	P	O	P
<b>09 CLEANING PROTOCOL</b>			
1: Cleaning Plan for Occupied Spaces	-	P	P

	Core and Shell	New and Existing Interiors	New and Existing Buildings
<b>10 PESTICIDE MANAGEMENT</b>			
1: Pesticide Use	P	-	P
<b>11 FUNDAMENTAL MATERIAL SAFETY</b>			
1: Asbestos and Lead Restriction	P	P	P
2: Lead Abatement	P	P	P
3: Asbestos Abatement	P	P	P
4: Polychlorinated Biphenyl Abatement	P	P	P
5: Mercury Limitation	P	P	P
<b>12 MOISTURE MANAGEMENT</b>			
1: Exterior Liquid Water Management	P	-	P
2: Interior Liquid Water Management	P	-	P
3: Condensation Management	P	-	P
4: Material Selection and Protection	P	-	P
<b>13 AIR FLUSH</b>			
1: Air Flush	-	O	O
<b>14 AIR INFILTRATION MANAGEMENT</b>			
1: Air Leakage Testing	O	O	O
<b>15 INCREASED VENTILATION</b>			
1: Increased Outdoor Air Supply	O	O	O
<b>16 HUMIDITY CONTROL</b>			
1: Relative Humidity	-	O	O
<b>17 DIRECT SOURCE VENTILATION</b>			
1: Pollution Isolation and Exhaust	O	O	O
<b>18 AIR QUALITY MONITORING AND FEEDBACK</b>			
1: Indoor Air Monitoring	-	O	O
2: Air Data Record Keeping and Response	-	O	O
3: Environmental Measures Display	-	O	O
<b>19 OPERABLE WINDOWS</b>			
1: Full Control	O	O	O
2: Outdoor Air Measurement	O	O	O
3: Window Operation Management	O	O	O
<b>20 OUTDOOR AIR SYSTEMS</b>			
1: Dedicated Outdoor Air Systems	O	O	O
<b>21 DISPLACEMENT VENTILATION</b>			
1: Displacement Ventilation Design and Application	-	O	O
2: System Performance	-	O	O
<b>22 PEST CONTROL</b>			
1: Pest Reduction	-	O	O
2: Pest Inspection	-	O	O
<b>23 ADVANCED AIR PURIFICATION</b>			
1: Carbon Filtration	O	O	O
2: Air Sanitization	O	O	O
3: Air Quality Maintenance	O	O	O

Core and Shell	New and Existing Interiors	New and Existing Buildings
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## 24 COMBUSTION MINIMIZATION

1: Appliance and Heater Combustion Ban	○	○	○
2: Low-Emission Combustion Sources	○	-	○
3: Engine Exhaust Reduction	○	-	○
4: Construction Equipment	○	-	○

## 25 TOXIC MATERIAL REDUCTION

1: Perfluorinated Compound Limitation	-	○	○
2: Flame Retardant Limitation	-	○	○
3: Phthalate (Plasticizers) Limitation	-	○	○
4: Isocyanate-Based Polyurethane Limitation	-	○	○
5: Urea-Formaldehyde Restriction	-	○	○

## 26 ENHANCED MATERIAL SAFETY

1: Precautionary Material Selection	-	○	○
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## 27 ANTIMICROBIAL ACTIVITY FOR SURFACES

1: High-Touch Surfaces	-	○	○
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## 28 CLEANABLE ENVIRONMENT

1: Material Properties	-	○	○
2: Cleanability	-	○	○

## 29 CLEANING EQUIPMENT

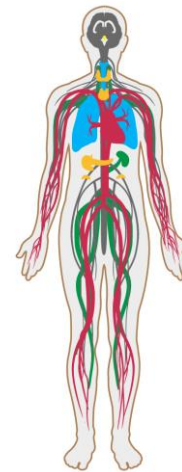
1: Equipment and Cleaning Agents	-	○	○
2: Chemical Storage	-	○	○

# 01

## AIR QUALITY STANDARDS

Pollutants generated indoors can lead to a variety of symptoms and health conditions. Volatile organic compounds (VOCs), combustion byproducts and airborne particulate matter are known to trigger nausea, headaches, asthma, respiratory irritation and allergies. While ambient outdoor air is often better quality, natural ventilation methods, operable doors and windows, and general building envelope infiltration can diminish indoor air quality if external air quality parameters are poor.

Intent: To ensure a basic level of high indoor air quality.



Cardiovascular  
Endocrine  
Immune  
Integumentary  
Nervous  
Respiratory

### PART 1: STANDARDS FOR VOLATILE SUBSTANCES

The following conditions are met:

- a.<sup>1</sup> Formaldehyde levels less than 27 ppb.
- b.<sup>1</sup> Total volatile organic compounds less than 500  $\mu\text{g}/\text{m}^3$ .

### PART 2: STANDARDS FOR PARTICULATE MATTER AND INORGANIC GASES

The following conditions are met:

- a.<sup>2</sup> Carbon monoxide less than 9 ppm.
- b.<sup>2</sup>  $\text{PM}_{2.5}$  less than 15  $\mu\text{g}/\text{m}^3$ .
- c.<sup>3</sup>  $\text{PM}_{10}$  less than 50  $\mu\text{g}/\text{m}^3$ .
- d.<sup>3</sup> Ozone less than 51 ppb.

### PART 3: RADON

The following conditions are met in projects with regularly occupied spaces at or below grade:

- a.<sup>4</sup> Radon less than 0.148 Bq/L [4 pCi/L] in the lowest occupied level of the project.

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

P

P

P

P

P

P

P

P

P

## SMOKING BAN

Over 42 million adults in the U.S. and over a billion individuals worldwide are cigarette smokers. In the U.S. alone, smoking tobacco is related to over 400,000 premature annual deaths. Furthermore, the average life expectancy of a smoker is 10 years less than that of a non-smoker. In addition to nicotine, cigarettes contain about 600 ingredients that form over 7,000 compounds when burned, of which at least 69 are known to be carcinogenic. Secondhand smoke exposes non-smokers to the same toxins, increasing the number of people subject to health risks from smoking.

Intent: To deter smoking, minimize occupant exposure to second hand smoke, and reduce smoke pollution.



Cardiovascular  
Digestive  
Endocrine  
Immune  
Integumentary  
Muscular  
Nervous  
Reproductive  
Respiratory  
Skeletal  
Urinary

### PART 1: INDOOR SMOKING BAN

Building policy or local code reflects the following:

- a.<sup>5</sup> Smoking and the use of e-cigarettes is prohibited inside the project.

### PART 2: OUTDOOR SMOKING BAN

Signage is present to indicate:

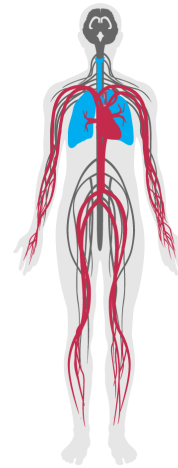
- a.<sup>1</sup> A smoking ban within 7.5 m [25 ft] (or the maximum extent allowable by local codes) of all entrances, operable windows and building air intakes.
- b. A smoking ban on all decks, patios, balconies, rooftops and other regularly occupied exterior building spaces.
- c. The hazards of smoking, in all areas beyond 7.5 m of the building entrances (if smoking is permitted in this areas). These signs are to be placed along all walkways with a distance of not more than 30 m [100 ft] between signs.

Core and Shell	New and Existing Interiors	New and Existing Buildings
P	P	P
P	-	P

## VENTILATION EFFECTIVENESS

Routine indoor activities including cooking, cleaning, building operations and maintenance and even the presence of occupants themselves can degrade air quality. Many indoor pollutants resulting from such activities, including particulate matter and VOCs can cause discomfort and trigger asthma and eye, nose and throat irritation. Because it is difficult to test for every potential pollutant, and because carbon dioxide is easy to detect, carbon dioxide levels serve as a proxy for other indoor pollutants.

Intent: To ensure adequate ventilation and high indoor air quality.



Cardiovascular  
Nervous  
Respiratory

### PART 1: VENTILATION DESIGN

One of the following requirements is met for all spaces:

- a.<sup>6</sup> Ventilation rates comply with all requirements set in ASHRAE 62.1-2013 (Ventilation Rate Procedure or IAQ Procedure).
- b.<sup>6</sup> Projects comply with all requirements set in any procedure in ASHRAE 62.1-2013 (including the Natural Ventilation Procedure) and demonstrate that ambient air quality within 1.6 km [1 mi] of the building is compliant with either the U.S. EPA's NAAQS or passes the Air Quality Standards feature in the WELL Building Standard for at least 95% of all hours in the previous year.

### PART 2: DEMAND CONTROLLED VENTILATION

For all spaces 46.5 m<sup>2</sup> [500 ft<sup>2</sup>] or larger with an actual or expected occupant density greater than 25 people per 93 m<sup>2</sup> [1,000 ft<sup>2</sup>], one of the following requirements is met:

- a.<sup>7</sup> A demand controlled ventilation system regulates the ventilation rate of outdoor air to keep carbon dioxide levels in the space below 800 ppm (measured at 1.2-1.8 m [4-6 ft] above the floor).
- b.<sup>7</sup> Projects that have met the Operable windows feature demonstrate that natural ventilation is sufficient to keep carbon dioxide levels below 800 ppm at maximum intended occupancies (measured at 1.2-1.8 m [4-6 ft] above the floor).

### PART 3: SYSTEM BALANCING

After the HVAC system is installed, the following requirement is met:

- a. After substantial completion and prior to occupancy, the HVAC system has (within the last 5 years), or is scheduled to, undergo testing and balancing.

Core and Shell	New and Existing Interiors	New and Existing Buildings
P	P	P

P	P	P
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-	P	P
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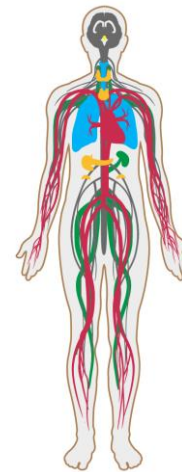


# 04

## VOC REDUCTION

Indoor air quality can be degraded significantly by volatile organic compounds (VOCs) that off-gas from paints, finishes and other coatings, and also result from the use of cleaning products, air fresheners, personal care products and other materials brought into the building. VOCs include benzene (classified by the EPA as a known human carcinogen), formaldehyde and other chemical compounds, which at high concentrations can lead to irritation of the nose and pharynx, and have been associated with leukemia, childhood asthma and other respiratory disorders. VOC levels can be 5 times higher indoors than outdoors.

Intent: To minimize the effect of VOCs in building materials on indoor air quality.



Cardiovascular  
Endocrine  
Immune  
Integumentary  
Nervous  
Respiratory

### PART 1: INTERIOR PAINTS AND COATINGS

Core and Shell	New and Existing Interiors	New and Existing Buildings
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P	P	P
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The VOC limits of newly applied interior paints and coatings meet one of the following requirements:

- <sup>1</sup> 100% of installed products meet California Air Resources Board (CARB) 2007, Suggested Control Measure (SCM) for Architectural Coatings, or South Coast Air Quality Management District (SCAQMD) Rule 1113, effective June 3, 2011 for VOC content.
- <sup>1</sup> At minimum 90%, by volume, meet the California Department of Public Health (CDPH) Standard Method v1.1-2010 (or later) for VOC emissions.
- <sup>1</sup> Applicable national VOC content regulations or conduct testing of VOC content in accordance with ASTM D2369-10; ISO 11890, part 1; ASTM D6886-03; or ISO 11890-2.

### PART 2: INTERIOR ADHESIVES AND SEALANTS

P	P	P
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The VOC limits of newly applied interior adhesives and sealants meet one of the following requirements:

- <sup>1</sup> 100% of installed products meet South Coast Air Quality Management District (SCAQMD) Rule 1168 for VOC content. Volatile organic compound (VOC) limits correspond to an effective date of July 1, 2005 and rule amendment date of January 7, 2005.
- <sup>1</sup> At minimum 90%, by volume, meet the California Department of Public Health (CDPH) Standard Method v1.1-2010 (or later) for VOC emissions.
- <sup>1</sup> Applicable national VOC content regulations or conduct testing of VOC content in accordance with ASTM D2369-10; ISO 11890, part 1; ASTM D6886-03; or ISO 11890-2.

### PART 3: FLOORING

P	P	P
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The VOC emissions of all newly installed interior flooring meet all limits set by the following, as applicable:

- <sup>1</sup> California Department of Public Health (CDPH) Standard Method v1.1-2010 (or later).

**PART 4: INSULATION**

P	P	P
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The VOC emissions of all newly installed interior thermal and acoustic insulation (excluding duct insulation) meet all limits set by the following, as applicable:

- a. <sup>1</sup> California Department of Public Health (CDPH) Standard Method v1.1-2010 (or later).

**PART 5: FURNITURE AND FURNISHINGS**

P	P	P
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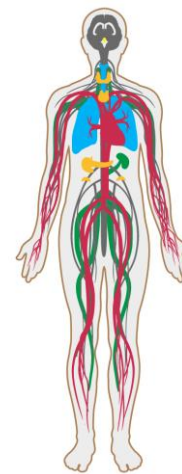
The VOC emissions of at least 95% (by cost) of all newly purchased interior furniture and furnishings within the project scope meet all limits set by the following, as applicable:

- a. <sup>1</sup> ANSI/BIFMA e3-2011 Furniture Sustainability Standard sections 7.6.1 or 7.6.2, tested in accordance with ANSI/BIFMA Standard Method M7.1-2011.
- b. California Department of Public Health (CDPH) Standard Method v1.1-2010 (or later).

## AIR FILTRATION

Air quality is subject to variability due to weather, dust, traffic and localized pollutant sources. Seasonal variations in pollen can trigger asthma and allergies in sensitive individuals. Similarly, exposure to high levels of coarse and fine particulate matter introduced from the outside can lead to respiratory irritation and has been associated with increases in lung cancer as well as cardiovascular disease and mortality. Carbon filters are designed to absorb such volatile pollutants and remove the largest particles, while media filters are meant to address smaller particles.

Intent: To remove indoor and outdoor airborne contaminants through air filtration.



Cardiovascular  
Endocrine  
Immune  
Integumentary  
Nervous  
Respiratory

### PART 1: FILTER ACCOMMODATION

If recirculated air is used, the following requirements are met in ventilation assemblies in the main air ducts for recirculated air:

- Rack space is available and rack location identified for future implementation of carbon filters or combination particle/carbon filters.
- The mechanical system is sized to accommodate the additional filters.

### PART 2: PARTICLE FILTRATION

One of the following requirements is met:

- MERV 13 (or higher) media filters are used in the ventilation system to filter outdoor air.
- Project demonstrates that for 95% of all hours in a calendar year, ambient outdoor PM<sub>10</sub> and PM<sub>2.5</sub> levels measured within 1.6 km [1 mi] of the building are below the limits set in the WELL Air Quality Standards feature.

### PART 3: AIR FILTRATION MAINTENANCE

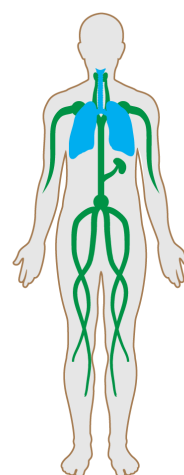
To verify that the filtration system continues to operate as designed, projects must annually provide IWBI with:

- Records of air filtration maintenance, including evidence that filters have been properly maintained as per the manufacturer's recommendations.

## MICROBE AND MOLD CONTROL

Mold often grows on cooling coils in HVAC systems due to moisture condensation and can be introduced into the building's indoor air. It can also occur on or within wall assemblies due to water damage or improper detailing in humid locations, for example kitchens and bathrooms. Mold spores can trigger asthma, headaches, allergies and other respiratory system disorders.

Intent: To reduce mold and bacteria growth within buildings, particularly from water damage or condensation on cooling coils.



Immune  
Integumentary  
Respiratory

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

### PART 1: COOLING COIL MOLD REDUCTION

P	P	P
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In buildings that rely on a mechanical system for cooling, one of the following requirements is met:

- a. Ultraviolet lamps (using a wavelength of 254 nm so as not to generate ozone) are employed on the cooling coils and drain pans of the mechanical system supplies. Irradiance reaching the cooling coil and drain pan, including the plenum corners, is modeled.
- b.<sup>9</sup> Building policy states that all cooling coils are inspected on a quarterly basis for mold growth and cleaned if necessary. Dated photos demonstrating adherence are provided to the IWBI on an annual basis.

### PART 2: MOLD INSPECTIONS

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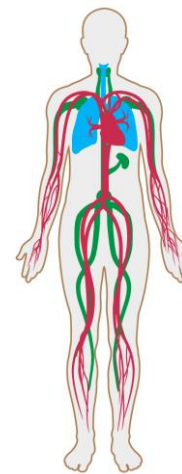
The following are not present:

- a.<sup>12</sup> Signs of discoloration and mold on ceilings, walls or floors.
- b.<sup>12</sup> Signs of water damage or pooling.

## CONSTRUCTION POLLUTION MANAGEMENT

Proper design and material selection is essential in creating healthy indoor air quality. However, this strategy can be compromised if equal care is not taken during construction to clear the space of dust, chemical vapors and other debris. Pollutants inadvertently introduced into the space can lead to various respiratory symptoms and will increase the likelihood of failing indoor air quality standards.

Intent: To minimize the introduction of construction-related pollutants into indoor air and protect building products from degradation.



Cardiovascular  
Immune  
Integumentary  
Respiratory

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

### PART 1: DUCT PROTECTION

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P

P

To prevent pollutants from entering the ventilation system, all newly installed ducts are either:

- a.<sup>1</sup> Sealed and protected from possible contamination during construction.
- b. Vacuumed out prior to installing registers, grills and diffusers.

### PART 2: FILTER REPLACEMENT

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To prevent pollutants from entering the air supply post-occupancy, if the ventilation system is operating during construction occurring within one year prior to Performance Verification, the following requirement is met:

- a.<sup>1</sup> All filters are replaced prior to occupancy.

### PART 3: MOISTURE ABSORPTION MANAGEMENT

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To prevent building materials from absorbing water or moisture during construction occurring within one year prior to Performance Verification, the following requirements are met:

- a.<sup>1</sup> A separate area is designated to store and protect absorptive materials, including but not limited to carpets, acoustical ceiling panels, fabric wall coverings, insulation, upholstery and furnishings.

### PART 4: DUST CONTAINMENT AND REMOVAL

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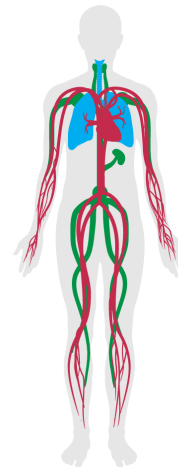
The following procedures are followed during building construction occurring within one year prior to Performance Verification:

- a.<sup>1</sup> All active areas of work are isolated from other spaces by sealed doorways or windows or through the use of temporary barriers.
- b.<sup>1</sup> Walk-off mats are used at entryways to reduce the transfer of dirt and pollutants.
- c.<sup>1</sup> Saws and other tools use dust guards or collectors to capture generated dust.

## HEALTHY ENTRANCE

Occupants often track harmful contaminants indoors, including bacteria, heavy metals, lawn and agricultural pesticides, among other toxins. In addition, as occupants walk through entry doors, potentially polluted air can enter the building. Both of these modes of introducing outdoor pollutants to the indoor environment highlight the need for measures that minimize or prevent the introduction of potentially harmful substances to indoor spaces.

Intent: To minimize the introduction of pollutants into indoor air at building entrances.



Cardiovascular  
Immune  
Respiratory

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

### PART 1: ENTRYWAY WALK-OFF SYSTEMS

P

O

P

To capture particulates from occupant shoes at all regularly used entrance(s) to the project, including doors with pedestrian traffic only to/from terraces or patios (no traffic to/from surrounding grounds), one of the following is installed and is maintained on a weekly basis:

- a.<sup>1</sup> Permanent entryway system comprised of grilles, grates or slots, which allow for easy cleaning underneath, at least the width of the entrance and 3 m [10 ft] long in the primary direction of travel (sum of indoor and outdoor length).
- b.<sup>1</sup> Rollout mats, at least the width of the entrance and 3 m [10 ft] long in the primary direction of travel (sum of indoor and outdoor length).
- c.<sup>1</sup> Any other material manufactured as an entryway walk-off system, at least the width of the entrance and 3 m [10 ft] long in the primary direction of travel (sum of indoor and outdoor length).

### PART 2: ENTRYWAY AIR SEAL

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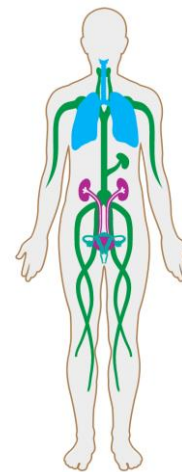
One of the following is in place to slow the movement of air from outdoors to indoors within mechanically ventilated main building entrances:

- a. Building entry vestibule with two normally-closed doorways.
- b. Revolving entrance doors.
- c. At least 3 normally-shut doors that separate occupied space from the outdoors. For example, a space on the fifth-floor could be separated by the exterior building doors, the first-floor elevator doors and the fifth-floor elevator doors. This option is applicable only for buildings whose entrance lobby is not a regularly occupied space or to projects where the building entrance is outside the project boundary.

## CLEANING PROTOCOL

Regular cleaning is an important practice as it helps to remove potentially harmful debris and maintain a healthy indoor environment. However, numerous chemicals and improper cleaning techniques can undermine indoor air quality. Harmful ingredients in cleaning products can lead to eye, nose, throat and skin irritation, and emit VOCs into the indoor environment, which may lead to other health effects including sick building syndrome (SBS). An adequate cleaning regimen using non-toxic, hypoallergenic cleaners helps to reduce bioloads, pests, environmental allergens and unpleasant odors without introducing chemicals that might adversely impact indoor air quality.

Intent: To reduce occupant exposure to pathogens, allergens, and harmful cleaning chemicals.



Immune  
Integumentary  
Reproductive  
Respiratory  
Urinary

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

### PART 1: CLEANING PLAN FOR OCCUPIED SPACES

A cleaning plan is created that includes:

- The Cleaning Equipment and Training section of Table A4 in Appendix C
- A list of approved product seals with which all cleaning, disinfection and hand hygiene products must comply in accordance with the Cleaning, Disinfection and Hand Hygiene Product section in Table A4 in Appendix C.
- A list of high-touch surfaces and schedule of sanitization or disinfection as specified in the Disinfection and Sanitization section in Table A4 in Appendix C.
- A cleaning schedule that specifies the extent and frequency of cleaning, including the Entryway Maintenance section of Table A4 in Appendix C.
- Dated cleaning logs that are maintained and available to all occupants.

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## PESTICIDE MANAGEMENT

Approximately one billion pounds of pesticides are used in a typical year in the U.S. alone. Pesticides and herbicides contaminate rivers and streams, and seep into groundwater through runoff. A U.S. Geological Survey conducted in the 1990s detected pesticide compounds in virtually every stream in agricultural, urban and mixed-use areas, as well as in over 50 percent of sampled wells assessing ground water in agricultural and urban areas. Atrazine, one of the most widely used pesticides, is a suspected endocrine disruptor and is associated with cardiovascular problems. Long-term exposure to glyphosate, a widely used herbicide, may lead to kidney problems and reproductive difficulties.

Intent: To reduce the presence of pests in buildings and minimizing occupant exposure to harmful chemicals.



Cardiovascular  
Digestive  
Endocrine  
Immune  
Nervous  
Reproductive  
Respiratory  
Urinary

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

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### PART 1: PESTICIDE USE

Pesticide and herbicide use on outdoor plants is eliminated, or hazards are minimized through one of the following:

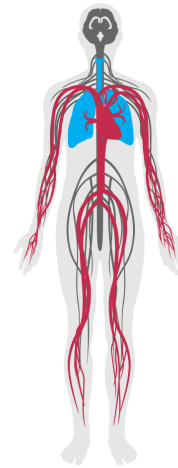
- a. <sup>14</sup> The creation of a pest management plan in place of pesticide/herbicide use, based on Chapter 3 of the San Francisco Environment Code Integrated Pest Management (IPM) program.
- b. <sup>14</sup> Use of pesticides with a Hazard Tier ranking of 3 (least hazardous) based on screening lists described in Table A2 in Appendix C.



## FUNDAMENTAL MATERIAL SAFETY

Some hazardous materials, such as asbestos, a known human carcinogen, and polychlorinated biphenyls (PCBs), a probable human carcinogen, are currently restricted or banned in many countries, but are often encountered in older buildings. Others, including lead, remain in limited use. Exposure to asbestos fibers through inhalation can occur when building materials degrade over time or are disturbed during renovation or demolition, and is associated with lung cancer and mesothelioma. Exposure to lead can have neurotoxic effects, even at low levels, and in early development is associated with negative effects on memory, IQ, learning and behavior.

Intent: To reduce or eliminate occupant exposure to lead, asbestos, and PCBs from building materials.



Cardiovascular  
Nervous  
Respiratory

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

### PART 1: ASBESTOS AND LEAD RESTRICTION

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All newly-installed building materials meet the following materials composition requirements:

- a. No asbestos.
- b.<sup>11</sup> Not more than a weighted average of 0.25% lead in wetted surfaces of pipes, pipe fittings, plumbing fittings, and fixtures, and 0.20% for solder or flux used in plumbing for water intended for human consumption.
- c.<sup>36</sup> Not more than 100 ppm (by weight) added lead in paint, ductwork, conduits, roofing/flashing, door hardware, vinyl blinds and wall coverings. For door hardware, project teams may document attempt to meet the requirement and demonstrate a petition or a formal request has been filed with manufacturers who were unable to meet their needs.

### PART 2: LEAD ABATEMENT

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For repair, renovation, demolition or painting of projects constructed prior to any applicable laws banning or restricting lead paint, lead evaluation and abatement is conducted in accordance with the following guidelines:

- a.<sup>31</sup> An on-site investigation of the space conducted by a certified risk assessor or inspector technician to determine the presence of any lead-based hazards in paint, dust and soil using the definitions in U.S. EPA 40 CFR Part 745.65 for residential dwellings or child-occupied facilities.
- b.<sup>31</sup> All commercial and institutional spaces found to have lead-based hazards must adhere to work practice standards for conducting lead-based paint activities, as outlined in U.S. 40 CFR Part 745.227 for multi-family dwellings and in U.S. 29 CFR Part 1926.62 for general construction work. An occupant protection plan must be implemented during the work activities.
- c.<sup>31</sup> Adherence to final rules, as they are proposed by the U.S. EPA, regarding the lead renovation, repair and painting program for public and commercial buildings (RIN: 2070-AJ56) supersedes adherence to definitions and protocols outlined in U.S. EPA 40 CFR Part 745 for residential dwellings or child-occupied facilities.

### PART 3: ASBESTOS ABATEMENT

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To reduce hazards in projects constructed prior to any applicable laws banning or restricting asbestos, the following testing, evaluation and abatement is conducted:

- a.<sup>33</sup> Inspection is conducted every three years through an accredited professional per Asbestos Hazard Emergency Response Act (AHERA)'s Asbestos Model Accreditation Plan (MAP), National Standards for Hazardous Air Pollutants (NESHAP) or accredited asbestos consultant (state or local equivalent).
- b.<sup>33</sup> In accordance with the Asbestos Hazard Emergency Response Act (AHERA), development, maintenance and update of asbestos management plans, including all necessary actions to minimize asbestos hazards: repair, encapsulation, enclosure, maintenance and removal, follow protocol detailed in the Asbestos-Containing Materials in Schools Rule (40 CFR part 763).
- c.<sup>33</sup> Projects conduct post-abatement clearance in accordance with Asbestos Hazard Emergency Response Act (AHERA) Asbestos-Containing Materials in Schools (40 CFR part 763).

### PART 4: POLYCHLORINATED BIPHENYL ABATEMENT

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For any projects undergoing current renovation or demolition that were constructed or renovated between 1950 and the institution of any applicable laws banning or restricting PCBs the below guidelines are applied:

- a.<sup>34</sup> Conduct evaluation and abatement of materials in accordance with the U.S. EPA Steps to Safe PCB Abatement Activities.
- b.<sup>34</sup> Conduct removal and safe disposal of PCB-containing fluorescent light ballasts in accordance with the U.S. EPA guidelines.

### PART 5: MERCURY LIMITATION

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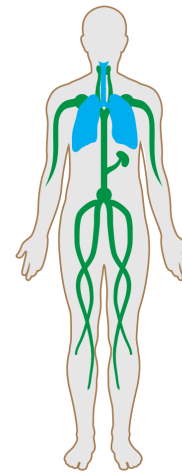
Mercury-containing equipment and devices are restricted in accordance with the below guidelines:

- a.<sup>1</sup> Project does not specify or install new mercury containing thermometers, switches and electrical relays.
- b.<sup>1</sup> Project does not install any lamps not compliant with the low-mercury limits specified in Appendix C, Table A5. Project develops a plan to upgrade any existing non-compliant lamps to low-mercury or mercury-free lamps.
- c.<sup>1</sup> Illuminated exit signs only use Light-Emitting Diode (LED) or Light-Emitting Capacitor (LEC) lamps.
- d.<sup>1</sup> No mercury vapor or probe-start metal halide high intensity discharge lamps are in use.

## MOISTURE MANAGEMENT

Good design principles and strategies to mitigate water damage help to preserve good indoor air quality. Moisture can enter buildings and building assemblies in four ways: bulk water, capillary water, air-transported moisture and vapor diffusion. In addition to preventing wetting from all four channels, managing moisture is also about promoting drying potential.

Intent: To limit the potential for bacteria and mold growth within buildings from water infiltration and condensation.



Immune  
Integumentary  
Respiratory

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

P

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### PART 1: EXTERIOR LIQUID WATER MANAGEMENT

A point-by-point narrative describes how liquid water from outside the building is addressed, responding to the nature and intensity of wetting based on the project's site and climate, and includes the following leading concerns:

- a.<sup>176</sup> Site drainage, including the impact of any site irrigation.
- b.<sup>176</sup> The local water table.
- c.<sup>176</sup> Building penetrations (especially windows and plumbing/electrical/mechanical penetrations).
- d.<sup>176</sup> Porous building materials connected to exterior sources of liquid water.

### PART 2: INTERIOR LIQUID WATER MANAGEMENT

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A point-by-point narrative describes how liquid water from interior sources is addressed, including these leading concerns:

- a.<sup>176</sup> Plumbing leaks.
- b.<sup>176</sup> "Hard-piped" plumbing appliances (appliances such as clothes washers exposed to building water pressure even when not in use).
- c.<sup>176</sup> Porous building materials connected to interior sources of liquid water.
- d.<sup>176</sup> New building materials with "built-in" high moisture content or building materials wetted during construction but now on the inside of the building.

### PART 3: CONDENSATION MANAGEMENT

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A point-by-point narrative describes how condensation is addressed, including these leading concerns:

- a. <sup>176</sup> High interior relative humidity levels, particularly in susceptible areas like bath and laundry rooms and below-grade spaces.
- b. <sup>176</sup> Air leakage which could wet either exposed interior materials or interstitially “hidden” materials.
- c. <sup>176</sup> Cooler surfaces, such as basement or slab-on-grade floors, or closets/cabinets on exterior walls.
- d. <sup>176</sup> Oversized air conditioning units.

### PART 4: MATERIAL SELECTION AND PROTECTION

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A point-by-point narrative describes how moisture-tolerant materials have been selected and/or moisture-sensitive materials (MSP) are being protected, considering these leading concerns:

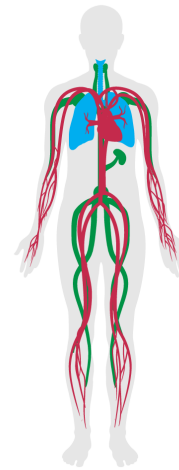
- a. <sup>176</sup> Exposed entryways and glazing.
- b. <sup>176</sup> Porous cladding materials.
- c. <sup>176</sup> Finished floors in potentially damp or wet rooms such as basements, bathrooms and kitchens.
- d. <sup>176</sup> Interior sheathing in damp or wet rooms.
- e. <sup>1</sup> Sealing and storing of absorptive materials during construction.

# 13

## AIR FLUSH

An air flush or building flush is a technique whereby air is forced through a building after construction and prior to occupancy in order to remove or reduce pollutants, such as VOCs and particulate matter, inadvertently introduced indoors during construction. Air flushing improves indoor air quality by limiting the exposure to an intense contamination period.

Intent: To remediate construction-related indoor air contamination.



Cardiovascular  
Immune  
Respiratory

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

### PART 1: AIR FLUSH

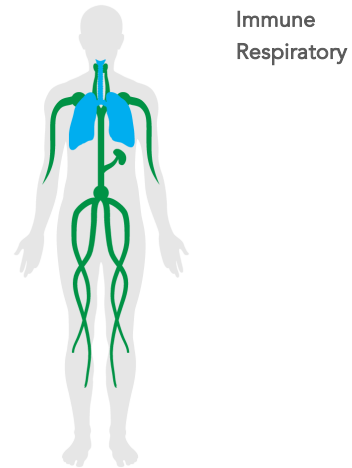
A building air flush is performed while maintaining an indoor temperature of at least 15 °C [59 °F] and relative humidity below 60%, at one of the following volumes:

- a.<sup>1</sup> A total air volume of 4,266 m<sup>3</sup> of outdoor air per m<sup>2</sup> of floor area [14,000 ft<sup>3</sup> per ft<sup>2</sup> of floor area] prior to occupancy.
- b.<sup>1</sup> A total air volume of 1,066 m<sup>3</sup> of outdoor air per m<sup>2</sup> of floor area [3,500 ft<sup>3</sup> per ft<sup>2</sup> of floor area] prior to occupancy, followed by a second flush of 3,200 m<sup>3</sup> of outdoor air per m<sup>2</sup> of floor area [10,500 ft<sup>3</sup> per ft<sup>2</sup> of floor area] post-occupancy. While the post-occupancy flush is taking place, the ventilation system must provide at least 0.1 m<sup>3</sup> per minute of outdoor air per m<sup>2</sup> of floor area [0.3 CFM outdoor air per ft<sup>2</sup> of floor area] at all times.

## AIR INFILTRATION MANAGEMENT

Indoor air quality and thermal comfort can be compromised by leaks and gaps that break the building's air barrier. These weak points are not only wasteful but can also lead to conditions conducive to growth of molds and the infiltration of pests or polluted air.

Intent: To minimize air quality and thermal comfort issues resulting from the infiltration of untreated air through the building envelope.



Immune  
Respiratory

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

### PART 1: AIR LEAKAGE TESTING

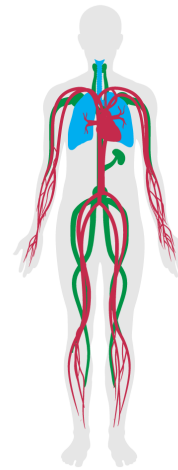
The following is performed after substantial completion and prior to occupancy to ensure the structure is airtight:

- a. <sup>1</sup> Envelope commissioning in accordance with ASHRAE Guideline 0-2005 and the National Institute of Building Sciences (NIBS) Guideline 3-2012 (for new construction or structural renovation).
- b. Detailed plan for action and remediation of unacceptable conditions.

## INCREASED VENTILATION

The guidelines put forth by ASHRAE provide the basis for acceptable indoor air quality, but not necessarily for best-in-class air quality for buildings. Unusually high building occupancy, a high risk of accidents that might degrade air quality or space capacity to install filtration make exceeding ASHRAE requirements a worthwhile strategy.

Intent: To expel internally-generated pollutants through an increased supply of outdoor air.



Cardiovascular  
Immune  
Respiratory

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings



### PART 1: INCREASED OUTDOOR AIR SUPPLY

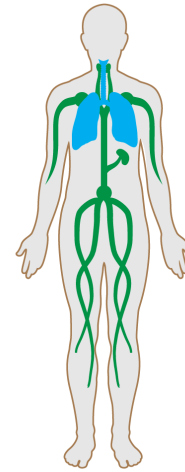
One of the following is required in all regularly occupied spaces:

- a. <sup>1</sup> Exceed outdoor air supply rates met in Feature 03, Part 1a by 30%.
- b. Follow CIBSE AM10, Section 4, Design Calculations, to predict that room-by-room airflows will provide effective natural ventilation.

## HUMIDITY CONTROL

Extremely low humidity can lead to dryness and irritation of the skin, eyes, throat and mucous membranes. Conversely, high humidity may promote the accumulation and growth of microbial pathogens, including bacteria, dust mites and mold, which can lead to odors and cause respiratory irritation and allergies in sensitive individuals. Additionally, higher humidity levels can lead to increased off-gassing: an increase in relative humidity of 35% can increase the emissions of formaldehyde by a factor of 1.8–2.6.

Intent: To limit the growth of pathogens, reduce off-gassing, and maintain thermal comfort by providing the appropriate level of humidity.



Immune  
Integumentary  
Respiratory

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
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Buildings

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### PART 1: RELATIVE HUMIDITY

At least one of the following is required:

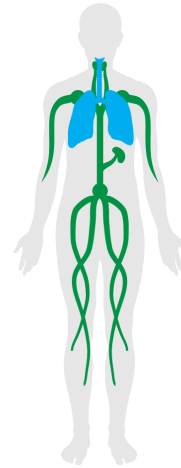
- a.<sup>8</sup> A ventilation system with the capability to maintain relative humidity between 30% to 50% at all times by adding or removing moisture from the air.
- b. Modeled humidity levels in the space are within 30% to 50% for at least 95% of all business hours of the year. Buildings in climates with narrow humidity ranges are encouraged to pursue this option.



## DIRECT SOURCE VENTILATION

Air pollution can be created from a number of indoor sources, including cleaning products, office equipment and humid environments. Chemical storage closets can be a source of harmful vapors, including VOCs that are linked to cancer, organ and central nervous system damage. Copy rooms can contribute to the production of ozone, which is linked to asthma and other respiratory diseases. Bathrooms can be a source of mold and mildew that release spores and toxins, which can trigger asthma and allergies in susceptible individuals.

Intent: To preserve air quality in occupied spaces through the isolation and proper ventilation of indoor pollution sources and chemical storage areas.



Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

### PART 1: POLLUTION ISOLATION AND EXHAUST

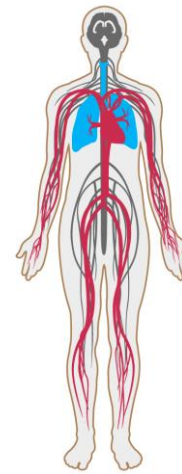
All cleaning and chemical storage units, all bathrooms, and all rooms that contain printers and copiers (except those meeting the low-emission criteria of Ecologo CCD 035, Blue Angel RAL-UZ 171, Blue Angel RAL-UZ 205 or Green Star) meet the following conditions:

- a. Are closed from adjacent spaces, such as by using self-closing doors.
- b.<sup>1</sup> Air is exhausted so that all air is expelled rather than recirculated.

## AIR QUALITY MONITORING AND FEEDBACK

Building performance, such as ventilation and infiltration rates, is highly variable and has a direct effect on indoor air quality. To maintain ideal performance metrics, projects must continuously gather data on building performance. Collecting this data allows individuals to be aware of and promptly fix any deviations in indoor quality metrics.

Intent: To monitor and effectively remediate indoor air quality issues and inform building managers and occupants of the quality of the indoor environment.



Cardiovascular  
Integumentary  
Nervous  
Respiratory

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

### PART 1: INDOOR AIR MONITORING

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Monitors measure 2 of the following pollutants in a regularly occupied or common space (minimum one per floor) within the building, at intervals no longer than once an hour (measured at 1.2-1.8 m [4-6 ft] above the floor), and results are annually transmitted to the IWBI:

- Particle count (resolution 35,000 counts per m<sup>3</sup> [1,000 counts per ft<sup>3</sup>] or finer) or particle mass (resolution 10 µg/m<sup>3</sup> or finer).
- <sup>1</sup> Carbon dioxide (resolution 25 ppm or finer).
- Ozone (resolution 10 ppb or finer).

### PART 2: AIR DATA RECORD KEEPING AND RESPONSE

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In an effort to consistently meet the WELL parameters, projects provide a written policy specifying:

- Detailed enforcement strategies for monitoring and record-keeping of parameters listed in Part 1: Indoor Air Monitoring.
- Records are to be kept for a minimum of 3 years, including full data from field inspectors or laboratory results where appropriate.
- Detailed plan for action and remediation of unacceptable conditions.

### PART 3: ENVIRONMENTAL MEASURES DISPLAY

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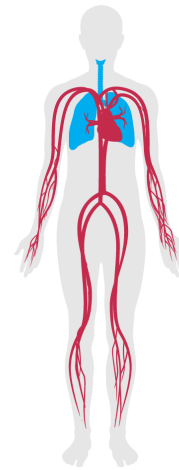
Real-time displays of the following indoor environmental parameters are made available per 930 m<sup>2</sup> [10,000 ft<sup>2</sup>] of regularly occupied space:

- Temperature.
- Humidity.
- Carbon dioxide concentration.

## OPERABLE WINDOWS

Achieving natural ventilation through open windows, doors and louvers can provide a positive occupant experience, but challenges the ability to maintain strict control over interior air quality. When weather and local ambient parameters indicate high quality outdoor air, WELL encourages the use of natural ventilation strategies. Open windows can then provide a supply of outdoor air and lower the levels of carbon dioxide and VOCs, such as formaldehyde, without compromising indoor air quality.

Intent: To increase the supply of high quality outdoor air and promote a connection to the outdoor environment by encouraging occupants to open windows when outdoor air quality is acceptable.



Cardiovascular  
Respiratory

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings



### PART 1: FULL CONTROL

The following requirement is met:

- a. <sup>13</sup> Every regularly occupied space has operable windows that provide access to outdoor air and daylight.

### PART 2: OUTDOOR AIR MEASUREMENT



Outdoor levels of ozone, PM<sub>10</sub>, temperature and humidity are monitored based on the following requirement, and data collected is made available to the building occupants:

- a. A data-gathering station located within 1.6 km [1 mi] of the building.

### PART 3: WINDOW OPERATION MANAGEMENT



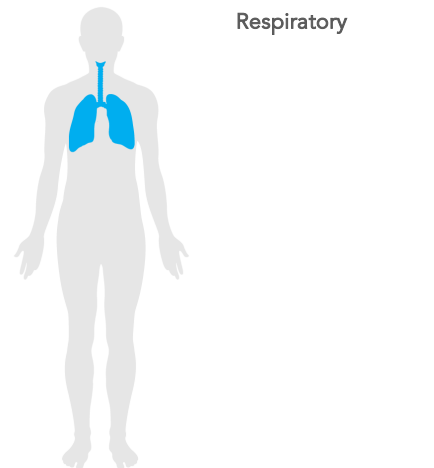
If the outdoor air measurement system indicates that outdoor air either (i) exceeds ozone levels of 51 ppb or PM<sub>10</sub> levels of 50 µg/m<sup>3</sup>; (ii) has a temperature of 8 °C [15 °F] above or below set indoor temperature; or (iii) has a relative humidity above 60% and the temperature is above the indoor set temperature, then one of the following is used to discourage occupants from opening windows:

- a. Software on occupants' computers or smartphones.
- b. Indicator lights at all operable windows.

## OUTDOOR AIR SYSTEMS

Dedicated outdoor air systems (DOAS) remove the constraints associated with linking heating and cooling with ventilation, so that optimal air quality and thermal comfort can be independently achieved. A properly designed DOAS can save energy compared to conventional systems while always supplying the appropriate amount of ventilation.

Intent: To allow buildings to control the outdoor air supply independently from the heating/cooling needs of the building.



Core  
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Interiors

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Buildings

### PART 1: DEDICATED OUTDOOR AIR SYSTEMS

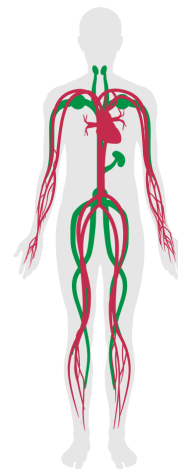
Dedicated outdoor air systems are used for ventilation and verified as being adequate through one of the following:

- a. The system complies with local codes or standards regarding dedicated outdoor air systems.
- b. A detailed design review of the proposed system is conducted by an independent, qualified and registered professional mechanical engineer (not employed or compensated by the mechanical engineer on record). The review addresses thermal comfort (temperature, humidity, air velocity, etc.) and ventilation rates, as well as overall serviceability and system reliability. Report must demonstrate satisfactory compliance with ventilation standards used in Feature 03 Ventilation effectiveness.

## DISPLACEMENT VENTILATION

By strategically designing the height of air ventilation, displacement ventilation can enhance air change effectiveness. Displacement ventilation supplies air at very low velocity levels at or near the floor level, which then rises to the ceiling level. Since heat in a room is naturally stratified, displacement ventilation not only ensures that air is not delivered and pushed through the return air path (often the dirtiest portion of the air stream), but also tends to concentrate pollutants near the ceiling. Once there, the pollutants are out of the breathing zone and can be more easily removed.

Intent: To improve air quality in the breathing zone of the room and maintain thermal comfort by supplying low velocity outdoor air near the floor and expelling near the ceiling.



Cardiovascular  
Immune

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

### PART 1: DISPLACEMENT VENTILATION DESIGN AND APPLICATION

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Projects implement a displacement ventilation system for heating and/or cooling in which one of the following is met:

- a.<sup>41</sup> Low side wall air distribution with the air supply temperature slightly cooler or warmer than the desired space temperature. The system must use the System Performance Evaluation and ASHRAE Guidelines RP-949 as the basis for design.
- b.<sup>37</sup> Underfloor Air Distribution (UFAD) with the air supply temperature slightly cooler or warmer than the desired space temperature. This system must use ASHRAE's UFAD Guide (Design, Construction and Operations of Underfloor Air Distribution Systems) as the basis of design. Displacement ventilation applied as part of an underfloor air distribution system must be installed at a raised floor height whereby the underfloor area can be cleaned on an annual basis.

### PART 2: SYSTEM PERFORMANCE

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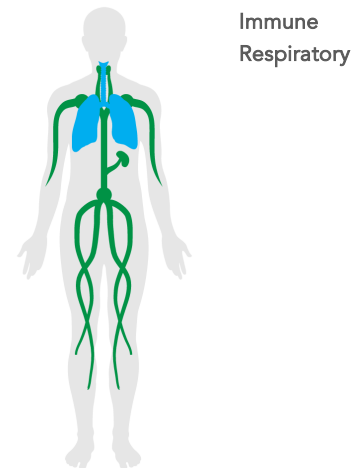
The following requirements are met:

- a. A Computational Fluid Dynamics (CFD) analysis is conducted for the displacement ventilation system.
- b.<sup>92</sup> The displacement ventilation system meets ASHRAE 55-2013 (Thermal Environmental Conditions for Human Occupancy) for comfort for at least 75% of all regularly occupied space.

## PEST CONTROL

Unhygienic conditions lead to the presence of pests and dust mites, which are common sources of indoor allergens. Their bodies, feces and saliva contain allergens which can trigger asthma and allergic reactions in susceptible individuals. Asthma can also be compounded by sensitivity to other allergens; up to 60% of individuals with asthma who live in urban environments also have a sensitivity to cockroach allergens.

Intent: To reduce the presence of pests in buildings and minimize occupant exposure to pest-related allergens.



Core  
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New and  
Existing  
Interiors

New and  
Existing  
Buildings

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### PART 1: PEST REDUCTION

The following are met:

- All non-refrigerated perishable food, including pet food, is stored in sealed containers.
- All indoor garbage cans (except paper recycling bins) less than 113 liters [30 gallons] have lids and hands-free operation, or are enclosed by cabinetry in an under-counter pull-out drawer, with a handle separate from the trash can.
- All indoor garbage cans (except paper recycling bins) greater than 113 liters [30 gallons] have a lid.

### PART 2: PEST INSPECTION

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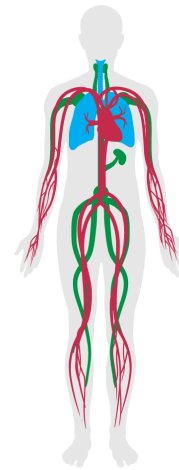
Visual inspections during Performance Verification show that the following are not present:

- Signs of infestation by cockroaches, termites or other pests.

## ADVANCED AIR PURIFICATION

Some circumstances justify greater investment in air purification strategies. For example, proximity to highly traveled roads, manufacturing plants and seasonal variation can affect outdoor air quality, increasing ozone and VOC content, and in turn diminishing indoor air quality. Similarly, climates with high humidity levels and inadequate indoor ventilation can foster the development of mold and spores in indoor environments.

Intent: To improve recirculated indoor air quality through the implementation of advanced air purification strategies.



Cardiovascular  
Immune  
Respiratory

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

### PART 1: CARBON FILTRATION

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To reduce VOCs in the indoor air, buildings which recirculate air use one of the following methods:

- Activated carbon filters or combination particulate/carbon filters in the main air ducts to filter recirculated air. Replacement is required as recommended by the manufacturer.
- A standalone air purifier with a carbon filter used in all regularly occupied spaces. Purifiers must be sized appropriately to the spaces they are serving. Filter replacement is required as recommended by the manufacturer.

### PART 2: AIR SANITIZATION

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Spaces with more than 10 regular occupants, within buildings that recirculate air, use one of the following treatments or technologies to treat the recirculated air, either integrated within the central ventilation system or as a standalone device:

- <sup>15</sup> Ultraviolet germicidal irradiation.
- <sup>15</sup> Photocatalytic oxidation.

### PART 3: AIR QUALITY MAINTENANCE

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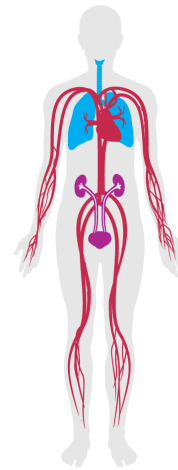
As evidence that the selected filtration/sanitization system chosen continues to be fully operational, projects must annually provide IWBI with:

- Records of air filtration/sanitization maintenance, including evidence that the filter and/or sanitizer has been properly maintained as per the manufacturer's recommendations.

## COMBUSTION MINIMIZATION

Although wood and gas fireplaces have aesthetic benefits, they can also be detrimental to indoor air quality. If not effectively sealed off from the living space, they can contribute harmful combustion byproducts such as carbon monoxide and particulate matter. Carbon monoxide has 210 times the binding affinity for hemoglobin compared to oxygen, and thus prevents oxygen from being delivered to the body, leading to hypoxia—lack of oxygen delivery to body tissues that can cause nausea, loss of consciousness and death. Carbon monoxide leads to about 170 non-automotive fatal poisonings in the U.S. every year.

Intent: To reduce occupant exposure to combustion-related air pollution from heating and transportation sources.



Cardiovascular  
Respiratory  
Urinary

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

### PART 1: APPLIANCE AND HEATER COMBUSTION BAN

The following are forbidden in regularly occupied spaces:

- a.<sup>29</sup> Combustion-based fireplaces, stoves, space-heaters, ranges and ovens.

### PART 2: LOW-EMISSION COMBUSTION SOURCES

All combustion equipment used in the project for heating, cooling, water-heating, process heating or power generation (including back-up if used more than 200 hours per year) meets California's South Coast Air Quality Management District rules for pollution:

- a.<sup>39</sup> Internal combustion engines.
- b.<sup>39</sup> Furnaces.
- c.<sup>39</sup> Boilers, steam generators and process heaters.
- d.<sup>39</sup> Water heaters.

### PART 3: ENGINE EXHAUST REDUCTION

Signage, visible from pick-up, drop-off and parking areas indicates:

- a. Idling with vehicle engines on for more than 30 seconds is prohibited.



## PART 4: CONSTRUCTION EQUIPMENT



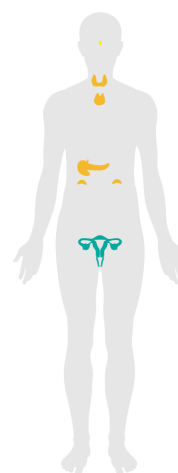
To reduce particulate matter emissions from both on-road and non-road diesel fueled vehicles and construction equipment, the following requirements are met for construction occurring within one year prior to Performance Verification:

- a. <sup>85</sup> All non-road diesel engine vehicles comply with the U.S. EPA Tier 4 PM emissions standards or local equivalent when applicable. Engines may be retrofitted with verified technology (required to be U.S. EPA or California Air Resources Board approved) at the time the equipment is first placed on the job site.
- b. <sup>85</sup> All on-road diesel engine vehicles meet the requirements set forth in the U.S. EPA model year 2007 on-road standards for PM, or local equivalent when applicable. Engines may be retrofitted with verified technology (required to be U.S. EPA or California Air Resources Board approved) at the time the equipment is first placed on the job site.
- c. <sup>85</sup> All equipment, vehicles and loading/unloading are located away from air intakes and operable openings of adjacent buildings when available.

## TOXIC MATERIAL REDUCTION

Various chemicals are still used in the manufacture of building materials, despite known or suspected health hazards. Flame retardant chemicals, which are used to increase fire-resistance of materials, include PBDEs (polybrominated diphenyl ethers)—which, based on animal tests, are associated with potential neurobehavioral, carcinogenic and immune effects. Some of these chemicals can bioaccumulate in fat and result in food chain contamination, including human milk. All parts of this feature only apply to materials installed inside the weather proofing membrane of a project.

Intent: To minimize the impact of hazardous building material chemicals on indoor air quality and protect the health of manufacturing and maintenance workers.



Endocrine  
Reproductive

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

### PART 1: PERFLUORINATED COMPOUND LIMITATION

-	○	○
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No perfluorinated compounds (PFCs) are present in the following condition:

- <sup>36</sup> At levels equal to or greater than 100 ppm in components that constitute at least 5% by weight of a furniture or furnishing (drapes/curtains) assembly.

### PART 2: FLAME RETARDANT LIMITATION

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Halogenated flame retardants are limited in the following components to 0.01% (100 ppm) to the extent allowable by local code:

- <sup>36</sup> Window and waterproofing membranes, door and window frames and siding.
- <sup>36</sup> Flooring, ceiling tiles and wall coverings.
- <sup>36</sup> Piping and electrical cables, conduits and junction boxes.
- <sup>36</sup> Duct, pipe, acoustic and thermal insulation.
- <sup>36</sup> Upholstered furniture and furnishings, textiles and fabrics.

### PART 3: PHTHALATE (PLASTICIZERS) LIMITATION

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DEHP, DBP, BBP, DINP, DIDP or DNOP (often found in polyvinyl chloride [PVC]) are limited in the following components to 0.01% (100 ppm):

- <sup>36</sup> Flooring, including resilient and hard surface flooring and carpet.
- <sup>36</sup> Wall coverings, window blinds and shades, shower curtains, furniture and upholstery.
- <sup>36</sup> Plumbing pipes and moisture barriers.

**PART 4: ISOCYANATE-BASED POLYURETHANE LIMITATION**

-	○	○
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Isocyanate-based polyurethane products are not used in:

- a. <sup>16</sup> Interior finishes.

**PART 5: UREA-FORMALDEHYDE RESTRICTION**

-	○	○
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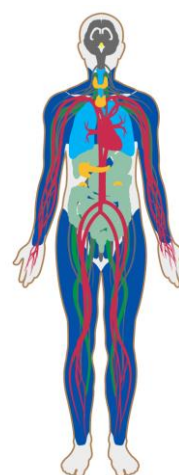
Urea-formaldehyde presence is limited in the following components to 100 ppm:

- a. <sup>59</sup> Furniture or any composite wood products.
- b. <sup>59</sup> Laminating adhesives and resins.
- c. <sup>59</sup> Thermal insulation.

## ENHANCED MATERIAL SAFETY

Some of the chemicals used in building materials have not been fully evaluated for safety and may carry potential health risks. Off-gassing from such materials can contribute to SBS (sick building syndrome) and associated respiratory, neurotoxic and dermatologic symptoms. A precautionary approach—taking reasonable steps to minimize risks and avoid hazards—suggests substituting potentially dangerous materials with safe ones when possible. Various voluntary programs in the market allow suppliers that have carefully screened the composition of their products and avoided potentially harmful substances to be recognized for their achievements.

Intent: To minimize the impact of hazardous building material ingredients on indoor air quality and protect the health of manufacturing and maintenance workers.



Cardiovascular  
Digestive  
Endocrine  
Immune  
Integumentary  
Muscular  
Nervous  
Respiratory

Core  
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New and  
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Interiors

New and  
Existing  
Buildings

### PART 1: PRECAUTIONARY MATERIAL SELECTION

-	○	○
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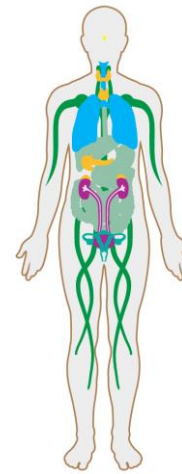
At least 25% of all furnishings, built-in furniture, interior finishes, and finish materials (calculated by cost) meet one or more of the following requirements:

- a. <sup>13</sup> Have a Declare: Living Building Challenge Red List Free, Declare: Living Building Challenge Compliant, or Living Product Challenge label.
- b. <sup>1</sup> Are Cradle to Cradle Certified™ products with a Bronze, Silver, Gold or Platinum level in the Material Health category or products with a Bronze, Silver, Gold or Platinum level Material Health Certificate from the Cradle to Cradle Products Innovation Institute.
- c. <sup>1</sup> Have no GreenScreen® Benchmark 1, List Translator 1 or List Translator Possible 1 substances over 1,000 ppm, as verified by a qualified Ph.D. toxicologist or Certified Industrial Hygienist.

## ANTIMICROBIAL ACTIVITY FOR SURFACES

Antimicrobial activity on surfaces can accelerate the natural rate of microbial cell death. Non-leaching antimicrobial surfaces are capable of killing microorganisms upon contact without leaching significant amounts of antimicrobial materials into the surrounding environment. Alternatively, cleaning processes and equipment that use short wavelength ultraviolet light (UV-C) effectively can reduce the bacterial load on surfaces, so long as they are used with sufficient frequency to prevent the bioload from being re-established.

Intent: To reduce occupant exposure to both harmful pathogens and hazardous cleaning agents.



Digestive  
Endocrine  
Immune  
Integumentary  
Reproductive  
Respiratory  
Urinary

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Buildings

### PART 1: HIGH-TOUCH SURFACES

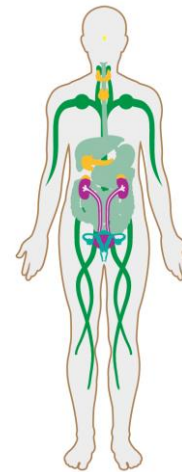
All countertops and fixtures in bathrooms and kitchens, and all handles, doorknobs, lightswitches and elevator buttons are one of the following:

- Coated with or comprised of a material that is abrasion-resistant, non-leaching and antimicrobial.
- Cleaned with a UV cleaning device, used as recommended by the manufacturer.

## CLEANABLE ENVIRONMENT

Surfaces exposed to frequent human touch can harbor microbes and toxins for extended periods of time. However, these surfaces can be kept sanitary if they are designed with suitable materials that facilitate easy cleaning. This reduces the need for cleaning products that contain potentially toxic chemicals and may also reduce the frequency of cleaning.

Intent: To reduce occupant exposure to pathogens on high-touch surfaces.



Digestive  
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Integumentary  
Reproductive  
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Interiors

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Buildings

### PART 1: MATERIAL PROPERTIES

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High-touch and non-porous surfaces (refer to Table A1 in Appendix C) meet the following requirements:

- Smooth and free of defects visible to the unaided eye.
- Finished to maintain smooth welds and joints.
- Free of crevices and other hard-to-reach places.

### PART 2: CLEANABILITY

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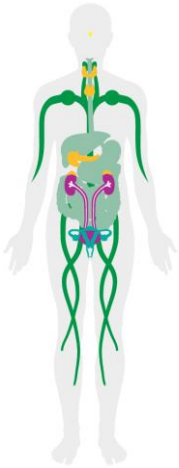
The following requirements are met:

- <sup>30</sup> No permanent wall-to-wall carpeting is used; only removable rugs, removable carpet tiles or hard surfaces are allowed.
- The building provides adequate flexible storage space for all permanent, movable items to allow high-touch surfaces to be completely cleared during cleaning.
- Right angles between walls and windows/floors are sealed.

## CLEANING EQUIPMENT

High performance cleaning equipment increases the effectiveness of cleaning practices. Cleaning equipment that effectively removes debris and fomite material not only prevents the spread of contaminants, but also reduces repetitive work and contact with potentially harmful chemicals.

Intent: To reduce occupant exposure to both harmful pathogens and hazardous chemicals through the use of high quality cleaning equipment and the proper storage of cleaning agents.



Digestive  
Endocrine  
Immune  
Reproductive  
Urinary

Core and Shell	New and Existing Interiors	New and Existing Buildings
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### PART 1: EQUIPMENT AND CLEANING AGENTS

All cleaning equipment meets the following:

- <sup>23</sup> Mops, rags and dusters used to clean all non-porous surfaces consist of microfiber with a denier no higher than 1.0.
- <sup>23</sup> Mops do not have to be wrung by hand.
- <sup>40</sup> Vacuum cleaners contain filters with a HEPA rating.

### PART 2: CHEMICAL STORAGE

All cleaning equipment meets the following:

- <sup>26</sup> In cleaning storage areas, bleach and ammonia-based cleaning products are kept in separate bins from one another.
- <sup>23</sup> Any bins and bottles of bleach and ammonia-based cleaning products are affixed with large, color-coded labels indicating they are not to be mixed.



# WATER



# BACKGROUND

Clean drinking water is a prerequisite for optimal health. More than two-thirds of the human body is comprised of water, a major component of cells, and the medium for the transport of nutrients and waste throughout the body. In addition, water helps to regulate the internal body temperature and serves as a shock absorber for the brain and spinal cord. The Institute of Medicine (IOM) recommends that women consume approximately 2.7 liters [91 oz] and men 3.7 liters [125 oz] of water per day (from all sources including drinking water, other beverages and food). These amounts are appropriate to offset what leaves the body through respiration, perspiration and excretion, aiding in the removal of toxins, byproducts and other waste.

Drinking water contamination is a major public health issue. Many people receive water that has been exposed to potentially harmful levels of biological, chemical and mineral contaminants. The World Health Organization (WHO) reports that almost one billion people lack access to safe drinking water worldwide, and two million annual deaths are attributable to unsafe water, sanitation and hygiene.

The source of water contamination can sometimes be traced back to industry and its related processes. Contaminants like lead, arsenic, glyphosate, atrazine and microbes that are naturally occurring or inadvertently introduced into the water can pose serious health threats. However, treatment and distribution systems meant to keep our drinking water safe are also potential sources of contamination. For example, chlorine and chloramine which are commonly added to water to kill pathogenic organisms can lead to the formation of disinfectant byproducts such as trihalomethanes (THMs) and haloacetic acids (HAAs), as well as N-nitrosodimethylamine (NDMA), which may lead to cancer and other adverse health effects when exposure occurs at levels above the EPA standards. Finally, pharmaceuticals, personal care products (PPCPs) and other emerging contaminants are increasingly finding their way into our water supplies, with largely unknown health effects.

The quality of the U.S. surface water relies largely on The Clean Water Act of 1974. The U.S. Environmental Protection Agency (EPA) works to implement this Act and others (namely, the Safe Drinking Water Act), and publishes threshold concentration standards for water contaminants. These limits are set based on the likelihood of the development of cancer and other adverse health effects after long-term exposure to the specified contaminants. Nevertheless, drinking water contamination is a persistent problem. In a 2009 report, the EPA warned that “threats to drinking water are increasing,” adding that “we can no longer take our drinking water for granted.”

While taste and aesthetic preferences lead many people to drink bottled water, consumption of bottled water is not without its drawbacks. Overreliance on bottled water has environmental implications, but even putting aside those concerns, the quality of bottled water is subject to degradation. In one study, levels of antimony in 48 brands of bottled water from 11 European countries increased by 90% after 6 months of storage due to antimony leaching from polyethylene terephthalate bottles (PET(E) bottles, designated as recyclable “1”).

The same standards for quality are typically applied across all uses of potable water. This can result in a significant waste of resources, since each use does not require the same level of protection. The WELL Building Standard® seeks to simultaneously preserve this resource while enhancing its quality for human health in the context of different uses. Therefore, WELL requires a broad initial assessment to evaluate a building’s water source. From there, filtration can be installed to meet the thresholds required for each use. Buildings can continue to perform periodic testing to maintain quality water over time.

# INTENT

The WELL Building Standard for Water promotes safe and clean water through the implementation of proper filtration techniques and regular testing in order for building occupants to receive optimal quality of water for various uses.

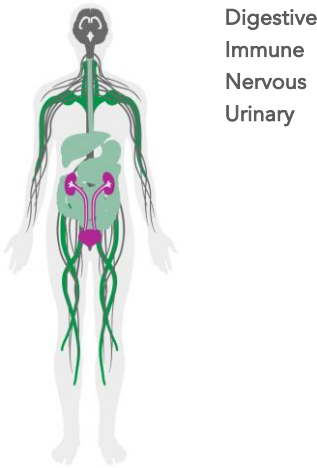
## WATER FEATURE LEVEL MATRIX

	Core and Shell	New and Existing Interiors	New and Existing Buildings
<b>30 FUNDAMENTAL WATER QUALITY</b>			
1: Sediment	P	P	P
2: Microorganisms	P	P	P
<b>31 INORGANIC CONTAMINANTS</b>			
1: Dissolved Metals	P	P	P
<b>32 ORGANIC CONTAMINANTS</b>			
1: Organic Pollutants	P	P	P
<b>33 AGRICULTURAL CONTAMINANTS</b>			
1: Herbicides and Pesticides	P	P	P
2: Fertilizers	P	P	P
<b>34 PUBLIC WATER ADDITIVES</b>			
1: Disinfectants	P	P	P
2: Disinfectant Byproducts	P	P	P
3: Fluoride	P	P	P
<b>35 PERIODIC WATER QUALITY TESTING</b>			
1: Quarterly Testing	-	O	O
2: Water Data Record Keeping and Response	-	O	O
<b>36 WATER TREATMENT</b>			
1: Organic Chemical Removal	O	O	O
2: Sediment Filter	O	O	O
3: Microbial Elimination	O	O	O
4: Water Quality Maintenance	O	O	O
5: Legionella Control	O	O	O
<b>37 DRINKING WATER PROMOTION</b>			
1: Drinking Water Taste Properties	O	O	O
2: Drinking Water Access	-	O	O
3: Water Dispenser Maintenance	-	O	O

FUNDAMENTAL WATER QUALITY

Two properties of water—turbidity and total coliforms—serve as indicators for the possible presence of many harmful contaminants. High turbidity can provide food and shelter for germs, and may also indicate that a building’s filtration system is not working properly. Removing turbidity may also remove harmful pathogens such as protozoa. Another test is the measurement of total coliforms. Coliform bacteria are naturally present in the environment and are generally considered harmless. However, their presence in water suggests that water may contain more dangerous pathogens, including bacteria, viruses and protozoa. Exposure to these pathogens through water containing coliforms can lead to adverse gastrointestinal effects such as diarrhea, vomiting, nausea and cramps.

Intent: To limit the presence of sediment and water-borne pathogens in water designated for human contact.



PART 1: SEDIMENT

All water being delivered to the project area except water not designated for human contact meets the following requirements:

- a.<sup>50</sup> Turbidity of the water sample is less than 1.0 NTU.

PART 2: MICROORGANISMS

All water being delivered to the project area except water not designated for human contact meets the following requirements:

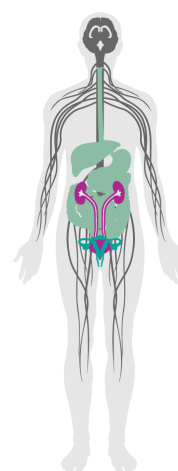
- a.<sup>54</sup> Total coliforms (including E. coli) are not detected in the sample.

Core and Shell	New and Existing Interiors	New and Existing Buildings
P	P	P
P	P	P

## INORGANIC CONTAMINANTS

While there are numerous metals that are necessary for healthy body functions, high levels of these essential metals can be harmful to health. Many dissolved metals that contaminate water supplies can be acutely or chronically toxic. Contamination levels vary widely by geographic location and water source, spurring the need for localized testing. Exposure to even minute amounts of certain metals such as lead and mercury through drinking water has been linked to developmental delays and deficits in learning abilities in children, as well as high blood pressure and kidney problems in adults. If necessary, reverse osmosis (RO) systems or Kinetic Degradation Fluxion (KDF) filters can remove dissolved metals at the point of delivery.

Intent: To limit the presence of inorganic contaminants in drinking water.



Cardiovascular  
Digestive  
Nervous  
Reproductive  
Urinary

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

### PART 1: DISSOLVED METALS

All water being delivered to the project area for human consumption (at least one water dispenser per project) meets the following limits:

- a. <sup>53</sup> Lead less than 0.01 mg/L.
- b. <sup>54</sup> Arsenic less than 0.01 mg/L.
- c. <sup>54</sup> Antimony less than 0.006 mg/L.
- d. <sup>54</sup> Mercury less than 0.002 mg/L.
- e. <sup>43</sup> Nickel less than 0.012 mg/L.
- f. <sup>54</sup> Copper less than 1.0 mg/L.

Core and Shell	New and Existing Interiors	New and Existing Buildings
P	P	P

## ORGANIC CONTAMINANTS

Organic contaminants are generally found in trace amounts in ground and surface waters and may pose serious threats to human health. Common sources of organic pollutants include industrial activities that inadvertently leach chemical runoff into surface waters. Exposure to organic contaminants such as polychlorinated biphenyls (PCBs) and vinyl chloride in drinking water has been associated with a range of adverse health effects, including cancer, immune deficiencies and nervous system difficulties. Activated carbon filters are effective in removing these and other harmful chemical substances.

Intent: To limit the presence of organic contaminants in drinking water.



Digestive  
Endocrine  
Immune  
Nervous  
Reproductive  
Urinary

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

### PART 1: ORGANIC POLLUTANTS

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P

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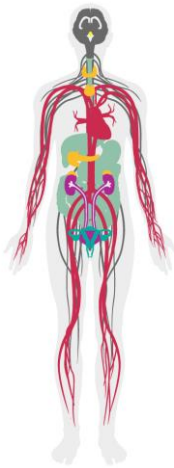
All water being delivered to the project area for human consumption (at least one water dispenser per project) meets the following limits:

- a. <sup>45</sup> Styrene less than 0.0005 mg/L.
- b. <sup>44</sup> Benzene less than 0.001 mg/L.
- c. <sup>44</sup> Ethylbenzene less than 0.3 mg/L.
- d. <sup>54</sup> Polychlorinated biphenyls less than 0.0005 mg/L.
- e. <sup>54</sup> Vinyl chloride less than 0.002 mg/L.
- f. <sup>44</sup> Toluene less than 0.15 mg/L.
- g. <sup>53</sup> Xylenes (total: m, p and o) less than 0.5 mg/L.
- h. <sup>54</sup> Tetrachloroethylene less than 0.005 mg/L.

AGRICULTURAL CONTAMINANTS

A U.S. Geological Survey conducted in the 1990s detected pesticide compounds in virtually every stream in agricultural, urban and mixed-use areas, as well as in 30-60% of the groundwater. These chemicals may enter the water supply from agricultural and storm water runoff, and their exposure has been linked to kidney, thyroid, gastrointestinal and reproductive effects. Atrazine, one of the most widely used pesticides, is a suspected endocrine disruptor and is associated with cardiovascular difficulties. Long-term exposure to glyphosate, a widely used herbicide, may lead to kidney problems and reproductive difficulties. If detected, these contaminants can be removed with carbon filters.

Intent: To limit the presence of agricultural contaminants in drinking water.



Cardiovascular  
Digestive  
Endocrine  
Nervous  
Reproductive  
Urinary

PART 1: HERBICIDES AND PESTICIDES

All water being delivered to the project area for human consumption (at least one water dispenser per project) meets the following limits:

- a.<sup>44</sup> Atrazine less than 0.001 mg/L.
- b.<sup>53</sup> Simazine less than 0.002 mg/L.
- c.<sup>54</sup> Glyphosate less than 0.70 mg/L.
- d.<sup>54</sup> 2,4-Dichlorophenoxyacetic acid less than 0.07 mg/L.

PART 2: FERTILIZERS

All water being delivered to the project area for human consumption (at least one water dispenser per project) meets the following limits:

- a.<sup>53</sup> Nitrate less than 50 mg/L (11 mg/L as nitrogen).

Core and Shell	New and Existing Interiors	New and Existing Buildings
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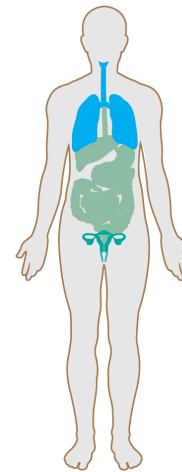
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P	P	P
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## PUBLIC WATER ADDITIVES

Sometimes, chemicals are intentionally added to water supplies. For example, chlorine or chloramine may be added to water to act as disinfectants, and fluoride may be added to prevent tooth decay. Although the addition of small amounts of these chemicals is beneficial for public health and safety, excessive exposure can lead to adverse effects, including fluorosis (aesthetic mottling of the teeth), stomach discomfort and eye and skin irritation. In addition, the use of chlorine can lead to the formation of disinfectant byproducts (DBPs), such as trihalomethanes (THMs) and haloacetic acids (HAAs), which have been linked to cancer and kidney damage.

Intent: To limit the presence of certain disinfectants, disinfection byproducts and fluoride in drinking water.



Digestive  
Integumentary  
Reproductive  
Respiratory

### PART 1: DISINFECTANTS

All water being delivered to the project area for human consumption (at least one water dispenser per project) meets the following limits:

- a. <sup>54</sup> Total chlorine less than 4 mg/L.
- b. <sup>54</sup> Chloramine less than 4 mg/L.

### PART 2: DISINFECTANT BYPRODUCTS

All water being delivered to the project area for human consumption (at least one water dispenser per project) meets the following limits:

- a. <sup>54</sup> Total trihalomethanes less than 0.08 mg/L.
- b. <sup>54</sup> Total haloacetic acids less than 0.06 mg/L.

### PART 3: FLUORIDE

All water being delivered to the project area for human consumption (at least one water dispenser per project) meets the following limits:

- a. <sup>54</sup> Fluoride less than 4.0 mg/L.

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

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P

## PERIODIC WATER QUALITY TESTING

Changing industrial practices and temporal variations in temperature, pH and weather may affect the leaching rate of inorganic metals into drinking water sources. Where possible, routine testing can help to detect any large variations in the chemicals present in water and help alert building occupants if a building is inconsistently receiving high quality water.

Intent: To maintain high quality water through regular water quality monitoring and remediation.



Digestive  
Immune  
Nervous  
Urinary

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

### PART 1: QUARTERLY TESTING

All water being delivered to the project area for human consumption is tested quarterly (with reports submitted annually to the IWBI) for the presence of the following dissolved metals or metalloids:

- <sup>53</sup> Lead.
- <sup>53</sup> Arsenic.
- <sup>53</sup> Mercury.
- <sup>53</sup> Copper.

### PART 2: WATER DATA RECORD KEEPING AND RESPONSE

Projects provide a written policy specifying:

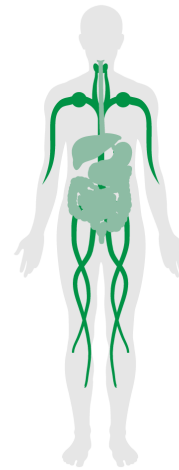
- Detailed enforcement strategies for monitoring and keeping record of, at minimum, water quality parameters listed in Feature 35 Part 1 of the WELL Building Standard.
- Records are kept for a minimum of 3 years, including full data from field inspections or laboratory results where appropriate.
- A detailed plan for action and remediation of unacceptable conditions.



## WATER TREATMENT

There are many types of contaminants that may compromise water quality, from pathogens and heavy metals to pesticide and herbicide residues. While routine testing helps to keep track of potential pollutants, sampling alone cannot guarantee the elimination of all risk. Disruptions to water supply, droughts, flooding and construction and infrastructure changes can temporarily affect water quality. Therefore, implementing and maintaining appropriate water treatment systems - including carbon filters, sediment filters and UV sanitization - is key in order to continuously deliver high quality water.

Intent: To improve water quality by requiring the use of water treatment systems.



Digestive  
Immune

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

### PART 1: ORGANIC CHEMICAL REMOVAL

All water being delivered to the project area for human consumption is treated with the following:

- a. <sup>25</sup> Activated carbon filter.

### PART 2: SEDIMENT FILTER

All water being delivered to the project area for human consumption is treated with the following:

- a. Filter to remove suspended solids tested with standard NSF 42 or EN 13443-2.

### PART 3: MICROBIAL ELIMINATION

All water being delivered to the project area for human consumption is treated with one of the following:

- a. <sup>24</sup> UVGI water sanitation.
- b. Filter rated by the NSF to remove or reduce microbial cysts.

### PART 4: WATER QUALITY MAINTENANCE

To verify that the selected filtration/sanitation system chosen continues to operate as designed, projects must annually provide the IWBI with:

- a. Record-keeping for a minimum of 3 years, including evidence that the filter and/or sanitizer has been properly maintained as per the manufacturer's recommendation.

## PART 5: LEGIONELLA CONTROL



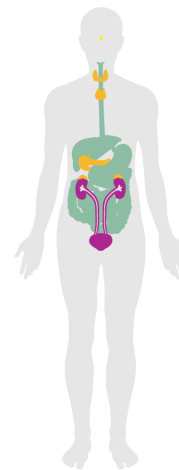
A point-by-point narrative describes how the building addresses Legionella, and includes the following:

- a. <sup>177</sup> Formation of a team for Legionella management in the building.
- b. <sup>177</sup> Water system inventory and production of process flow diagrams.
- c. <sup>177</sup> Hazard analysis of water assets.
- d. <sup>177</sup> Identification of critical control points.
- e. <sup>177</sup> Maintenance and control measures, monitoring, establishment of performance limits and corrective actions.
- f. <sup>177</sup> Documentation, verification and validation procedures.

## DRINKING WATER PROMOTION

Access to clear, good-tasting water helps to promote proper hydration throughout the day. Many otherwise healthy people unknowingly suffer from mild dehydration, a condition where there is less water and fluids in the body than there should be, which results in avoidable symptoms such as muscle cramps, dry skin and headaches. Drinking plenty of water, especially when exercising and at higher temperatures is essential to ensure good hydration. Improving the taste and appearance of tap water encourages increased water consumption and reduces reliance on bottled water.

Intent: To promote the consumption of water by making high quality drinking water easily accessible to occupants.



Digestive  
Endocrine  
Urinary

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

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### PART 1: DRINKING WATER TASTE PROPERTIES

All water being delivered to the project area for human consumption:

- a. <sup>54</sup> Aluminum less than 0.2 mg/L.
- b. <sup>54</sup> Chloride less than 250 mg/L.
- c. <sup>54</sup> Manganese less than 0.05 mg/L.
- d. <sup>47</sup> Sodium less than 270 mg/L.
- e. <sup>54</sup> Sulfate less than 250 mg/L.
- f. <sup>54</sup> Iron less than 0.3 mg/L.
- g. <sup>54</sup> Zinc less than 5 mg/L.
- h. <sup>54</sup> Total Dissolved Solids less than 500 mg/L.

### PART 2: DRINKING WATER ACCESS

To encourage water consumption, the following is met:

- a. At least one dispenser is located within 30 m [100 ft] of all parts of regularly occupied floor space (minimum one per floor).

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### PART 3: WATER DISPENSER MAINTENANCE

The components of dispensers that provide water for human consumption are cleaned with at least the following regularity:

- a. <sup>48</sup> Daily, for mouthpieces, protective guards and collective basins, to prevent lime and calcium build-up.
- b. <sup>48</sup> Quarterly, for outlet screens and aerators, to remove debris and sediment.

-	<input type="radio"/>	<input type="radio"/>
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# NOURISHMENT

# BACKGROUND

Nutrition plays a key role in health maintenance, weight management and chronic disease prevention. However, adherence to the dietary recommendations in the U.S. is poor. Similarly, global dietary patterns are also less than optimal; in many countries, people consume more than 500 calories from added sugars per day. In the U.S., half of the population consumes sugar-sweetened beverages (SSBs) on any given day, with a quarter of the population consuming over 200 calories from SSBs daily. In addition, the average dietary intake of calories in the U.S. in 2010 was nearly 2,600 calories per person per day, which is a 25% increase in energy intake since 1970. Consumption of flour and cereal products, added fats and oils, and added sugars and sweeteners are some of the chief contributors to the increase in caloric intake.

Together with physical inactivity, poor diet is a major contributor to the U.S. overweight (Body Mass Index (BMI) of 25-29.9) and obesity (BMI over 30) epidemic, increasing the risk of cardiovascular disease, diabetes and cancer. Over two thirds (69%) of all American adults (20 years and older) today are overweight, and more than a third (35%) are obese. The situation is similar worldwide, with more than 1.9 billion (39%) adults overweight in 2014, of which over 600 million (13%) were obese, making obesity not just an epidemic but a global pandemic.

Suboptimal dietary patterns can also lead to other detrimental health outcomes. For example, high consumption of SSBs has been linked to diabetes, metabolic syndrome, obesity, hypertension, dental caries and even depression. High intake of red and processed meat is associated with heart failure, hypertension, coronary heart disease, and colorectal and breast cancers. Moreover, low fruit and vegetable consumption is associated with a higher rate of type 2 diabetes, cardiovascular mortality, as well as breast and gastrointestinal cancers. The World Health Organization (WHO) reports that 2.7 million deaths worldwide are attributed to insufficient fruit and vegetable intake, making it one of the top 10 risk factors contributing to global mortality.

While the components and ingredients that often make up our foods represent a significant and reasonable concern, another issue is the changes in cultural food practices. Busy lives and longer workdays are encouraging unhealthy behaviors, including eating meals on the go and in front of the TV, snacking between meals and eating large portion meals. Further, high-fat, high-sugar snack foods of low nutritional quality are engineered to be tastier, with potentially addictive qualities. These foods are often supported by colorful and enticing advertisements that inundate our environments, from vending machines to restaurants and supermarket shelves. In the U.S. alone, more than \$1.6 billion is spent annually by the food industry specifically marketing cereal, fast-food and soft drinks to children and adolescents, which, according to the Institute of Medicine (IOM), is “out of balance with recommended healthful diets”, contributing to unhealthy dietary patterns and putting the health of the American youth at risk.

Fortunately, food purchase and consumption decisions, dietary patterns and preparation practices all represent not only points of concern, but also venues for health improvement. A variety of social, economic, physiological and environmental factors can affect individual dietary behaviors; the built environment is one of them. Distance and access to grocery stores and other places that have fresh fruits and vegetables, access to farmers’ markets, the use of behavioral economics in cafeterias, increased availability of healthy foods and reduced marketing and availability of unhealthy foods, provision of caloric information and many other strategies can have an effect on our food choices and overall dietary patterns. The WELL Building Standard® recognizes this and seeks to implement design strategies and policies within the built environment that increase access to healthy food options, enable people to make more informed dietary choices and lead to better health and well-being.

# INTENT

The WELL Building Standard for Nourishment requires the availability of fresh, wholesome foods, limits unhealthy ingredients and encourages better eating habits and food culture.

## NOURISHMENT FEATURE LEVEL MATRIX

	Core and Shell	New and Existing Interiors	New and Existing Buildings
<b>38 FRUITS AND VEGETABLES</b>			
1: Fruit and Vegetable Variety	-	P	P
2: Fruit and Vegetable Promotion	-	P	P
<b>39 PROCESSED FOODS</b>			
1: Refined Ingredient Restrictions	P	P	P
2: Trans Fat Ban	P	P	P
<b>40 FOOD ALLERGIES</b>			
1: Food Allergy Labeling	P	P	P
<b>41 HAND WASHING</b>			
1: Hand Washing Supplies	-	P	P
2: Contamination Reduction	-	P	P
3: Sink Dimensions	-	P	P
<b>42 FOOD CONTAMINATION</b>			
1: Cold Storage	-	P	P
<b>43 ARTIFICIAL INGREDIENTS</b>			
1: Artificial Substance Labeling	O	P	P
<b>44 NUTRITIONAL INFORMATION</b>			
1: Detailed Nutritional Information	O	P	P
<b>45 FOOD ADVERTISING</b>			
1: Advertising and Environmental Cues	O	P	P
2: Nutritional Messaging	O	P	P
<b>46 SAFE FOOD PREPARATION MATERIALS</b>			
1: Cooking Material	-	O	O
2: Cutting Surfaces	-	O	O
<b>47 SERVING SIZES</b>			
1: Meal Sizes	-	O	O
2: Dishware	-	O	O
<b>48 SPECIAL DIETS</b>			
1: Food Alternatives	-	O	O
<b>49 RESPONSIBLE FOOD PRODUCTION</b>			
1: Sustainable Agriculture	-	O	O
2: Humane Agriculture	-	O	O
<b>50 FOOD STORAGE</b>			
1: Storage Capacity	-	O	O

Core and Shell	New and Existing Interiors	New and Existing Buildings
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## 51 FOOD PRODUCTION

1: Gardening Space	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2: Planting Support	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

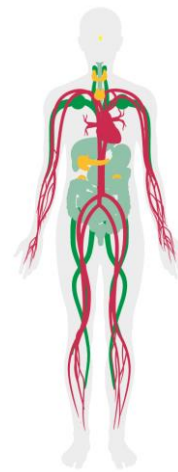
## 52 MINDFUL EATING

1: Eating Spaces	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2: Break Area Furnishings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## FRUITS AND VEGETABLES

Regular consumption of fresh fruits and vegetables is the cornerstone of a healthy diet and can lower the risk of cancer, diabetes, heart disease and obesity. Insufficient fruit and vegetable intake, on the other hand, is one of the top 10 risk factors contributing to global mortality, leading to approximately 2.7 million deaths worldwide. The Dietary Guidelines for Americans recommend an average consumption of at least 4 servings of fruits and 5 servings of vegetables per day. However, only 8% of the U.S. population consume the recommended amount of fruit, and only 6% achieve the recommended intake of vegetables.

Intent: To promote the consumption of fruits and vegetables by making fruits and vegetables easily accessible to occupants.



Cardiovascular  
Digestive  
Endocrine  
Immune

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

### PART 1: FRUIT AND VEGETABLE VARIETY

-	P	P
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If foods are sold or provided on a daily basis on the premises by (or under contract with) the project owner, then the selection includes at least one of the following:

- a. At least 2 varieties of fruits (containing no added sugar) and at least 2 varieties of non-fried vegetables.
- b. At least 50% of available options are fruits (containing no added sugar) and/or non-fried vegetables.

### PART 2: FRUIT AND VEGETABLE PROMOTION

-	P	P
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Cafeterias operated or contracted by the project owner, if present, include the following design interventions:

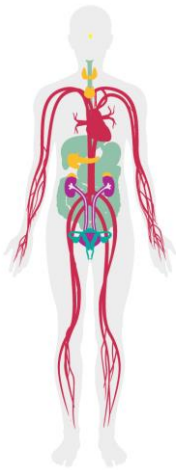
- a.<sup>180</sup> Salad bar or similar salad-providing section, positioned in a visible and accessible location.
- b.<sup>73</sup> Fruits and vegetables are visually apparent, either through display or through color photographs on the menu.
- c.<sup>73</sup> Vegetable dishes are placed at the beginning of the food service line.
- d.<sup>73</sup> Fruits or fruit dishes are placed in a bowl or in a stand at the checkout location.



PROCESSED FOODS

Foods that contain highly processed ingredients tend to be high in sugar, calories and added fats, and have low nutritional value. More than half of the U.S. population consumes sugar-sweetened beverages on a given day, and the average consumption of added sugars is more than 22 teaspoons per day, even though the recommended limit is 6-9 teaspoons. High consumption of added sugars is associated with weight gain, obesity, type 2 diabetes, kidney disease, hypertension and other negative health effects.

Intent: To help occupants avoid highly-processed ingredients and foods.



Cardiovascular  
Digestive  
Endocrine  
Reproductive  
Urinary

PART 1: REFINED INGREDIENT RESTRICTIONS

All foods and beverages sold or provided on a daily basis on the premises by (or under contract with) the project owner, including in vending machines, meet the following conditions:

- a. <sup>78</sup> Beverages do not contain more than 30 g of sugar per container. Bulk containers of 1.9 L (2 quart) or larger are exempt from this requirement.
- b. <sup>78</sup> At least 50% of beverages have 1 g of sugar or less per 16 mL [1.87 g of sugar or less per 1 oz].
- c. <sup>78</sup> No non-beverage food item contains more than 30 g of sugar per serving.
- d. <sup>55</sup> In at least 50% of grain-based foods, a whole grain is the first ingredient.

PART 2: TRANS FAT BAN

All foods and beverages sold or provided on a daily basis on the premises by (or under contract with) the project owner, including in vending machines, do not contain:

- a. <sup>56</sup> Partially-hydrogenated oil.

Core and Shell      New and Existing Interiors      New and Existing Buildings

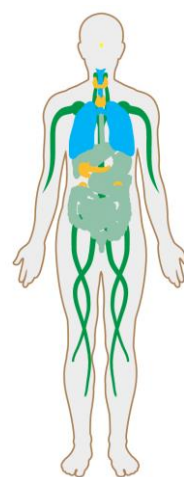
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P	P	P
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## FOOD ALLERGIES

Without clear labeling of ingredients, individuals with food allergies face an increased risk of exposure to allergens. Currently, about 8% of children and 4% of adults in the U.S. have food allergies. Every year, about 30,000 people require emergency room treatment, 2,000 are hospitalized and 150 die because of allergic reactions to food. Because there is no cure for food allergies, sensitive individuals must strictly avoid all foods containing the allergen in order to prevent serious allergic reactions. The FDA requires that all packaged foods explicitly declare the presence of common allergens, and several municipalities and state governments have additional guidelines regarding allergen labeling for prepared foods served in food service establishments.

Intent: To help occupants avoid consumption of or contact with potential food allergens.



Digestive  
Endocrine  
Immune  
Integumentary  
Respiratory

Core  
and  
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New and  
Existing  
Interiors

New and  
Existing  
Buildings

### PART 1: FOOD ALLERGY LABELING

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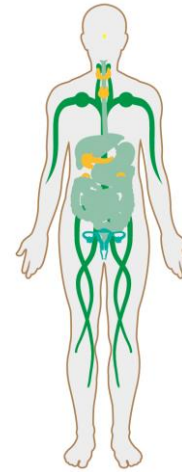
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All foods and beverages sold or provided on a daily basis on the premises by (or under contract with) the project owner are clearly labeled on packaging, menus, signage, or electronic media to indicate if they contain the following allergens:

- a.<sup>57</sup> Peanuts.
- b.<sup>57</sup> Fish.
- c.<sup>57</sup> Shellfish.
- d.<sup>57</sup> Soy.
- e.<sup>57</sup> Milk and dairy products.
- f.<sup>57</sup> Egg.
- g.<sup>57</sup> Wheat.
- h.<sup>57</sup> Tree nuts.
- i.<sup>57</sup> Gluten.

## HAND WASHING

Hand washing is one of the most important and effective means of reducing the transmission of pathogens through food. Responsible for approximately 48 million illnesses, 128,000 hospitalizations and 3,000 deaths occurring in the U.S. each year, foodborne illness is a major cause of preventable illness and death, personal distress and avoidable economic burden. Regular rinsing with soap and water helps to reduce the spread of unwanted and potentially dangerous germs. In addition, using paper towels to dry hands is more effective in removing bacteria than using air dryers. Since liquid soap in bulk refillable dispensers is prone to bacterial contamination, utilizing sealed liquid soap cartridges reduces the possibility for bacterial contamination and significantly reduces bacteria on hands whereas contaminated refillable dispensers increase bacteria on hands after handwashing. Handwashing sinks should also provide sufficient room for washing one's hands without touching the sink sides, to prevent possible recontamination.



Digestive  
Endocrine  
Immune  
Integumentary  
Reproductive

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

Intent: To reduce pathogen transmission by providing accessible and sanitary hand washing facilities.

### PART 1: HAND WASHING SUPPLIES

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The following are provided, at a minimum, at all sink locations:

- a. <sup>76</sup> Fragrance-free hand soap in accordance with the Cleaning, Disinfection and Hand Hygiene Product section in Table A4 in Appendix C.
- b. <sup>68</sup> Disposable paper towels (air dryers are not forbidden, but are supplemented).

### PART 2: CONTAMINATION REDUCTION

-	P	P
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One of the following is provided, at a minimum, at all sink locations:

- a. <sup>68</sup> Liquid soap in dispensers with disposable and sealed soap cartridges.
- b. Bar soap with a soap rack that allows for drainage.

### PART 3: SINK DIMENSIONS

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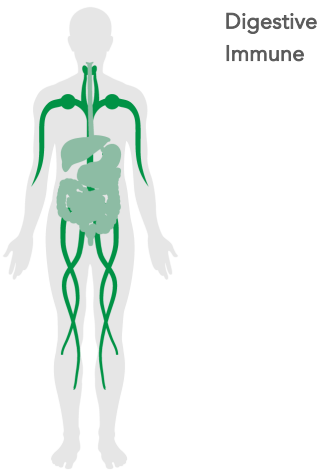
Bathroom and kitchen sinks meet the following requirements:

- a. <sup>70</sup> The sink column of water is at least 25 cm [10 inches] in length.
- b. <sup>70</sup> The handwashing basin is at least 23 cm [9 inches] in width and length.

FOOD CONTAMINATION

Foods such as raw meat, fish and poultry pose an increased risk of becoming contaminated with bacteria. Microorganisms from such foods can be transmitted to other products via cutting boards and other equipment and surfaces, leading to gastrointestinal problems associated with food poisoning. To mitigate foodborne illnesses, foods must be properly stored and clearly labeled, and prepared at sufficiently high temperatures. Effective sanitation techniques also need to be put in place to prevent or minimize the growth of pathogenic microorganisms and thus reduce the risk of contamination and transmission.

Intent: To minimize occupant exposure to food-borne pathogens by providing safe food storage.



Core and Shell	New and Existing Interiors	New and Existing Buildings
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PART 1: COLD STORAGE

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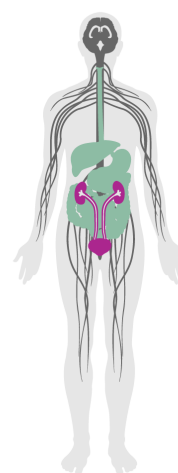
If raw meat, fish, or poultry is prepared or stored on site, cold storage spaces contain the following:

- a. <sup>71</sup> At least one removable, cleanable drawer or container located at the bottom of the unit, designated and labeled for storing raw meat, fish and poultry.
- b. A visual display of holding temperatures to ensure accurate representation of storage temperatures.

## ARTIFICIAL INGREDIENTS

Numerous artificial ingredients are typically added to highly processed foods to improve taste and extend shelf life. However, some people may be sensitive to these ingredients, such as sulfites, which can lead to breathing problems in individuals with asthma. Since these additives do not add nutritional value to a food, and tend to appear in foods with low nutritional qualities, they should be avoided as often as possible.

Intent: To help occupants avoid artificial colors, sweeteners and preservatives in food.



Digestive  
Nervous  
Urinary

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

### PART 1: ARTIFICIAL SUBSTANCE LABELING

O	P	P
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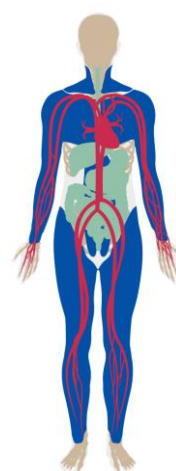
All foods and beverages sold or provided on a daily basis on the premises by (or under contract with) the project owner are clearly labeled on packaging, nearby menus or signage to indicate if they contain the following:

- a.<sup>10</sup> Artificial colors.
- b.<sup>10</sup> Artificial flavors.
- c.<sup>10</sup> Artificial sweeteners.
- d.<sup>10</sup> Brominated vegetable oils.
- e.<sup>10</sup> Potassium bromate.
- f.<sup>10</sup> BHA (Butylated hydroxyanisole).
- g.<sup>10</sup> BHT (Butylated hydroxytoluene).
- h.<sup>10</sup> Monosodium glutamate (MSG).
- i.<sup>10</sup> Hydrolyzed vegetable protein (HVP).
- j.<sup>10</sup> Sodium nitrate and sodium nitrite.
- k.<sup>10</sup> Sulfites.

## NUTRITIONAL INFORMATION

Access to nutritional information allows consumers to make informed dietary choices. For example, being able to compare the sodium content of two different snacks can enable individuals who need to limit their salt intake choose the better option. The FDA sets specific requirements for nutrition labeling in packaged foods, and several municipal administrations have extended a labeling regulation to apply to prepared foods as well.

Intent: To help occupants make informed food consumption choices.



Cardiovascular  
Digestive  
Muscular  
Skeletal

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

### PART 1: DETAILED NUTRITIONAL INFORMATION

For foods and beverages sold or provided on a daily basis on the premises by (or under contract with) the project owner, the following are displayed (per meal or item) on packaging, menus or signage:

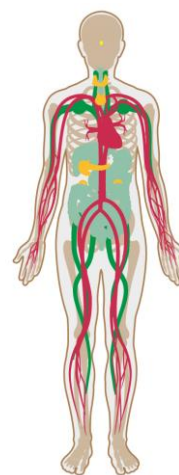
- a. <sup>74</sup> Total calories.
- b. <sup>61</sup> Macronutrient content (total protein, total fat and total carbohydrate) in weight and/or as a percent of the estimated daily requirements (daily values).
- c. <sup>61</sup> Total sugar content.

O	P	P
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## FOOD ADVERTISING

Every year, food companies spend billions of dollars marketing and advertising unhealthy foods to children and adults, contributing to the creation of an obesogenic (obesity-promoting) environment. Over a billion dollars are spent annually on marketing breakfast cereals, carbonated beverages and restaurant food to youth alone. However, access to nutrition information can help individuals learn about and develop better eating habits. Further, limiting advertising cues for unhealthy foods can help individuals make better food selections and mitigate suboptimal nutritional choices.

Intent: To promote healthy food consumption choices.



Cardiovascular  
Digestive  
Endocrine  
Immune  
Integumentary  
Skeletal

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

### PART 1: ADVERTISING AND ENVIRONMENTAL CUES

The following requirement is met:

- a. <sup>77</sup> Advertisements for any food or beverage items that do not conform to the requirements set forth in the Processed Foods feature are not displayed on the premises.

### PART 2: NUTRITIONAL MESSAGING

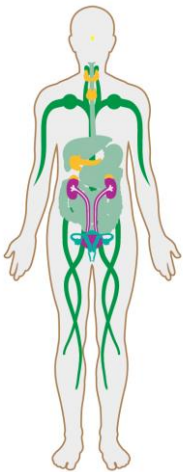
Using prominent displays such as educational posters, brochures or other visual media, designated eating areas or common areas contain at least 3 different instances of messaging per project intended to achieve either or both of the following requirements:

- a. <sup>77</sup> Encourage the consumption of whole, natural foods and cuisines.
- b. <sup>77</sup> Discourage the consumption of sugary or processed foods and beverages.

SAFE FOOD PREPARATION MATERIALS

Food preparation equipment can be a source of potentially hazardous contaminants. Porous surfaces can harbor harmful toxins, while chemicals used to impart special attributes to food preparation equipment, such as non-stick properties for cookware, can leach or volatilize during use. One such contaminant is bisphenol-A (BPA), a phenolic-based chemical that is used in products ranging from baby bottles and plastic foodware to water bottles and food can linings. While generally stable, BPA can be released when products containing BPA are exposed to heat or UV light, and may have negative effects on human health.

Intent: To reduce occupant exposure to harmful contaminants that may originate from food preparation materials and eliminate surfaces that harbor pathogens.



Digestive  
Endocrine  
Immune  
Integumentary  
Reproductive  
Urinary

Core and Shell	New and Existing Interiors	New and Existing Buildings
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PART 1: COOKING MATERIAL

-	<input type="radio"/>	<input type="radio"/>
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Pots, pans, dishware and other cooking tools used to prepare food (except cutting boards) are made entirely of one or more of the following inert materials:

- a.<sup>67</sup> Ceramics, except those containing lead.
- b.<sup>67</sup> Cast iron.
- c.<sup>67</sup> Stainless steel.
- d.<sup>67</sup> Glass.
- e.<sup>67</sup> Coated aluminum.
- f. Solid (non-laminated) wood that is untreated or treated with food-grade mineral or linseed oil.

PART 2: CUTTING SURFACES

-	<input type="radio"/>	<input type="radio"/>
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All cutting boards are made from the following materials, and are replaced when they become excessively worn or have deep grooves from cutting:

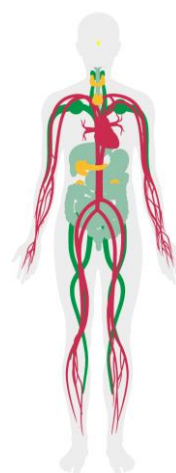
- a.<sup>75</sup> Marble.
- b.<sup>75</sup> Plastic.
- c.<sup>75</sup> Glass.
- d.<sup>75</sup> Pyroceramic.
- e.<sup>75</sup> Solid (non-laminated) wood that is untreated or treated with food-grade mineral or linseed oil.
- f.<sup>75</sup> Bamboo.



## SERVING SIZES

Excess caloric intake, especially through easy access to oversized meal options, can lead to excess weight gain and obesity. Some studies show that individuals will serve and eat more food when provided with larger plates and bowls compared to smaller ones. In addition, larger portions of energy-dense foods also promote overconsumption. Therefore, reducing the size and caloric content of meals can reduce the likelihood of unintended overeating, thereby encouraging healthier eating habits.

Intent: To reduce unintended overconsumption and encourage portion control.



Cardiovascular  
Digestive  
Endocrine  
Immune

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

### PART 1: MEAL SIZES

If food is sold or provided on a daily basis by (or under contract with) the project owner and is prepared to order, the following is available and listed on the menu for at least half of all available main course options:

- a. <sup>58</sup> A version or portion of the main course that is 650 kcal [650 Cal] or less and at a lower cost compared to the larger, regular version.

### PART 2: DISHWARE

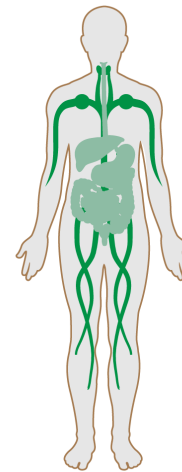
If food is sold or provided on a daily basis on the premises by (or under contract with) the project owner, is self-serve, and requires the use of serving plate, bowl, or cup, each of the following is met (as applicable):

- a. Circular plates: the diameter of a plate is no larger than 25 cm [10 in].
- b. Non-circular plates: the total surface area of a plate does not exceed 507 cm<sup>2</sup> [79 in<sup>2</sup>].
- c. Bowls are no larger than 473 mL [16 oz].
- d. Cups are no larger than 473 mL [16 oz].

## SPECIAL DIETS

Individuals with food allergies or dietary restrictions often encounter difficulty in finding suitable meal options. Clear labeling can prevent unintended exposure to allergens or food items that require some degree of restriction, but if a sufficient variety of alternatives is unavailable, these individuals may be at risk for consuming potentially harmful foods.

Intent: To provide alternative food choices to individuals with food restrictions or allergies.



Digestive  
Immune  
Integumentary

Core  
and  
Shell

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Existing  
Interiors

New and  
Existing  
Buildings

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### PART 1: FOOD ALTERNATIVES

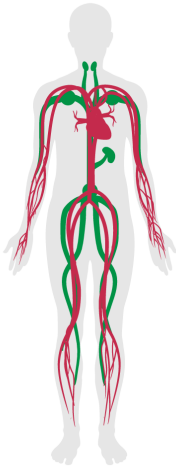
Meals sold or provided by the project owner (on a daily basis) or catering (provided at least once a month) include at least one main course option for each of the following criteria (as necessary, by request):

- a.<sup>32</sup> Peanut-free.
- b.<sup>60</sup> Gluten-free.
- c.<sup>60</sup> Lactose-free.
- d.<sup>60</sup> Egg-free.
- e.<sup>60</sup> Contains no animal, seafood or dairy products.
- f.<sup>60</sup> Contains no animal or seafood products, except for eggs and dairy.

RESPONSIBLE FOOD PRODUCTION

Organic and sustainable farming practices are designed to reduce environmental pollution and increase the quality of life of livestock that we rely upon for food. Organic farming makes up a rapidly growing share of food cultivation processes in the U.S. due to increasing demand from conscientious consumers. While research on health effects of consuming organic versus conventionally-grown foods is still inconclusive, studies have found higher levels of antioxidants and lower levels of pesticide residues and antibiotic-resistant bacteria in organic as compared to conventionally-grown foods.

Intent: To reduce occupant exposure to pesticides or hormones, limit environmental degradation and promote humane livestock practices.



Cardiovascular  
Immune

PART 1: SUSTAINABLE AGRICULTURE

Produce is sold or provided on the premises on a daily basis by (or under contract with) the project owner that meets the following criteria:

- a. <sup>63</sup> Federally Certified Organic labeling.

Core and Shell	New and Existing Interiors	New and Existing Buildings
-	○	○

PART 2: HUMANE AGRICULTURE

If meat, egg or dairy products are sold or provided on the premises on a daily basis by (or under contract with) the project owner, they meet the following criteria for the humane treatment of livestock:

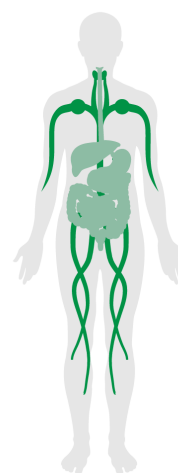
- a. <sup>64</sup> Certified Humane™ labeling.
- b. <sup>63</sup> Federally Certified Organic labeling.

Core and Shell	New and Existing Interiors	New and Existing Buildings
-	○	○

## FOOD STORAGE

Most refrigerators are not designed with the intent to preserve the taste and nutrient content of fresh fruits and vegetables, which are typically best stored at relatively higher temperatures. Additionally, crisper drawers are often too small to store a sufficient quantity of produce for a moderately-sized group of people, potentially discouraging individuals from bringing healthier food options to work.

Intent: To encourage the consumption of fresh foods by providing sufficient cold food storage to occupants.



Digestive  
Immune

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

### PART 1: STORAGE CAPACITY

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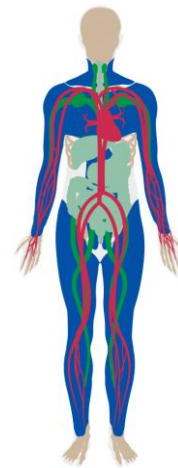
The space provides cold storage that meets one of the following requirements:

- Total volume of at least 20 L [0.7 ft<sup>3</sup>] per occupant (no more than 7,000 L [247 ft<sup>3</sup>] of combined space is required).
- Evidence that the volume provided exceeds occupant demand by at least 20%.

## FOOD PRODUCTION

Gardening or the cultivation of produce and herbs increases access to healthy, fresh and nutrient-rich foods and allows individuals to be more engaged with food production processes. Studies show that gardening can lead to better eating habits and more positive perceptions of overall health, and has been associated with lower BMI as well as lower odds of overweight and obesity.

Intent: To improve access to fresh produce by providing space, infrastructure and tools for on-site food production.



Cardiovascular  
Digestive  
Immune  
Muscular  
Skeletal

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

### PART 1: GARDENING SPACE

A space of at least 0.1 m<sup>2</sup> [1 ft<sup>2</sup>] per occupant (no more than 70 m<sup>2</sup> [754 ft<sup>2</sup>] maximum is required) is accessible and located within 0.8 km [0.5 mi] of the project boundary for one or a combination of the following:

- <sup>22</sup> A garden with food-bearing plants.
- <sup>22</sup> A greenhouse with food-bearing plants.
- Edible landscaping (e.g., fruit trees, herbs).

### PART 2: PLANTING SUPPORT

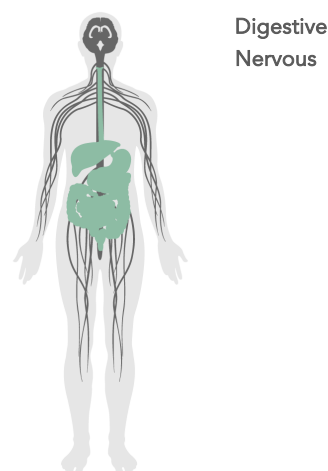
Adequate quantities of the following supplies are provided to grow and maintain vegetables, herbs or other edible plants in the Gardening Space provided:

- <sup>22</sup> Planting medium.
- <sup>22</sup> Watering system.
- <sup>22</sup> Lighting (interior spaces only).
- <sup>22</sup> Plants.
- Gardening tools.

## MINDFUL EATING

Demanding work schedules and a lack of communal eating spaces can lead people to eat in isolation during meal breaks. Distracted eating at workstations while doing work, reading, watching television or listening to the radio may result in eating more, both immediately and during later food intake. Eating attentively and placing focus on the process of eating, on the other hand, may lead to better control of food intake. Time spent in break areas can lead to better eating habits, encourage social interactions, and help reduce stress.

Intent: To encourage mindful eating behaviors and socialization by providing communal eating spaces.



### PART 1: EATING SPACES

Eating spaces for occupants adhere to the following requirements:

- Contain tables and chairs to accommodate at least 25% of total occupants at a given time.

### PART 2: BREAK AREA FURNISHINGS

Eating spaces for occupants contain all of the following:

- Refrigerator, device for reheating food (such as microwave or toaster oven), and sink.
- Amenities for dish washing.
- At least one cabinet or storage unit available for occupant use.
- Eating utensils, including spoons, forks, knives and microwave-safe plates and cups.

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings





# LIGHT

# BACKGROUND

Light is a visible form of electromagnetic radiation, bordered in the spectrum by ultraviolet radiation at smaller wavelengths and infrared at larger wavelengths. Current lighting codes and guidelines provide illuminance recommendations for different room types, derived from usual lighting requirements for typical activities per room. These standards, created by technical groups such as Illuminating Engineering Society (IES), ensure good visual acuity in a variety of tasks to avoid eyestrain and to minimize productivity losses and headaches.

Light enters the eye and hits photoreceptors on the retina: rods, cones and intrinsically photosensitive retinal ganglion cells (ipRGCs). All of these cells absorb light and send it as information in the form of electrochemical signals to different parts of the brain. Rods facilitate peripheral vision and vision in dim lighting conditions, with peak sensitivity to green-blue light (498 nm). Cones facilitate daytime vision and color perception, and the peak sensitivity for the sensation of brightness with this system occurs at green-yellow light (555 nm).

In addition to facilitating vision, light influences the human body in non-visual ways. Humans and animals have internal clocks that synchronize physiological functions on roughly a 24-hour cycle called the circadian rhythm. The body responds to a number of zeitgebers—the external cues that align physiological functions to the solar day in this cycle. Light is the most important of these zeitgebers, keeping the body's internal clocks synchronized in a process known as circadian photoentrainment.

The ipRGCs are critical to the circadian system, sending information to various parts of the brain to trigger reactions downstream in the body. These cells demonstrate peak sensitivity to teal-blue light ( $\approx 480$  nm). Notably, the ipRGCs project information to a specific part of the brain called the suprachiasmatic nucleus to let it know the time of day based on the light received, and this main clock then acts as an oscillator to likewise synchronize clocks in peripheral tissues and organs.

Multiple physiological processes—including those relating to alertness, digestion and sleep—are regulated in part by the variance and interplay of hormones involved in this cycle. A consideration of light exposure is particularly significant considering the role this plays in sleep, and given that the Institute of Medicine reports that about 50 to 70 million U.S. adults have a chronic sleep or wakefulness disorder. Further, such disorders and chronic sleep deprivation are associated with increased risk of certain morbidities, including diabetes, obesity, depression, heart attack, hypertension and stroke.

All light—not just sunlight—can contribute to circadian photoentrainment. Given that people spend much of their waking day indoors, insufficient illumination or improper lighting design can lead to a drift of the circadian phase, especially if paired with inappropriate light exposure at night. Humans are continuously sensitive to light, and under normal circumstances, light exposure in the late night/early morning will shift our rhythms forward (phase advance), whereas exposure in the late afternoon/early night will shift our rhythms back (phase delay). To maintain optimal, properly synchronized circadian rhythms, the body requires periods of both brightness and darkness.



# INTENT

The WELL Building Standard® for Light provides illumination guidelines that are aimed to minimize disruption to the body's circadian system, enhance productivity, support good sleep quality and provide appropriate visual acuity where needed.

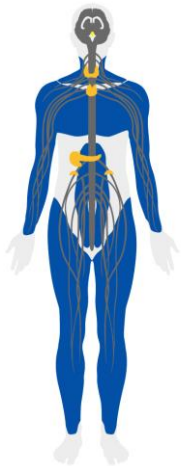
## LIGHT FEATURE LEVEL MATRIX

	Core and Shell	New and Existing Interiors	New and Existing Buildings
<b>53 VISUAL LIGHTING DESIGN</b>			
1: Visual Acuity for Focus	-	P	P
2: Brightness Management Strategies	-	P	P
<b>54 CIRCADIAN LIGHTING DESIGN</b>			
1: Melanopic Light Intensity for Work Areas	-	P	P
<b>55 ELECTRIC LIGHT GLARE CONTROL</b>			
1: Luminaire Shielding	-	P	P
2: Glare Minimization	P	P	P
<b>56 SOLAR GLARE CONTROL</b>			
1: View Window Shading	O	P	P
2: Daylight Management	O	P	P
<b>57 LOW-GLARE WORKSTATION DESIGN</b>			
1: Glare Avoidance	-	O	O
<b>58 COLOR QUALITY</b>			
1: Color Rendering Index	-	O	O
<b>59 SURFACE DESIGN</b>			
1: Working and Learning Area Surface Reflectivity	-	O	O
<b>60 AUTOMATED SHADING AND DIMMING CONTROLS</b>			
1: Automated Sunlight Control	-	O	O
2: Responsive Light Control	-	O	O
<b>61 RIGHT TO LIGHT</b>			
1: Lease Depth	O	O	O
2: Window Access	-	O	O
<b>62 DAYLIGHT MODELING</b>			
1: Healthy Sunlight Exposure	O	O	O
<b>63 DAYLIGHTING FENESTRATION</b>			
1: Window Sizes for Working and Learning Spaces	O	O	O
2: Window Transmittance in Working and Learning Areas	O	O	O
3: Uniform Color Transmittance	O	O	O

VISUAL LIGHTING DESIGN

Adequate light levels are needed for a broad variety of activities, including reading various qualities and types of print, and working on detail-oriented tasks. Brightness levels also contribute to the perception of spaciousness, as well as to the overall visual appeal of illuminated spaces. Targeted task lighting can provide the necessary amount of light at workspaces without over-illuminating ancillary spaces; ambient light levels of 300 lux are sufficient for most tasks. Pairing adjustable direct task lighting with indirect or diffuse ambient lighting allows user customization and good visual acuity while providing more suitable background light. Light intensity for visual acuity is measured in lux (or foot candles), which is a measure of the way the eye responds to light weighted to the response of the cone cells—the main photoreceptors for daytime vision, located on the retina of the human eye.

Intent: To support visual acuity by setting a threshold for adequate light levels and requiring luminance to be balanced within and across indoor spaces.



Endocrine  
Muscular  
Nervous

Core and Shell      New and Existing Interiors      New and Existing Buildings

PART 1: VISUAL ACUITY FOR FOCUS

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The following requirements are met at workstations or desks:

- a. The ambient lighting system is able to maintain an average light intensity of 215 lux [20 fc] or more, measured on the horizontal work plane. The lights may be dimmed in the presence of daylight, but they are able to independently achieve these levels.
- b. The ambient lighting system is zoned in independently controlled banks no larger than 46.5 m<sup>2</sup> [500 ft<sup>2</sup>] or 20% of open floor area of the room (whichever is larger).
- c.<sup>81</sup> If average ambient light is below 300 lux [28 fc] and meets Part 1a, task lights providing 300 to 500 lux [28 to 46 fc] at the work surface are available upon request.

## PART 2: BRIGHTNESS MANAGEMENT STRATEGIES

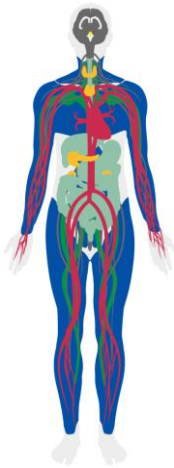
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Provide a narrative that describes strategies for maintaining luminance balance in spaces, which takes into consideration at least two of the following:

- a.<sup>52</sup> Maximum brightness contrasts between main rooms and ancillary spaces, such as corridors and stairwells, if present. For example, projects may establish that, while still maintaining lighting variety, a main room cannot exhibit 10 times greater or lesser luminance than an ancillary space.
- b.<sup>52</sup> Maximum brightness contrasts between task surfaces and immediately adjacent surfaces, including adjacent visual display terminal screens. For example, projects may establish that, while still maintaining lighting variety, a surface cannot exhibit 3 times greater or lesser luminance than an adjacent surface.
- c.<sup>52</sup> Brightness contrasts between task surfaces and remote, non-adjacent surfaces in the same room. For example, projects may establish that, while still maintaining lighting variety, a surface cannot exhibit 10 times greater or lesser luminance than another remote surface in the same room.
- d.<sup>52</sup> The way brightness is distributed across ceilings in a given room that maintains lighting variety but avoids both dark spots, or excessively bright, potentially glaring spots. For example, projects may establish that, while still maintaining lighting variety, one part of the ceiling cannot be 10 times greater or lesser luminance than another part of the ceiling in the same room.

## CIRCADIAN LIGHTING DESIGN

Light is one of the main drivers of the circadian system, which starts in the brain and regulates physiological rhythms throughout the body's tissues and organs, affecting hormone levels and the sleep-wake cycle. Circadian rhythms are kept in sync by various cues, including light which the body responds to in a way facilitated by intrinsically photosensitive retinal ganglion cells (ipRGCs): the eyes' non-image-forming photoreceptors. Through ipRGCs, lights of high frequency and intensity promote alertness, while the lack of this stimulus signals the body to reduce energy expenditure and prepare for rest. The biological effects of light on humans can be measured in Equivalent Melanopic Lux (EML), a proposed alternate metric that is weighted to the ipRGCs instead of to the cones, which is the case with traditional lux. During Performance Verification, EML is measured on the vertical plane at eye level of the occupant. Tables L1 and L2 in Appendix C show how to calculate the EML of individual lamps and larger spaces.



Cardiovascular  
Digestive  
Endocrine  
Immune  
Muscular  
Nervous

Intent: To support circadian health by setting a minimum threshold for daytime light intensity.

### PART 1: MELANOPIC LIGHT INTENSITY FOR WORK AREAS

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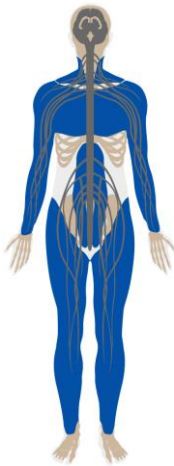
Light models or light calculations demonstrate that at least one of the following requirements is met:

- At 75% or more of workstations, at least 200 equivalent melanopic lux is present, measured on the vertical plane facing forward, 1.2 m [4 ft] above finished floor (to simulate the view of the occupant). This light level may incorporate daylight, and is present for at least the hours between 9:00 AM and 1:00 PM for every day of the year.
- For all workstations, electric lights provide maintained illuminance on the vertical plane facing forward (to simulate the view of the occupant) of 150 equivalent melanopic lux or greater.

## ELECTRIC LIGHT GLARE CONTROL

Non-diffuse, bright indoor lights create uneven levels of brightness in the visual field. The resulting glare, defined as “excessive brightness of the light-source, excessive brightness-contrasts and excessive quantity of light”, can cause visual discomfort (discomfort glare), fatigue, visual impairment and even injury (disability glare), and can be attributed to either direct or reflected glare. In the case of glare caused by electric light sources, lamps should be shielded based on their luminance. This quantity, often given in  $\text{cd}/\text{m}^2$ , can be measured directly or calculated from lighting specification sheets with sufficient detail. Light fixtures of greater luminous intensity require a greater shielding angle to reduce the likelihood of creating direct glare for occupants.

Intent: To minimize direct and overhead glare by setting limits on the luminous intensity of luminaires.



Muscular  
Nervous  
Skeletal

Core and Shell	New and Existing Interiors	New and Existing Buildings
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### PART 1: LUMINAIRE SHIELDING

The following shielding angles ( $\alpha = 90^\circ$  - cutoff angle) must be observed for lamps in regularly occupied spaces with luminance values in the ranges specified:

- No shielding required for less than  $20,000 \text{ cd}/\text{m}^2$  (including reflected sources).
- <sup>79</sup>  $\alpha$ :  $15^\circ$  for  $20,000$  to  $50,000 \text{ cd}/\text{m}^2$ .
- <sup>79</sup>  $\alpha$ :  $20^\circ$  for  $50,000$  to  $500,000 \text{ cd}/\text{m}^2$ .
- <sup>79</sup>  $\alpha$ :  $30^\circ$  for  $500,000 \text{ cd}/\text{m}^2$  and above.

### PART 2: GLARE MINIMIZATION

P	P	P
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At workstations, desks and other seating areas in regularly occupied spaces, one of the following requirements is met:

- <sup>52</sup> Luminaires more than  $53^\circ$  above the center of view (degrees above horizontal) have luminances less than  $8,000 \text{ cd}/\text{m}^2$ .
- Workstations achieve a UGR of 19 (or less).

## SOLAR GLARE CONTROL

Though bright light during the day is conducive to good health, uneven levels of brightness in the visual field can cause visual fatigue and discomfort. Glare, or excessive brightness, is caused by light scattering within the eye (intraocular scattering), thereby creating a “veil” of luminance that reduces the luminance contrast as received by the retina. In buildings, sources of glare are often unshielded or poorly shielded light, or sunlight directly hitting the eye or reflective surfaces.

Intent: To avoid glare from the sun by blocking or reflecting direct sunlight away from occupants.



Muscular  
Nervous  
Skeletal

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

### PART 1: VIEW WINDOW SHADING

O	P	P
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At least one of the following is present for all glazing less than 2.1 m [7 ft] above the floor in regularly occupied spaces (excluding lobbies):

- <sup>80</sup> Interior window shading or blinds that are controllable by the occupants or set to automatically prevent glare.
- External shading systems that are set to prevent glare.
- Variable opacity glazing, such as electrochromic glass, which can reduce transmissivity by 90% or more.

### PART 2: DAYLIGHT MANAGEMENT

O	P	P
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At least one of the following is required for all glazing greater than 2.1 m [7 ft] above the floor in regularly occupied spaces (excluding lobbies):

- <sup>80</sup> Interior window shading or blinds that are controllable by the occupants or set to automatically prevent glare.
- External shading systems that are set to prevent glare.
- Interior light shelves to reflect sunlight toward the ceiling.
- A film of micro-mirrors on the window that reflects sunlight toward the ceiling.
- Variable opacity glazing, such as electrochromic glass, which can reduce transmissivity by 90% or more.

## LOW-GLARE WORKSTATION DESIGN

Glare is commonly generated when high-intensity electric or natural light reflects off glossy surfaces that may be positioned at suboptimal angles in and around occupant spaces, in relation to windows. The resulting discomfort can be a hindrance to an otherwise comfortable and effective work environment. Adjusting the angle at which the light hits a surface can help guide the light away from reflecting directly into the eye, thereby avoiding glare.

Intent: To minimize visual discomfort by situating computer monitors in a way that avoids glare and luminance contrast.



Muscular  
Nervous  
Skeletal

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

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### PART 1: GLARE AVOIDANCE

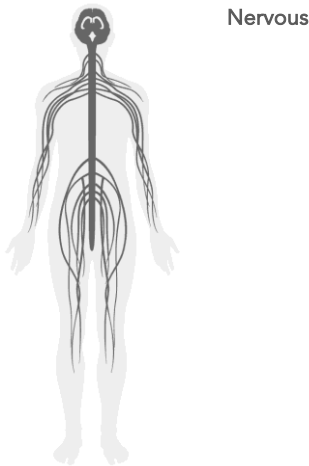
The following requirements are met:

- a. <sup>81</sup> To minimize glare caused by incoming sunlight, all computer screens at desks located within 4.5 m [15 ft] of view windows can be oriented within a 20° angle perpendicular to the plane of the nearest window.
- b. Overhead luminaires are not aimed directly at computer screens.

## COLOR QUALITY

Color quality is a function of the spectral output of a light source, the spectral absorbance/reflectance of an object, and the sensitivity of the eye’s cone photoreceptors to different wavelengths of light, which we perceive as color. Color quality impacts visual appeal and can either contribute to or detract from occupant comfort. Poor color quality can reduce visual acuity and the accurate rendering of illuminated objects. For instance, foods, human skin tones and plants may appear dull or unsaturated under lights that have low color quality metrics. Color rendering index (CRI) is a common way to measure color quality, capturing R1-R8 metrics. R9, while not always reported, is also included as part of this feature, as R9 values further take into consideration how we perceive the saturation of warmer hues.

Intent: To enhance spatial aesthetics and color differentiation through the use of lamps with quality color rendering abilities.



Nervous

Core and Shell	New and Existing Interiors	New and Existing Buildings
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-	○	○
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### PART 1: COLOR RENDERING INDEX

To accurately portray colors in the space and enhance occupant comfort, all electric lights in occupiable spaces (except decorative fixtures, emergency lights and other special-purpose lighting) meet the following conditions:

- a.<sup>80</sup> Color Rendering Index Ra (CRI, average of R1 through R8) of 80 or higher.
- b.<sup>80</sup> Color Rendering Index R9 of 50 or higher.



## SURFACE DESIGN

Exposure to light not only facilitates image-formation and color perception, but can also trigger a series of non-visual effects involving the regulation of the circadian cycle. Light exposure mainly occurs via two ways: (1) directly from luminous sources, and (2) indirectly from reflected surfaces. Since most light encountered within buildings is reflective, quality of surfaces greatly affects the amount of light ultimately reaching the eye. Surfaces with lower light reflectance values (LRVs) absorb light from the source and result in lower overall light intensity. Higher LRVs mean that the surface reflects more light from the source, resulting in maximum light intensity and promoting alertness and activity. Choosing surfaces with higher LRV values thus represents a good strategy for ensuring that a sufficient amount of light reaches the eye without increasing energy consumption or glare.



Endocrine  
Muscular  
Nervous

Intent: To increase overall room brightness through reflected light from room surfaces and avoiding glare.

Core and Shell	New and Existing Interiors	New and Existing Buildings
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### PART 1: WORKING AND LEARNING AREA SURFACE REFLECTIVITY

-	○	○
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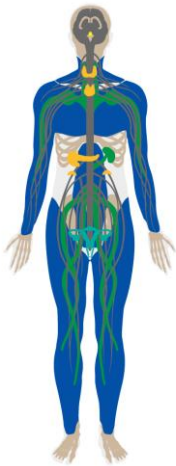
The following Light Reflectance Values (LRV) are met:

- a.<sup>80</sup> Ceilings have an average LRV of 0.8 (80%) or more for at least 80% of surface area in regularly occupied spaces.
- b.<sup>80</sup> Vertical surfaces have an average LRV of 0.7 (70%) or more for at least 50% of surface area directly visible from regularly occupied spaces.
- c. Furniture systems have an average LRV of 0.5 (50%) or more for 50% of surface area directly visible from regularly occupied spaces.

AUTOMATED SHADING AND DIMMING CONTROLS

Design features such as adjustable window shades and lights with dimmers must be actively managed to be effective. Automated controls can help to ensure that these systems continually operate as intended and meet intended benefits such as glare avoidance and energy reduction. Furthermore, setting these features to automatically adjust can greatly contribute to comfort without disrupting occupants from other tasks.

Intent: To prevent glare and encourage reliance on natural light through automated shading and dimming.



Endocrine  
Immune  
Muscular  
Nervous  
Reproductive  
Skeletal

Core and Shell	New and Existing Interiors	New and Existing Buildings
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PART 1: AUTOMATED SUNLIGHT CONTROL

All windows larger than 0.55 m<sup>2</sup> [6 ft<sup>2</sup>] have the following:

- a.<sup>80</sup> Shading devices that automatically engage when light sensors indicate that sunlight could contribute to glare at workstations and other seating areas.

-	○	○
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PART 2: RESPONSIVE LIGHT CONTROL

The following requirements are met in all major workspace areas:

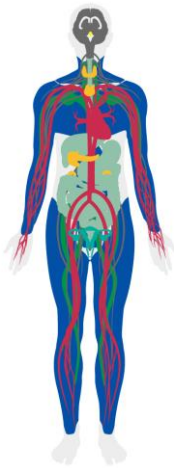
- a.<sup>80</sup> All lighting except decorative fixtures is programmed using occupancy sensors to automatically dim to 20% or less (or switch off) when the zone is unoccupied.
- b.<sup>80</sup> All lighting except decorative fixtures has the capacity and is programmed to dim continuously in response to daylight.

-	○	○
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RIGHT TO LIGHT

Exposure to adequate levels of sunlight is critical for health and well-being, for effects ranging from visual comfort to potential psychological and neurological gains: there are measurable physiological benefits to receiving the quality of light provided by the sun, as well as positive subjective reports from occupants able to enjoy access to sunlight. Proximity to windows, outdoor views and daylight in indoor spaces are some of the most sought-after elements of design. As such, buildings should utilize daylight as a primary source of lighting to the greatest extent possible.

Intent: To promote exposure to daylight and views of varying distances by limiting the distance workstations can be from a window or atrium.



- Cardiovascular
- Digestive
- Endocrine
- Immune
- Muscular
- Nervous
- Reproductive

PART 1: LEASE DEPTH

The following requirement is met:

- a. 75% of the area of all regularly occupied spaces is within 7.5 m [25 ft] of view windows.

PART 2: WINDOW ACCESS

The following conditions are met:

- a. 75% of all workstations are within 7.5 m [25 ft] of an atrium or a window with views to the exterior.
- b. 95% of all workstations are within 12.5 m [41 ft] of an atrium or a window with views to the exterior.

Core and Shell	New and Existing Interiors	New and Existing Buildings
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
-	<input type="radio"/>	<input type="radio"/>

## DAYLIGHT MODELING

Exposure to appropriate amounts of natural light reinforces the alignment of our circadian rhythms and reduces dependence on electricity for artificial lighting; however, excessive sunlight, during can cause glare and unwanted visual contrast. This is not only important to consider throughout the course of the day, but also throughout the course of the year, such that occupants are able to enjoy the benefits of daylight exposure in all seasons. Therefore, it is necessary to find a balance between Spatial Daylight Autonomy (sDA), which measures the percentage of floor area that receives adequate sunlight, and Annual Sun Exposure (ASE), which measures the percentage of floor area receives too much direct sunlight.

Intent: To support circadian and psychological health by setting thresholds for indoor sunlight exposure.



Cardiovascular  
Digestive  
Endocrine  
Immune  
Muscular  
Nervous  
Reproductive

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

### PART 1: HEALTHY SUNLIGHT EXPOSURE

Lighting simulations demonstrate that the following conditions are expected:

- a.<sup>1</sup> Spatial daylight autonomy (sDA300,50%) is achieved for at least 55% of regularly occupied space. In other words, at least 55% of the space receives at least 300 lux [28 fc] of daylight for at least 50% of operating hours each year.
- b.<sup>1</sup> Annual sunlight exposure (ASE1000,250) is achieved for no more than 10% of regularly occupied space. In other words, no more than 10% of the area can receive more than 1,000 lux [93 fc] for 250 hours each year.

## DAYLIGHTING FENESTRATION

Exposure to natural light can improve occupant mood, alertness and overall health. Ideal lighting involves proper exposure to diffuse daylight, as well as careful design of windows and glazing to avoid excessive glare and heat gain. Windows are therefore a key variable for both ensuring that occupants receive enough light for positive physiological and subjective effects, but also not too much light that causes discomfort or becomes a source of distraction. Balancing energy performance, thermal comfort and access to quality daylight are essential to proper building design.

Intent: To optimize occupant exposure to daylight and limit glare through enhanced fenestration parameters.



Cardiovascular  
Digestive  
Endocrine  
Immune  
Muscular  
Nervous  
Reproductive

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

### PART 1: WINDOW SIZES FOR WORKING AND LEARNING SPACES

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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The following conditions are met on façades along regularly occupied spaces:

- Window-wall ratio as measured on external elevations is between 20% and 60%. Percentages greater than 40% require external shading or adjustable opacity glazing to control unwanted heat gain and glare.
- Between 40% and 60% of window area is at least 2.1 m [7 ft] above the floor.

### PART 2: WINDOW TRANSMITTANCE IN WORKING AND LEARNING AREAS

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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The following visible transmittance (VT) conditions are met for all non-decorative glazing:

- All glazing (excluding skylights) located higher than 2.1 m [7 ft] from the floor has VT of 60% or more.
- All glazing located 2.1 m [7 ft] or lower from the floor has VT of 50% or more.

### PART 3: UNIFORM COLOR TRANSMITTANCE

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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All windows used for daylighting meet the following requirement:

- The visible light transmittance of wavelengths between 400 and 650 nm does not vary by more than a factor of 2.



# FITNESS

# BACKGROUND

The Centers for Disease Control (CDC) define fitness as “the ability to carry out daily tasks with vigor and alertness, without undue fatigue, and with ample energy to enjoy leisure-time pursuits and respond to emergencies”. Regular physical activity is essential to achieve optimal health, including weight management, chronic disease prevention and fitness maintenance. The American College of Sports Medicine, among others, recommends that all healthy adults engage in at least 30 minutes of moderate-intensity aerobic activity five days per week, and muscle-strengthening activities at least two days per week. Numerous types of physical activities, including walking, running, cycling, swimming and resistance training have demonstrated health benefits, with greater gains when performed at higher intensities or for longer periods of time.

However, the majority of people today are physically inactive. Modern transportation, labor saving conveniences and sedentary jobs have created an environment in which millions of people fail to achieve the minimum level of activity necessary to help prevent type 2 diabetes, metabolic syndrome, obesity, heart disease and other chronic conditions. In the U.S. alone, fewer than 50% of elementary school students, 10% of adolescents and 5% of adults obtain 30 minutes of daily physical activity. An average adult obtains only 6-10 minutes of moderate to vigorous intensity physical activity a day. The situation is similar worldwide—over 60% of all people do not get the recommended daily 30-minute minimum of moderate-intensity physical activity, and are thus considered inactive.

Physical inactivity poses one of the biggest modern threats to public health. It is an independent risk factor for numerous chronic diseases and is estimated to be responsible for 30% of ischemic heart disease, 27% of type 2 diabetes and 21-25% of breast and colon cancer cases. Lack of physical activity can also increase the odds of having a stroke by 20-30% and shave off 3-5 years of life. Together, these and other conditions make physical inactivity the fourth leading risk factor for mortality, accounting for 6-9% of deaths worldwide, or three to five million mortalities every year.

While the issue of insufficient activity is multi-faceted, one of the factors known to impact physical activity levels is the built environment. Neighborhood walkability, access to and use of mass transit, active transportation, availability of physical activity facilities near workplaces and homes, stair accessibility in buildings, active furnishings and many other factors can affect the physical activity level of an individual. Considering that 90% of our time is spent within the built environment, urban planning and building design strategies that are consciously articulated either to encourage more physical activity or discourage sedentariness can constitute powerful intervention strategies to promote a more active lifestyle.

The WELL Building Standard® recognizes the physical activity-promoting policies and strategies that can be implemented in the built environment to encourage physical activity and reduce sedentariness, thus helping to combat obesity and other chronic diseases.

# INTENT

The WELL Building Standard for Fitness promotes the integration of physical activity into everyday life by providing the opportunities and support for an active lifestyle and discouraging sedentary behaviors.

## FITNESS FEATURE LEVEL MATRIX

	Core and Shell	New and Existing Interiors	New and Existing Buildings
<b>64 INTERIOR FITNESS CIRCULATION</b>			
1: Stair Accessibility and Promotion	P	O	P
2: Staircase Design	P	O	P
3: Facilitative Aesthetics	P	O	P
<b>65 ACTIVITY INCENTIVE PROGRAMS</b>			
1: Activity Incentive Programs	-	P	P
<b>66 STRUCTURED FITNESS OPPORTUNITIES</b>			
1: Fitness Programs	-	O	O
2: Fitness Education	-	O	O
<b>67 EXTERIOR ACTIVE DESIGN</b>			
1: Pedestrian Amenities	O	O	O
2: Pedestrian Promotion	O	O	O
3: Neighborhood Connectivity	O	O	O
<b>68 PHYSICAL ACTIVITY SPACES</b>			
1: Site Space Designation for Offices	O	O	O
2: External Exercise Spaces	O	O	O
<b>69 ACTIVE TRANSPORTATION SUPPORT</b>			
1: Bicycle Storage and Support	O	O	O
2: Post Commute and Workout Facilities	O	O	O
<b>70 FITNESS EQUIPMENT</b>			
1: Cardiorespiratory Exercise Equipment	O	O	O
2: Muscle-strengthening Exercise Equipment	O	O	O
<b>71 ACTIVE FURNISHINGS</b>			
1: Active Workstations	-	O	O
2: Prevalent Standing Desks	-	O	O



## INTERIOR FITNESS CIRCULATION

The integration of interior pathways and stairs within the built environment can provide a convenient way to incorporate short periods of physical activity into the workday, thus reducing sedentary tendencies. Stair climbing is a low-impact, moderate-to-vigorous intensity physical activity that burns calories and has been associated with improved cardiorespiratory fitness and a lower risk of stroke. To encourage greater use, pathways and stairs should be aesthetically pleasing and easily accessible from high-traffic routes.

Intent: To encourage intermittent bouts of physical activity and reduce sedentary behavior through accessible, safe, and visually appealing stairs, entryways, and corridors.



Cardiovascular  
Muscular  
Skeletal

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

P

O

P

### PART 1: STAIR ACCESSIBILITY AND PROMOTION

In projects of 2 to 4 floors, at least one common staircase meets the following requirements:

- a. <sup>27</sup> Stairs are accessible to regular building occupants during all regular business hours.
- b. <sup>87</sup> Throughout the space, wayfinding signage and point-of-decision prompts are present to encourage stair use (at least one sign per elevator bank).

### PART 2: STAIRCASE DESIGN

P

O

P

In projects of 2 to 4 floors, at least one common staircase meets the following requirements:

- a. <sup>27</sup> Located within 7.5 m [25 ft] of the main project entrance, main entry check-point (e.g., welcome/reception desk), the edge of its main lobby, or edge of its main welcome area.
- b. <sup>27</sup> Clearly visible from the main project entrance, main entry check-point (e.g., welcome/reception desk), the edge of its main lobby, or edge of its main welcome area, or are located visually before any elevators present upon entering from the main entrance.
- c. <sup>87</sup> Stair width set at a minimum of 1.4 m [56 in] between handrails, or the maximum width allowable by local code.

### PART 3: FACILITATIVE AESTHETICS

P

O

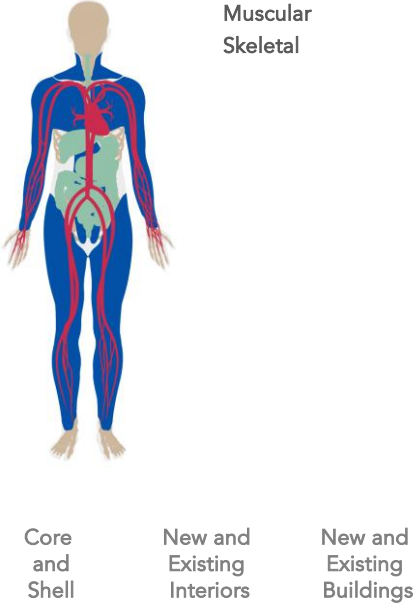
P

In projects of 2 to 4 floors, both common stairs and paths of frequent travel display elements of aesthetic appeal by incorporating at least 2 of the following throughout:

- a. <sup>87</sup> Artwork.
- b. <sup>87</sup> Music.
- c. <sup>27</sup> Daylighting using windows or skylights of at least 1 m<sup>2</sup> [10.8 ft<sup>2</sup>] in size.
- d. <sup>87</sup> View windows to the outdoors or building interior.
- e. Light levels of at least 215 lux [20 fc] when in use.
- f. Biophilic elements.

# ACTIVITY INCENTIVE PROGRAMS

The health benefits of physical activity are numerous, from reduced risk of chronic diseases such as cancer, cardiovascular disease and diabetes, to better mental health and increased quality of life. In addition, relatively small amounts of activity can lead to significant benefits: just 2.5 hours of moderate-intensity physical activity per week can reduce overall mortality risk by nearly 20%. Research shows that even small incentives can significantly influence individual decisions and behaviors towards physical activity. However, the effectiveness of varying types of incentives (e.g., monetary, non-monetary), their distribution schedule, their magnitude, and their relationship to specific types of activity engagement remain largely unknown. In addition, implementation of physical activity incentives for different populations and geographic regions adds an additional layer of complexity in prescribing and implementing effective incentive programs. Therefore, projects play a fundamental role in defining and creating incentive programs that are meaningful to their project population and aim to help develop and maintain regular exercise and physical activity behaviors.



Intent: To promote active lifestyles through the provision of physical activity incentive programs.

## PART 1: ACTIVITY INCENTIVE PROGRAMS

-	P	P
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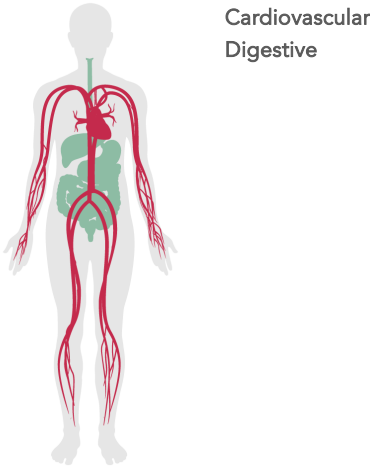
At least two of the following are implemented for all full-time employees:

- <sup>88</sup> Tax-exempt payroll deductions relating to active transportation (e.g., a subsidy to purchase a personal bicycle) or mass transit (includes public transportation) use. Direct subsidies of an equivalent amount are also acceptable.
- <sup>82</sup> Meaningful reimbursements or incentive payments (including non-monetary) offered for every 6-month period that an employee meets a 50-visit minimum to a gym or physical activity program.
- A meaningful subsidy offered at least yearly towards participation or membership costs for fitness activities such as races, group fitness classes, sports teams, fitness centers, training centers, gyms, or studios. Direct subsidies of an equivalent amount are also acceptable.
- A meaningful subsidy offered at least yearly towards the cost of an annual bicycle share membership
- No cost or discounted physical activity opportunities or memberships, in which it can be demonstrated that 30% of occupants have utilized on a regular basis (at least weekly) over the last six months.

STRUCTURED FITNESS OPPORTUNITIES

Access to advice and training programs developed by experts can help individuals learn new fitness techniques and achieve physical health goals. Individuals with special considerations that require further guidance to ensure they engage in physical activity routines that are safe and appropriate for their level or particular disability can especially benefit from expert guidance. Training programs, depending on frequency and duration, can help increase aerobic fitness and muscle endurance, assist in weight loss, lower blood pressure and decrease worker absenteeism. Providing individuals with access to fitness services is an important step towards making exercise a part of a healthy work culture.

Intent: To promote safe and convenient exercise through access to on-site professional fitness training and education.



Core and Shell	New and Existing Interiors	New and Existing Buildings
-	<input type="radio"/>	<input type="radio"/>

PART 1: FITNESS PROGRAMS

The following is offered from a qualified professional at least once a month:

- a. <sup>84</sup> Onsite fitness or training programs.

PART 2: FITNESS EDUCATION

-	<input type="radio"/>	<input type="radio"/>
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Classes from a qualified professional are offered at least once every 3 months to cover the following:

- a. Different modes of exercise.
- b. Safe fitness techniques.
- c. Comprehensive exercise regimens.

## EXTERIOR ACTIVE DESIGN

Greater land-use mix has been linked to higher physical activity levels and lower rates of obesity. In addition, the presence of retail shops, bus stops and offices within walking distance from residences is linked to a higher likelihood of walking and using transit. Similarly, integrating elements of active design into the building and site, and creating cyclist and pedestrian-friendly environments around the building can help incentivize physical activity. Providing facilities such as benches, drinking fountains and water bottle refilling stations along a building's walking routes can help support occupant activity throughout the day. Incorporating active design principles is particularly important for projects that are isolated from urban centers where automobile transportation predominates.

Intent: To promote active lifestyles through the integration of active design elements into the building exterior.



Cardiovascular  
Muscular  
Nervous  
Respiratory  
Skeletal

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

### PART 1: PEDESTRIAN AMENITIES

Sites in which the building takes up less than 75% of the total lot size provide at least one of the following within highly-trafficked areas, such as building entrances, public transportation stops, walking paths and plazas:

- a. <sup>87</sup> A bench.
- b. <sup>87</sup> A cluster of movable chairs and tables.
- c. <sup>87</sup> A drinking fountain or water refilling station.

### PART 2: PEDESTRIAN PROMOTION

To encourage more pedestrian activity, sites in which the building takes up less than 75% of the total lot size include at least two of the following in the outdoors:

- a. <sup>87</sup> A water fountain or other water feature.
- b. <sup>87</sup> A plaza or open air courtyard.
- c. A garden or other landscaped elements.
- d. <sup>87</sup> Public art.

### PART 3: NEIGHBORHOOD CONNECTIVITY

To encourage neighborhood connectivity and daily activity, at least one of the following requirements is met:

- a. <sup>86</sup> The building address has a Walk Score® of 70 or greater.
- b. <sup>1</sup> At least four existing and publicly available diverse uses (listed in LEED BD+C: Surrounding Density and Diverse Uses, Appendix 1) are present within 800 m [0.5 mi] of the main building entrance.

## PHYSICAL ACTIVITY SPACES

In the U.S., the presence of both indoor and outdoor physical activity facilities within a census-block group is associated with an increased likelihood of performing five or more bouts of moderate- to vigorous-intensity physical activity per week, and is linked to a lower risk of being overweight. In addition, buildings that contain an interior fitness space incentivize occupants to engage in regular exercise routines and allow a variety of exercise activities, including low-impact exercises like yoga or Pilates, or more intense activities such as aerobic and muscle-strengthening exercise.

Intent: To promote physical activity through complimentary access to on-site indoor and local outdoor physical activity spaces.



Cardiovascular  
Muscular  
Skeletal

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

### PART 1: SITE SPACE DESIGNATION FOR OFFICES



Spaces with more than 10 regular occupants provide complimentary access to the following:

- a. <sup>87</sup> Dedicated exercise space that is at least 18.6 m<sup>2</sup> [200 ft<sup>2</sup>] plus 0.1 m<sup>2</sup> [1 ft<sup>2</sup>] per regular building occupant, up to a maximum of 370 m<sup>2</sup> [4,000 ft<sup>2</sup>].

### PART 2: EXTERNAL EXERCISE SPACES



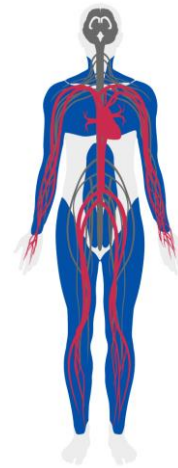
At least one of the following spaces is within 0.8 km [0.5 mi] walking distance of the main project entrance with complimentary access:

- a. <sup>87</sup> A green space or park with playground features.
- b. <sup>1</sup> A workout station or fitness zone.
- c. A trail network.
- d. An accessible body of water or public swimming pool.
- e. A gym, fitness or training center.
- f. A recreational field.

## ACTIVE TRANSPORTATION SUPPORT

Active transportation is a cost-effective way to integrate physical activity into daily routines while reducing carbon footprint. Biking or walking to work has been associated with lower rates of diabetes, hypertension, overweight and obesity. Showers and changing rooms at work are preferred by the majority of employees as a support strategy for more physical activity. Therefore, providing amenities and facilities on-site can support the ability of occupants to engage in active commuting.

Intent: To promote daily physical activity through the provision of complimentary on-site support for active commuting.



Cardiovascular  
Nervous

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

### PART 1: BICYCLE STORAGE AND SUPPORT



The following are provided onsite or within 200 m [650 ft] of the main project entrance:

- a. Basic bicycle maintenance tools, including tire pumps, patch kits and hex keys available for use.
- b.<sup>18</sup> Separate and secure bicycle storage for at least 5% of regular building occupants, as well as short-term bicycle storage for at least 2.5% of all peak visitors.

### PART 2: POST COMMUTE AND WORKOUT FACILITIES



The following are provided onsite or within 200 m [650 ft] of the main project entrance:

- a.<sup>18</sup> One shower with changing facility for the first 100 regular building occupants and one additional shower for every 150 regular building occupants thereafter.
- b. One locker for every 5 regular building occupants, or evidence that the lockers provided exceed demand by at least 20%.

## FITNESS EQUIPMENT

Convenient access to varied types of fitness equipment can make regular exercise habits easier to achieve. Aerobic and muscle-strengthening activities each provide unique health benefits, including weight control, lower risk of cardiovascular disease, diabetes and cancer, better bone health, cardiorespiratory and muscular fitness, and improved cognitive function. Providing equipment that allows for a variety of exercise options can give occupants a wider range of health benefits.

Intent: To promote both cardiovascular and muscle-strengthening exercise by providing complimentary access to on-site fitness equipment.



Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

### PART 1: CARDIORESPIRATORY EXERCISE EQUIPMENT

The following requirement is met:

- a. <sup>27</sup> Projects provide some combination of cardiorespiratory exercise equipment in an interior fitness space free of charge, in a quantity that would allow use by at least 1% of regular building occupants and accompanied by instructions for safe use.

### PART 2: MUSCLE-STRENGTHENING EXERCISE EQUIPMENT

The following requirement is met:

- a. <sup>27</sup> Projects provide some combination of muscle-strengthening exercise equipment in an interior fitness space free of charge, in a quantity that would allow use by at least 1% of regular building occupants and accompanied by instructions for safe use.





## ACTIVE FURNISHINGS

Most individuals spend the majority of their time indoors in a seated position. Prolonged sitting is associated with a number of adverse health conditions, including an increased risk of cancer, weight gain, and greater fatigue and back discomfort. In addition, sitting burns 50 fewer calories per hour than standing, and sitting for more than 3 hours per day is associated with a 2-year lower life expectancy. Unfortunately, regular exercise does not appear to negate the health consequences of long periods of sitting. Therefore, creating opportunities that mitigate prolonged sitting, while sustaining work productivity is essential to reduce sitting time during the workday.

Intent: To reduce sedentary behavior by making active workstations readily available to occupants.



Cardiovascular  
Muscular  
Skeletal

Core  
and  
Shell

New and  
Existing  
Interiors

New and  
Existing  
Buildings

### PART 1: ACTIVE WORKSTATIONS

Some combination of the following is required for 3% or more of employees (minimum one), and are available for any employee to reserve or use:

- Treadmill desks.
- Bicycle desks.
- Portable desk pedal or stepper machine.

### PART 2: PREVALENT STANDING DESKS

At least 60% of workstations feature one of the following:

- Adjustable height standing desk.
- Standard desk with desk-top height adjustment stand.
- Pairs of fixed-height desks of standing and seated heights (which need not be located adjacent to each other).



# COMFORT

# BACKGROUND

The indoor environment should be a place of comfort. In pursuit of that vision, the WELL Building Standard® focuses on significantly reducing the most common sources of physiological disruption, distraction and irritation and on enhancing acoustic, ergonomic, olfactory and thermal comfort to prevent stress and injury and facilitate comfort, productivity and well-being.

Built environments can harbor sounds that are distracting and disruptive to work or relaxation. Employee surveys show that acoustic problems are a leading source of dissatisfaction within the environmental conditions of an office. As acoustic comfort is determined in part by the physical properties and contents of environments, the WELL Building Standard aims to shape spaces to mitigate unwanted indoor noise levels and reduce exterior noise intrusion in order to enhance social interaction, learning, satisfaction and productivity. While noise is ubiquitous, we are able to adopt policies, technologies and practices that ensure quieter acoustical environments and minimize our exposure to harmful and unnecessary sound.

In addition to acoustic comfort, ergonomics and universal design play a significant role in mitigating physical and mental stress. Most of the adverse health effects related to ergonomics are seen in the musculoskeletal and nervous systems of the human body. Musculoskeletal disorders (MSDs), including low back pain, neck pain, osteoarthritis and others are extremely common in nearly all populations. Low back pain affects about 31 million Americans, and 380,600 days of work were missed in 2013 because of musculoskeletal disorders, accounting for one third of the total number of days away from work. The statistics are similar worldwide and in 2010, nearly 7% (more than 169 million) of all disability-adjusted life years (DALYs) resulted from musculoskeletal disorders. The WELL Building Standard promotes comprehensive ergonomics solutions that help prevent stress and injury and facilitate comfort and well-being. These design strategies not only provide access for people with limited mobility, but also prevent injury by encouraging navigable spaces for everyone.

Thermal comfort is another factor that plays a large role in the way we experience places where we live and work. In 2006, only 11% of the office buildings surveyed in the U.S. provided thermal environments that met generally accepted goals of occupant satisfaction. Six primary personal and environmental variables contribute to an occupant's thermal comfort: air speed, dry bulb temperature, radiant temperature, humidity, metabolic rate and clothing or other insulation, all of which interact to create a subjective, individualized response. Finally, in addition to the measurable metrics, there are also psychological parameters such as individual expectations that may also affect thermal comfort. This makes thermal comfort subjective, meaning that not everyone will be equally comfortable under the same conditions. The WELL Building Standard takes a holistic approach to thermal comfort and provides a combination of strategies to address occupant issues.

# INTENT

The WELL Building Standard for Comfort establishes requirements designed to create distraction-free, productive and comfortable indoor environments.

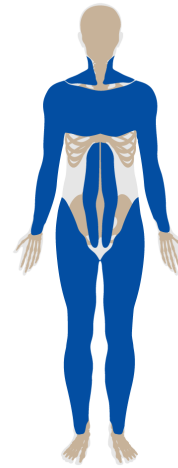
## COMFORT FEATURE LEVEL MATRIX

	Core and Shell	New and Existing Interiors	New and Existing Buildings
<b>72 ACCESSIBLE DESIGN</b>			
1: Accessibility and Usability	P	P	P
<b>73 ERGONOMICS: VISUAL AND PHYSICAL</b>			
1: Visual Ergonomics	-	P	P
2: Desk Height Flexibility	-	P	P
3: Seat Flexibility	-	P	P
<b>74 EXTERIOR NOISE INTRUSION</b>			
1: Sound Pressure Level	P	O	P
<b>75 INTERNALLY GENERATED NOISE</b>			
1: Acoustic Planning	-	P	P
2: Mechanical Equipment Sound Levels	O	P	P
<b>76 THERMAL COMFORT</b>			
1: Ventilated Thermal Environment	P	P	P
2: Natural Thermal Adaptation	P	P	P
<b>77 OLFACTORY COMFORT</b>			
1: Source Separation	-	O	O
<b>78 REVERBERATION TIME</b>			
1: Reverberation Time	-	O	O
<b>79 SOUND MASKING</b>			
1: Sound Masking Use	-	O	O
2: Sound Masking Limits	-	O	O
<b>80 SOUND REDUCING SURFACES</b>			
1: Ceilings	-	O	O
2: Vertical Surfaces	-	O	O
<b>81 SOUND BARRIERS</b>			
1: Wall Construction Specifications	-	O	O
2: Doorway Specifications	-	O	O
3: Wall Construction Methodology	-	O	O
<b>82 INDIVIDUAL THERMAL CONTROL</b>			
1: Free Address	-	O	O
2: Personal Thermal Comfort Devices	-	O	O
<b>83 RADIANT THERMAL COMFORT</b>			
1: Lobbies and Other Common Spaces	O	-	O
2: Offices and Other Regularly Occupied Spaces	-	O	O

## ACCESSIBLE DESIGN

Ensuring that individuals with physical disabilities have access and mobility is an important aspect of an equitable building environment.

Intent: To promote equity by providing buildings that are accessible and usable by people of all physical abilities.



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### PART 1: ACCESSIBILITY AND USABILITY

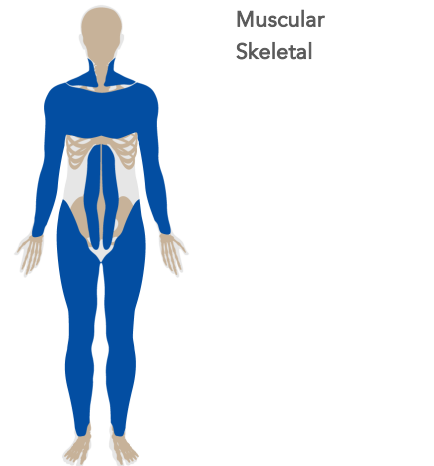
The project demonstrates compliance with one of the following:

- a.<sup>89</sup> Current ADA Standards for Accessible Design or comparable local code or standards.
- b.<sup>42</sup> ISO 21542:2011 - Building Construction - Accessibility and Usability of the Built Environment.

## ERGONOMICS: VISUAL AND PHYSICAL

Overuse of the same muscles and ligaments while trying to adjust to static furniture or equipment over time can cause discomfort and strain the body, especially in occupational environments that require repetitive tasks. Under such conditions, the effects of even slight visual or physical discomfort are compounded, leading to decreased occupant comfort and focus.

Intent: To reduce physical strain and maximize ergonomic comfort and safety.



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### PART 1: VISUAL ERGONOMICS

The following requirement is met:

- a. <sup>83</sup> All computer screens, including laptops, are adjustable in terms of height and distance from the user.

### PART 2: DESK HEIGHT FLEXIBILITY

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At 30% of workstations that are at seated height or similar work surfaces, users have the ability to alternate between sitting and standing through one of the following:

- a. Adjustable height sit-stand desks.
- b. Desk-top height adjustment stands.
- c. Pairs of fixed-height desks of standing and seated heights (which need not be located adjacent to each other).

### PART 3: SEAT FLEXIBILITY

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Occupant furnishings are adjustable in the following ways:

- a. <sup>178</sup> Workstation chair height adjustability is compliant with the HFES 100 standard or BIFMA G1 guidelines.
- b. <sup>178</sup> Workstation seat depth adjustability is compliant with the HFES 100 standard or BIFMA G1 guidelines.

## EXTERIOR NOISE INTRUSION

Particularly in urban areas, loud or repetitive exterior noises can be a source of stress and a risk factor for certain health outcomes. Studies show that individuals exposed to traffic noise have a higher risk for diabetes, stroke and heart attack, and those exposed to road traffic and aircraft noises have a higher risk for hypertension. In addition, exposure to noise can lead to reduced reaction time and increased levels of annoyance. Preventing excessive exterior noise from reaching building interiors can help improve occupant comfort and well-being.

Intent: To reduce acoustic disruptions by limiting external noise intrusion.



Cardiovascular  
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### PART 1: SOUND PRESSURE LEVEL

Each regularly occupied space meets the following sound pressure level as measured when the space and adjacent spaces are unoccupied, but within 1 hour of normal business hours:

- a. Average sound pressure level from outside noise intrusion does not exceed 50 dBA.

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## INTERNALLY GENERATED NOISE

Electronics, HVAC systems, mechanical equipment and other noise-emitting office devices, as well as occupants themselves, can be sources of indoor noise. As offices and workspaces are increasingly designed to promote employee interaction, occupants can experience decreased levels of privacy and acoustic comfort, especially when users with different job types share a space. Office noise can lead to decreased productivity, especially in open-plan offices where aural distractions and interruptions from other employees are frequent. Additionally, studies show that exposure to noise generated within the building can lead to reduced concentration and mental arithmetic performance, and increased distraction due to reduced speech privacy.

Intent: To reduce acoustic disruptions from internal noise sources and increase speech privacy:



Cardiovascular  
Endocrine  
Nervous

### PART 1: ACOUSTIC PLANNING

An acoustic plan is developed that identifies the following spaces and potential sources of disruption:

- a. <sup>90</sup> Loud and quiet zones.
- b. Noisy equipment in the space.

### PART 2: MECHANICAL EQUIPMENT SOUND LEVELS

The mechanical equipment system meets the following requirements once interior build-out is complete in the following spaces:

- a. <sup>90</sup> Open office spaces and lobbies that are regularly occupied and/or contain workstations: maximum noise criteria (NC) of 40.
- b. <sup>90</sup> Enclosed offices: maximum noise criteria (NC) of 35.
- c. Conference rooms and breakout rooms: maximum noise criteria (NC) of 30 (25 recommended).

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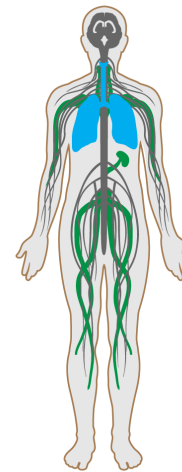
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## THERMAL COMFORT

Thermal comfort in the body is provided through homeothermy, the balancing of heat gains and losses to maintain the body's core temperature within its narrow range, 36-38 °C [97-100 °F], and regulated by the hypothalamus. Thermal comfort can affect mood, performance and productivity. However, temperature preferences are highly personal and differ from one individual to another. Balancing the energy requirements of large buildings with the varied occupant preferences can thus be challenging.

Intent: To promote occupant productivity and ensure a sufficient level of thermal comfort.



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Integumentary  
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### PART 1: VENTILATED THERMAL ENVIRONMENT

All occupiable spaces in mechanically-conditioned projects (including circulation areas) meet the design, operating and performance criteria:

- a. <sup>92</sup> ASHRAE Standard 55-2013 Section 5.3, Standard Comfort Zone Compliance.

### PART 2: NATURAL THERMAL ADAPTATION

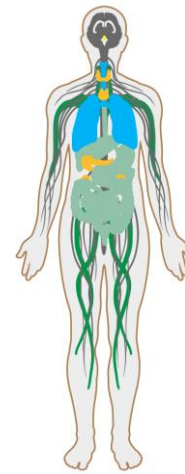
All occupiable spaces in naturally-conditioned projects meet the following criteria:

- a. <sup>92</sup> ASHRAE Standard 55-2013 Section 5.4, Adaptive Comfort Model.

## OLFACTORY COMFORT

Excessively strong or distinct odors can disrupt physical and psychological comfort, and even trigger eye, nose and throat irritation, nausea and headaches. Limiting these odors is a simple strategy that can greatly contribute to occupant comfort and well-being.

Intent: To maximize olfactory comfort by reducing the transmission of strong smells and odors within the building.



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### PART 1: SOURCE SEPARATION

All restrooms, janitorial closets, kitchens, cafeterias and pantries prevent strong odors from migrating to workspaces through one or more of the following separation methods:

- Negative pressurization.
- Self-closing doors.
- Hallways, vestibules or other intermediate areas.

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## REVERBERATION TIME

Reverberation time, or RT60, is a metric which describes the length of time taken for a sound to decay by 60 dB from its original level. Optimal reverberation times vary depending on room volume, intended use of the space and the frequency of transmitted sound. In spaces with high reverberation times, the sounds of voices and footsteps take longer to dissipate, contributing to higher levels of ambient noise. The noise produced by reverberation can decrease speech intelligibility and in some situations cause additional stress. This performance specification can be met through the use of sound-absorbing materials on various surface and design elements.

Intent: To help maintain comfortable sound levels by limiting reverberation times.



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### PART 1: REVERBERATION TIME

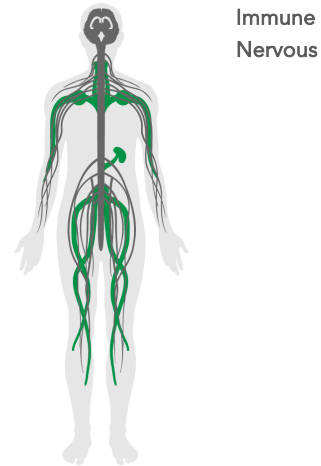
The following spaces have maximum reverberation time (RT60) as described:

- a. <sup>90</sup> Conference rooms: 0.6 seconds.
- b. Open workspaces: 0.5 seconds.

## SOUND MASKING

Ambient silence can be just as distracting as a loud environment as it highlights acoustical disturbances and decreases speech privacy. Overhearing private conversations is reported as a specific cause of employee acoustic dissatisfaction in open offices. Sound masking systems supply a low level of background noise to provide workers with a degree of confidentiality in their communications and can decrease distraction associated with aural interruptions.

Intent: To reduce acoustic disruptions and increase speech privacy by implementing sound masking into the building design.



### PART 1: SOUND MASKING USE

All open workspaces use the following:

- a. <sup>90</sup> Sound masking systems.

### PART 2: SOUND MASKING LIMITS

If sound masking systems are used, sound levels fall within the following range, when measured from the nearest workspace:

- a. <sup>90</sup> Open workspaces: 45 - 48 dBA.
- b. <sup>90</sup> Enclosed offices: 40 - 42 dBA.

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SOUND REDUCING SURFACES

Proper design and construction are not always enough to achieve acoustic comfort in buildings. Sources that contribute to acoustic dissatisfaction such as sound transmission from internal and external sources, footfall noise and voices from adjacent spaces are difficult to control. However, sound reduction treatments that incorporate absorptive surfaces, such as wall panels, ceiling baffles and surface enhancements can help with reverberation management and improve acoustic comfort. The noise reduction coefficient (NRC) of a material is an average value that determines its absorptive properties. The larger the NRC value, the better the material is at absorbing sound under standardized conditions.

Intent: To reduce sound reverberation and maintain comfortable sound levels through absorptive ceiling and vertical surfaces.



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PART 1: CEILINGS

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The following spaces, if present, have ceilings that meet the specifications described:

- a. <sup>90</sup> Open workspaces: minimum NRC of 0.9 for the entire surface area of the ceiling (excluding lights, skylights, diffusers, beams, joists and grilles).
- b. <sup>90</sup> Conference and teleconference rooms: minimum NRC of 0.8 on at least 50% of the surface area of the ceiling (excluding lights, skylights, diffusers, beams, joists and grilles).

PART 2: VERTICAL SURFACES

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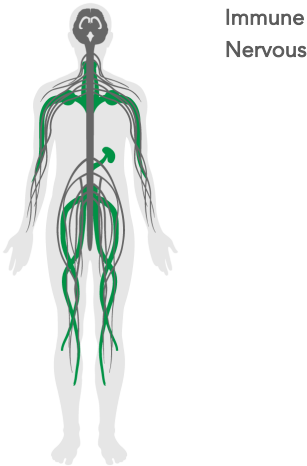
The following spaces, if present, have vertical surfaces that meet the NRC specifications described:

- a. <sup>90</sup> Enclosed offices, conference and teleconference rooms: minimum NRC of 0.8 on at least 25% of the surface area of interior surrounding walls.
- b. <sup>90</sup> Open workspaces: minimum NRC of 0.8 on at least 25% of the surface area of the surrounding walls.
- c. <sup>90</sup> Partitioned office spaces: partitions reach at least 1.2 m [48 inches] and have a minimum NRC of 0.8.

SOUND BARRIERS

Noise from adjacent spaces can be disturbing to building occupants. Careful detailing and high quality construction materials can greatly improve the sound reducing abilities of interior partitions or doors that act as sound barriers and reduce sound transmission between adjacent spaces.

Intent: To reduce sound transmission and acoustic disruptions through sound barriers.



Core and Shell	New and Existing Interiors	New and Existing Buildings
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PART 1: WALL CONSTRUCTION SPECIFICATIONS

The following spaces, if present, have interior partition walls that meet the Sound Transmission Class (STC) described:

- a. <sup>90</sup> Enclosed offices: minimum STC of 40 when a sound masking system is present, or minimum STC of 45 when no sound masking system is used.
- b. <sup>90</sup> Conference rooms and teleconference rooms: minimum STC of 53 on walls adjoining private offices, conference rooms or other teleconference rooms.

PART 2: DOORWAY SPECIFICATIONS

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Doors connecting to private offices, conference rooms and teleconference rooms are constructed with at least one of the following:

- a. <sup>90</sup> Gaskets.
- b. <sup>90</sup> Sweeps.
- c. <sup>90</sup> Non-hollow core.

PART 3: WALL CONSTRUCTION METHODOLOGY

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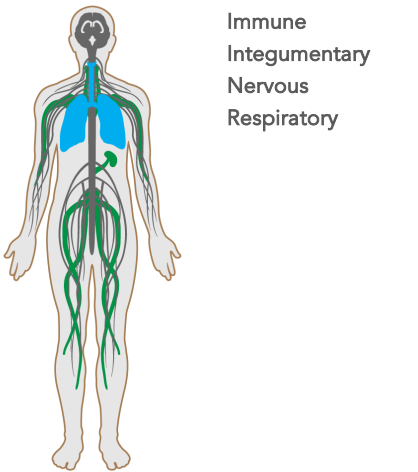
All interior walls enclosing regularly occupied spaces are constructed for optimal performance by reducing air gaps and limiting sound transmission through the following:

- a. <sup>90</sup> Properly sealing all acoustically rated partitions at the top and bottom tracks.
- b. <sup>90</sup> Staggering all gypsum board seams.
- c. <sup>90</sup> Packing and sealing all penetrations through the wall.

INDIVIDUAL THERMAL CONTROL

Thermal comfort preferences are highly individual, and can be affected by metabolism, body type and clothing. These factors make it nearly impossible to find a temperature that will satisfy all occupants in the same space at the same time. Providing areas with different thermal gradients, as well as individual thermal comfort devices can ensure that building occupants can choose areas with temperatures that best fit their thermal preferences (termed “free address”).

Intent: To maximize and personalize thermal comfort among all occupants.



Core and Shell	New and Existing Interiors	New and Existing Buildings
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PART 1: FREE ADDRESS

Projects over 200 m² [2,150 ft²] meet the following free address requirement:

- a. The building provides a thermal gradient of at least 3 °C [5 °F] across open workspaces and between floors or rooms with more than 10 people.
- b. All open office spaces with occupants performing tasks that require similar workstations allow for at least 50% free address to allow occupants to select a work space with a desired temperature.

PART 2: PERSONAL THERMAL COMFORT DEVICES

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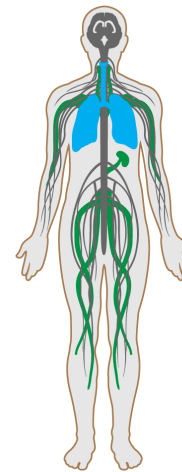
The following condition is met in spaces with 10 or more workstations in the same heating or cooling zone:

- a. Occupants have access to personal thermal comfort devices such as fans (excluding space heaters).

## RADIANT THERMAL COMFORT

New technology surrounding radiant temperature systems has led to recent advances making the systems more energy efficient. Additional benefits include saved floor space, lower dust transportation and increased thermal comfort through the separation of temperature controls and outdoor air supply systems. In addition, with the use of radiant heating, the mean radiant temperature in a space can be kept lower compared to convective heating, providing the benefit of a slightly higher relative humidity in winter time.

Intent: To maximize floor space, reduce dust transmission and increase thermal comfort by incorporating radiant heat and cooling systems into the building design.



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### PART 1: LOBBIES AND OTHER COMMON SPACES

All lobbies and other common spaces meet the requirements set forth in ASHRAE Standard 55-2013 for thermal comfort through the use of one of the following systems:

- a. <sup>93</sup> Hydronic radiant heating and/or cooling systems.
- b. <sup>93</sup> Electric radiant systems.

### PART 2: OFFICES AND OTHER REGULARLY OCCUPIED SPACES

At least 50% of the floor area in all offices and other regularly occupied spaces meets the requirements set forth in ASHRAE Standard 55-2013 for thermal comfort through the use of one of the following systems:

- a. <sup>93</sup> Hydronic radiant heating and/or cooling systems.
- b. <sup>93</sup> Electric radiant systems.





# MIND

# BACKGROUND

While mental and physical health are often conceptualized as separate domains, our minds and bodies are inextricably connected. For instance, exercise increases the release of serotonin, which can elevate mood and regulate the sleep cycle. The simple act of worrying, on the other hand, can trigger physiological responses similar to the way physical stress and injury can. While the body has a remarkable capacity for recovering from a single acute stressor, chronic, repeated activation of the stress response can be especially damaging both physiologically and psychologically. Because humans have the capacity to worry about abstract and often non-immediately resolvable problems such as loss, career, finance issues and self-esteem, modern life can be wrought with stressors that lead to low mood, depression and a negative sense of self.

The global burden of mental health illnesses is significant. In 2010, mental illnesses and substance use disorders accounted for nearly 184 million disability-adjusted life years (DALYs), 8.6 million years of life lost to premature mortality (YLL) and over 175 million years lived with disability (YLD) worldwide. Furthermore, it is estimated that the life expectancy among those with mental illness is more than 10 years shorter compared to those without mental illnesses, and that more than 14%, or 8 million deaths each year are attributable to mental disorders.

The lifetime prevalence of mood disorders in the U.S. (classified as the presence of a major depressive disorder, dysthymic disorder or bipolar disorder) is estimated at nearly 21%. Major depression is one of the most common of all mood disorders, affecting about 16 million adults in the U.S. Mood disorders are inevitably linked to physical illness and are associated with a range of detrimental health outcomes. Chronic low level disturbances or mental distress play increasingly important roles in some of the most common chronic diseases. For example, depression is associated with a higher risk of heart disease and immunosuppression. Chronic stress and anxiety are also directly responsible for stress hormones associated with a variety of negative physiological outcomes, including increased risk of metabolic syndrome, cardiovascular disease, gastrointestinal disorders and skin conditions such as acne and psoriasis.

Because the mind plays a vital role in an individual's overall health and well-being, an atmosphere that supports a healthy mental state can have significant psychological and physical benefits. Interventions to mediate stress can either be direct or indirect. This includes providing access to therapies that help promote relaxation and address mental or emotional trauma, instituting policies that improve sleep hygiene or encourage altruism and community engagement, and promoting the use of sensor technologies that increase awareness of physiological and environmental factors to inform positive behavioral changes.

The WELL Building Standard® recognizes the features of the built environment and identifies workplace policies that can be implemented to positively impact mood, sleep, stress levels and psychosocial status in order to promote and enable overall occupant health and well-being.

# INTENT

The WELL Building Standard for Mind requires design, technology and treatment strategies designed to provide a physical environment that optimizes cognitive and emotional health.

## MIND FEATURE LEVEL MATRIX

	Core and Shell	New and Existing Interiors	New and Existing Buildings
<b>84 HEALTH AND WELLNESS AWARENESS</b>			
1: WELL Building Standard® Guide	P	P	P
2: Health and Wellness Library	P	P	P
<b>85 INTEGRATIVE DESIGN</b>			
1: Stakeholder Charrette	P	P	P
2: Development Plan	P	P	P
3: Stakeholder Orientation	P	P	P
<b>86 POST-OCCUPANCY SURVEYS</b>			
1: Occupant Survey Content	-	P	P
2: Information Reporting	-	P	P
<b>87 BEAUTY AND DESIGN I</b>			
1: Beauty and Mindful Design	P	P	P
<b>88 BIOPHILIA I - QUALITATIVE</b>			
1: Nature Incorporation	O	P	P
2: Pattern Incorporation	O	P	P
3: Nature Interaction	O	-	P
<b>89 ADAPTABLE SPACES</b>			
1: Stimuli Management	-	O	O
2: Privacy	-	O	O
3: Space Management	-	O	O
4: Workplace Sleep Support	-	O	O
<b>90 HEALTHY SLEEP POLICY</b>			
1: Non-Workplace Sleep Support	-	O	O
<b>91 BUSINESS TRAVEL</b>			
1: Travel Policy	-	O	O
<b>92 BUILDING HEALTH POLICY</b>			
1: Health Benefits	-	O	O
<b>93 WORKPLACE FAMILY SUPPORT</b>			
1: Parental Leave	-	O	O
2: Employer Supported Child Care	-	O	O
3: Family Support	-	O	O
<b>94 SELF-MONITORING</b>			
1: Sensors and Wearables	-	O	O

Core and Shell	New and Existing Interiors	New and Existing Buildings
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## 95 STRESS AND ADDICTION TREATMENT

1: Mind and Behavior Support	-	○	○
2: Stress Management	-	○	○

## 96 ALTRUISM

1: Charitable Activities	-	○	○
2: Charitable Contributions	-	○	○

## 97 MATERIAL TRANSPARENCY

1: Material Information	○	○	○
2: Accessible Information	○	○	○

## 98 ORGANIZATIONAL TRANSPARENCY

1: Transparency Program Participation	-	○	○
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## 99 BEAUTY AND DESIGN II

1: Ceiling Height	○	○	○
2: Artwork	○	○	○
3: Spatial Familiarity	○	○	○

## 100 BIOPHILIA II - QUANTITATIVE

1: Outdoor Biophilia	○	○	○
2: Indoor Biophilia	-	○	○
3: Water Feature	○	○	○

HEALTH AND WELLNESS AWARENESS

Health literacy, defined by the National Academy of Medicine as “the degree to which individuals can obtain, process, and understand the basic health information and services they need to make appropriate health decisions”, is essential for optimal health and well-being. Literacy requires awareness and an ability to decipher health literature and options for health services. Both accessibility and customizability of health-oriented literature are necessary to promote increased health awareness and well-being.

Intent: To promote a deeper understanding of factors that impact health and wellness.



Core and Shell	New and Existing Interiors	New and Existing Buildings
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PART 1: WELL BUILDING STANDARD® GUIDE

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Explanatory guides allow occupants to familiarize themselves with and benefit from features that are incorporated into the project, as well as gain a broader understanding of health and wellness factors beyond the built environment. The following is provided:

- a. A guide (available to all occupants) describing the WELL Building Standard features pursued by the project.

PART 2: HEALTH AND WELLNESS LIBRARY

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A digital and/or physical library of resources is provided that focuses on mental and physical health and meets the following criteria:

- a. Contains at least one book title or one magazine subscription for every 20 occupants (no more than 20 titles are required).
- b. Is prominently displayed and readily available to all occupants.

## INTEGRATIVE DESIGN

A truly collaborative design process ensures that construction and upkeep of a space follows the original expectations and goals for the building. A focus on health and wellness principles throughout the design process guarantees that health-promoting criteria are well understood and integrated into a project.

Intent: To facilitate a collaborative development process and ensure adherence to collective wellness goals.



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### PART 1: STAKEHOLDER CHARRETTE

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Project stakeholders, including at a minimum the owner, architects, engineers and facilities management team, meet to:

- a. Perform a values assessment and alignment exercise within the team to inform any project goals as well as strategies to meet occupant expectations.
- b.<sup>1</sup> Discuss the needs of the occupants, focusing on wellness.
- c. Set future meetings to stay focused on the project goals and to engage future stakeholders who join the process after the initial meeting, such as contractors and sub-contractors.

### PART 2: DEVELOPMENT PLAN

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A written document detailing the building's health-oriented mission is produced with the consent of all stakeholders, incorporating all of the following:

- a. Building site selection, taking into account public transportation.
- b. WELL concepts of air, water, nourishment, light, fitness, comfort and mind.
- c. Plans for implementation of the above analyses and decisions.
- d. Operations and maintenance plans for facility managers and building policy requirements related to wellness.

### PART 3: STAKEHOLDER ORIENTATION

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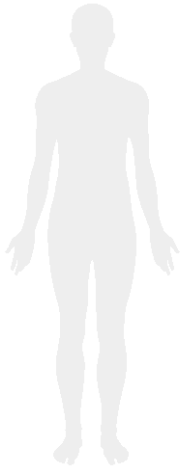
Upon construction completion, the designers, owners, managers and facilities staff must:

- a. Tour the building as a group.
- b. Discuss how building operations will support adherence to the WELL Building Standard.

POST-OCCUPANCY SURVEYS

Given the diversity of built environments, it is difficult to prescribe a comprehensive set of features that are effective across all settings. Occupancy surveys can be useful in measuring the extent to which a building is effectively promoting and protecting the health and comfort needs of its occupants. In addition, the ability to offer feedback and have a recognized stake in one’s comfort and well-being can have a positive impact on occupant mood.

Intent: To allow occupants to provide feedback to building owners and management, and help further develop the WELL Building Standard.



Core and Shell	New and Existing Interiors	New and Existing Buildings
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PART 1: OCCUPANT SURVEY CONTENT

In buildings with 10 or more occupants, the Occupant Indoor Environmental Quality (IEQ) Survey™ from the Center for the Built Environment at UC Berkeley (or approved alternative) is completed by a representative sample of at least 30% of occupants at least once per year. The survey covers the following topics of occupant satisfaction:

- a.<sup>35</sup> Acoustics.
- b.<sup>35</sup> Thermal comfort, including humidity and air flow, at least twice a year (once during the cooling season and once during the heating season).
- c.<sup>35</sup> Furnishings.
- d.<sup>35</sup> Workspace light levels and quality.
- e.<sup>35</sup> Odors, stuffiness and other air quality concerns.
- f.<sup>35</sup> Cleanliness and maintenance.
- g.<sup>35</sup> Layout.

PART 2: INFORMATION REPORTING

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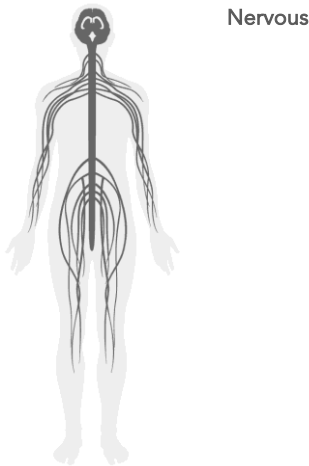
Aggregate results from surveys are reported within 30 days to the following groups:

- a. Building owners and managers.
- b. Building occupants (upon request).
- c. The International WELL Building Institute.

BEAUTY AND DESIGN I

A physical space in which design principles align with an organization’s core cultural values can positively impact employees’ mood and morale. Integrating aesthetically pleasing elements into a space can help building occupants derive a measure of comfort or joy from their surroundings. The incorporation of design elements and artwork to a space can create a calming environment able to improve occupant mood.

Intent: To thoughtfully create unique and culturally-rich spaces.



Core and Shell	New and Existing Interiors	New and Existing Buildings
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PART 1: BEAUTY AND MINDFUL DESIGN

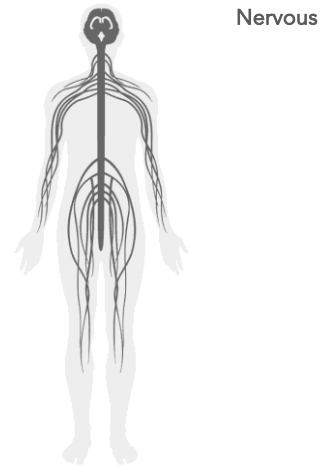
The project contains features intended for all of the following:

- a.<sup>13</sup> Human delight.
- b.<sup>13</sup> Celebration of culture.
- c.<sup>13</sup> Celebration of spirit.
- d.<sup>13</sup> Celebration of place.
- e.<sup>13</sup> Meaningful integration of public art.



## BIOPHILIA I - QUALITATIVE

Until relatively recently in human history, people had constant interaction with living things and their natural surroundings. Biophilia, or the idea that humans have an affinity towards the natural world, is an emerging field that aims to address our psychological need to be around life and life-like processes. Exposure to views and images of nature can help to speed up healing and recovery time, boost positive feelings and reduce negative ones. Interior environments that are cold, sterile and devoid of life, on the other hand, can diminish our experience, mood and happiness. Modeled after the Living Building Challenge, the biophilia requirements involve conducting historical, cultural, ecological and climatic studies to inform biophilic elements and creating a biophilic framework that tracks biophilia at each design phase of the project.



Intent: To nurture the innate human-nature connection within the project.

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### PART 1: NATURE INCORPORATION

A biophilia plan is developed that includes a description of how the project incorporates nature through the following:

- a. <sup>13</sup> Environmental elements.
- b. <sup>13</sup> Lighting.
- c. <sup>13</sup> Space layout.

### PART 2: PATTERN INCORPORATION

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A biophilia plan is developed that includes a description of how the project incorporates the following:

- a. <sup>13</sup> Nature's patterns throughout the design.

### PART 3: NATURE INTERACTION

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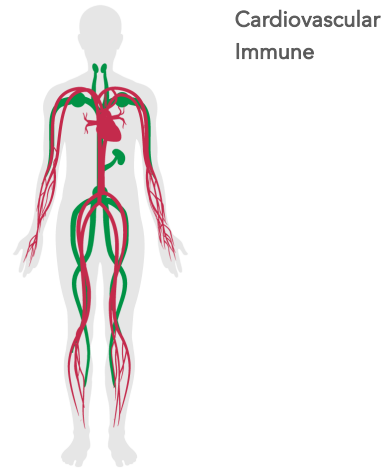
A biophilia plan is developed that provides sufficient opportunities for human-nature interactions:

- a. <sup>13</sup> Within the building.
- b. <sup>13</sup> Within the project boundary, external to the building.

### ADAPTABLE SPACES

Healthy work environments should be designed to mitigate stress and optimize productivity, and should therefore be sufficiently adaptable to working, focusing, collaborating and resting as needed. Research demonstrates that the presence of a variety of workspaces that enable individuals to adjust their environments and choose the degrees of engagement is associated with job satisfaction and group cohesiveness.

Intent: To reduce distractions, mitigate stress and enable focused work by integrating a stimuli management program within the building.



Core and Shell	New and Existing Interiors	New and Existing Buildings
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#### PART 1: STIMULI MANAGEMENT

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Seating and spatial layouts are organized into separate workplace zones and provide differing degrees of sensory engagement. Regularly occupied spaces of 186 m<sup>2</sup> [2,000 ft<sup>2</sup>] or larger provide documentation of methods used to establish appropriate zones based on the below guidelines:

- A programing plan is developed, using data from interviews, surveys, focus groups and observational research, to establish the organization's culture, work patterns, work processes and space utilization.
- Annotated floor plans incorporate research data to establish work zones that support a variety of work functions.
- Designated quiet zones are provided as enclosable or semi-enclosable rooms with no more than 3 seats per room.
- Designated collaboration zones are provided as enclosable or semi-enclosable rooms with no less than 3 seats and at minimum one visual vertical surface area for communicating ideas or work.

#### PART 2: PRIVACY

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Projects with gross floor area greater than 1,860 m<sup>2</sup> [20,000 ft<sup>2</sup>] provide a designated quiet space for focus, contemplation and relaxation, which meets the following requirements:

- Space is at minimum 7 m<sup>2</sup> [75 ft<sup>2</sup>] plus 0.1 m<sup>2</sup> [1 ft<sup>2</sup>] per regular building occupant, up to a maximum of 74 m<sup>2</sup> [800 ft<sup>2</sup>].
- <sup>49</sup> Ambient lighting provides continuously dimmable light levels at 2,700 K or less.
- Noise Criteria (NC) from mechanical systems is 30 or lower.
- A plan is developed that includes a description of how the project incorporates two of the following elements into the space: (i) plant wall and/or floor plantings, (ii) audio device with nature sounds, (iii) variety of seating arrangements.

### PART 3: SPACE MANAGEMENT

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To minimize clutter and maintain a comfortable, well-organized environment, minimal storage requirements are addressed through the provision of some combination of the following:

- a. A workstation cabinet at a minimum volume of 0.1 m<sup>3</sup> [4 ft<sup>3</sup>] for each regular occupant.
- b. A personal locker at a minimum volume of 0.1 m<sup>3</sup> [4 ft<sup>3</sup>] for each regular occupant.

### PART 4: WORKPLACE SLEEP SUPPORT

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Short naps are an effective and healthy means for improving mental and physical acuity, even more so than caffeine, which can disrupt sleep. At least one of the following furniture options must be provided for the first 30 regular building occupants and an additional one for every 100 regular building occupants thereafter:

- a. Couch.
- b. Cushioned roll-out mat.
- c. Sleep pod.
- d. Fully reclining chair.
- e. Hammock.

## HEALTHY SLEEP POLICY

High quality sleep is essential to good health. Adequate sleep improves mental health, is necessary for maintaining sustained mental and physical performance throughout the day and can help prevent unhealthy weight gain. Insufficient sleep, on the other hand, has been associated with a higher risk of depression, diabetes, heart attack, hypertension and stroke. Adopting this feature demonstrates that the organization values sleep quality and understands its impact on overall worker productivity and well-being.

Intent: To support healthy sleep habits by discouraging occupants from working late at night and providing them with sleep support software.



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### PART 1: NON-WORKPLACE SLEEP SUPPORT

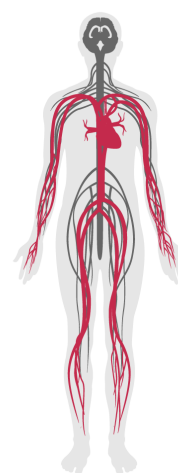
The following requirements are met:

- a. For non-shift work, introduce organizational cap at midnight for late night work and communications.
- b. Provide employees with a 50% subsidy on software and/or applications that monitor daytime sleep-related behavior patterns such as activity levels, caffeine and alcohol intake, and eating habits.

## BUSINESS TRAVEL

Business travel is often associated with a number of negative health outcomes. Research from the World Bank indicates that business travel is associated with higher total medical claim costs, with the highest increase attributed to psychological disorders related to stress. Additionally, findings indicate that the main stressors of business travel are impacts on family and personal life, jetlag, increased workload upon return and isolation from family and friends.

Intent: To minimize disruptions to occupants' sleep and fitness regimens, and personal relationships by adopting supportive travel policies.



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### PART 1: TRAVEL POLICY

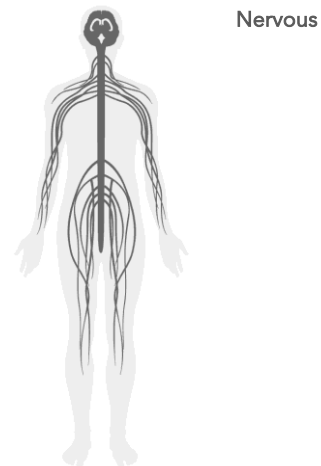
In order to reduce stress related to business travel, employers promote the following policies:

- a. Employees are provided the option to select non red-eye flights or are given the option to work remotely on the day of arrival from a red-eye flight.
- b. Employees are not required to take business trips for which the total travel time (including layovers, wait times and travel to and from terminals) exceeds both 5 hours and 25% of the total trip duration.
- c.<sup>119</sup> During long business trips (domestic travel lasting more than 2 weeks and international travel lasting more than 4 weeks), employees are given the time off and a budget to fly home for at least 48 hours or to fly a friend or family member to meet them.
- d.<sup>119</sup> Employees are booked at hotels with free fitness centers or reimbursed for any gym usage fees incurred during their travel.

## BUILDING HEALTH POLICY

Protecting employee health is of the utmost importance since it impacts various aspects of work including productivity, concentration and even the health of coworkers. Employees often feel overwhelmed and unable to take appropriate rest or time away from work to recover. Workplace health policies can help support employees' physical and mental well-being, make adopting and maintaining healthy behaviors easier and create and foster a company culture promoting good health.

Intent: To protect the overall health and well-being of occupants and their families by adopting comprehensive health policies.



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### PART 1: HEALTH BENEFITS

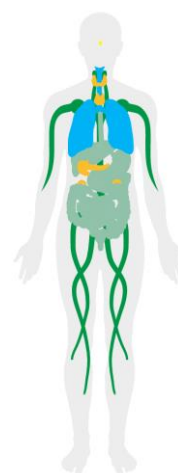
Employers provide at least three of the following to employees:

- a. <sup>185</sup> Employer-based health insurance for part- and full-time workers, as well as their spouses and dependents, or subsidies to purchase individual insurance through an exchange.
- b. <sup>184</sup> Flexible spending accounts or any other employer-established benefit plan designed to reimburse employees for qualified medical expenses.
- c. <sup>184</sup> Health savings accounts.
- d. <sup>91</sup> On-site immunizations or time off during the workday to receive immunizations.
- e. <sup>20</sup> Workplace policies that encourage ill employees to stay home or work remotely.

## WORKPLACE FAMILY SUPPORT

Work-life balance can often be overlooked and personal lives neglected to work responsibilities. Family care policies ensure that employees are able to take the necessary time off for self-care and balance their work and personal lives in a healthy manner. Research shows that employees with extensive time-flexible policies report lower stress levels.

Intent: To ensure occupants are able to properly care for themselves and their families by adopting supportive family care policies.



Digestive  
Endocrine  
Immune  
Respiratory

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Interiors

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### PART 1: PARENTAL LEAVE

Employers provide the following:

- a. <sup>98</sup> Paid paternity and maternity leave for 6 workweeks during any 12-month period.
- b. <sup>46</sup> Additional 12 workweeks of paternity or maternity leave during any 12-month period.

### PART 2: EMPLOYER SUPPORTED CHILD CARE

Employers provide at least one of the following:

- a. <sup>66</sup> On-site child care centers compliant with local child care licensure.
- b. <sup>66</sup> Subsidies or vouchers for child care.

### PART 3: FAMILY SUPPORT

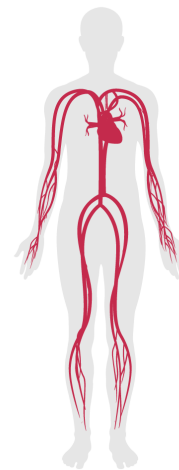
Employers provide the following:

- a. <sup>46</sup> At least 12 workweeks of leave during any 12-month period for the care of a seriously ill child, spouse, domestic partner, parent, parent-in-law, grandparent, grandchild or sibling.
- b. <sup>51</sup> The option to use paid sick time for the care of a child, spouse, domestic partner, parent, parent-in-law, grandparent, grandchild or sibling.
- c. <sup>51</sup> All nursing mothers with break times of at least 15 minutes, every 3 hours.

## SELF-MONITORING

Self-monitoring devices that accurately observe and quantify changes to the body over time show promise in promoting awareness of one's health status. These technologies can provide a powerful tool for gaining personal insight into the physiological states of the body, thereby encouraging positive behavioral and lifestyle changes. Monitoring food intake, weight and physical activity is a proven behavior therapy technique that can aid in weight loss and weight maintenance programs, promoting improved health and well-being.

Intent: To promote awareness of individual biomarkers associated with health and wellness.



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### PART 1: SENSORS AND WEARABLES

A sensor capable of measuring at least 2 of the following parameters is made available to each employee for his/her personal use and is subsidized by at least 50%:

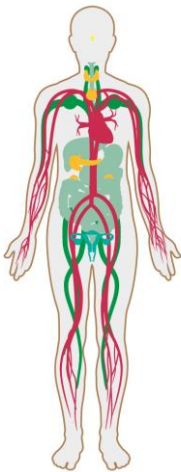
- <sup>94</sup> Body weight/mass.
- <sup>62</sup> Activity and steps.
- Heart rate variability.
- Sleep duration, quality and regularity.



STRESS AND ADDICTION TREATMENT

Chronic stress adversely impacts the body, from the nervous to the cardiovascular system. Substance addiction is one of the most damaging manifestations of stress, combining the toxicity of the substance itself with the mental distress associated with the social stigma of the disease. In recent years, refinements in addiction treatment and stress reduction therapies, as well as pharmacological interventions have been successful in helping to mitigate these debilitating conditions.

Intent: To avoid or mitigate substance use and addiction issues by providing access to stress management programs.



Cardiovascular  
Digestive  
Endocrine  
Immune  
Reproductive

PART 1: MIND AND BEHAVIOR SUPPORT

A program that addresses psychological and behavioral distress is made available to workplace occupants through:

- a. <sup>97</sup> Employee Assistance Programs (EAPs) offering short-term treatment and referrals to qualified professionals for depression, anxiety, substance use, addiction and co-occurring mental health issues.

PART 2: STRESS MANAGEMENT

A stress management program is made available to occupants through:

- a. A qualified counselor offering group or private workshops and referrals.

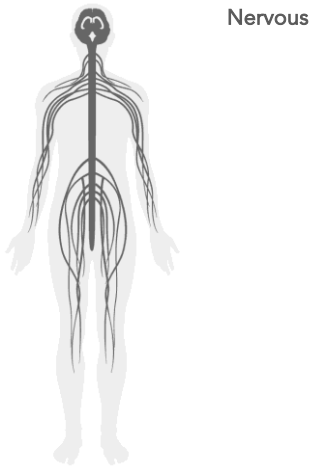
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ALTRUISM

Research demonstrates beneficial health and wellness outcomes associated with acts of generosity and charity. Volunteering fulfills many functions, providing a way for individuals to express their values, strengthen social relationships and gain career-related experience. The Mental Health Foundation states that helping others increases social support by increasing feelings of belonging, while decreasing feelings of isolation and loneliness. For these reasons, altruistic sentiments and behaviors are increasingly incentivized within the workplace.

Intent: To enhance community identity and promote social cohesion.



PART 1: CHARITABLE ACTIVITIES

Individuals are given the option to take paid time off work to participate in volunteer activities as follows:

- a. 8 hours of paid time organized by the employer for a registered charity twice a year.

PART 2: CHARITABLE CONTRIBUTIONS

Employers commit to the following:

- a. Contributing annually to a registered charity to match employee donations.

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## MATERIAL TRANSPARENCY

Just as consumers have a right to know the contents of the food they consume (whether to avoid allergic reactions or to make healthier nutrition choices), they should also have a right to know what is in the products and materials that make up the buildings they occupy. Due to the complex and multi-tiered nature of the global material production supply chain, little is known about the tens of thousands of chemicals in circulation today. This lack of data obscures necessary information required to identify potential hazards to the environment and human health. Demand for material ingredient disclosure at the consumer level pushes supply chain transparency and—even more importantly—supports innovation and green chemistry.

Intent: To promote material transparency along the supply chain.



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### PART 1: MATERIAL INFORMATION

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At least 50% (as measured by cost) of interior finishes and finish materials, furnishings (including workstations) and built-in furniture have some combination of the following material descriptions (in order to contribute, the product must indicate that all ingredients have been evaluated and disclosed down to 1,000 ppm):

- <sup>19</sup> Declare Label.
- <sup>28</sup> Health Product Declaration.
- <sup>1</sup> Any method accepted in USGBC's LEED v4 MR credit: Building Product Disclosure and Optimization - Material Ingredients, Option 1: material ingredient reporting.

### PART 2: ACCESSIBLE INFORMATION

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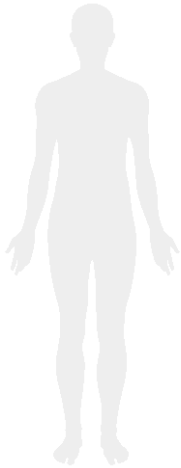
The following condition is met:

- All declaration information is compiled and made readily available to occupants either digitally or as part of a printed manual.

ORGANIZATIONAL TRANSPARENCY

Organizations that espouse fair, equitable and just treatment toward their workforce help create a culture of reduced stress and greater employee satisfaction, as well as a heightened sense of loyalty. Research shows that high levels of perceived justice in the decision making process at work are correlated with a lower risk of poor health, whereas declining levels of perceived justice can in turn increase such risk. By transparently sharing their policies and investment decisions, organizations not only allow employees, clients and patrons to determine if their personal values are shared by the organization, but also provide them the opportunity to voice their opinion about the organization’s social equity practices.

Intent: To promote economic and social equity by requiring the adherence to and disclosure of fair and equitable business practices.



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PART 1: TRANSPARENCY PROGRAM PARTICIPATION

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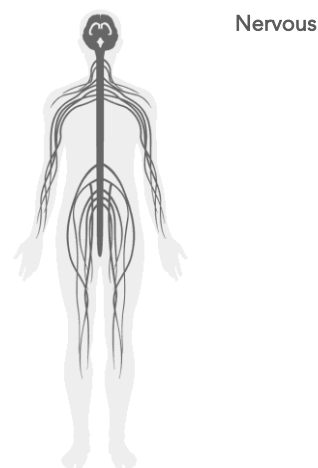
The entity seeking WELL certification must participate in one of the following programs, and results must be publicly available within the project premises and on the entity's website:

- a.<sup>72</sup> The JUST program operated by the International Living Future Institute (for more information, see [www.justorganizations.com](http://www.justorganizations.com)).
- b.<sup>181</sup> Reporting in compliance with the GRI Standards operated by the Global Reporting Initiative, including Universal Standards and at least one additional topic-specific Standard (for more information, see [www.globalreporting.org](http://www.globalreporting.org)).

## BEAUTY AND DESIGN II

A beautiful and meaningful space in which design aesthetics are expressly considered can have a positive impact on occupant morale and mood. Elements that provide visual complexity, balance and proportion can impart a sense of comfort, ease and potentially mitigate stress.

Intent: To promote occupant comfort and spatial familiarity by designing spacious, familiar and aesthetically appealing spaces.



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### PART 1: CEILING HEIGHT

Ceiling height that is proportional to room dimensions provides an expansive, comfortable and open feel to the interior space. Floor to ceiling heights for regularly occupied spaces meet the following requirements:

- <sup>96</sup> Rooms of 9 m [30 ft] width or less have ceiling height of at least 2.7 m [8.8 ft].
- Rooms of greater than 9 m [30 ft] width have ceiling height of at least 2.75 m [9 ft] plus at least 1 m per 20 m [1 ft per 20 ft].
- Rooms that provide a full wall view to the outdoors or an atrium space (with at least twice the ceiling height of the room) have a minimum ceiling height of 2.75 m [9 ft] for a room width of 12 m [40 ft] plus at least 1 m per 30 m [1 ft per 30 ft].

### PART 2: ARTWORK

Integration of artwork to interior space adds complexity to the visual field. A plan is developed that includes a description of how the project incorporates meaningfully integrated artwork in:

- Entrances and lobbies.
- All regularly occupied space greater than 28 m<sup>2</sup> [300 ft<sup>2</sup>].

### PART 3: SPATIAL FAMILIARITY



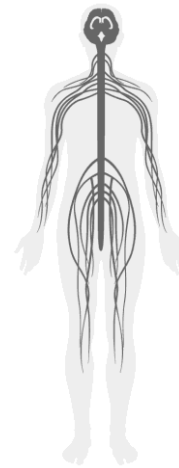
Design elements can be used to establish way-finding, aid in orientation and provide spatial familiarity. A plan is developed that includes a description of how the project incorporates way-finding elements in projects with floor plates 929 m<sup>2</sup> [10,000 ft<sup>2</sup>] or larger through use of the following elements:

- a. Artwork that is distinct in shape and color.
- b. Visually grouped zones or areas that use the following unifying design components: (i) lighting, (ii) furniture color and (iii) flooring pattern/color.
- c. Corridors over 9 m [30 ft] in length end in artwork or a view window to the exterior with a sill height no taller than 0.9 m [3 ft] from the floor and with at least a 30 m [100 ft] vista.

## BIOPHILIA II - QUANTITATIVE

Biophilia supports the idea that humans have an affinity towards the natural world. Evidence on the emotional and psychological benefits of nature is mounting. Research indicates that the experience of nature or nature-derived patterns can improve experience, mood and happiness.

Intent: To support occupant emotional and psychological well-being by including the natural environment in interior and exterior design.



Nervous

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### PART 1: OUTDOOR BIOPHILIA

At least 25% of the project site area meets the following requirements:

- Features either landscaped grounds or rooftop gardens accessible to building occupants.
- <sup>95</sup> Consists of, at minimum, 70% plantings including tree canopies (within the 25%).

### PART 2: INDOOR BIOPHILIA

Wall and potted plants are incorporated into the design of interior space according to the following:

- <sup>95</sup> Potted plants or planted beds cover at least 1% of floor area per floor.
- <sup>95</sup> A plant wall per floor, covering a wall area equal or greater than 2% of the floor area, or covering the largest of the available walls, whichever is greater.

### PART 3: WATER FEATURE

At least one water feature for every 9,290 m<sup>2</sup> [100,000 ft<sup>2</sup>] in projects larger than 9,290 m<sup>2</sup> [100,000 ft<sup>2</sup>] which meets the following requirements:

- <sup>95</sup> At least 1.8 m [5.8 to 6 ft] in height or 4 m<sup>2</sup> [43 ft<sup>2</sup>] in area.
- Ultraviolet sanitation or other technology to address water safety.



# INNOVATION



## INNOVATION FEATURES

As the scientific understanding of health continues to evolve, so too does the ability to address complex issues of promoting wellness through the built environment. Recent discoveries in neuroscience, for example, have led to new insights in light's impact on the human brain, opening the door for addressing sleep disruption through improvements in lighting design. It is likely that similar discoveries will continue to be made. The WELL Building Standard embraces the creative thinking that is needed to address the complex ways in which interior spaces contribute to health and wellness.

Intent: To promote the continuous evolution of the Standard by enabling projects to propose a new feature that addresses health and wellness in a novel way.



Core and Shell	New and Existing Interiors	New and Existing Buildings
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### PART 1: INNOVATION PROPOSAL

The feature meets one of the following requirements:

- a. Goes above and beyond the current requirements of the existing WELL feature.
- b. Relates to the wellness concept in a novel way that is not already covered in the WELL Building Standard to impact the occupants of the project or the general public in a positive manner.

### PART 2: INNOVATION SUPPORT

The feature is supported by the following:

- a. The feature is fully substantiated by existing scientific, medical and industry research, and is consistent with applicable laws and regulations and leading practices in building design and management.

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## Appendix A: Glossary

### General Terms

Acute Exposure	Single exposure to an environmental condition (not lasting more than a day). Acute exposures contrast with chronic exposures, which are prolonged and repeated. Single exposures still have effects on health.
Allergic Reaction	An exaggerated or pathological reaction (sneezing, respiratory irritation, itching or skin rashes) to substances that are without comparable effect on the average individual.
Alveoli	Small thin-walled air-containing compartments of the lung that are typically arranged in saclike clusters that give the tissue a honeycomb appearance and expand its surface area for the purpose of air exchange.
Alzheimer's Disease	A type of dementia marked by the loss of cognitive ability, affecting memory, thinking and behavior generally over a period of 10 to 15 years.
Ambient Lighting	Electric lighting fixtures on walls and ceilings that contribute to the ambient amount of light in a space. This excludes light from daylight, task lamps, and sources such as computer screens.
Asthma	Chronic inflammatory disease of the airways. Asthma attacks are often triggered by exposure to allergens, and during an attack the airways spasm, alternatively swelling and narrowing, causing the individual to wheeze or gasp for air.
Building Envelope	The separation between the interior and the exterior environments of a building, restricting transfer of air, water, heat, light, noise and creatures.
Chronic Diseases	Any disease that is persistent or has long-lasting health effects.
Chronic Exposure	Repeated, continuous exposure to a substance or condition over an extended period from several years to a lifetime.
Circadian Rhythms	Internal clock that keeps the body's hormones and bodily processes on a roughly 24-hour cycle, even in continuous darkness.
Collaboration Zone	A physical area within a building that encourages group interplay and discussion through its strategic layout and design.
Cone Cells	Photosensitive cells in the eye used to differentiate colors and brightness in moderate and high levels of illumination.
Diabetes	A group of diseases that impact the metabolism due to insufficient insulin production (Type 1) and/or high insulin resistance (Type 2), and a leading cause of death. Results in poor blood sugar control, frequent urination, increased thirst, increased hunger and other symptoms.
Environmental Product Declaration (EPD)	Quantified environmental data for a product with pre-set categories of parameters based on the International Organization of Standards (ISO) 14040 series of standards, but not excluding additional environmental information.
Fenestration	An opening in a surface (as a wall or membrane).
Focus Zone	A physical area within a building that encourages concentration and attentiveness to a task among occupants through its strategic layout and design.
Free Address	Ability for occupants to be able to choose their own workspace within the office or workplace.
Fungi	Any of a group of unicellular, multicellular or syncytial spore-producing organisms feeding on organic materials.
Glazing	Glasswork, which must be carefully designed in order to avoid excessive glare and heat gain.
Health Product Declaration (HPD)	A standard format for reporting product content and associated health information for building products and materials.
Heart Disease	A class of disease that affects the heart, arteries, capillaries or veins.
Heating, Ventilating, and Air Conditioning System (HVAC)	Equipment, distribution systems and terminals that provide the processes of heating, ventilating or air conditioning.
High Efficiency Particulate Air (HEPA) Filter	Filter which removes 99.97% of all particles greater than 0.3 micrometers and satisfies standards of efficiency set by the Institute of Environmental Sciences and Technology.
High-touch Surfaces	Surfaces that are frequently touched by building users and occupants such as door knobs, hand rails and tables. See Table A1.
Homeostasis	A state of having regulated responses to environmental conditions to retain stability.
Immune System	The integrated body system of organs, tissues, cells and cell products such as antibodies that differentiates self from non-self and neutralizes potentially harmful organisms or substances.

Immuno-compromised	An inability to develop a normal immune response, usually as a result of disease, malnutrition or medical therapy that affects the immune system.
Inflammation	Localized protective reaction of tissue to irritation, injury or infection, characterized by pain, redness, swelling and sometimes loss of function.
Interior	Pertaining to products within (but not including) the waterproofing membrane.
Intrinsically Photoreceptive Retinal Ganglion Cells (ipRGCs)	Relay environmental light levels to the suprachiasmatic nucleus through the retinohypothalamic tract. Most sensitive to blue light.
Liver	An organ that plays a vital role in a range of important metabolic processes including detoxification, protein synthesis and glycogen storage.
Main Air Duct	The duct or ducts connected directly to the air handling unit
Malnutrition	A condition that results from insufficient nutrient intake, excess nutrient intake or nutrient intake in the wrong proportions.
Metabolic	Any biochemical process that occurs within an organism that is necessary to sustain life.
Metabolic Syndrome	A cluster of medical conditions or risk factors that increase the chances of developing cardiovascular disease, diabetes fatty liver disease and several cancers.
Metamers	Different spectral distributions of light which produce the same response on the cones and are therefore visually identical.
Nanoparticles	Particles between 1 and 100 nanometers in size.
Nap Pod	A personal dedicated resting space optimized to offer a short but regenerative sleep.
National Ventilation Procedure	ANSI/ASHRAE Standards 62.1 is the recognized standard for ventilation system design and acceptable procedure with regards to establishing an effective ventilation system.
Neurocognitive Diseases	Diseases of the brain and nervous system.
Newly Installed	Products or materials applied or installed within one year prior to the WELL Performance Verification are considered to be newly installed.
Obesity	A medical condition in which the accumulation of excess adipose tissue poses an adverse effect on health.
Occupational Safety and Health Administration (OSHA)	Outlines current indoor air quality guidelines for the workplace.
Occupiable Space	An enclosed space intended primarily for human activities. Excludes storage rooms, equipment rooms and others that are occupied only occasionally and for short periods of time.
Party Wall	A wall separating spaces under different ownership or tenancy.
Pathogen	An infectious biological agent such as bacteria, virus and fungus that is capable of causing disease in its host.
Permanent movable items	Items that are permanently located on site, but not fixed or stationary, for example desk or desktop organizers.
Photocatalytic oxidation (PCO)	Achieved when you combine UV light rays with a TiO <sub>2</sub> -coated filter.
Public Health Goals (PHGs)	Unenforced regulations developed by California Office of Environmental Health Hazard Assessment. Similar in concept to the EPA's Maximum Contaminant Level Goal (MCLG).
Radioactivity	The energy and particles which are released during the decomposition process of atomic nuclei is called radiation.
Regularly Occupied Space	An area or areas where workers or other building occupants perform focused activities inside a building for an average of one hour a day or more.
Respiratory Failure	Inadequate gas exchange by the respiratory system, with the result that oxygen and/or carbon dioxide levels leaving the heart cannot be maintained within their normal ranges.
Retina	Light-sensitive membrane found at the back end of the eyeball that receives the image produced by the lens.
Rod Cells	Photosensitive cells in the eye used to discern peripheral vision in low levels of illumination.
Sick Building Syndrome (SBS)	A set of symptoms, such as headache, fatigue, eye irritation and breathing difficulties, that typically affect workers in modern airtight office buildings, and that are believed to be caused by indoor pollutants and poor environmental control.
Sleep Hygiene	Personal habits and practices that help maximize sleep quality.

Tissues	A group of cells that perform a common and specified function. At an organizational level, tissues are between cells and organs.
Toxicity	Extent to which a substance is harmful to a living thing.
Trail	Any outdoor pathways designated for pedestrian or biker use.
Ultraviolet Germicidal Irradiation (UVGI)	A sterilization method that uses ultraviolet (UV) light to break down microorganisms by destroying their DNA. Often used in a variety of applications, such as food, air and water purification.
Universal Design (UD)	Designing objects and spaces with aesthetically pleasing while maximizing accessibility, usability and operability regardless of the user's age, ability and other factors.
Ventilation Rate	Rate of exchange of outside air, as well as the circulation of air within the building.
Wayfinding	Act of spatial problem solving.
Weather Resistant Barrier (WRB)	A sheet, spray- or trowel-applied membrane or material layer that prevents the passage of liquid water even after long or continuous exposure to moisture.
Workstation	An area where an individual performs daily work-related tasks. This could comprise of a traditional seated-height desk, standing-height desk, adjustable-height desk or other work surface that is appropriate for the type of work being performed.
Zeitgebers	Physical stimuli which have an impact on the body's circadian rhythm. Examples include light, temperature and eating or drinking behaviors.

## Substances

2,4-Dichlorophenoxyacetic Acid (2,4-D)	A major herbicide that is very susceptible to running off or leaching into ground and surface water sources.
Acrylamides	A potentially toxic and potentially cancer-causing substance that can be naturally present in uncooked, raw foods in very small amounts.
Aerosols	Substances consisting of very fine particles of a liquid or solid suspended in a gas. For example, mist which consists of very fine droplets of water in air.
Allergen	Environmental substance that can produce an allergic reaction in the body but may not be intrinsically harmful. Common allergens include pollen, animal dander, house dust, feathers and various foods.
Antibody	Proteins generally found in the blood that detect and rid the body of potentially damaging organisms, such as bacteria and viruses.
Antimony	A naturally occurring metal found in ore deposits; the most common form of antimony is antimony trioxide, which is used as a flame retardant.
Arsenic	An element found in the earth's crust that has applications in various industrial processes, however runoff from factories, agricultural practices and natural deposits can lead to high concentrations in water.
Asbestos	A naturally occurring mineral that was commonly used in insulation because of its chemical and flame resistance, tensile strength and sound absorption properties. It is now known to be a leading cause of mesothelioma and lung cancer.
Atrazine	Among the most widely used pesticides in the United States and among the most commonly detected pesticide in drinking water.
Benzene	Widely used as a precursor to various materials such as detergents, dyes, pesticides, Styrofoam, nylon and other synthetic fibers.
Carbohydrate	Any of a group of organic compounds that includes sugars, starches, celluloses and gums and serves as a major energy source to support bodily functions and physical activity. Easily digestible carbohydrates found in white bread, pastries and soda may contribute to weight gain and promote diabetes and heart disease.
Carbon Monoxide	Colorless, odorless and highly poisonous gas formed by incomplete combustion. Replaces oxygen in hemoglobin, limiting blood's ability to deliver oxygen and can lead to death.
Carcinogens	A compound that increases the risk of developing cancer.
Chloramine	A disinfectant formed when ammonia is added to chlorine and is commonly used as a secondary disinfectant in public water systems.
Chlorine	A highly irritating, greenish-yellow gaseous halogen, capable of combining with nearly all other elements, produced principally by electrolysis of sodium chloride and used widely to purify water, as a disinfectant and bleaching agent.
Coarse Particles	Particulate matter larger than 2.5 micrometers and smaller than 10 micrometers in diameter. Often found near roadways and dusty industries.

Copper	Metallic element that enters water sources through natural deposits, but contamination most commonly occurs through corrosion of copper or brass.
Cortisol	A hormone that plays a primary role in stress, during which it increases blood sugar, suppresses the immune system and aids in protein, fat and carbohydrate metabolism. Also undergoes diurnal variation, playing an important role in the sleep-wake cycle.
Decorative Glazing	Coating on window surfaces purely for aesthetic purposes with no other functionality.
Ethylbenzene	A naturally occurring component of crude oil and a combustion byproduct.
Fine Particles	Particulate matter 2.5 micrometers in diameter or smaller. Can be directly emitted from combustion sources such as forest fires or can form when gases emitted from power plants, industries and automobiles react in the air. Also called PM <sub>2.5</sub> .
Flame Retardants	Chemicals used in thermoplastics, thermosets, textiles and coatings that inhibit or resist the spread of fire. Some of these chemicals have been linked to cancer, delayed development, low IQ and thyroid disruption.
Food Additives	Substances typically added to processed foods to enhance or preserve flavor or appearance.
Formaldehyde	A colorless gas compound, HCHO. Used for manufacturing melamine and phenolic resins, fertilizers, dyes and embalming fluids as preservatives and disinfectants.
Fructose	A simple sugar that is found naturally in small amounts in fruits and vegetables, but which occurs in extremely large quantities in many modern foods. High fructose intake has been implicated in liver disease, inflammation, metabolic syndrome, diabetes, heart disease and cancer.
Fungicides	Chemicals applied to crops or structures to reduce the harmful effects of mold, mushrooms and other fungi.
Glucose	A simple sugar that occurs widely in most plant and animal tissue. It is the principal circulating sugar in the blood and the major energy source of the body. Once eaten, carbohydrates break down immediately into glucose. Elevated blood glucose levels are one of the distinguishing elements of diabetes.
Glyphosate	A non-selective herbicide used in many pesticide formulations; exposure may result from its normal use due to spray drift, residues in food crops and from runoff into drinking water sources.
Haloacetic Acid	When chlorine and chloramine are added to water and react with other organic matter to produce haloacetic acids known as a disinfectant byproduct (DBP), these can damage internal organs and the nervous system in elevated concentrations and can lead to cancer.
Herbicides	A group of pesticides commonly used on farms and lawns to eliminate weeds from the fields.
Hormones	A chemical released by a cell, gland or organ that transmits a signal to another part of the body.
Hydrogenation	Made by forcing hydrogen gas into oil at high pressure in order to increase the shelf life and prevent rancidity of an oil.
Inorganic Chemicals	Refers to a chemical compound that is not "organic". Broadly, compounds not containing carbon.
Iron	Necessary for healthy blood circulation, but excessive iron particles in water can provide a shelter for disease-causing bacteria.
Lead	A naturally occurring metal found deep within the ground. Used in creation of old pipes, ceramics and paint. Also the stable final element of uranium's radioactive decay series.
Manganese	Small amounts are required for a healthy diet, but higher amounts may cause neurological damage.
Melatonin	"Darkness hormone" whose levels in the body is regulated by the circadian rhythm and the presence of light and in humans acts a driver for sleep.
Mercury	A naturally-occurring poisonous metal element which occurs naturally in the earth's surface.
Microflora	Bacteria and microscopic algae and fungi, especially those living in a particular site or habitat.
Nickel	Enters groundwater and surface water by dissolution of rocks and soils, from atmospheric fallout and biological decays and waste disposal.
Nitrogen Dioxide (NO <sub>2</sub> )	A product of combustion mainly found near burning sources (for instance, wood smoke and traffic combustion).
Nutrient	A chemical that is required for metabolic processes, which must be taken from food or another external source. Macronutrients taken from food sources include carbohydrates, proteins, fats and vitamins.
Organic Chemicals	Broadly refers to chemical compounds that possess carbon-based atoms, generally found in biological systems.
Oxidized Lipids	A lipid, any of a diverse group of organic compounds including fats, oils, hormones and certain components of membranes that are grouped together because they do not interact appreciably with water, combined chemically with oxygen.

Ozone	Triatomic form of oxygen. Hazardous to the respiratory system at ground level, but a layer in the upper atmosphere blocks much of the ultraviolet radiation from the sun.
Partially Hydrogenated Oil	Vegetable oils that have been hydrogenated or partially hydrogenated for the purpose of being solid at room-temperature, which contain trans-fats.
Particulate Matter	A complex mixture of elemental and organic carbon, salts, mineral and metal dust, ammonia and water that coagulate together into tiny solids and globules.
Perfluorinated Compound (PFC)	A family of fluorine-containing chemicals with unique properties to make materials stain- and stick-resistant.
Petrochemical	A chemical that is made from petroleum or natural gas.
Polychlorinated Biphenyls (PCBs)	A former commercially produced synthetic organic chemical compound that may be present in products and materials produced before the 1979 PCB ban.
Polyunsaturated Fat	Polyunsaturated fats are among the "good" fats that can help reduce cholesterol levels and risk of heart disease and stroke. Polyunsaturated fats are found in sunflower, corn, soybean and flaxseed oils, walnuts and many fish.
Polyurethane	A synthetic resin used chiefly in paints and varnishes. Diisocyanates in polyurethane products can be toxic if inhaled or touched during installation.
Polyvinyl Chloride (PVC)	An inexpensive plastic that is widely used for many objects. Exposure to its chemical precursors, additives and products of combustion can be harmful.
Radon	Radioactive, carcinogenic noble gas generated from the decay of natural deposits of uranium.
Saturated Fat	Typically solid at room temperature, saturated fats are found in high concentrations in salmon, butter, bacon, beef and cheese.
Serotonin	Neurotransmitter hormone produced in the gut and brain stem which regulates mood, sleep and digestion.
Simazine	Widely used in agriculture as an herbicide to control weeds; high levels of simazine exposure over a short period can cause weight loss and blood damage.
Sodium	Sodium is consumed as sodium chloride in common salt. It is a vital nutrient, but unhealthy in high amounts.
Sulfate	Sulfates occur naturally and can erode into water supplies; the health effects of sulfates are uncertain, but ingesting large amounts has been linked to negative health effects.
Tetrachloroethylene	A chlorinated hydrocarbon used as a dry cleaning solvent, an additive in textile processing and metal degreasing that has been linked to cancer.
Toxicant	Any toxic substance, generally created by human activity.
Toxin	A poisonous substance produced by a living organism.
Trihalomethane	Chlorine in water can combine with organic matter to form compounds called disinfectant byproducts (DBPs), such as trihalomethanes.
Ultrafine Particles	Also called nanoparticles, ultrafine particles are a subcategory of P <sub>2.5</sub> which are exclusively less than 0.1 µm. Due to the small size they are often airborne and can easily reach the alveoli of the lungs.
Urea-formaldehyde (UF)	A low-cost thermosetting resin that is used in the wood product industry.
Volatile Organic Compounds (VOCs)	Organic, and therefore carbon and hydrogen containing, materials which evaporate and diffuse easily at ambient temperature. VOCs are emitted by a wide array of building materials, paints and common consumer products.
Xylene	Typical applications include solvents for the printing, rubber and leather industries as well as ingredients in paper and fabric coatings.

## Units and Measures

Air Changes Per Hour (ACH)	A measure of how many times the volume of air within a defined space is replaced, used in the context of building ventilation and air tightness.
Annual Sunlight Exposure (aSE)	Percentage of space in which the light level from direct sun alone exceeds a pre-defined threshold (such as 1000 lux) for some quantity of hours (such as 250) in a year.
A-Weighted Decibel (dBA)	Acoustic decibel modified using "A-weighting" to adjust the frequency-dependent response of human hearing.
Candela (cd)	Measurement of luminous intensity and the SI base unit of light.
Clothing Insulation (CLO)	Clothing insulation is the resistance to heat transfer provided by clothing measured in clo (1 clo = 0.155 m <sup>2</sup> K/W = 0.88°F ft <sup>2</sup> h/BTU).

Color Rendering Index (CRI)	Comparison of the appearance of 8 to 14 colors under a light source in question, to a blackbody source of the same color temperature. CRI or Ra refers to the average of the first 8 comparisons and R9 describes the lighting accuracy on red surfaces.
Correlated Color Temperature (CCT)	Spectral distribution of electromagnetic radiation of a blackbody at a given temperature. For example, the color temperature during the daytime is approximately 15,000 K, while during sunset is approximately 1,850 K.
Cubic feet per minute (CFM)	Measures the mass of gas that passes through a certain point.
Decibel (dB)	A unit of measurement for sound. The decibel is a logarithmic unit so an increase in 10 decibels equals an increase by a factor of 10.
Dry Bulb Temperature (DBT)	Temperature of air measured by a thermometer freely exposed to the air but shielded from radiation and moisture. This temperature is usually thought of as air temperature and it is the true thermodynamic temperature. Dry bulb temperature does not take humidity into account.
Equivalent Continuous Level (LAeq)	The time averaged sound pressure level on the A-weighted scale, converted to decibels.
Equivalent Melanopic Lux (EML)	A measure of light used to quantify how much a light source will stimulate melanopsin's light response.
Footcandle (fc)	Unit of illuminance, equivalent to one lumen per square foot.
Frequency (f)	The number of times an event repeats itself per a specified unit of time. Hertz (Hz) is a common unit for frequency and equals cycles per second i.e. 1 Hz = 1 cycle/second. Most commonly used with waves (sound and light) and is the number of times the wave repeats itself at its particular wavelength.
Illuminance (Lux)	Amount of light passing through a given area in space. Measured in lux or foot-candles.
Impact Insulation Class (IIC)	Extent to which a physical structure blocks out sound, typically used in describing flooring, a higher IIC reduces footfall noise, and other impact sounds.
Light Reflectance Value (LRV)	Rating from 0 (black) to 100 (white) describing the amount of visible and usable light that reflects from (or absorbs into) a painted surface.
Lumens	Measure of luminous flux, derived from the SI base unit candela, and therefore weighted to the eye's sensitivity to light; 1 W of light at 555 nm equates to 683 lumens.
Luminance (cd/m <sup>2</sup> )	Measurement of how bright a surface or light source will appear to the eye. Measured in candela/m <sup>2</sup> or foot-lamberts.
Luminous Flux	Total luminous output of a light source, measured in lumens. Weighted to the eye's visual sensitivity.
Luminous Intensity	Radiant power weighted to human vision, describing light emitted by a source in a particular direction. Measured by the candela.
Lux	Unit of illuminance, one lux being equivalent to one lumen per square meter.
Maximum Contaminant Level Goal (MCLG)	Concentration of a substance in drinking water believed to result in no adverse effects. Derived from on Population Adjusted Dose and estimated daily water consumption, fraction of exposure from water and body weight.
Maximum Contaminant Levels (MCL)	Enforceable water quality limits for a substance, based on the Maximum Contaminant Level Goal, but taking into account technology and cost limitations of treatment.
Mean Radiant Temperature (MRT)	The uniform surface temperature of an imaginary black enclosure in which an occupant would gain or lose the same amount of radiant heat as in the actual non-uniform space; MRT is a primary driver of human thermal comfort, roughly equal in influence to air temperature.
Metabolic Rate (MET)	Rate that chemical energy in the body is converted to heat and mechanical energy.
Micro-Ra	Roughness rating of a physical surface, averaged in micro-meters & micro-inches.
Milliwatt (mW)	Unit of measurement for electromagnetic radiation, equal to 1/1000 watt. Not weighted to biological responses such as vision.
Minimum Efficiency Reporting Value (MERV)	Value assigned to an air filter to describe the amount of different types of particles removed when operating at the least effective point in its life.
Nephelometric Turbidity Units (NTU)	Measure the turbidity of water.
Noise Criteria (NC)	Define the sound pressure limits of the octave band spectra ranging from 63-8000 Hz. The noise criteria equals the lowest curve which is not exceeded in the spectrum.
Noise Isolation Class (NIC)	Field test for determining the sound transmitting abilities of a wall. Higher NIC values indicate better sound insulation i.e. more effective sound cancellation between spaces. NIC specifications are defined in ASTM Standard E366.

Noise Reduction Coefficient (NRC)	Average value that determines the absorptive properties of materials.
Parts per Billion (PPB)	Measurement of the mass of a chemical or contaminate per unit volume of water.
Parts Per Million (PPM)	A unit of measurement to express very dilute concentrations of substances.
PicoCurie per Liter (pCi/L)	A non-SI unit of radioactivity.
Relative Humidity (rH)	Ratio of partial pressure of water vapor in the air to the saturation pressure of water vapor at the same temperature and pressure.
Reverberation Time (RT)	Time it takes for sound to decay. The most commonly used reverberation time is RT60, the time it takes for the sound level to decrease 60 decibels. Additional reverberation time measurements are RT20 and RT30, for decreases of 20 and 30 decibels, respectively.
Sound Pressure Level (SPL)	Sound pressure level (SPL), also known as acoustic pressure, is the pressure variation associated with sound waves. Usually measured in decibels, the acoustic pressure is a ratio between the measured value and a reference value; a common reference is threshold of hearing or the minimum sound level that the average person can hear.
Sound Transmission Class (STC)	A laboratory method for determining the sound transmission through a wall. Higher STC values indicate more effective noise isolation than lower ones. STC specifications are found in ASTM Standards E90-09 and E1425.
Spatial Daylight Autonomy (sDA)	Percentage of floor space where a minimum light level (for example 300 lux) can be met completely for some proportion (for example 50%) of regular operating hours by natural light.
Visible Transmittance (VT)	Amount of light in the visible portion of the spectrum that passes through a glazing material.
Walk Score®	A walkability index based on the distance to amenities such as grocery stores, schools, parks, libraries, restaurants, and coffee shops. Scores are normalized from 0 to 100 points and are based on an algorithm that awards maximum points to amenities within a 5 minute walk distance or 400 m [0.25 mi], and a decay function assigns points for amenities up to 30 minutes away.
Wavelength (λ)	The distance between two points on a wave in which the wave repeats itself. Often used to describe light waves.
μg/m <sup>3</sup>	The concentration of an air pollutant (e.g. ozone) is given in micrograms (one-millionth of a gram) per cubic meter air or μg/m <sup>3</sup> .



## Appendix B: Standards Citations

Citations are organized by the endnote number found next to each Requirement letter in the WELL Building Standard. The reference codes below the citation refer to a specific Feature number, Part number and Requirement letter.

- 1 U.S. Green Building Council. *LEED v4: Reference Guide for Building Design and Construction*. Washington D.C.: U.S. Green Building Council; 2013: 37, 43-44, 541-552, 567, 605, 623, 645-53, 658-61, 682-3, 685-6, 723-4.
  - 1.1.a USGBC's LEED v4: Reference Guide for Building Design and Construction EQ Credit: Indoor Air Quality Assessment requires demonstration of formaldehyde levels less than 27 ppb.
  - 1.1.b USGBC's LEED v4: Reference Guide for Building Design and Construction EQ Credit: Indoor Air Quality Assessment requires demonstration of total VOC levels less than 500 µg/m<sup>3</sup>.
  - 2.2.a USGBC's LEED v4 EQ prerequisite: Environmental Tobacco Smoke requires prohibition of smoking outside the building except in designated smoking areas located at least 25 feet from all entries, outdoor air intakes and operable windows.
  - 4.1.a Adherence to CARB SCM for Architectural Coatings or SCAQMD Rule 1113 satisfies the requirements for VOC content but not the emissions requirement of USGBC's LEED v4 EQ Credit: Low-Emitting Materials for wet-applied products.
  - 4.1.b USGBC's LEED v4 EQ Credit: Low-Emitting Materials requires that 90%, by volume, for emissions of paints and coatings applied to walls, floors and ceilings are tested and determined compliant with CDPH Standard Method v1.1-2010.
  - 4.1.c USGBC's LEED v4 EQ Credit: Low Emitting Materials suggests projects outside the U.S. meet applicable national VOC control regulations or conduct testing of VOC content in accordance with ASTM D2369-10; ISO 11890, part 1; ASTM D6886-03; or ISO 11890-2.
  - 4.2.a USGBC's LEED v4 EQ Credit: Low-Emitting Materials requires that adhesives and sealants wet-applied on site meet the applicable VOC limits of the SCAQMD Rule 1168, in addition to emissions requirements.
  - 4.2.b USGBC's LEED v4 EQ Credit: Low-Emitting Materials requires that 90% of interior adhesives and sealants, for emissions, applied on site are tested and determined compliant with CDPH Standard Method v1.1-2010.
  - 4.2.c USGBC's LEED v4 EQ Credit: Low Emitting Materials suggests projects outside the U.S. meet applicable national VOC control regulations or conduct testing of VOC content in accordance with ASTM D2369-10; ISO 11890, part 1; ASTM D6886-03; or ISO 11890-2.
  - 4.3.a USGBC's LEED v4 EQ Credit: Low-Emitting Materials requires flooring ofollow the test method and meet the emissions criteria of CDPH Standard Method v1.1-2010.
  - 4.4.a USGBC's LEED v4 EQ Credit: Low-Emitting Materials requires insulation follow the test method and meet the emissions criteria of CDPH Standard Method v1.1-2010.
  - 4.5.a USGBC's LEED v4 EQ Credit: Low-Emitting Materials requires furniture and furnishings to comply with ANSI/BIFMA e3-2011 Furniture Sustainability Standard sections 7.6.1 and 7.6.2, and be tested in accordance with ANSI/BIFMA Standard Method M7.1-2011.
  - 5.2.a USGBC's LEED v4 EQ Credit: Enhanced Indoor Air Quality Strategies requires ventilation systems for outdoor air with particle filters to have a MERV of 13 or higher or Class F7 or higher (CEN Standard EN 779-2002) particle air filters.
  - 7.1.a USGBC's LEED v4 EQ Credit: Construction Indoor Air Quality Management Plan requires adherence to certain SMACNA guidelines, including sealing all ductwork, registers, diffusers, and returns when stored on site or not in service.
  - 7.2.a USGBC's LEED v4 BD+C EQ Credit: Construction Indoor Air Quality Management Plan requires the the replacement of all filtration media with new filters before occupancy.
  - 7.3.a USGBC's LEED v4 BD+C EQ Credit: Construction Indoor Air Quality Management Plan requires that absorptive materials stored on-site and installed are protected from moisture damage.
  - 7.4.a USGBC's LEED v4 EQ Credit: Construction Indoor Air Quality Management Plan requires adherence to certain SMACNA guidelines, including sealing doorways and windows, or tenting off areas as needed using temporary barriers, such as plastic separations.
  - 7.4.b USGBC's LEED v4 EQ Credit: Construction Indoor Air Quality Management Plan requires adherence to certain SMACNA guidelines, including the provision of walk-off mats at entryways to reduce introduced dirt and pollutants.

- 7.4.c USGBC's LEED v4 EQ Credit: Construction Indoor Air Quality Management Plan requires adherence to certain SMACNA guidelines, including the use of dust guards and collectors on saws and other tools.
- 8.1.a USGBC's LEED v4: Reference Guide for Building Design and Construction EQ Credit: Enhanced Indoor Air Quality Strategies requires permanent entry walk-off systems.
- 8.1.b USGBC's LEED v4: Reference Guide for Building Design and Construction EQ Credit: Enhanced Indoor Air Quality Strategies requires permanent entry walk-off systems.
- 8.1.c USGBC's LEED v4: Reference Guide for Building Design and Construction EQ Credit: Enhanced Indoor Air Quality Strategies requires permanent entry walk-off systems.
- 11.5.a USGBC's LEED v4 For Healthcare: MR prerequisite, PBT Source Reduction - Mercury bans the use of mercury containing equipment, including thermostats, switching devices and other building systems in new construction (of healthcare facilities).
- 11.5.b USGBC's LEED v4 For Healthcare: MR prerequisite, PBT Source Reduction - Mercury recommends phasing out mercury products and upgrading current mercury-containing lamps to low mercury or mercury-free lamp technology in renovating healthcare facilities.
- 11.5.c USGBC's LEED v4 For Healthcare: MR prerequisite, PBT Source Reduction - Mercury recommends that projects only specify and install illuminated exit signs that use Light Emitting Diode (LED) or Light-Emitting Capacitor (LEC) lamps.
- 11.5.d USGBC's LEED v4 For Healthcare: MR prerequisite: PBT Source Reduction - Mercury recommends that projects do not install or specify mercury vapor type high intensity discharge (HID) lamps and probe start metal halide HID lamps in interior spaces.
- 12.4.e USGBC's LEED v4 BD+C EQ Credit: Construction Indoor Air Quality Management Plan requires that absorptive materials stored on-site and installed are protected from moisture damage.
- 13.1.a USGBC's LEED v4 EQ Credit: Indoor Air Quality Assessment requires performance of a building flush-out by supplying a total air volume of 14,000 cubic feet of outdoor air per square foot of gross floor area.
- 13.1.b USGBC's LEED v4 EQ Credit: Indoor Air Quality Assessment requires that the space may be occupied only after delivery of a minimum of 3,500 cubic feet of outdoor air per square foot of gross floor area.
- 14.1.a LEED v4 BD+C: Enhanced commissioning provides two options for the credit, one of which involves following commissioning processes for the building's thermal envelope in accordance with ASHRAE Guideline 0-2005 and NIBS Guideline 3-2012.
- 15.1.a USGBC's LEED v4 EQ prerequisite: Minimum Indoor Air Quality Performance requires using the minimum outdoor air intake flow for mechanical ventilation systems using the ventilation rate procedure from ASHRAE 62.1-2010.
- 17.1.b USGBC's LEED v4 EQ Credit: Enhanced Indoor Air Quality Strategies requires no recirculation of air in spaces where hazardous gases or chemicals may be present or used (e.g., garages, housekeeping and laundry areas, and copying and printing rooms).
- 18.1.b USGBC's LEED v4 EQ prerequisite: Minimum Indoor Quality Performance requires carbon dioxide monitoring within each thermal zone for mechanically ventilated spaces.
- 26.1.b USGBC's LEED v4 MR Credit: Building Product Disclosure and Optimization - Material Ingredients allows Cradle to Cradle v2 Gold or Platinum or v3 Silver, Gold or Platinum as one way to achieve Option 2.
- 26.1.c USGBC's LEED v4 MR Credit: Building Product Disclosure and Optimization - Material Ingredients allows GreenScreen v1.2 Benchmark as one way to achieve Option 2.
- 62.1.a USGBC's LEED v4 EQ Credit: Daylight, Option 1 requires that at least 55% of space receives at least 300 lux of sunlight for an award of 2 points.
- 62.1.b USGBC's LEED v4 EQ Credit: Daylight, Option 1 requires that annual sunlight exposure ASE(1000,250) is achieved for no more than 10% of regularly occupied space.
- 67.3.b USGBC's LEED v4 LT credit: Surrounding Density and Diverse Uses is intended to "promote walkability, and transportation efficiency and reduce vehicle distance traveled" and "improve public health by encouraging daily physical activity".
- 68.2.b USGBC's LEED v4 SS credit: Joint Use of Facilities, for Schools, Option 3 requires collaboration between school authorities and organizations/agencies to provide access to various types of spaces, including gyms, playing fields and swimming pools.
- 85.1.b USGBC's LEED BD+C: Healthcare requires the generation of an Owner's Project Requirements (OPR) document that outlines ways to optimize occupant health.

- 97.1.c USGBC's LEED v4 MR credit: Building Product Disclosure and Optimization - Material Ingredients Option 1 has projects use at least 20 permanently installed products from at least 5 different manufacturers that use any of 4 programs described in the credit.
- 2 U.S. Environmental Protection Agency. *National Ambient Air Quality Standards*. 40 CFR Part 50. <https://www.epa.gov/criteria-air-pollutants/naaqs-table>. Revised October 2011. Updated December 14, 2012. Accessed September 16, 2014.
    - 1.2.a The EPA's 2012 NAAQS require ambient air in cities to keep 8-hr average levels of carbon monoxide below 9 ppm and 1-hr averages below 35 ppm, not to be exceeded more than once per year.
    - 1.2.b The EPA's 2012 NAAQS require PM<sub>2.5</sub> to be less than 12 µg/m<sup>3</sup> for a primary annual mean, secondary annual mean of 15 µg/m<sup>3</sup> and a 24-hour concentration of 35 µg/m<sup>3</sup>, averaged over three years .
  - 3 World Health Organization. *WHO Air Quality Guidelines for Particulate Matter, Ozone, Nitrogen Dioxide and Sulfur Dioxide*. Geneva: World Health Organization; 2005: 9, 14.
    - 1.2.c The WHO's Air Quality Guidelines for Particulate Matter, Ozone, Nitrogen Dioxide, and Sulfur set 50 µg/m<sup>3</sup> as a 24-hour mean concentration limit for PM<sub>10</sub>.
    - 1.2.d The WHO's Air Quality Guidelines for Particulate Matter, Ozone, Nitrogen Dioxide, and Sulfur Dioxide recommend ozone limits at 100 µg/m<sup>3</sup> 8-hour mean.
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    - 1.3.a The EPA's A Citizen's Guide to Radon recommends radon levels to be less than 4 pCi/L.
  - 5 State of New York. Regulation of Smoking in Public and Work Places § 1399. [https://www.health.ny.gov/regulations/public\\_health\\_law/section/1399/](https://www.health.ny.gov/regulations/public_health_law/section/1399/). Revised 2009. Accessed September 15, 2014.
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  - 6 ASHRAE Standing Standard Project Committee 62.1. *ANSI/ASHRAE STANDARD 62.1-2013: Ventilation for Acceptable Indoor Air Quality*. Atlanta: ASHRAE; 2013.
    - 3.1.a ASHRAE's Standard 62.1: Ventilation for Acceptable Indoor Air Quality provides guidelines for ventilation rates.
    - 3.1.b ASHRAE's Standard 62.1: Ventilation for Acceptable Indoor Air Quality provides ventilation rates.
  - 7 Illinois Department of Public Health. Illinois Department of Public Health Guidelines for Indoor Air Quality. [http://www.idph.state.il.us/envhealth/factsheets/indoorairqualityguide\\_fs.htm](http://www.idph.state.il.us/envhealth/factsheets/indoorairqualityguide_fs.htm). Updated May 2011. Accessed September 15, 2014.
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    - 3.2.b The IDPH's Guidelines for Indoor Air Quality recommend properly ventilated buildings should have carbon dioxide levels with a floor or building average of 800 ppm or less.
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    - 6.1.b NADCA's White Paper on Ultraviolet Lighting Applications in HVAC Systems states that to avoid ozone production, use UVC lamps with a wavelength of 254 nm.
  - 10 Jacobson, Michael. *Chemical Cuisine: Your guide to food additives*. Nutrition Action; 2014.

- 43.1.a The CSPI's Chemical Cuisine reports that artificial colorings often suggest absence of fruit and other natural ingredients, and that artificial colorings can contribute to hyperactivity in some children, cause tumors in animals and allergic reactions.
- 43.1.b The CSPI's Chemical Cuisine reports evidence that most flavoring chemicals also occur in nature and are probably safe, but are used almost exclusively in junk foods.
- 43.1.c The CSPI's Chemical Cuisine states that evidence continues to mount that artificial sweeteners negatively impact the digestive microbiome, leading to glucose intolerance and metabolic dysregulation.
- 43.1.d The CSPI's Chemical Cuisine reports that brominated vegetable oil leaves residue in the human body, and in animal studies has been shown to cause heart lesions, changes in the liver, and impaired growth and behavioral development.
- 43.1.e The CSPI's Chemical Cuisine reports that potassium bromate is banned in most countries, but not in the U.S., where it is frequently used in baked goods.
- 43.1.f The CSPI's Chemical Cuisine reports that BHA is classified as "reasonably anticipated to be a human carcinogen" by the Department of Health and Human Services.
- 43.1.g The CSPI's Chemical Cuisine reports that BHT increases the risk of various cancers in animals and has been shown to accumulate in human fat.
- 43.1.h The CSPI's Chemical Cuisine reports that studies have found that some people are sensitive to large amounts of MSG and may experience adverse reactions.
- 43.1.i The CSPI's Chemical Cuisine reports that HVP contains MSG and may cause reactions in sensitive people.
- 43.1.j The CSPI's Chemical Cuisine reports that sodium nitrate and sodium nitrite "introduce only a small risk", but are still worth avoiding.
- 43.1.k The CSPI's Chemical Cuisine Reports that sulfiting agents destroy vitamin B1 and can cause reactions in people, particularly those who have asthma.
- 11 Environmental Protection Agency. *Use of Lead Free Pipes, Fittings, Fixtures, Solder and Flux for Drinking Water*. Safe Drinking Water Act (SDWA) Section 1417.
  - 11.1.b Section 1417 of the EPA's Safe Drinking Water Act defines "lead free" as a weighted average of 0.25% lead calculated across the wetted surfaces of a pipe, pipe fitting, plumbing fitting, and fixture and 0.2% lead for solder and flux.
- 12 National Center for Healthy Housing and American Public Health Association. National Healthy Housing Standard. [http://www.nchh.org/Portals/0/Contents/NHHS\\_Full\\_Doc.pdf](http://www.nchh.org/Portals/0/Contents/NHHS_Full_Doc.pdf). Published 2014. Accessed September 15, 2014.
  - 6.2.a The National Healthy Housing Standard states that building materials affected by mold or mildew should be cleaned, dried, and repaired. It also states that interior and exterior surfaces shall have no signs of visible mold growth.
  - 6.2.b The National Healthy Housing Standard states that the foundation, roof, roofing components, exterior walls, doors, skylights and windows shall be free of persistent dampness or moisture.
- 13 International Living Future Institute. *Living Building Challenge 3.0*. Seattle; 2014: 38, 43-49, 60.
  - 19.1.a The International Living Future Institute's Living Building Challenge 3.0 Imperative 07 requires full control of windows.
  - 26.1.a The International Living Future Institute's Living Building Challenge 3.0 Imperatives 10 and 12 require independently verified declarations of products.
  - 87.1.a The International Living Future Institute's Living Building Challenge 3.0 Imperative 19 requires design features to support human delight.
  - 87.1.b The International Living Future Institute's Living Building Challenge 3.0 Imperative 19 requires design features to support celebration of culture.
  - 87.1.c The International Living Future Institute's Living Building Challenge 3.0 Imperative 19 requires design features to support celebration of spirit.
  - 87.1.d The International Living Future Institute's Living Building Challenge 3.0 Imperative 19 requires design features to support celebration of place.
  - 87.1.e The International Living Future Institute's Living Building Challenge 3.0 Imperative 19 requires design features to support meaningful integration of public art.

- 88.1.a The International Living Future Institute's Living Building Challenge 3.0 Imperative 9 requires a framework and plan that outlines the way the project will be transformed through the incorporation of nature through environmental elements in the project.
- 88.1.b The International Living Future Institute's Living Building Challenge 3.0 Imperative 9 requires a framework and plan that outlines the way the project will be transformed through the incorporation of nature through lighting elements in the project.
- 88.1.c The International Living Future Institute's Living Building Challenge 3.0 Imperative 9 requires a framework and plan that outlines the way the project will be transformed through the incorporation of nature through space in the project.
- 88.2.a The International Living Future Institute's Living Building Challenge 3.0 Imperative 9 requires a framework and plan that outlines the way the project will be transformed through the incorporation of nature's patterns into the project.
- 88.3.a The International Living Future Institute's Living Building Challenge 3.0 Imperative 9 requires a framework and plan that outlines ways to provide human-nature interactions in the interior of the building.
- 88.3.b The International Living Future Institute's Living Building Challenge 3.0 Imperative 9 requires a framework and plan that outlines ways to provide human-nature interactions in the exterior of the project.
- 14 San Francisco Department of the Environment. Integrated Pest Management Ordinance. <http://www.sfenvironment.org/article/city-staff/pest-management>. Published 2011. Accessed September 14, 2014
  - 10.1.a The San Francisco Department of the Environment's Integrated Pest Management recommends that pesticide products be used as a last result, only after other non-chemical management options have been exhausted.
  - 10.1.b The San Francisco Department of the Environment's Integrated Pest Management Ordinance assigns hazard tiers to pesticide products from lowest to highest concern.
- 15 U.S. Environmental Protection Agency. *Residential Air Cleaners: A Summary of Available Information*. Washington, DC: U.S. Environmental Protection Agency; August 2009.
  - 23.2.a The EPA's "Residential Air Cleaners" notes that properly designed UVGI cleaners in typical airstream disinfection applications could reduce the viability of vegetative bacteria and molds, and could provide low to moderate reduction in viruses.
  - 23.2.b The EPA's Residential Air Cleaners document notes that photocatalytic oxidation cleaners are intended to change gaseous pollutants and associated odors into harmless products.
- 16 U.S. Environmental Protection Agency. Methylene Diphenyl Diisocyanate and Related Compounds Action Plan. [http://www.wftaylor.com/wp-content/uploads/2012/03/EPA\\_MDI\\_Action\\_Plan.pdf](http://www.wftaylor.com/wp-content/uploads/2012/03/EPA_MDI_Action_Plan.pdf). Published April 2011. Accessed October 17, 2014.
  - 25.4.a The EPA's Methylene Diphenyl Diisocyanate and Related Compounds Action Plan outlines the risk of exposure to isocyanate-based compounds.
- 18 U.S. Green Building Council. Sustainable Site 4: Alternative Transportation – Bicycle Storage and Changing Rooms. <http://www.usgbc.org/node/1731996?return=/credits>. Published 2009. Accessed October 17, 2014.
  - 69.1.b USGBC's LEED v4 LT Credit: Bicycle Facilities requires separate and secure bicycle storage for at least 5% of regular building occupants (minimum 4) and short-term bicycle storage for at least 2.5% of all peak visitors.
  - 69.2.a USGBC's LEED v4 LT Credit: Bicycle Facilities requires at least one on-site shower with a changing facility for the first 100 regular building occupants and one additional shower for every 150 regular building occupants thereafter.
- 19 Declare. The Ingredients Label for Building Projects. <https://ilbi.org/about/About-Docs/handouts-docs/declare-postcard>. Seattle: International Living Future Institute; Accessed September 15, 2014.
  - 97.1.a Declare promotes materials transparency by providing a platform for manufacturers to disclose product ingredients and other relevant information.
- 20 National Partnership for Women and Families. *Paid Sick Days: Good for Business, Good for Families*. <http://www.nationalpartnership.org/research-library/work-family/psd/paid-sick-days-good-for-business-and-workers.pdf>. Published August 2012. Accessed October 16, 2014.
  - 92.1.e National Partnership for Women and Families' Paid Sick Days: Good for Business, Good for Workers notes that "when sick workers are able to stay home, the spread of disease slows and workplaces are both healthier and more productive."

- 21 U.S. Environmental Protection Agency. *Protocol for Residual Self-Sanitizing Activity of Dried Chemical Residues on Hard, Non-Porous Surfaces*, #01-1A. [https://www.epa.gov/sites/production/files/2015-09/documents/cloroxpcol\\_final.pdf](https://www.epa.gov/sites/production/files/2015-09/documents/cloroxpcol_final.pdf). Published September 2015. Accessed Jun 2016.  
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51.1.b LEED v4: Reference Guide for Building Design and Construction sets a Pilot Credit (local food production) for onsite food production, which requires the provision of a greenhouse.  
51.2.a LEED v4: Reference Guide for Building Design and Construction sets a Pilot Credit (local food production) for onsite food production, which requires the provision for onsite food production.  
51.2.b LEED v4: Reference Guide for Building Design and Construction sets a Pilot Credit (local food production) for onsite food production, which requires the provision of a watering system.  
51.2.c LEED v4: Reference Guide for Building Design and Construction sets a Pilot Credit (local food production) for onsite food production, which requires the provision of access to sunlight.  
51.2.d LEED v4: Reference Guide for Building Design and Construction sets a Pilot Credit (local food production) for onsite food production, which requires the provision of vegetable gardens and/or edible nut and fruit-bearing plants.
- 23 Occupational Safety and Health Administration. Protecting Workers Who Use Cleaning Chemicals. <https://www.osha.gov/Publications/OSHA3512.pdf>. Published 2012. Accessed October 17, 2014.  
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29.1.b OSHA's Protecting Workers Who Use Cleaning Chemicals info sheet recommends the use of hands-free mops.  
29.2.b Protecting Workers Who Use Cleaning Chemicals info sheet recommends avoiding the mixing of cleaning products that contain bleach and ammonia.
- 24 United States Environmental Protection Agency Office of Water. *Alternative Disinfectants and Oxidants Guidance Manual*. [http://www.epa.gov/ogwdw/mdbp/alternative\\_disinfectants\\_guidance.pdf](http://www.epa.gov/ogwdw/mdbp/alternative_disinfectants_guidance.pdf). Published April 1999. Accessed June 12, 2015.  
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64.1.a LEED v4 Pilot Credit 78: Design for Active Occupants for primary staircase(s) includes classifying regularly occupied floors for re-entry, allowing all building users to access them, and providing access via stairs to at least 50% of the tenant floors.  
64.2.a LEED v4 Pilot Credit 78: Design for Active Occupants includes a requirement for a main staircase to be located within 25 ft of any edge of the lobby.

- 64.2.b LEED v4 Pilot Credit 78: Design for Active Occupants includes a requirement to locate a main staircase that is visible before occupants encounter elevators and/or escalators.
- 64.3.c LEED v4 Pilot Credit 78: Design for Active Occupants requires some features, one of which is the provision of daylighting with windows and/or skylights that are at least 8 square feet.
- 70.1.a USGBC's LEED Pilot Credit 78: Design for Active Occupants requires equipment to be provided in the interior fitness space and for use by 5% of regular building occupants.
- 70.2.a USGBC's LEED Pilot Credit 78: Design for Active Occupants requires equipment to be provided in the interior fitness space and for use by 5% of regular building occupants.
- 28 Health Product Declaration Collaborative (HPD). *Health Product Declaration Standard Version 1.0*. [http://hpdcollaborative.org/standard-documents/hpdstandard\\_v1\\_0\\_121215.pdf](http://hpdcollaborative.org/standard-documents/hpdstandard_v1_0_121215.pdf) . Updated December 15, 2012. Accessed June 9, 2015.
  - 97.1.b The Health Product Declaration's Standard Version 1.0 provides guidance for declaring "product content and direct health hazards associated with exposure to its individual contents."
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- 30 U.S. Consumer Product Safety Commission. Biological Pollutants in Your Home. <https://www.cpsc.gov/safety-education/safety-guides/home/biological-pollutants-your-home>. Accessed December 15, 2017.
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  - 11.2.c The EPA's Work Practice Standards for Conducting Lead-Based Paint Activities document establishes requirements for conducting lead-based paint activities.
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  - 11.3.a AHERA's Asbestos Model Accreditation Plan establishes asbestos limits.
  - 11.3.b The EPA's Guidelines for Conducting the AHERA TEM Clearance Test to Determine Completion of an Asbestos Abatement Project guidelines establish requirements for conducting post-abatement checks.
  - 11.3.c The EPA's Guidelines for Conducting the AHERA TEM Clearance Test to Determine Completion of an Asbestos Abatement Project guidelines establish requirements for conducting post-abatement checks.
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  - 11.4.b The EPA's Steps to Safe PCB Abatement Activities provides guidance on the handling, storage, and disposal of PCB waste.



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  - 86.1.b CBE's Occupant Indoor Environmental Quality (IEQ) Survey™ covers several core question areas that address key aspects of the indoor environment, including thermal comfort.
  - 86.1.c CBE's Occupant Indoor Environmental Quality (IEQ) Survey™ covers several core question areas that address key aspects of the indoor environment, including office furnishings.
  - 86.1.d CBE's Occupant Indoor Environmental Quality (IEQ) Survey™ covers several core question areas that address key aspects of the indoor environment, including lighting.
  - 86.1.e CBE's Occupant Indoor Environmental Quality (IEQ) Survey™ covers several core question areas that address key aspects of the indoor environment, including air quality.
  - 86.1.f CBE's Occupant Indoor Environmental Quality (IEQ) Survey™ covers several core question areas that address key aspects of the indoor environment, including cleanliness and maintenance.
  - 86.1.g CBE's Occupant Indoor Environmental Quality (IEQ) Survey™ covers several core question areas that address key aspects of the indoor environment, including office layout.
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  - 25.1.a USGBC's LEED v3 Pilot Credit 54 requires that third party certified building materials may not include perfluorinated compounds at levels equal to or greater than 100 ppm.
  - 25.2.a USGBC's LEED v3 Pilot Credit 54 requires that third party certified building products not contain more than 0.01% by mass (100ppm) brominated or halogenated flame retardants containing bromine, chlorine, or fluorine.
  - 25.2.b USGBC's LEED v3 Pilot Credit 54 requires that third party certified building products not contain more than 0.01% by mass (100ppm) brominated or halogenated flame retardants containing bromine, chlorine, or fluorine.
  - 25.2.c USGBC's LEED v3 Pilot Credit 54 requires that third party certified building products not contain more than 0.01% by mass (100ppm) brominated or halogenated flame retardants containing bromine, chlorine, or fluorine.
  - 25.2.d USGBC's LEED v3 Pilot Credit 54 requires that third party certified building products not contain more than 0.01% by mass (100ppm) brominated or halogenated flame retardants containing bromine, chlorine, or fluorine.
  - 25.2.e USGBC's LEED v3 Pilot Credit 54 requires that third party certified building products not contain more than 0.01% by mass (100ppm) brominated or halogenated flame retardants containing bromine, chlorine, or fluorine.
  - 25.3.a USGBC's LEED v4 Pilot Credit 54 requires that third party certified building products not contain more than 0.01% by mass (100ppm) of phthalates.
  - 25.3.b USGBC's LEED v4 Pilot Credit 54 requires that third party certified building products not contain more than 0.01% by mass (100ppm) of phthalates.
  - 25.3.c USGBC's LEED v4 Pilot Credit 54 requires that third party certified building products not contain more than 0.01% by mass (100ppm) of phthalates.
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  - 21.1.b ASHRAE's Underfloor Air Distribution Guide provides recommendations for underfloor air distribution systems.
- 39 South Coast Air Quality Management District. *Rules and Regulations, Regulation XI - Source Specific Standards*. <http://www.aqmd.gov/home/regulations/rules/scaqmd-rule-book/regulation-xi>. Accessed October 17, 2014.
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- 24.2.b The South Coast Air Quality Management District Rule 1111 (amended 9/5/14) establishes requirements for natural gas fired, fan-type central furnaces for the purpose of reducing emission of nitrogen oxides.
- 24.2.c The South Coast Air Quality Management District Rules 1146.1 (amended 11/1/13) and 1146.2 (amended 5/5/06) establish requirements for the reduction of emissions of oxides of nitrogen from boilers, process heaters and steam generators.
- 24.2.d The South Coast Air Quality Management District Rules 1121 (amended 9/3/04) and 1146.2 (amended 5/5/06) establish requirements for emissions of nitrogen oxides from residential natural gas-fired water heaters and large water heaters.
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- 21.1.a The Performance Evaluation and Development of Design Guidelines for Displacement Ventilation document recommends air supply temperatures.
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- 72.1.b The ISO's 21542:2011 provides standards on accessibility for newly constructed or renovated buildings.
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- 32.1.c The California Environmental Protection Agency regulates Ethylbenzene in drinking water to a Maximum Contaminant Level of 0.3 mg/L.
- 32.1.f The California Environmental Protection Agency regulates Toluene in drinking water to a Maximum Contaminant Level set at 0.15 mg/L.
- 33.1.a The California Environmental Protection Agency regulates Atrazine in drinking water to a Maximum Contaminant Level of 0.001 mg/L.
- 45 Office of Environmental Health Hazard Assessment. Public Health Goal for Styrene in Drinking Water. Sacramento: California Environmental Protection Agency; 2010: 1.
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- 93.3.a United States federal law permits eligible employees to receive up to 12 workweeks of leave during any 12-month period for an employee to care for a spouse, child or parent with a serious health condition.
- 47 New York State Department of Health. *Individual Water Supply Wells - Fact Sheet #3 Recommended Residential Water Quality Testing*. Troy: New York State Department of Health Bureau of Water Supply Protection; 2006.
- 37.1.d The New York State Department of Health notes that water containing more than 270 mg/L of sodium should not be used by people on moderately restricted sodium diets.

- 48 U.S. Environmental Protection Agency (EPA). *Drinking Water Best Management Practices*, EPA 816-B-13-002. Washington, D.C.: U.S. Environmental Protection Agency; April 2013.
  - 37.3.a The EPA's Drinking Water Best Management Practices notes that it is "important to clean drinking water fountains to remove lime and calcium build-up."
  - 37.3.b The EPA's Drinking Water Best Management Practices note to clean debris out of all outlet screens and aerators on a regular basis.
- 49 The Society of Light and Lighting. *Lighting for the Built Environment - Lighting Guide 13: Lighting for Places of Worship*. England: The Lavenham Press; 2014.
  - 89.2.b CIBSE's Lighting Guide 13: Lighting for Places of Worship notes that lamps with a correlated color temperature of 2700-3000 K for congregation spaces can help these spaces feel psychologically "warmer".
- 50 U.S. Environmental Protection Agency. *National Primary Drinking Water Regulations*. EPA 816-F-09-004. Published May 2009. Washington, D.C.
  - 30.1.a The US EPA National Primary Drinking Water Regulations notes that for systems that use conventional or direct filtration, "samples for turbidity must be less than or equal to 0.3 NTU in at least 95 percent of the samples in any month".
- 51 National Partnership for Women and Families. *Expecting Better: A State-by-State Analysis of Laws That Help New Parents*.  
<http://www.nationalpartnership.org/research-library/work-family/expecting-better-2014.pdf>. Published June, 2014:23. Accessed September 15, 2014.
  - 93.3.b The National Partnership for Women and Families' *Expecting Better* recognizes US states that allow workers to use their earned paid sick days to care for either a new child or an ill family member.
  - 93.3.c The National Partnership for Women and Families' "Expecting Better" recognizes US states that improve upon federal law by "providing all nursing mothers with reasonable break times and/or a place other than a bathroom to express breast milk at work."
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  - 53.2.a ANSI/IES RP-1-12 provides recommended luminance ratios for offices.
  - 53.2.b ANSI/IES RP-1-12 provides recommended luminance ratios for offices. It notes that studies suggest that ratios do not exceed 3:1 or 1:3 between a paper task and an adjacent visual display terminal.
  - 53.2.c ANSI/IES RP-1-12 provides recommended luminance ratios for offices. It notes that for ceiling luminance ratios, 10:1 is the maximum acceptable ratio.
  - 53.2.d ANSI/IES RP-1-12 provides recommended luminance ratios for offices. It notes that studies suggest that ratios do not exceed 10:1 or 1:10 between a task and a remote surface.
  - 55.2.a ANSI/IES American National Standard Practice for Office Lighting (RP-1-12) notes that luminaires at angles higher than 53° above horizontal may cause discomfort, and that such luminaires should be less than 8,000 cd/m<sup>2</sup>.
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  - 32.1.g The WHO Guidelines for Drinking Water Quality set a guideline value for Xylene concentrations at 0.5 mg/L.
  - 33.1.b The WHO Guidelines for Drinking Water Quality set a guideline value for Simazine concentrations at 0.002 mg/L.
  - 33.2.a The WHO Guidelines for Drinking Water Quality set a guideline value for nitrate concentrations at 50 mg/L.
  - 35.1.a The WHO Guidelines for Drinking-water Quality, Fourth Edition notes that some hazards "may arise intermittently, often associated with seasonal activity or seasonal conditions."
  - 35.1.b The WHO Guidelines for Drinking-water Quality, Fourth Edition notes that some hazards "may arise intermittently, often associated with seasonal activity or seasonal conditions."
  - 35.1.c The WHO Guidelines for Drinking-water Quality, Fourth Edition notes that some hazards "may arise intermittently, often associated with seasonal activity or seasonal conditions."

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- 30.2.a The EPA 2012 Edition of the Drinking Water Standards and Health Advisories set a Maximum Contaminant Level Goal for Total Coliforms at 0.
- 31.1.b The EPA's Drinking Water Standards and Health Advisories set a Maximum Contaminant Level for Arsenic concentrations at 0.01 mg/L.
- 31.1.c The EPA's Drinking Water Standards and Health Advisories set a Maximum Contaminant Level for Antimony concentrations at 0.006 mg/L.
- 31.1.d The EPA's Drinking Water Standards and Health Advisories set a Maximum Contaminant Level for Mercury (inorganic) concentrations at 0.002 mg/L.
- 31.1.f The EPA Secondary Drinking Water Regulations set a secondary Maximum Contaminant Level for Copper concentrations at 1.0 mg/L.
- 32.1.d The EPA's Drinking Water Standards and Health Advisories set a Maximum Contaminant Level for Polychlorinated biphenyl concentrations at 0.0005 mg/L.
- 32.1.e The EPA's Drinking Water Standards and Health Advisories set a Maximum Contaminant Level for Vinyl Chloride at 0.002 mg/L.
- 32.1.h The EPA's Drinking Water Standards and Health Advisories set a Maximum Contaminant Level for Tetrachloroethylene concentrations at 0.005 mg/L.
- 33.1.c The EPA's Drinking Water Standards and Health Advisories set a Maximum Contaminant Level for Glyphosate concentrations at 0.7 mg/L.
- 33.1.d The EPA's Drinking Water Standards and Health Advisories set a Maximum Contaminant Level for 2,4-Dichlorophenoxyacetic Acid concentrations at 0.07 mg/L.
- 34.1.a The EPA 2012 Edition of the Drinking Water Standards and Health Advisories includes a Maximum Residual Disinfection Level for chlorine of 4 mg/L.
- 34.1.b The EPA 2012 Edition of the Drinking Water Standards and Health Advisories includes a Maximum Residual Disinfection Level for chloramine of 4 mg/L.
- 34.2.a The EPA's 2012 Edition of the Drinking Water Standards and Health Advisories notes that the 1998 Final Rule for Disinfection By-products set the total concentration for trihalomethanes at 0.08 mg/L.
- 34.2.b The EPA's 2012 Edition of the Drinking Water Standards and Health Advisories notes that the 1998 Final Rule for Disinfection By-products set the total concentration for five Haloacetic acids at 0.06 mg/L.
- 34.3.a The EPA's Drinking Water Standards and Health Advisories set a Maximum Contaminant Level for Fluoride at 4 mg/L.
- 37.1.a The EPA Secondary Drinking Water Regulations set a secondary Maximum Contaminant Level for Aluminum concentrations at 0.2 mg/L.
- 37.1.b The EPA Secondary Drinking Water Regulations set a secondary Maximum Contaminant Level for Chloride concentrations at 250 mg/L.
- 37.1.c The EPA Secondary Drinking Water Regulations set a secondary Maximum Contaminant Level for Manganese concentrations at 0.05 mg/L.
- 37.1.e The EPA Secondary Drinking Water Regulations set a secondary Maximum Contaminant Level for Sulfate concentrations at 250 mg/L.
- 37.1.f The EPA Secondary Drinking Water Regulations set a secondary Maximum Contaminant Level for Iron concentrations at 0.3 mg/L.
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- 46.1.d The National Institutes of Health's Cooking Utensils and Nutrition identifies the scratch resistant and cleanable properties of glass cutting boards.
- 46.1.e The National Institutes of Health's Cooking Utensils and Nutrition identifies easily cleanable, scratch resistant and non-hazardous properties of anodized aluminum cookware.

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  - 46.2.c The USDA recommends consumers choose cutting boards with a nonporous surface such as glass.
  - 46.2.d The USDA recommends consumers choose cutting boards with a nonporous surface such as pyroceramic.
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  - 58.1.b The GSA's Facilities Standard for the Public Buildings Service Tier 2 High Performance requires a Color Rendering Index R9 of at least 50.
  - 59.1.a The GSA's Facilities Standard for the Public Buildings Service Baseline requires an average LRV for ceilings of 80% or greater.
  - 59.1.b The GSA's Facilities Standard for the Public Buildings Service Tier 2 High Performance recommends an average LRV on walls of 70%.
  - 60.1.a The GSA's Facilities Standard for the Public Buildings Service notes that automatic shade controls help occupants manage luminance levels.
  - 60.2.a The GSA's Facilities Standard for the Public Buildings Service notes that automatic controls for occupancy save energy.
  - 60.2.b The GSA's Facilities Standard for the Public Buildings Service notes that automatic controls for daylight dimming save energy.



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  - 64.1.b NYC Active Design Guidelines: Promoting Physical Activity and Health in Design recommends including permanent signage encouraging stair use, to be integrated with the building's wayfinding program.
  - 64.2.c NYC Active Design Guidelines recommends a strategy for making stairs wide enough for traveling in groups, or in two directions, a width of at least 56 inches can comfortably accommodate this.
  - 64.3.a NYC Active Design Guidelines recommends strategies for encouraging stair use through a number of methods, including the incorporation of artwork into the stair environment.
  - 64.3.b NYC Active Design Guidelines recommends strategies for encouraging stair use through a number of methods, including adding music to stairwells.
  - 64.3.d NYC Active Design Guidelines recommends strategies for encouraging stair use through a number of methods, including highlighting interesting views onto nature or interior areas.
  - 67.1.a NYC Active Design Guidelines identifies the design of pedestrian-friendly streets with a number of features, including benches, as a key recommended measure to encourage active environments.



- 67.1.b NYC Active Design Guidelines recommends strategies for creating pedestrian and bicycle-friendly public spaces, including the provision of both movable and fixed seating.
- 67.1.c NYC Active Design Guidelines recommends strategies for increasing walking, including the provision of supportive infrastructure along walking routes, such as drinking fountains and water refilling stations.
- 67.2.a NYC Active Design Guidelines recommends strategies for creating pedestrian and bicycle-friendly public spaces, including the provision of water fountains.
- 67.2.b NYC Active Design Guidelines: Promoting Physical Activity and Health in Design recommends strategies for creating attractive plaza spaces.
- 67.2.d NYC Active Design Guidelines: Promoting Physical Activity and Health in Design recommends incorporating temporary and permanent public art installations into the streetscape to provide a more attractive and engaging environment.
- 68.1.a The NYC Active Design Guidelines recommend providing physical activity spaces such as exercise rooms, active play spaces, and multi-purpose recreational spaces in public, workplace and residential buildings.
- 68.2.a NYC Active Design Guidelines recommend locating places of residence and work near existing recreational facilities, walking paths, parks, and waterfront areas.
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  - 72.1.a The Department of Justice Civil Rights Division's 2010 ADA Standards for Accessible Design set accessibility standards for new construction and alterations.
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  - 75.2.a The General Services Administration's Sound Matters recommends a background noise maximum of NC 40 for open plan workspaces.
  - 75.2.b The General Services Administration's Sound Matters recommends a background noise maximum of NC 35 for private offices.
  - 78.1.a The General Services Administration's Sound Matters recommends RT60 of 0.6 seconds for meeting rooms.
  - 79.1.a The General Services Administration's Sound Matters recommends that sound masking should be considered a technique to achieve acoustic comfort in contemporary offices.
  - 79.2.a The General Services Administration's Sound Matters recommends sound masking at 45-48 dBA for open plan workspaces.
  - 79.2.b The General Services Administration's Sound Matters recommends sound masking at 40-42 dBA for private offices.
  - 80.1.a The General Services Administration's Sound Matters recommends this NRC value for open plan workspaces.
  - 80.1.b The General Services Administration's Sound Matters recommends this NRC value for meeting rooms and teleconference rooms.
  - 80.2.a The General Services Administration's Sound Matters recommends a minimum NRC of 0.8 on at least 25% of two adjacent walls for enclosed workspaces.
  - 80.2.b The General Services Administration's Sound Matters recommends this NRC value for open plan workspaces.
  - 80.2.c The General Services Administration's Sound Matters recommends this NRC value for quiet open offices which have head-height walls.
  - 81.1.a The General Services Administration's Sound Matters recommends this NIC value for private offices.
  - 81.1.b The General Services Administration's Sound Matters recommends this NIC value for teleconference rooms.

- 81.2.a The General Services Administration's Sound Matters recommends door gaskets to help prevent noise intrusion into offices.
- 81.2.b The General Services Administration's Sound Matters recommends that the undercut should be shielded in some fashion such as a sweep or drop seal gasket.
- 81.2.c The General Services Administration's Sound Matters advises that as it relates to acoustics, hollow core doors are only good to poor.
- 81.3.a The General Services Administration's Sound Matters recommends caulking gypsum partition slabs as an effective sound blocking technique.
- 81.3.b The General Services Administration's Sound Matters recommends staggering gypsum partition slabs as an effective sound blocking technique.
- 81.3.c The General Services Administration's Sound Matters recommends plugging holes as an effective sound blocking technique.
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- 76.2.a ASHRAE Standard 55: Thermal Environmental Conditions for Human Occupancy sets best practices for thermal comfort in buildings.
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- 83.1.b The Department of Energy identifies radiant heating systems as more efficient and less likely to distribute allergens than forced-air systems.
- 83.2.a The Department of Energy recommends radiant heating systems over forced-air systems as they are usually more efficient and do not distribute allergens.
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- 94.1.a The NHLBI Obesity Education Initiative's "Practical Guide: Identification, Evaluation, and Treatment of Overweight and Obesity in Adults" states that self-monitoring a behavior usually changes that behavior in the desired direction.
- 95 Marcus, C. C. & Sachs, N. A. *Therapeutic Landscapes: An Evidence-based Approach to Designing Healing*. Hoboken: John Wiley & Sons; 2013.
- 100.1.b Marcus and Sachs' *Therapeutic Landscapes: An Evidence-based Approach to Designing Healing* provide guidelines for planting, including the provision of gardens that have an approximate ratio of 70% softscape (plants) to 30% hardscape.
- 100.2.a Marcus and Sachs' *Therapeutic Landscapes: An Evidence-based Approach to Designing Healing* recommends providing opportunities for indoor nature connection, such as through the use of potted plants.
- 100.2.b Marcus and Sachs' *Therapeutic Landscapes: An Evidence-based Approach to Designing Healing* recommends incorporating vegetation growing at multiple heights, such as through planted walls.
- 100.3.a Marcus and Sachs' *Therapeutic Landscapes: An Evidence-based Approach to Designing Healing* recommends providing at least one water feature.

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  - 93.1.a A 2015 Presidential Memorandum from the White House directs federal agencies to ensure employee policies offering 240 hours (equivalent to 6 workweeks) of advanced (i.e., paid) sick leave for appropriate uses, including the birth or adoption of a child.
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  - 91.1.c CWT Solutions Group's Stress Triggers for Business Travelers notes that, compared to respondents living alone, respondents living with a partner reported that traveling during the weekends was more stressful.
  - 91.1.d In CWT Solutions Group's Stress Triggers for Business Travelers, "not able to maintain workout routine" was listed as a medium stress factor.
- 176 U.S. Environmental Protection Agency. *Moisture Control Guidance for Building Design, Construction and Maintenance*. Washington, DC: U.S. Environmental Protection Agency; Dec 2013. EPA 402-F-13053.
  - 12.1.a EPA 402-F-13053 notes that effectively controlling water intrusion requires directing drain rain and irrigation water away from the building.
  - 12.1.b EPA 402-F-13053 notes to design buildings such that the interior floor grade is above the local water table.
  - 12.1.c EPA 402-F-13053 notes to design exterior walls to manage rainwater.
  - 12.1.d EPA 402-F-13053 advises to consider key elements of moisture behavior, including transport mechanisms such as moisture wicking through porous materials.
  - 12.2.a EPA 402-F-13053 notes that leaks in pipes or tanks in the plumbing system can release water.
  - 12.2.b EPA 402-F-13053 notes that moisture problems include leaks in pressurized pipes and vessels in appliances that use water.
  - 12.2.c EPA 402-F-13053 advises to consider key elements of moisture behavior, including transport mechanisms such as moisture wicking through porous materials.
  - 12.2.d EPA 402-F-13053 notes to "avoid enclosing wet materials in new construction by protecting moisture-sensitive and porous materials" as part of a comprehensive strategy to control liquid water movement.
  - 12.3.a EPA 402-F-13053 notes that in low-rise buildings, damp basements and crawlspaces may add water vapor to the air.
  - 12.3.b EPA 402-F-13053 notes that air that infiltrates the building through air leaks represents one of the largest sources of humidity.
  - 12.3.c EPA 402-F-13053 notes that condensation may be caused by "excessively high dew point, unusually cold surfaces, or a combination of the two."
  - 12.3.d EPA 402-F-13053 notes that "oversized cooling systems do not solve humidity control problems—instead, they cause them."
  - 12.4.a EPA 402-F-13053 advises to use materials able to tolerate repeated wetting and drying in wet areas. The document also notes that particularly in buildings in cold climates, it is important to consider the condensation potential of glazing designs.

- 12.4.b EPA 402-F-13053 notes that exterior cladding and other measures can intercept most of the rain water and direct it away from the building.
- 12.4.c EPA 402-F-13053 advises to use materials able to tolerate repeated wetting and drying in wet areas.
- 12.4.d EPA 402-F-13053 advises to use low-permeability insulating sheathing and interior finishes.
- 177 ASHRAE Standing Standard Project Committee 188. ANSI/ASHRAE Standard 188-2015: Legionellosis: Risk Management for Building Water Systems. Atlanta; 2015.
  - 36.5.a ASHRAE's Hazard Analysis and Critical Control Point Plan requires the development of a team comprised of members who understand the building's water systems and the principles of the plan.
  - 36.5.b ASHRAE's Hazard Analysis and Critical Control Point Plan requires teams to develop at least two process flow diagrams mapping the receipt, processing and delivery of water to occupants.
  - 36.5.c ASHRAE's Hazard Analysis and Critical Control Point plan for preventing building associated legionellosis includes conducting a hazard analysis.
  - 36.5.d ASHRAE's Hazard Analysis and Critical Control Point plan includes identifying critical control points.
  - 36.5.e ASHRAE's Hazard Analysis and Critical Control Point plan for preventing building associated legionellosis includes monitoring identified control points and establishing procedures for corrective measures.
  - 36.5.f ASHRAE's Hazard Analysis and Critical Control Point plan for preventing building-associated legionellosis includes establishing documentation and verification procedures.
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  - 73.3.a HFES standards accommodate at least 90% of the North American workforce. The BIFMA G1 provides recommendations for sizing furniture to accommodate the 5th percentile female to the 95th percentile male of the North American population.
  - 73.3.b HFES standards accommodate at least 90% of the North American workforce. The BIFMA G1 provides recommendations for sizing furniture to accommodate the 5th percentile female to the 95th percentile male of the North American population.
- 180 Wansink B. *Smarter Lunchrooms*. In: *Slim By Design: Mindless Eating Solutions for Everyday Life*. New York, NY: HarperCollins Publishers; 2014: 185-224.
  - 38.2.a In *Slim by Design*, Wansink notes that in one intervention in a school, positioning the salad bar away from the wall led to an increase in salad bar sales by 200 to 300 percent within a few weeks.
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  - 98.1.b The GRI Standards are the first global standards for sustainability reporting and represent the global best practice for reporting on a range of economic, environmental and social impacts.
- 184 Cohen RA. *Impact of type of insurance plan on access and utilization of health care services for adults aged 18-64 years with private health insurance: United States, 2007-2008*. NCHS Data Brief. 2010(28): 1-8.
  - 92.1.b A 2010 NCHS Data Brief reports that according to the National Health Interview Survey, for privately insured adults, having a flexible spending account or health savings account was associated with increase health care utilization for some services.
  - 92.1.c A 2010 NCHS Data Brief reports that according to the National Health Interview Survey, adults with private health insurance without a health savings account were more likely to have unmet medical needs compared to those with health savings accounts.
- 185 Cohen RA, Martinez ME. *Health Insurance Coverage: Early Release of Estimates From the National Health Interview Survey, January–March 2012*. Atlanta, GA: Centers for Disease Control and Prevention. 2013.
  - 92.1.a A report from the National Center for Health Statistics found that, based on responses from the National Health Interview Survey, an estimated 45.5 million people in the US were uninsured, including 18.5% of respondents who had employment.

## Appendix C: Tables

The following tables are referred to in various requirements of the Standard. The first letter of the table name denotes the Concept chapter it refers to, e.g. "A" for Air.

**Table A1: High Touch Surfaces**

**Table A2: Reduced Risk Pesticides**

**Table A3: (Removed in Q2 2017 Addenda)**

**Table A4: Cleaning Protocol**

**Table A5: Mercury Limits**

**Table L1: Melanopic Ratio**

**Table L2: Melanopic and Visual Response**

## Table A1: High-Touch Surfaces

These are surfaces that require more frequent and thorough sanitization. Cleaning protocols should list these surfaces within the project and incorporate the correct cleaning instructions accordingly. Based on CDC Environmental Checklist for Monitoring Terminal Cleaning.

### Non-porous

- Tabletops
- Doorknobs
- Elevator buttons
- Telephones
- Public digital devices and keyboards
- Light switches
- Chairs
- Bathroom handles and fixtures
- Countertops in bathrooms
- Toilet handles and lids
- Bathtubs and shower walls and floor
- Interior shower and bath surfaces
- Kitchen handles and fixtures
- Countertops in kitchens
- Non-disposable medical devices
- Bed railing
- Serving trays and bed tables

### Porous

- Rugs
- Upholstered furniture covers
- Fabric curtains
- Towels
- Bedding: linens, pillow cases and comforter

## Table A2: Reduced Risk Pesticides

For up-to-date and immediate San Francisco Hazard Review Process evaluation results, the Pesticide Research Institute's PestSmart tool [1] or Pesticide Product Evaluator tool [2] may be used.

If a pesticide has not yet been evaluated by the Pesticide Research Institute's tools above, use the Guide to the San Francisco's Reduced Risk Pesticide List Hazard Tier Review Process, which outlines the procedure for evaluating pesticides [3].

[1] <http://pesticideresearch.com/site/pestsmart/>

[2] <https://pesticideresearch.com/site/evaluator/>

[3] [http://sfenvironment.org/sites/default/files/fliers/files/sfe\\_th\\_guide\\_to\\_reduced\\_risk\\_pesticide\\_listposted.pdf](http://sfenvironment.org/sites/default/files/fliers/files/sfe_th_guide_to_reduced_risk_pesticide_listposted.pdf)

### **Table A3: (Removed in Q2 2017 Addenda)**

Table A3 was removed from the WELL Building Standard as part of the Q2 2017 Addenda process. However, please note that the remaining tables (Table A4 and Table A5) were not renumbered so that project teams that registered prior to the release of the Q2 addenda can continue to access these tables as they had previously.



## Table A4: Cleaning Protocol

### Cleaning Equipment and Training

An effective cleaning protocol must consider equipment use and staff training. A project's cleaning practice must include or be evaluated to incorporate the following changes and/or additions.

#### Cleaning Equipment

Projects must implement a program for the use of sustainably powered cleaning equipment that abide by Green Seal 42, Standard for Commercial and Institutional Cleaning Services for Powered Equipment Use/ Maintenance Plan or local equivalent for projects outside the United States. Additionally, the following requirements must be met:

1. For projects in humid climates, as designated by ANSI/ASHRAE/IESNA 90.1-2007, powder carpet cleaning systems must be used in place of traditional carpet extraction systems.
2. Battery-powered equipment must be equipped with recyclable, spill-proof rechargeable batteries.
3. Equipment must be designed with safeguards, such as rollers or rubber bumpers, to reduce potential damage to building surfaces.

#### Program Training

A successful cleaning program requires, beyond the selection of safer products, proper training and use of green cleaning materials and products. Projects must have in place a cleaning program that addresses each of the following:

1. Chemical Measuring and Dilution: A control system; for example a wall mounted dispensing system for concentrates, that limits direct handling and worker exposure to chemicals, ensures proper dilution of mixtures and prevents overuse or waste.
2. Training on Procedures: Sequencing of cleaning steps and use of personal protective equipment.
3. Training on Safety: Training on how to reduce and prevent ergonomic injuries and exposure to hazardous materials.
4. Annual In-Service Training: Training on use of certified green cleaning products, materials and equipment.
5. Training on Purchasing: Training of purchasing personnel in the selection of green cleaning materials.

### Cleaning, Disinfection and Hand Hygiene Product Selection

By establishing criteria that consider human health endpoints, certified cleaning products eliminate harmful ingredient contents and reduce potential associated hazards. Cleaning, disinfection, sanitization, hand soap, and sanitizers selected for use must meet the below criteria. Alternatively, projects may use products labeled as "safer" or "healthier" by a Type 1 eco-labeling program, as defined by ISO 14024:1999 (or more recent version) and developed by a member of the Global Ecolabelling Network (GEN) or labeled as such by a third-party certification recognized by the government where the project is located. These include products certified as EPA's Safer Choice, GreenSeal, Environmental Choice New Zealand, EU Ecolabel, Nordic Ecolabel, etc.

#### 1. Cleaning Products

Cleaning products, per appropriate functional class or use case, are not formulated or manufactured with intentionally added ingredients that are:

1. Classified under the Globally Harmonized System (GHS) with one or more of following hazard statements: H340 (May cause genetic defects), H350 (May cause cancer), or H360 (May damage fertility of the unborn child).
2. Classified under GHS with the following hazard statement: H372 (Causes damage to organs through prolonged or repeated exposure).
3. Classified under the Globally Harmonized System (GHS) with one or more of following hazard statements: H317 (May cause an allergic skin reaction), H334 (May cause allergy or asthma symptoms or breathing difficulties if inhaled).

#### 2. Hand Soaps and Hand Sanitizers

Soaps, shampoos and hand sanitizers provided by the project:

1. Use no antimicrobial agents (other than as a preservative) except where prescribed by health codes, public health advisories or other regulations, such as food service and health care requirements.

## Disinfection and Sanitization

High-touch surfaces present increased risk for contamination, particularly in high transit areas. A cleaning protocol must take into account the degree to which disinfection and sanitization are necessary. Disinfection and sanitization reduce exposure to microorganisms and parasites that can result in decreased disease and illness, however these practices are also increasingly linked to a rising prevalence of hypersensitivity disorders and autoimmune diseases, especially in industrialized nations.

### Disinfection Limitation

To effectively apply these cleaning principles, projects must:

1. Maintain a list of high touch surfaces.
2. Limit disinfection to high-touch surfaces.

## Entryway Maintenance

Entryway maintenance and care is critical to minimizing dirt and pollutants tracked in from the outdoor environment. Clean and well-maintained entryways can contribute greatly to improved indoor air quality.

### Entryways and Lobbies

In order to minimize the migration of contaminants into the building, projects shall adhere to the below cleaning and maintenance guidelines for entryways and lobbies:

1. Rollout mats are wet cleaned, including the underside, at least once every two days and allowed to dry before use.
2. Rollout mats must be vacuumed using a vacuum with a beater bar in both directions, at least once a day and twice a day during inclement weather.
3. Non-toxic and environmentally safe ice melting compounds (e.g., non-corrosive, non-phosphate) must be selected through the winter months.

**Table A5: Mercury Limits**

This table indicates allowable mercury limits in lamps, as referred to in the Fundamental Material Safety feature. Values from LEED PBT source reduction - mercury prerequisite

**Fluorescent**

Lamp	Maximum Hg Content
Compact, integral ballast	3.5 mg
Compact, nonintegral ballast	3.5 mg
T-5, circular	9 mg
T-5, linear	2.5 mg
T-8, eight-foot	10 mg
T-8, four-foot	3.5 mg
T-8, two- and three-foot	3.5 mg
T-8, U-bent	6 mg

**High-pressure sodium**

Lamp	Maximum Hg Content
400 W or less	10 mg
Over 400 W	32 mg

## Table L1: Melanopic Ratio

This unit Equivalent Melanopic Lux (EML) was proposed by Lucas and others (Lucas et al., "Measuring and using light in the melanopsin age." Trends in Neuroscience, Jan 2014). The authors provided a toolbox which for a desired spectrum derives equivalent "α-opic" lux for each of the five photoreceptors in the eye (three cones, rods, and the ipRGCs). The authors selected scaling constants such that each of the values would be identical to each other and the standard definition of lux for a light spectrum of perfectly uniform energy (CIE Standard Illuminant E).

Given a spectrum of light, each equivalent α-opic lux is related to each other by a constant. To calculate the equivalent melanopic lux (EML), multiply the visual lux (L) designed for or measured in a building by this ratio (R):  $EML = L \times R$ . For example, if incandescent lights provide 200 lux in a space, they will also produce 108 equivalent melanopic lux. If daylight is modeled to provide the same visual brightness (200 lux), it will also provide 220 equivalent melanopic lux.

Similar melanopic ratios can be determined by incorporating the spectrum of the desired source into the calculations in Table L2. Both the authors of the journal article and the IWBI have spreadsheets to aid in this calculation.

**Table L2: Melanopic and Visual Response**

To calculate the melanopic ratio of light, start by obtaining the light output of the lamp at each 5 nm increment, either from manufacturer or by using a spectrometer. Then, multiply the output by the melanopic and visual curves given below to get the melanopic and visual responses. Finally, divide the total melanopic response by the total visual response and multiply the quotient by 1.218.

Although the ipRGCs have a peak sensitivity at about 480 nm, the melanopic response in this table peaks at 490 nm because it takes into account the adult eye's lens, which preferentially transmits longer wavelength light.

Wavelength	Light Output	Melanopic Curve	Melanopic Response	Visual Curve	Visual Response
380		0.00092		0.00004	
385		0.00167		0.00006	
390		0.00309		0.00012	
395		0.00588		0.00022	
400		0.01143		0.00040	
405		0.02281		0.00064	
410		0.04615		0.00121	
415		0.07948		0.00218	
420		0.13724		0.00400	
425		0.18710		0.00730	
430		0.25387		0.01160	
435		0.32068		0.01684	
440		0.40159		0.02300	
445		0.47400		0.02980	
450		0.55372		0.03800	
455		0.62965		0.04800	
460		0.70805		0.06000	
465		0.78522		0.07390	
470		0.86029		0.09098	
475		0.91773		0.11260	
480		0.96560		0.13902	
485		0.99062		0.16930	
490		1.00000		0.20802	
495		0.99202		0.25860	
500		0.96595		0.32300	
505		0.92230		0.40730	
510		0.86289		0.50300	
515		0.78523		0.60820	
520		0.69963		0.71000	
525		0.60942		0.79320	
530		0.51931		0.86200	
535		0.43253		0.91485	
540		0.35171		0.95400	
545		0.27914		0.98030	
550		0.21572		0.99495	
555		0.16206		1.00000	
560		0.11853		0.99500	
565		0.08435		0.97860	

570	0.05870	0.95200
575	0.04001	0.91540
580	0.02687	0.87000
585	0.01786	0.81630
590	0.01179	0.75700
595	0.00773	0.69490
600	0.00507	0.63100
605	0.00332	0.56680
610	0.00218	0.50300
615	0.00143	0.44120
620	0.00095	0.38100
625	0.00063	0.32100
630	0.00042	0.26500
635	0.00028	0.21700
640	0.00019	0.17500
645	0.00013	0.13820
650	0.00009	0.10700
655	0.00006	0.08160
660	0.00004	0.06100
665	0.00003	0.04458
670	0.00002	0.03200
675	0.00001	0.02320
680	0.00001	0.01700
685	0.00001	0.01192
690	0.00000	0.00821
695	0.00000	0.00572
700	0.00000	0.00410
705	0.00000	0.00293
710	0.00000	0.00209
715	0.00000	0.00148
720	0.00000	0.00105
725	0.00000	0.00074
730	0.00000	0.00052
735	0.00000	0.00036
740	0.00000	0.00025
745	0.00000	0.00017
750	0.00000	0.00012
755	0.00000	0.00008
760	0.00000	0.00006
765	0.00000	0.00004
770	0.00000	0.00003
775	0.00000	0.00002
780	0.00000	0.00001

Totals:

\_\_\_\_\_

\_\_\_\_\_

## Appendix D: Feature Types and Verification Methods

Parts of the WELL Building Standard fall into one of three categories with respect to the interventions necessary for their completion – design elements, protocols or performance standards. Design standards require that a specific technology or design strategy be used. Protocols are also prescriptive, but for building or company policies or schedules. Performance-based standards mandate environmental conditions and therefore are affected by both building design and operation. They are also technology- and practice-neutral, allowing flexibility in how a project meets acceptable quantified thresholds.

The following table also displays the type of documentation relevant (if any) for each Part of a Feature. Project teams should consult this table to understand what document needs to be submitted to demonstrate that the Part has been satisfied, or if no action is necessary because a WELL Performance Testing Agent will check the Part on-site during the Performance Verification through a performance test or spot check.

-Policy document: a formally adopted set of rules of operation or behavior followed by or implemented in the project to comply with WELL feature requirements.

-Operations schedule is a document outlining routine or cyclical maintenance implemented in the project to comply with WELL feature requirements.

These documents cover the following:

- (1) The procedures or strategies in place that make up the policy.
- (2) The scope of the building or space to which the policy applies.
- (3) Details on all parties involved in the policy.
- (4) Details on accessibility of the policy by the parties involved.
- (5) The time period for which this policy document is valid.

AIR	Letters of Assurance	Annotated Documents	On-Site Assessment
<b>FEATURE 01: AIR QUALITY STANDARDS</b>			
PART 1 (Performance) STANDARDS FOR VOLATILE SUBSTANCES			PERFORMANCE TEST
PART 2 (Performance) STANDARDS FOR PARTICULATE MATTER AND INORGANIC GASES			PERFORMANCE TEST
PART 3 (Performance) RADON			PERFORMANCE TEST
<b>FEATURE 02: SMOKING BAN</b>			
PART 1 (Protocol) INDOOR SMOKING BAN		POLICY DOCUMENT	
PART 2 (Protocol) OUTDOOR SMOKING BAN			VISUAL INSPECTION
<b>FEATURE 03: VENTILATION EFFECTIVENESS</b>			
PART 1 (Design) VENTILATION DESIGN	MEP		
PART 2 (Design) DEMAND CONTROLLED VENTILATION	MEP		
PART 3 (Design) SYSTEM BALANCING	MEP OR CONTRACTOR		

AIR	Letters of Assurance	Annotated Documents	On-Site Assessment
<b>FEATURE 04: VOC REDUCTION</b>			
PART 1 (Design) INTERIOR PAINTS AND COATINGS	ARCHITECT & CONTRACTOR		
PART 2 (Design) INTERIOR ADHESIVES AND SEALANTS	ARCHITECT & CONTRACTOR		
PART 3 (Design) FLOORING	ARCHITECT & CONTRACTOR		
PART 4 (Design) INSULATION	ARCHITECT & CONTRACTOR		
PART 5 (Design) FURNITURE AND FURNISHINGS	ARCHITECT & OWNER		
<b>FEATURE 05: AIR FILTRATION</b>			
PART 1 (Design) FILTER ACCOMMODATION	MEP		SPOT CHECK
PART 2 (Design) PARTICLE FILTRATION	MEP		SPOT CHECK
PART 3 (Design) AIR FILTRATION MAINTENANCE		OPERATIONS SCHEDULE	
<b>FEATURE 06: MICROBE AND MOLD CONTROL</b>			
PART 1 (Design) COOLING COIL MOLD REDUCTION		MEP DRAWING OR OPERATIONS SCHEDULE	
PART 2 (Performance) MOLD INSPECTIONS			VISUAL INSPECTION
<b>FEATURE 07: CONSTRUCTION POLLUTION MANAGEMENT</b>			
PART 1 (Protocol) DUCT PROTECTION	CONTRACTOR		
PART 2 (Protocol) FILTER REPLACEMENT	CONTRACTOR		
PART 3 (Protocol) MOISTURE ABSORPTION MANAGEMENT	CONTRACTOR		
PART 4 (Protocol) DUST CONTAINMENT AND REMOVAL	CONTRACTOR		
<b>FEATURE 08: HEALTHY ENTRANCE</b>			
PART 1 (Design) ENTRYWAY WALK-OFF SYSTEMS			VISUAL INSPECTION
PART 2 (Design) ENTRYWAY AIR SEAL			VISUAL INSPECTION
<b>FEATURE 09: CLEANING PROTOCOL</b>			
PART 1 (Protocol) CLEANING PLAN FOR OCCUPIED SPACES		OPERATIONS SCHEDULE	



AIR	Letters of Assurance	Annotated Documents	On-Site Assessment
<b>FEATURE 10: PESTICIDE MANAGEMENT</b>			
PART 1 (Protocol) PESTICIDE USE		OPERATIONS SCHEDULE	
<b>FEATURE 11: FUNDAMENTAL MATERIAL SAFETY</b>			
PART 1 (Design) ASBESTOS AND LEAD RESTRICTION	ARCHITECT & MEP		
PART 2 (Protocol) LEAD ABATEMENT		REMEDICATION REPORT	
PART 3 (Protocol) ASBESTOS ABATEMENT		REMEDICATION REPORT	
PART 4 (Protocol) POLYCHLORINATED BIPHENYL ABATEMENT		REMEDICATION REPORT	
PART 5 (Design) MERCURY LIMITATION	MEP		
<b>FEATURE 12: MOISTURE MANAGEMENT</b>			
PART 1 (Design) EXTERIOR LIQUID WATER MANAGEMENT		PROFESSIONAL NARRATIVE	
PART 2 (Design) INTERIOR LIQUID WATER MANAGEMENT		PROFESSIONAL NARRATIVE	
PART 3 (Design) CONDENSATION MANAGEMENT		PROFESSIONAL NARRATIVE	
PART 4 (Design) MATERIAL SELECTION AND PROTECTION		PROFESSIONAL NARRATIVE	
<b>FEATURE 13: AIR FLUSH</b>			
PART 1 (Protocol) AIR FLUSH	CONTRACTOR		
<b>FEATURE 14: AIR INFILTRATION MANAGEMENT</b>			
PART 1 (Design) AIR LEAKAGE TESTING		COMMISSIONING REPORT	
<b>FEATURE 15: INCREASED VENTILATION</b>			
PART 1 (Design) INCREASED OUTDOOR AIR SUPPLY	MEP		
<b>FEATURE 16: HUMIDITY CONTROL</b>			
PART 1 (Design) RELATIVE HUMIDITY	MEP		SPOT MEASUREMENT
<b>FEATURE 17: DIRECT SOURCE VENTILATION</b>			
PART 1 (Design) POLLUTION ISOLATION AND EXHAUST		MECHANICAL AND ARCHITECTURAL DRAWINGS	

AIR	Letters of Assurance	Annotated Documents	On-Site Assessment
<b>FEATURE 18: AIR QUALITY MONITORING AND FEEDBACK</b>			
PART 1 (Design) INDOOR AIR MONITORING	MEP		SPOT CHECK
PART 2 (Protocol) AIR DATA RECORD KEEPING AND RESPONSE		POLICY DOCUMENT	
PART 3 (Design) ENVIRONMENTAL MEASURES DISPLAY			VISUAL INSPECTION
<b>FEATURE 19: OPERABLE WINDOWS</b>			
PART 1 (Design) FULL CONTROL	ARCHITECT		SPOT CHECK
PART 2 (Design) OUTDOOR AIR MEASUREMENT		POLICY DOCUMENT	
PART 3 (Design) WINDOW OPERATION MANAGEMENT	OWNER		SPOT CHECK
<b>FEATURE 20: OUTDOOR AIR SYSTEMS</b>			
PART 1 (Design) DEDICATED OUTDOOR AIR SYSTEMS	MEP		
<b>FEATURE 21: DISPLACEMENT VENTILATION</b>			
PART 1 (Design) DISPLACEMENT VENTILATION DESIGN AND APPLICATION	MEP		
PART 2 (Design) SYSTEM PERFORMANCE	MEP		
<b>FEATURE 22: PEST CONTROL</b>			
PART 1 (Design) PEST REDUCTION		POLICY DOCUMENT	SPOT CHECK
PART 2 (Performance) PEST INSPECTION			VISUAL INSPECTION
<b>FEATURE 23: ADVANCED AIR PURIFICATION</b>			
PART 1 (Design) CARBON FILTRATION	MEP		SPOT CHECK
PART 2 (Design) AIR SANITIZATION	MEP		SPOT CHECK
PART 3 (Protocol) AIR QUALITY MAINTENANCE		OPERATIONS SCHEDULE	

AIR	Letters of Assurance	Annotated Documents	On-Site Assessment
<b>FEATURE 24: COMBUSTION MINIMIZATION</b>			
PART 1 (Design) APPLIANCE AND HEATER COMBUSTION BAN	OWNER		SPOT CHECK
PART 2 (Design) LOW-EMISSION COMBUSTION SOURCES	MEP		
PART 3 (Protocol) ENGINE EXHAUST REDUCTION			VISUAL INSPECTION
PART 4 (Protocol) CONSTRUCTION EQUIPMENT	CONTRACTOR		
<b>FEATURE 25: TOXIC MATERIAL REDUCTION</b>			
PART 1 (Design) PERFLUORINATED COMPOUND LIMITATION	ARCHITECT & OWNER		
PART 2 (Design) FLAME RETARDANT LIMITATION	ARCHITECT & CONTRACTOR		
PART 3 (Design) PHTHALATE (PLASTICIZERS) LIMITATION	ARCHITECT & CONTRACTOR		
PART 4 (Design) ISOCYANATE-BASED POLYURETHANE LIMITATION	ARCHITECT & CONTRACTOR		
PART 5 (Design) UREA-FORMALDEHYDE RESTRICTION	ARCHITECT & CONTRACTOR		
<b>FEATURE 26: ENHANCED MATERIAL SAFETY</b>			
PART 1 (Design) PRECAUTIONARY MATERIAL SELECTION	ARCHITECT, CONTRACTOR, & OWNER		
<b>FEATURE 27: ANTIMICROBIAL ACTIVITY FOR SURFACES</b>			
PART 1 (Design) HIGH-TOUCH SURFACES		ARCHITECTURAL DRAWING OR OPERATIONS SCHEDULE	
<b>FEATURE 28: CLEANABLE ENVIRONMENT</b>			
PART 1 (Design) MATERIAL PROPERTIES	ARCHITECT & CONTRACTOR		SPOT CHECK
PART 2 (Design) CLEANABILITY	ARCHITECT & CONTRACTOR		SPOT CHECK
<b>FEATURE 29: CLEANING EQUIPMENT</b>			
PART 1 (Protocol) EQUIPMENT AND CLEANING AGENTS		OPERATIONS SCHEDULE	
PART 2 (Design) CHEMICAL STORAGE			VISUAL INSPECTION

WATER	Letters of Assurance	Annotated Documents	On-Site Assessment
FEATURE 30: FUNDAMENTAL WATER QUALITY			
PART 1 (Performance) SEDIMENT			PERFORMANCE TEST
PART 2 (Performance) MICROORGANISMS			PERFORMANCE TEST
FEATURE 31: INORGANIC CONTAMINANTS			
PART 1 (Performance) DISSOLVED METALS			PERFORMANCE TEST
FEATURE 32: ORGANIC CONTAMINANTS			
PART 1 (Performance) ORGANIC POLLUTANTS			PERFORMANCE TEST
FEATURE 33: AGRICULTURAL CONTAMINANTS			
PART 1 (Performance) HERBICIDES AND PESTICIDES			PERFORMANCE TEST
PART 2 (Performance) FERTILIZERS			PERFORMANCE TEST
FEATURE 34: PUBLIC WATER ADDITIVES			
PART 1 (Performance) DISINFECTANTS			PERFORMANCE TEST
PART 2 (Performance) DISINFECTANT BYPRODUCTS			PERFORMANCE TEST
PART 3 (Performance) FLUORIDE			PERFORMANCE TEST
FEATURE 35: PERIODIC WATER QUALITY TESTING			
PART 1 (Protocol) QUARTERLY TESTING		OPERATIONS SCHEDULE	
PART 2 (Protocol) WATER DATA RECORD KEEPING AND RESPONSE		POLICY DOCUMENT	
FEATURE 36: WATER TREATMENT			
PART 1 (Design) ORGANIC CHEMICAL REMOVAL	MEP		SPOT CHECK
PART 2 (Design) SEDIMENT FILTER	MEP		SPOT CHECK
PART 3 (Design) MICROBIAL ELIMINATION	MEP		SPOT CHECK
PART 4 (Protocol) WATER QUALITY MAINTENANCE		OPERATIONS SCHEDULE	
PART 5 (Design) LEGIONELLA CONTROL		PROFESSIONAL NARRATIVE	

WATER	Letters of Assurance	Annotated Documents	On-Site Assessment
FEATURE 37: DRINKING WATER PROMOTION			
PART 1 (Performance) DRINKING WATER TASTE PROPERTIES			PERFORMANCE TEST
PART 2 (Design) DRINKING WATER ACCESS	ARCHITECT		SPOT CHECK
PART 3 (Protocol) WATER DISPENSER MAINTENANCE		OPERATIONS SCHEDULE	
NOURISHMENT	Letters of Assurance	Annotated Documents	On-Site Assessment
FEATURE 38: FRUITS AND VEGETABLES			
PART 1 (Protocol) FRUIT AND VEGETABLE VARIETY		POLICY DOCUMENT	SPOT CHECK
PART 2 (Protocol) FRUIT AND VEGETABLE PROMOTION		POLICY DOCUMENT	SPOT CHECK
FEATURE 39: PROCESSED FOODS			
PART 1 (Protocol) REFINED INGREDIENT RESTRICTIONS		POLICY DOCUMENT	SPOT CHECK
PART 2 (Protocol) TRANS FAT BAN		POLICY DOCUMENT	SPOT CHECK
FEATURE 40: FOOD ALLERGIES			
PART 1 (Protocol) FOOD ALLERGY LABELING		POLICY DOCUMENT	SPOT CHECK
FEATURE 41: HAND WASHING			
PART 1 (Protocol) HAND WASHING SUPPLIES		POLICY DOCUMENT	SPOT CHECK
PART 2 (Protocol) CONTAMINATION REDUCTION			VISUAL INSPECTION
PART 3 (Design) SINK DIMENSIONS	ARCHITECT		SPOT CHECK
FEATURE 42: FOOD CONTAMINATION			
PART 1 (Design) COLD STORAGE	OWNER		SPOT CHECK
FEATURE 43: ARTIFICIAL INGREDIENTS			
PART 1 (Protocol) ARTIFICIAL SUBSTANCE LABELING		POLICY DOCUMENT	SPOT CHECK
FEATURE 44: NUTRITIONAL INFORMATION			
PART 1 (Protocol) DETAILED NUTRITIONAL INFORMATION			VISUAL INSPECTION

NOURISHMENT	Letters of Assurance	Annotated Documents	On-Site Assessment
FEATURE 45: FOOD ADVERTISING			
PART 1 (Protocol) ADVERTISING AND ENVIRONMENTAL CUES			VISUAL INSPECTION
PART 2 (Protocol) NUTRITIONAL MESSAGING			VISUAL INSPECTION
FEATURE 46: SAFE FOOD PREPARATION MATERIALS			
PART 1 (Protocol) COOKING MATERIAL		POLICY DOCUMENT	SPOT CHECK
PART 2 (Protocol) CUTTING SURFACES		POLICY DOCUMENT	SPOT CHECK
FEATURE 47: SERVING SIZES			
PART 1 (Protocol) MEAL SIZES		POLICY DOCUMENT	SPOT CHECK
PART 2 (Protocol) DISHWARE		POLICY DOCUMENT	SPOT CHECK
FEATURE 48: SPECIAL DIETS			
PART 1 (Protocol) FOOD ALTERNATIVES		POLICY DOCUMENT	
FEATURE 49: RESPONSIBLE FOOD PRODUCTION			
PART 1 (Protocol) SUSTAINABLE AGRICULTURE		POLICY DOCUMENT	
PART 2 (Protocol) HUMANE AGRICULTURE		POLICY DOCUMENT	
FEATURE 50: FOOD STORAGE			
PART 1 (Design) STORAGE CAPACITY	OWNER		SPOT CHECK
FEATURE 51: FOOD PRODUCTION			
PART 1 (Design) GARDENING SPACE	OWNER		SPOT CHECK
PART 2 (Design) PLANTING SUPPORT	OWNER		SPOT CHECK
FEATURE 52: MINDFUL EATING			
PART 1 (Design) EATING SPACES		ARCHITECTURAL DRAWING	
PART 2 (Design) BREAK AREA FURNISHINGS	OWNER		SPOT CHECK

LIGHT	Letters of Assurance	Annotated Documents	On-Site Assessment
<b>FEATURE 53: VISUAL LIGHTING DESIGN</b>			
PART 1 (Design) VISUAL ACUITY FOR FOCUS	ARCHITECT	POLICY DOCUMENT	SPOT MEASUREMENT
PART 2 (Design) BRIGHTNESS MANAGEMENT STRATEGIES		PROFESSIONAL NARRATIVE	
<b>FEATURE 54: CIRCADIAN LIGHTING DESIGN</b>			
PART 1 (Design) MELANOPIC LIGHT INTENSITY FOR WORK AREAS	ARCHITECT		SPOT MEASUREMENT
<b>FEATURE 55: ELECTRIC LIGHT GLARE CONTROL</b>			
PART 1 (Design) LUMINAIRE SHIELDING	ARCHITECT		
PART 2 (Design) GLARE MINIMIZATION	ARCHITECT		
<b>FEATURE 56: SOLAR GLARE CONTROL</b>			
PART 1 (Design) VIEW WINDOW SHADING	ARCHITECT		SPOT CHECK
PART 2 (Design) DAYLIGHT MANAGEMENT	ARCHITECT		SPOT CHECK
<b>FEATURE 57: LOW-GLARE WORKSTATION DESIGN</b>			
PART 1 (Design) GLARE AVOIDANCE			VISUAL INSPECTION
<b>FEATURE 58: COLOR QUALITY</b>			
PART 1 (Design) COLOR RENDERING INDEX	ARCHITECT		
<b>FEATURE 59: SURFACE DESIGN</b>			
PART 1 (Design) WORKING AND LEARNING AREA SURFACE REFLECTIVITY	ARCHITECT		
<b>FEATURE 60: AUTOMATED SHADING AND DIMMING CONTROLS</b>			
PART 1 (Design) AUTOMATED SUNLIGHT CONTROL	MEP		
PART 2 (Design) RESPONSIVE LIGHT CONTROL	MEP		
<b>FEATURE 61: RIGHT TO LIGHT</b>			
PART 1 (Design) LEASE DEPTH		ARCHITECTURAL DRAWING	SPOT CHECK
PART 2 (Design) WINDOW ACCESS		ARCHITECTURAL DRAWING	SPOT CHECK
<b>FEATURE 62: DAYLIGHT MODELING</b>			
PART 1 (Design) HEALTHY SUNLIGHT EXPOSURE		MODELING REPORT	

LIGHT	Letters of Assurance	Annotated Documents	On-Site Assessment
FEATURE 63: DAYLIGHTING FENESTRATION			
PART 1 (Design) WINDOW SIZES FOR WORKING AND LEARNING SPACES		ARCHITECTURAL DRAWING	SPOT CHECK
PART 2 (Design) WINDOW TRANSMITTANCE IN WORKING AND LEARNING AREAS	ARCHITECT		
PART 3 (Design) UNIFORM COLOR TRANSMITTANCE	ARCHITECT		
FITNESS	Letters of Assurance	Annotated Documents	On-Site Assessment
FEATURE 64: INTERIOR FITNESS CIRCULATION			
PART 1 (Design) STAIR ACCESSIBILITY AND PROMOTION			VISUAL INSPECTION
PART 2 (Design) STAIRCASE DESIGN			VISUAL INSPECTION
PART 3 (Design) FACILITATIVE AESTHETICS			VISUAL INSPECTION
FEATURE 65: ACTIVITY INCENTIVE PROGRAMS			
PART 1 (Organizational Protocol) ACTIVITY INCENTIVE PROGRAMS		POLICY DOCUMENT	
FEATURE 66: STRUCTURED FITNESS OPPORTUNITIES			
PART 1 (Organizational Protocol) FITNESS PROGRAMS		POLICY DOCUMENT	
PART 2 (Organizational Protocol) FITNESS EDUCATION		POLICY DOCUMENT	
FEATURE 67: EXTERIOR ACTIVE DESIGN			
PART 1 (Design) PEDESTRIAN AMENITIES	OWNER		SPOT CHECK
PART 2 (Design) PEDESTRIAN PROMOTION	OWNER		SPOT CHECK
PART 3 (Design) NEIGHBORHOOD CONNECTIVITY		ANNOTATED MAP	
FEATURE 68: PHYSICAL ACTIVITY SPACES			
PART 1 (Design) SITE SPACE DESIGNATION FOR OFFICES		ARCHITECTURAL DRAWING	
PART 2 (Design) EXTERNAL EXERCISE SPACES		ANNOTATED MAP	



FITNESS	Letters of Assurance	Annotated Documents	On-Site Assessment
FEATURE 69: ACTIVE TRANSPORTATION SUPPORT			
PART 1 (Design) BICYCLE STORAGE AND SUPPORT	OWNER		SPOT CHECK
PART 2 (Design) POST COMMUTE AND WORKOUT FACILITIES	ARCHITECT		SPOT CHECK
FEATURE 70: FITNESS EQUIPMENT			
PART 1 (Design) CARDIORESPIRATORY EXERCISE EQUIPMENT	OWNER		SPOT CHECK
PART 2 (Design) MUSCLE-STRENGTHENING EXERCISE EQUIPMENT	OWNER		SPOT CHECK
FEATURE 71: ACTIVE FURNISHINGS			
PART 1 (Design) ACTIVE WORKSTATIONS	OWNER		SPOT CHECK
PART 2 (Design) PREVALENT STANDING DESKS	OWNER		SPOT CHECK
COMFORT	Letters of Assurance	Annotated Documents	On-Site Assessment
FEATURE 72: ACCESSIBLE DESIGN			
PART 1 (Design) ACCESSIBILITY AND USABILITY	ARCHITECT		
FEATURE 73: ERGONOMICS: VISUAL AND PHYSICAL			
PART 1 (Design) VISUAL ERGONOMICS	OWNER		SPOT CHECK
PART 2 (Design) DESK HEIGHT FLEXIBILITY	OWNER		SPOT CHECK
PART 3 (Design) SEAT FLEXIBILITY	OWNER		SPOT CHECK
FEATURE 74: EXTERIOR NOISE INTRUSION			
PART 1 (Performance) SOUND PRESSURE LEVEL			PERFORMANCE TEST
FEATURE 75: INTERNALLY GENERATED NOISE			
PART 1 (Protocol) ACOUSTIC PLANNING		PROFESSIONAL NARRATIVE	
PART 2 (Performance) MECHANICAL EQUIPMENT SOUND LEVELS			PERFORMANCE TEST
FEATURE 76: THERMAL COMFORT			
PART 1 (Design) VENTILATED THERMAL ENVIRONMENT	MEP		SPOT MEASUREMENT
PART 2 (Design) NATURAL THERMAL ADAPTATION	MEP		SPOT MEASUREMENT

COMFORT		Letters of Assurance	Annotated Documents	On-Site Assessment
FEATURE 77: OLFACTORY COMFORT				
PART 1 (Design)			ARCHITECTURAL DRAWING	
SOURCE SEPARATION				
FEATURE 78: REVERBERATION TIME				
PART 1 (Performance)				PERFORMANCE TEST
REVERBERATION TIME				
FEATURE 79: SOUND MASKING				
PART 1 (Design)		MEP		
SOUND MASKING USE				
PART 2 (Performance)				PERFORMANCE TEST
SOUND MASKING LIMITS				
FEATURE 80: SOUND REDUCING SURFACES				
PART 1 (Design)		ARCHITECT		
CEILINGS				
PART 2 (Design)		ARCHITECT		
VERTICAL SURFACES				
FEATURE 81: SOUND BARRIERS				
PART 1 (Design)		ARCHITECT		
WALL CONSTRUCTION SPECIFICATIONS				
PART 2 (Design)		ARCHITECT & CONTRACTOR		
DOORWAY SPECIFICATIONS				
PART 3 (Design)		CONTRACTOR		
WALL CONSTRUCTION METHODOLOGY				
FEATURE 82: INDIVIDUAL THERMAL CONTROL				
PART 1 (Protocol)			POLICY DOCUMENT	
FREE ADDRESS				
PART 2 (Protocol)		OWNER		SPOT CHECK
PERSONAL THERMAL COMFORT DEVICES				
FEATURE 83: RADIANT THERMAL COMFORT				
PART 1 (Design)		MEP		
LOBBIES AND OTHER COMMON SPACES				
PART 2 (Design)		MEP		
OFFICES AND OTHER REGULARLY OCCUPIED SPACES				
MIND		Letters of Assurance	Annotated Documents	On-Site Assessment
FEATURE 84: HEALTH AND WELLNESS AWARENESS				
PART 1 (Protocol)				VISUAL INSPECTION
WELL BUILDING STANDARD® GUIDE				
PART 2 (Protocol)			PROFESSIONAL NARRATIVE	VISUAL INSPECTION
HEALTH AND WELLNESS LIBRARY				

MIND	Letters of Assurance	Annotated Documents	On-Site Assessment
<b>FEATURE 85: INTEGRATIVE DESIGN</b>			
PART 1 (Protocol) STAKEHOLDER CHARRETTE		PROFESSIONAL NARRATIVE	
PART 2 (Protocol) DEVELOPMENT PLAN		PROFESSIONAL NARRATIVE	
PART 3 (Protocol) STAKEHOLDER ORIENTATION		PROFESSIONAL NARRATIVE	
<b>FEATURE 86: POST-OCCUPANCY SURVEYS</b>			
PART 1 (Protocol) OCCUPANT SURVEY CONTENT		POLICY DOCUMENT	
PART 2 (Protocol) INFORMATION REPORTING		POLICY DOCUMENT	
<b>FEATURE 87: BEAUTY AND DESIGN I</b>			
PART 1 (Design) BEAUTY AND MINDFUL DESIGN		PROFESSIONAL NARRATIVE	
<b>FEATURE 88: BIOPHILIA I - QUALITATIVE</b>			
PART 1 (Design) NATURE INCORPORATION		PROFESSIONAL NARRATIVE	
PART 2 (Design) PATTERN INCORPORATION		PROFESSIONAL NARRATIVE	
PART 3 (Design) NATURE INTERACTION		PROFESSIONAL NARRATIVE	
<b>FEATURE 89: ADAPTABLE SPACES</b>			
PART 1 (Design) STIMULI MANAGEMENT	ARCHITECT		SPOT CHECK
PART 2 (Design) PRIVACY	ARCHITECT		SPOT CHECK
PART 3 (Design) SPACE MANAGEMENT	OWNER		SPOT CHECK
PART 4 (Protocol) WORKPLACE SLEEP SUPPORT	OWNER		SPOT CHECK
<b>FEATURE 90: HEALTHY SLEEP POLICY</b>			
PART 1 (Organizational Protocol) NON-WORKPLACE SLEEP SUPPORT		POLICY DOCUMENT	
<b>FEATURE 91: BUSINESS TRAVEL</b>			
PART 1 (Organizational Protocol) TRAVEL POLICY		POLICY DOCUMENT	
<b>FEATURE 92: BUILDING HEALTH POLICY</b>			
PART 1 (Organizational Protocol) HEALTH BENEFITS		POLICY DOCUMENT	

MIND	Letters of Assurance	Annotated Documents	On-Site Assessment
<b>FEATURE 93: WORKPLACE FAMILY SUPPORT</b>			
PART 1 (Organizational Protocol) PARENTAL LEAVE		POLICY DOCUMENT	
PART 2 (Organizational Protocol) EMPLOYER SUPPORTED CHILD CARE		POLICY DOCUMENT	
PART 3 (Organizational Protocol) FAMILY SUPPORT		POLICY DOCUMENT	
<b>FEATURE 94: SELF-MONITORING</b>			
PART 1 (Organizational Protocol) SENSORS AND WEARABLES		POLICY DOCUMENT	
<b>FEATURE 95: STRESS AND ADDICTION TREATMENT</b>			
PART 1 (Organizational Protocol) MIND AND BEHAVIOR SUPPORT		POLICY DOCUMENT	
PART 2 (Organizational Protocol) STRESS MANAGEMENT		POLICY DOCUMENT	
<b>FEATURE 96: ALTRUISM</b>			
PART 1 (Organizational Protocol) CHARITABLE ACTIVITIES		POLICY DOCUMENT	
PART 2 (Organizational Protocol) CHARITABLE CONTRIBUTIONS		POLICY DOCUMENT	
<b>FEATURE 97: MATERIAL TRANSPARENCY</b>			
PART 1 (Design) MATERIAL INFORMATION	ARCHITECT, CONTRACTOR, & OWNER		
PART 2 (Design) ACCESSIBLE INFORMATION			VISUAL INSPECTION
<b>FEATURE 98: ORGANIZATIONAL TRANSPARENCY</b>			
PART 1 (Organizational Protocol) TRANSPARENCY PROGRAM PARTICIPATION		POLICY DOCUMENT	SPOT CHECK
<b>FEATURE 99: BEAUTY AND DESIGN II</b>			
PART 1 (Design) CEILING HEIGHT		ARCHITECTURAL DRAWING	SPOT CHECK
PART 2 (Design) ARTWORK		PROFESSIONAL NARRATIVE	
PART 3 (Design) SPATIAL FAMILIARITY		PROFESSIONAL NARRATIVE	

MIND	Letters of Assurance	Annotated Documents	On-Site Assessment
FEATURE 100: BIOPHILIA II - QUANTITATIVE			
PART 1 (Design) OUTDOOR BIOPHILIA	OWNER		SPOT CHECK
PART 2 (Design) INDOOR BIOPHILIA	ARCHITECT		SPOT CHECK
PART 3 (Design) WATER FEATURE	ARCHITECT		SPOT CHECK
INNOVATION	Letters of Assurance	Annotated Documents	On-Site Assessment
FEATURE 101: INNOVATION I			
PART 1 (Innovation) INNOVATION PROPOSAL		INNOVATION PROPOSAL	
PART 2 (Innovation) INNOVATION SUPPORT		INNOVATION PROPOSAL	
FEATURE 102: INNOVATION II			
PART 1 (Innovation) INNOVATION PROPOSAL 2		INNOVATION PROPOSAL	
PART 2 (Innovation) INNOVATION SUPPORT 2		INNOVATION PROPOSAL	
FEATURE 103: INNOVATION III			
PART 1 (Innovation) INNOVATION PROPOSAL 3		INNOVATION PROPOSAL	
PART 2 (Innovation) INNOVATION SUPPORT 3		INNOVATION PROPOSAL	
FEATURE 104: INNOVATION IV			
PART 1 (Innovation) INNOVATION PROPOSAL 4		INNOVATION PROPOSAL	
PART 2 (Innovation) INNOVATION SUPPORT 4		INNOVATION PROPOSAL	
FEATURE 105: INNOVATION V			
PART 1 (Innovation) INNOVATION PROPOSAL 5		INNOVATION PROPOSAL	
PART 2 (Innovation) INNOVATION SUPPORT 5		INNOVATION PROPOSAL	

## **Appendix E: (Removed in Q1 2018 Addenda)**

Appendix E was removed from the WELL Building Standard as part of the Q1 2018 Addenda process. Projects pursuing both LEED and WELL should refer to the crosswalk document, *Applying LEED and The WELL Building Standard™*, available at [wellcertified.com/resources](http://wellcertified.com/resources). Note that the remaining appendices were not renamed so that project teams that registered prior to the release of these addenda can continue to access the appendices as they had previously.

## **Appendix F: (Removed in Q1 2018 Addenda)**

Appendix F was removed from the WELL Building Standard as part of the Q1 2018 Addenda process. Projects pursuing both the Living Building Challenge and WELL should refer to the crosswalk document, Living Building Challenge® & the WELL Building Standard™, available at [wellcertified.com/resources](http://wellcertified.com/resources). Note that the remaining appendices were not renamed so that project teams that registered prior to the release of these addenda can continue to access the appendices as they had previously.

## Appendix G: External Reviewers

The IWBI would like to extend its sincere gratitude to the following external reviewers for their time in reviewing and providing critical feedback.

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Kathy Wardle	Perkins and Will
Lauren Yarmuth	YR&G
Peter Yost	Building Green
Technical Development Subject Matter Experts	U.S. Green Building Council
Certification Review Subject Matter Experts	Green Building Certification Institute



## Appendix H: Concept & Feature References

The following pages list the sources used for statistics and other material in the descriptions for the Concepts and Features in the WELL Building Standard.

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#### 01 Air quality standards

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## Appendix I: Core & Shell Scope

WELL Core and Shell Certified projects integrate fundamental WELL features into the base building design and operation, which creates an incentive for future tenants seeking to support the health and productivity of their occupants. It also enables future tenants to more easily pursue WELL Certification for their interior spaces.

Core and Shell Certification includes the areas of the building controlled by the owner, including common spaces, such as lobbies and elevator banks, as well as any areas of the interior buildout managed by the project owner. Depending on the developer's scope, Core and Shell projects can receive Optimizations for complying with all parts of a WELL feature determined to be not applicable (see the WELL applicability matrix in the Introduction to the WELL Building Standard).

For further clarity, the following document outlines applicability determinations for Core and Shell projects.

- Entire Building: These features are required to be met throughout the entire building, in both tenant and owner-occupied spaces. For features which are intended to impact all occupants, such as amenity and common spaces, Core and Shell projects should use the expected building occupancy or the default occupancy of 250 ft<sup>2</sup>/person (23 m<sup>2</sup>/person).
- Extent of Developer Buildout: These features are required to be met in all common areas, spaces under owner control, and all portions of the interior buildout managed by the project owner.
- Extent of Developer Buildout with Capacity for Tenant Achievement: These features are required to be met in all spaces included in the developer buildout and require that the building systems in place have capacity to allow tenants to implement the feature requirements within their leased space.
- Extent of Developer Buildout and Confirmed Tenant Support: These features are required to be met in all spaces included in the developer buildout and require the building owner to provide tenants with full support to meet the feature requirements. This may include providing tenants fiscal allowance to implement the feature. Additional documentation may be required in these cases, depending on the type of support provided. Lease or sales agreements that leave the cost of implementation to the tenant do not qualify.
- Spaces under Owner Control with Tenant Education: These policy-based features are required to be met for the staff operating the Core and Shell building or employed by the project owner and working in the building (full time and part time). Additionally, they require the project owner to provide education to tenants related to the benefits and implementation the programs described in the feature.
- Common Areas and Spaces under Owner Control: These features are required to be met in common areas and spaces under building owner control.
- Spaces Under Owner Control: These features are required to be met only in spaces that are used by the staff operating the Core and Shell building or employed by the project owner and working in the building.

AIR		Scope
FEATURE 01: AIR QUALITY STANDARDS		
PART 1: Standards for Volatile Substances	common areas and spaces under owner control	PRE
PART 2: Standards for Particulate Matter and Inorganic Gases	common areas and spaces under owner control	PRE
PART 3: Radon	common areas and spaces under owner control	PRE

AIR		Scope	
<b>FEATURE 02: SMOKING BAN</b>			
PART 1: Indoor Smoking Ban		entire building	PRE
PART 2: Outdoor Smoking Ban		entire building	PRE
<b>FEATURE 03: VENTILATION EFFECTIVENESS</b>			
PART 1: Ventilation Design		extent of developer buildout with capacity for tenant achievement	PRE
PART 2: Demand Controlled Ventilation		extent of developer buildout with capacity for tenant achievement	PRE
<b>FEATURE 04: VOC REDUCTION</b>			
PART 1: Interior Paints and Coatings		extent of developer buildout	PRE
PART 2: Interior Adhesives and Sealants		extent of developer buildout	PRE
PART 3: Flooring		extent of developer buildout	PRE
PART 4: Insulation		extent of developer buildout	PRE
PART 5: Furniture and Furnishings		extent of developer buildout	PRE
<b>FEATURE 05: AIR FILTRATION</b>			
PART 1: Filter Accommodation		extent of developer buildout with capacity for tenant achievement	PRE
PART 2: Particle Filtration		extent of developer buildout with capacity for tenant achievement	PRE
PART 3: Air Filtration Maintenance		extent of developer buildout with capacity for tenant achievement	PRE
<b>FEATURE 06: MICROBE AND MOLD CONTROL</b>			
PART 1: Cooling Coil Mold Reduction		extent of developer buildout with capacity for tenant achievement	PRE
PART 2: Mold Inspections		common areas and spaces under owner control	PRE
<b>FEATURE 07: CONSTRUCTION POLLUTION MANAGEMENT</b>			
PART 1: Duct Protection		extent of developer buildout	PRE
PART 2: Filter Replacement		extent of developer buildout	PRE
PART 3: Moisture Absorption Management		extent of developer buildout	PRE
PART 4: Dust Containment and Removal		extent of developer buildout	PRE
<b>FEATURE 08: HEALTHY ENTRANCE</b>			
PART 1: Entryway Walk-Off Systems		entire building	PRE
PART 2: Entryway Air Seal		entire building	PRE
<b>FEATURE 09: CLEANING PROTOCOL</b>			
PART 1: Cleaning Plan for Occupied Spaces		extent of developer buildout and confirmed tenant support	N/A
<b>FEATURE 10: PESTICIDE MANAGEMENT</b>			
PART 1: Pesticide Use		entire building	PRE

AIR		Scope
<b>FEATURE 11: FUNDAMENTAL MATERIAL SAFETY</b>		
PART 1: Asbestos and Lead Restriction	extent of developer buildout	PRE
PART 2: Lead Abatement	entire building	PRE
PART 3: Asbestos Abatement	entire building	PRE
PART 4: Polychlorinated Biphenyl Abatement	entire building	PRE
PART 5: Mercury Limitation	extent of developer buildout	PRE
<b>FEATURE 12: MOISTURE MANAGEMENT</b>		
PART 1: Exterior Liquid Water Management	entire building	PRE
PART 2: Interior Liquid Water Management	extent of developer buildout	PRE
PART 3: Condensation Management	extent of developer buildout	PRE
PART 4: Material Selection and Protection	extent of developer buildout	PRE
<b>FEATURE 13: AIR FLUSH</b>		
PART 1: Air Flush	entire building	N/A
<b>FEATURE 14: AIR INFILTRATION MANAGEMENT</b>		
PART 1: Air Leakage Testing	entire building	OPT
<b>FEATURE 15: INCREASED VENTILATION</b>		
PART 1: Increased Outdoor Air Supply	extent of developer buildout with capacity for tenant achievement	OPT
<b>FEATURE 16: HUMIDITY CONTROL</b>		
PART 1: Relative Humidity	entire building	N/A
<b>FEATURE 17: DIRECT SOURCE VENTILATION</b>		
PART 1: Pollution Isolation and Exhaust	extent of developer buildout with capacity for tenant achievement	OPT
<b>FEATURE 18: AIR QUALITY MONITORING AND FEEDBACK</b>		
PART 1: Indoor Air Monitoring	extent of developer buildout	N/A
PART 2: Air Data Record Keeping and Response	extent of developer buildout	N/A
PART 3: Environmental Measures Display	extent of developer buildout	N/A
<b>FEATURE 19: OPERABLE WINDOWS</b>		
PART 1: Full Control	entire building	OPT
PART 2: Outdoor Air Measurement	entire building	OPT
PART 3: Window Operation Management	entire building	OPT
<b>FEATURE 20: OUTDOOR AIR SYSTEMS</b>		
PART 1: Dedicated Outdoor Air Systems	entire building	OPT

AIR		Scope
<b>FEATURE 21: DISPLACEMENT VENTILATION</b>		
PART 1: Displacement Ventilation Design and Application	entire building	N/A
PART 2: System Performance	entire building	N/A
<b>FEATURE 22: PEST CONTROL</b>		
PART 1: Pest Reduction	extent of developer buildout and confirmed tenant support	N/A
PART 2: Pest Inspection	entire building	N/A
<b>FEATURE 23: ADVANCED AIR PURIFICATION</b>		
PART 1: Carbon Filtration	extent of developer buildout with capacity for tenant achievement	OPT
PART 2: Air Sanitization	extent of developer buildout with capacity for tenant achievement	OPT
PART 3: Air Quality Maintenance	extent of developer buildout with capacity for tenant achievement	OPT
<b>FEATURE 24: COMBUSTION MINIMIZATION</b>		
PART 1: Appliance and Heater Combustion Ban	entire building	OPT
PART 2: Low-Emission Combustion Sources	entire building	OPT
PART 3: Engine Exhaust Reduction	entire building	OPT
PART 4: Construction Equipment	entire building	OPT
<b>FEATURE 25: TOXIC MATERIAL REDUCTION</b>		
PART 1: Perfluorinated Compound Limitation	extent of developer buildout	N/A
PART 2: Flame Retardant Limitation	extent of developer buildout	N/A
PART 3: Phthalate (Plasticizers) Limitation	extent of developer buildout	N/A
PART 4: Isocyanate-Based Polyurethane Limitation	extent of developer buildout	N/A
PART 5: Urea-Formaldehyde Restriction	extent of developer buildout	N/A
<b>FEATURE 26: ENHANCED MATERIAL SAFETY</b>		
PART 1: Precautionary Material Selection	extent of developer buildout	N/A
<b>FEATURE 27: ANTIMICROBIAL ACTIVITY FOR SURFACES</b>		
PART 1: High-Touch Surfaces	extent of developer buildout	N/A
<b>FEATURE 28: CLEANABLE ENVIRONMENT</b>		
PART 1: Material Properties	extent of developer buildout	N/A
PART 2: Cleanability	extent of developer buildout	N/A
<b>FEATURE 29: CLEANING EQUIPMENT</b>		
PART 1: Equipment and Cleaning Agents	extent of developer buildout and confirmed tenant support	N/A
PART 2: Chemical Storage	extent of developer buildout and confirmed tenant support	N/A

WATER		Scope
<b>FEATURE 30: FUNDAMENTAL WATER QUALITY</b>		
PART 1: Sediment	extent of developer buildout and confirmed tenant support	PRE
PART 2: Microorganisms	extent of developer buildout and confirmed tenant support	PRE
<b>FEATURE 31: INORGANIC CONTAMINANTS</b>		
PART 1: Dissolved Metals	extent of developer buildout and confirmed tenant support	PRE
<b>FEATURE 32: ORGANIC CONTAMINANTS</b>		
PART 1: Organic Pollutants	extent of developer buildout and confirmed tenant support	PRE
<b>FEATURE 33: AGRICULTURAL CONTAMINANTS</b>		
PART 1: Herbicides and Pesticides	extent of developer buildout and confirmed tenant support	PRE
PART 2: Fertilizers	extent of developer buildout and confirmed tenant support	PRE
<b>FEATURE 34: PUBLIC WATER ADDITIVES</b>		
PART 1: Disinfectants	extent of developer buildout and confirmed tenant support	PRE
PART 2: Disinfectant Byproducts	extent of developer buildout and confirmed tenant support	PRE
PART 3: Fluoride	extent of developer buildout and confirmed tenant support	PRE
<b>FEATURE 35: PERIODIC WATER QUALITY TESTING</b>		
PART 1: Quarterly Testing	extent of developer buildout	N/A
PART 2: Water Data Record Keeping and Response	extent of developer buildout	N/A
<b>FEATURE 36: WATER TREATMENT</b>		
PART 1: Organic Chemical Removal	extent of developer buildout and confirmed tenant support	OPT
PART 2: Sediment Filter	extent of developer buildout and confirmed tenant support	OPT
PART 3: Microbial Elimination	extent of developer buildout and confirmed tenant support	OPT
PART 4: Water Quality Maintenance	extent of developer buildout and confirmed tenant support	OPT
PART 5: Legionella Control	entire building	OPT
<b>FEATURE 37: DRINKING WATER PROMOTION</b>		
PART 1: Drinking Water Taste Properties	extent of developer buildout and confirmed tenant support	OPT
NOURISHMENT		Scope
<b>FEATURE 38: FRUITS AND VEGETABLES</b>		
PART 1: Fruit and Vegetable Variety	common areas and spaces under owner control	N/A
PART 2: Fruit and Vegetable Promotion	common areas and spaces under owner control	N/A
<b>FEATURE 39: PROCESSED FOODS</b>		
PART 1: Refined Ingredient Restrictions	common areas and spaces under owner control	PRE
PART 2: Trans Fat Ban	common areas and spaces under owner control	PRE

NOURISHMENT		Scope
<b>FEATURE 40: FOOD ALLERGIES</b>		
PART 1: Food Allergy Labeling	common areas and spaces under owner control	PRE
<b>FEATURE 41: HAND WASHING</b>		
PART 1: Hand Washing Supplies	extent of developer buildout	N/A
PART 2: Contamination Reduction	extent of developer buildout	N/A
PART 3: Sink Dimensions	extent of developer buildout	N/A
<b>FEATURE 42: FOOD CONTAMINATION</b>		
PART 1: Cold Storage	common areas and spaces under owner control	N/A
<b>FEATURE 43: ARTIFICIAL INGREDIENTS</b>		
PART 1: Artificial Substance Labeling	common areas and spaces under owner control	OPT
<b>FEATURE 44: NUTRITIONAL INFORMATION</b>		
PART 1: Detailed Nutritional Information	common areas and spaces under owner control	OPT
<b>FEATURE 45: FOOD ADVERTISING</b>		
PART 1: Advertising and Environmental Cues	common areas and spaces under owner control	OPT
PART 2: Nutritional Messaging	common areas and spaces under owner control	OPT
<b>FEATURE 46: SAFE FOOD PREPARATION MATERIALS</b>		
PART 1: Cooking Material	common areas and spaces under owner control	N/A
PART 2: Cutting Surfaces	common areas and spaces under owner control	N/A
<b>FEATURE 47: SERVING SIZES</b>		
PART 1: Meal Sizes	common areas and spaces under owner control	N/A
PART 2: Dishware	common areas and spaces under owner control	N/A
<b>FEATURE 48: SPECIAL DIETS</b>		
PART 1: Food Alternatives	common areas and spaces under owner control	N/A
<b>FEATURE 49: RESPONSIBLE FOOD PRODUCTION</b>		
PART 1: Sustainable Agriculture	common areas and spaces under owner control	N/A
PART 2: Humane Agriculture	common areas and spaces under owner control	N/A
<b>FEATURE 50: FOOD STORAGE</b>		
PART 1: Storage Capacity	common areas and spaces under owner control	N/A
<b>FEATURE 51: FOOD PRODUCTION</b>		
PART 1: Gardening Space	entire building	OPT
PART 2: Planting Support	entire building	OPT
<b>FEATURE 52: MINDFUL EATING</b>		
PART 1: Eating Spaces	entire building	OPT
PART 2: Break Area Furnishings	entire building	OPT

LIGHT		Scope
<b>FEATURE 53: VISUAL LIGHTING DESIGN</b>		
PART 1: Visual Acuity for Focus	entire building	N/A
PART 2: Brightness Management Strategies	entire building	N/A
<b>FEATURE 54: CIRCADIAN LIGHTING DESIGN</b>		
PART 1: Melanopic Light Intensity for Work Areas	entire building	N/A
<b>FEATURE 55: ELECTRIC LIGHT GLARE CONTROL</b>		
PART 2: Glare Minimization	extent of developer buildout	PRE
<b>FEATURE 56: SOLAR GLARE CONTROL</b>		
PART 1: View Window Shading	extent of developer buildout and confirmed tenant support	OPT
PART 2: Daylight Management	extent of developer buildout and confirmed tenant support	OPT
<b>FEATURE 57: LOW-GLARE WORKSTATION DESIGN</b>		
PART 1: Glare Avoidance	entire building	N/A
<b>FEATURE 58: COLOR QUALITY</b>		
PART 1: Color Rendering Index	entire building	N/A
<b>FEATURE 59: SURFACE DESIGN</b>		
PART 1: Working and Learning Area Surface Reflectivity	entire building	N/A
<b>FEATURE 60: AUTOMATED SHADING AND DIMMING CONTROLS</b>		
PART 1: Automated Sunlight Control	extent of developer buildout and confirmed tenant support	N/A
PART 2: Responsive Light Control	extent of developer buildout and confirmed tenant support	N/A
<b>FEATURE 61: RIGHT TO LIGHT</b>		
PART 1: Lease Depth	entire building	OPT
<b>FEATURE 62: DAYLIGHT MODELING</b>		
PART 1: Healthy Sunlight Exposure	entire building	OPT
<b>FEATURE 63: DAYLIGHTING FENESTRATION</b>		
PART 1: Window Sizes for Working and Learning Spaces	entire building	OPT
PART 2: Window Transmittance in Working and Learning Areas	entire building	OPT
PART 3: Uniform Color Transmittance	entire building	OPT
FITNESS		Scope
<b>FEATURE 64: INTERIOR FITNESS CIRCULATION</b>		
PART 1: Stair Accessibility and Promotion	entire building	PRE
PART 2: Staircase Design	entire building	PRE
PART 3: Facilitative Aesthetics	entire building	PRE

FITNESS		Scope
<b>FEATURE 65: ACTIVITY INCENTIVE PROGRAMS</b>		
PART 1: Activity Incentive Programs	spaces under owner control with tenant education	N/A
<b>FEATURE 66: STRUCTURED FITNESS OPPORTUNITIES</b>		
PART 1: Fitness Programs	entire building	N/A
PART 2: Fitness Education	entire building	N/A
<b>FEATURE 67: EXTERIOR ACTIVE DESIGN</b>		
PART 1: Pedestrian Amenities	entire building	OPT
PART 2: Pedestrian Promotion	entire building	OPT
PART 3: Neighborhood Connectivity	entire building	OPT
<b>FEATURE 68: PHYSICAL ACTIVITY SPACES</b>		
PART 1: Site Space Designation for Offices	entire building	OPT
PART 2: External Exercise Spaces	entire building	OPT
<b>FEATURE 69: ACTIVE TRANSPORTATION SUPPORT</b>		
PART 1: Bicycle Storage and Support	extent of developer buildout with confirmed tenant support	OPT
PART 2: Post Commute and Workout Facilities	extent of developer buildout with confirmed tenant support	OPT
<b>FEATURE 70: FITNESS EQUIPMENT</b>		
PART 1: Cardiorespiratory Exercise Equipment	entire building	OPT
PART 2: Muscle-strengthening Exercise Equipment	entire building	OPT
<b>FEATURE 71: ACTIVE FURNISHINGS</b>		
PART 1: Active Workstations	entire building	N/A
PART 2: Prevalent Standing Desks	entire building	N/A
COMFORT		Scope
<b>FEATURE 72: ACCESSIBLE DESIGN</b>		
PART 1: Accessibility and Usability	extent of developer buildout	PRE
<b>FEATURE 73: ERGONOMICS: VISUAL AND PHYSICAL</b>		
PART 1: Visual Ergonomics	entire building	N/A
PART 2: Desk Height Flexibility	entire building	N/A
PART 3: Seat Flexibility	entire building	N/A
<b>FEATURE 74: EXTERIOR NOISE INTRUSION</b>		
PART 1: Sound Pressure Level	entire building	PRE
<b>FEATURE 75: INTERNALLY GENERATED NOISE</b>		
PART 2: Mechanical Equipment Sound Levels	common areas and spaces under owner control	OPT



COMFORT		Scope
<b>FEATURE 76: THERMAL COMFORT</b>		
PART 1: Ventilated Thermal Environment	extent of developer buildout with capacity for tenant achievement	PRE
PART 2: Natural Thermal Adaptation	extent of developer buildout with capacity for tenant achievement	PRE
<b>FEATURE 77: OLFACTORY COMFORT</b>		
PART 1: Source Separation	entire building	N/A
<b>FEATURE 78: REVERBERATION TIME</b>		
PART 1: Reverberation Time	entire building	N/A
<b>FEATURE 79: SOUND MASKING</b>		
PART 1: Sound Masking Use	entire building	N/A
PART 2: Sound Masking Limits	entire building	N/A
<b>FEATURE 80: SOUND REDUCING SURFACES</b>		
PART 1: Ceilings	entire building	N/A
PART 2: Vertical Surfaces	entire building	N/A
<b>FEATURE 81: SOUND BARRIERS</b>		
PART 1: Wall Construction Specifications	entire building	N/A
PART 2: Doorway Specifications	entire building	N/A
PART 3: Wall Construction Methodology	entire building	N/A
<b>FEATURE 82: INDIVIDUAL THERMAL CONTROL</b>		
PART 1: Free Address	entire building	N/A
PART 2: Personal Thermal Comfort Devices	entire building	N/A
<b>FEATURE 83: RADIANT THERMAL COMFORT</b>		
PART 1: Lobbies and Other Common Spaces	common areas and spaces under owner control only	OPT
PART 2: Offices and Other Regularly Occupied Spaces	entire building	N/A
MIND		Scope
<b>FEATURE 84: HEALTH AND WELLNESS AWARENESS</b>		
PART 1: WELL Building Standard® Guide	entire building	PRE
PART 2: Health and Wellness Library	entire building	PRE
<b>FEATURE 85: INTEGRATIVE DESIGN</b>		
PART 1: Stakeholder Charrette	extent of developer buildout	PRE
PART 2: Development Plan	extent of developer buildout	PRE
PART 3: Stakeholder Orientation	extent of developer buildout	PRE

MIND		Scope
<b>FEATURE 86: POST-OCCUPANCY SURVEYS</b>		
PART 1: Occupant Survey Content	entire building	N/A
PART 2: Information Reporting	entire building	N/A
<b>FEATURE 87: BEAUTY AND DESIGN I</b>		
PART 1: Beauty and Mindful Design	common areas and spaces under owner control	PRE
<b>FEATURE 88: BIOPHILIA I - QUALITATIVE</b>		
PART 1: Nature Incorporation	common areas and spaces under owner control	OPT
PART 2: Pattern Incorporation	common areas and spaces under owner control	OPT
PART 3: Nature Interaction	common areas and spaces under owner control	OPT
<b>FEATURE 89: ADAPTABLE SPACES</b>		
PART 1: Stimuli Management	spaces under owner control	N/A
PART 2: Privacy	entire building	N/A
PART 3: Space Management	entire building	N/A
PART 4: Workplace Sleep Support	spaces under owner control	N/A
<b>FEATURE 90: HEALTHY SLEEP POLICY</b>		
PART 1: Non-Workplace Sleep Support	spaces under owner control with tenant education	N/A
<b>FEATURE 91: BUSINESS TRAVEL</b>		
PART 1: Travel Policy	spaces under owner control with tenant education	N/A
<b>FEATURE 92: BUILDING HEALTH POLICY</b>		
PART 1: Health Benefits	spaces under owner control with tenant education	N/A
<b>FEATURE 93: WORKPLACE FAMILY SUPPORT</b>		
PART 1: Parental Leave	spaces under owner control with tenant education	N/A
PART 2: Employer Supported Child Care	spaces under owner control with tenant education	N/A
PART 3: Family Support	spaces under owner control with tenant education	N/A
<b>FEATURE 94: SELF-MONITORING</b>		
PART 1: Sensors and Wearables	spaces under owner control with tenant education	N/A
<b>FEATURE 95: STRESS AND ADDICTION TREATMENT</b>		
PART 1: Mind and Behavior Support	spaces under owner control with tenant education	N/A
PART 2: Stress Management	spaces under owner control with tenant education	N/A
<b>FEATURE 96: ALTRUISM</b>		
PART 1: Charitable Activities	spaces under owner control with tenant education	N/A
PART 2: Charitable Contributions	spaces under owner control with tenant education	N/A

MIND	Scope	
FEATURE 97: MATERIAL TRANSPARENCY		
PART 1: Material Information	extent of developer buildout	OPT
PART 2: Accessible Information	extent of developer buildout	OPT
FEATURE 98: ORGANIZATIONAL TRANSPARENCY		
PART 1: Transparency Program Participation	common areas and spaces under owner control	N/A
FEATURE 99: BEAUTY AND DESIGN II		
PART 1: Ceiling Height	extent of developer buildout	OPT
PART 2: Artwork	common areas and spaces under owner control	OPT
PART 3: Spatial Familiarity	common areas and spaces under owner control	OPT
FEATURE 100: BIOPHILIA II - QUANTITATIVE		
PART 1: Outdoor Biophilia	entire building	OPT
PART 3: Water Feature	entire building	OPT