EXPRO National Manual for Projects Management

Volume 6, chapter 7

Architectural Design Guidelines

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1.0 PURPOSE

The purpose of this document is to provide guidance on Architectural Design to the Entity but primarily to their Architect/Engineer(A/E) consultants to ensure all aspects of project designs are executed in a considered and cohesive fashion. This Section covers requirements for the architectural design and planning of residential, commercial, transport, institutional and industrial facilities, including aesthetic, functional, life safety, and accessibility aspects of buildings and their relationship to their respective environments. This Section provides the basis for design of Building Projects including their Site Development; Building Components, Materials and Systems; and provides general Guidelines by Building Type.

These guidelines shall be adopted and enforced by the Entity but must be considered as non-exhaustive.

2.0 SCOPE

These guidelines cover Architectural Design across all Entity infrastructure and construction projects in the Kingdom of Saudi Arabia.

The criteria in this Section apply to all buildings unless noted as only applicable to a specific building type.

These Guidelines apply to buildings and industrial developments. Parks and open spaces, as well as streetscapes, are addressed in the Landscape Design Guidelines in Volume 6 Chapter 7, Design Guidelines.

3.0 DEFINITIONS

The following are intended as a general guide only. Refer to applicable Codes for specific definitions and requirements. Refer to Section 6.2 – Definitions and References.

Term	Definition
ENTITY	The Entity refers to any Government Ministry or EPMO or any organization hired by the Government Ministry on their behalf.
A/E	The A/E is any organization including their sibs who are responsible for the design of the project including EPC Contractor or Specialty Consultants or organizations providing engineering support during design or construction.
Accessible	A site, building, facility or portion thereof that accommodates the needs of the disabled or those of reduced mobility.
Accessory Structure	A structure that is adjacent to, is subordinate to, and has a service function in support of a primary use or structure, also typically but not necessarily, subordinate in size.
Accessory Use	The function of an Accessory structure, typically one which differs from that of the primary structure and/or is very specialized.
Adjacent Uses or Adjacent Lots	Lots that share a common lot line or are only separated by a public way.
Alteration	Any physical change to a building, structure, or site.
Anti-Slip	Floor friction characteristics intended to minimize slip and fall accidents
Assembly	A Use that consists of the congregation of people.
Block	A site or group of contiguous properties that are bounded on all sides by a street, public way or other geographically separating feature, forming a planning unit, typically a repeated organizing element creating an urban or land use pattern
Buffer	A strip or area of land that separates one use, occupancy, road, or other type of land use from another, typically provided with landscaping or other forms of screening.

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Term	Definition
Building	An architectural structure housing or supporting human activity, though not necessarily occupied, that is governed by applicable building Codes.
Building Line	The line beyond which a building or structure is not permitted to encroach.
Building Types	Classifications of buildings according to their principal activity. These include but are not limited to Public/Government, Commercial, Residential, Industrial, etc.
Carport	A covered area or shelter, often open on one or more sides, used for the parking of one or more motor vehicles.
Cartway	A strip of pavement designed primarily for public vehicular traffic circulation, defined as the area from curb to curb or edge to parallel edge of pavement.
Communication Tower	Public or private vertical structure intended for telecommunications transmission, reception, and/or relay.
Contextual Setback	A theoretical line offset and parallel to a property line, established with the intended purpose to align the faces of buildings or structures with the adjacent building(s) or structure(s).
Contextual Height	A building structure's height dimension from a base plane or grade, established with the intended purpose to establish a visual consistency in height among adjacent developments.
Contour Lines	Graphic lines on a grading plan that connect points of identical elevation, expressed in values relative to a standard such as sea level.
Density	Within a development with a defined geographic area, such as the ratio dwelling units per given area of land, or of the total floor areas of all buildings on a site to the land area.
Development	The total of all improvements to a site, or any substantial change in the use or appearance of any structures or land. In connection with the use of land, substantial disturbance of existing vegetation, tree cover, site contours, watercourses, parking areas, and/or structures.
Driveway	A privately developed and maintained strip of pavement intended for vehicular circulation or access.
Dwelling Unit	A building or portion thereof designed and used for residential occupancy by a single family and that includes exclusive sleeping, cooking, eating and sanitation facilities or as otherwise defined by Code in SBC 201 4.2, 9.2, and 2.10.2 SBC 801 1.2.
Elevation	A view of a building seen from one side as a flat representation of one façade, commonly used to depict the external appearance of a building or series of adjacent buildings.
Façade	The exterior elevation of a structure or building as viewed from any single vantage point.
Facility	Building and/or enclosed or unenclosed industrial processes as well as all its site features.
Flame Spread Rating	Classifications of interior building materials that evaluates their surface burning characteristics by means of a specific certified test assembly.
Gross Floor Area (GFA)	The sum total horizontal area of all floors of a building measured from the exterior face of exterior walls or from the center line of walls separating two (2) abutting buildings, including or excluding such

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Term	Definition
	areas as defined by applicable code or ordinance SBC 201 8.2.1 and SBC 801 8.2.1.
Net Floor Area (NFA)	The horizontal area of all floors of a building, measured from face-of-wall to face-of-wall in each space, totaled together, including or excluding such areas as defined by applicable code or ordinance SBC 201 8.2.1 and SBC 801 8.2.1.
Floor Area Ratio (FAR)	The amount of gross floor area of all principal buildings on a lot divided by the total area of the lot on which such buildings are located.
Garage	A structure or any portion thereof designed for the parking of one (1) or more motor vehicles, not including vehicle repair, exhibition, or showrooms.
General Requirements	Requirements necessary to carry out the construction, such as start-up mobilization; construction trailers; temporary offices, toilets, and utilities; site stake-out; dumpsters and trash removal; security; and various other overhead items. These are typically referred to as the "General Requirements of the Contract for Construction" On all building projects, the A/E and Construction Contractor shall illustrate that the proposed construction work plan takes adequate financial and logistic account of the General Requirements.
Grading Plan	A site plan or drawing that illustrates an intended physical change in a land surface, typically by means of contour lines and spot elevations.
Height, Building	The vertical distance between the finished grade and a defined point at the top of a building or structure. Refer to the applicable code for what constitutes 'finished grade' and what is the defined point at the top of a building or structure. See SBC 801 3.3 and SBC 201 3.3. See also Expro White Book Section 6.7.3.3.B for Height, Bulk, and Scale.
Helipad, Heliport, Helistop, or Helicopter Landing Area	An area specifically designed for the landing of public, private, or medical assistance helicopters.
Impervious Surface	Area covered by pavement, roofs, or other surface that inhibits ground absorption of water.
Site improvements	All changes and additions to the natural ground surface, or to the site surface prior to the proposed development.
Life-Cycle Cost Analysis (LCCA)	Method for assessing the total cost of facility ownership, taking in to account first costs as well as operations and maintenance expenses.
Lots	Lot Area - the total area of a piece of property lying within the lot lines, not including any portion of a street or way. Corner Lot - means a lot abutting two (2) or more streets at their intersection. Lot Depth - the horizontal distance between front and rear lot lines measured as noted in the applicable ordinance. Lot Size - the area of a parcel of land within its defined boundaries. Lot Width - the horizontal distance between the side lot lines measured as noted in the applicable ordinance.
Master Plan	A conceptual or detailed site plan document produced by the Developer, A/E, and/or Construction Contractor that defines the entire intent of the proposed development to the level of detail appropriate to the site plan review process. An established document controlling proposals for development as endorsed by the ENTITY to demonstrate that a superior

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Term	Definition
	development is intended. The master development plan shall contain all that information required by the zoning administrator to support the application. Refer to Section 6.5.7 Coordination with Region and/or Municipal l Master Plan.
Mixed Use Development	The development of a tract of land, a building, or a structure with a variety of complementary and integrated uses, such as, but no limited to, residential, office, manufacturing, retail, public, or assembly.
Nomenclature	Terminology or Language
Open Space	That portion of a lot or property which is not occupied by buildings. By definition it may or may not include parking areas, driveways, streets or loading areas.
Ordinance	A general term for any applicable rule of law or governing code.
Overlay District	Zoning regulation that imposes additional requirements or provisions above that required by the underlying district based on specific or special conditions.
Owner	The controlling partner in a development.
Parking Area	An uncovered open space other than a street or way, used for the parking of motor vehicles.
Plot	A map or plan of a subdivision of land parcels.
Plot Plan	A drawing used for the purposes of identifying the intended use or occupancy of a particular plot of land, and to facilitate administrative review, showing the location of the property boundary, structures, streets and other important features.
Positive Drainage	Drainage that occurs in a downhill/downslope direction away from a structure or site improvement to help prevent water infiltration and damage.
Public Way	Any area of land whose designated purpose is vehicular or pedestrian circulation or a publicly available space that is capable of vehicular or pedestrian circulation.
Ramp	A walking surface that has a running slope steeper than one vertical unit in 20 horizontal units (5-percent slope), or as elsewhere defined.
Right-of-way	A strip of land acquired by reservation, dedication, forced dedication, prescription, condemnation, or decree, intended to be occupied by a road, crosswalk, railroad, electric transmission lines, oil or gas pipeline, water line, sanitary storm sewer, and other similar uses, typically defined with specific boundaries that define its width.
Setback	A specific line fixed by regulatory action, parallel to the property line at the street right-of-way that defines a zone wherein a defined level of improvement may not occur.
Shaft	An enclosed space extending vertically through one or more stories of a building.
Solar Orientation	The compass direction a building or site element faces (for example north, south, east, or west), considered in reference to the sun and solar heat gain considerations.
Spot Elevation	Numeric notation on a grading plan that indicates the height above sea level elevation at a specific point.
Story	That portion of a building included between the surface of any floor and the surface of the next floor or roof above it.
Structure	Anything constructed or erected by means of a secure connection to or fixture on the ground, and intended for a non-temporary function or location.

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Term	Definition
Subdivision	A legally obtained division of a property into separate uses or parcels.
Topology	The functional relationship of one or more architectural spaces due to related use, necessary interconnectedness, grouping in a spatial arrangement, or other organizational criteria.
Tower	For the purpose of this Section, any structure that is designed and constructed primarily for the purpose of supporting one (1) or more antennas, or telecommunications apparatus.
Tree Protection Zone	An area surrounding an individual tree or group of trees to be preserved during construction; defined by the drip line of an individual tree or the perimeter drip line of groups of trees.
Use	The function purpose for which land or a building is intended.
UV Degradation	Cracking, bleaching or disintegration that results in materials after exposure to sunlight.
Yard	The unobstructed open space that exists or that is proposed between a setback line and a lot line.
Zoning District	An area of land consisting of multiple properties for which a common general use is defined and specific constraints to development are given based on this use.
Zoning Ordinance	A legal document consisting of verbiage, maps, and in some cases, details that govern all developments in a given area.

3.1 Abbreviations

Abbreviations	Description
SBC	Saudi Building Code
IBC	International Building Code
NFPA	National Fire Protection Association
UABE	Universal Accessibility Built Environment
ADA	Americans with Disabilities Act
ANSI	American National Standards Institute
UL	Underwriters Laboratories Inc.
FM	Factory Mutual
ASTM	American Society for Testing and Materials
GFA	Gross floor area
NFA	Net floor area
FAR	Floor area ratio

4.0 REFERENCES

4.1 Templates

EPM-KEA-TP-000001 Template - Architectural Drawings Checklist
EPM-KEA-TP-000003 Template - Architectural Design Criteria
EPM-KEA-RG-000001 Template - List of Architectural Deliverables

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4.2 Related Sections

1. NPM-KEA-GL-000004 Guideline - Universal Accessibility
2. EPM-KEA-GL-000005 Guideline - Landscape Architecture Design
3. EPM-KEA-GL-000006 Guideline - Program of Rooms / Spaces for Building Design Report
4. EPM-KEA-GL-000003 Guideline - Door and Window schedule
5. EPM-KEA-GL-000007 Guideline - Finishing Material Schedule
6. EPM-KEA-GL-000008 Guideline - Data Sheet Escalator
7. EPM-KEA-GL-000009 Guideline - Data Sheet Elevator
8. EPM-KEA-PR-000001 Procedure - Encroachment Permits
9. EPM-KEA-PR-000002 Procedure - Saudi Arabia Archeology Regulations
10. EOM-ZP0-PR-000004 - Operations and Maintenance - Projects Interface

5.0 ARCHITECTURAL DESIGN

All entity projects must follow a regimented design process. This will commence on foot of the initial Entity inception brief once issued to the A/E following commencement of the project through the preceding stage gates. Volume 3, Chapter 4, Concept Masterplan and Development Framework, elaborates on the concept master planning stage identifying the Framework for the Process, Sequence and Deliverables which all Entity projects must comply with in full. Following on from the Masterplan Stage the Design Stages, their sequence and specific deliverables, described in Volume 6, Chapter 6, Project Design and Engineering Services and Chapter 7, Design Guidelines are of critical importance to the efficient planning and execution of the project.

The following shall form the basis and be considered continually throughout the design of any development. All developments shall be generated with explicit response to:

a. The applicable overall Conceptual Master Plan and Development Framework for the area where the development is located. Where no framework or masterplan exists, the entity shall clearly define the entire project parameters and produce Development or Site Wide Guidelines to identify all design parameters to be adhered to in addition to the relevant codes, standards and regulations. Refer to Volume 3, Chapter 4, Concept Masterplan and Development Framework.
b. The Entity Brief, Basis of Design, Program of Areas and Budget throughout the project submitting reports with each stage deliverable.
c. Sustainability Standards or the Entities sustainability goals set out for the development. Refer to Volume 6, Chapter 5, Codes, Standards and References, Section 8, Sustainability for further detail.
d. The local vernacular and site conditions in terms of building character, access, circulation, topography and the visual effect of the development.
e. The cultural context relevant to the Kingdom of Saudi Arabia.
f. Providing developments that are universally accessible to all persons. Refer to Volume 6, Chapter 5, Codes, Standards and References, Section 6.1, Guideline - Universal Accessibility.
g. Requirements specific to the building type and its proposed use(s).
h. Maximizing the energy efficiency of all buildings through its design in all stages of the project. Orientation, spatial layout, mass, fabric, services and construction shall be considered and reflected in the project energy efficiency and sustainability goals.
i. Meeting the entity operational and occupational requirements and incorporating it into the design.

The A/E and/or Construction Contractor are to meet the design criteria requirements herein provided to ensure the highest level of architectural design quality.

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Professional competence in the uniformity of practical approaches, compatibility of design, and coordination of interfaces among the other design disciplines and third party services, shall be required.

Designs must protect the unique character of the area, and create compatibility in the environment through architectural treatment and site design.

Designs must develop an architectural character and site design that creates a sense of place,

Designs must screen and protect privacy, frame and enhance views, and appropriately accommodate uses and activities.

Design Criteria:

a. The overall goal of these criteria is to provide the user with buildings and spaces that provide the best possible environment that will support their mission, functions and needs. Overall site organization criteria include: well-planned circulation that is adequately sized for both current and future needs; creative use of landscape elements, and building siting and orientation for energy efficiency and sustainability.
b. These Architectural Design Guidelines govern the selection of materials to be used in the construction of ENTITY projects. These guidelines set minimum Standards for quality; energy efficiency; life cycle cost; color and texture; scale, proportion and massing; graphics and signage; as well as safety statements.
c. The A/E and/or Construction Contractor shall identify, designate, and protect historically significant resources by complying with the provisions set forth. This document establishes the Standards and guidelines for site work and alterations within the historic district, including both the interior and exterior renovation/rehabilitation of the properties identified in the memorandum and any major projects affecting these structures. The A/E and/or Construction Contractor shall also adhere to the ENTITY's Construction Standards regarding energy conservation requirements and current Code Standards. See SBC 601.

5.1 Principals of Architectural Design

An architectural design shall form a response and solution to the context, conditions, restrictions and parameters in the development of a site. These may be social, technical and/or economic in nature yet all individual items are answered in one cohesive design response.

Architecture is the realization of space and its enclosure, the movement through and around it and the integration of the program within its context. The design shall respond to the fundamental principles including:

- Form and spaces
- Circulation
- Organization
- Proportion and scale
- Order and hierarchy
- Rhythm and repetition

Specifically, the following shall be observed,

1. The form and proportion of buildings within a development shall be consistent or compatible with the scale, form and proportion of the existing development in the immediate area, or as otherwise directed by the ENTITY.
2. Architectural design shall create harmony using textures, complementary colors, shadow lines and shapes.
3. The rhythm of structural mass to voids, such as windows and glass doors, of front facades shall relate to those established in adjacent buildings.

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4. Monotony of design in single or multiple building projects shall be avoided. Variation of form, detail, and siting shall be used to provide visual interest. Large unarticulated or monotonous forms are discouraged.
5. Architectural elements such as building materials, finishes, colors, facade and roof lines, and screening shall be consistent and compatible.
6. Design and architectural elements that are consistent on all sides may be used to meet the requirements of these principles and criteria. Adjacent land uses, visibility from public streets and use of screening devices such as walls, fences, berms, and landscaping are to be considered when varying this treatment. The A/E and/or Construction Contractor will justify the reasons for differing treatment on different sides such as the need for automobile access on one side and pedestrian access on another.

5.2 Cultural Context

All facilities shall be designed keeping in mind the Saudi Arabian heritage, and culture. Architectural aesthetics and layout shall reflect Saudi Arabian needs and values using both traditional and modern designs, motifs and influences. Local materials and products shall be considered first, to the greatest extent possible, when designing.

The overall facility shall be sensitive to and reflect the local culture. Architectural design shall be respectful and relate to the building location and surroundings using design elements including appropriate color, materials, and detailing. Overall architecture shall enhance the environment by honoring local architectural, historical, cultural, and community themes.

5.3 Privacy

Buildings such as mosques, government facilities, commercial facilities and permanent private residences may or may not be provided with privacy walls or fences, as determined by the A/E and/or Construction Contractor and approved by the ENTITY. When privacy walls or fences are not provided, the area between the building and the lot boundary must be landscaped.

Fenced security enclosures, including lockable gates and security lighting, shall be provided around all facilities requiring the exclusion of unauthorized persons.

The site or location of all building or other improvements must be approved by the ENTITY. The ENTITY will take into consideration the height, profile and proposed placement of buildings on the units in relation to the height, profile and location or potential location of other buildings or improvements on adjacent portions of the units to minimize obstruction of the view from other parts as much as possible.

Notwithstanding the above, the ENTITY, as defined in Standards, may construct, or require the construction of, a perimeter wall on or near the property line of a lot or a screening wall within the setback area of a lot as a special condition.

5.3.1 Screening

The following shall be taken into consideration when designing screening and maintaining privacy:

1. All screening elements, walls, and fences shall be within the lot lines.
2. The area between the lot line and a wall or fence set back from the lot line shall be landscaped.
3. All wall and fence material shall be compatible with the exterior building finishes.
4. All details for screening shall comply with ENTITY guidelines and requirements and subject to their approval.
5. Garbage and Trash Containers shall be kept within an enclosure.

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6. Preserving trees is highly desirable where there is existing tree cover. Large artificial landscape areas and foreign flora are not considered to be desirable.
7. Privacy issues related to zoning and the Design Guidelines are to be reviewed and approved with the ENTITY.
8. The A/E and/or Construction Contractor shall comply with any additional requirements from the Entities.

5.3.2 Gender Separation

The A/E and/or Construction Contractors shall incorporate gender separation on all projects with public access. Separate entrances for Singles and Families, restricted visual access (screening) separate waiting areas, and separate work areas are some of the elements that may be incorporated.

The A/E must submit the goals and objectives related to gender separation at the 10% stage to the ENTITY for review and approval to clearly demonstrate the strategy intended and include the elements to accomplish it. They will also submit the methodologies related to gender separation at the 30% stage with a more fully developed design.

5.4 Local Conditions

The following are items related to a developments context. Local conditions will have varying impacts the design of a development and therefore must be considered.

5.4.1 Elements

Elements of an environment or site have numerous physical and environmental effects. These elements include man-made and natural features with interrelationships that may be difficult to anticipate.

5.4.2 Design

Design shall consist of low maintenance/vandal-resistant interior finishes and building systems comprised of materials that are commonly available for repair and replacement. The design of mechanical, electrical, and plumbing systems shall be based on simple, reliable components.

5.4.3 Operation and Maintenance

All material and systems shall be reliable and easy to use or operate and maintain. Materials shall be environmentally sound.

5.4.4 Location

The Building and Site Design shall reflect the location and surroundings in terms of color, materials, and detailing, and shall preserve and build upon those architectural themes.

5.4.5 Blending

The Architectural design shall result from the successful blending of local culture, function, environment, economy, durability, operation and maintenance.

5.4.6 Emphasis

The Architectural design shall place appropriate weight and emphasis on each element, and shall not let one of these elements become overly dominant.

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5.4.7 Characteristics

The Architectural design shall reflect and support the characteristics and function with the exterior of the structure not disguising the function of the structure.

5.4.8 Transient Styles

The Architectural design must avoid following transient architectural styles which are short-lived.

5.4.9 Quality

The Architectural design shall provide quality to enhance safety, productivity, and quality of life. In this light, the architectural design shall:

1. Be functional,
2. Be Constructible,
3. Be intended for an extended life. Building systems and materials shall have a demonstrated longevity, durability, and reliability,
4. Be conceived, designed, and constructed to provide ease of operations and maintenance,
5. Be conceived, designed, and constructed for ease of alterations and expansions,
6. Be conceived, designed, and constructed to provide a quality cost effective facility,
7. Be respectful of the cultures of those it is intended to serve,
8. Be expressive of its function and of the services it provides.

5.4.10 Thermal Insulation Continuity

Thermal performance of buildings is of critical importance to reducing energy demands. The A/E and Construction Contractors must ensure all measures are taken to eliminate thermal bridging and reduce thermal transfer from the earliest stages of design through to construction. Using standard detailing practices and considerate material selection the building must firstly ensure regulation u-values are achieved and bettered where possible and secondly that they achieve the Entity's energy performance benchmark also. Refer to SBC 601 for current codes as a minimum benchmark.

5.4.11 Air Tightness

Air infiltration through the building fabric contributes to the increased energy demands of poorly constructed buildings. Badly sealed buildings allow air pass through structures creating draughts and allowing cooling or heating to escape from the internal space increasing mechanical demands and therefore energy. Applied standard detailing and a quality focused construction will minimize air infiltration and subsequently the associated energy demands. It is the responsibility of the A/E and Contractors to ensure all measures are taken to identify design issues early, simplify designs, employ standardized details and specifications thus increasing quality and minimizing construction tolerances. Refer to SBC 601 for current codes as a minimum benchmark.

5.4.12 Control Joints

Large thermal expansions and contractions tend to occur due to temperature differentials. These may happen in a short period of time. Careful study of the use of materials, their exposure to sun and counteracting-measures, such as expansion joints and control joints, shall be made at all levels of architectural and structural detailing. The resulting expansion joints must accommodate all movements without compromising the strength, stability, weather tightness, or integrity of the building envelope, as well as aesthetics.

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Special care shall be taken when designing with metal cladding to avoid buckling, deformation, and “oil canning”, or movement-generated noise resulting from uncontrolled rapid thermal expansion. It is also essential that heat gain and radiation due to the intense sun be minimized.

Low heat absorbing materials, light colors, natural/passive air flow between building components, orientation of buildings and surfaces, and angling of surfaces are examples of measures designs shall consider in addressing the local climate thereof are prime considerations. Materials and colors which do not fade or degrade due to ultraviolet light shall be specified.

5.4.13 Corrosion

Mitigation of corrosive effects on cladding materials, hardware, finishes, sealants, joints, connectors, and detailing must be ensured. This is most important on the exterior of buildings but shall be recognized as a potential problem in the interior of buildings as well. When dealing with metals, the use of heavily anodized aluminum, galvanized and properly coated steel, as well as stainless steel, is recommended. Exterior stainless steel must be Grade 316 or higher corrosion –resistant grade, and a lacquer or polyurethane clear coat is recommended.
In coastal regions, humid saline atmosphere tends to corrode metals and stain other materials. It is imperative that guarding against such effects be at all levels of architectural and structural detailing and selection of materials.

5.4.14 Sand Control

The prevention of sand and dust infiltration is essential throughout the design of a facility. Blowing dust particles tend to infiltrate through minute cracks, joints and openings. The accumulation of sand and its harmful abrasive effects must be countered. Joints and connections shall be designed to prevent dust and sand infiltration.

High quality weather stripping, gaskets and tight connections and tolerances shall be provided for. Materials resistant to sand abrasion, sand blasting effect during heavy sand storms and high saline content in sand shall be specified.

All main entrances and all other entrances to public buildings which may be frequently used (except certain emergency exits), shall have vestibules with adequately separated doors to serve as an air lock to check sand accumulation. Tight weather-stripping completely around all doors, windows, roll-up doors, sliding doors, industrial doors, and other openings shall be incorporated.

Mechanical intake and exhaust louvers and grills shall be protected or placed in such a way as to minimize infiltration of wind, water, and sand.

5.4.15 Pest Control

5.4.15.1 Chemical Treatment

A/E and/or Construction Contractor shall consider in the design of all buildings, facilities and the sites surrounding them as well as in the use of materials, steps and procedures to combat and exclude all rodents, termites and insects. Problems with subterranean termites, cockroaches and rats exist in the area.
Any anti-pest substance or material must be a substance approved by local health authorities, and the ENTITY and the Standards referenced therein. Substances must be employed strictly in accordance with health regulations and manufacturer’s recommendations.

Anti-pest substances or materials typically require specialized approved chemical agents in significant quantities which must be applied only by licensed professionals where typical termite and insect treatment techniques include soil trenching and injection into the effected materials via drilling or other invasive methods.

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A zone of treated soil shall be created around the building perimeter. Soil shall be treated with an approved termiticide, prior to the concrete slab construction, for control of subterranean termites, as best method for the control of subterranean termite is prevention.

Chemicals for treatment must conform to all applicable product and application restrictions. The A/E and/or EPC must only use approved substances, chemicals, and/or materials, and is responsible for all permitting. Some chemicals may include the following list, subject to the above,

i. Organophosphates and synthetic pyrethroids (modified).

ii. Reticulated Chemicals are proprietary systems that use a piping distribution network installed at strategic points under concrete slabs and around the perimeters of buildings. At completion of Construction, chemicals are injected to reach each distribution point. Retreatment may be applied at any time.

Chemically impregnated membranes for under-slab and perimeter protection may be provided with a proprietary system where a vapor barrier membrane is laminated to a synthetic fibrous web impregnated with synthetic chemicals,

a. Stainless steel mesh (‘termimesh’) is a proprietary system that consists of a fine woven marine grade stainless steel mesh used as a physical barrier. The stainless-steel mesh is too narrow for intrusion and incapable of being chewed through. The mesh may be under the entire concrete slab or as a partial system in conjunction with a concrete slab barrier that allows for construction of a perimeter barrier only. Installations must comply with the manufacturer’s requirements.

5.4.15.2 Preventative Measures

The following are recommended preventative measures during construction:

a. Construction site garbage, food, and food or drink container refuse, shall not be mixed with construction material waste, and shall have separate receptacles subject to frequent pick-up.

b. Temporary Construction toilets shall be maintained and regularly refreshed.

c. The observed presence of rodents, termites, insects and other pests shall be immediately reported to the appropriate on-site personnel who shall address the situation by employing professional exterminators as necessary.

d. Removal of all form boards and grade stakes used in construction activities.

e. Sites shall be cleared of vegetation and/or ripped and grubbed to remove roots etc. prior to commencing earthworks. Vegetation, tree stumps, and roots shall be removed from site as soon as practical, and shall not be incorporated in any fill.

f. Any wood that contacts the soil, such as fence posts and foundation elements shall be made of pressure treated wood.

5.4.15.3 General Construction Techniques

a. Construction techniques shall employ deterrents to rodent entry, avoidance of wood or wood products near the ground or water sources within the building such as showers, toilets, sinks and drain lines.

b. There shall be no contact between the building woodwork and the soil or fill materials.

5.4.15.4 Types of Potential Termites

There are two main types of termites capable of attacking buildings:

a. Drywood termites, which do not have ground contact, and

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b. Subterranean termites, which require contact with the ground or some other moisture source. Subterranean termites are found to be most responsible for termite damage of economic significance.

5.4.16 Protection Options

Termite or Ant Shields are continuous metal barriers or shields acting as physical barriers. Materials may be of aluminum, stainless steel, sheet copper or an alloy. These elements shall be installed with a continuous protruding metal edge turned down at an angle of no less than 45° from the horizontal. The protruding edge must not be less than 38 mm from the vertical pier or wall.

The shields' main value is that of detection rather than protection. They force the termites to construct their tubes in a visible area where they may be treated or removed.

Inherent Deterrents

i. Monolithic Concrete Slabs form an inherent barrier; however, construction joints and service penetrations must be handled properly to prevent intrusion.

ii. Ventilation of crawl spaces and cavities, and the proper installation of under-slab vapor barriers deter moisture and build-up of humidity that attract termites. A minimum of 400 mm vertical clearance is recommended for proper maintenance inspections.

iii. The use of termite resistant and wolmanized lumber.

iv. Strip footings and slabs shall be continuous to minimize construction breaks that may allow intrusion.

v. Utility penetrations shall be provided with both physical and chemical deterrents.

vi. Walls with masonry veneers shall not allow the air cavity (‘finger space’) to extend below grade.

vii. Ventilation opening in foundations shall be designed to prevent dead air pockets. These helps to keep the ground dry and unfavorable for termites.

viii. Create proper grading to direct water away from the structures to eliminate favorable conditions for pests.

5.4.17 Inspections

Where termite shields exist, particularly when there has been a history of termites in the immediate neighborhood, properties shall be inspected regularly, approximately every six to twelve months by a qualified professional experienced in termite detection.
Thorough annual inspections shall be conducted to detect evidence of termite activity such as shelter tubes on foundation surfaces, discarded wings or adult termites.
Foundation area shall be designed and constructed to be accessible for inspection if possible.

5.5 Summary

In summary, acceptable architectural design shall reflect the function of the structure, the environment and culture of the people being served, respect and enhance its immediate environment, and achieve its mission in a quality and cost-effective manner.

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6.0 STANDARDIZATION

Uniformity and standardization of materials, equipment, hardware and finishes to minimize and simplify service and maintenance. Efforts shall be made to design structures and elements to be compatible with their environment and adjoining buildings.

The architectural design shall include the selection of materials based upon location, quality, energy efficiency, life cycle costs, safety and environmental impact.

Throughout the design review and construction management process, the ENTITY will implement its Construction Standards. The design review process shall also inform the A/E and/or Construction Contractor of any adjustments to the Design Guidelines or Construction Standards.

All signage requires approval from the ENTITY as to size, material, graphics, color, reflectivity, and illumination. Most signs are not permitted except for identification signs showing the name and the address of the owner or occupant of the building or unit.

7.0 FACILITY LIFE CYCLE

7.1 Design

All permanent facilities, buildings, components and systems shall be designed to maintain their structural, functional, operational, and aesthetic integrity for a minimum of 30 years or as per ENTITY requirements. Various building components shall be designed to maintain their structural, functional, operational, and aesthetic integrity for a minimum of varying years based upon ENTITY requirements. All material and systems shall be cost effective and efficient.

The evaluation of life cycle costs for building materials, systems and equipment, will continue to be an issue in preparing construction drawings and specifications for the foreseeable future. Life cycle cost analysis (LCCA) is a valuable tool for evaluating appropriate/durable materials based upon their longevity and expected maintenance costs. While LCCA has traditionally addressed mechanical, electrical and plumbing equipment/systems, it may also be used to evaluate major civil, structural and architectural envelope systems.

7.2 Operation and Maintenance

Designs shall deliver low maintenance/vandal-resistant interior finishes and building systems that are commonly available for necessary replacement. Designs of mechanical, electrical and plumbing systems shall be based on reliable components.
All material and systems shall be reliable and easy to operate, access, and maintain. Materials shall be environmentally sound.
Design shall take into consideration the access arrangements to plant, access to utilities, equipment, systems and components for maintenance purposes as well as on safe access for cleaning and maintaining the building envelope. Consideration also shall be made for the internal transport and concealed storage of access equipment for use in maintenance and for cleaning the internal envelope of the asset.
Design shall consider the implications of obsolescence and consider how long parts and materials should be supported by the manufacturers

7.3 Demolition and Salvage

Designs shall consider demolition and construction activities and strive to minimize the amount of construction debris. Construction waste of any type shall be prohibited from entering the municipal waste stream. Salvage, reuse, repurposing, and recycling of materials are highly encouraged.

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8.0 BASIS OF DESIGN

8.1 Design Basis Report

The Design Basis Report is a key project specific document which along with the Basic Engineering Design Data (BEDD), Design Criteria, Specifications and Standard Details forms the scope and the basis of the design of the Entity's projects. The DBR is developed by the A/E to convey the background, the detailed breakdown of the scope of the project clarifying how the A/E will achieve the intent of the scope, the references and the precedents used to design each operational system and infrastructure component of the Project. The DBR shall be completed within the first three months of the design phase and submitted for Entity's approval. A/E shall update the DBR with any scope changes throughout the project and obtain Entity's approval at each revision before proceeding with the change.

The Project DBR describes the detailed scope of the project (location, access, existing facilities, list of buildings/ types/ foot prints, external works, utilities, tie-up, assumptions, etc.) and how the design meets the Entities' scope of work, the technical, performance, and functional requirements as well as design constraints. The DBR shall apply to all applicable disciplines.

The DBR is an item included in the A/E's Scope of Work document as a deliverable from the A/E. Refer to Development of Service Requisition – Procedure (EPM-KE0-PR-000006) for the guide on the development of the Scope of Services for A/E and/or Engineering, Procurement and Construction (EPC) contracts.

The DBR shall contain the following descriptive items to address each project:

8.1.1 Introduction

a. Project overview (background, purpose, related and adjacent work)
b. Supporting documents

8.1.2 Detailed Project Scope

The A/E shall define in detail the facilities/services to be designed for its project. It shall include any required demolitions and assumptions made which need verification by the Entity. The information on project scope of work shall include, but not limited to, the following:

a. Site location and access (existing and proposed)
b. List/ type/ foot prints of buildings with required support facilities
c. Site works (grading, roads, parking, drains, etc.)
d. Concrete and Steel works (foundations, structures, etc.)
e. Utilities (Potable Water, Sewage, Fire Water, irrigation, Electrical) – existing, max/ min demand and tie-ups
f. Low Voltage Systems (Telecommunications, Voice & Data, Security, Fire Alarm, etc.)

8.1.3 Space Allocation Program

The terms "Space Allocation Program", "Architectural Program", and "Architectural Brief", and "Scope of Facility" (or SOF) may be interchangeable and shall be considered herein to have identical meaning.

See Volume 6, Chapter 7, Design Guidelines, Section 3.3, Program of Rooms / Spaces for Building Design Report – Guideline for more information on data collection and recording of space planning and programming design documents where its process includes but is not is not limited to the following:

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Goals

- The goals of the building owner or developer are expressed in written form.

Statement of intent

- The building owner or developer initially provides a written statement noting the type of building or its purpose, an approximate size, and a budgeted construction cost.

Project Requirements / "Basis of Design"

- Provide general design intent information, including the intended design character, preferred materials, etc.
- Submit the applicable parking, loading, and site requirements.
- Provide specialized information such as industrial process equipment, support and utility infrastructure, material handling and storage, and vehicular and/or user traffic that may be generated.
- Programming shall respond to additional requirements of the Department of Education.

Information Gathering

- Specify the needs of the building as defined by means of meetings with the owner/developer, investigative studies of their current facilities and needs, and other means as required.
- The types, functions, and approximate sizes of spaces are to be defined. The topology or functional relationships of the spaces and circulation are to be indicated, and circulation, production, and /or industrial process flow is to be delineated.
- Any specific functional needs of specific spaces are to be defined.
- Orientation and orientation requirements such as the following are to be defined:
    - Spatial orientation
    - Solar orientation
    - Ceremonial / Religious orientation
    - The utility needs of the spaces are to be defined.
    - The technology, security, and/or telecommunications needs of the spaces are to be defined.
    - Any special disability/accessibility requirements or challenges are to be defined.
    - Any special hazardous material requirements are to be defined.
    - Site access, delivery, and service requirements are to be defined.

Compilation

- Typically, a "bubble diagram" showing the connectivity of spaces shall be illustrated to define room and space arrangements, and their topology.
- The resultant or intended hierarchy of spaces in terms of function or size shall be described.
- Coupled with the topology, "stacking diagrams", or three dimensional or cross sectional diagrammatic drawings shall be created to show the vertical topology and the beginning of a volumetric arrangement organizing the spaces in multi-story buildings.
- Diagrams of special areas shall be included.
- Submit a detailed spreadsheet of spaces with their areas, with provisions for support, circulation, and net/gross area factors indicated.

8.1.4 Basic Engineering Design Data (BEDD)

The BEDD is a project specific document which shall contain meteorological, seismic, existing site condition report, etc. required for the design of the Project. The BEDD shall also be completed within the first three months of the design phase and submitted for Entity's approval. Refer to the Document No. EPM-KE0-TP000013 (Project Basic Engineering Design Data Template), referred to in the MPWB, Volume 6, Chapter 7- General Design Guidelines.

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8.1.5 Design Criteria

Design Criterion provide the technical basis to be used for the design of the project such as selection of codes, material/ equipment/ technology selection, design margins, types of foundations, installation requirements, battery limits, etc. Design Criteria shall be developed by the A/E for each discipline within first three months of the design phase and submitted to the Entity for review/ approval before proceeding with the design. Refer to Document No. EPM-EN0-PL-000001, Technical Standardization Plan for the details on the development of Design Criteria. This plan provides the reference to the Discipline Design Guidelines which define the purpose of its use by the Entity/ A/E.

8.1.6 Appendices, Abbreviations and Definitions (as needed)

8.1.7 Modification, Exemptions, Deviations

Any modifications of, exemptions to, or deviation from the requirements specified by the ENTITY shall be stated here.

As a minimum, the DBR along with Design Criteria shall demonstrate that the A/E has:

- Familiarized themselves with Project site conditions
- Analyzed and defined all functional requirements.
- Analyzed and defined the performance targets.
- Considered the integration of all systems, sub-systems, and components and fully identified and defined all interfaces.
- Identified and mitigated risks and constructability issues related to the design.
- Developed all relevant preliminary design drawings (e.g. general arrangements, location plans, schematics, single line diagrams, etc.).
- Performed and recorded any studies required to support and or validate the design basis.

9.0 SITE DEVELOPMENT FOR BUILDINGS

9.1 Building Site Planning

9.1.1 Introduction

This Section provides the basis for Site Planning for Building Projects. The Guidelines apply to the following features:

1. General Building Site Planning
2. Building Orientation
3. Setback Criteria and Placement of Structures
4. Building Approaches and Entrances
5. Walkways Paving and Pedestrian Safety
6. Site Lighting
7. Services Access Hydronic Cooling
8. Vehicle Access and Parking
9. Loading, Off-Loading, and Delivery Areas
10. Waste Collection Requirements
11. Screening of Waste Utilities and Service Areas
12. Sufficient space to carry out the function provided by the Entity.
13. Sufficient space for the recipients of the service.

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14. Potential future expansion, bearing in mind the anticipated life of the asset.
15. Anticipated working hours for the asset.
16. Availability of utilities at the proposed location.
17. Corporate (Entity) identity or style.
18. Sufficient space allowance for utilities, services, plant-rooms, storerooms and workshops. Information on good practice with respect to allowances for these elements can be found in BSRIA Rules of Thumb

For further detail refer to:

Volume 6, Chapter 2, Definitions and References, Section 2.3 for Abbreviations,
Volume 6, Chapter 7, Design Guidelines, Section 3.2, Guideline - Landscape Architecture Design
Volume 6, Chapter 7, Design Guidelines, Section 3.8, Procedure - Encroachment Permits
Volume 6, Chapter 7, Design Guidelines, Section 3.9, Procedure - Saudi Arabia Archeology Regulations

9.1.2 Planning Guidelines

Site Planning shall strive to provide social, environmental, and economic benefits for each project in keeping with physical site conditions, public expectations, market realities, and environmental constraints. The site organization and planning shall follow the approved Conceptual Masterplan & Development Framework and the Outline Business Case, both developed in the scoping and planning stages. These documents are underpinned with the following project information where all of which shall form the basis of the subsequent development design:

1. Land Acquisition Strategy
2. Environmental Impact Assessment
3. Stakeholder Engagement Plan
4. Permitting Plan
5. Project Delivery Plan
6. Project Cost Estimate
7. Project Schedule.

The Entity, A/E and/or Construction Contractor shall provide accurate Topographical, Hydrological and Geotechnical Surveys and Investigations of the Existing Site Conditions.
A site survey including topographic information, utilities, existing site features and similar detail is a prerequisite to the planning process. This accurate survey is to be carried out to define the boundary of the site and identify existing features within and adjacent to the site. The survey shall be comprehensive and detailed.

The Entity shall also provide legal boundary maps with setout points for digital overlay on the topographical survey to clarify site extents.

Property lines, setbacks, and other physical constraints of the site shall be diagrammed. These include, but are not limited to, adjacent buildings, traffic flow around the site, pedestrian paths, natural features, views, solar orientation and the like. Issues to be considered include, but are not limited to:

1. Setbacks and Placement of Structures, refer to Subsection 2.3
2. Building Approaches and Entrances refer to Subsection. 2.4
3. Walkways, Paving, and Pedestrian Safety, refer to Subsection. 2.5

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The positioning of entrances, the ability of building exits to exit onto a public way or appropriate open space, accessible pedestrian and vehicular traffic flow within the site and connecting beyond, the availability of universally useable open space, the proximity of parking to building entrances all must be coordinated.

Site composition is a paramount issue. The character of the development, its “sense of place”, the organization of buildings, the creation of outdoor spaces by framing and forming it with structures, the reinforcement and treatment of existing axes, edges and boundaries (refer to Subsection 6.7.3.3.D.2), and the creation of new ones, all shall be thoughtfully considered and skillfully addressed to lead to a successful and harmonious development plan. All site improvements including: pavements, garden walls, all constructed elements, and even automatic irrigation systems, shall be designed to maintain their structural, functional, operational and aesthetic integrity for a minimum of 30 years.

The entrance of utilities to the site and the building, including utility meters and security fencing, shall be coordinated to provide functional access and be esthetically located sympathetic to the building design.

9.1.3 Site Drainage

Refer to Volume 6, Chapter 7 for Guidance on the design of storm-water facilities.

9.1.4 Ground Level Drainage

Special attention shall be given to the facility system for site drainage. A positive site drainage system must be coordinated with the adjacent off-site drainage system at points of discharge and interface. The external/off-site system capacity shall be verified.

Ground absorption or percolation areas are not a suitable or acceptable method for managing rain water. A positive rain water drainage system is required where erosion protection shall be provided for all drainage slopes and landscape embankments.

Proposed site grades and landscaping, including future development, shall emphasize the intent to minimize changes to the natural drainage patterns and contours. Any proposed changes to existing grades, swales or existing drainage patterns must be accompanied by a proposed method of handling changes in the direction, quantity, or subsurface loading of water. All such proposals for change must be approved by the ENTITY and by an independent engineering consultant retained by the A/E and/or Construction Contractor. Such engineering consultant shall be approved in advance by the ENTITY.

All buildings shall conform to the typical grading plans provided by the Entity sponsoring the Project. The A/E and/or Construction Contractor shall confirm all finished floor elevations with the Entity sponsoring the Project.

Existing trees and vegetation shall be retained whenever possible. Cuts and fills shall be designed to complement the natural topography of the site. Existing drainage structures shall not be altered or affected in any way. Flow of water shall be directed to existing or proposed drainage structures in such a manner as not to allow run-off onto adjacent property nor allow puddles or ponding in paved areas, channels or swales. Surface runoff is not allowed to drain to the adjacent street or road.

Grades shall be nominally sloped away from building entrances providing drainage away from buildings at 2% for 2m minimum. The overall parking lot shall be generally sloped by a minimum of 0.5% towards the rainwater drainage or collection system elements.
Rain Water Drainage at roofs
When roof drainage is achieved through internally concealed pipes, an additional overflow shall be provided at each roof sump or drain in case concealed pipes are blocked. The overflow shall be located 100 mm above the top surface of the associated roof sump or drain.
Subsurface drainage shall be provided for those areas where it becomes necessary to control perched water or ground water (“water table”) elevations at foundation walls, cut areas, and landscape areas.

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9.1.5 Landscape Scheme

Refer to Volume 6, Chapter 7 for guidance on the details of landscaping and plant irrigation systems.
A detailed landscape plan is required. This scheme shall show the hard landscape layout detailing surface treatments, boundary types, earthwork design and changes of level, proposed levels, artifacts such as walls, steps etc., plant beds and grass areas, services and site furniture. Details shall also be provided as necessary. A complete automatic irrigation system, if required, shall be fully specified and detailed. It shall serve all plantings. The planting schedule shall be coordinated with irrigation water availability volumes and schedule. Landscape design, irrigation system design and planting selection shall consider water conservation techniques.

9.1.6 Open Spaces

Pedestrian open spaces shall be provided consisting of pedestrian courts, yards, plazas, greens, and linear open spaces. Greens shall serve as social congregation areas. Linear open spaces shall consist of pedestrian ways and shall provide linkages between facilities or amenities and potentially serve as recreational assets.

The potential of open spaces for the use and enjoyment of its inhabitants shall be fulfilled by the judicious planning, design, and installation of appropriate landscape materials.

9.1.7 Special Site Features

9.1.7.1 Swimming Pools and Enclosures

All swimming pools and bathing facilities shall conform to local customs, and all applicable Codes and Standards.

Total separation of sexes, both for the swimming and bathing facilities associated with such establishments, is necessary. The design must incorporate facilities to enable users to shower or bath before and after the use of the swimming pools and/or hot tubs.

9.1.7.2 Tennis Courts

Tennis court to be constructed on any lot shall be subject to approval by the Entity sponsoring the Project. Any lighting shall be designed to buffer the surrounding residences from the lighting and must be approved by the Entity sponsoring the Project.

9.1.7.3 Play Equipment Accessory Structures, and Decorative Objects

No basketball-backboard, swing set other fixed game or play structure, platform, dog house, tool shed or structure of a similar kind or nature shall be constructed on any part of a home site except when approved by the Entity sponsoring the Project.
No decorative objects such as sculptures birdbaths fountains, flagpoles, and the like shall be placed or installed on the street side of any lot without approval of the Entity sponsoring the Project.

9.1.7.4 Games and Play Structures

All basketball backboards and any other fixed game structures shall be located at the rear of the dwelling, or on the inside portion of corner lots within the setback lines. No platforms, playhouses, or structures of a similar kind or nature shall be constructed on any part of a lot located in front of the rear line of the residence constructed thereon, and any such structure must have prior approval of the Entity sponsoring the Project.

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9.1.7.5 Play Surfacing Treatments

A key consideration in the design of accessible playground areas is the type of surfacing to use. It is important that play surface materials be suitable for cushioning falls, yet firm and stable enough to provide access for persons of reduced mobility.

Children's play facilities shall be located with shaded areas. The surfaces beneath the equipment shall be sand or other approved material. Natural turf is not sufficiently durable for use beneath play equipment.

9.1.8 Site Plan Content

Ultimately the Site Plan shall be a comprehensive layout drawing or drawings showing the detailed site design and development of all project components. It shall describe the design thoroughly with specific details, from entrance feature design and the selection of materials for walkways to storm water management design and subsurface utility plans. Renderings and final presentation materials may also need to be developed to present the design concept to the Entity sponsoring the Project in the approval process.

Proposed plant species, density and microclimate factor; irrigation efficiency; and use of captured rainwater shall also be included.

9.2 Building Orientation

9.2.1 Site Plan Considerations

9.2.1.1 Solar Orientation

South-facing orientations receive sunlight vertically, so horizontal elements may provide shading. East and west-facing orientations receive horizontal solar rays. West exposures typically have stronger solar gain than east-facing exposures. North-facing orientations typically have the least direct solar gain.

9.2.1.2 Sun Angles

Study the sun angles for proposed designs. Use these in determining basic building orientation, as well as selecting both active and passive shading devices. Sun angles vary by latitude, by season, and by time of day.

9.2.1.3 Solar Path

Solar Path refers to the relative position of the sun during a day at a selected date or during a season. Charts and diagrams are available from various sources to inform this study. The relative position of the sun at various times of day shall be a consideration for both interior and exterior spaces of a building.

Consideration shall be given to the Solar Path at various seasons to understand the effects of light and shading on the development as it relates to the building and site functions and to the selection of landscaping species.

9.2.1.4 Related Sections

Refer to section 3.3.4.2 of his document for guidance on the Design of Shading Systems.
Refer to section 3.5.3 of his document for guidance on Orientation.

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9.3 Setback Criteria and Placement of Structures

9.3.1 Definition

A Setback is a specific line fixed by regulatory action, parallel to the property line at the street right-of-way, abutting property that defines a zone wherein a defined level of improvement may not occur.

9.3.2 Location

Typically, a site has specific setbacks along each property line that are defined by the applicable zoning ordinance. These are set by zoning district. These will consist of front yard setbacks, side yard setbacks, and rear yard setbacks, which may differ dimensionally from one another.

9.3.3 Purpose

The purpose of setbacks is to keep developments from infringing on the use, function, or views of adjacent developments and in some cases to implicitly set density, daylighting, or open space requirements.

9.3.4 Context

Contextual setbacks must also be considered. A contextual setback is an imaginary line determined by the A/E or the reviewing agency intended to align the face of a building or structure with the adjacent building(s) or structure(s) to establish a visual commonality.
Effort shall be made to design structures and the elements to be compatible with their environment and adjoining buildings. Design excellence reinforces and enhances the urban fabric, scale, and coherence of architectural treatments.

9.3.5 References

Refer to section 3.1.1 of his document for guidance on the Height, Mass, and Scale considerations and Volume 6, Chapter 5 for Zoning Regulations.

9.4 Building Approaches and Entrances

9.4.1 Street Access

Refer to Volume 6 Chapter 7 for Roads design criteria for location of entrances to sites from roadways.
Consideration must be given to the location of driveways. The speed of traffic and number of lanes may affect the radius of the curb cut of the driveway based on the expected speed of an entering vehicle. The presence of medians or barriers may restrict turning in and out to one direction. The queuing distance of vehicles at an adjacent intersection may necessitate setting the access point further from the intersection.
The horizontal and vertical location of an entrance drive may typically be affected by sight lines from a vehicle awaiting exiting, based on adjacent topography, obstructions, and anticipated street vehicle speed. Sight line studies are mandatory and consideration must be given to the anticipated turning radii of trucks, delivery and service vehicles. Sidewalks, street crosswalks and on-site pedestrian paths may also affect entrance drive design.

Refer to Volume 6, Chapter 5 for further detail on Universal Accessibility Guidelines which shall be adopted and complied with.

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9.4.2 Entrance Approaches

The requirements of the drive approaches to building entrances vary greatly between building types.

1. Consideration shall be given to the following:
   a. Delivery vehicle needs
   b. Emergency vehicle requirements
   c. Vehicle drop-off for pedestrians
   d. Accessibility
   e. Adjacent parking

9.4.3 Emergency Vehicle Requirements

Emergency access-ways shall be located and designed in an appropriate manner to ensure safe ingress to and egress from facilities.

9.4.4 Landscaping at Entrances

a. Entry drives in vehicular use areas shall be landscaped with approved trees and shrubs in a manner that visually emphasize the areas and offer the driver and pedestrian an attractive appearance from the street.
b. The landscape plan shall identify a visibility triangle at all intersections including parking access aisles and roads. No trees, shrubs or other materials shall be placed where this will impede visibility.

9.4.5 Parking Areas

a. Trees shall be planted in parking areas to provide shade, windbreaks, spatial enclosure and to provide a visual and acoustical buffer of parking areas where possible.
b. All parking areas shall follow the relevant Entity and/or Municipality design guidelines.

9.4.6 Related Sections

Refer to sections 9.7 of his document for guidance on Service and Loading Requirements.

9.5 Walkways, Paving and Pedestrian Safety

9.5.1 Walkways

Walkways are the paths for pedestrian circulation within the site. In addition to shading and planting requirements, refer to Section 6.5.3 for Building Code Requirements, Volume 6, Chapter 5 for Zoning Regulations, and Volume 6, Chapter 5, for details on Universal Accessibility Design Requirements.

9.5.2 Paving

Durability and longevity shall be considered in selecting walkway paving materials. Proper sub-base, control joint spacing, and pavement thicknesses are required. Materials should comply with slip resistance standards and be suitably laid to eliminate trip hazards.

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9.5.3 Pedestrian Safety

Refer to Volume 6, Chapter 5, for details on Universal Accessibility Design for requirements on vehicular and pedestrian accessibility requirements.

1. Vehicular Dangers

   Separation of motorized vehicle and pedestrian circulation shall be incorporated into the landscape development plan. The layout of pedestrian walkways must consider vehicular danger potential. Intersections must be carefully planned and kept clear of visual obstructions for both driver and pedestrian. Analyzing pedestrian site distances to oncoming vehicles is critical to pedestrian safety.

   Guardrails, railings, walls, or other physical barriers or reasonable distances shall be provided at walkways along streets or major thoroughfares with painted or physically defined pedestrian crosswalks at key locations. Tactile warning areas in pavements shall be provided in accordance with accessibility codes and standards.

   The Entity shall develop site wide Life Safety strategies including establishing on-site speed limits, vehicle and pedestrian warning signage, crosswalk signs, pavement markings whilst ensuring all comply with universal accessibility codes and standards highlighted in Volume 6, Chapter 5.

2. Fall Potential

   Sidewalks and patios shall be constructed of textured or sandblasted concrete, brick, interlocking pavers, or stone. The coefficient of friction of a proposed walking surface shall be a factor in its selection, particularly with brick, stone, ceramic, and certain other paver types. Concrete masonry units typically are more slip-resistant than fired clay units.

   All walking surfaces shall have a non-slip finish. Tiled and slab paving shall be solid bedded with fully grouted joints. Colored paving shall only be provided in light-reflective colors, resistant to fading from strong sunlight. Adequate provisions shall be made for expansion and cracking due to temperature and moisture changes in paving materials. The coefficient of friction of a proposed walking surface shall be a factor in its selection.

   Maintenance of walking surfaces is critical to pedestrian safety. Storm water deflection and collection shall be designed to minimize the fall potential due to wet pavement. The possibility of standing water shall be eliminated.

   Shielding from blowing sand shall be provided periodically along longer pedestrian paths. Sun-shading is also a strong consideration.

   Slopes beside walkways shall not exceed 1:20 for the first 500 centimeters. Railings or other guards shall be provided where this may not be achieved.

   Guards and rails shall be provided in accordance with building Codes where walking surfaces are elevated above the grade plane. See SBC 201 2.18.2.3 and SBC 801 2B.6.2.3

9.5.4 Lighting

All outdoor lighting shall be designed to provide sufficient security for all facilities. The system shall, by its design, style, material, color and function, serve as a unifying element of the visual character of the areas developed by the Entity.
Illumination levels shall be within the limits prescribed by applicable code, but must be appropriate for the function to be illuminated, and adequate for security and safety.

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9.6 Site Lighting

9.6.1 Location

Street lighting shall be provided at all intersections of street and access drives. Refer to Volume 6 Chapter 7 for details on Roadway lighting. In addition, lights shall be provided in parking areas, along sidewalks, between buildings, and at loading areas as needed for safety and convenience.

9.6.2 Design

The placement, height, and shielding of light Standards shall provide adequate lighting without hazard to drivers or nuisance to nearby residents. No spillover of light onto adjoining properties is permitted.
Lighting shall not glare to hinder pedestrians or drivers either on or off the site.
Light standard size shall reflect use, use taller street lights in vehicular areas and shorter pedestrian scaled lights along sidewalks, plazas, and building entrances.

9.7 Vehicle Access and Parking

9.7.1 Vehicle Access

1. Location

   Access drives shall enter public streets at safe locations with adequate sight distances, capacity for anticipated traffic and pedestrian flows, and allow sufficient spacing and safety provisions from other intersections and traffic.

2. Design

   Access drives shall consist of a well-defined roadway separate from the parking area and shall not have excessive grades and shall provide a level area at intersections.

   The angle of intersection between the access drive and the public street shall be as close to 90 degrees as possible and the number of access points to a development shall be based on the number of users needing egress at specific times as approved by the Entity.

9.7.2 Services Access

Vehicular access for service vehicles is recommended from a secondary entrance rather than the primary entrance where segregation of service vehicle route from user vehicle circulation shall be done so in a practical manner following all access, traffic and safety considerations.

The service route and loading area shall be designed to accommodate the maneuvering requirements of the largest anticipated vehicles.

9.7.3 Parking

1. Location

   Parking spaces shall be “off-street”, that is located on the same lot as the principal use and shall not be directly accessed from the public street. Entity and/or Municipality requirements shall be adhered to.

2. Design

   Off street parking lots shall be graded, surfaced, drained and suitably maintained. Double loaded parking bays with parking spaces arranged at 90 degrees to the drive aisle is an efficient and preferred arrangement.

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3. Quantity

   The quantity of parking to be provided shall be calculated based on the Entity/Municipality governing standards or requirements based on the number of anticipated users taking into account peak time and overlap between user or shifts. Where parking use times are complementary between adjacent uses, the potential for joint use parking shall be considered to reduce the overall number of spaces.

   Handicap parking spaces shall be provided and be the closest spaces to the building accessible entrance and shall have an accessible path of travel to the building entrance. Refer to Volume 6, Chapter 5 for universal accessibility design details.

   Visitor parking spaces shall be provided in accordance with Volume 6, Chapter 5 for Zoning Regulations.

   All parking requirements shall be in accordance with SBC and relevant ENTITY/Municipality codes and standards.

9.7.4 Landscaping and Buffers

Canopy trees shall be provided in parking medians. Parking lots shall be buffered around the perimeter with suitable landscaping or a fence. See Volume 6, Chapter 7 for Landscape Architecture Design Guidelines.

9.8 Loading and Off-Loading Areas

An off-street loading and unloading space shall be provided and sized to accommodate anticipated loading requirements. The loading area shall be located and/or screened to be hidden from view of the public street and main building entry and shall have direct access to a public street without the use of parking spaces.
All loading spaces shall be independently accessible such that a vehicle may enter or exit without the necessity of moving another vehicle.

Vehicle bollards shall be provided to protect the building, access routes, stairs and loading docks from being blocked or hit by maneuvering service vehicles.

9.9 Waste Collection Requirements

Waste dumpsters and/or enclosed storage for all waste shall be determined by the amount of waste generated as indicated by a specific Waste Management Plan. All dumpsters and waste storage shall be enclosed on all sides with walls, and an operable gate shall be provided for access from waste collection vehicles. Enclosed waste rooms shall be suitably ventilated and cooled.
An off-street waste collection area shall be provided and adequately sized to accommodate dumpsters, stored waste, and enclosure and the maneuvering requirements of collection vehicles. Separate dumpsters or storage areas shall be provided for recycling.

The location, arrangement, and spatial requirements of dumpsters shall be coordinated with the type and loading characteristics of the anticipated collection vehicle.

9.10 Screening of Waste, Utilities and Service Areas

To the greatest extent practical, locate waste, utilities, and service areas out of view of from public streets, building entrances, and pedestrian amenities. Waste, utilities, and service areas shall be screened by vegetation, fencing, and/or grade changes. Maintained existing vegetation may be used to fulfill screening requirements.

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10.0 BUILDING DEVELOPMENT

10.1 General Themes and Concepts

This Section provides general themes and concepts that shall be considered in the design of all projects commissioned by the ENTITY.

10.1.1 Height, Mass and Scale

10.1.1.1 Height

Building height shall be determined with due consideration to the function of the building, activities in the building, aesthetics and economy where height restrictions for buildings as defined in local Codes and Standards shall be strictly adhered to. These restrictions set parameters to avoid blocking the views from nearby buildings and to meet life safety requirements. See SBC 201 & 801 3.3 & 3.4.
It shall be acknowledged that height restrictions are designated in zoning Codes to be contextual – to create harmonious visual environments.
Height restrictions also may be in place to enable light and air to reach the streetscape below, again enhancing the environment.
Setbacks may also be in place to mitigate the 'canyon effect' of streets between tall buildings or to enable green spaces to thrive.
Developments on the edge of zoning districts with different height restrictions shall be designed with sensitivity to the inherent height transition.

10.1.1.2 Mass

The size and shape of a mass is known as the form. The individual forms that comprise a building or occur within a multi-building development shall be designed to complement one another and the overall environment. The massing of a building shall be developed as a harmonious composition of elements and shall take into consideration the massing of the adjacent buildings to create a skyline.
The building mass must work in harmony with the natural environment in terms of site location, density, color, form, function and materials where the form and proportion of buildings shall be consistent or compatible with the scale, form and proportion of existing development in the immediate area.
The rhythm of structural mass and voids, such as windows and glass doors of a front façade shall be related to the rhythms established by adjacent buildings.

10.1.1.3 Scale

Scale is the proportional relationship of a person to their spatial environment. The scale of a design shall result in a comfortable relationship for the user in their environment, and will vary as space, size and activities vary.
The most common scales used in the built environment are monumental and human scales. Monumental scale is used to make a dramatic statement or to be viewed from a distance creating a landmark or point of orientation. Human scale is used to create comfortable spaces for people to live and work in and respond to the physical and emotional needs of the typical man.
Monumental and human scales may be used independently or together in the design of a facility. The application of these different scales is often used to define public versus private areas. For example, monumental scales may be more likely to be used for large buildings, lobbies, and gathering places for larger groups of people or to create more formal settings within public areas or structures; while human scale is more likely to be created in spaces designed for smaller groups of people or more private places. Sometimes buildings of more monumental overall stature may be made up of spaces and volumes of moderate or human scale that serve the needs of the users while creating a more monumental overall structure.
A third type of scale is the automotive scale. This scale relates to the perception of form and space due to potential speed of movement. At higher speeds, human perception of form, space and detail diminishes.

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Building designed to be viewed at automotive scale may have simpler features or may be more iconic to give recognition at a glance. Streetscapes need to consider automotive scale at closer proximity. The character of the lowest levels of structures may require more detail to enhance the quality of the transportation experience. Building entrances and parking locations must be identifiable physically as well as by signage. To promote universal accessibility, encourage sense of place and following Urban Design principles, new developments shall emphasize the Human scale. Slowing down streetscapes to a pedestrian speed will encourage public activity and engagement thus creating spaces with life and vitality.

10.1.2 Architectural Context

10.1.2.1 Cultural Considerations

All facilities shall be designed keeping in mind the Saudi Arabian heritage and culture. Architectural aesthetics and layout shall reflect Saudi needs and values using both traditional and modern designs, motifs and influences. Local materials and products shall be utilized to the greatest extent possible.
The overall facility shall be sensitive to and reflect the local culture.

Architectural design shall be respectful and relate to the building location and surroundings using appropriate color, materials, and detailing. Overall architecture shall enhance the environment by honoring and preserving significant architectural, historical, cultural, and community themes which bring consistency.
Architectural design shall result from the successful blending of local culture, function, environment, economy, durability, operation and maintenance and location.

10.1.2.2 City and Community Context

Architectural design is the creation of the physical language that becomes part of a city or community identity. New construction will inevitably be set in an environment of other structures, circulation, and spaces. It will both respond to and affect the environment where it is constructed. Consideration must be given by the A/E and/or Construction Contractor to both the response and effect of any proposed design on its environment. These existing structures will have varying characteristics to which the new design must be sensitive. One of the characteristics of this environment is the architectural context.
The role of the A/E and/or Construction Contractor is to work thoughtfully to incorporate new designs into the unique local character using the best qualities of the regional and cultural forms found in this region.
The overall context is comprised of many things, including its character or “sense of place”; the cultural context of the locale; architectural features of adjacent structures; the contextual history of the site area; circulation routes; building massing and alignments; and the specific aesthetics of adjacent structures such as forms and spaces, materials and colors, and scale.

1. Character and “sense of place”: Is the character industrial, high-tech, picturesque, or urban? “Sense of place” is its identity as an area or neighborhood with identifiable differentiating characteristics.
2. “The cultural context”: of the locale relates to historic precedents and the related architectural forms and features with which people culturally or religiously identify.
3. “Contextual history”: The built environment is constantly changing and growing through various transformations whether rapid or prolonged. Existing cities and communities have unique cultures and pasts called “contextual history”. Future designs of buildings and spaces weave their way into this context and become a part of the whole.
4. “Circulation routes”: must not be overlooked as key components of context, since the enhancement or alteration of pedestrian or vehicular circulation may drastically affect the way spaces are used and how access is facilitated.
5. “Adjacent building massing and alignments”: may also create context which a proposed development shall respond to by aligning the new forms with existing, picking up horizontal lines, or otherwise placing the new forms and surfaces in a composition with the adjacent existing structures.

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6. “The aesthetics of adjacent structures”: forms, spaces, materials, colors, and scale - are discussed elsewhere, but they contribute significantly to the context of a new structure and a new structure’s relationship to the aesthetic characteristics of its neighbors must enhance and not detract visually from the common good.
7. “Regional motifs”: are recognizable combinations of forms, surface textures, colors, and patterns that are indigenous to the locale. These shall be analyzed and studied to be responsive in the new design which now will contribute to the regional motif.

Every building design must consider its context to create an environment that will enrich the lives of the people and respond to the vision, history, beliefs, and identity of a place and time.
In the somewhat unique situation of the creation of a new city, community or development, the A/E must identify the context from which to draw the style and culture to base design upon. The A/E must work with the Entity to identify the contextual model that the new development is to become, creating and framework and masterplan to guide the project to realization.
The A/E and/or Construction Contractor shall continue to identify, respond to, and protect the region’s historically significant resources by complying with the provisions set forth. This agreement establishes the Standards and guidelines for site work and alterations within the historic district, including both the interior and exterior renovation/rehabilitation of the properties identified in the memorandum and any major projects affecting these structures. The A/E shall also utilize the Entity sponsoring the Project Construction Standards to help address energy conservation requirements and current code Standards. See SBC 601.

Refer to Volume 6, Chapter 7 for Guidelines on Land Use Compatibility.
Refer to Volume 6, Chapter 5 for guidance on Coordination with Region and/or Municipal Master Plan.

10.2 Life Safety Requirements

10.2.1 Public Facilities

All public facilities shall comply with Civil Defense and all Life Safety Requirements adopted by the ENTITY. Refer to Volume 6, Chapter 5, Codes, Standards and References.

10.2.2 Significant Aspects of the Applicable Life Safety Codes and Standards

Some significant aspects of the applicable Life Safety Codes and Standards relative to ENTITY Expro White Book are discussed below. However, at a minimum all applicable provisions of the Codes adopted by the ENTITY are to be followed.

10.2.2.1 Saudi Building Code

The Saudi Building Code covers numerous aspects of design and construction, all of which shall be considered applicable and mandatory to all projects to be constructed in the Kingdom of Saudi Arabia. Specific topics include but are not limited to the following:

1. Architectural, Structural, Mechanical, Electrical, Energy Conservation, Sanitary, and Fire Protection
2. Building design restrictions based on Height and Area
3. Use/Occupancy and Construction Type as generators of Fire Resistance rating requirements
4. Requirements for high-rise buildings
5. Fire Protection/sprinkler system requirements.
6. Means of Egress design and capacity
7. Accessibility
8. Emergency Planning and Preparedness

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9. Fire Service Features
10. Fire Safety During Construction and Demolition
11. Design Criteria for Aviation Facilities
12. Requirements for Various Types of Industrial and Fabrication Facilities
13. Requirements for Tents, Canopies and Other Membrane Structures
14. Requirements for buildings containing Hazardous Materials and Aerosols; Combustible, Flammable and Toxic Materials; and other Industrial Substances
15. Fire Apparatus Access Roads; Fire Hydrant Locations and Distribution; Fire-Flow Requirements for Buildings
16. Standards of the Saudi Arabian Standards Organization (SASO) apply as cited in the Saudi Building Code.

10.2.2.2 International Codes

1. International Building Code (IBC)
    a. IBC deals with multiple topics of special interest, including:
    b. Building design restrictions based on Height and Area
    c. Use/Occupancy and Construction Type as generators or Fire Resistance rating requirements
    d. Requirements for high-rise buildings
    e. Fire Protection/sprinkler system requirements
    f. Means of egress design and capacity
    g. Accessibility
    h. Energy efficiency requirements
    i. Exterior wall and roof assemblies
    j. Structural Design and Testing; Soils and Foundations
    k. Design with steel, masonry, and other materials
    l. Mechanical, Electrical and Plumbing systems
    m. Additionally, the Sections on Fire Districts, Safeguards during Construction, and Encroachments into the Public Way may have special applicability.

2. International Mechanical Code
    a. Governs heating, ventilating, and air conditioning requirements
    b. International Plumbing Code
    c. Governs plumbing system design
    d. Attention is to be paid to the following:
    e. Plumbing Fixture Count Calculations which may be modified by Saudi and local law.
    f. Certain fixture types and privacy features
    g. International Code Council (ICC) Energy Conservation Code
    h. ICC Electric Code
    i. ICC Fuel Gas Code
    j. ICC Fire Code
    k. ICC Green Construction Code
    l. National Fire Alarm and Signaling Code (NFPA 72)

3. National Fire Protection Association (NFPA), National Fire Codes

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a. There are numerous NFPA Codes covering a variety of applicable topics. Many of these are cited by direct reference in the IBC or other primary Codes in effect. Some significant aspects of these relative to the ENTITY are discussed below. However, all applicable provisions of the most current versions of the Standards that are in effect are to be followed.
b. The Life Safety Code Handbook and NFPA 101
c. Sections deal with specific requirements based on Occupancy Classification. The Section on Hazardous Contents is to be applied to industrial, laboratory, and storage of certain materials.
d. Means of Egress including additional requirements on travel distance to exits, emergency lighting, and Special Provisions for Occupancies with High Hazard Contents.
e. Smoke barriers and compartmentation, fire barriers and opening protectives.
f. Special provisions by occupancy type, including high-rise buildings, assembly occupancies, childcare and healthcare facilities, dorms and apartments, business and mercantile facilities, and industrial and storage facilities.

4. NFPA 5000 – Building Construction and Safety Code, includes additional coverage of many of the issues above, plus the following among others:

a. Special structures such as membrane structures; tents; awnings and canopies; pools and spas; towers; high-rise buildings; spires and other tall structures; heliports.
b. Underground structures; open-air facilities including processing facilities; and structures surrounded by water.
c. Quality assurance during construction
d. Structural requirements for various materials and building systems.
e. Interior environment and energy efficiency
f. MEP and Fire Protection
g. Enhanced Fire Compartment Requirements based on construction type.

5. ASTM International
   a. ASTM International was formerly known as the American Society for Testing and Materials (ASTM).
   b. ASTM designations relate to numerous testing that materials and systems must pass to qualify as acceptable in the IBC family of Codes and other applicable Codes. Compliance with specific ASTM tests as cited in the applicable Codes imposes those requirements. The detail of the requirements may be accessed in the referenced ASTM Standard.

6. American National Standards Institute (ANSI)
   a. ANSI Standards cited in the applicable Codes are imposed on the development in a similar way to the ASTM Standards noted above.
   b. Of interest, shall be ANSI A117.1 Accessibility Standards, and ANSI A17.1 Elevator Standards.

7. International Association of Plumbing and Mechanical Officials (IAPMO)

   IAPMO requirements may be accessed at www.iapmo.org. These include:

   a. Product evaluations, Standards and testing
   b. IAPMO Green, including the Green Plumbing Institute. The Uniform Plumbing Code (UPC) mandates water efficient plumbing fixtures and fittings.
   c. The Backflow Prevention Institute
   d. Uniform Swimming Pool, Spa, and Hot Tub Code (USPSHTC)

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e. Uniform Solar Energy & Hydronics Code (USEHC)
f. IAPMO Uniform Solar Energy Code

10.2.2.3 Code Requirements

Code requirements are achieved by showing compliance in the following 16 areas. For each area of compliance provide source of guideline. For example, under Classification of Occupancy and Hazard a Business Group B the source is SBC 2007 Section 201 2.4.

10.2.2.4 Applicable Master Plan, Zoning and\or District Guidelines

1. Identify the applicable Master Plan
2. List any zoning / district guidelines
3. List any special guidelines such as mosque, fuel stations, etc.
4. List any special site provisions such as variances, easements, LAR's.

10.2.2.5 Site Development Regulations

For each regulation identify the code allowable/required and the proposed.

1. Lot coverage
2. Density / FAR (Floor Area Ratio)
3. Structure height
4. Setbacks at front, side, and rear.
5. Landscaping (ground cover, trees, etc.)
6. Open space
7. Parking
8. Accessible parking

10.2.2.6 Classification of Occupancy and Hazard

Identify the primary occupancy of the building and secondary occupancies for spaces within the building per floor

10.2.2.7 Type of Construction

1. Construction Classification
   a. Type of construction
   b. Material combustibility
2. Fire resistance rating requirements for building elements
   a. Structural frame
   b. Bearing Walls- exterior
   c. Interior
   d. Partitions Exterior
   e. Floor construction
   f. Roof construction
   g. Wall separating occupancies
3. Required separation of occupancies

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10.2.2.8 Building Heights and Areas - provide per floor

1. Construction type
2. Allowable height
3. Allowable area
4. Allowable increases
5. Total height and stories allowed
6. Proposed height and number of stories
7. Proposed area

10.2.2.9 Fire and Smoke Protection Requirements and Measures

1. Fire suppression system
   a. Occupancy
   b. Fire area (sq. meters)
   c. Fire suppression system (e.g. sprinkler, fire extinguisher)
   d. Code reference
2. Fire separation

   For each exterior elevation (e.g. North, East, South, West)

10.2.2.10 Interior Finish Requirements

1. Floor or space in building
2. Occupancy classification
3. Sprinklers Y/N (yes or no)
4. Finish class required. Also, provide a table showing what each class requires for flame spread and smoke developed.

10.2.2.11 Exits and Egress Requirements – for each space and per floor

1. Floor, Area/Space
2. No. of Occupants
3. No. Exit Doors Required
4. No. Exit Doors provided
5. Egress Width per Occupant
6. Total Width Required
7. Total Width Provided

10.2.2.12 Stair Number and Width Calculations

1. List each stair by room number
2. No occupants served
3. No. stairway required
4. No. stairways provided
5. Width per occupant requirement
6. Total width required
7. Minimum code width per each stairway required

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8. Total width provided

10.2.2.13 Exit Access Design

1. Maximum Travel Distance
2. Maximum Dead End
3. Maximum Common Path of Egress per occupancy classification

10.2.2.14 Specific Occupancy Egress Requirements

Assembly occupancies have additional requirements related to Travel Distance, Common Path of Egress Travel, and Aisle Width.

10.2.2.15 Area of Refuge Calculation

Refer to Volume 6, Chapter 5, Codes, Standards and References All developments shall be in compliance with SBC and Civil Defense codes and standards.

10.2.2.16 Occupant Load Calculation

1. Floor level
2. Area or space
3. Occupancy classification
4. Proposed area
5. Occupant load factor
6. Total occupant load

10.2.2.17 Sound Isolation Requirements

See section 3.6, Acoustic Design Requirements.

10.2.2.18 Energy Efficiency - Building Envelope Summary

1. Glazing area % of floor
2. Building element (e.g. roof, wall, mass wall, wall below-grade, floor, etc.)
3. Assembly maximum U-value
4. Insulation minimum R-Value
5. Proposed Assembly
6. Assembly R-value or U-value
7. Air-tightness

Note: U and R values are to be based on the Saudi Building Code Requirement

10.2.2.19 Plumbing Fixture Requirement

1. Floor
2. Occupancy group
3. No. Occupants
4. Water closets required
5. Water closets required
6. Lavatories required

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7. Lavatories provided
8. Showers required
9. Showers provided
10. Drinking fountain required
11. Drinking fountain provided
12. Other (e.g. service sink)

10.3 Architectural Concept and Consistency

10.3.1 General

After the architectural context is defined, the architectural design shall be used to create harmony within the context using textures, forms, colors, shadow lines and both complimentary and contrasting shapes to meld the new design into the existing locale.
All permanent facilities, buildings, components and systems shall be designed to keep their structural, operational, aesthetic, and contextual integrity for a minimum of 30 years.
Effort shall be made to design structures and elements thereof to be compatible with their environment and adjoining buildings. Design excellence reinforces and enhances the urban fabric, scale, and coherence of architectural treatments.
Monotony of design in single or multiple building projects shall be avoided.
Variation of detail, form and siting shall be used to provide visual interest.
Architectural materials shall be of high caliber. Material and color selection shall create a harmonious composition. While visual variety and interest is encouraged, the A/E shall be judicious in the number of types of materials, textures, finishes, and colors used.

10.3.2 Design Considerations

10.3.2.1 Activity

The design shall provide a physical development that encourages and enhances the importance of movement and fosters an interest using urban spaces.
Internal activity is encouraged by creating interest through attractive detailing and the provision of a spatially comfortable environment.
External activity shall be fostered with adequate consideration of the solar environment. Spaces with specific purposes and features designed to encourage social interaction and use of outdoor space are encouraged. Daytime shading and nighttime lighting are encouraged to promote usability.

10.3.2.2 Community

The design shall provide development that produces a sense of pride and commitment to the awareness of quality of life issues.
The design shall create opportunities that invite public use, except where inappropriate, and sharing of spaces within a complex of structure to encourage personal interaction.
The design shall visually “be a good neighbor” to surrounding developments by favorable juxtaposition of its design components to its neighbors.
Refer to Section Volume 6, Chapter 5 for Coordination with Region and/or Municipal Master Plan

10.3.2.3 Harmony

The design shall assure that the proposed design is compatible with existing development and the natural environment in terms of site location, mass, density, color, form, function and materials.

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10.3.2.4 Livability

The design shall provide an environment that is sensitive to natural elements such as topography, vegetation, light, water and views.
The design shall have features that enhance the quality of life for the users.

10.3.2.5 Maintenance

The design shall promote ease of maintenance, operation, and management.
This entails choosing materials and surfaces that have low replacement or refinishing requirements, that weather well, and utilization of forms that allow ease of access to maintainable areas of components.
Design to deliver low maintenance/vandal-resistant interior finishes and building systems that are commonly available for necessary replacement. Base the design of mechanical, electrical and plumbing systems on simple, reliable components.

Provisions for window cleaning are highly recommended and may be required for taller buildings at conditions that make accessing windows for cleaning unsafe, or at the discretion of the Entity.

10.3.2.6 Security

The design shall provide an environment that is safe and secure.
Refer to Subsection 6.7.3.3.F.9 for specific considerations.

10.3.2.7 View

The design shall provide physical development that frames and enhances desirable vistas and screens undesirable vistas.

10.3.3 Design Principles

The visual inventory and analysis requires an understanding of basic design principles. The primary principles, described in more detail in section 3.4, are:

1. Scale

   The proportional relationship of a person to their spatial environment. The scale shall result in a comfortable relationship for the user and will vary as space, size and activities vary.

2. Form

   The size and shape of mass. Individual forms shall be designed to complement one another and the environment.

3. Function
   a. Function is the use of a space or area. Function is gaged by the degree to which the space works in its intended purpose.
   b. Aspects of design that facilitate function are the size and shape of the volume of space for each activity; amenities and features within the space; appropriate connection to other spaces of related function; access to and from the space; and appropriate degree of light and air.

4. Color

   All elements of the visual environment have color. The use and arrangement of colors greatly determine the visual impact of all elements.

5. Texture
   a. All elements of the visual environment have texture. The use and blending of textures greatly impact the visual environment.
   b. Unity

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c. All elements of the visual environment shall blend to complement one another. Repetition of scale, form, color and texture results in a unified visual impression and a sense of composition to the design.

6. Framing

   Positioning architectural elements in such a way as to direct attention to views of other elements, spaces or vistas is referred to as “framing”. All views typically include a ground plane, side planes, and overhead plane. These are the primary tools to employ. The relationship of planes changes as the individual moves through the environment, which may create opportunities to enhance the user’s experience of the architecture.

7. Axis

   An axis is a linear progression of space connecting two or more dominant features. It has a definite planning function in creating connectivity and organizing architectural elements, but shall also have an experiential characteristic to persons moving along it or having their views drawn by it.

8. Terminus

   A terminus is the end of an axis and is typically defined by a dominant feature such as a building.

9. Balance

   Visual elements are composed to be symmetrical or asymmetrical. In either case, visual elements shall be sized and located to provide visual balance.

10. Economic Issues

    The facility shall be sensitive to the cost of materials, building layout, and operations and maintenance of building systems, yet not jeopardize aesthetics, function and environmental impact.

11. Durability

    The facility shall be constructed for a 30-year life or as stated by ENTITY. All materials and systems shall be cost effective and resource efficient.

12. Energy Efficiency

    All buildings shall be designed and constructed to maximize energy efficiency throughout the life cycle of the development. From an early stage the client’s sustainability goals shall particularly identify the aspirations and the strategy to achieve such goals technically and operationally. Refer to SBC to relevant codes and standard to be applied at minimum.

10.3.4 Aesthetic Requirements of Visual Elements

Basic design principles are utilized to define visual elements and assess their character. The assessment and classification of visual elements follows basic design principles describing “good” and “not so good” design. Their assessment becomes the design criteria used to determine the visual character of the installation. Visual inventory and analysis rely on an understanding of the installation’s visual elements, and an understanding of the principles of design. The visual elements for principles of design are described in the following paragraphs.

Proposed designs are encouraged to find ways to create Visual Elements to enhance the urban character and create visual interest and dynamic character.
Design is more than the sum of the parts. It is acknowledged that it is possible to create “not so good” designs with “good” materials and individual features juxtaposed in awkward or unsightly ways, and it is sometimes possible to create “good” design compositions with an array of lesser elements. However, the following visual elements are to be considered.

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10.3.4.1 Visual Elements

Visual elements of a city or development include a myriad of physical and environmental impacts. These elements include man-made and natural features and their inter-relationship. The visual inventory shall include review and assessment of the following elements of the installation.

1. Natural Characteristics

   Includes the regional and site characteristics that have been preserved and enhanced. These include topography, natural or man-made watercourses, and adjacent natural or man-made landscape features.

2. Edges and Boundaries

   Linear elements such as walls, fences, or a tree line create separation of use and activities. Streets, rail lines, transit corridors, edges of adjacent developments, and natural characteristics are other typical elements that form edges and boundaries.

3. Buildings and Structures

   Typically, the most dominant features of a city or development installation. Their location and design characteristics determine the primary visual image.

4. Materials
   a. The A/E shall implement existing provisions of the Entity sponsoring the Project Construction Standards which address the selection of materials based upon location, quality, energy efficiency, life cycle costs, and safety statements.
   b. Material selection is primarily done for visual reasons. Therefore, the appropriateness of materials is paramount. Color, texture, pattern, and reflectivity must be considered. The site context may suggest, dictate or negate certain choices.
   c. Effort shall be made to design structures and elements thereof to be compatible with their environment and adjoining buildings. Design excellence reinforces and enhances the urban fabric, scale, and coherence of architectural treatments.
   d. A sense of uniformity and standardization of materials, equipment, hardware and finishes is desirable.
   e. Material selection shall enhance the overall composition of the building or complex. Consistency through the application of certain materials in certain ways is desirable.
   f. Material selection shall minimize service and maintenance.
   g. Materials shall be environmentally sound, in other words have sustainable attributes such as recycled material content, low volatile organic compound (VOC) content, and non-hazardous characteristics when returned to the environment.
5. Exterior Lighting
   a. Exterior site lighting must conform to applicable Codes and ordinances in terms of “lux” levels, light pole heights, and cut-off at the property lines.
   b. Comply with all light pollution laws, ordinances, and decrees.
   c. Building up-lighting may be in color or white, and must be designed in keeping with the building composition.
   d. Beacons, lasers, and other similar light types are to be specifically agreed with the Entity.
6. Nodes
   a. Centers of activity that attract people daily.
   b. Nodes may be physical elements, functional foci, or both.
   c. Nodes tend to be concise elements or points in the urban fabric such as a traffic circle, plaza, or tower.
   d. They may be the focus of elements or activities directed toward them, or the origin of elements or activities radiating out from them.

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e. A node as a physical element may be a tower or landmark structure that stands out amidst its context.

f. A node may also be a “void” such as a traffic circle, green area or depression in the urban fabric.

g. Nodes are typically reinforced by axes or radiating elements such as boulevards or linear structures of some kind.

7. Landmarks
   a. Visually or historically prominent features such as towers, statues or buildings that provide identity and orientation of place.
   b. Landmarks are universally recognizable buildings or features whose status is based on monumentality, prominent function, physical character, or other significant attributes.
   c. Special care must be taken in the design of landmarks to create the appropriate character and scale.
   d. Acknowledgment of existing landmarks shall be displayed by site and building designs that enhance and do not diminish or conflict with their stature.
8. Entrances and Gates
   a. Provide the first and last impression of the facility. These may also be elements that consciously or subtly form gateways.
   b. An “Entrance” is the sense of visual passage through an element such as a group of buildings or into an area. It implies that upon “entering”, a place of recognizable character is entered.
   c. Gates or gateways tend to imply the penetration of a boundary or edge which may lead to access for a larger zone or sense of existing one. Again, it implies that upon “entering”, a place of recognizable character is entered.
9. Circulation System
   a. Vehicular includes streets, service roads, mass transit lines, parking lots, and driveways. Delivery areas utilize a large amount of space and create significant visual impact that needs to be screened.
   b. Pedestrian includes sidewalks, walking pathways and bicycle paths.
   c. Circulation elements shall be designed with architectural character to enhance the experience of movement, and shall not just be a means to an end to get from place to place.
   d. Lining vehicular circulation with attractive and reinforcing features is encouraged.
   e. Coupling vehicular and pedestrian circulation must be done with care from a safety standpoint but the visual strength gained from this mutual reinforcement is to be encouraged.
   f. Pedestrian circulation as a visual element shall be enhanced with detail that enriches the experience. Variety in spaces along circulation, paths, framed views and vistas, places to stop and rest or gain shade or shelter, features such as water, bridges.
   g. Refer also to Volume 6, Chapter 5 for Universal Accessibility Guidelines.
10. Trees and Other Vegetation
    a. Trees and other vegetation frame views provide visual screens; provide shade, color, and interest in the environment.
    b. These may also be used to create rest stops and add interest to the circulation experience.
11. Street Trees
    a. Street trees soften, complement, and define the road hierarchy, and improve the overall visual quality of the installation.
    b. The biological needs to facilitate growth of the street trees are light, access to water, adequate growth material, all of which must be designed to enable longevity.
12. Views and Vistas
    a. Scenic and attractive views and vistas shall be enhanced. Unattractive views shall be screened.
    b. Views may be toward natural or man-made features, or both.

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c. Both natural vegetation and man-made walls, edges or other architectural elements may be used to frame the views and vistas.

13. Open Spaces

a. Open space areas create visual impact and serve to separate or join adjacent uses according to how they are designed.

b. The character of open spaces is critical to be consciously created.

Plazas are more open and are generally devoid of internal barriers. This enables larger gatherings to take place there or large numbers of people to traverse through them. Plazas typically have a character of monumentality to them.

Courtyards are smaller spaces designed for fewer people. These may be “way stations” for respite, zones designed for contemplation, or simply pleasant smaller spaces.

Open spaces may be bounded on two or more sides with the other direction(s) opening to greater vistas and views

14. Signage

a. A coordinated installation signage plan, addressing both exterior and interior signage, shall be developed to facilitate circulation and provide useful information.

b. Appropriate directional, safety and identity signs shall be provided in all public and industrial facilities.

c. The A/E and/or Construction Contractor shall follow ENTITY standards for Exterior Signage, and Interior Signage to address the needs of both exterior and interior signage respectively. The ENTITY’s existing design review process policy shall continue to be utilized to facilitate the coordination of exterior and interior graphics.

d. All signs require approval from the ENTITY as to size, material, graphics and color. Normally, signs will not be permitted except for identification signs showing the name and the address of the owner or occupant of the unit.

e. Signs shall be clearly visible, contrasting with their immediate environment and generally follow established international principles.

f. Signs may be both graphic and written, provided graphic signs are clearly identifiable, simple and stylized.

g. Arabic is the official language for all public signs and instructions such as traffic signs, warning signs, and street signs. Written signage shall firstly be in the Arabic language, followed by the English language. The use of any other language shall be approved by the ENTITY prior to implementation. The Arabic shall always be to the right or above the English. The Arabic lettering shall be 1.5 times as high as the English and the style of Arabic lettering for all signs shall be in "NASKH" characters. When appropriate the use of graphics shall be maximized. See the "Planning Manual" of the ENTITY for other details.

h. Internally lit building identification signs such as corporate logos or names must be mounted in the top 10% of the height of the building. The size of such signs is subject also to applicable Codes and ordinances.

i. Refer also to Volume 6, Chapter 7, Design Guidelines for information regarding Street and Roadway Signage.

j. Refer to Volume 6, Chapter 5 for Zoning Requirements for Signage.

k. For high way sign structures, please refer to Volume 6, Chapter 7, Design Guidelines.

l. All signage shall follow the ENTITY and Authority guidelines and requirements. Al relevant approvals must be obtained for both content and structure.

15. Utility Corridors

a. Utilities shall be in corridors.

Utility corridors are comprised of land designated for the installation of utility infrastructure that serves one or more buildings. These “corridors” are typically strips of land that may be so designated for common use.

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b. Utility corridors shall NOT become visual elements in the landscape or streetscape.
   Unsightly above ground utilities shall be minimized.
c. Where it does not inhibit use, tapping, or access, utility corridors may sometimes be overlaid with pedestrian or vehicular circulation elements, landscaping, or elements forming axes which happen to have a utility corridor alongside or within them.

10.3.5 Building Style and Elevations

Each architectural design shall be considered on an individual basis with specific emphasis on impact and harmony with surrounding buildings and styles. Elevations that are similar in appearance are prohibited on adjacent lots. Notwithstanding the above, similar elevations in the same parcel section will be limited to a maximum of three.

Elevation approval shall consist of a review of front, side, and rear elevations. All elevation treatments shall follow the common architectural design theme of the local buildings as closely as possible.

10.3.5.1 Design Uniformity

Architectural treatments (e.g., building materials, colors, facade design, roof lines, and screening) shall be consistent and compatible on all sides, i.e. there shall be no side or portion of the building treated as the “back”. Treatment that is uniform on all sides will be deemed to meet the requirements of these principles and criteria.

Adjacent land uses, visibility from public streets, and use of screening devices (walls, fences, berms, landscaping) are criteria to be considered when varying the treatment on different facades. The A/E and/or Construction Contractors will have the burden of demonstrating the reasons for differing treatment on different sides (for example, the need for automobile access on one side and pedestrian access on another).

10.3.5.2 Designing Shading Systems

Sun shading is a critical element in building design. However explicit consideration need be given based on the building function, design and solar orientation.

1. South-facing orientations receive sunlight vertically, so horizontal elements such as fixed overhangs on south-facing glass shall be used to control direct solar radiation.
2. East and west-facing orientations receive horizontal solar rays. Therefore, it is advisable to limit the amount of east and west-facing glass since it is harder to shade than south-facing glass. Vertical building elements or site features such as the use of landscaping may be used to shade east and west exposures. West exposures typically have stronger solar gain than east-facing exposures.
3. North-facing glass may be used for natural daylighting since this orientation receives much less direct solar gain.
4. Consider ways to shade the roof even if there are no skylights since the roof is a major source of transmitted solar gain into the building.
5. Study the sun angles for proposed designs. Use these in determining basic building orientation, as well as selecting shading devices, photovoltaic panels, or solar collectors.

For shading systems for most buildings in this solar environment, the following design recommendations generally hold true:

- Light shelves bounce natural light deeply into a room through high windows while shading lower windows.
- Indirect radiation shall be controlled by other measures, such as the choice of glass.
- Do not expect interior window shading devices such as blinds or vertical louvers to reduce cooling loads since the solar gain has already been admitted into the space.

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- Interior window shading devices do offer glare control and may contribute to visual acuity and visual comfort.
- Consider operable of electronically controlled shading devices where feasible.

10.3.6 Color

10.3.6.1 General Requirements

Colors used on the project shall be in accordance with the overall project scheme and the local context and shall be subject to project approval prior to use on the project. Color schemes developed as part of systems for the protection of health, safety and welfare shall be coordinated with the overall color scheme to maintain project continuity and maximum aesthetic impact.
The guidelines for the color and texture of new and renovated or expanded facilities have been established to provide continuity between the new and existing facilities. In addition to providing aesthetic harmony in the appearance, this approach allows more cost-efficient maintenance of all facilities.

10.3.6.2 Fair-Face Concrete Color Finish

Natural gray color finish for the Fair-Face concrete shall not be used for exterior facades of buildings. Some examples of systems, which may be considered, are as follows:

1. Use of low-volatile organic compound (VOC) Spray Paint.
2. Use of white cement per ASTM C150, Type V.
3. Use of color pigments like titanium dioxide, zirconium orthosilicate, cobalt oxide, etc.
4. Combination of white cement and color pigments like natural yellow iron oxides, nickel titanate yellow, natural brown iron oxides, etc.
5. Plaster in colors other than gray.

A/E and/or Construction Contractors shall submit their proposed system for the ENTITY approval.

10.4 Human Scale

10.4.1 Scale

The proportional relationship of a person to their spatial environment. The scale shall result in a comfortable relationship of the user and will vary as space, size and activities vary. Multiple scales may coexist together creating drama and harmony at the same time. These scales which all have a place in the built environment include: monumental scale, human scale and micro scale.
Typically, monumental scale is for public spaces, human scale is for private people spaces and micro scale is for fine details of parts and pieces.

10.4.2 Human Scale

Human scale is designed to enable personal physical interaction with the built environment based on physical dimensions of one's surroundings. It may be the creation of "personal space" which implies a sense of ownership, an intimately sized environment that implies a sense of shelter, or simply a space whose elements are proportionate to the human body.

What differentiates human scale from monumental or micro scales is the detail in building components. Human scale components fit the human hand, foot, stride, reach, visual acuity and mental comprehension. Human scale creates places for people.

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Building components scaled to the human physical capabilities include stairs, ramps, railings, doors, seating, work surfaces, finish patterns, ceiling heights, building component modules, distances, heights, mass and many other features that fit the human eye and perception of comfort and ease.

Human scale may exist in the entirety of a building such as a single-family residence, or as a component of a larger monumental structure such as an office building, apartment building or a shopping mall.

Human scale is also a sensory quality that reflects comfort in the built environment such as: acoustic comfort, pleasing sightlines, lighting levels that deliver visual and temperature comfort, finishes that are pleasing to the touch and to the eye and spatial qualities that put the mind in a safe and comfortable state.

10.5 Building Entrances

10.5.1 Natural Access Control

The normal users of the space shall be made to feel welcome and secure, while discouraging the entry of undesirable users. Access to the site, parking areas and accompanying structures shall be well defined and incorporate a celebration of a sense of arrival.

The main entrance to a site, parking area or structure shall be sufficiently sized to accommodate the normally expected ingress and egress demands. Supplemental entry and exit ways shall be securable or can be closed off.

All buildings shall have a minimum of two entrance/exit points.

10.5.2 Entry Signage

Signage size, type, and lighting must conform to applicable Codes and ordinances.
Identity signs for public buildings shall be located at eye level on the entrance door or on the wall adjacent to it, or as required by accessibility requirements.

Accessible signage shall meet applicable code requirements for braille, pictorial icons, and graphics. See Volume 6, Chapter 5 for Accessible Design Guidelines.

Signage and natural barriers shall inform normal users of the space of appropriate directions and the rules pertaining to the areas, while eliminating excuses for the abnormal user's unacceptable behavior.
Flashing, animated, and electronic signs with moving graphics, and motionless digital flat-screen signs, require special approval.

10.5.3 Orientation

Whenever possible, passive strategies, such as utilizing shade to minimize heat gain, radiation and glare or positioning a building entrance to take advantage of existing topography or opportunities for natural ventilation afforded by prevailing winds, shall be accommodated into the design of all facilities.

Structures shall be oriented to take advantage of such conditions, and excessively glazed surfaces, particularly when un-shaded or directly facing toward the sun, shall be avoided.

Seasonal wind rises, showing a predominance of west-north-west to north-northwest winds both in frequency and velocities as referred to in the Environmental Chapter shall also be consulted when orienting facility entrances.

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Properly designed exterior sun control devices for entry vestibules and other openings are strongly encouraged. A study of their optimum shape in relation to the sun, as well as their initial economic impact, and maintenance costs as related to HVAC equipment and operation costs, shall be made. Such devices shall have low heat absorptive qualities and minimal contact with the building surfaces to which they are attached.

10.5.4 Design

A building entrance provides the first impression and the last impression of the building, the operations taking place in the building and the people working or living there. This first and last impression is essential to the success of a building design.

The building entrance shall be obvious, well lighted and inviting to all visitors, users, and residents.
The Scale of the entrance needs to respond to the human scale of the users versus monumental scale for larger buildings.

Materials shall be appropriate to the local land and building scape of the region, neighborhood or individual streets.

10.5.5 Emergency and Fire Department Access

Entrances and entrance canopies, porte-cocheres, and marquees must be designed to allow unfettered emergency vehicle access. Height and width of these elements must allow passage of emergency vehicles. The space between the closest access point of an emergency vehicle and the doorway must be clear and capable of enabling emergency personnel to transport gurneys smoothly.

Fire department access must be provided in accordance with the IBC and applicable building Codes. See SBC 201 2.15.13, & 2.27.9.5.2.2 and 801 5C.3 Appendix D.

Both the local emergency response team and fire departments must be contacted to verify requirements and approve building configurations at access points and shall comply with SBC and Civil Defense regulations.

Refer to Volume 6, Chapter 7, Design Guidelines for information regarding Fire Department Connections.

10.5.6 Sand Control

The prevention of sand and dust infiltration is essential throughout the design of a facility entrance. Blowing dust particles tend to infiltrate through minute cracks, joints and openings. The accumulation of sand and its harmful abrasive effects must be countered. Joints and connections shall be designed to prevent dust and sand infiltration.
High quality weather-stripping, gaskets and tight connections and tolerances shall be provided for. Materials resistant to sand abrasion, sand blasting effect during heavy sandstorms and high saline content in sand shall be specified.

All main entrances and all other entrances to public buildings, which are frequently used except emergency exits, shall have vestibules with adequately separated doors to check sand accumulation. Tight weather-stripping all around all doors, windows, roll-up doors, sliding doors and other industrial doors shall be installed.

Inner and outer doors located in sequence that are on automatic operators or motion sensors shall be timed to minimize the time both sets of doors are open simultaneously. At heavy-use entrances in areas of high winds, automatic sliding doors shall be used.

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Mechanical intake and exhaust louvers and grilles shall be protected or placed in such a way as to minimize these effects.

10.5.7 Exterior Door Hardware

Door hardware for main entrances and monumental entrances shall be commensurate with the character of the building. Exterior hardware shall be chosen for its ability to operate in a dusty environment, therefore dustproof keyways shall be provided. All doors shall be provided with appropriate hardware including hinges or pivots, locksets or latch-sets, closers, door stops, weather-stripping, kickplates, push-pull plates, flush or surface bolts, coordinators and roller latches.

Hardware for each door shall be set-up in "Hardware Sets" and the sets shall be included in the appropriate specification. Each Hardware Set shall identify every item of hardware required for the door.

1. In public buildings, latch-sets and locksets shall feature lever operators instead of knobs for accessibility.
2. All knuckle-type hinges shall be of the 5-knuckle design and all out swinging exterior doors shall have hinges with non-removable pins. All doors up to a height of 2150 mm shall be provided with $1^1/_2$ pair (3) hinges, and 2 pair (4) hinges shall be provided for doors whose height is more than 2150 mm up to a height of 2700 mm.
3. “Piano hinges”, offset pivot hinges, and bi-parting automatic doors are allowable.
4. Auto-operators are encouraged for main entrances, subject to Subsection 6.7.3.3.F.6 – Sand Control.
5. Mortise type locksets are preferred for exterior doors with cylinders having a minimum of 6 pins.

Mechanical or electrified automatic closers are required for all exterior doors. Closer tension is subject to Accessibility requirements. Hardware using any plastic components is unacceptable. All hardware shall be low maintenance, rugged and of durable materials. Hardware which may be exposed to excessive humidity and all exterior hardware shall be corrosion resistive.

10.5.8 Universal Accessibility

Building entrances shall meet all applicable Codes, Standards and guidelines for accessibility including ramps, doors, handrails, signage, communication and safety. See Volume 6, Chapter 5 for Universal Accessibility Design Guidance and Saudi Building Code 201, Chapter 9.
All clearances required for accessibility must be provided.

Door width, hardware type, mounting heights, and door closer tension setting must comply with applicable accessibility requirements. Automatic entrances with motion sensors or paddle type activation are recommended typically and required where required by code.

10.5.9 Security Systems

The A/E and/or Construction Contractor are expected to consider security as part of the Project design process. The A/E’s approach shall be holistic and consider security risks that may affect the Project and mitigation strategies to accommodate those risks.
Each building entrance is required to have an electronic security Access Control System installed by a security Service Company approved by the ENTITY. The ENTITY shall set the minimum system capabilities and approve the design and installation of each system. Each system shall be placed in service upon completion of the building.

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24-hour CCTV surveillance is to be provided at building entrances and parking garages and parking lots that are included in the arrival and departure sequence to and from the building, and elsewhere as deemed desirable.

Lighting shall be uniform, consistent and contain overlapping zones of coverage to avoid any dark or shadowed areas that could conceal a possible threat. Lighting levels shall coordinate with security camera capabilities.

The A/E shall consider on a Project-by-Project basis physical security measures to plan for, protect from, and prevent security threats by the physical design in place. Physical security measures to be considered shall include but are not limited to:

1. Maintaining appropriate distances from a security risk or blast potential
2. Line of sight
3. Barrier design (bollards, berms, vehicular access prevention, etc.)
4. Sally ports
5. Blast resistance
6. Envelope hardening strategies
7. Opening protection

“Security, Safety, and Fire Protection Strategy and Approvals to be obtained from the relevant Authority Having Jurisdiction responsible for the development and implementation of security, safety, and fire protection strategies.

10.6 Acoustic Design Requirements

10.6.1 General

All significant spaces in buildings and facilities shall be designed to provide an acoustically controlled environment in relation to exterior noise from adjacent interior spaces and exterior influences.
Placement of significant spaces shall be strategically planned during the development of the project’s site plan and floor plans to avoid having to take extraordinary measures to sound isolate a space.

10.6.2 Acoustically Sensitive Spaces

All acoustically sensitive spaces such as mosques, school music rooms, sound studios, laboratories, concert halls and auditoriums shall be designed with the aid of qualified acoustical consulting firms.

Spaces with high levels of sound control requirements such as classrooms, conference rooms, offices, sleeping rooms, audiology testing rooms, laboratories and special healthcare spaces shall be designed by the A/E or engineer to achieve the required sound isolation.

Indoor locations containing generators or other noise-generating equipment shall have the room designed to reduce and/or prevent transmission of the equipment noise to the adjacent spaces. The level of sound attenuation is dependent on the criticality of the adjacent spaces. The A/E shall define mitigation strategies for high frequency and low frequency transmission.

10.6.3 Sound Control Devices

Exterior spaces shall strive to control sound created within them by using strategies that include planting materials, non-paved areas and the use of sound absorbent materials.

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Interior spaces shall strive to prevent sound generation within the space and absorb the sound generated that may not be avoided by using sound absorbing materials such as planting materials, carpeting, draperies, acoustic ceiling systems and fabric covered furnishings.

10.6.4 Demolition and Construction Activities

Demolition and new construction activities shall seek to minimize the amount of construction noise generated. Work restrictions on items such as time frame for certain work activities, tool usage, and equipment operation, as imposed by applicable ordinances and laws, shall be strictly adhered to.

10.6.5 Sound Transmission Limitations

Mechanical equipment shall be located and installed to minimize transmission of objectionable sound to the surrounding area. Sound Transmission Class (STC) shall be determined with ASTM E90 and E413 Standards.

Mechanical equipment shall be placed on sound and vibration isolators to mitigate structure borne vibration and noise being transferred from one space to another.

Ductwork shall be wrapped with sound attenuation/thermal insulation to control airborne ductwork noise and expansion and contraction noise.

Acoustic baffles and equipment screens may be required per Subsection 6.7.3.3.I.

Mechanical equipment shall be commissioned by a certified commissioning agent before Owner acceptance to assure that equipment is operating properly, efficiently and quietly. Regular maintenance is required to assure that the commissioned operating levels are maintained.

Refer to Table 6.7.3.3.A below for additional sound transmission limitations between important spaces defined as “Sound Transmission Class” (STC).

TABLE 6.7.3.3.A: SOUND TRANSMISSION LIMITATIONS

	SEPARATION BETWEEN		Minimum Sound Isolation Requirement (STC)
	ROOM	ADJACENT AREA	
Dwelling Units Except Private Residence	Bedroom	Bedroom, bathroom of separate occupancy, living room, kitchen, corridors, public spaces.	47
	Bedroom	Mechanical equipment room, high noise public and service spaces	52
Executive Areas, Doctor’s Suites, Confidential Privacy Requirements	Office	Private offices, corridors, lobby, toilets, kitchens, dining areas.	47
	Office	General offices, exterior of building	42
Normal Office Areas, Normal Privacy Requirements	Office	Private offices, general offices, corridors, lobby, exterior of building	37
	Conference	Conference rooms, offices, General office areas, corridors, lobbies	42
Normal School Buildings	Class Room	Class rooms, corridors, public areas, exterior of building	37

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	SEPARATION BETWEEN		Minimum Sound Isolation Requirement (STC)
	ROOM	ADJACENT AREA	
	Class Room	Shops, recreational areas, music rooms, drama areas	47
Performing Arts Buildings and Theaters	Theaters, Concert Halls	Similar areas, recreational areas, mechanical, equipment rooms, shops, toilet rooms, exterior of buildings	52
	Theaters, Lecture Halls	Public spaces, classrooms, laboratories, arts and Concert Halls, areas	47

10.7 Rooftop Equipment

10.7.1 Rooftop Equipment Screening

Rooftop equipment shall be screened from view from the ground near the building. A variety of strategies may be employed to meet this screening requirement.
Vertical extensions of the building walls may be used as a device for screening rooftop equipment if it fits within the context of the design and does not result in a large cost increase to the structure. Wall extensions shall be reviewed with a structural engineer who will prepare a lateral force analysis to determine the lateral bracing required to adequately handle local wind loads. Protection from sand is also a major consideration.
Parapet walls may be extended to provide screening of rooftop equipment. If parapet walls are extended more than 1 meter above the roof surface, a structural engineer shall review and prepare a lateral force analysis and determine the required lateral bracing to adequately handle local wind loads. Parapet walls are also subject to building code.

Requirements related to fire-rating of structural elements and fire-separation requirements at adjacent buildings.

Architectural design features using the same family of materials as on the exterior walls of the building shall be used to screen rooftop equipment if they fit within the context of the design.
Locate rooftop equipment in a roofed penthouse when possible to avoid the need for screening and noise control.

Screening materials with acoustical properties shall be considered for use when detailing screen walls to also absorb equipment noise at the source. The Entity sponsoring the Project reserves the right to require acoustic enclosures at its sole discretion.

Mounding or dense evergreen vegetation as part of a Green Roof installation.

10.7.2 Design, Selection and Location of Rooftop Equipment

All attempts shall be made to locate rooftop equipment as close as possible to the center of the roof to reduce the viewing angles from adjacent properties.
Careful design and selection of rooftop equipment shall be made to select the lowest profile equipment available that may be used to allow screening height to be minimized.

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10.7.3 Extent of screening

Where topography permits, it is desirable to screen rooftop equipment from adjacent properties, but it is not the intent of this requirement to increase the height of the screening significantly above that of the equipment to screen it from view from high rise buildings or from higher ground.

Screening of rooftop equipment shall extend minimally 150 mm above the highest element on the equipment. The highest element is defined to include piping, ductwork, and all other elements serving the piece of equipment.

Screening shall occur on all sides of all rooftop items.
Items that need not be screened include:

1. Plumbing vent pipes,
2. Exhaust fans less than 650mm tall,
3. Satellite dishes less than 650mm in diameter whose tops are less than 1000mm off the roof.

10.7.4 Satellite Dishes

Size and height requirements:
The maximum permissible size for rooftop satellite dishes is 1,100mm in diameter.
The top of the dish may be no more than 1,250mm above the roof surface at the satellite dish location.

Large satellite dishes shall be set in toward the center of the roof, screened behind larger building forms, or located within roof screens where possible. All building-mounted satellite dishes shall be located and designed as follows:

1. Roof-mounted satellite dishes less than 650mm in diameter shall be located no closer than 2m to the nearest edge of the roof, unless screened by a parapet or other building element meeting the requirements of Subsection 6.7.3.3.I.3.b.
2. Roof-mounted satellite dishes greater than 650mm in diameter shall be located no closer than 5m to the nearest edge of the roof.
3. Wall-mounted satellite dishes of any size are prohibited unless a special exception is applied for and granted by the ENTITY.
4. All obsolete or unused satellite dishes shall be removed within sixty (60) days of cessation of use.

10.7.5 Antennae

Antennae include radio, television, cellular phone, and telecommunications antennas, and their complete support structures. All building-mounted telecommunications antennas shall be located and designed as follows:

1. Roof-mounted antennas shall be located no closer than 2m to the nearest edge of the roof;
2. Wall-mounted antennas are prohibited unless a special exception is applied for and granted by the ENTITY.

No antenna located in a Residential District shall exceed 5m in height nor shall any antenna located in other Districts exceed 10m in height.
All obsolete or unused antennas shall be removed within 60 days of cessation of use.

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10.8 Electrical Rooms

10.8.1 Electrical Room Sizing

Electrical Rooms shall be adequately sized to accommodate all electrical equipment and provide all code required clearances and egress routes. See SBC 401.

10.8.2 Electrical Room Stacking

Electrical Rooms shall be stacked (aligned vertically from floor to floor) to facilitate vertical distribution of feeders where possible.

10.8.3 Access

Electrical Rooms shall be designed to restrict access to only authorized personnel experienced with operation and maintenance of electrical equipment.

Electrical Rooms shall be located and arranged to facilitate installation and replacement of equipment. The doors and removal path shall accommodate the largest electrical equipment items.

10.8.4 Life Safety

For Electrical Rooms containing equipment rated 1200 amperes or more, the means of egress shall swing in the direction of the egress from the room and shall not require the operation of keys, operable latches, or other mechanisms to exit the space, but shall employ “Panic Hardware” or similar devices.

10.8.5 Fire Protection

For Electrical Rooms in sprinklered buildings use a clean agent system unless directed otherwise by the ENTITY.

10.9 Telecom Rooms

10.9.1 Telecom Room Sizing

Telecom Rooms shall be adequately sized to accommodate all equipment and provide all code required clearances including entrance facilities (EFs). The room shall have adequate space for cable vaults, isolated racks and cabinets not dedicated to telecommunications.

10.9.2 Telecom Room Stacking

Telecom Rooms shall be stacked (aligned vertically from floor to floor) to facilitate vertical distribution of feeders where possible.

10.9.3 Access

Telecom Rooms shall be designed to restrict access to only authorized personnel experienced with operation and maintenance of telecom equipment.
Telecom Rooms shall be located and arranged to facilitate installation and replacement of equipment. The doors and removal path shall accommodate the largest Telecom equipment items.

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10.9.4 Fire Protection

For Telecom Rooms in sprinklered buildings use a clean agent system unless directed otherwise by the Entity.

10.10 Mechanical Rooms

10.10.1 Mechanical Room Sizing

Mechanical Rooms shall be adequately sized to accommodate all equipment and provide all code required clearances. See SBC 501.

10.10.2 Access

Mechanical Rooms shall be designed to restrict access to only authorized personnel experienced with operation and maintenance of electrical equipment.
Mechanical Rooms shall be located and arranged to facilitate replacement of equipment. The doors and removal path shall accommodate the largest installed equipment items. Space must be provided for the removal of coils from air handling units and tube bundles from chillers.

10.11 Restrooms

10.11.1 Restroom Room Sizing

Restrooms shall be adequately sized to accommodate all fixtures and partition doors to fixtures and provide all code required clearances.

10.11.2 Restroom Stacking

Restrooms shall be stacked (aligned vertically from floor to floor) to facilitate vertical distribution of sanitary sewer where possible.

10.11.3 Access

Restrooms shall be located to provide convenient access for all users and meet code requirements

10.12 Accessibility

All developments shall meet all applicable Codes, Standards and guidelines for accessibility including restrooms, ramps, stairs, doors, handrails, signage, communication and safety. Refer to Volume 6, Chapter 5 for Universal Accessibility Guidelines and Saudi Building Code 201, Chapter 9.

All clearances required for accessibility must be provided. Door width, hardware type, mounting heights, and door closer tension setting must comply with applicable accessibility requirements. Automatic entrances with motion sensors or paddle type activation are recommended typically and required where required by code.

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11.0 BUILDING COMPONENTS

11.1 General

The Design Guidelines below are intended to be general in nature. The purpose of these guidelines is to provide the A/E and/or Construction Contractor with the requirements of the ENTITY for specific building components. These guidelines are not intended to provide design usage or specifications but rather to indicate additional information, provisions and considerations for each building component. The building components are separated into the following categories:

- Unit Masonry
- Stone
- Metals
- Wood, Plastics and Composites
- Thermal and Moisture Protection
- Openings
- Finishes
- Specialties
- Equipment
- Furnishings
- Conveying Systems
- Special Construction

11.1.1 Categories

Each of these categories is broken down further into sub-categories for specific building components. If the A/E and/or Construction Contractor retained is asked to use a building component the type of which is not contained in this Section, he must then request specific guidelines from ENTITY prior to commencing the work.

11.1.2 Quality of Material

The Saudi Arabian Standards Organization (SASO), the American National Standards Institute (ANSI), Underwriters Laboratories (UL) and the American Society for Testing Materials (ASTM) are recognized as the industry standard for establishing the performance requirements for various building materials.
The A/E and/or Construction Contractor shall consider the quality of design and relationship and compatibility to other building materials in the immediate neighborhood for each building component. Durability of materials takes precedence over matching existing material.

11.1.3 References

Refer to Volume 6, Chapter 5, Codes, Standards and References for all related requirements, Codes and Standards for each building component.

11.2 Unit Masonry

This Section is intended to provide general design guidelines and provisions for all allowable unit masonry types for the A/E and/or Construction Contractors working on any project under the jurisdiction of the ENTITY.

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11.2.1 References

The information in this Section shall be considered in the development of specification and Typical Construction Detail Drawings (TCDD).

11.2.2 Concrete Unit Masonry

The A/E and/or Construction Contractor shall utilize and document all the following provisions that apply to each project in the 90% submission. Refer to Volume 6 Chapter 6 for additional submission requirements:

1. All visible masonry shall be void of any defects, blemishes or discolorations.
2. Coordinate the design of all structural masonry with a structural engineer.
3. Select materials and finishes appropriate for their resistance to the environment including UV exposure, intense solar heat gain, high salt content in the air and sandstorms.
4. When utilizing masonry, horizontal and vertical dimensions of all building elements, such as windows, doors, and walls shall be designed with consideration to the modular masonry size wherever possible. This will help maintain aesthetics and decrease labor costs.
5. Mortar joints, control joints and relief angles shall be considered during the design process and integrated in the aesthetic of the building.
6. Consideration for ease of maintenance shall be given for all exposed masonry.
7. Utilize air space, weeps and vents to achieve proper air flow in masonry wall systems.
8. Design consideration shall be given to the top, bottom and side terminations, flashing, penetrations, vertical and horizontal transitions and cladding/roofing interface.

Refer to Volume 6, Chapter 7, and Design Guidelines for additional design requirements.

11.2.3 Clay Unit Masonry

In addition to the design guidelines above, the A/E and/or Construction Contractor shall comply with the following in the design of Clay Unit Masonry:

1. Selection of clay masonry over concrete masonry shall be considered based on their cost, availability, thermal performance, moisture absorption, strength and durability required for the application.
2. Utilize clay masonry in areas that will be exposed to excessive temperatures, such as a fireplace.

11.3 Stone

This Section is intended to provide general design guidelines and provisions for all allowable stone types for the A/E and Construction Contractors working on any project under the jurisdiction of the ENTITY.

11.3.1 References

The information in this Section shall be considered in the development of specification and Typical Construction Detail Drawings (TCDD).

11.3.2 Exterior Stone Cladding

11.3.2.1 Stone Materials

The A/E and/or Construction Contractor shall utilize and document all the following provisions that apply to each project in the 90% submission. Refer to Volume 6, Chapter 6 for additional submission requirements:

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1. All visible stone shall be void of any defects, blemishes or discolorations.
2. Select materials and finishes appropriate for their resistance to the environment including UV exposure, intense solar heat gain, high salt content in the air and sandstorms.
3. When utilizing stone, horizontal and vertical dimensions of all building elements, such as windows, doors, and walls shall be designed with consideration to the modular stone size wherever possible. This will help maintain aesthetics and decrease labor costs.
4. Mortar joints, control joints and relief angles shall be considered during the design process and integrated in the aesthetic of the building.
5. Consideration for ease of maintenance shall be given for all exposed stone.
6. Utilize air space, weeps and vents to achieve proper air flow in wall systems.
7. Design consideration shall be given to the top, bottom and side terminations, flashing, penetrations, vertical and horizontal transitions and cladding/roofing interface.

11.3.2.2 Attachment Methods

In addition to the design guidelines above, the A/E and/or Construction Contractor shall comply with the following in the design of attachment methods:

1. Coordinate the support of all exterior stone cladding with a structural engineer.
2. Coordinate anchor type with stone and mortar types to prevent corrosion.

11.4 Metals

This Section is intended to provide general design guidelines and provisions for all allowable metal types for the A/E and/or Construction Contractors working on any project under the jurisdiction of the ENTITY.

11.4.1 References

The information in this Section shall be considered in the development of specification and Typical Construction Detail Drawings (TCDD).

11.4.2 Shop Applied Coatings

The A/E and/or Construction Contractor shall utilize and document all the following provisions that apply to each project in the 90% submission. Refer to Volume 6, Chapter 6, Project Submission Standards and Requirements for additional submission requirements:
Select materials and finishes appropriate for their resistance to the environment including UV exposure, intense solar heat gain, high salt content in the air and sand storms.

11.4.3 Pipe and Tube Railings

In addition to the design guidelines above, the A/E and/or Construction Contractors shall comply with the following in the design of pipe and tube railings:
Consideration shall be given to the location of exterior metal stairs, pipe and tube railings to minimize their exposure to direct sunlight.
Pipe and tube railings exposed to long periods of sunlight shall receive a suitable heat reducing coating.

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11.4.4 Metal Grilles

In addition to the design guidelines above, the A/E and/or Construction Contractor shall comply with the following in the design of metal grilles:

1. Metal gratings and cover plates shall be flush, shall have a non-slip finish and shall be removable to allow access for adequate maintenance.
2. Perforated cover plates and gratings in public circulation areas shall be designed to avoid items such as women's heels, canes, crutches or fingers from becoming stuck in them.
3. When placed in areas of potential bike traffic, grilles, cover plates, and gratings shall be designed to prevent bicycle wheels from lodging in them.

11.4.5 Criteria

In addition to the design guidelines above, the A/E and/or Construction Contractors shall comply with the following in the design of all metals:

1. Coordinate the use of all metals with a structural engineer.
2. Aluminum shall never be in direct contact with concrete. Gaskets or other separation devices shall be utilized in all occurrences.
3. All metal building components shall be checked on both the galvanic corrosion chart and anodic index to prevent corrosion with any other connecting metal building components.
4. Exterior metals shall be evaluated by a corrosion specialist for their exposure to salts and chlorides, especially at ocean-front locations. Appropriate alloys and coatings shall be used for long-term resistance to corrosion.

11.5 Wood, Plastics and Composites

11.5.1 General

This Section is intended to provide general design guidelines and provisions for all allowable wood, plastics and composite types for the A/E and/or Construction Contractors working on any project under the jurisdiction of the ENTITY.

11.5.2 References

The information in this Section shall be considered in the development of specification and Typical Construction Detail Drawings (TCDD).

11.5.3 Finish Carpentry

The A/E and/or Construction Contractor shall utilize and document all the following provisions that apply to each project in the 90% submission. Refer to Volume 6, Chapter 6, Project Submission Standards and Requirements for additional submission requirements:
All visible wood shall be void of any defects, blemishes or discolorations.
Select materials and finishes appropriate for their resistance to the environment including UV exposure, intense solar heat gain, high salt content in the air and sandstorms.
Plastic laminate finishes shall be considered in heavily utilized areas for ease of maintenance, durability, and cost.

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Water resistant materials such as solid surface counters, granite, quartz surfacing, marble, or tile shall be used exclusively around sinks or other surfaces that are subjected to significant moisture. Laminate finishes in these areas shall not be accepted.
The core or substrate material of millwork or cabinet panels shall be plywood or high-density particle board. Medium Density Fiberboard (MDF) is not acceptable.

11.5.4 Architectural Woodwork

In addition to the design guidelines above, the A/E and/or Construction Contractors shall comply with the following in the design of architectural woodwork:
All exposed millwork and cabinetry shall be smoothly finished with rounded corners and eased edges for safety and good appearance.

Woodwork exposed to the highly saline and humid atmosphere shall be treated to resist degradation in accordance with the Standards of the American Wood Preservers Association.

Refer to the National Hardwood Lumber Association's (NHLA) Rules for the Measurement & Inspection of Hardwood & Cypress to select the proper grade of lumber appropriate for the application. The grades recognized are as follows:

1. FAS – First and Seconds
2. F1F – First and Seconds One Face
3. Selects
4. No. 1 Common
5. No. 2A Common
6. No. 2B Common
7. No. 3A Common
8. No. 3B Common
9. Below Grade
10. Sound Wormy
11. WHND – Worm Holes No Defect

11.6 Thermal and Moisture Protection

This Section is intended to provide general design guidelines and provisions for all allowable thermal and moisture protection types for the A/E and/or Construction Contractors working on any project under the jurisdiction of the ENTITY.

11.6.1 References

The information in this Section shall be considered in the development of specification and Typical Construction Detail Drawings (TCDD).

1. ASHRAE
    a. 90.1 Energy Standard for Buildings Except Low Rise Residential Buildings
    b. 90.2 Energy Efficient Design of Low Rise Residential Buildings
2. SBC
    a. 601 Energy Conservation

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11.6.2 Damp Proofing and Waterproofing

The A/E and/or Construction Contractor shall utilize and document all the following provisions that apply to each project in the 90% submission. Refer to Volume 6, Chapter 6, Project Submission Standards and Requirements for additional submission requirements:
Continuity of both the damp and waterproofing shall be maintained in both plan and section across the entirety of the building envelope.
Provisions shall be made for protection of slabs on grade from the effects of a high-water table and mineral content. Slabs for wet areas, such as bathrooms, shall be waterproofed.
Dew point calculations shall be made for all exterior wall types to ensure condensation occurs outside of the damp and waterproofing.
Flashing, weeps, and vents shall be utilized and integrated with the damp and waterproofing.

11.6.3 Thermal Insulation

In addition to the design guidelines above, the A/E and/or Construction Contractor shall comply with the following in the design of thermal insulation:
Thermal resistance value of insulation shall be determined by using the prescriptive requirements of SBC section 601 Energy Conservation.
Continuity of the thermal insulation shall be maintained in both plan and section across the entirety of the building envelope. Select insulation appropriate for their resistance to fire, rot and vermin.
Consider utilizing passive solar design strategies for the exterior envelope to enhance the energy efficiency characteristics of the building's overall performance.

11.6.4 Metal Roof and Wall Panels

In addition to the design guidelines above, the A/E and/or Construction Contractors shall comply with the following in the design of metal roof and wall panels:
Select roofing materials appropriate for their resistance to the environment including UV exposure, intense solar heat gain, high salt content in the air and sand storms.
Storm water flow must be directed to and conform to the approved drainage plan and requirements. Coordinate all storm water flow elements with the plumbing and civil engineer.
No wood shingle or wood shake shall be permitted on any pitched roofs.

11.6.5 Membrane Roofing

In addition to the design guidelines above, the A/E and/or Construction Contractors shall comply with the following in the design of membrane roofing:

1. Inverted Membrane roofing shall be utilized on flat or low sloped roofs.
2. Design flashing around all roof penetrations and edge conditions to ensure continuity of waterproofing.
3. Roofs shall be designed with proper drainage and to eliminate any standing water.
4. All layered insulation shall be designed to create staggered joints.
5. Inverted roof system shall use sloped lightweight concrete screed with an adhered membrane directly applied. A polyethylene sheet or geotextile fabric shall be used directly above the membrane, covered by loose-laid rigid insulation of the thickness required to meet R-values. Provide a layer of geotextile fabric and concrete pavers or round river stone ballast.
6. Consider the membrane roofing system's performance in UV radiation to minimize degradation.
7. All roofing system elements including the insulation, membranes, protection boards, flashing, and decking shall be designed to prevent wind uplift.

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Built-up roofing, two and three ply modified bitumen roofing systems. Ballasted roofs shall not be used.

11.6.6 Fire and Smoke Protection

In addition to the design guidelines above, the A/E and/or Construction Contractors shall comply with the following in the design of fire and smoke protection:
Refer to the Saudi Building Code (SBC), International Building Code (IBC) and the International Fire Code (IFC) for all regulations regarding fire and smoke protection.

11.6.7 Joint Protection

In addition to the design guidelines above, the A/E and/or Construction Contractors shall comply with the following in the design of joint protection:
Consideration to all thermal and waterproofing joints shall be given to ensure continuity through the building envelope.
Utilize expansion joints to prevent damage from the expansion and contraction of building components.

11.7 Openings

This Section is intended to provide general design guidelines and provisions for all allowable opening types for the A/E and/or Construction Contractors working on any project under the jurisdiction of the ENTITY.

11.7.1 References

The information in this Section shall be considered in the development of specification and Typical Construction Detail Drawings (TCDD).

11.7.2 Door and Window Design

The A/E and/or Construction Contractor shall utilize and document all the following provisions that apply to each project in the 90% submission:

1. Horizontal window mullions shall not block views from either interior standing or seated positions.
2. Include sill pan flashing with integral end dams for all window openings.
3. Integrate both thermal and air barriers into all door and window framing elements (heads, jambs, sills) to ensure the continuity of both barriers.
4. Coordinate the support of all openings with a structural engineer.
5. Coordinate any access control requirements with security design.
6. Design all exterior doors, openings, louvers, vents, and penetrations with protection from sand storms.
7. Select materials, hardware and finishes appropriate for their resistance to the environment including UV exposure, intense solar heat gain, high salt content in the air and sand storms.
8. Utilize overhangs, horizontal and vertical sun shading elements to protect openings from solar heat gain.

Refer to Volume 6, Chapter 6 for additional submission requirements. Refer to section 6.7.3.3.f for additional design requirements.

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11.7.2.1 Materials

The A/E and/or Construction Contractors shall select door and window materials, from the list below, that are appropriate for their location on the building, security requirements, blast requirement, longevity and budget:

- Steel
- Wood
- Aluminum
- Fiberglass

11.7.3 Entrances, Storefronts and Curtain Walls

In addition to the design guidelines above, the A/E and/or Construction Contractors shall comply with the following in the design of entrances, storefronts and curtain walls:

Utilize overhangs and canopies to provide occupants exterior protection from the elements.
Refer to Subsection 6.7.3.3.F, Building Development, for additional design guidelines regarding entrances.

11.7.4 Hardware

In addition to the design guidelines above, the A/E and/or Construction Contractors shall comply with the following in the design of hardware:

Plastic door hardware shall not be accepted.

Coordinate any hardware requiring power with the electrical design.

Refer to Subsection 6.7.3.3.F.7, Exterior Door Hardware, for additional design guidelines regarding hardware.

11.7.5 Glazing

In addition to the design guidelines above, the A/E and/or Construction Contractors shall comply with the following in the design of glazing:

1. The A/E and/or Construction Contractors shall select glazing types from the list below, that are appropriate for their location on the building, security requirements, blast requirement, longevity and budget:
    a. Fire Rated
    b. Tempered
    c. Laminated
    d. Wired
    e. Insulated

Utilize low emissivity, tinted or reflective coatings on exterior glazing to reduce solar heat gain. Refer to SBC 601 and ASHRAE 90.1 and 90.2.

When utilizing spandrel glazing, the coating shall be placed on either surface 2 or 3 of the glazing unit.

11.7.6 Louvers and Vents

In addition to the design guidelines above, the A/E and/or Construction Contractors shall comply with the following in the design of louvers and vents:

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Utilize bug screens on all exterior louvers and vents.
Coordinate all related exterior openings with the HVAC design.
Provide sand control louvers on buildings in undeveloped desert areas, or as required by project.
Maintain minimum height of louvers and vents.

11.8 Finishes

This Section is intended to provide general design guidelines and provisions for all allowable finish types for the A/E and/or Construction Contractors working on any project under the jurisdiction of the ENTITY.

11.8.1 References

The information in this Section shall be considered in the development of specification and Typical Construction Detail Drawings (TCDD).

11.8.2 General Criteria

The A/E and/or Construction Contractor shall utilize and document all the following provisions that apply to each project in the 30% submission. Refer to Volume 6, Chapter 6, Project Submission Standards and Requirements for additional submission requirements:

Select materials, hardware and finishes appropriate for their resistance to the environment including UV exposure, intense solar heat gain, high salt content in the air and sand storms.

Select materials intended for hygienic purposes in food preparation areas, health care facilities and toilet rooms.

All selected finishes shall adhere to the Americans with Disabilities Act (ADA) for slip resistance.

11.8.3 Exterior Finish Materials and Colors

In addition to the design guidelines above, the A/E and/or Construction Contractors shall comply with the following in the design of exterior finish materials and colors:

1. Light coloring, heat reflecting, thermal insulating qualities, and low maintenance shall be the major considerations in the selection of all exterior finishes.
2. Materials – The A/E and/or Construction Contractors shall select exterior materials from the list below, that are appropriate for their location on the building, blast requirement, longevity, budget and overall cohesion with the design concept:
    a. Stucco.
    b. Masonry – stone or brick.
    c. Wood – timbers, boards, board and batten, tongue and groove, solid wood siding, and rough sawn lumber.
    d. Metals – factory finished in durable anodized or polyvinylidene difluoride (PVDF) based paint.

11.8.4 Interior Finishes Materials and Colors

In addition to the design guidelines above, the A/E and/or Construction Contractors shall comply with the following in the design of interior finishes materials and colors:

1. Floors

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a. Utilize non-slip surfaces on any areas subject to wetting such as toilet rooms, locker rooms, and showers.
b. Choose finishes that counter the effects of sand abrasion, sand accumulation and wheel traffic.

2. Walls
   a. Consider the integration of way finding elements when choosing wall and floor finishes.
   b. Utilize water resistant materials on any surfaces subject to wetting.
   c. Utilize impact resistant elements such as chair rails, impact resistance gypsum board or crash rails in areas more susceptible to damage.
3. Ceilings
   a. Coordinate ceiling design and layout with any above ceiling mechanical, electrical, or plumbing equipment requiring access.
   b. All toilet room ceilings for public building types shall be PVC ceiling tiles. Smoke developed and Flame Spread criteria for PVC ceiling tiles shall meet the requirements of ASTM E84.

11.9 Specialties

This Section is intended to provide general design guidelines and provisions for all allowable specialties types for the A/E and/or Construction Contractors working on any project under the jurisdiction of the ENTITY.

11.9.1 References

The information in this Section shall be considered in the development of specification and Typical Construction Detail Drawings (TCDD).

11.9.2 Signage

The A/E and/or Construction Contractor shall utilize and document all the following provisions that apply to each project in the 90% submission. Refer to Volume 6, Chapter 6, Project Submission Standards and Requirements for additional submission requirements:

1. Utilize appropriate directional safety and identity sign in all public and industrial facilities as required by building type.
2. The design of all signs shall maximize visibility and contrast with the immediate environment.
3. Utilize both graphic and written elements on signs where possible.
4. Written signage shall firstly be in the Arabic language, followed by the English language.

Refer to Volume 6, Chapter 5, Codes, Standards and References, for additional design Codes and Standards regarding signs.

11.9.3 Toilet and Bath Accessories

In addition to the design guidelines above, the A/E and/or Construction Contractors shall comply with the following in the design of toilet and bath accessories:

1. Partitions provided around all public water closets and shower stall shall extend from floor to ceiling.
2. To reduce water damage and provide air circulation, doors shall be undercut to a maximum of 30 mm.
3. Privacy screens shall be installed between all urinals, extending from approximately 600 mm above the finish floor to a height of 1500 mm.

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4. Each shower or bath stall shall have adequate room for dressing and undressing in private, as well as for clothes storage.
5. Steel toilet partitions are not acceptable.
6. All exposed metal parts of toilet accessories and hardware shall be stainless steel or chrome plated. Painted metal accessories shall not be acceptable.
7. All showers shall have bathtub or shower tray.

11.9.4 Safety Specialties

In addition to the design guidelines above, the A/E and/or Construction Contractors shall comply with the following in the design of safety specialties:

- All safety equipment shall be installed in strict compliance with the manufacturer's recommendations.

11.9.5 Sun Control Devices

In addition to the design guidelines above, the A/E and/or Construction Contractors shall comply with the following in the design of sun control devices:

1. Utilize sun control devices to protect doors and windows from solar heat gain.
2. A study of their optimum shape in relation to the sun, as well as their initial economic impact and maintenance costs as related to HVAC equipment and operation costs shall be made.
3. Select materials and finishes to have low heat absorptive qualities.
4. Minimize contact with the building surfaces to which there are attached.
5. Utilize interior shading such as blinds and curtains. Select materials, hardware and finishes appropriate for their resistance to the environment including UV exposure and intense solar heat gain.

11.9.6 Vehicle Shelters

In addition to the design guidelines above, the A/E and/or Construction Contractors shall comply with the following in the design of vehicle shelters:

1. Select materials, hardware and finishes appropriate for their resistance to the environment including UV exposure, intense solar heat gain, high salt content in the air and sand storms.
2. Tensile Fabric canopies shall be designed to quickly shed rain and avoid any possibility of ponded water.

11.10 Equipment

This Section is intended to provide general design guidelines and provisions for all allowable equipment types for the A/E and/or Construction Contractors working on any project under the jurisdiction of the ENTITY.

11.10.1 References

The information in this Section shall be considered in the development of specification and Typical Construction Detail Drawings (TCDD).

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11.10.2 Criteria

The A/E and/or Construction Contractor shall utilize and document all the following provisions that apply to each project in the 30% submission. Refer to Volume 6, Chapter 6, Project Submission Standards and Requirements for additional submission requirements:

1. All equipment shall be specified only from manufacturers with a proven record of reliability, service and replacement parts supply.
2. All equipment shall conform to applicable safety regulations and shall be installed in strict compliance with manufacturer's recommendations.
3. Equipment shall be designed for a service life appropriate to the building type.
4. Where possible, exterior equipment shall be designed to be kept away from public spaces. Landscaping and/or screen walls shall be utilized to minimize the visual impact of exterior or roof top equipment.
5. Exterior equipment shall be protected appropriately for resistance to the environment including UV exposure, intense solar heat gain, high salt content in the air and sand storms.
6. Utilize sound separation from large equipment to minimize disturbance to public spaces or neighboring occupied spaces.

11.11 Furnishings

This Section is intended to provide general design guidelines and provisions for all allowable furnishing types for the A/E and/or Construction Contractors working on any project under the jurisdiction of the ENTITY.

11.11.1 References

The information in this Section shall be considered in the development of specification and Typical Construction Detail Drawings (TCDD).

11.11.2 Criteria

11.11.2.1 General Furniture

The A/E and/or Construction Contractor shall utilize and document all the following provisions that apply to each project in the 30% submission. Refer to Volume 6, Chapter 6, Project Submission Standards and Requirements for additional submission requirements:

1. Consideration shall be given to numerous factors of the users that include, but are not limited to, the following:
    a. Functions and types of spaces.
    b. Number of assigned staff and visitors.
    c. Types and quantities of items to be stored.
    d. Signage requirements.
    e. Quantity, condition, and type of furniture to be reused.

Select furniture and furnishings with function, durability, aesthetics, and budget as a primary consideration.

Flexible, replaceable and modular furniture and furnishing construction shall be considered based on the current or potential future project needs.

Select furniture and furnishing materials appropriate for their resistance to fire.

Select furniture and furnishing materials that reduce the maintenance to clean and/or repair them.

Select furniture and furnishing materials that complement the project design, provide aesthetic consistency, and have proper scale, size, and proportion for the space.

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11.11.2.2 Other Furniture

In addition to the design guidelines above, the A/E and/or Construction Contractors shall comply with the following in the design of other furniture:

- Classroom furniture shall be designed with durability as a primary concern.

11.12 Conveying Systems

This Section is intended to provide general design guidelines and provisions for all allowable conveying system types for the A/E and/or Construction Contractors working on any project under the jurisdiction of the ENTITY.

11.12.1 References

The information in this Section shall be considered in the development of specification and Typical Construction Detail Drawings (TCDD).

11.12.2 Elevators

The A/E and/or Construction Contractor shall utilize and document all the following provisions that apply to each project in the 90% submission. Refer to Volume 6, Chapter 6, Project Submission Standards and Requirements for additional submission requirements:

1. Alphanumeric lettering for elevator call buttons shall be as follows:

    a. Basement (when applicable): B
    b. Ground Floor: 1
    c. Subsequent Floors: 2, 3, etc.
    d. The letter “G” shall not be used for Ground Floor.
    e. The Arabic alphanumeric shall be used and be 50% larger in size and stroke and written to the right of the English alphanumeric.

Coordinate all elevator design with a structural engineer.

Coordinate any access control requirements with security design.

Select materials, hardware and finishes appropriate for the aesthetic design, intended usage and necessary durability of the elevator and building type.

Elevators intended primarily for public or passenger use shall be placed to maximize accessibility and occupant flow and its location shall coordinate with the lobby, stairways and/or corridors.

Elevators intended primarily for private or freight use shall be located away from the public circulation if possible, and its location shall correspond with any spaces intended to utilize it, such as mechanical rooms, shipping, and maintenance.

Consider the building type and elevator function when choosing elevator type and speed.

Consider the required vertical height clearances to ensure elevators have the necessary space above their highest landing.

11.12.3 Ambulance Stretcher

Elevator car to accommodate ambulance stretcher per IBC 2009 3002.4 Lifts.

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11.13 Special Construction

This Section is intended to provide general design guidelines and provisions for all allowable special construction types for the A/E and/or Construction Contractors working on any project under the jurisdiction of the ENTITY.

11.13.1 References

The information in this Section shall be considered in the development of specification and Typical Construction Detail Drawings (TCDD).

11.13.2 General Criteria

The A/E and/or Construction Contractor shall utilize and document all the following provisions that apply to each project in the 30% submission. Refer to Volume 6, Chapter 6, Project Submission Standards and Requirements for additional submission requirements:

1. Utilize qualified acoustical consulting firms for the design of all acoustically sensitive spaces such as mosques, music rooms, sound studios and laboratories, concert halls, meeting rooms with 50 or more occupants, and auditoriums. The A/E and/or Construction Contractor shall submit a report reflecting how each of these spaces have been addressed.
2. Total separation of sexes, both for the swimming and bathing facilities associated with such establishments, is necessary. The design must incorporate facilities to enable users to shower/bath before and after the use of the swimming pools.

12.0 GUIDELINES BY BUILDING TYPE

12.1 Design Guidelines Intent

These Design Guidelines are intended to be general in nature. When looking at specific building typologies the A/E and/or Construction Contractors shall request from the ENTITY the specific codes and standards to be used. Therefore, these guidelines are not intended to provide design knowledge but rather to direct the A/E towards the relevant references for the specific information and the provisions and submissions required for each building type. Some of these Building Types are separated into the following categories:

- Commercial
- Residential
- Education
- Medical / Healthcare
- Transport
- Hospitality
- Sport
- Tourism
- Industrial
- Government

For each of these building types the A/E is directed to obtain the relevant design guidelines and required codes and standards to be used in the design and construction of the facility and therefore should be clarified with the Entity as part of the project data collection stages.

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