

**ASSET DEVELOPMENT & MANAGEMENT GUIDELINES**  
AT KORAMCO

*LAST REVISED 2025*

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# TABLE OF CONTENTS

<b>1</b>	<b>INTRODUCTION</b> .....	<b>1</b>
<b>2</b>	<b>PRE-ACQUISITION AND PRE-DEVELOPMENT CONSIDERATIONS</b> .....	<b>2</b>
<b>2.1</b>	<b>SITE SELECTION CONSIDERATIONS</b> .....	<b>2</b>
<b>2.2</b>	<b>RISK AND OPPORTUNITIES IDENTIFICATION</b> .....	<b>3</b>
<b>2.3</b>	<b>LEGAL COMPLIANCE REVIEW</b> .....	<b>4</b>
<b>3</b>	<b>DURING DESIGN</b> .....	<b>7</b>
<b>3.1</b>	<b>OWNER’S PROGRAM REQUIREMENTS (OPR)</b> .....	<b>7</b>
<b>3.2</b>	<b>BASIS OF DESIGN (BOD)</b> .....	<b>7</b>
<b>3.3</b>	<b>INTEGRATIVE DESIGN PROCESS</b> .....	<b>8</b>
<b>3.4</b>	<b>SUSTAINABLE BUILDING CONSIDERATIONS</b> .....	<b>9</b>
<b>4</b>	<b>DURING CONSTRUCTION</b> .....	<b>19</b>
<b>5</b>	<b>DURING ASSET MANAGEMENT</b> .....	<b>22</b>
<b>5.1</b>	<b>SITE MANAGEMENT</b> .....	<b>22</b>
<b>5.2</b>	<b>WATER MONITORING AND MANAGEMENT</b> .....	<b>23</b>
<b>5.3</b>	<b>MONITORING AND MANAGEMENT</b> .....	<b>24</b>
<b>5.4</b>	<b>OCCUPANT MONITORING AND MANAGEMENT</b> .....	<b>30</b>
<b>6</b>	<b>REFERENCES</b> .....	<b>32</b>

## LIST OF TABLES & FIGURES

Table 1 Standard site selection checklist.....	2
Table 2 Standard ESG risks and opportunities checklist .....	3
Table 3 Standard legal compliance checklist.....	4
Table 4 Standard local laws and regulation checklist.....	4
Table 5 Scope of due diligence.....	5
Table 6 Standard OPR considerations .....	7
Table 7 Standard BOD components.....	7
Table 8 Integrative design factors.....	8
Table 9 Visual comfort measures .....	9
Table 10 Strategies to promote design for health and wellness.....	10
Table 11 Energy efficient features .....	12
Table 12 Indoor water efficient fixture requirements.....	13
Table 13 Indoor water efficient appliance recommendations .....	13
Table 14 Other water efficiency measures .....	14
Table 15 Recommended maximum mercury content for lamps .....	16
Table 16 VOC content requirements for interior paints and coatings by type.....	17
Table 17 Erosion and sedimentation control measures.....	19
Table 18 IAQ management recommendations .....	20
Table 19 Recommended site management measures.....	22
Table 20: Water consumption monitoring template (example) .....	23
Table 21 Water fixture requirements.....	23
Table 22 Water fittings requirements.....	24
Table 23 Energy consumption monitoring template (example).....	24
Table 24 On-site renewable energy monitoring template (example).....	24
Table 25 GHG emission monitoring template (example) .....	25
Table 26 Waste discharge monitoring template (example) .....	26
Table 27 Waste diversion monitoring template (example) .....	26
Table 28 Green cleaning checklist.....	28
Table 29 Recommended pest management measures .....	29
Table 30 Occupant comfort survey questions .....	30
Figure 1 ESG Approach throughout business life cycle.....	1
Figure 2 Example of no smoking signage (Source: LEED v4 Reference Guide) .....	27

## I INTRODUCTION

This Asset Development Guidelines is to provide a framework for Environmental Social Governance (ESG) throughout the business cycle of Asset Development at KORAMCO REITs & Trust and KORAMCO Asset Management (hereafter referred to as “KORAMCO” or “We”). This guideline will be regarded as best practices for ESG in asset development and internally followed. In general, our business cycle occurs as in the following Figure 1:

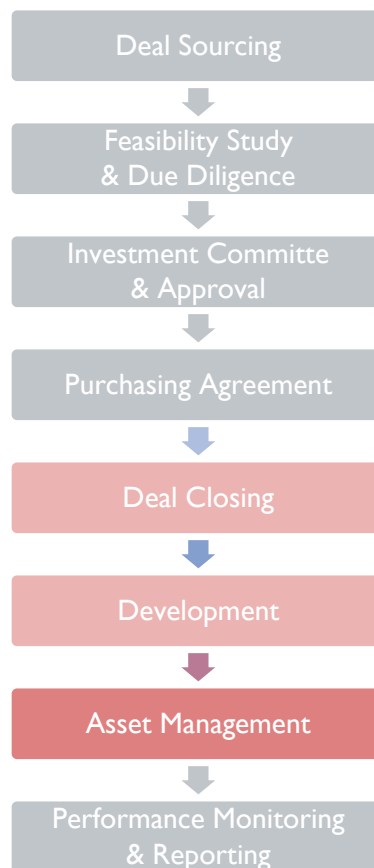


Figure 1 ESG Approach throughout business life cycle

For the purpose of useful implementation, this guideline will cover the stages during **ASSET DEVELOPMENT** and **ASSET MANAGEMENT**.

## 2 PRE-ACQUISITION AND PRE-DEVELOPMENT CONSIDERATIONS

Understanding that improving ESG performance in doing our business can improve operating profitability and reduce ESG risks while increasing opportunities, these steps should be considered carefully.

### 2.1 SITE SELECTION CONSIDERATIONS

During investment identification stage these environmental aspects of the potential site or asset should be considered. Use the following standard checklist but consider more factors depending on the specific characteristics of the project.

- **Site selection**

*Table 1 Standard site selection checklist*

Checkpoints	Analysis	Considerations
Does the site/asset have connection to multi-modal transit networks in vicinity?		- Better connectivity - Reduce carbon footprint caused by the site/asset
Does the site has surrounding density and amenities?  <i>* Use walkability score as a reference.</i>		- Promote walkability - Improve public health by encouraging daily physical activity
Is the site/asset located within existing developed areas?		- Utilizing the existing infrastructure - Reducing environmental impact from the building location
Has the site/asset consider the protection, restoration, and conservation of aquatic-ecosystems / farmland / floodplain functions / habitats for threatened and endangered species?		- Preventing environmental risks posed to the surrounding natural features - Avoiding development of environmentally sensitive lands
Does the site/asset involve redevelopment on brownfield sites?		- Enhancing and remediating brownfield
Does the site has high-priority historically or classified by the government for specific designations (i.e. community renewal zone, environmentally protected zone, etc.)		- Embracing development constraints - Promotion of the health of the surrounding area
Is the site/asset connected to existing bicycle network?		- Improve public health by encouraging daily physical activity - Reduced motor vehicle use

The OPR shall include measurable sustainability goals for energy performance, energy and water monitoring, renewable energy application where feasible, and provision of operation and maintenance documentation.

## 2.2 RISK AND OPPORTUNITIES IDENTIFICATION

During investment identification stage, various aspects of the potential risks should be considered. Use the following standard checklist but consider more factors depending on the specific characteristics of the project.

- Identification of material ESG risks and opportunities relevant to investment identification on:
  - i. Climate Change
  - ii. Regulatory Trends and Legislation
  - iii. Tenant Preferences
  - iv. Investor Sentiment
  - v. Crime

Use the following standard checklist in general but consider more factors depending on the specific characteristics of the project.

Table 2 Standard ESG risks and opportunities checklist

Checkpoints	Analysis
What are the impacts of changes in sustainability policy and regulation throughout the real estate investment cycle?	
What are the ratings agencies, regulators, legal advisors and other stakeholders saying about the materiality of ESG and climate risks?	
What ESG and climate impacts are already included in assessment of risks?	
What will be the likely impacts of ESG and climate risks on the valuation assessment of real estate assets over their useful lives?	
Will real estate assets face regulatory or physical “obsolete” due to ESG and climate risk factors over their useful lives and/or become stranded assets?	
What are and will be the impacts from the societal shift to place greater economic value on ESG and climate factors on real estate assets/strategies over the fund live?	
What are the levels of crime? Will the occupants have high risk of being exposed to crime and violence?	

Checkpoints	Analysis
What are the impacts of crime levels?	

## 2.3 LEGAL COMPLIANCE REVIEW

During investment identification stage, these legal compliance such as legal, financial and non-financial aspects should be checked thoroughly. Use the following standard checklist but consider more factors depending on the specific characteristics of the project.

- **Legal compliance review**

Table 3 Standard legal compliance checklist

Checkpoints	Analysis
Compliance to building energy codes and building codes	
Mandatory audits and TAB	
Reporting and benchmarking	
Mandatory or voluntary green building or energy rating if applicable	
Financial incentives	
Non-financial incentives	
Client demand	

Table 4 Standard local laws and regulation checklist

Korea Authority	Statues
Ministry of Land, Infrastructure & Transport	Building Act
	Enforcement Decree of the Building Act
	Housing Act
Office for Government Policy Coordination	Enforcement Decree of the Housing Act
	Green Building Subsidies Act
Ministry of Trade, Industry & Energy	Framework Act on Low Carbon, Green Growth
Ministry of Environment	Enforcement Decree of the Framework Act on low Carbon, GRI
	Energy Use Rationalization Act
	Indoor Air Quality Control Act
	Enforcement Decree of the Indoor Air Quality Control Act
Ministry of Environment	Water Supply and Waterworks Installation Act
	Enforcement Decree of the Water Supply and Waterworks Installation Act
Ministry of Environment	Sewerage Act

- **Due diligence**

The following needs to be considered for the scope of due diligence.

*Table 5 Scope of due diligence*

<b>Scope</b>	<b>Key Considerations</b>
General	Compliance with relevant laws, standards and regulations
	Local law enforcement situation
	Record keeping
	Permits and licenses (i.e. obtained and up-to-date)
	Documentation of operations
	Risk management processes
	Environmental, social, and business integrity track-record
	Certifications obtained (e.g. ISO 14001, OSHAS)
	Compliance with the IFC Performance Standards and Environmental, Health and Safety Guidelines
	Adherence to other relevant international practices
	Supply chain practices
Environment	Effluents
	Emissions
	Water pollution
	Air pollution
	Energy use
	Natural resource use
	Water use
	Waste management
	Land clearance
	Land and soil quality
	Sensitive forest or other habitats
	Biodiversity loss
	Climate change: risks and opportunities
	Natural hazards
Other environmental impacts	
Social	Local adherence to the fundamental International Labour Organization (ILO) Conventions
	Local minimum working age in line with ILO Conventions 138 and 182
	Local minimum wage levels and company compliance
	Discrimination
	Representation and unions
	Vulnerable labor
	Impacts on local communities
	Local social issues
Governance	Transparency International's Country Corruption Perception Ranking
	Prevalence of bribery in industrial sector
	Criminal convictions

Scope	Key Considerations
	Code of conduct Anti-bribery, corruption, and money laundering (AML) Anti-money laundering (AML) and know-your-customer (KYC) training and procedures Accounting and legal compliance Political affiliations or contributions Media references to illegal or disreputable activities Undisclosed or unusual beneficial ownership or carried interests Sudden or unexplained change of investors, shareholders, auditors, accountants, lawyers or other professional advisors Tax evasion Suspicious use of tax havens, off-shore companies, compensation, sources of wealth, lifestyles, fees, local costs or transfer pricing Large or serious law suits Reluctance to discuss business integrity issues Commitment to good corporate governance Structured and functioning board Adequate control and risk management Rights of minority shareholders and treatment of stakeholders
Health & Safety	Types and level of health and safety risks Protective measures, procedures and equipment Safety record Training

## 3 DURING DESIGN

In order to maintain the consistency and performance of ESG developed/managed by KORAMCO, it is important to understand that the following are considered.

### 3.1 OWNER'S PROGRAM REQUIREMENTS (OPR)

The OPR details the functional requirements as well as the expectations of the building's use and operation. The intention is to document the owner's requirements and objectives for the project to verify that these goals are carried through the life of the project. There is no required format for OPR but in general, it is recommended that the OPR should contain the following information at minimum:

Table 6 Standard OPR considerations

Scope	Key Considerations
Key project requirements	Items that the owner has deemed critical to the project
Occupant requirements	Functions
	Number of occupants
	Schedules for the building
Budget considerations and limitations	Expected cost restrictions
	Considerations for the project's design and construction
Target goals	The owner's overall goals
	Energy efficiency goals
	Sustainability goals
Performance criteria	The project's sustainability performance criteria shall align with the achieved G-SEED Green 2nd Grade certification level and associated design strategies.
	Measurable and verifiable evaluation criteria
	Criteria on general, economic, user requirements, construction process, operations, systems, assemblies
Operations & maintenance requirements	Criteria for ongoing operations and maintenance
	Training requirements for personnel

### 3.2 BASIS OF DESIGN (BOD)

BOD explains how the construction and other details will execute the OPR. The intention is to document the thought processes and assumptions behind design decisions made to meet the OPR. The BOD usually should include the following:

Table 7 Standard BOD components

Scope	Key Considerations
Systems/Design and assemblies	General overview of the systems and assemblies and how they are intended to meet the OPR
	Standards that the system/design was designed to meet

Scope	Key Considerations
Performance criteria and assumptions	Expectations regarding system/design operation and maintenance
	Descriptions (i.e. general building, envelope, HVAC, electrical, water, other systems)
	Statement of operation describing how the system/design is expected to operate
Governing codes and standards	Specific codes, standards, and guidelines considered during the design of the asset and the designer's response to these requirements
Owner directives	Assumptions regarding the usage of the asset
Design development guidelines	Concepts
	Calculations
	Product selections
	Specific design methods
	Design specifications
Drawings	
Revision history	Summary of changes made throughout the project phases

### 3.3 INTEGRATIVE DESIGN PROCESS

The following factors should be considered during the pre-design throughout the design phases in order to identify and use opportunities to achieve synergies across discipline and building systems. Health and wellbeing of occupants were considered along with multi other aspects.

Table 8 Integrative design factors

Category	Factor	Descriptions
Energy-related	Site conditions	Assessment of shading, exterior lighting, hardscape, landscaping, and adjacent site conditions
	Massing and orientation	Massing, orientation which can affect HVAC sizing, energy consumption, lighting, and renewable energy opportunities
	Basic envelope attributes	Assessment of insulation values, window-to-wall ratios (WWR), glazing characteristics, shading, and window operability
	Lighting levels	Assessment of interior surface reflectance values, lighting levels in occupied spaces
	Thermal comfort ranges	Assessment of thermal comfort range options
	Plug and process load needs	Assessment of reducing plug and process loads through programmatic solutions (e.g. equipment and purchasing policies, layout options)
	Programmatic and operational parameters	Assessment of multifunctioning spaces, operating schedules, space allotment per person, teleworking, reduction of building area, and anticipated operations and maintenance
Water-related	Indoor water demand	Flow and flush fixture design case demand volumes

Category	Factor	Descriptions
	Outdoor water demand	Landscape irrigation design case demand volume
	Process water demand	Kitchen, laundry, cooling tower, and other equipment demand volumes
	Supply sources	Potential nonpotable water supply source volumes (i.e. on-site rainwater and graywater, municipally supplied nonpotable water, and HVAC equipment condensate)

### 3.4 SUSTAINABLE BUILDING CONSIDERATIONS

During *Asset Development* stage, it is important to specify and select building system, design and materials carefully to ensure that the asset built is safe, sustainable, and can provide satisfying space to the suitable tenants and occupants while functioning well for the suitable building programme. BIGTRIANGLE PFV Co., Ltd requires to achieve at least G-SEED with 2nd rating.

Where applicable, development projects shall also promote innovation measures such as alternative transportation facilities, whole-building life cycle assessment, and the participation of qualified green building professionals.

#### VISUAL COMFORT

To ensure high productivity, occupant satisfaction, and occupant health and well-being, it is important to minimize glare, provide sufficient daylight and quality view, and provide supplementary artificial lighting as applicable. The following measures are recommended:

Table 9 Visual comfort measures

Category	Strategy
Glare control	Provide manual or automatic glare-control devices for all regularly occupied spaces
Lighting control	Provide individual lighting controls with at least three lighting levels (on, off, midlevel) for at least 90% of individual occupant spaces
Daylight	Achieve at least 75% daylit floor area of regularly occupied floor area with illuminance levels between 300 lux and 3,000 lux
Light fixture luminance	Use light fixtures with a luminance of less than 2,500 cd/m <sup>2</sup> between 45 and 90 degrees from nadir (exception: wallwash fixtures, indirect uplighting fixtures, adjustable fixtures)
Color rendering index (CRI)	Use light sources with a CRI of 80 or higher (Exception: lamps or fixtures specifically designed to provide colored lighting for effect, sight lighting, or other special use)
Lamp life	For at least 75% of the total connected lighting load, use light sources with a rated life of at least 24,000 hours (at 3-hour per start, if applicable)
Direct overhead lighting	Use direct-only overhead lighting for 25% or less of the total connected lighting load for all regularly occupied spaces
Surface reflectance: ceilings, walls, floors	For at least 90% of the regularly occupied floor area, meet or exceed area-weighted average surface

Category	Strategy
	reflectance of: 85% for ceilings, 60% for walls, and 25% for floors

## DESIGN FOR HEALTH AND WELLNESS

While it is important to have a well-performing building in terms of measurable qualities, it is also important to have spatial design catered to promote healthy lifestyle and wellness of the building occupants and to the community. The following strategies are recommended to promote design for health and wellness:

*Table 10 Strategies to promote design for health and wellness*

Strategy	Details
Conduct Health Impact Assessment	Assess the health impacts of policies, plans of the building design
Provisions of recreational spaces	Design for green spaces, outdoor seating/eating areas, gym facilities, playgrounds, etc. which can benefit the community socioeconomically
Active design features	Aesthetically engaging signage encouraging the occupants to move more, making stairs easily accessible and aesthetic
Indoor air quality	Provide sufficient outdoor intake compliant with ASHRAE 62.1-2010 Refer to <i>Materials Selection, Low Emitting Materials (Pages 17-18)</i>
Natural ventilation	Provide operable windows to allow better cross-ventilation
Provisions for active transport	Provide bicycle storage facilities and shower/locker facilities to encourage active transport
Occupant education on health & well-being	Provide educational sessions to occupants on health and well-being benefits that can be brought by sustainable building features
Post-construction health and well-being monitoring	Conduct annual occupant engagement surveys such as occupant comfort satisfaction survey. At a minimum, occupant satisfaction on health and well-being must be tracked annually for at least five years post-construction.

## BUILDING SAFETY

All assets should comply with local code and regulations:

- i. *Regulations on the Structural Standard of the Building by Korea Ministry of Land, Infrastructure & Transport. Professional*
- ii. *Act on Fire Prevention and Installation, Maintenance and Safety of Fire-Fighting Systems by Korea National Fire Agency*
- iii. *Special Act on the Safety Control and Maintenance of Establishments by Korea Ministry of Land, Infrastructure and Transport*
- iv. *Regulations on Standards for Evacuation and Fire Protection of buildings by Korea Ministry of Land, Infrastructure and Transport*

- v. *Rules on Equipment Standards for Buildings* by Korea Ministry of Land, Infrastructure and Transport
- vi. *Regulations on the Environmental Impact Assessment* by Korea Ministry of Environment

## BUILDING RESILIENCE

### *Resilience to Natural Hazards*

All newly developing assets should identify potential natural hazards (i.e. floods, natural disasters of geological origin such as volcanic eruptions, earthquakes, and landslides, natural disasters of climatic or meteorological origin such as draught, avalanche, wave surges, tsunami, tidal wave, wind storm, or wild fire) of the project site and plan/design the building with appropriate mitigation measures. Basic climate change screening can be done using the World Bank's Climate & Disaster Risk Screening Tools (<https://climatescreeningtools.worldbank.org>).

### *Resilience from Damage and Material Degradation*

The building should incorporate suitable durability and protection measures, or designed features or solutions to prevent damage to vulnerable parts of the internal and external building and landscaping elements. The relevant parts of the building should incorporate appropriate design and specification measures to limit material degradation due to environmental factors. The following measures are recommended:

- i. Bollards or barriers, or raised curbs to delivery and vehicle drop-off areas
- ii. Robust external wall construction, up to 2m high
- iii. Protection rails to walls of corridors
- iv. Kick plates or impact protection (from trolleys etc.) on doors
- v. Hard-wearing and easily washable floor finishes in heavily used circulation areas (i.e. main entrance, corridors, public areas etc.)
- vi. Designing out the risk without the need for additional materials specification to protect vulnerable areas

### *Adaptation to Climate Change*

It is important to have mitigation measures to be prepared for extreme weather events arising from climate change. The following measures are recommended:

- i. Structural and fabric resilience: carry out a systematic structural and fabric resilience risk assessment to identify and evaluate the impact on the building over its projected life cycle from expected extreme weather conditions arising from, where feasible.
- ii. Low impact design of landscapes: minimize the risks of increased flood risk and surface water run-off affecting the site or others

## MECHANICAL / ELECTRICAL / PLUMBING SYSTEMS

Selection of mechanical, electrical, plumbing (MEP) system and equipment play a crucial role in determining building's energy and water performance. Therefore, following strategies are recommended:

### Energy related

- i. Energy strategies shall include improved energy performance, energy monitoring and management support systems, renewable energy application where feasible, low-carbon energy technologies, and the avoidance of ozone-depleting substances.
- ii. Exceed local energy codes or standards: *Energy Saving Design Standard of Building* by Korea Ministry of Land, Transport and Transport
- iii. Implement energy efficient features:

Table 11 Energy efficient features

Category	Features
Lighting	Internal daylit and non-daylit areas have switching controls that take account of absence or occupancy
	Where at least 80% of general internal luminaires in fixed fittings achieve an efficacy of at least 65 luminaire lumens/Watt or greater.
Water heating	Hot water is supplied via a self-contained system that has an efficiency of $\geq 85\%$ (either central or decentralized) OR where decentralized gas fired storage heaters are specified that have an efficiency of $\geq 85\%$ .
Building fabric	Meet U-value requirements in Building Energy Code
	Pressure test shows air permeability $\leq 50\%$ of leakage value of current national standards. If national standards are not available, $5\text{m}^3/\text{h}/\text{m}^2 @ 50\text{Pa}$ should be taken as the maximum value for air permeability to achieve the credit.
Space heating	The seasonal efficiency of the source of space heating is $\geq 90\%$ .
Air conditioning and ventilation	Where the design incorporates a system of providing low carbon cooling to completely displace the need for a mechanical cooling system OR The cooling system has a Coefficient of Performance (COP) of $> 4.5$ .
	Where the specific fan power for the mechanical ventilation system specified is: 1. $\leq 0.6\text{W}/\text{litre}/\text{second}$ for continuous extract ventilation systems 2. $\leq 1.0\text{W}/\text{litre}/\text{second}$ for whole house MVHR when running at each of its settings AND achieves a heat recovery efficiency of at least 85%
	Where a method of heat recovery is integrated into the design of the mechanical ventilation system AND achieves a heat recovery efficiency of at least 75%
Energy monitoring	Install new or use existing building-level energy meters, or submeters that can be aggregated to provide building level data representing total building energy consumption (electricity, natural gas, chilled water, steam, fuel oil, propane, biomass, etc). At a minimum, energy consumption must be tracked at one-month intervals for at least five years post-construction.

Category	Features
	Install energy metering for any individual energy end uses that represent 10% or more of the total annual consumption of the building. Observe the energy use trend by day, week, month, or year per end use to analyze the energy use pattern and strategize on energy use reduction.
Energy sourcing	Source energy from renewable grid or energy produced with less carbon emissions if applicable
GHG emissions and monitoring	Implement energy efficient strategies mentioned in this table as much as possible which can reduce GHG emissions
Onsite renewable energy production	Install an onsite renewable energy production system such as biofuels, geothermal, hydro, solar/photovoltaic, or wind

- iv. Energy modeling to achieve a minimum level of energy efficiency for the building and its systems: comparison against a baseline building that complies with *Standard 90.1–2010, Appendix G*.

*Water related*

- i. Water management strategies shall include rainwater management, alternative water use where feasible, water-efficient fixtures, and water consumption monitoring.
- ii. Indoor water efficient fixture requirements

*Table 12 Indoor water efficient fixture requirements*

Fixture type	Required flush and flow rates	Reference standard
Toilet (water closet)	4.8 lpf or less	Watersense
Urinal	1.9 lpf or less	Watersense
Public lavatory faucet	1.9 lpf or less (at 415 kPa)	LEED v4 fixture and fitting code requirements
Private lavatory faucet	5.7 lpf or less (at 415 kPa)	Watersense
Kitchen faucet (excluding faucets used exclusively for filling operations)	8.3 lpm or less (at 415 kPa)	LEED v4 fixture and fitting code requirements
Showerhead	7.6 lpm or less	Watersense

- iii. Indoor water efficient appliance recommendations

*Table 13 Indoor water efficient appliance recommendations*

Appliance	Standard
Residential clothes washer	ENERGY STAR or performance equivalent
Commercial clothes washer	CEE Tier 3A

Appliance	Standard
Residential dishwasher, standard or compact	ENERGY STAR or performance equivalent
Prerinse spray valves	4.9 lpm or less
Ice machine	ENERGY STAR or performance equivalent

iv. Outdoor water efficiency recommendations

Reduce outdoor water use through selecting native and drought-tolerant plants, which do not require irrigation beyond a maximum two-year establishment or require less water.

v. Process water efficiency recommendations

Conserve water used for cooling tower makeup by conducting water analysis to control microbes, corrosion, and scale in the condenser water system, to achieve higher number of cycles.

vi. Water supply

Consider using site-derived alternative water sources such as treated wastewater or stormwater for non-potable applications, or treated wastewater provided by a municipal agency which can offset potable water used for irrigation or flush fixtures.

vii. Implement other water efficiency measures such as:

*Table 14 Other water efficiency measures*

Measure	Details
Drip/smart irrigation	Drip-fed subsurface irrigation incorporating soil moisture sensors. The irrigation control should be zoned to permit variable irrigation to different planting assemblages.
Leak detection system	A leak detection system which is capable of detecting a major water leak on the main water supply within the building and between the building and the utilities' water meter should be installed.
Flow control devices	A presence detector and controller, i.e. an automatic device detecting occupancy or movement in an area to switch water on and turn it off when the presence is removed.
Water use monitoring	Install permanent water meters that measure the total potable water use for the building and associated grounds. Meter data must be able to be compiled into monthly and annual summaries. At a minimum, water consumption must be tracked at one-month intervals for at least five years post-construction.
	Install permanent water meters for two or more of the following water subsystems such as irrigation, indoor plumbing fixtures and fittings, domestic hot water, boiler, reclaimed water, and process water. Observe the water use trend by day, week, month, or year per end use to analyze

Measure	Details
	the water use pattern and strategize on water use reduction.

*Occupant Controllability of the Systems*

It is recommended to provide thermal comfort controls for at least 50% of individual occupant spaces and provide group thermal comfort for all shared multi-occupant spaces. Thermal comfort control should be able to adjust air temperature, radiant temperature, air speed, and humidity in the occupant's local environment.

Automatic temperature controls and occupant-oriented indoor environmental control strategies shall be maintained to support thermal comfort.

## MATERIALS SELECTION

### *Sourcing of materials*

Responsible sourcing of materials should be considered wherever possible within reasonable budget allowance. The company shall prioritize the use of environmental product declaration (EPD) products, low-carbon materials, resource-circulating materials, low-hazard materials, and green building materials, while also providing dedicated storage facilities for recyclable resources where applicable. Procurement of materials that are sourced in a responsible way and have a low embodied impact over their life including extraction, processing and manufacture, and recycling can have less impact to the environment and provide healthy indoor environment to the occupants. The following strategies are recommended:

- i. Use as much legally harvested and traded timber as possible for all timber and timber-based products used on the project.
- ii. Use third party certified products that demonstrate impact reduction in either global warming potential (greenhouse gases), depletion of stratospheric ozone layer, acidification of land and water sources, eutrophication, or formation of tropospheric ozone.
- iii. Use products and materials for which life cycle information is available. For applicable development projects, the company shall promote whole-building life cycle assessment (LCA) at the design stage to evaluate the environmental impacts of the building over its life cycle and to support design decision-making. The assessment should, where feasible, cover major building materials and life cycle stages including raw material extraction, manufacturing, construction, use, and end-of-life, and should be based on transparent data, recognized calculation methodology, and third-party verified information where available.
- iv. Reduce the use of persistent, bioaccumulative and toxic (PBT) Source by:
  - A. Installing lamps with low mercury content and long lamp life

Refer to the table below for the recommended maximum mercury content of lamps.

*Table 15 Recommended maximum mercury content for lamps*

Lamp	Maximum content
T-8 fluorescent (2.4m)	10 mg mercury
T-8 fluorescent (1.2m)	3.5 mg mercury
T-8 fluorescent (U-bent)	6 mg mercury
T-5 fluorescent (Linear)	2.5 mg mercury
T-5 fluorescent (Circular)	9 mg mercury
Compact fluorescent (non-integral ballast)	3.5 mg mercury

Lamp	Maximum content
Compact fluorescent (integral ballast)	3.5 mg mercury, ENERGY STAR qualified
High-pressure sodium (up to 400 watts)	10 mg mercury
High-pressure sodium (above 400 watts)	32 mg mercury

B. Specify substitutes for materials manufactured with lead and cadmium

C. Prohibit the use and specification of materials containing asbestos

Disclosure about the environmental and health attributes of building materials are required:

- i. Use at least 20 different permanently installed products sourced from at least five different manufacturers with *Environmental Product Declaration (EPD)* which conform to *ISO 14025, 14040, 14044, and EN 15804* or *ISO 21930*.
- ii. Use at least 20 different permanently installed products from at least five different manufacturers that demonstrate chemical inventory, with *Health Product Declaration*, or certified with *Cradle to Cradle*.

#### Low-Emitting Materials

Selecting low-emitting materials used for interior finish is important to reduce concentrations of chemical contaminants that can damage air quality, human health & well-being, productivity, and the environment. In order to maintain good indoor environmental quality, the following should be considered as applicable:

- i. Prefer selecting interior paints and coatings with VOC content requirement meeting the *VOC paint standards* by Korea Ministry of Environment as of January 1, 2020.

Table 16 VOC content requirements for interior paints and coatings by type

Material	VOC content (g/L)
<b>1) Concrete · Cement · Mortar</b>	
Water-based paint (matte)	35
Water-based paint (gloss)	65
Primer	Water-based: 30 / oil-based: 180
Putty	Water-based: 40 / oil-based: 50
Oil-based exterior paint (except for PVDF)	410
Oil-based exterior paint (PVDF)	400
Oil-based interior paint	200
<b>2) Steel</b>	
Topcoat (except for spray type)	420
Topcoat (spray type)	170
Primer (except for spray type)	420

<b>Material</b>	<b>VOC content (g/L)</b>
Primer (spray type)	170
<b>3) Wood</b>	
Primer (except for spray type)	Water-based: 180 / oil-based: 420
Primer (spray type)	Water-based: 180 / oil-based: 550
Topcoat (except for spray type)	Water-based: 180 / oil-based: 430
Topcoat (spray type)	Water-based: 180 / oil-based: 530
Stain	Water-based: 100 / oil-based: 300
<b>4) Waterproof flooring</b>	
Oil-based primer (one-component)	460
Oil-based topcoat (two-component)	400
Oil-based intermediate coat (one-component)	80
Oil-based intermediate coat (two-component)	60
Oil-based primer	480
Water-based paint	35
<b>5) House paint</b>	
Water-based paint	35
Oil-based paint	100
<b>6) Special use</b>	
Water repellent paint	100
Multicolor paint	50
Clear coat paint	Water-based: 180 / oil-based: 530
<b>7) Other</b>	
Water-based paint	180
Oil-based paint	250

- ii. Prefer selecting carpet and carpet cushion with *Carpet and Rug Institute Green Label Plus* certifications
- iii. Prefer selecting hard surface flooring certified with the *FloorScore*
- iv. Prefer selecting materials that are locally extracted or manufactured
- v. Prefer selecting materials with higher pre-consumer recycled content and post-consumer recycled content

## 4 DURING CONSTRUCTION

Depending on how well the construction process is planned and managed, the construction activities can have impact to the surrounding environment and the community. In order to reduce pollution from construction activities, the following measures should be implemented as much as possible:

- **Create and Implement Erosion and Sedimentation Control Plan**

The following measures should be selectively implemented according to site conditions.

*Table 17 Erosion and sedimentation control measures*

Category	Measures
Erosion and sedimentation control	Providing natural buffers
	Installing perimeter controls
	Minimizing sediment track-out
	Controlling discharges from stockpiled sediment or soil
	Minimizing dust
	Minimizing the disturbance of steep slopes
	Preserving topsoil
	Minimizing soil compaction
	Protecting storm drain inlets
	Maintaining control measures
Stabilization	Setting deadlines for initiating and completing stabilization
	Setting criteria for stabilization
Pollution prevention	Prevent prohibited discharges
	Perform general maintenance
	Notify if any emergency spills occur
	Implement pollution prevention standards and fertilizer discharge restrictions

- **Construction and Demolition Waste Management**

It is important to plan for construction and demolition waste produced during development activities to reduce construction and demolition waste disposed of in landfills and incineration facilities by recovering, reusing, and recycling materials. The following recommendations should be followed wherever possible:

- Develop and implement a construction and demolition waste management plan with waste diversion goals for major materials and specific material handling/process strategies.
- Set a target diversion rate of materials (including reusable vegetation, rocks, and soil) and recover / reuse / and recycle as much as possible.
- Provide clear signage for the location of construction waste collection, type of waste with provisions of on-site designated facility to separate waste.

- iv. Provide training for relevant employees/contractors on waste management.
- v. Separately manage hazardous waste and non-hazardous waste. Follow MSDS and safety guidelines for hazardous wastes.
- vi. Record construction and demolition waste data by hazardous waste and non-hazardous waste on a monthly basis and monitor the diversion rate.
- vii. If target diversion rate is not met, conduct hazardous waste and/or non-hazardous waste audit to identify opportunities for improvements.

• **Construction Indoor Air Quality Management**

It is important to manage indoor air quality during construction to promote health and well-being of construction workers and building occupants by minimizing indoor air quality problems associated with construction and renovation. The following recommendations should be followed wherever possible:

- i. Develop and implement an indoor air quality (IAQ) management plan for the construction and preoccupancy phases of the building. The plan is recommended to address the following:

*Table 18 IAQ management recommendations*

Category	Measures
HVAC Protection	If air conditioning is required during construction, use supplementary HVAC units instead of permanently installed equipment if possible.
	If permanently installed HVAC system must be used during construction, install filtration to protect the return (negative pressure) side of the system. Replace these filters regularly during construction.
	Seal all ductwork, registers, diffusers, and returns with plastic when stored on site or not in service. Seal unfinished runs of ductwork at the end of each day.
	Replace all filtration media before occupancy.
	Do not store materials in mechanical rooms, to reduce potential debris and contamination to mechanical systems.
Source control	Use low-toxicity and low-VOC materials to the greatest extent possible.
	Develop protocols for the use of any high-toxicity materials. Isolate areas where high-toxicity materials are being installed and use temporary ventilation for that area.
	Prevent exhaust fumes (from idling vehicles, equipment, and fossil-fueled tools) from entering the building.
	Enforce the no-smoking job site policy.
	Protect stored materials from moisture because absorbent materials exposed to moisture during construction can mold and degenerate long after installation. Store materials in dry conditions indoors, under cover, and off the ground or floor.
Pathway interruption	If materials are improperly exposed to moisture, replace the material and consider testing air quality before occupancy to make sure no mold contamination has occurred.
	Isolate areas of work to prevent contamination of other spaces, whether they are finished or not. Seal doorways, windows, or tent off areas as needed using temporary barriers, such as plastic

Category	Measures
	separations. Provide walk-off mats at entryways to reduce introduced dirt and pollutants.
	Depressurize the work area to allow a differential between construction areas and clean areas. Exhaust to the outdoors using 100% outdoor air, if possible.
	Use dust guards and collectors on saws and other tools.
Housekeeping	Maintain good job site housekeeping on a daily basis. Use vacuum cleaners with high-efficiency particulate filters and use sweeping compounds or wetting agents for dust control when sweeping
	Keep materials organized to improve job site safety as well as indoor air quality.
Scheduling	Keep trades that affect IAQ physically isolated on site and separated from each other by the construction schedule. For example, schedule drywall finishing and carpet installation for different days or different sections of the building. Consider after-hours or weekend work if practical.
	Install absorptive-finish materials after wet-applied materials have fully cured whenever possible.
	If applicable, plan adequate time to conduct a flush-out and/or perform IAQ testing before occupancy.
	Remove all temporary filtration media and replace them with new filters before occupancy.

- ii. Do not operate permanently installed air-handling equipment during construction unless appropriate filtration media are installed at each return air grille and return or transfer duct inlet opening such that there is no bypass around the filtration media. Immediately before occupancy, replace all filtration media with the final design filtration media.

- **Community Management**

It is important to plan and monitor the impacts of development activities on the local community. This includes Minimizing light pollution and noise pollution to the surrounding community. The following recommendations should be followed wherever possible:

- i. Actively communicate with the local community to continuously gather complaints and suggestions related to development, thereby monitoring the community impact. If necessary, review data such as traffic patterns and crime levels before and after development to assess environmental and social impacts.
- ii. Analyze and interpret the data obtained from motoring process.
- iii. Conduct due diligence (and/or environmental and social impacts assessment) in order to identify and analyze risks that are likely to cause nuisance and disruption to the local community.
- iv. Develop a risk mitigation plan as well as monitoring plan based on the findings and analysis.
- v. Develop communication plan to hear feedback from the community and any other impacted groups.

## 5 DURING ASSET MANAGEMENT

Understanding that sustainable building operations and maintenance can lead to operational cost reduction, better occupant satisfaction, reduce GHG emissions and improve energy/water efficiency, it is important to manage asset following this guideline closely. The areas of site management, water, energy, GHG emissions, waste, and occupant comfort should be continuously monitored and managed.

Operation and maintenance documentation shall be maintained, and relevant green building certification information shall be retained for ongoing asset management.

### 5.1 SITE MANAGEMENT

Site Management applies to the site and grounds and building exterior for the asset. This plan will be consulted prior to any maintenance activity that is performed on the site and grounds or on the building exterior for the asset. The following areas should be considered:

Table 19 Recommended site management measures

Operational element	Measures
Maintenance equipment selection	Prefer to use manual or electric-powered maintenance equipment and refrain from equipment using fuels
Snow and ice removal	Use environmentally preferred deicers and establish reduced treatment areas
Cleaning products	Use environmentally preferred cleaning products
Erosion and sedimentation control	Implement erosion and sedimentation control measures
Organic waste management	Compost organic waste
Invasive and exotic species management	Implement invasive and exotic species management measures
Fertilizer usage	Minimize fertilizer uses and use organic fertilizers if required
Irrigation management	Implement irrigation management measures
Storage of materials and equipment	Implement storage of materials and equipment

## 5.2 WATER MONITORING AND MANAGEMENT

Continuous monitoring of water consumption and having a water fixture and fitting replacement and retrofit policy is crucial to reduce water consumption wherever applicable.

- **Monitoring Water Consumption**

Have permanently installed water meters that measure the total potable water use for the building and associated grounds. Metering of any gray or reclaimed water supplied to the building is also encouraged.

Record meter data on a monthly basis and compile according to the following standard tracking template:

Table 20: Water consumption monitoring template (example)

<b>Water Consumption</b>	(month)	(month)	(month)	(month)	(month)	(month)
<b>Total monthly water consumption (m<sup>3</sup>)</b>						
On-site water reuse (m <sup>3</sup> ) (greywater, blackwater)						
On-site capture (m <sup>3</sup> ) (rainwater)						
On-site extraction (m <sup>3</sup> ) (groundwater)						
<b>Total reused and recycled water (m<sup>3</sup>)</b>						
<b>Percentage reused and recycled water (%)</b>						

- **Water Fixture and Fitting Replacement and Retrofit Policy**

For any newly installed water closets, urinals, private lavatory faucets, and showerheads are recommended to use flush and flow rate requirements equivalent to Watersense of fixture and fitting. For fixture and fitting not specified by Watersense will use LEED v4 fixture and fitting code requirements.

Table 21 Water fixture requirements

<b>Fixture type</b>	<b>Required flush and flow rates</b>	<b>Reference standard</b>
Toilet (water closet)	4.8 lpf or less	Watersense
Urinal	1.9 lpf or less	Watersense
Public lavatory faucet	1.9 lpf or less (at 415 kPa)	LEED v4 fixture and fitting code requirements
Private lavatory faucet	5.7 lpf or less (at 415 kPa)	Watersense
Kitchen faucet (excluding faucets used exclusively for filling operations)	8.3 lpm or less (at 415 kPa)	LEED v4 fixture and fitting code requirements
Showerhead	7.6 lpm or less	Watersense

Table 22 Water fittings requirements

Appliance	Standard
Residential clothes washer	ENERGY STAR or performance equivalent
Commercial clothes washer	CEE Tier 3A
Residential dishwasher, standard or compact	ENERGY STAR or performance equivalent
Prerinse spray valves	4.9 lpm or less
Ice machine	ENERGY STAR or performance equivalent

### 5.3 MONITORING AND MANAGEMENT

Continuous monitoring of energy consumption and operating/maintaining appropriate to energy optimization is crucial to reduce energy consumption wherever applicable.

- **Monitoring Energy Consumption**

Monitor energy from new or use existing building-level energy meters or submeters that can be aggregated to provide building-level data representing total building energy consumption (electricity, natural gas, chilled water, steam, fuel oil, propane, etc).

Record meter data on a monthly basis and compile according to the following standard tracking template:

- i. **Energy consumption (Monthly)**

Table 23 Energy consumption monitoring template (example)

	(Month)	(Month)	(Month)	(Month)	(Month)	(Month)
Fuel (MWh)						
District heating & cooling (MWh)						
Electricity (MWh)						

- ii. **On-site renewable energy production (Monthly)**

Table 24 On-site renewable energy monitoring template (example)

	(Month)	(Month)	(Month)	(Month)	(Month)	(Month)
On-site renewable energy (generated and consumed on-site) (MWh)						

Off-site renewable energy (generated off-site or purchased from third party) (MWh)						
On-site renewable energy (generated on-site and exported) (MWh)						
Total renewable energy (MWh)						

- **Monitoring GHG Emission**

As managing GHG is becoming an industry-norm, it is important to quantify GHG emissions according to scope. Reducing GHG emissions can reduce damages from air pollution, costs/risks associated with carbon taxation and improve energy efficiency.

Record GHG emission data on a monthly basis and compile according to the following standard tracking template:

*Table 25 GHG emission monitoring template (example)*

Emissions scope		(Month)	(Month)	(Month)	(Month)	(Month)	(Month)
Whole Building (tonnes)	Scope 1						
	Scope 2						
	Scope 3						
Outdoor / Exterior areas / Parking (tonnes)	Scope 1						
	Scope 2						
	Scope 3						
GHG Offsets purchased (tonnes)							
Net GHG Emissions after offsets (tonnes)							

- **Monitoring Waste Produced**

Consistent collection of waste data is required to monitor the environmental impact caused by KORAMCO.

Record waste production data on a monthly basis and compile according to the following standard tracking template:

- i. **Waste discharge by category**

*Table 26 Waste discharge monitoring template (example)*

Waste category	(Month)	(Month)	(Month)	(Month)	(Month)	(Month)
Paper (tonnes)						
Plastic (tonnes)						
Glass (tonnes)						
Aluminum (e.g. Can) (tonnes)						
Others (tonnes)						
Hazardous waste (e.g. chemicals, lamps, batteries, etc.) (tonnes)						

- ii. **Waste diversion**

*Table 27 Waste diversion monitoring template (example)*

Disposal route	(Month)	(Month)	(Month)	(Month)	(Month)	(Month)
Landfill (tonnes)						
Incineration (tonnes)						
Diverted – waste to energy (tonnes)						
Diverted - recycling (tonnes)						
Diverted - other (tonnes)						
Other (tonnes)						

- **No Smoking Policy**

To prevent or minimize exposure of building occupants, indoor surfaces and ventilation air distribution systems to environmental tobacco smoke (ETS), smoking in the building should be prohibited except in designated smoking areas. Prohibit on-property smoking within 8 meters of entries, outdoor air intakes and operable windows. Provide signage to allow smoking in designated areas only and prohibit on-property smoking.

According to Article 9 (*Measures for Non-Smoking*) of National Health Promotion Act, office buildings, factories, and complex buildings with a total floor area of at least 1,000 square meters are designated as a non-smoking area and have to install a sign indicating that the relevant facility is a non-smoking area.



Figure 2 Example of no smoking signage (Source: LEED v4 Reference Guide)

- **Green Cleaning**

Green Cleaning is a preferred method of cleaning to reduce levels of chemical, biological, and particulate contaminants that can compromise air quality, human health, building finishes, building systems and the environment. The following strategies are recommended to adopt green cleaning where applicable.

Table 28 Green cleaning checklist

Category	Standard	Check
Cleaning products and materials purchases	<ul style="list-style-type: none"> <li>• Any type I eco-labeling program as defined by ISO 14024:1999 developed by a member of the Global Ecolabelling Network (e.g. Korea Eco-Label)</li> <li>• Green Seal GS-37, for general-purpose, bathroom, glass and carpet cleaners used for industrial and institutional purposes</li> <li>• UL EcoLogo 2792, for cleaning and degreasing compounds</li> <li>• UL EcoLogo 2759, for hard-surface cleaners</li> <li>• UL EcoLogo 2795, for carpet and upholstery care</li> <li>• Green Seal GS-40, for industrial and institutional floor care products</li> <li>• UL EcoLogo 2777, for hard-floor care</li> <li>• EPA Safer Choice Standard</li> <li>• Cleaning devices that use only ionized water or electrolyzed water and have third-party-verified performance data equivalent to the other standards mentioned above (if the device is marketed for antimicrobial cleaning, performance data must demonstrate antimicrobial performance comparable to EPA Office of Pollution Prevention and Toxics and Safer Choice Standard requirements, as appropriate for use patterns and marketing claims).</li> </ul>	
Cleaning equipment purchases	<b>Powered equipment:</b> <ul style="list-style-type: none"> <li>• Safeguards, such as rollers or rubber bumpers, to avoid damage to building surfaces;</li> <li>• Ergonomic design to minimize vibration, noise, and user fatigue, as reported in the user manual in accordance with ISO 5349-1 for arm vibrations, ISO 2631-1 for vibration to the whole body, and ISO 11201 for sound pressure at operator's ear</li> <li>• As applicable, environmentally preferable batteries (e.g., gel, absorbent glass mat, lithium-ion) except in applications requiring deep discharge and heavy loads where performance or battery life is reduced by the use of sealed batteries.</li> </ul>	
	<b>Vacuum cleaners:</b> <ul style="list-style-type: none"> <li>• Certified by the Carpet and Rug Institute Seal of Approval/Green Label Vacuum Program and operate with a maximum sound level of 70 dBA or less in accordance with ISO 11201.</li> </ul>	
	<b>Carpet extraction equipment:</b> <ul style="list-style-type: none"> <li>• Certified by the Carpet and Rug Institute's Deep Cleaning Extractors Seal of Approval / Green Label Deep Cleaning Systems Program</li> </ul>	
	<b>Automated scrubbing machines:</b> <ul style="list-style-type: none"> <li>• Variable-speed feed pumps and either on-board chemical metering to optimize the use of cleaning fluids or dilution control systems for chemical refilling. Alternatively, scrubbing machines may use tap water only, with no added cleaning products.</li> </ul>	

- **Integrated Pest Management**

In order to minimize pest problems and exposure to pesticides to provide safe and healthy asset environment to the occupants while keeping the occupants healthy, the following measures are recommended where applicable.

*Table 29 Recommended pest management measures*

<b>Operational Element</b>	<b>Measures</b>	<b>Check</b>
Cases that warrant emergency treatment	Prior to applying chemical pesticides or baits, alternative pest control methods should be used	
Cases that do not warrant emergency treatment	If alternative methods fail, least-toxic pesticides will be used prior to resorting to the use of non-least toxic pesticides or baits	
Occupant notification	In non-least toxic pesticide applications, occupants will receive notification according to the notification procedures.	

## 5.4 OCCUPANT MONITORING AND MANAGEMENT

Continuous monitoring of occupant comfort is important way of measuring building performance and to quantify the perceived comfort level of the occupant in the areas of acoustics, building cleanliness, indoor air quality, lighting and thermal comfort, is encouraged for every asset to conduct an occupant comfort survey once every 2 years.

It is recommended that at least 30% of the total occupants respond to the survey. A corrective action plan and its implementation are encouraged if the results indicate that more than 20% or occupants are dissatisfied.

- **Occupant Comfort Survey**

The following survey form includes recommended survey questions and the questions may be adjusted according to the asset needs.

Table 30 Occupant comfort survey questions

Operational Element	Satisfaction Level				
	Very Unsatisfied	Unsatisfied	Neutral	Satisfied	Very Satisfied
<b>BUILDING OPERATION &amp; MANAGEMENT</b>					
What do you think of the services provided by the building facility managers?					
Did facility managers respond in a timely manner when you reported issues on building damage or any other building related issues?					
Are you satisfied when communicating with property managers/facility managers?					
<b>INDOOR ENVIRONMENT</b>					
How satisfied are you with the indoor temperature?					
How satisfied are you with the indoor air quality?					
How satisfied are you with the indoor lighting level?					
How satisfied are you with current disinfection management routines?					
<b>CLEANING</b>					
How satisfied are you with the cleanliness of the common space?					
How satisfied are you with the cleanliness of the lavatories?					
How satisfied are you with the cleanliness of the lobby?					
How satisfied are you with the level of building maintenance in general?					
<b>SECURITY AND SAFETY</b>					
Are you satisfied with current level of building security and safety?					
How convenient is it to use the building before/after building operating hours?					
How satisfied are you with the safety of the parking garage?					
<b>OVERALL SATISFACTION SCORE</b>					

Operational Element	Satisfaction Level				
	Very Unsatisfied	Unsatisfied	Neutral	Satisfied	Very Satisfied
Overall, how satisfied are you with the building?					
<b>VALUE FOR MONEY</b>					
How satisfied are you with the cost of rent of the building and the service/quality provided?					
<b>NET PROMOTER SCORE</b>					
How likely would you recommend this building to another friend or a colleague?					

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