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TAIPEI PUBLIC HOUSING SMART COMMUNITY

Construction Reference Manual



Taipei Public Housing Smart Community
Construction Reference Manual
2018



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Preface

The Taipei City Government is promoting public housing by establishing 5 major visions: 1. practice residential justice; 2. implement urban aesthetics; 3. become a smart city industry experimental field; 4. create a new residential business model; and 5. manage community relations. The goal is to provide high-quality and affordable living environment to the residents of Taipei. So architectural aesthetics, public art, and smart green architecture will be combined with the ICT-related industrial energy in Taiwan in terms of architectural planning to create a new generation of smart public housing.

To implement this public housing development vision, the Taipei City Government has planned the public housing smart community demonstration base by investing an additional 3%-5% of the construction funds to build smart facilities and use smart technologies for the design, construction, management and maintenance of public housing. In addition to energy conservation, water conservation and community safety; we will also construct a smart community management Cloud, smart power grid, smart senior health homes, etc., so residents can receive more timely and comprehensive care in terms of safety, health, and comfort. According to the Xinglong Public Housing Zone 1 experiences; smart power grid and smart community operations are able to reduce electricity consumption by over 13% compared to that of a general community. Mayor Ko indicated that all public housings in Taipei City will be equipped with the relevant smart technology facilities and be upgraded to become smart communities. We can use various smart technologies, sustainable environmental protection methods and other relevant industrial technologies to achieve energy conservation, carbon reduction and environmental sustainability during urban development in response to the environmental issues worldwide such as climate change and energy depletion.

In addition to the residential units, the spatial features of the public housing in Taipei City shall include using the ground floors (1st and 2nd floors) as public service spaces containing neighborhood shops, activity centers, youth entrepreneurship services, libraries, green park spaces, children nursery care, elderly care, public babysitting and other social welfare facilities in the hope of building a new lifestyle pattern and life architecture model. The underground parking lot is provided for use by the public to serve as a type of public facility for the surrounding communities. In the future, the relevant public services spaces will incorporate smart technology applications to provide more convenient and faster services to the people. In addition to improving the convenience of the citizens' lives, the goal of smart public housing is to also achieve the sustainable development of the city, assist Taiwan's ICT industry to obtain the opportunities to transform the businesses and industries via smart housing living area integration and implementation, and export the opportunities from Taiwan to the international arena.

To this end, the municipal government has published the "Taipei Public

Housing Smart Community Construction Reference Manual” and invited smart community experts, scholars and industry pioneers to provide advice and guidance. The goal is to adhere to the open and transparent government principle to describe the overall architecture and operational design concepts of the entire smart community creation process and enable all social circles to understand the [procurement strategy], [design], [construction], [completion acceptance inspection] and subsequent [operation management] phases. The manual also proposes the 6 major projects that must be constructed and the selective building projects according to the base conditions in order to serve as the holistic, directional, and principal references for the relevant municipal government bureaus, potential bidding design units and ICT technology vendors. While the smart technology applications are evolving and widely ranged, with various product items, for the standardization of the smart technology applications in Taiwan, the Ministry of Science and Technology and the Bureau of Standards require the application for the shared standards of communications. With this premise, through the cross-industry integration, including the cooperation with the Architecture and Building Research Institute, Ministry of the Interior, and the Taiwan National Energy Program - Phase II (NEP-II), with the three principles “Openness, “Compatibility,” and “Expandability,” Taipei City Government released the “Manual for the Construction of Smart Community in the Taipei City Public Housing,” Version 1.0 in July, 2016, and the Version 2.0 was released in July 2017. With the field validation and review for two years, and the “Seminar of Experts for the Manual for the Construction of Smart Community in the Taipei City Public Housing” convened on September 13, 2018 by the Urban Development Department, the Information Department, and the Taipei Smart City Project Office, as well as the “Discussion and Research Meeting for the Manual for the Construction of Smart Community in the Taipei City Public Housing and the Reference Manual of Service Systems (2018), the Urban Development Department has revised and adjusted the contents of the “Design Stage” and “Construction Stage”, to prepare the “Manual for the Construction of Smart Community in the Taipei City Public Housing (2018)” in order to ensure the functionality and novelty of the smart equipment, and jointly lead the public housing in Taipei City toward the smart community.

In addition, the public services provided by the lower-levels of public housing in Taipei City can also integrate the smart technology application service items. The “Taipei Smart City Project Management Office” shall propose the “Taipei Public Housing Smart Community Services System Reference Manual” as value-added reference for smart services.

Chapter 1. Public Housing Smart Community Building Strategy

I. Public Housing - Creating a Quality Smart community

The goal is to ensure better performance and environmental quality of public housings under the premise of promoting Taipei City public housings as smart communities; ensure residents receive more timely and comprehensive cares in terms of safety, health care, comfort, and convenience; and to enhance the efficiency of life. As the world is facing environmental issues such as climate change and energy depletion, there is an urgent need to introduce smart strategies, sustainable environmental protection, and other relevant industrial technologies to help construct smarter and more environmentally friendly public housings. In the future, we will apply smart technologies to design construction and management maintenance; and use the innovative planning concepts of ICT related technological development and Intelligent Building technology life applications to fulfill the various residential needs such as energy management, automation control, system integration, security surveillance, home care, and digital living. The goal is to perform a series of electronization and informatization and provide solutions by integrating innovative services. It is anticipated to guide the development of affordable housings followed by civil construction projects in order to achieve a win-win for the people, industry and the government. The government will use the demonstrative smart community as the Intelligent Building pioneer example to promote Intelligent Buildings that will in turn form smart communities and eventually develop into a smart city.



With the Smart Technologies, the Followings Are Created:

The living space with effective management, energy saving, comfort and convenience, and health and wellbeing.



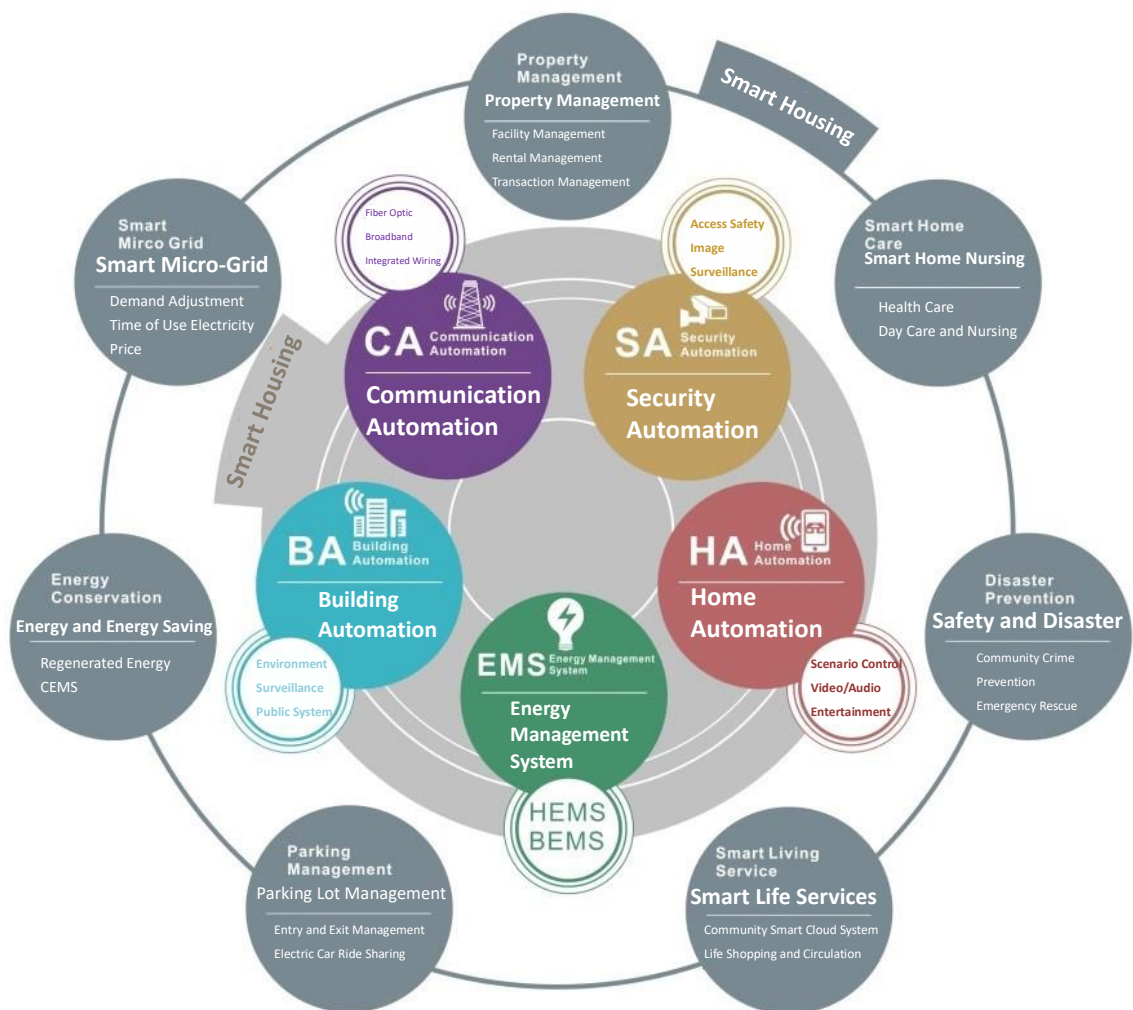
Graph 1-1 Highlights for the Smart ICT System Design in the Public Housing

It is expected to achieve the following 7 basic services:

- (I) Provide public services: Child nursery, elderly care, employment services.
- (II) Provide healthy, sustainable, comfortable, convenient, energy-saving, and safe smart living spaces.
- (III) In addition to considering the urban texture, topography, and other base conditions; the architectural planning and design will also integrate architectural aesthetics, public art, smart green architecture, universal design, and safe utilization.
- (IV) Smart property management for community safety and life management services will be introduced in terms of maintenance management.
- (V) Construct smart facilities; install smart water, electricity, and gas meters; and provide potable tap water directly from the Taipei Water Department.
- (VI) Establish an infrastructure management cloud in each community base (including rack-type cloud service server, dual WAN firewall router, anti-virus software, system

integration software, community website design and construction, mobile APP development, and other equipment) to upload the community-integrated system equipment (visitor service systems, security access control systems, energy management systems, community information, etc.) information to the community Cloud. Assign permissions and provide information query services to the community residents and management company personnel/units.

(VII)The community cloud software must be general standard communication protocol software in order to facilitate browse and query by the relevant personnel.



Graph 1-2 Indicative Diagrams of the Structures of the Smart Community in the Public Housing

II. Smart Housing Procurement Outsourcing Strategy

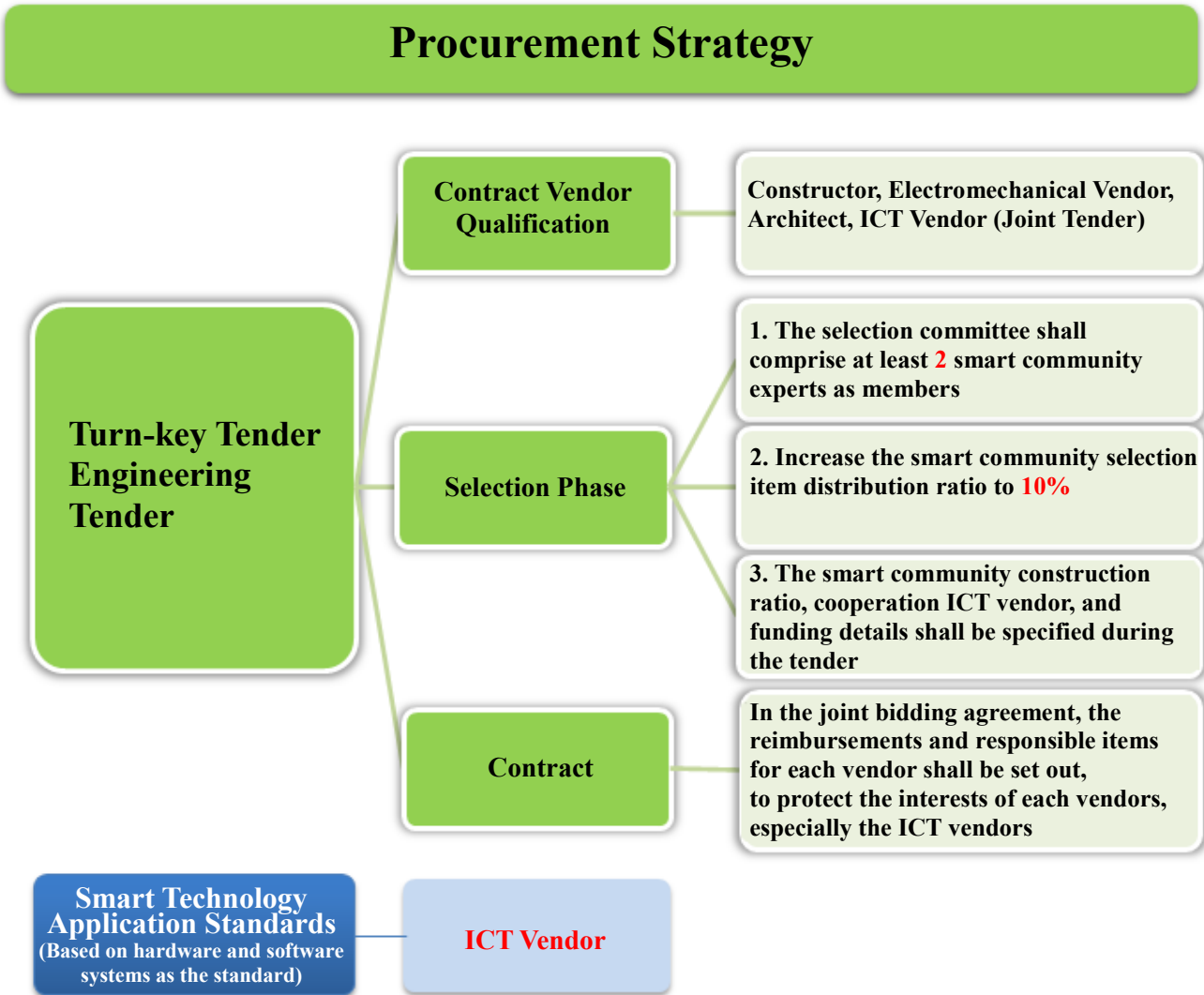
The design - contract awarding - construction method for general traditional public works comprised handing over the architectural design and construction to architects and construction contractors. The designs must meet the fair competition principles of the Government Procurement Act. So it is difficult to use special specifications or innovative construction techniques and easy to encounter interface integration difficulties during the construction phase of the project. To avoid legal disputes from the relevant events to affect the construction progress, a smart community procurement and outsourcing strategy package is proposed.

Article 24 of the Government Procurement Act provided: “An entity may, according to the needs of efficiency and quality, conduct the procurement on a turn-key basis. Projects exceeding the review amount shall be reported to the higher authority for approval before implementation.” The features of turn-key includes executing the procurement of construction work or property by consolidating the procurement of design and work, supply, installation, or maintenance within a certain period, etc., into the tendering contract. Therefore, based on the turn-key spirit, the winning bidder shall complete the work according to the provisions of the contract, specifications, and drawings in order to meet the agency’s needs. The work implementation includes detailed design, supply, and construction of the project as well as the signature approvals, audit items, construction progress arrangement control, quality management, warranty, etc. The winning bidder shall use design integration and construction interface coordination to achieve the functions that the project should have, handle the relevant matters, supply the facilities, provide the documentations, execute the construction, etc. In addition, the turn-key operating instructions also detailed that the quality plan proposed by the vendor must include a design quality plan; and the contents shall at least include the project content and budget, scheduled design progress, schedule control points, technical specifications, organization and authorities, review mechanisms (including the qualifications, experience, audit opportunities, audit projects of the reviewers), design drawing and document corrections, corrective and preventive measures, and document record management.

Considering the increasing professional designs of buildings; the main body of construction, electromechanical, fire protection, air conditioning, communication, and smart light current, etc., shall have use division of labor in terms of design and be integrated. The architect must fully coordinate the integration with the various professional engineers, equipment suppliers, building materials vendors, and industrial manufacturers during the design phase in order to achieve reliable design quality and avoid disputes during construction. For the base outsourced using the turn-key method; the tender documents shall propose the recommended material grades, fixed prices and set bonuses to attract good contractors to bid. The documents must also provide the basic design

standards and turn-key requirements and collaborate with this government's public review committee list. The goal is to allow architects to be innovative and avoid being completely dominated by builders, and attract excellent ICT technology vendors to participate in the bidding. Moreover, consider the integration and implementation of the interface, the turn-key contractor shall be responsible for applying the smart basic construction items and obtaining the Intelligent Building marks. The smart equipment and system parts can be procured individually.

In the future, the outsourced projects will primarily be considered as public housing cases. The turn-key tender or construction tender methods will be used for procurements; and the requirements will be proposed in the tender qualification, selection phase, and contract documents. In terms of the ratios for smart communities, the following is specifically required: 1. The selection committee shall comprise at least 2 smart community experts as members; 2. Increase the smart community selection item distribution ratio to 10%; and 3. The smart community construction ratio, cooperation ICT vendor, and funding details shall be specified during the tender. In addition to the importance of strengthening the smart technology applications as well as promoting cross-industry integration for construction plants, architects, and the ICT industry; part of the smart system will be planned to individually handle the "Smart Technology Application Tender" according to the base characteristics and the relevant hardware and software systems in order to encourage the industry to create novel and innovative business models.



Graph 1-3 The Flow of Procurement Strategy for the Smart Service Items of the Public Housing

1. Bidding Vendor Qualification for Smart Technology Application Tender

- Based on the above, turn-key team members for the relevant technology application tender shall include:
 - System Integration Vendor
 - 1) CC01 Motor and electronic machinery manufacturing industry
 - 2) CE01 Optical and precision equipment manufacturing industry
 - 3) E605 Computer engineering industry
 - 4) E701 Telecom engineering industry
 - 5) F113 Machinery and equipment wholesale industry

- 6) F118 Information software wholesale industry
- 7) F119 Electronic materials wholesale industry
- 8) F213 Machinery and equipment retailing industry
- 9) F218 Information software retail industry
- 10) F219 Electronic materials retail industry
- 11) F401 International trade industry
- 12) I301 Information service industry
- 13) JA02 Repair services industry

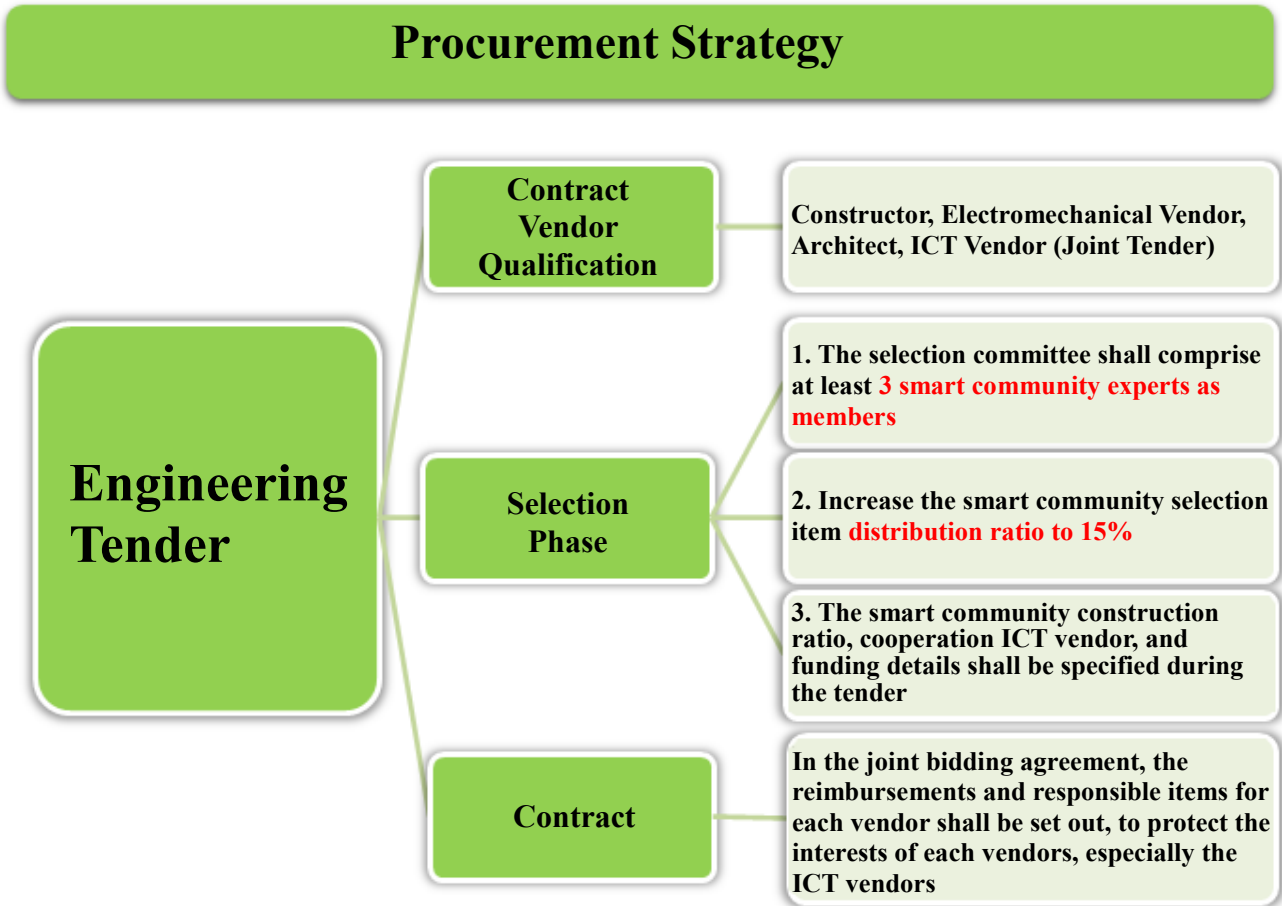
2. Electrical Equipment Industry

3. Motor Technician Office

- Turn-key representative vendor: light current or system integration vendors shall be the representative

2. Smart Projects shall Include the Engineering Tender Handling Procurement

Public housing smart community joint bidding advanced edition. If the case elects to use the engineering tender method for procurement, please pay attention that there must be at least 3 smart community specialists as members for the selection committee during the selection phase, and the smart community selection item distribution ratio shall be 15%. (Please refer to Graph 1-4)



Graph 1-4 The Advanced Flow Chart of Joint Bidding for the Smart Community in the Public Housing

3. Selection Items (public housing smart community)

To realize the rationality and openness of the smart community procurement strategy, the contents and distributions of the selection items are adjusted as follows: comprehensive design capabilities increased from 20 points to 25 points, brand specifications for smart facilities are added to the main material equipment selection instructions, the smart community plan is increased from 10 points to 15 points, the project management capability and schedule as well as rationality are combined as project management and work schedule control capability for a total 15 points. (Please refer to Graph 1-5 for the detailed adjustment)

Professional competence, past performances and financial strength	1. Team Organization 2. Staff Educational Backgrounds and Relevant Practical Performances 3. Financial Proof	10 points	Professional competence, past performances and financial strength	1. Team Organization 2. Staff Educational Backgrounds and Relevant Practical Performances 3. Financial Proof	10 points
Comprehensive Design Capability	1. Planning Design Description, Conception, Design Quality Management 2. Green Building, Building Information Modeling (BIM) Strategy	10 points	Comprehensive Design Capability	1. Planning Design Description, Conception, Design Quality Management 2. Green Building, Building Information Modeling (BIM) Strategy	25 points
Main Materials Equipment Selection	Brand specifications of construction materials, electromechanical air conditioning, and smart facilities used	10 points	Main Materials Equipment Selection	Brand specifications of construction materials and electromechanical air conditioning used	10 points
Smart Community Plan	1. Smart Community Implementation Plan and ICT Industry Alliance Plan 2. Smart Community Innovative Solutions	10 points	Smart Community Plan	1. Smart Community Implementation Plan and ICT Industry Alliance Plan 2. Smart Community Innovative Solutions 3. Brand Specifications of Smart Facilities	15 points
Project Management Capability	1. Management Plan, Work Execution Essentials, Construction Method Description, Construction Management Organization 2. Engineering Organization Staff, Manpower Allocation Plan	10 points	Project Management and Schedule Control Capability	1. Management Plan, Work Execution Essentials, Construction Method Description, Construction Management Organization 2. Work Schedule and Expenditure Control as well as Operation Time Reduction Methods	15 points
Work Schedule and Rationality	The time required for completing the turn-key project, work schedule and expenditure control, and operation time reduction methods	15 points	Integrity and rationality of price composition	1. The integrity, rationality, and cost control compliance of the proposed total price and combinations 2. Feedbacks and specific implementation plans provided by this project	20 points
Integrity and rationality of price composition	1. The integrity, rationality, and cost control compliance of the proposed total price and combinations 2. Feedbacks and specific implementation plans provided by this project	20 points	Briefing	Integrity and professionalism of the briefing contents	5 points
Briefing	Integrity and professionalism of the briefing contents	5 points			
Before			Before		

Graph 1-5 The Comparison Chart of the Adjustments to the Key Points of Review and Selections for the Smart Community in the Public Housing

(The score sheet is still subject to the assessment of each case selection committee.)

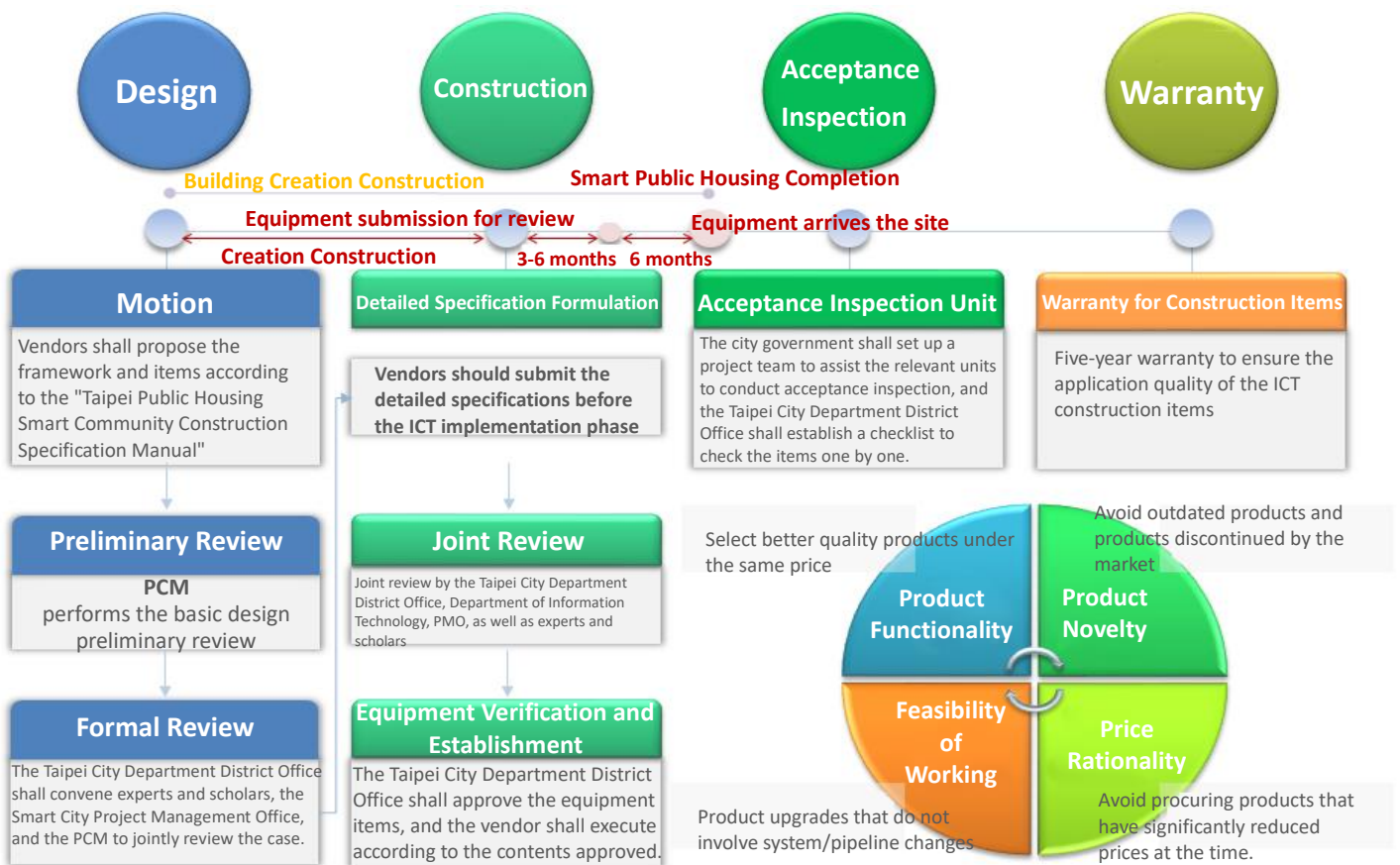
III. Smart public housing verification operation

To ensure that public housing smart facilities can use the products with better specifications at the same price and maintain product functionality in order to avoid the use of obsolete products that are regarded as outdated by the market while taking the equipment and system implementation feasibility and the price rationality principle into consideration; this project shall be subject to the design, construction, acceptance inspection, and warranty phase acceptance inspection operation standards. The overall public housing inspection audit operation framework and the chapters for the subsequent phases are further detailed below.

- 1. Design phase:** Vendors shall propose the frameworks and items according to the construction specifications specified in this manual. The project cycle management (PCM) team commissioned by the Taipei City Department District Office shall perform the basic design

preliminary review. The case shall enter the formal review phase after passing the preliminary review; and the Taipei City Department District Office shall convene experts and scholars, the Smart City Project Management Office, and the PCM to jointly review the case.

2. **Construction phase:** Vendors shall propose the detailed specifications before the smart construction phase. After joint review by the Taipei City Department District Office, Department of Information Technology, Smart City Project Management Office, as well as the experts and scholars; the Taipei City Department District Office shall approve the equipment items and the vendor shall execute according to the contents approved.
3. **Acceptance inspection phase:** The Taipei City Department District Office shall set up project team to assist the relevant units to conduct acceptance inspection and establish a checklist to check the items one by one.
4. **Warranty phase:** Vendors are required to provide 5-year warranty maintenance for the construction items to ensure the quality of the Intelligent Building items.



Graph 1-6 The Holistic Operation Flow Structure of the Validation and Review of the Public Housing

Chapter 2. Design Phase - Smart Community Planning and Design Principles

I. Mandatory Establishment Items

Taipei City Public Housing Demonstrative Smart Community Requirements:

1. All public housing: Establish “3-smart meters (water, electricity, and gas meters)” and obtain the Intelligent Building mark.
2. Public housing smart community: Spend 3%-5% of the construction funds to establish the basic smart facilities including energy conservation (smart power grid), community security, smart parking management, smart management Cloud, and the relevant smart services.



Graph 2- 1 The Indicative Graph for the Intelligent Building Mark

In addition to meeting the Silver level or higher requirements of the Intelligent Building Mark, we also hope to introduce smart systems and equipment, and integrate them into indoor building applications so the building would have auto-detection smart functions. The following is a description of items that must be established under the 6 demand orientations: safety and disaster prevention, information communication, building automation, energy conservation management and smart power grid, smart life services, and property management. The goal is to create a safe, healthy, convenient,

comfortable, energy-conserving, and sustainable demonstrative smart community. Besides, the latter part of the section describes that the public housing may develop the optional installments such as the day-time nursing, remote nursing, long-term nursing, smart parking lot, co-working space, rooftop farms and etc. based on its base scale, the characteristics of the area, and neighborhood facilities.



Graph 2-2 The Smart Life Design Structures for the Guang-Tzu Public Housing

1. Safety and Disaster Prevention

1. General Design Principles

Safety and disaster prevention mainly focus on the establishment of building and personal disaster prevention related systems. In addition to advance prevention or prediction, the system must be able to successfully guide the people to evacuate in case of a disaster and prevent the expansion of the disaster.

1.1 Definition of Main Items

1.1.1. In the life cycle of a building, it is necessary to face various natural disasters or man-made intrusions and damages. How to prevent the various disasters from occurring or expanding should they ever occur and guide the personnel to evacuate using

the various automation systems in order to protect the life and property of the users are indispensable for the planning and design of smart communities.

- 1.1.2. In terms of prevention and control of the various disasters for buildings, especially for fire prevention, there are already various regulations for the subject. The safety and disaster prevention proposed for smart community focuses on “proactive disaster prevention” and the “degree of integration and auto-activation of the various automation systems.” The purpose of the plans and designs is to apply the various modern technologies, enable buildings to prevent disasters or reduce disaster damages more intelligently, and ensure the personal safety of the building’s occupants.
- 1.1.3. Safety and disaster prevention system: Refers to the various safety and disaster prevention systems and equipment that have the ability to detect, notify, display, restrict, or eliminate the disaster and provide evacuation guidance or emergency rescue. Use system integration planning to achieve auto-activation for the equipment of the various systems and achieve the proactive disaster prevention benefits.
- 1.1.4. Detection, notification and display performances: Refers to the level of smartization for the various system equipment to detect building and personnel safety hazards, and notify and display the relevant information.
- 1.1.5. Restriction and exclusion performance: Refer to the level of smartization for the various system equipment to restrict the expansion of a disaster and eliminate the hazards in order to protect the building and personnel safety.
- 1.1.6. Evacuation guidance and emergency rescue: Refers the ability for the various system equipment to protect personnel safety by effectively guide the direction of evacuation and provide rescue in case of a disaster.

1.2 Scope of Application

- 1.2.1. Make building management more user-friendly and smarter in order to extend the life of the building, conserve energy, save manpower, provide a comfortable life quality, improve building environment efficiency, and reduce the future operating costs of the building.
- 1.2.2. The design and construction shall conform to the applicable standards (all regulations are based on domestic regulations, and

areas not provided by domestic regulations shall refer to foreign regulations).

- 1.2.3. China National Standard (CNS).
- 1.2.4. Building Code and Regulations (CBC).
- 1.2.5. Architecture and Building Research Institute “Intelligent Building Assessment Manual” (2016 edition).
- 1.2.6. Construction and Planning Agency “Public Smart Green Building Implementation Policy” (2011 edition).
- 1.2.7. Taiwan Power Company Operating Rules.
- 1.2.8. Residential Power Distribution Site Establishment Standards added by the Taiwan Power Company.
- 1.2.9. “Indoor Wiring Device Rules” and “Electrical Industry Power Supply Wiring Device Rules” established by the Ministry of Economic Affairs.
- 1.2.10. Telecommunications Act and the relevant sub-laws.
- 1.2.11. “Engineering Technical Specifications for Outdoor and Indoor Building Telecom Equipment” for users promulgated by the National Communications Commission.
- 1.2.12. For this project, a certified technician with professional licenses shall be responsible for the design and signature-approval of related operations. It is also necessary for the relevant licensed contractors and various professional vendors to perform the installation and testing operations.
- 1.2.13. The design drawings and relevant materials shall be submitted to the relevant competent authorities (fire station, power company, telecommunications, NCC, water company, health department, water conservancy bureau, etc.) for review and approval.

2. Design Principles

2.1 System Design Elements and Principles

- 2.1.1 The planning and design principle is based on the fire protection regulations. The smart system must be able to prevent or safeguard the building from fire, water, or other disasters in advance and use the smart system to prevent harms or threats to the users by preventing criminal intrusions, vandalisms, or harmful gas leakages. The basic safety and disaster requirements shall include: fire protection system, anti-vibration system, waterproof system, anti-theft system, surveillance system, access control system, parking management, harmful gas control, and emergency rescue system.

- 2.1.2 In addition to being able to operate independently, the sub-systems of the safety and disaster prevention system shall have the central surveillance communication connection and system auto-activation disaster prevention functions. The system shall be integrated into a comprehensive management interface designed based on the information sharing and centralized management principle. The system shall be an open network structure. The protocols among systems shall apply the internationally common protocols such as BACnet, ModbusTCP/IP, and LonWorks. The remote monitor and test shall be available, and the communication system format may be provided depending on the client's need, for the purpose of follow-up expansion and integration/application
- 2.1.3 The nighttime disaster status and evacuation ability of the occupants must be taken into account to provide a simple, easy to understand, and clearly displayed smart disaster prevention and evacuation design.
- 2.1.4 The integrity of the fire-proof zones: based on the Construction Techniques Regulations, various fire-proof zones shall be integral. The running through part of the fire-proof zones (conduit rooms included) shall have the fire-proof filling system conforming with CNS14514 (applicable till September 9, 2016)/CNS 15814-1. Various fire-proof filling system methods shall pass the flaming test, and obtain the "Recognition Notice for New Technology, New Method, New Equipment, and New Material of Construction by MOI," issued and approved by the Construction and Planning Agency, MOI. Moreover, the system construction methods submitted for review must be valid throughout the information review submission and the construction completion periods.

3 Design Standards

3.1 Fire Prevention System Design Standards

3.1.1. Design Outline

- (1) The fire protection system shall include: Disaster prevention center or central surveillance office, automatic fire detection and alarm system, and fire system failure automatic report and recording system. In addition, the health and welfare rehabilitation type spaces shall have evacuation direction indicator light equipment or devices with indicator, sound, and lighting functions; and immediately auto-activate other disaster prevention facility equipment in order to achieve the smart

integrated damage mitigation and control functions.

- (2) The hallways of the various floors must establish evacuation indicator lights and no-passage lights. When an alarm occurs, evacuation directions shall be displayed immediately and the no-passage lights must be turned on for the fire disaster zones to facilitate personnel escape and evacuation.
- (3) The fire alarm emergency broadcasting system must have the service broadcasting function that can be divided into looping or whole region broadcasts. The system can play music during general times and broadcast fire alarms during an emergency.

3.1.2 Design Requirements

- (1) The fire alarm system must conform to the standard international communication protocol, be integrated with the central surveillance system, be able to display the alarm and disconnection messages for each detector on the central surveillance system floor plan, and can display the floor plan immediately when a fire alarm is triggered.
- (2) R type fire alarm receiver, detector
 - A. Must conform to the smart (R type) host machine approved by the National Fire Agency, Ministry of the Interior.
 - B. The smart (R type) host machine must be able to detect the disconnection and alarm status for each detector.
 - C. The smart (R type) host machine must conform to the standard international communication protocol and be integrated with the central surveillance system
- (3) Emergency Exit Light
 - A. LED type, AC/DC dual use.
 - B. Conform to fire regulations ◦
 - C. Contain sound-indicator emergency exit lights that can effectively guide people to evacuate immediately.

3.2 Waterproof System Design Standard

3.2.1 Design Summary

Waterproof system shall be installed at the basement and important machine rooms such as electric power room,

generator room, water pumping room, central surveillance room, etc. In addition to sounding an alarm, the leakage detectors must auto-activate the surveillance system or the water pumping equipment.

3.2.2 Design Requirements

- (1) The leakage detectors must be made of stainless steel.
- (2) The leakage detectors must have sensitivity adjustment function.
- (3) The leakage detectors must have leakage warning light indicators.

3.3 Anti-theft System Design Standard

3.3.1 Design Summary

- (1) The anti-theft system shall include automatic alarm equipment, infrared or microwave detection system, door position magnetic reed and broken glass detection equipment, etc., installed at important machine rooms or access points.
- (2) The anti-theft system can set or disable alarms according to location or time.
- (3) The system can test the operating status and signal transmission line of the automatic anti-theft alarm device, issue a fault alarm, and indicate the fault location immediately.

3.3.2 Design Requirements

- (1) Establish infrared, reed, or access door detectors to detect entry or opening of important spaces such as machine room, storage space, electric power room, generator room, etc.; and connected to the central surveillance system for display and recording.
- (2) Infrared shall adopt 360° human body perception and can set the sensitivity levels and action times.
- (3) The automatic alarm device shall adopt the telephone voice messaging and SMS notification methods to dial or send different messages or voice warnings according to different detection reports.

3.4 Fire Prevention System Design Standard

3.4.1 Design Summary

- (1) Provide a 3D virtual model for the entire building.

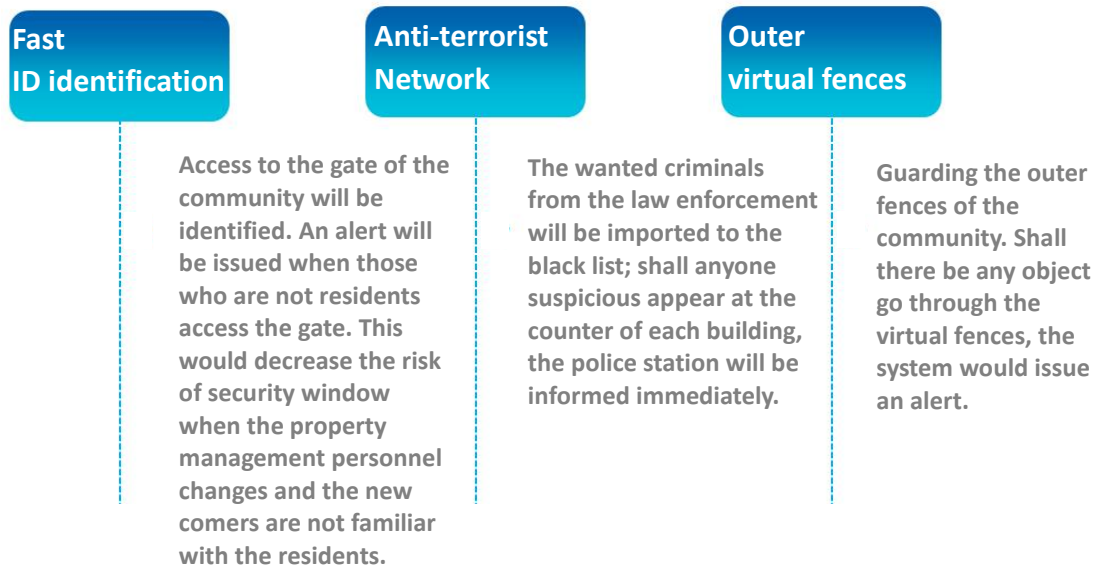
- (2) Use the 3D virtual model to design and analyze building and environmental safety, including: building environment safety within 100 m radius of the building and underground pipeline safety planning within 100 m radius of the building.
- (3) The overall planning and design needs must meet the data standards of the Construction and Planning Agency and the GPS coordinate precision must be within the error margin of 50 cm to facilitate property management and disaster relief.
- (4) The system must be able to directly import and construct the building model via AutoCAD or BIM; and integrate the security surveillance systems such as video monitoring, access control, and building automation to establish 3D centralized monitoring and management.
- (5) The video monitoring system includes: indoor and outdoor network cameras, full-features cameras, network video recorder NVR, and video central management system CMS software so the devices can transmit data via the high-speed fiber-optic network system and have a separate site backup-image storage function to ensure image data storage.

3.4.2 Design Requirements

- (1) The establishment locations include: underground parking lots; 1F access points; outdoor platform or roof terrace; and the stairs, elevators, and important machine rooms such as the central control room.
- (2) Webcam image must be FULL HD 1920 x 1080 30 fps or higher.
- (3) The camera's built-in microcrystalline array infrared light must reach 25 m or further.
- (4) Contain two-way voice compression format G.711/PCM, IVS image displacement detection, network mask, and image loss and anomaly alarm functions.
- (5) Conform to the Open Network Video Interface Forum (ONVIF) global open interface standard.
- (6) The CMS management software can integrate BIM or AutoCAD to directly import 3D images and place the camera icon at the areas where the user wants to directly display the live image.
- (7) The surveillance system can provide RTSP streaming or

international standard protocols, integrate the emergency rescue and fire alarm systems, and display the images immediately when an alarm occurs.

- (8) The system must auto-activate the anti-theft alarm and access control systems, be able to manually/automatically switch the specified monitors to show the live shot when necessary, and record automatically.
- (9) The monitoring screen of the system can be selectively combined; can be switched automatically or manually; and must display camera number, location, recording time, and other relevant information.



Graph 2-3 The Indicative Graph for the Smart Image of the Public Housing

3.5 Access Control System Design Standard

3.5.1 Summary of Design

- (1) Establish an access control system to perform personnel access control (including parking lot access and elevator floor control) to ensure the traffic route needs and permission/security

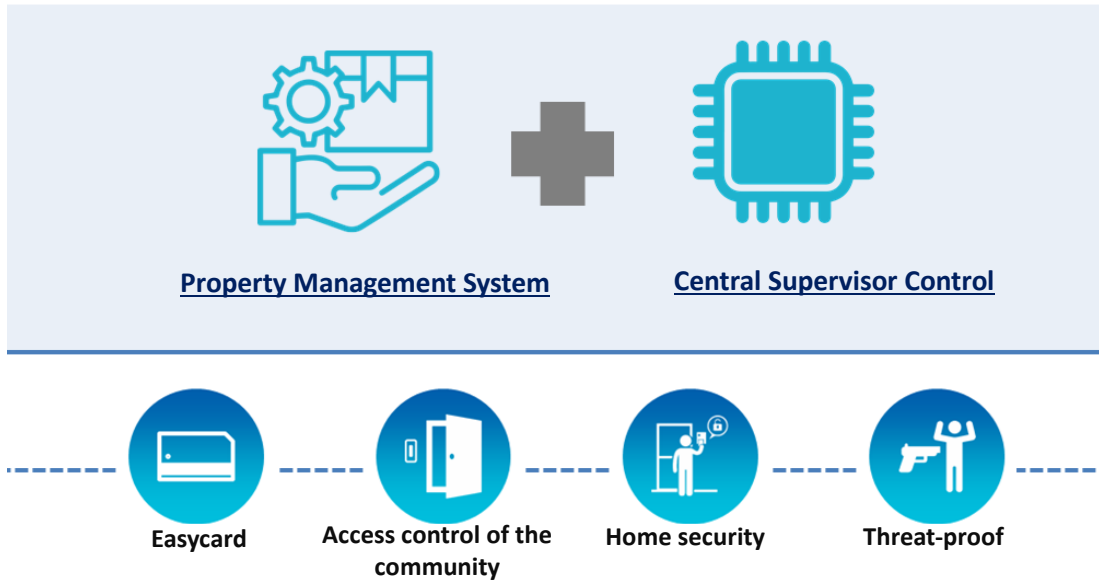
distinctions for all personnel, and provide traffic flow control according to the user's access permission.

- (2) The access control system must auto-activate the fire prevention system so the fire exits and security doors can be activated in the event of a fire.

3.5.2 Design Requirements

- (1) The installation sites include 1F access points, basement access points, elevator interiors (floor control), and key machine room doors.
- (2) The access control software must have WEB remote management functions.
- (3) The card readers and controller must adopt separate controls to prevent the electric lock from unlocking when the card reader is damaged.
- (4) The card reader must have chip card + fingerprint or chip card + vein detection dual function control with at least one international standard integrated communications protocol such as OPC, DDE, or ODBC.
- (5) The access controller must be able to expand the number of digital input/output modules, receive fire alarm messages, and directly auto-deactivate the door access control.
- (6) You can set the access zone for each card to effectively control access security for different zones and set the reachable floor for each card.
- (7) The system must auto-activate the key access control zones and the surveillance system in order to record live video and audio at the site.
- (8) The system must have instant control or set program control for the scope, access subject, and transit time of the access control zone.
- (9) The system must allow users to open or close access doors remotely.
- (10) The card reader must have an anti-coercion alarm function, can issue alarms directly to the central surveillance office via the system, and can be integrated with the central surveillance system.

◆ **Control the Key Access of the Community**



Graph 2-4 The Indicative Diagram for the Access Control of the Public Housing Life

3.6 Parking Management System Design Standard

3.6.1 Design Summary

The parking management system must have parking lot smart access automatic control including: bump-prevention barrier machine, parking lot exit/parking lot internal channel driving signal indication, vehicle access counter and display function, license plate number automatic recognition function, and e-Tag detection function.

3.6.2 Design Requirements

a. Electric Fence Machine

- (1) Smart positioning system that uses a microcomputer to control the barrier raising or lowering positions whereby the system can automatically detect the signal to stop the operation.
- (2) Contain smart resistance return device when the barrier touches an object during the lowering process, the system would immediately raise the lever to ensure human and vehicle safety.
- (3) Contain a variety of second-timing delay automatic closing settings.
- (4) Contain vehicle collision detection signal and circuit

abnormality self-test signal.

b. Long Distance e-Tag Reader

- (1) Detection frequency: must be able to read eTag electronic tags.
- (2) Valid distance detection must meet the on-site usage needs.
- (3) Must have IP65 or higher waterproof certification level.

c. License Plate Recognition System

- (1) Must be able to recognize different format vehicle plate numbers for motorcycles, small passenger cars (include taxis), pickup trucks, recreational vehicles, etc.
- (2) Contain counting function that can calculate the number of vehicles entering and exiting.
- (3) You can comprehensively search for license plates and successfully identify the plate when it is at any position in the screen, and must have the recognition accuracy rate of 95% or higher.
- (4) Integrate with the video surveillance system to record or take photos simultaneously.

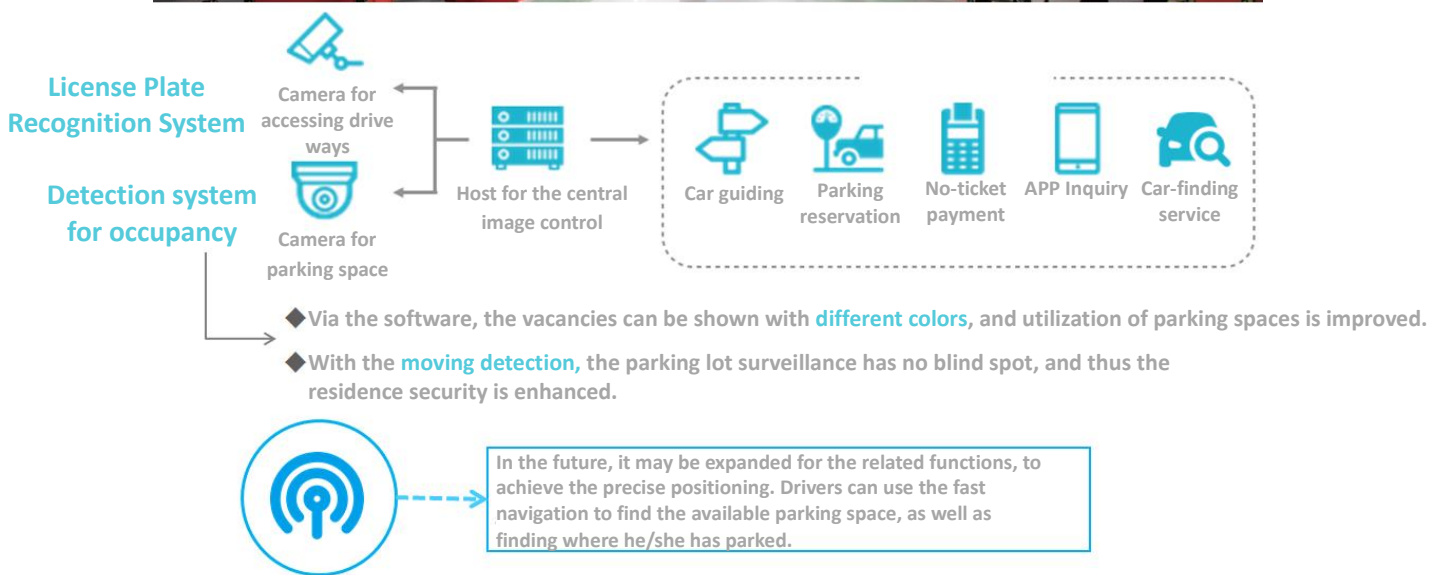
d. Vehicle Sensors

- (1) Use in conjunction with the induction coil to be able to adjust sensitivity and detect vehicles.
- (2) The external rotary switch can select multiple detection sensitivities.
- (3) The detector must have a two-color high-brightness LED indicator on the outside to display power and coil status or fault conditions.
- (4) If the coil returns to the normal state after a fault occurs, no re-start is needed, and the system can return to the normal detection status by itself. There is also a re-set switch to force a re-boot.
- (5) There are four coil frequency switches on the front panel of the detector for self-setting to eliminate interferences.

e. Vehicle Counter and Display

- (1) Number display: Must display at least 6 digits.

- (2) A controller that can detect and calculate the number of entering and exiting vehicles.
- (3) The counting detection controller must have RS485 or TCP/IP connection function and can connect to the central surveillance system.



Graph 2-5 The Indicative Diagram for the Parking Control of the Public Housing

3.7 Harmful Gas Prevention System Design Standard

3.7.1 Design Summary

The system must be able to detect various harmful gases such as gas and carbon monoxide, and auto-activate the gas elimination or dilution devices.

3.7.2 Design Requirements

- (1) Install a carbon monoxide and air quality detector in the basement parking lot that can activate the exhaust fan when the upper limit alarm value is reached.

- (2) The harmful gas detector must be connected to the central surveillance system and display the harmful gas detection data in the central control office or disaster prevention center.
- (3) Temperature and humidity detectors must be installed at confined meeting spaces such as conferee and leisure rooms, and must be able to auto-activate the air conditioners or exhaust fans when needed.
- (4) The temperature and humidity display sensors shall be able to display $0^{\circ}\text{C} \sim 50^{\circ}\text{C}$ temperature and 0% - 95% humidity, have digital value display panels, and RS-485 communication or 4~20ma output.
- (5) Gas detector alarm setting range: 1/10~1/4 L.E.L. (low gas explosion limit) must comply with the UL1484 regulations and have buzzer (automatic reset), LED flashing alarm, dry contact, and NO/NC output.

3.8 Emergency Rescue System Design Standard

3.8.1 Design Summary

- (1) Emergency rescue calling, flash horn, and intercom system must be established for toilets, stairwells, roof, and parking lots. The intercom host machine at the central control office must display the rescue request number position and the intercom call location, and can be integrated and shown in the central surveillance system's floor plan display.
- (2) Establish emergency rescue buttons or emergency phones that can contact outside: establish emergency call buttons or intercom devices for building elevators, direct access stairs, indoor parking lots, etc.
- (3) The emergency rescue system must be integrated with and able to auto-activate the video surveillance system (key entrances, parking lot, roof).
- (4) Must have the integrated user mobile phone signal connection and smartphone APP push notification features.

3.8.2 Design Requirements

a. Intercom host machine/auxiliary machine

- (1) Intercom auxiliary machines shall be made of stainless-steel material and adopt hands-free style.

- (2) The intercom host machine must display distress and call signals.
- (3) The main intercom and sub-intercom machines must be able to call and communicate with each other.

b. Flashing Horns

- (1) Alarm decibel (dB): 110.
- (2) Alarm mode: flash alarm, flash + sound.

2.Information Communication

1. General Design Principles

Smart methods shall be used in terms of information communication to provide a comprehensive network within the community and build a community-safe information exchange structure to cover the entire community, and use the fiber-optics to home service to provide comprehensive information communication services.

1.1 Definition of Main Items

- 1.1.1.Public mobile communication system: The public mobile communication system of the smart community shall comprise telecommunications operator interface services that offer seamless communication for the community.
- 1.1.2.Security mechanism and information security protection mechanism system: Refers to the security protection mechanisms for the relevant systems within the community, and the response and design principles in case of power outage, security breach, etc.
- 1.1.3.WAN access (fiber-optics to home network system): Internet interface design principle for the residential units, public areas, and spaces used by the participating units within the smart community.
- 1.1.4.Establish wireless LAN for the public areas: Provide Wireless LAN for the public areas of the smart community.
- 1.1.5.Audio and video intercom system (video call, open door, and guard room three-way visitor communication): The communication intercom system in the smart community shall include communication intercom services for the various

residential units, central control centers, disaster prevention centers, gates, and the various management desks within the smart community.

1.2 Scope of Application

Spaces used by the residential units, public areas and participating units.

2. Design Principles

- 2.1. Establish wireless routers at the public areas to provide wireless area network via the building's Internet. Moreover, the building's network can also be used to provide Taipei Free services in the future if needed.
- 2.2. Each residential unit shall be equipped with color video intercom security and emergency rescue host machine with emergency rescue request buttons connected to the unit's main entrance door and front (landscape) balcony, rear (work) balcony door/window reed switch, kitchen gas leak detector, living room, and master bedroom (include barrier-free residential restroom) that can transmit anti-theft, gas leak detection emergency rescue, and other alarms. The system shall be connected to the central control center/disaster prevention center management host machine computer and entrance hall management office auxiliary machine computer to display the residential address that triggered the alarm. (If the base has an individual building, the management host machine shall be established at the central control center/disaster prevention center, and the auxiliary machine shall be established at the foyer management office. If the base has two or more buildings, the host machine shall be established at the central control center/disaster prevention center, and the auxiliary machines shall be established at the foyer management offices of each building.
- 2.3. All the important equipment in the building shall be integrated into the surveillance automation system in order to quickly and reliably monitor and control the condition of each equipment. In addition to effectively prevent improper use, the method can also prevent emergencies, accidents, etc.
- 2.4. The surveillance and monitoring related signals from the fire prevention, central surveillance, security access control, anti-theft, smart community, and other systems shall be transmitted to the community management center. It is also necessary to establish management personnel for the relevant equipment for surveillance and monitoring to effectively control the various information in the community and facilitate management. In addition, the signals must

be consolidated and uploaded to the community Cloud for browsing, surveillance, and monitoring by remote browsers.

- 2.5. Establish the main community management intercom host machine in the community management center that can communicate with the color video intercom security and emergency rescue host machine in the units. When the resident is not in the unit, the system can transfer the video call to the resident's smartphone. When no one answers the main community management intercom host machine terminal, the call can be transferred to the manager's smartphone for a video call. The caller needs to pay the phone bill or the host machine must add an outside line or a network card.
- 2.6. Establish the various system host machines at the central control center/disaster prevention center on the base and set up the auxiliary machines at the management offices of each base to facilitate future community maintenance and management. (If the base has an individual building, the management host machine shall be established at the central control center/disaster prevention center, and the auxiliary machine shall be established at the foyer management office. If the base has two or more buildings, the host machine shall be established at the central control center/disaster prevention center, and the auxiliary machines shall be established at the foyer management offices of each building.
- 2.7. The disaster prevention center/central control center and the entrance hall management office management personnel seats (shall include seats and computers, printers, other office equipment, furniture, and sufficient space). Establish smart central surveillance server and screens that connect all the equipment and systems together (must provide energy efficiency visualization, safety surveillance, police notification, and fire notification functions).
- 2.8. Provide overall planning for the uninterruptible power equipment and generator circuit power supply connections needed for light current, fire prevention, and other systems.
- 2.9. Community activities and property management needs can be considered for areas around the central control center/disaster prevention center of the base to combine community services planning (include reservation for public outlets and various networks). Each residential unit reserves the community public facilities and community services via the color video intercom security and emergency rescue host machine in the unit or a smartphone.
- 2.10. Set up detection system connection devices at each base to keep

each household safe, and transmit the anti-theft signals to the disaster prevention center/central control center to provide emergency support services to the community households.

- 2.11. Provide a visitor service system for visitor reception management services so visitors can leave audio or video messages or login the delivery or reception of mail parcels. The system can immediately notify the residential unit via the color video intercom security and emergency rescue host machine or a smartphone.
- 2.12. Provide a mail parcel mailbox management system to login the delivery or reception of mail parcels and notify the residents immediately unit via smartphone. Residents can also use the smartphone to check the relevant management messages instantly.
- 2.13. Collaborate with the local gas companies to establish the gas system: Reserve the signal piping and spaces needed for microcomputer gas meters, seismographs, shut-off valves, and rear balcony gas detectors.
- 2.14. The underground parking lot must install mobile phone signal improvement system equipment in order to achieve seamless reception.
- 2.15. The contractor shall be responsible for the various mobile phone (smartphone) APP functions described in this case, the APP must support Android or iOS operating systems to ensure versatility, and the APP shall be openly available for the residents to download and install.
- 2.16. A firewall shall be uniformly established for external networks of each system in the smart community to ensure information security. If the smart community has multiple bases with separate network settings, a firewall shall be established for external networks.

3. Design Standards

3.1 Public Mobile Communication System Standards

- 3.1.1. The underground public areas, parking lot, residential units, and various construction participation unit spaces must install mobile phone signal improvement system equipment in order to achieve seamless reception.
- 3.1.2. The mobile phone signal improvement system must support at least three major telecom service providers in the market.
- 3.1.3. The mobile phone signal improvement system shall provide 4G

or the system can upgrade to 5G in the future full-band services.

3.2 Security Mechanism and Information Security Protection Mechanism System Standards

- 3.2.1. Provide overall planning for the uninterruptible power equipment and community emergency power circuit (generator) connections needed for the light current, fire prevention, and other systems.
- 3.2.2. Access control, CCTV, emergency intercom system, security intercom management system, firewall, and central backbone network equipment shall be connected to the emergency power circuit (generator) and be equipped with an uninterruptible power system to ensure normal operations even when the power is interrupted.
- 3.2.3. The residential units' color video intercom security and emergency rescue host machines shall be connected to the community emergency power circuit to ensure the security and intercom functions are functional in during an emergency.
- 3.2.4. The security intercom management host machine and the other auxiliary machines shall be able to support each other to ensure that the security mechanism can still operate normally if one equipment malfunctioned.
- 3.2.5. A firewall shall be uniformly established for external networks of each system in the smart community to ensure information security. If the smart community has multiple bases with separate network settings, a firewall shall be established for external networks.
- 3.2.6. The firewall shall be installed for the network server room of the smart community, central control center, or disaster prevention center according to the design of the various smart communities.
- 3.2.7. If the various systems in the smart community are connected to the Internet, they shall be incorporated within the protection of the firewall.
- 3.2.8. The overall processing efficiency of the firewall shall achieve over 1 Gbps performance and 400 Mbps of encryption/decryption performance at full load.
- 3.2.9. The firewall shall be equipped with intrusion detection system (IDS) and intrusion prevention system (IPS) to provide instant protection.

3.3 WAN Access (fiber-optics to home network system) Standard

- 3.3.1 Information outlets shall be established at each living room and bedroom of the residential units. Information outlets shall be established at the public spaces in the central control center/disaster prevention center, foyer management office, management center, and the various management spaces or other designated areas.
- 3.3.2 Network outlets shall be reserved at the walls surrounding the user areas for public areas or spaces used by visiting units. The locations of the reserved outlets must meet the actual needs and the space requirements.
- 3.3.3 The network server room shall be located at the basement level. The reserved light current pipelines for each level shall be connected via cable trays through the vertical main pipe from the telecommunications room to the light current pipelines for each level. The fiber-optic wires shall be laid through the vertical main pipe to the various light current server rooms, and then laid separately to the wire integration box of each household using 2-core fiber-optic wires. The internal containment shall conform to the fiber-optics to home principle. The horizontal pipeline shall connect the CAT-6 network cable from the wire integration box in the household to the terminal socket outlet to satisfy the information and communication needs.
- 3.3.4 Establish backbone network switches, firewalls, routers, and marginal switches on each floor for use by the central control center/disaster prevention center and other light current systems (surveillance, access control, monitoring, and other systems) in collaboration with the integrated wiring needs.

3.4 Public Area WAN Establishment Standards

- 3.4.1. Establish wireless routers at the public areas to provide wireless area network via the building's Internet. Moreover, the building's network can also be used to provide Taipei Free services in the future if needed.
- 3.4.2. Establish a wireless network base station at the first-floor foyer area of each building. The wireless network base station shall be able to connect back to the wireless network manager to exert unified control, prevent unauthorized people from using the community network, and provide a network management system that is compatible with the network equipment in order to perform central management. Subsequent maintenance and

management convenience shall be considered when selecting the wired (including routers) and wireless network equipment systems.

3.5 Audio and Video Intercom System (Video Call, Open Door, and Guard Room Three-way Visitor Communication) Standards

- 3.5.1. This system provides the color video intercom and security anti-theft functions for the visitors, residents, foyer management office, central control center/disaster prevention center.
- 3.5.2. Each residential unit shall be equipped with color video intercom security and emergency rescue host machine with emergency rescue request buttons connected to the unit's main entrance door and front (landscape) balcony, rear (work) balcony door/window reed switch, kitchen gas leak detector, living room, and master bedroom (include barrier-free residential restroom) that can transmit anti-theft, gas leak detection emergency rescue, and other alarms. The system shall be connected to the central control center/disaster prevention center management host machine computer and entrance hall management office auxiliary machine computer to display the residential address that triggered the alarm.
- 3.5.3. Each residential unit shall be equipped with a color video intercom security and emergency rescue host machine to ensure communication and video quality. The video must have the video quality of 720P or higher to ensure video call quality.
- 3.5.4. An outdoor machine containing a camera and intercom functions shall be established at the first-floor entrance for each building. The video intercoms established in the residential units shall be able to view the display images, see the visitors clearly before opening the front door, or use the intercom system to talk with the visitors. In addition, visitors can use the outdoor intercom auxiliary machine to verify the visitors before opening the door to ensure residential safety.
- 3.5.5. Each residential unit shall be equipped with a color video intercom security and emergency rescue host machine.
- 3.5.6. The various residents can use the color video intercom security and emergency rescue host machines equipped in the units to perform two-way video calls.
- 3.5.7. An emergency button shall be established in the bathroom of barrier-free units according to the Barrier-free Facility

Establishment Specifications.

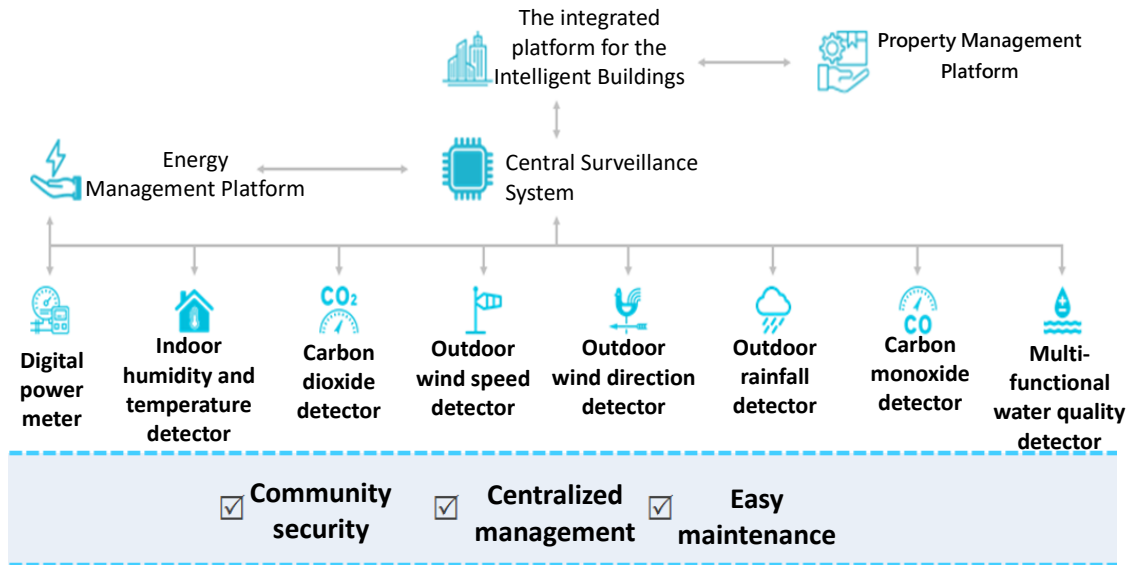
- 3.5.8. Barrier-free toilets in all areas (residential units, public toilets, long-term care facilities for the elderly, community public babysitters, etc.) shall establish the emergency button according to the Barrier-free Facility Establishment Specifications.
- 3.5.9. Establish an emergency call button at each floor's escape ladder and establish an intercom machine and emergency rescue button equipment at the outdoor area of the top floor, which shall connect to the central control center/disaster prevention center's management main machine, the foyer management room's auxiliary machine, and display the location to facilitate contact with the management personnel in case of an emergency.
- 3.5.10. Once the security door access on the top floor is opened, the surveillance camera shall be activated and an alarm shall be issued to the central control center to remind the management to monitor the area and prevent the poor and sick vulnerable groups from suicide attempts.
- 3.5.11. Establish an indoor intercom and emergency call button at the appropriate distance and location in the parking lot. An outdoor intercom shall be installed at the parking lot access point, which shall connect to the central control center/disaster prevention center's management main machine and the foyer management room's auxiliary machine and display the location.
- 3.5.12. Provide a visitor service system for visitors to check the visit records, receive reception management services, or leave video or audio messages.
- 3.5.13. Provide a mail parcel management system to login the delivery or reception of mail parcels and notify the residents instantly via personal computer, the color video intercom security and emergency rescue host machine, or smartphone. Residents can also use a personal computer, the color video intercom security and emergency rescue host machine, or a smartphone to instantly check the relevant management messages.
- 3.5.14. Cable Trays used for the vertical pipeline.
- 3.5.15. The color video intercom security and emergency rescue host machine must be able to switch the language and shall provide at least Traditional Chinese and English options.
- 3.5.16. Because the color video intercom security and emergency

rescue host machine will be used by elderly people for this project, the embedded box adopted must be standard single box, double box, or octagonal box to facilitate repair and replacement after the embedded box has stopped production or been damaged to avoid the problem where a single unit cannot communicate with the central management center.

3.5.17. Residents can use a personal computer, a color video intercom security and emergency rescue host machine, or a smartphone to obtain the relevant Open Data messages provided by the government within 500M~1KM from the location of this case to check the real-time U-Bike, bus information, weather information, cultural arts activities, parking lot, water stoppage, and road construction related information.

3.5.18. Each residential unit shall be equipped with color video intercom security and emergency rescue host machine with emergency rescue request buttons connected to the unit's main entrance door and front (landscape) balcony, rear (work) balcony door/window reed switch, kitchen gas leak detector, living room, and master bedroom (include barrier-free residential restroom) emergency rescue buttons; which will display the alarm category and residential address that triggered the alarm. (If the base has an individual building, the management host machine shall be established at the central control center/disaster prevention center, and the auxiliary machine shall be established at the foyer management office. If the base has two or more buildings, the host machine shall be established at the central control center/disaster prevention center, and the auxiliary machines shall be established at the foyer management offices of each building.)

(3) Managers can instantly check whether or not the color video intercom security and emergency rescue host machines in the various residential units are working properly from the general management center to ensure that the residential unit is safe if its main or auxiliary color video intercom security and emergency rescue host machine in a residential unit cannot operate or is disconnected from the network.



Graph 2-6 The Indicative Diagram for the Central Control System Consolidated Platform for the Public Housing

III. Building Automation

1. General Design Rules

Use smart means to effectively collect the management data via the relevant equipment in the smart community and provide smart visual interface to display the analyzed data in order to achieve system management automation, smart reminders, smart auto-activation, disaster prevention, and action-based community management objectives.

1.1 Definition of Main Items

1.1.1. Central surveillance system: Integrate all important equipment in the building into the surveillance automation system to quickly and reliably auto-activate the surveillance system and control the status of each equipment, and incorporate the various types of electromechanical and security equipment systems into the surveillance records to establish an asset management system. It is anticipated to use functional demand assessment and planning as well as management organization pattern and organization to establish the annual equipment management and maintenance plan as well as the long-term repair plan.

1.1.2. Remote surveillance system: The remote surveillance system in the smart community is primarily used to collect the Taipower Advanced Metering Infrastructure (AMI), self-established digital

power meter, and tap water operator's digital water meter information. The relevant information can be accessed via the central surveillance system, color video intercom security and emergency rescue host machines in the various residential units, and the residents' smartphones.

1.1.3. Electronic meter: Refers to smart meter or digital meter that can accurately display the power usage information through a digital display. It is also equipped with communication functions such as RJ-45 or RS-485 that can transmit the data to other systems.

1.1.4. Smart water meter: Refers to an instrument that measures the volume of water flowing through a water meter via electronic induction, and can use the RJ-45 or RS-485 communication methods to transmit the digitized data to other systems (such as the Taipei Water Department).

1.2 Scope of Application

Spaces used by the residential units, public areas and participating units.

2. Design Principles

2.1. Add an electronic meter behind the Taipower's meter to transmit the signal to the central surveillance system and then to the various central control centers of the base to facilitate energy system management. In addition, people can also connect their personal computer or a smartphone to the network to review the electricity usage status.

2.2. The central surveillance system collects all monitoring signals from the distributed field controller (DDC/PLC), and the central surveillance and control software shall provide the Chinese BROWSER browsing operation interface. The graphic control software for the project shall be developed via commercially available standard development software. The data format (which shall contain at least XML and ACCESS) can be browsed, monitored, and controlled via a private network (TCP/IP) remote browser. At least 3 browsers (*e.g.*, IE, CHROME, and FIREFOX) can be used for remote connection monitoring. The host machine shall be able to connect to the network and can use the JSON, XML, and EXCEL interface method via OPEN API to release the data from the data structure delivery system to the public housing management agency.

2.3. Collaborate with the local gas companies to establish the gas system: Reserve the signal piping and spaces needed for

microcomputer gas meters, seismographs, shut-off valves, and rear balcony gas detectors.

- 2.4. Use the digital water meter of established by the Taipei Water Department and API to upload the households' water usage data to the Taipei Water Department Information Center via the Internet. The water usage condition can also be used to detect water leakage status to effectively control and protect the water resource. The water usage information for the various residential units, public spaces, or construction participation unit spaces indicated by the smart water meters can be viewed from the central control system, color video intercom security and emergency rescue host machines in the various residential units, and the smartphones from the various household/space units.

3. Design Standards

- 3.1 Incorporate Electromechanical, Fire Prevention, Air Conditioning, Water Supply and Drainage into the central surveillance System Standards

- 3.1.1. The various important equipment in the building shall be integrated with the surveillance automation system in order to quickly and reliably auto-activate the surveillance system and control the condition of each equipment. In addition to effectively prevent improper use, the method can also prevent emergencies, accidents, etc. In addition, all types of electromechanical and maintenance equipment systems shall be included in the monitoring records to establish an asset management system. It is expected to use the functional needs assessment planning as well as management organization type and organization to establish an annual equipment management and maintenance plan and a long-term repair plan.

- 3.1.2. The central surveillance system collects all monitoring signals from the distributed field controller (DDC/PLC). the central surveillance software shall have Chinese interface; support BROWSER browsing (MENU BARM, TITLE BAR, DIALOG BOX, etc.); the control interface must be commercially available standard development software; and the data can be remotely browsed, monitored, and controlled via IE through a private network (TCP/IP).

- 3.1.3. The host machine shall be able to connect to the network and can use the JSON, XML, and EXCEL interface method via OPEN API to release the data from the data structure delivery

system to the public housing management agency.

- 3.1.4. Use the centralized project monitoring to achieve the decentralized control and centralized manage effect. Integrate the various systems to achieve network Cloud, and the system can be integrated with other subsystems via Modbus/TCP communication.
- 3.1.5. Construct a community management Cloud so the community integrated system equipment data (visitor service systems, security access control systems, energy management systems, community information, etc.) can be uploaded to the community Cloud. Assign permissions and provide information query services to the community residents, management company, public housing management agency personnel/units.
- 3.1.6. The community cloud shall provide the following functions (including, but not limited to)
 - (1)Visitor service system: The community management center can transmit the visiting, voice message, video message, mail parcel, and other information via the Cloud instantly to the color video intercom security and emergency rescue host machine and the residents' smartphones so the residents can check and grasp their household status in real-time.
 - (2)Security access control system: This system can instantly transmit the family member community access information to the color video intercom security and emergency rescue host machine and the resident's smartphone via the Internet so residents can check and grasp their household access security in real-time.
 - (3)Energy management system: Residents can use a personal computer via the community Cloud through the Internet. In addition, any energy usage anomaly messages shall be provided to the resident and the community management center in order to grasp the status in real-time in order to achieve energy conservation and maintain community safety. The community public energy related data can be uploaded to the residents, management companies, public housing agencies via the community Cloud for review and record keeping.
 - (4)Community information: The community Cloud can be used to transmit the various information and system data/messages to the residents and the relevant units in real-time for review,

and provided the information to the management companies and public housing agencies via the community Cloud for review and record keeping.

- (5) Mail parcel management system: Provide a mail parcel management system to login the delivery or reception of mail parcels and notify the residents instantly via each unit's intercom security and emergency rescue host machine or smartphone. Residents can also use the unit's intercom security and emergency rescue host machine or a smartphone to instantly check the relevant management messages.
 - (6) Repair maintenance system: Residents can use the property management system and smartphones to address the community's internal maintenance and repair needs (including text, pictures, live photos, or live videos), notify the relevant management personnel, and check the repair status by the management personnel in real-time. Managers can also use a smartphone or smart device to report the repair status (including text, pictures, live photos, or live videos) in real-time for system inquiry.
 - (7) Construction material resume system: Residents can use a personal computer, property management system, or a smartphone to check the materials, equipment, and construction material related information (model number, vendor information, etc.) for materials used in the community; and the system can also provide simple repair teaching videos to facilitate follow-up repair and maintenance.
 - (8) Community merchant feedback and interactive messages: The community merchants can use this platform to send the relevant information feedback to the community (community-specific feedback coupons, community event videos, etc.). Residents can use a personal computer, property management system, or smartphone to print, scan QR Code, or display coupons as a way for merchants to provide feedback and interactive message credentials.
- 3.1.7. The community management Cloud software must be general standard communication protocol software that uses an OPEN API to interface with JSON, XML, and EXCEL to provide an open data framework in order to facilitate browse and query by the relevant personnel.
 - 3.1.8. Establish a Central Surveillance System for the Central Control Center/Disaster Prevention Center

- (1) Safety management system and property management system integration and scope of surveillance: Monitor the public power, water supply and drainage, water level, ventilation, emergency power supply, and fire prevention equipment; immediately notify the management personnel's smartphone or smart device when a problem occurs with the system; and be able to check the relevant information in real-time.
- (2) Centralize the management for fire alarms, emergency broadcasts, video intercom video intercom security and emergency rescue system equipment, access control, and security surveillance to ensure fire and access security for the community; and provide timely support and care as well as issue notifications to the managers' smartphones or smart devices so they can grasp the latest situation.
- (3) Detect the tap water quality and the water levels of the inlet tank, gravity tank at the roof, sewage pool, wastewater pool, rainwater recovery pool, and fire-fighting pool. Show the water level position and Issue an alarm when the water level is lower than the minimum, exceeds the maximum, or in case of an abnormal overflow.
- (4) Detect the lid of the tap water inlet tank and gravity tank at the roof to prevent the community's household water from being maliciously contaminated by people and to ensure water safety.
- (5) Detect the lowest oil level of the emergency generator, display the abnormal position, issue an alarm, and notify the relevant management personnel's smartphone or smart device to request immediate assistance and handling.
- (6) Detect the operation of the sewage pump, waste water pump, rainwater recovery pump, lift pump, fire pump, foam pump, water spray pump, drainage pump, exhaust fan, intake fan, exhaust fan, and emergency generator in the public areas. There must be a fault trip report function so a notification can be transmitted to the relevant management personnel's smartphone or smart device to request immediate assistance and handling when a malfunction occurs.
- (7) Detect the voltage, current, power information of the high (low) pressure main power distribution panel. There must be a fault trip report function so a notification can be transmitted to the relevant management personnel's smartphone or smart device to request immediate assistance and handling when a

malfunction occurs.

- (8) Detect the parking lot carbon monoxide concentration level and activate the support service system immediately when the concentration exceeds the standard value.
 - (9) Establish a temperature and humidity detector on the roof and transmit the signals to the central control center, the intercom video intercom security and emergency rescue host machine, and the residents' smartphones to remind the users of the outdoor climate changes.
 - (10) Controllable water irrigation (spray) system for the courtyard and roof greenery.
 - (11) The fire-fighting system shall be linked to the central control system. When the fire-fighting system is triggered, the access control will be disabled automatically for the evacuation, and the air-conditioning and ventilation system for the public space will be switched off automatically to prevent the fire from expanding.
 - (12) The central surveillance system's ability to auto-activate other subsystems shall at least meet the following requirements: Each associated monitoring and control device must be connected to the system to effectively manage the power usage conditions, and achieve the energy conservation and carbon reduction objectives.
 - (13) Use distributed field controllers (DDC/PLC) and transmit the data to the central control center/fire prevention center via the fiber-optic network.
 - (14) Provide surveillance network equipment, optical-to-electrical transducer, and surveillance network connection.
 - (15) Lighting and nighttime landscape lighting in public areas, parking lot, etc., shall adopt lighting control combined with computers to achieve complete automation in order to conserve energy.
- 3.1.9. The central control center/disaster prevention center must reserve the spaces needed for equipment connection or at least operate the systems needed for this case (this system may be adjusted according to the building space configuration and management model, and the cost shall not increase or decrease) and the managing personnel's seats for the community central control center/disaster prevention center of the base.

- 3.1.10. Establish the smart central control host machines, screens, and connect all the equipment and systems for community disaster prevention center/central control center of the base (must provide energy efficiency visualization, safety surveillance, police notification, and fire notification functions; and auxiliary machines must be established at the manager's office).
- 3.1.11. The fire prevention system host machine, power, lighting, water supply, drainage, automatic sprinkler, digital surveillance video recorder, monitors, and intercoms (for common entrances and exits), and roof surveillance, etc., must be incorporated into the central surveillance system plan.
- 3.1.12. Establish a display at the appropriate position of the first-floor lobby and connect it to the application system host machine to display convey information of the community. It should be used as a community bulletin board to government decree announcement board for the residents. All the information and telecommunications wiring must be fully integrated to meet the basic information and telecommunication construction project standards for Intelligent Buildings.
- 3.1.13. Establish a public energy (include solar power and electricity usage) usage bulletin at the first-floor foyer to let the residents understand the community's public electricity consumption status in real-time and achieve energy visualization and optimal control system for energy control and conservation.
- 3.1.14. Provide overall planning for the various light current systems and the uninterruptible power system must be connected to the generator circuit.
- 3.1.15. Community activities, property management needs, and community service planning can be considered for areas around the community management/disaster prevention center (include reservation for public outlets and various networks).
- 3.1.16. The electricity consumption status of each household shall be transmitted back to the central surveillance system via HEMS so residents can check the household electricity consumption status via the community cloud.
- 3.1.17. Other equipment that must be included in the central surveillance system.

- 3.1.18. The items above must combine the smart green building, smart community, and property management functions to provide comfortable living spaces to the residents and satisfy their needs.
- 3.1.19. The central surveillance system must adopt a Web-based operating environment and international or industrial standardization integration platform, can clearly display the graphic visual control icons at the relevant positions of the equipment, have the remote emergency notification functions, and must be integrated with the subsystems. The system must at least connect the surveillance cameras, access management, security, intercom, parking management, emergency rescue, and other subsystem functions.
- 3.1.20. Provide a wide range of drivers to communicate with the automation devices without the support of any third-party software and must include globally well-known brand equipment drivers such as Honeywell, Siemens, Schneider, GE, Mitsubishi, and Omron. No optional fees are required, and the open platform must make it feasible for system-wide integration.
- 3.1.21. The instant operating system must be able to multi-task, and provide multi-task instant program execution and application program development.

Table 2-1 The Subsystem of the Construction Automation

Subsystem Name	Auto-activation
Power Surveillance	Energy management (including large and small public power distribution panels), contract capacity monitoring and control, ventilation surveillance, lighting surveillance, sanitary water supply, and drainage pump surveillance (electricity consumption record and analysis).
Air conditioning ventilation surveillance	Fire prevention system (must be able to power off the air conditioning and ventilation system during a fire incident)
Lighting surveillance	Energy management (power consumption record and analysis)
Sanitary water supply and drainage	Water level management, power surveillance (power consumption record and analysis)

Subsystem Name	Auto-activation
surveillance	
Air ventilation surveillance	Energy management (power consumption record and analysis) and indoor environmental quality surveillance must have mutual auto-activation (at least auto-activate the carbon monoxide detection at the basement).
Elevator surveillance	and fire prevention system and surveillance auto-activate each other (in case of a fire accident, at least the general elevators must be stopped and the emergency elevators can stand-by at the evacuation floor).
Access control system surveillance	System and fire prevention system must auto-activate each other
Surveillance System	Public area and emergency rescue systems must auto-activate each other
Emergency Rescue System	Public area, surveillance, and the units' emergency rescue systems must auto-activate to each other.
Intercom System	If the outdoor and basement cameras captured a situation. The central surveillance or management office can make a call through broadcasting.
The fire prevention system surveillance	System and the air conditioner, air ventilation, elevator surveillance, and access control systems must auto-activate each other
Energy Management System	Must be connected with the lighting, air ventilation, sanitary water supply and drainage pump surveillance and control systems

3.2 Remote Monitoring System Standards

3.2.1. The tap water is provided via the main pipe to the water tower at the roof, and the smart water meter for each household is established at the roof layer in principle (households, shops, construction participation units, etc.). Then the water pipes of each household are arranged at the back (work) balcony duct and connected to the water equipment. Before the water supply pipes enter each household, gate valves must be established to facilitate adjustment and system maintenance in the future, and the residential unit number shall be marked in series and set according to the relevant regulations of the Taipei Water Department.

3.2.2. Establish smart water meters: (1) The water consumption of each household can be uploaded to Taipei Water Department

via the Internet; (2) Water leakage can be detected; (3) Flow reversal information can be provide; and (4) The daily, weekly, monthly, quarterly, and annual water usage information can be recorded and queried. The preceding functions are available from the central control system, the color video intercom security and emergency rescue host machines in the residential units, and the households.

- 3.2.3. The system must collaborate with the tap water design to reserve the transmission pipelines and spaces for smart water meters, and jointly complete the water delivery and data transmission procedure with Taipei Water Department.
- 3.2.4. The smart water meter can obtain water usage anomaly information through the central control system and actively notify the central control system and the smartphones of the various households/space application units.
- 3.2.5. Collaborate with the local gas companies to establish the gas system: Reserve the signal piping and spaces needed for microcomputer gas meters, seismographs, shut-off valves, and rear balcony gas detectors.
- 3.2.6. The computerized gas meters shall: (1) Combine with the detector to have automatic cut-off function, (2) Immediately cut-off the gas when the gas flow suddenly increases, (3) Cut-off the gas when the usage time exceeds the set time, (4) Immediately cut-off the gas during a major earthquake of magnitude 5 or higher.



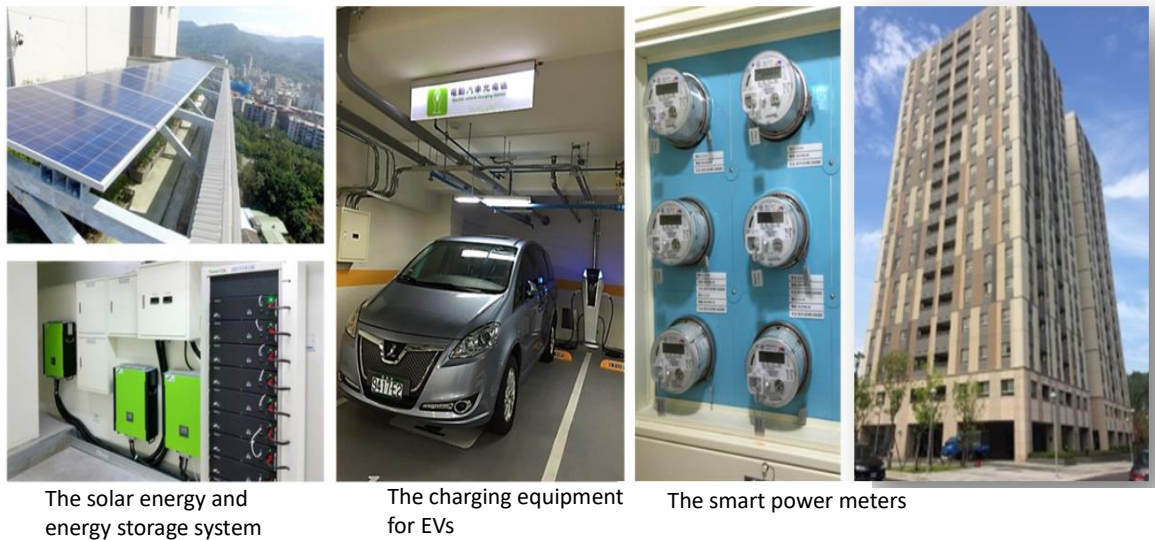
Providing the living environment with the **close residence management and life services to the residents**

Graph 2-7 The Indicative Diagram for the Cross Platforms of the Smart Park in the Public Housing

IV Energy Conservation, Energy Generation, and Smart Power Grid

1. General Design Rules

Refers to the planning and design of energy-conservation and low-carbon electricity and power generation equipment for buildings while performing the surveillance, control, recording, and management operations to enable the building equipment and systems to achieve higher energy consumption efficiency during installation and operations. The designs must also consider subsequent update development and expansion needs. Primarily used to expand the green energy of the building, improve the electricity use efficiency and willingness to save electricity for household and public electricity consumption, collaborate with the power company demand side's grid management measures, and adjust the public housing power usage during peak electricity usage times.



Graph 2-8 The Smart Power Grid for the Public Housing in Hsing-Lung D1 Area

1.1 Definition of Main Items

1.1.1 Energy Conservation

Buildings should give procurement priority to electricity, water appliances, and equipment that comply with the energy-saving label,

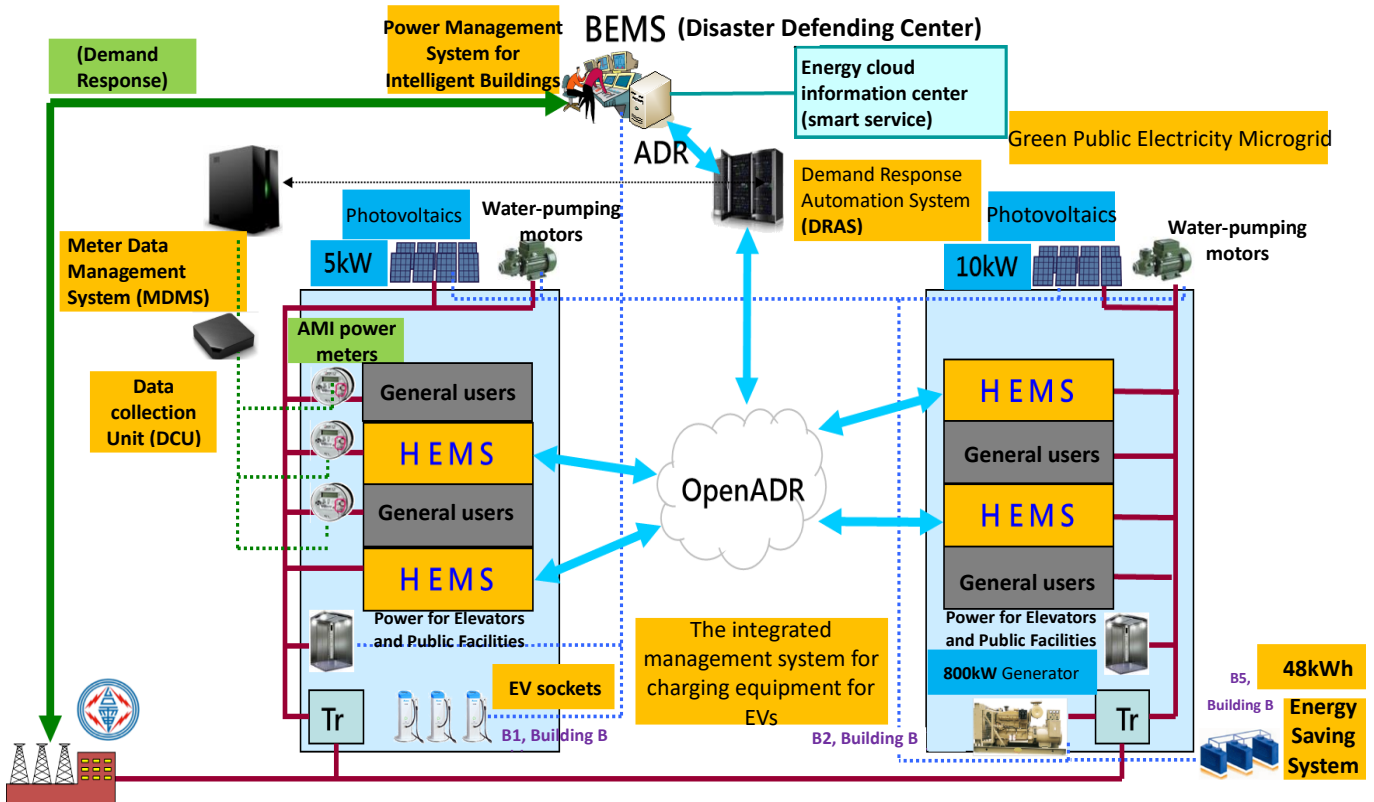
environmentally friendly label, or water-conservation label. The purpose of building energy conservation is to improve the building electricity consumption efficiency. In addition to lower the energy costs, the efforts can also reduce carbon dioxide emissions, promote environmental sustainability, and slow down the global warming trend.

1.1.2 Energy Generation

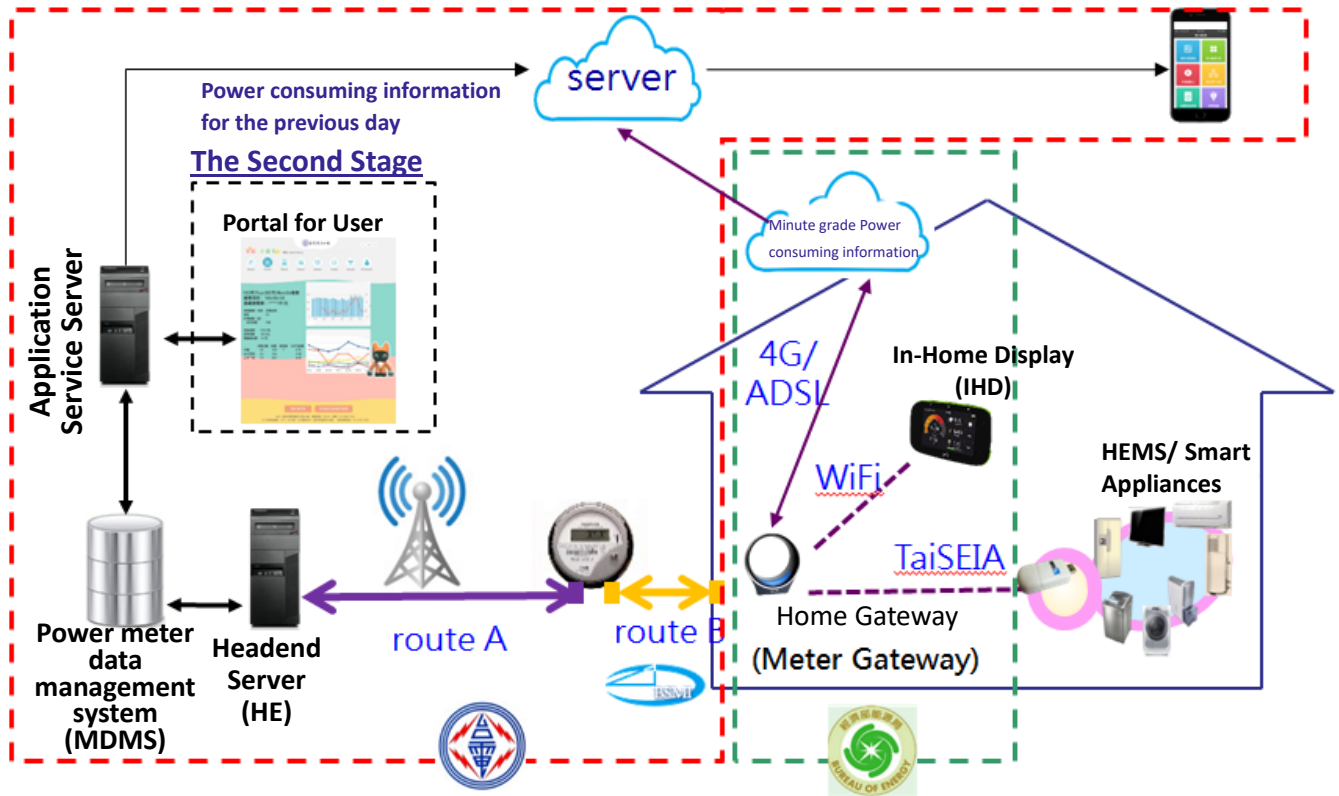
Under the premise of not affecting the use of existing spaces, safety and aesthetics, and regulations; consider the natural environment conditions to establish decentralized green energy generation equipment with appropriate device capacity such as solar photovoltaic power generation equipment, wind power generation equipment, etc.

1.1.3 Smart Power Grid

Use information, communication and automation technologies to establish user side integrated power monitoring and management network; and emphasize on automation, security, and close cooperation between the client and supply sides. Connect the various data collection devices in the building with green energy-generating equipment, electrical equipment, and energy storage systems; and use human-machine interfaces to achieve visualization, energy consumption surveillance, power consumption scheduling, and smart scenario setting functions to facilitate effective electricity management for public areas and individual household units.



Graph 2-9 The Smart Power Grid Structure Diagram for the Public Housing in Hsing-Lung D2 Area



Graph 2-10 The Visualized Energy Indicative Diagram for the Health Public Housing

1.2 Scope of Application

Spaces used by the residential units, public areas and participating units. The primary scope of applications for power-conservation/generation and smart power grid are as follows.

- (1) Public energy-conservation equipment introduction and power consumption management (high energy efficiency lighting and electrical equipment, electricity consumption visualization, power plant scheduling management, etc.).
- (2) Residential unit energy-conservation equipment introduction and power consumption management (high energy efficiency lighting and electrical equipment, electricity consumption visualization, power plant scheduling management, etc.).
- (3) Introduction and management of decentralized renewable energy power generation equipment (solar photovoltaics, small wind turbine equipment, etc.).
- (4) Introduction and management of backup power generation and energy storage facilities (emergency backup diesel engines,

power storage systems, etc.).

- (5) Introduction and management of electric vehicle charging equipment (smart electric vehicle charging equipment, etc.).
- (6) Electricity demand management mechanism corresponding to grid regulation (time-period electricity price, automatic demand response, electricity consumption reduction measures, demand price bidding, user group representative, and other electricity demand management mechanisms).

2. Design Principles

2.1 Energy Conservation

If possible, adopt high energy efficiency lighting and electrical equipment that are commercially available or announced by the Bureau of Energy, Ministry of Economic Affairs, in order to conserve energy.

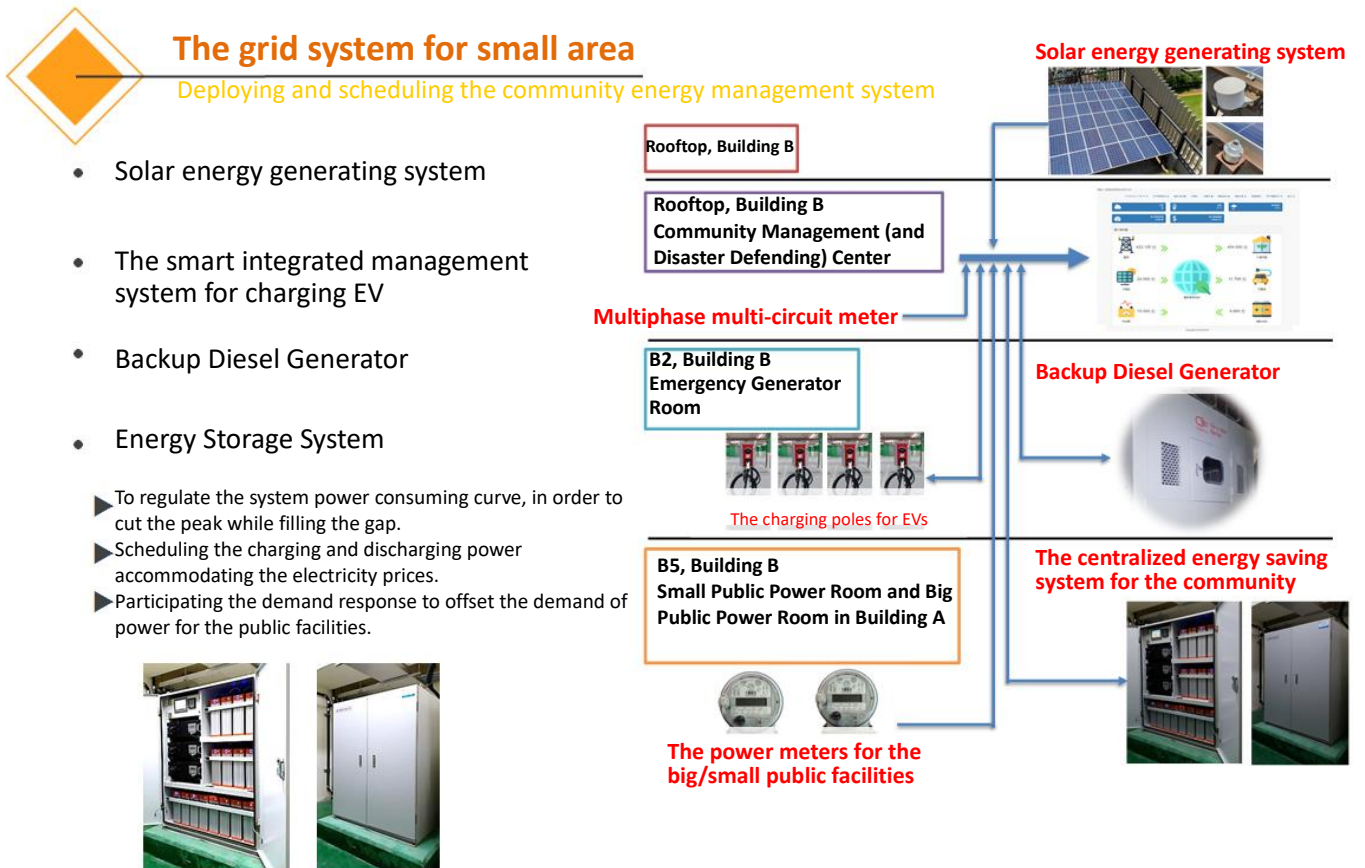
2.2 Energy Generation

If possible, use the public housing roof, outer walls, or other suitable spaces to establish solar photovoltaic panels, small wind turbines, or other decentralized renewable energy generation equipment; and prioritize the purpose as self-use to increase the ratio of green energy generation.

2.3 Smart Power Grid

2.3.1 Green Public Electricity Microgrid

Integrate the building's green energy electrical equipment, existing diesel generators, and public area electrical equipment such as electric vehicle charging equipment and energy storage system to construct a green public electricity microgrid. The goal is to realize the renewable energy generation, storage, and electrical equipment control and adjustment functions; and represent the user group to perform a demand response during the peak electricity consumption hours. We hope that together with demand control, equipment unloading, and renewable energy storage systems, the energy conservation efficiency can be 10% or higher and the electricity consumption during peak time can be adjusted by 20% compared to those of similar buildings without a smart power grid or energy management system.



Graph 2-11 The Electricity Microgrid for the Green Public Power in the Public Housing

2.3.2 Smart Home Energy Management System (HEMS)

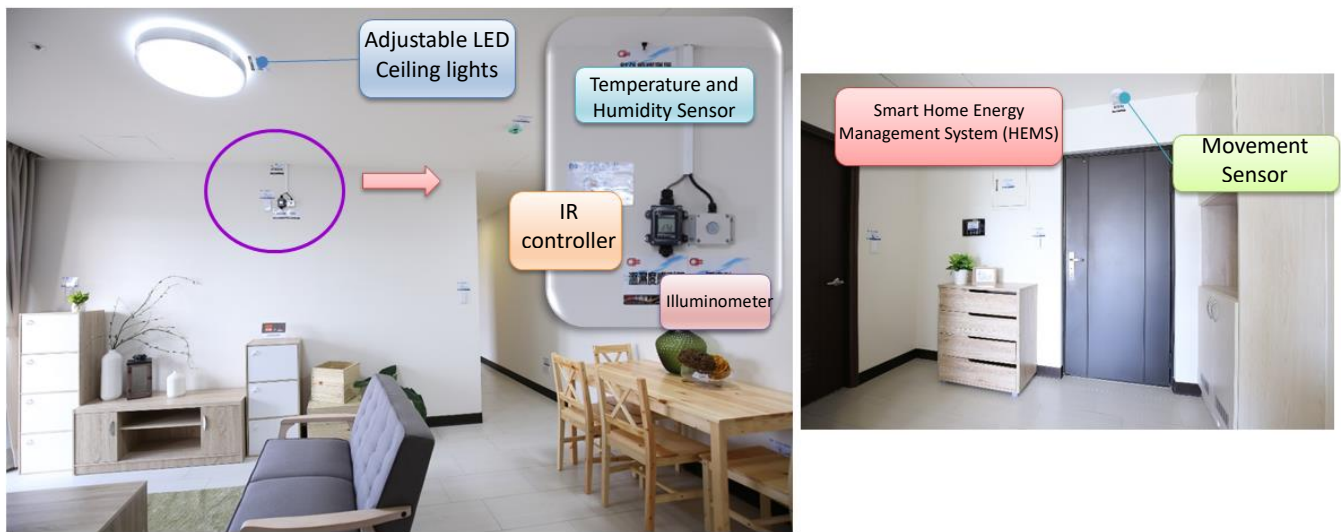
Use the digital meters, sensors, and controls established in each household unit to collect electricity consumption data and provide real-time and historical power consumption information to the residents, smart electricity scheduling management, and energy-consumption education information. Residents can use human-machine interfaces such as a webpage or mobile APP to review graphical data and grasp the residential electricity consumption data in real-time, use network settings or remotely control the home appliances to turn them on or off, and set the lighting or air-conditioning electricity consumption status. The efforts can help to save energy consumption and electricity costs, combine the Intelligent Building energy management systems, and participate in the user group representative energy demand response measures.

Due to the public housing construction costs and subsequent operation maintenance cost considerations, the smart home energy management system can be designed or installed in response to the

features of each base or according to the building design requirements specification considerations.

Smart Home Energy Management System (HEMS)

The Smart Home Energy Management System (HEMS) can visualize the power consumption for each household, and realizes the voluntary power saving. The **adjustable LED ceiling lights, IR control for air-conditioner that goes with humidity/temperature detector, luxometer, and movement detector** are applied to operate the power management system.



Graph 2-12 The Household Energy Management System (HEMS) of the Public Housing in Hsing-Lung D2 Area

2.3.3 Building Energy Management System

Different from central monitoring system of traditional residential buildings, the Intelligent Buildings is recommended to establish building energy management system with individual management capabilities. The system must use the main host machine for the building's air conditioner, power, lighting, outlets, and public electricity or use the digital power meters or public power equipment such as supervised air conditioner or lighting established based on the actual needs of the various bases to integrate the power management system functions of each household. The system must manage the building's electricity consumption for the public areas or residential units in order to enhance the willingness to conserve energy and implement automatic demand response during peak consumption hours for the user group representative in order to achieve the energy conservation, carbon reduction, and demand reduction effects.

(1) The building energy management system framework shall

include three levels: design, operation, and energy-conservation countermeasure expert system.

- (2) The building energy management system should have an integrated building automation system (BAS), energy management system (EMS), building management system (BMS), and facilities management system (FMS).
- (3) Adopt open network architecture design; use BACnet, LonWorks, or other international protocols that are widely used; support TCP/IP protocol; and can perform remote telemetry.
- (4) Must automatically capture the measurement data for the relevant systems to display the real-time operation performance of the systems online.
- (5) Provide the central surveillance system electricity collection information and usage status, and the data can be displayed graphically at the central monitoring system.
- (6) The building energy management system can provide public area air conditioning adjustment equipment (equipment startup, shutdown, or partial shutdown for certain areas), lighting (dimming or shut down for some areas), and power equipment (device startup, shutdown, or partial shutdown for certain areas) unload or load reduction according to needs, time-period price, time price bidding, and other diversified electricity usage patterns and behaviors.

The system requires real-time Online diagnostics to help understand the current building energy consumption status and analysis. Residents can query each sensor data by specifying a date or time period (can select a data or a time frame), and can select multiple query items.

The design standards are as follows:

- (1) Grade-I: Buildings with a floor area of 5,000 m² or less must establish 50~250 management points and the system functions shall include basic equipment operation status monitoring functions for power consumption, cumulative power consumption, operation efficiency, and equipment maintenance records.
- (2) Grade-II: Buildings with a floor area of between 5,001 m² and 20,000 m² must establish 251~500 management points, have the system functions of Grade-I buildings, equipment start and stop

schedule management, and air conditioner system energy consumption record and archive.

- (3) Grade-III: Buildings with a floor area of between 20,001 m² and 50,000 m² must establish 501~3,000 management points, have the system functions of Grade-II buildings, include operation status monitoring and control of most equipment, equipped with a charging mechanism, and contain data processing functions. The power usage and operation status of each equipment are compared and analyzed and reported (monthly report, quarterly report, annual report, etc.) for comparative analysis using the various graphic charts.
- (4) Grade-IV: Buildings with a floor area exceeding 50,001 m² must establish 3,001 or more management points, have the system functions of Grade-III buildings, and incorporate all equipment in the building into the scope of monitoring and control. Equipped with optimized operation control function and can effectively adjust the operation status based on the outdoor environment conditions of the building. In addition to the billing mechanism, the life cycle of the equipment is also included in the management. Integrate fire protection and security systems, and including personnel management.



Energy Management



Demand Response



The Three Smart Meters



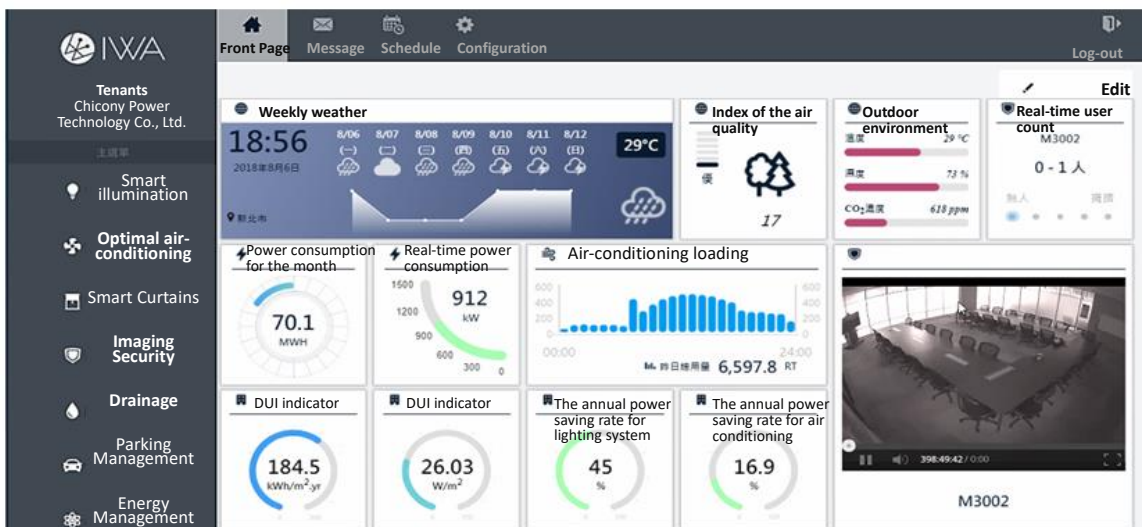
Solar energy + energy saving



Solar energy + energy saving



Air-conditioning control



Graph 2-13 The Indicative Diagram for the Smart Energy Management in the Public Housing

3. Design Standards

3.1 Smart Meter Hardware and Software Equipment

3.1.1 Digital Power Meter

- (1) Digital power meter inspected and approved by the Bureau of Standards, Metrology, and Inspection.
- (2) Can measure 3-phase 3-wire and 3-phase 4-wire type power specifications.
- (3) The meter can use a precision current comparator or external current comparator that provides accurate measurements.
- (4) Equipped with data storage and collection capabilities. Built-in or external connection devices can be adopted. The system must be able to store 730 (two years), display the annual data, and can compare the date for same month of previous year. Must support BACnet, ModBus, TCP/IP, LonWorks, or other standard communication protocols; support web query electronic data, and be integrated with the central graphics platform provided.
- (5) Must have V, A, pf, kWh, immediate demand, and other measurement parameters.
- (6) Can display the current accumulated electricity usage (kWh) and show at least six digits.

3.1.2 Central Graphic Control Management Platform

- (1) Must be traditional Chinese WEB based design, at least support simultaneous login by two or more people, and support operation using at least two types of browsers.
- (2) Webpage electronic map: Can use JPEG or GIF based electronic map that shows the value of the digital meter. The various parameters of the digital meter can be added, modified, and deleted on the map as needed.
- (3) The platform must support mobile device APP, support iOS (iPhone/iPad) and Android platforms, and at least display the annual data and compare the data for the same month from

previous year.

- (4) The password must be entered again when modifying the alarm parameter values, and the database must record the source IP and user name, modification date and time, and the modification device name.
- (5) The database must record the personnel account, source IP, login date and time for each login as well as the login statistics to be able to query the login statistics for the day/latest week/latest year.
- (6) Can set the current overshoot alarm threshold of the various circuit meters so that an over-current abnormality alarm is displayed when the current has been exceeded.
- (7) The alarm supports mail notification, traditional Chinese messages or message marquees, or provides.
- (8) Statistical trend graph: Provides the daily/monthly/annual electricity consumption trend graph, and provide download function.
- (9) Provide statistical report query and print functions.

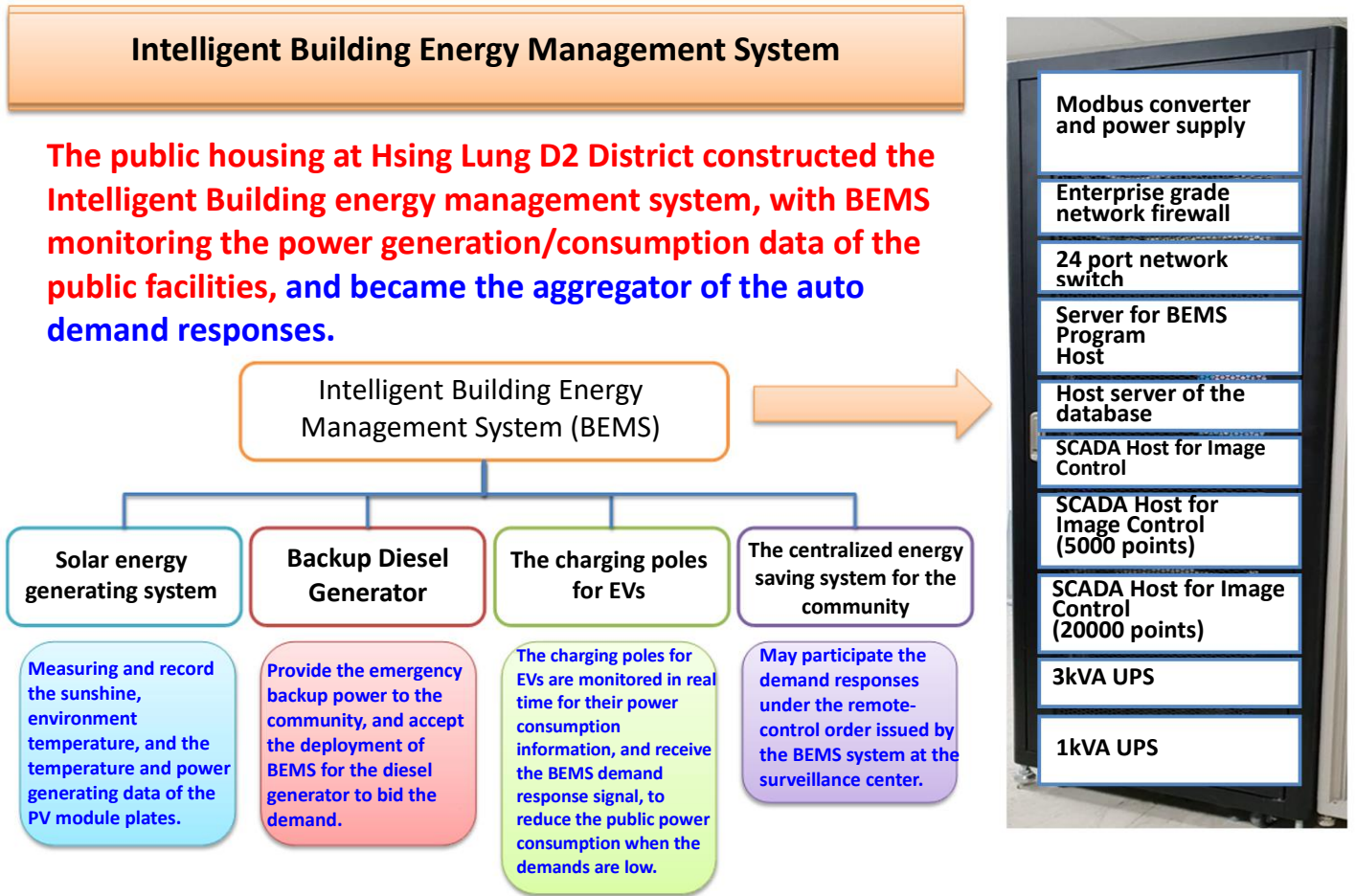
3.2 Smart Power Grid

3.2.1. Intelligent Building Energy Management System (BEMS)

Include power management system software and hardware setup, human-machine interface, as well as database and communication systems. Use the server, SCADA, and other hardware equipment as well as the database, human-machine interface, and the interfacing programs to collect the real-time operation data for electric vehicle and decentralized renewable energy power generation equipment such as solar power generation equipment, energy storage systems, and diesel generator. The system must also have the remote control switch and operation control functions. The monitoring equipment must contain operational status monitoring and analysis functions, can store the data measured, and display the real-time and cumulative power generation data. In addition, incorporate smart scheduling control and automatic demand response technology so the power usage conditions can be adjusted based on the demand response measures in the future to achieve the peak-time electricity consumption reduction, energy efficiency improvement, electricity cost reduction, as well as energy-conservation and carbon-reduction functions. Should have BAS, EMS, BMS, and

FMS integrated functions. Descriptions are provided as follows:

- (1) **Building Automation System (BAS):** Use the various internal electrical equipment, air conditioning equipment, cold and heat source equipment, as well as fire prevention and anti-theft equipment in the building to perform centralized surveillance. The goal is to ensure environment comfort within the building as well as optimized operation status and utilization rate for the various equipment under the premise of energy conservation and global environmental protection.
- (2) **Energy Management System (EMS):** Computing technology based modern integrated power automation system that can allocate and adjust the management energy application and strategy based on the values obtained from the various monitoring points transmitted via central monitoring. The goal is to keep the electrical devices in the building to operate in optimal efficiency via power offloading, demand management, etc.
- (3) **Building Management System (BMS):** Manage the operation and maintenance of the various equipment to ensure maintenance staff scheduling management and all the costs for the building are recorded and stored into the system database.
- (4) **Facility Management System (FMS):** Use the computer database to collect the operation status records and maintenance costs of the various equipment, print the various reports, and perform the various financial assessment and operation management.



Graph 2-14 The Intelligent Building Energy Management System (BEMS) for the Public Housing

3.2.2 Energy Generation Equipment

Establish the appropriate decentralized renewable energy power generation equipment for the building. The electricity generated can be used to participate in renewable energy sales or use a parallel power conversion equipment to supply part of the electricity demands for the building. The self-use principle is recommended. The relevant power generation data must be managed using a Intelligent Building power management system.

3.2.3 Energy Storage System

It can operate in conjunction with renewable energy and have power quality maintenance and power usage adjustment functions. The system can be used with the existing power grid, and can improve power efficiency in addition to being used as emergency backup power. In addition to collaborating with the time-period

price to shave electricity usage during peak hours, the diesel engine can also serve as the temporary emergency power supply for regional disaster prevention and rescue in case of emergencies.

3.2.4 Diesel Generator

The Intelligent Building power management system monitoring can be used to provide electricity during temporary regional disaster prevention and rescue emergencies or participate in the automatic demand response mechanism when necessary.

3.2.5 Electric Vehicle Charging Equipment

It can be monitored by a Intelligent Building power management system, and equipped with general and fast charging type electric vehicle charging equipment with smart charge regulation capabilities.

3.2.6 Smart Home Energy Management System (HEMS)

It can collect the household electrical equipment electricity consumption data for back-end power equipment and those connected to different power line circuits via the multi-circuit meters, small servers, hardware controllers, illuminometers, mobile sensors, temperature and humidity sensors, power management systems, and human-machine interfaces. The system must also enable remote control for lighting, air conditioning, or other electrical equipment to be able to adjust brightness, temperature and humidity, on/off switch, or other relevant adjustment settings via tablets or other handheld devices; and have the environmental data display, collection, and statistics functions. Can use a variety of sensors and software to perform different scenario dimming, electrical equipment monitoring, and detect personnel activity to automatically control lighting and power source for other controllable electrical equipment.

V. Smart Life Services

1. General Design Rules

The main function is to provide users with a healthy and comfortable, intimate, and convenient living service system. The purpose is to establish smarter innovation items, provide diversified value-added services, and improve the quality of life while creating quality used spaces.

1.1 Scope of Application

The main scope of application for smart life services includes:

- (1) Visitor services (visitor inquiries, reception, management, or mailing, etc.).
- (2) Innovative services (life information bulletin board, roof farm, etc.).

2. Design Principles

2.1 Visitor Services

The main design principle of visitor service is to build a visitor inquiry reception system that can conduct visitor ID verification and floor control. Meanwhile, the interactive system can connect to the visatee's smartphone or location extension to increase mutual safety and ensure the reception quality. If the visatee is absent, a video message can be used to notify the visatee through the smartphone (or other receiving devices). The visiting record can be stored to facilitate subsequent management and allow visitors to enjoy high quality reception services. Moreover, an automated mail delivery system must be established so if no one is home, the logistics operators can provide delivery or receiving services such as issuing notifications or provide records in order to reduce manpower and save costs.

2.2 Innovative Services

2.2.1 Life Information Bulletin Board

The main design principle of Life Information Bulletin Board is to use digital devices to receive a wide array of up-to-date information about life such as weather conditions, vascular status, public events, human resources, ride-sharing messages, auction markets, and more.

2.2.2 Roof Garden

The main design principle of Roof Garden is to use the roof

space to create a smart farming garden. The system shall include agricultural intelligence and crop monitoring functions as described below:

(1) Agricultural Intelligence

The Agricultural Intelligence System can link to central or local climate observatories stations to provide weather or geographical news to any digital devices so we can receive future weather change information such as temperature, humidity, rainfall, evaporation, wind direction, wind speed, sunshine hours, and all-sky insolation conditions in real-time. The goal is to help the agricultural operators to adjust the farming method, irrigation time or frequency, and adopt disaster prevention measures according to the weather changes.

(2) Crop Monitoring

The Crop Monitoring System primarily uses monitors to provide crop growth status to digital devices and use sensors to collect data on the growth environment of different crops such as temperature and humidity, rainfall volume, sunshine hours, and carbon dioxide concentration in order to stabilize the crop growth environment in response to weather or geography changes and thereby enhance the crop production yield and quality. The data collected shall also be stored in a database periodically so if an anomaly occurs, the digital device can be used to issue real-time notifications.

3. Design Standards

The smart life service design standard is shown in Table 2-2.

Table 2-2. Smart life service design standard

Evaluation Item	Design Standards
Visitor Services	1. Provide visitor inquiries and receptions; 2. Be used for visitor control; 3. Leave video chat messages; 4. Keep visitor records; 5. Perform mail management; 6. Provide logistics receiving and delivery services.
Innovative Services	1. You can use the life information bulletin board to provide information related to everyday life. 2. Can establish the roof garden, use the agricultural intelligence system and crop monitoring system to provide countermeasures for crop growth environment changes anytime, anywhere, in order to enhance crop productivity and quality.

VI. Property Management

1. General Design Rules

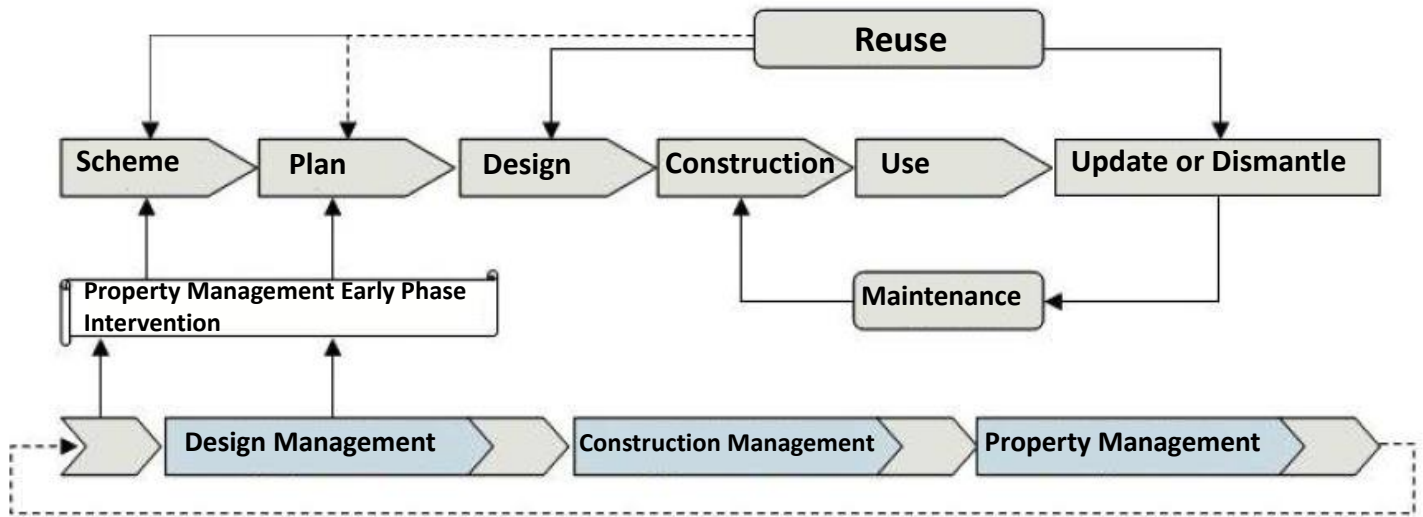
The public housing in Taipei City is operated by lease only and not selling. In the future, a 100% capital contribution method will be used to establish a public housing management company to serve as the negotiation and management interface for the turn-key and subsequent operating contractors. The concept of professional property management is introduced in advance during the planning and design phase to enhance the public housing smart property management capabilities, which is key to determining whether the public housing can maintain sustainable operations and achieve satisfactory levels.

1.1 Definition of Main Items

1.1.1. In terms of the scope of public housing management services, it can be divided into

- (1). Community and environmental maintenance (providing services such as building and environmental management maintenance, cleaning, preservation, public safety inspection, fire safety equipment, and maintenance of auxiliary facilities and equipment).
- (2). Life and business services (provide property agency and consulting industry, transaction management, property management and life services [community network, care service, babysitter, home delivery logistics, lifestyle products (food, clothing, housing, transportation, education, entertainment)], and business support services).

1.1.2. Smart systems and equipment must be established and incorporated into the public housing smart community, and such items must be selected according to the conditions of the base. The objective is to maintain the reliability of the building's smart functions, timely resolve anomalies or malfunctions, provide stable service quality, and ensure the correctness of information collection. These elements are the key factors to controlling the Intelligent Building performances.



Graph 2-15 The Initial Introduction of the Maintenance Concept of the Public Housing

1.2 Scope of Application

1.2.1. Spaces used by the residential units, public areas and participating units.

1.2.2. The property management function not only can comprehensively construct and extend the life cycle of the building, it can also enhance the application functions and efficiency as well as ensure the safety and health of the people using the building. In addition, the property management industry can also be extended to community services, life care, etc., to intimately connect property management and family life.

1.2.3. Property management can be used for multi-functional services such as management, administration, operation, and construction of the building as well as the people, affairs, and objects in the building.

2. Design Principles

2.1. By promoting smart property management services and the city government's decision to adopt smart property management equipment systems, we can select the investment equipment items and benefits while taking the users' social class into account.

2.2. By considering various issues from different aspects, such as there are mid and long-term maintenance and renovation costs for buildings, and the regular management fees paid by the residents, the building and the real estate development industry shall be assisted to avoid excessive spending, and to efficiently link to the

follow-up property management of buildings.

- 2.3. Combine smart equipment systems with property management to improve user safety and efficiency in terms of services and building maintenance management.
- 2.4. Emphasizing the sustainable development of a community, and create a safe, healthy, convenient, comfortable, and user-friendly smart living space.
- 2.5. The property management system must be integrated with the public residential BIM Cloud management platform.

3. Design Standards

- 3.1. The goal of property management is to pursue the best quality management services to meet the needs of the users, and control the minimum management revenue and expenditure budget level by considering the cost-effective efficiency.
- 3.2. Include the management and maintenance of building facilities and equipment, offer personnel services for building users, and provide information for owners or managers to make decisions.
- 3.3. The functional operation of facilities and equipment such as electrical items, air conditioning, elevators, fire prevention, lighting, water supply and drainage, light current, heat source, security, and central monitoring must be able to complete operations such as control, monitoring, recording, correction, and issue alarms independently via the relevant machine systems.
- 3.4. A detailed management and maintenance plan must be provided for the management, maintenance, and repair of smart facilities and equipment. The management and maintenance of the building's application technologies and equipment use must be based on the life cycles to establish the necessary maintenance items at the various phases. Meanwhile, a long-term management cost budget must be prepared to raise the funds.
- 3.5. In terms of providing personnel services for building users, human-machine systems (services personnel and equipment) must be used to complete the activities of the users within the building such as parking management, video conferencing, messaging, financial accounting, documentation, duty management, or maintenance and repair activities in order to assist users to use and control the various smart facilities during different activities.
- 3.6. Data summaries, statistics, and analysis can be planned for the

relevant information and data contentiously generated and saved in computers as a result of building smartization so the management and decision makers can always access detailed and correct information during immediate troubleshooting, preventive repair and maintenances, and system operation performance evaluations.

3.7. The contents of the property management plan shall include the number of people planned, work planning, cost estimation, building revenue and expenditure (including advertising rental income), and optimization projects. Maintenance cost assessment must be incorporated for all maintenance management projects in the community according to the maintenance management principles of each case. The evaluation items include security personnel costs, electrical/mechanical maintenance and cleaning personnel expenses, building water tank cleaning costs, landscape maintenance costs, exterior wall cleaning costs, building public safety related inspection items reporting costs, fire fighting equipment maintenance report costs, elevator equipment maintenance costs, equipment purchase costs, and public water and electricity advances.

3.8. Community activities, property management needs, community service planning services (include reservation for public outlets and various networks), resting areas, conference rooms, and indoor gathering spaces can be considered for areas surrounding the community (property) management center. In principle, plan the property management (operation office, spare parts room, public restroom, or electromechanical room) areas and reserve the spaces needed for pipelines (wires).

II. Selective Construction Items according to the Base Conditions

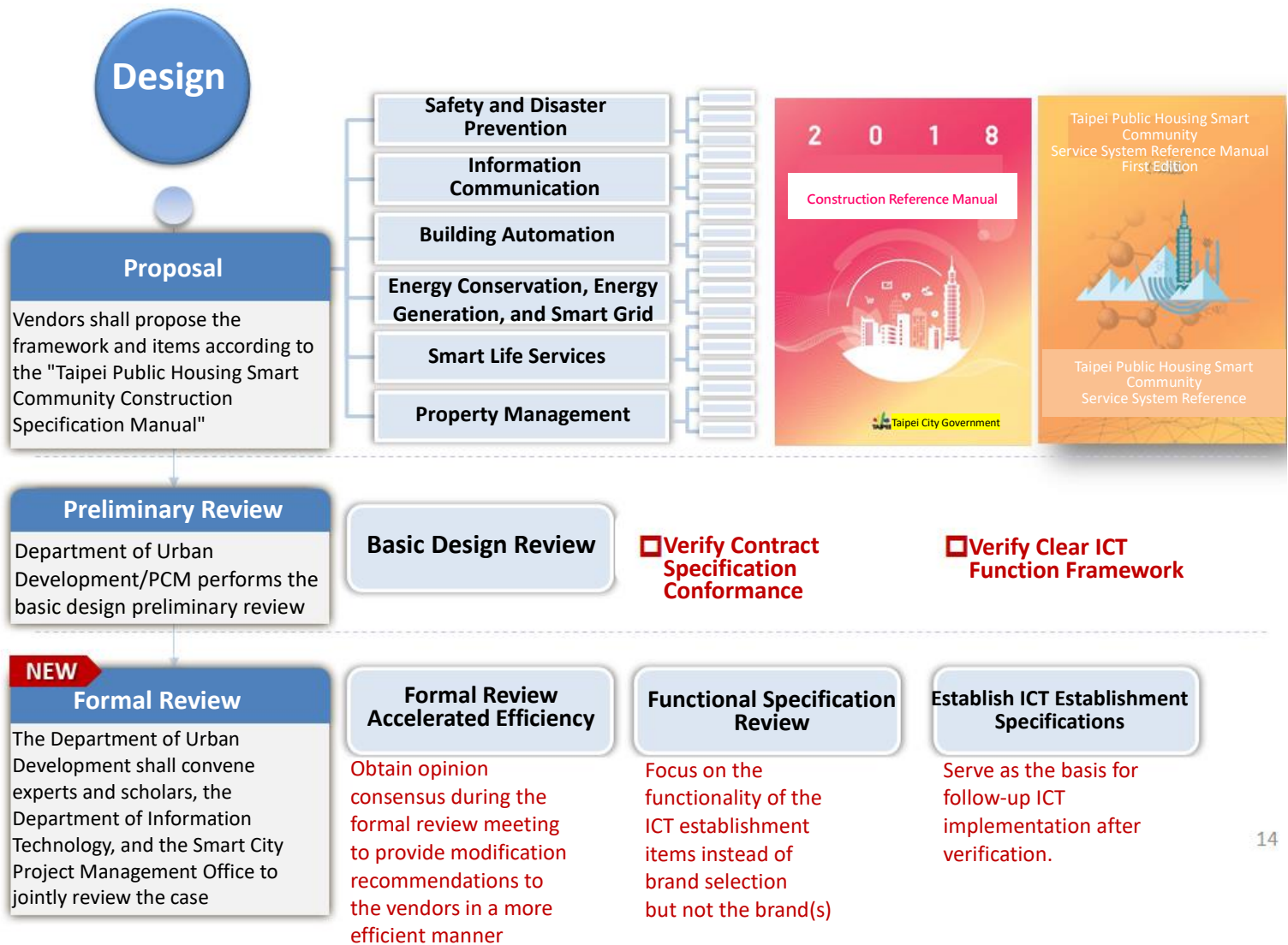
Please reference the “Taipei Public Housing Smart Community Services System Reference Manual.”

III. Smart Public Housing Smart Construction Review Process-Design Phase

- **Proposal:** The vendor proposes the contents of the 6 major mandatory construction items (safety and disaster prevention, information communication, building automation, energy management and smart power grid, smart living services, and property management) according to the planning and design principles outlined in this construction

specification manual.

- **Preliminary review:** The project cycle management (PCM) team commissioned by the Taipei City Department District Office performs the basic design review, ensures conformance to the contract specifications, and verifies whether the smart function framework is complete.
- **Formal review:** The Taipei City Department District Office convenes experts and scholars, the Department of Information Technology, and the Smart City Project Management Office (PMO) to conduct a formal review to provide industry revision suggestions, review functional specifications, and establish Intelligent Building specifications.



Graph 2-16 The Smart Construction of the Public Housing- the Review Process in the Design Stage

Chapter 3. Construction Phase

BIM primarily uses design models to verify the on-site constructability during the construction phase of public housing smart community to visually assist the on-site staff to communicate, reduce perception errors, and use the models to facilitate the on-site management and construction.

I. Introduction and Integration of BIM

Supervision must be provided for the obligatory items stipulated in the “Turn-key Contract” and “BIM Work Implementation Plan” according to the detailed model. The BIM elements must be built according to the manufacturing process and assembly procedures to provide reference for construction management decisions, and 2D auxiliary drawings must be used to describe the construction assembly points.

1. Suggested Delivery Items, Tasks, and Purposes

A brief description of the management strategy and operation contents for this phase is as follows:

- **Main equipment construction model for the integrated smart community**

The construction model is produced based on the architectural, structural, and MEP models. This model must be constructed according to the construction method and sequence to serve as reference for construction management decisions.

- **The material details, area and quantity of the quantitative project items of the smart community**

The BIM model shall reproduce the material details, areas, and quantities to provide reference for the contractor.

- **BIM Log**

Fill-in the BIM operation work hours, contents, and staff each day.

- **BIM Construction Coordination Meeting**

Use the BIM construction coordination meeting to describe the subcontracting and professional integration results, construction progress, and various interface coordination matters. Defect improvements, blue print revisions, or design changes must be displayed in the construction coordination meeting.

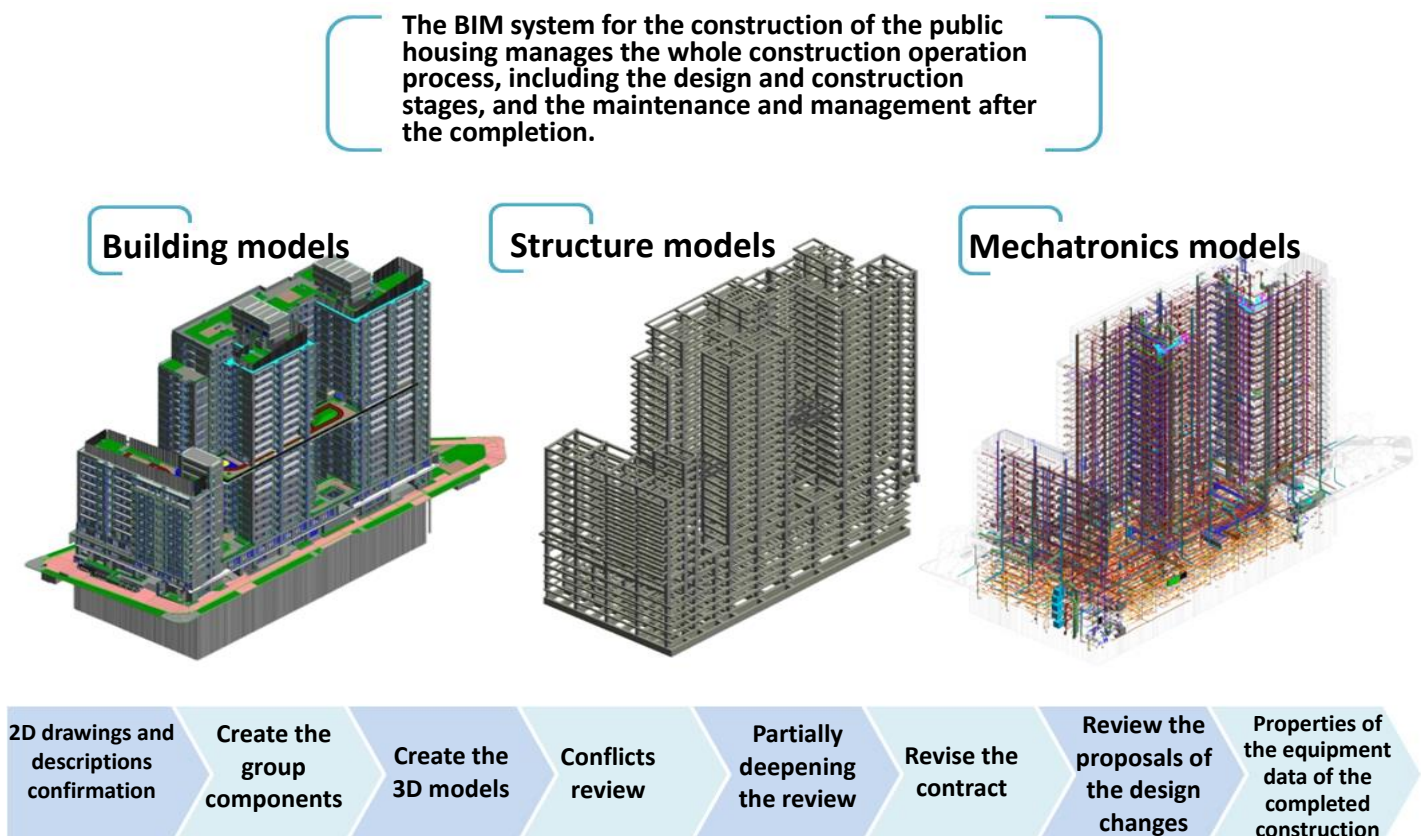
- **Use BIM for construction progress review and inspection**

management

Apply the scheduled progress to the BIM model, and implement a 3D plus time schedule progress display and construction plan. Inspect the actual progress against the 3D plus time schedule progress so as to adopt countermeasures as soon as the progress is behind. Manage the progress via the 3D plus time method, and report the latest progress during the monthly and biweekly meetings.

- **Public Housing Smart Community BIM Inspection Results Report**

After the phased construction project goals for the smart community are reached, the contractor shall produce the “Public Housing Smart Community BIM Inspection Result Report,” which must cover the construction, structure and hydropower construction (CSD/SEM) smart equipment modules and BIM model reviews in the checklist reports to ensure that the model and the completed work-site are identical.



Graph 3-1 The BIM System for the Public Housing

2. Construction phase model requirements

The smart community 3D digital model shall include the appearances of exterior walls, columns, beams, panels, doors, and windows, etc.; and the building structure, size and configuration. The quantity, size, and location of the building, structures, and MEP must be precisely marked and drawn as well as include the installation and construction method.

- **Draw the Structure, Building, Hydropower Construction and Smart Equipment Related Diagrams**

1. Produce the BIM construction model. The contents shall include the appearances of exterior walls, columns, beams, panels, doors, and windows, etc.; and the building structure, size, and configuration. The quantity, size and location of the building, structures and smart electromechanical equipment must be precisely marked and drawn as well as include the installation and construction method.
2. The BIM interface integration meeting shall be held before the relevant smart equipment construction started to ensure the heavy work construction is on schedule. The BIM model must be corrected according to the construction progress, and handed over to the owner for maintenance operations after the work has completed.

- **Public Housing Smart Community Construction Building Model (including Landscape and Decoration)**

Review the relevant equipment and electromechanical pipeline interfaces according to the public housing smart community detailed construction model and incorporate the construction needs. Add the construction instructions using labels or marks, and directly produce or reproduce the construction diagrams. Correct the physical properties of materials and equipment, and enter the specifications, brands, maintenance vendors, and warranty period (in response to subsequent operations).

- **Construction MEP Model**

Review the relevant equipment and electromechanical pipeline interfaces according to the public housing smart community detailed MEP model and incorporate the construction needs. Add the construction instructions via labels or marks, and directly produce or reproduce the construction diagrams. Correct the physical properties of materials and equipment, and enter the specifications, brands, maintenance vendors, and warranty period (in response to subsequent operations).

※The following describes the standards in which the construction phase BIM model shall be delivered, which are mostly divided into buildings, structures, MEPs, and related smart equipment:

- **Building Model Standards**

1. The precast and pre-fabricated building elements can be placed in the BIM model objects.
2. The building elements must be constructed using the correct tools. When the existing tools are insufficient, select the appropriate tools to construct the element, but the “category” of the item must be defined appropriately.
3. Elements smaller than the model requirement size do not need a model, but can be described using 2D diagrams.
4. 2D detail figures can be supplemented to describe the BIM model.
5. Building elements shall be built separately for each floor.
6. Demand parameters - category, materials, ID and size. Among them, the “category” parameter is used as the basis for the quantity extracted.
7. If over two types of tools are used to construct the element model, the “category” of the item must be defined appropriately. For example, if a board or a beam tool can be used to construct a “road,” then the “category” of the completed “road” shall be set as “road.”
8. The structural elements shall be constructions in the dimensions provided by the structural engineer.

- **Structural Model Standards**

The contractor and the sub-contractor shall jointly set up the detailed model into a construction model using the construction assembly method. If necessary, use drawings of the structural model to show more details.

1. The structural consultant shall construct the structural analysis and structural BIM models according to the actual position and size of the elements, and the models shall be used to generate structural documents.
2. Pre-cast and pre-fabricated structural elements can also be designed and made using other special tools, and then added into the structural

BIM model.

3. The structural BIM model shall include all concrete, timber, and steel frames with heavy loads as well as non-load concrete structures. The basic elements include walls, boards, beams, and lattice frames that must be made using the correct tools (walls, boards, etc.). If no appropriate tool is available, use other appropriate tools to produce the elements, but the “category” of the element must be defined appropriately.
 4. The structural model can be divided into different phases according to the structural review requirements.
 5. Reinforced steel and joint details for the model can be produced using the appropriate model construction tools during the detailed design phase.
 6. Model for low-ratio elements is not required, but can be described using 2D diagrams. For example: no model is needed for elements less than 10 cm in size.
 7. 2D diagram can be used for load planning.
 8. If the BIM model construction tool is limited, the 2D diagrams can be used to make column details, and the column details must showcase the column shape and sectional views.
 9. Structural elements shall be built separately for each floor.
 10. Parameter requirements: category, material, ID code, size, and the “category” parameter is used for quantity extraction.
 11. If over two types of tools are used to construct the element, the “category” of the item must be defined appropriately. For example: after the roof trusses are built with individual beams, these frames shall be grouped, and their “type” defined as “Truss.”
- **MEP Modeling Standards**
 1. Air conditioning and mechanical ventilation
 - (1) Construct models for areas that require special attention.
 - (2) Clearly label the parts changed by the construction company and approved by the engineering consultants.
 - (3) If there is no BIM modeling tool, it can be replaced using a box

shape; but the name shall be marked and the appropriate parameters shall be given.

- (4)The elevation of each system element must be clearly labeled (according to the finished building floor surface or other reference planes).
- (5)Construct the system part or hanging part models if necessary.

2. Water Supply/Drainage and Sewage

- (1)Strengthen the parts of the system that requires special attention.
- (2)Clearly label the parts changed by the construction company and approved by the engineering consultants.
- (3)If there is no BIM modeling tool, it can be replaced using a box shape. The name shall be marked and the appropriate parameters shall be given.
- (4)The elevation of each system element must be clearly labeled (according to the finished building floor surface or other reference planes).
- (5)Construct the system part or hanging part models if necessary.

3. Fire Prevention System

- (1)Construct models for areas that require special attention.
- (2)Clearly label the parts changed by the construction company and approved by the engineering consultants.
- (3)If there is no BIM modeling tool, it can be replaced using a box shape; but the name shall be marked and the appropriate parameters shall be given.
- (4)Clearly label the elevation of each system element (according to the finished building floor surface or other reference planes).
- (5)Construct the system part or hanging part models if necessary.

4. Power System

- (1)Construct models for areas that require special attention.
- (2)Clearly label the parts changed by the construction company and

approved by the engineering consultants.

- (3) If there is no BIM modeling tool, it can be replaced using a box shape. The name shall be marked and the appropriate parameters shall be given.
- (4) Clearly label the elevation of each system element (according to the finished building floor surface or other reference planes).
- (5) Construct the system part or hanging part models if necessary.

5. Intelligent/Smart Equipment System

- (1) Construct models for areas that require special attention.
- (2) Clearly label the parts changed by the construction company and approved by the engineering consultants.
- (3) If there is no BIM modeling tool, it can be replaced using a box shape. The name shall be marked and the appropriate parameters shall be given.
- (4) Clearly label the elevation of each system element (according to the finished building floor surface or other reference planes).
- (5) Construct the system part or hanging part models if necessary.

II. Level-III Quality Control

I. Division of Power and Responsibility

Term	Symbol	Definition
Implementation	●	Perform the relevant work items, formulate the relevant documents for review, and handle the follow-up works based on the review comments.
Assistance	○	Assisting the implementation of the related works.
Supervision	□	Overseeing the implementation of works and inspecting the progress. Shall any inconsistency to the Contract and the Specifications be found, the inconsistency shall be corrected.
Oversight	■	Overseeing and instructing the implementation of works based on the Contract and the Specifications.
Review	▲	Checking the work execution of the administrators to see whether the submitted information consistent to the Contract and the Specifications, and providing the opinions for handling, to require the administrators rectify, for the approver (validator) as the reference for decision making.
Validation	☆	Reviewing and confirming if the outcomes of work of the administrators or the submitted information consistency to the Contract and the Specifications, and the results are provided to the organizer as the reference or for approval.
Approval	★	Organizer: making decisions regarding the matters reported by the administrator, reviewer, or validator. Other unit: reviewing or validating whether the outcomes of work of the administrators or the submitted information consistency to the Contract and the Specifications, making decisions, making decisions, and send the decisions to the organizer as the references.
Reference	◎	Receiving inspection or verification after receiving inspection.

Life Cycle Phase	Work Mission	Responsible (Providing) Unit				
		●implementation ○ assisting implementation □supervision ▲review ☆validation ★approval ◎reference				
		Organizer	PCM	Manufacture Supervision	Turn-key Design	Turn-key Construction
Planning Design Phase	BIM Work Execution Plan	★	●			
	Planning Design Phase BIM Results Report	★	●			
	Weekly Work Meeting		●			
	Irregular Coordination Meeting		●			
	16-hour Education and Training		●			
Turn-key Design Phase	BIM initiation meeting			○	●	
	Working Biweekly			○	●	
	Management Monthly Meeting			○	●	
	BIM Work Execution Plan for the Turn-key	★	☆	▲	●	○
	Conflict Review (Soft Collision) Report	◎	☆	▲	●	○
	Interference Collision (Hard Collision) Report	◎	☆	▲	●	○
	Quantity Calculation Report	◎	☆	▲	●	
	Detail Design BIM Model File	◎	☆	▲	●	○
	Detailed Design and Construction Diagram	◎	☆	▲	●	○
	Detailed Design BIM Inspection Results Report	★	☆	▲		●
4D Construction Planning Dynamic		■	▲		●	

	Schedule					
Turn-key Construction Phase	Weekly Work Meeting				○	●
	Management Monthly Meeting					●
	BIM Work Log	◎	★	▲	○	●
	Construction Interface Coordination Meeting				○	●
	Conflict Review (Soft Collision) Report			▲		●
	4D Animation			▲		●
	Construction BIM Model File			▲		●
	Output of Construction Drawings			▲		●
	Construction Completion BIM Model File			▲		●
	Construction Completion Drawings			▲		●
	16-hour BIM Training				○	●
	Construction Phase BIM Inspection Results Report	★	☆		○	●
	4D Construction Period Review Animation Scheduling		■	▲		●
Construction Complete Phase	Construction Completion BIM Model File	◎	☆	▲		●
	BIM Construction Results Report	★	☆	▲		●
	Residential Building Engineering BIM Design Management Guidelines and Inspection Results Report	★	☆	▲	●	
	Residential Building Engineering BIM Construction Management Guidelines and Inspection Results Report	★	☆	▲	○	
	Residential Building Engineering BIM Application Maintenance Report	★	☆	▲		

II. Quality Inspection Items at Each Phase

Table 2-3. Quality Inspection Review Items at Each Phase

General Inspection		
01. Has the BIM information submitted conform to the contract, service recommendation, and implementation plan provisions?		
02. Have the vendors been prompted to upload the BIM files regularly?		
03. Have the BIM design and construction coordination meetings been held, and have the records and project specific volumes been made regularly?		Convening frequency:
04. Has the software conforming to the contract been provided to the inspection unit for review?		Provided a total of _____ set(s).
05. Have the vendors been prompted to establish the		

BIM control schedule, and has the progress been reported during each meeting?			
06. Have the BIM model construction standards and specifications been established (include object coding, color rendering, and in-depth component table)?			
07. Have the model been returned to the firm, the interference reviews been performed as required by the contract, and the interference parts been included in the meeting in order to discuss the deadline for improvement?			
08. Have the education and training scheduled and contents been arranged and reported to the owner?			Contract hours: Actual hours:
09. Has the vendor been supervised to deploy the appropriate and sufficient number of personnel according to the contract?			Number of personnel provided by the contract: Actual number of personnel:
Basic Design Phase			
01. Has the vendor submitted the basic design reports and models on time? If not, has the vendor been placed under tracking control and issued a penalty fine?			Contractual appointment time: Actual delivery time:
02. Check whether or not the review units have submitted the review opinions to the vendor on time and assist with the relevant matters.			Vendor delivery time: Review completion time:
03. BIM model elements are correctly partitioned and layered.			
04. Have the intelligent/smart related device location been planned according to the rules and commitments stipulated in the “contract,” “service plan” and “work execution plan” contents?			
05. The BIM model fineness level conforms to the implementation plan.			
06. The building target subjects and spaces are placed in the correct model space locations.			
07. The volume and spaces of the building subject matter are completely built without anything missing.			
08. The space name and quantity of the building model have been mapped to the space plan table.			

09. The building model names, the names of volume objects and spaces, and the categories must be correctly listed according to the element characteristics.			
10. The model has no repeating/overlapping objects or connections.			
11. The size of the building space conforms with usage and regulatory requirements.			
12. The building space heights conform to the requirements and regulations.			
13. The building space is configured correctly.			
14. Is green energy calculation needed to produce the energy-conservation data for the intelligent/smart equipment?			
Detailed Design Phase			
01. Has the vendor submitted the detailed design reports and models on time? If not, has the vendor been placed under tracking control and issued a penalty fine?			Contractual appointment time: Actual delivery time:
02. Check whether or not the review units have submitted the review opinions to the vendor on time and assist with the relevant matters.			Vendor delivery time: Review completion time:
03. Has the vendor been assisted to resolve the RFI, and has the design unit response instructions been attached?			Number of doubts resolved:
04. Have the BIM model correctness and progress been verified with the computer staff of the firm, and has a review plan proposed at the control meeting?			
05. BIM model elements are correctly partitioned and layered.			
06. Have the intelligent/smart related equipment positions and pipelines been established?			
07. The BIM model fineness level conforms to the implementation plan.			
08. The building target subjects and spaces are placed in the correct model space locations.			
09. The volume and spaces of the building subject matter are completely built without anything missing.			
10. The space name and quantity of the building			

model have been mapped to the space plan table.			
11. The dimension drawings (flat, vertical, and sectional) have been printed on paper.			
12. Are the number and name index for the figures consistent?			
13. Are the repeated elements organized into the same group?			
14. Does the model information conform to the commitment items stipulated in the turn-key BIM work implementation plan?			
15. The model has no repeating/overlapping objects or connections.			
16. The building model names, the names of volume objects and spaces, and the categories must be correctly listed according to the element characteristics.			
17. Has the quantity calculation been submitted and verified according to the commitment items stipulated in the work implementation plan?			
18. Have the electromechanical CSD/SEM overlay been integrated and reviewed?			
19. Have the various unreasonable conflicts between the various objects and spaces been recorded to the RFI and transferred to the relevant units for coordination?			
20. Have the relevant meetings been held on time, and have the meeting minutes been recorded to facilitate tracking?			
21. Has the 4D engineering progress been scheduled?			
22. Has a conclusion been derived for the intelligent/smart equipment according to the infrastructure results, and have different programs been designed in order to achieve maximum performance?			
23. Have interference collisions for the model caused by human drawings been eliminated? If not, have management instructions been provided?			
Construction phase (including detailed parallels)			
01. Has the vendor submitted the construction phase reports and models on time? If not, has the vendor been placed under tracking control and issued a penalty fine?			Contractual appointment time: Actual delivery time:

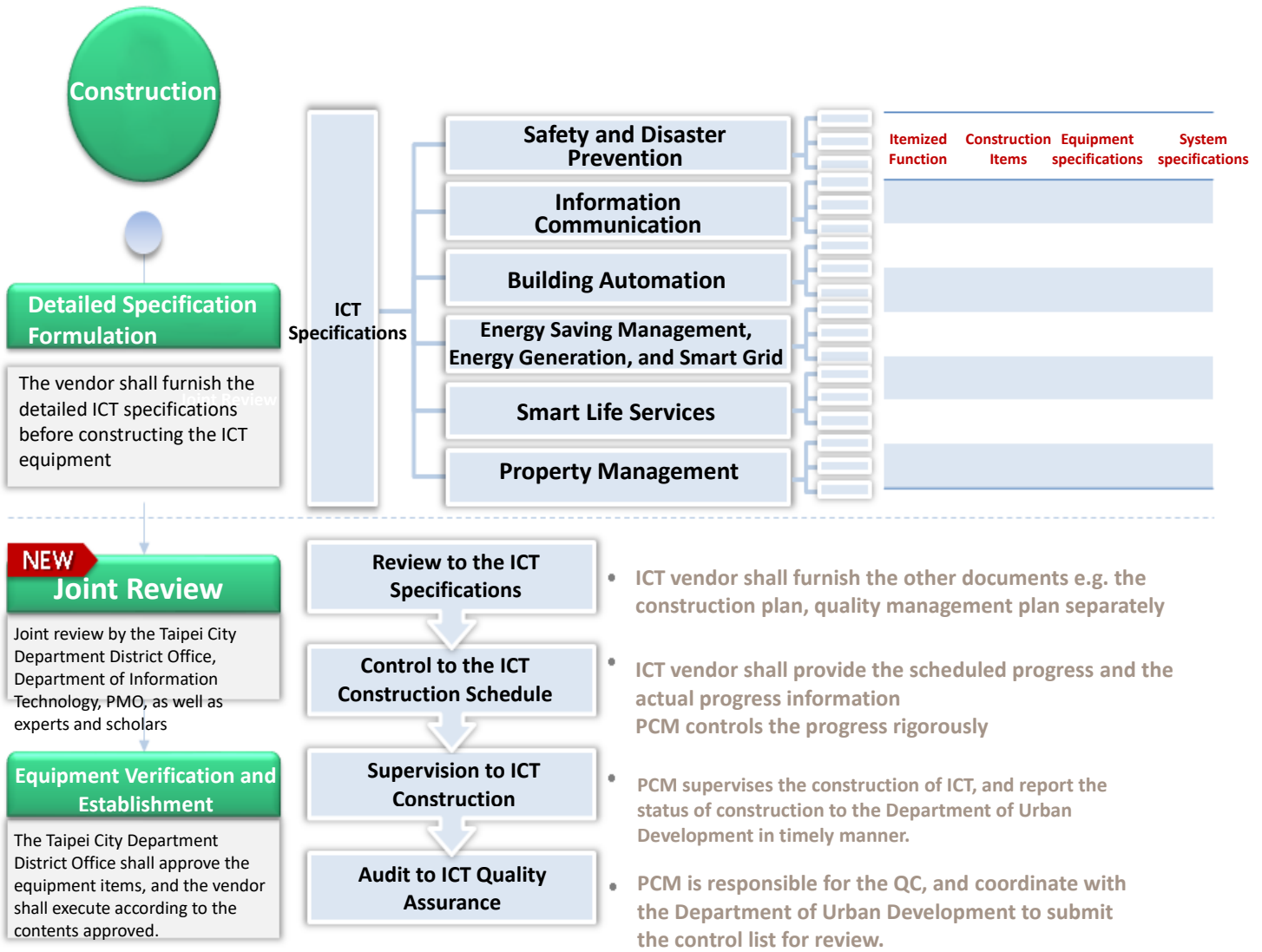
02. Check whether or not the review units have submitted the review opinions to the vendor on time and assist with the relevant matters.			Vendor delivery time: Review completion time:
03. Has a BIM model (including hypothetical engineering) conforming to the current construction conditions been established to ensure the consistency and immediacy between the model and the construction site progress?			
04. Have 3D model configurations been posted at the work site to facilitate sub-contractor construction comparison.			
05. If there are design changes, has the vendor been prompted to correct the model according to the design content changes, and submit the content correction reviews with the construction phase report?			Number of changes:
06. If there are design changes, has the computer department staff of the firm been contacted to verify the model correction and conduct intervention review according to the design changes?			
07. Have the BIM construction detailed drawings been formulated according to the current construction progress?			
08. BIM model elements are correctly partitioned and layered.			
09. The BIM model fineness level conforms to the implementation plan.			
10. The building target subjects and spaces are placed in the correct model space locations.			
11. The volume and spaces of the building subject matter are completely built without anything missing.			
12. The space name and quantity of the building model have been mapped to the space plan table.			
13. The dimension drawings (flat, vertical, and sectional) have been printed on paper.			
14. Are the number and name index for the figures consistent?			
15. Are the repeated elements organized into the same group?			
16. Does the model information conform to the			

commitment items stipulated in the turn-key BIM work implementation plan?			
17. The model has no repeating/overlapping objects or connections.			
18. The building model names, the names of volume objects and spaces, and the categories must be correctly listed according to the element characteristics.			
19. Have the quantities been checked for design difference analysis comparison during the construction phase?			
20. Have the various unreasonable conflicts between the various objects and spaces been recorded to the RFI and transferred to the relevant units for coordination?			
21. Have the relevant construction integration meetings been held regularly, and the meeting minutes logged and submitted for review?			
22. Has the 4D construction progress been reviewed according to the construction progress?			
23. Have the electromechanical CSD/SEM overlay been integrated and reviewed?			
24. Has the construction log been filled-out and submitted for review on time?			
25. Has the on-site model inspection been conducted and the records been submitted for review?			
26. Have the intelligent/smart equipment and system interference inspections been completed?			
27. Have the intelligent/smart equipment been constructed or corrected according to the information submitted for review?			
28. Have interference collisions for the model caused by human drawings been eliminated? If not, have management instructions been provided?			
Construction Complete Phase			
01. Has the vendor submitted the construction completion reports and models on time? If not, has the vendor been placed under tracking control and issued a penalty fine?			Contractual appointment time: Actual delivery time:
02. Check whether or not the review units have submitted the review opinions to the vendor on time and assist with the relevant matters.			Vendor delivery time: Review completion time:

03. Has the model been returned back to the firm within the regulated time frame, and has the computer department staff checked whether the equipment element information was established and correct?			
04. Do the models match the objects on-site?			
05. All BIM model compilation software can be outputted and be converted for application by different software (e.g., IFC).			
06. BIM model elements are correctly partitioned and layered.			
07. The BIM model fineness level conforms to the implementation plan.			
08. The building target subjects and spaces are placed in the correct model space locations.			
09. The volume and spaces of the building subject matter are completely built without anything missing.			
10. The space name and quantity of the building model have been mapped to the space plan table.			
11. The dimension drawings (flat, vertical, and sectional) have been printed on paper.			
12. Are the number and name index for the figures consistent?			
13. Are the repeated elements organized into the same group?			
14. Does the model information conform to the commitment items stipulated in the turn-key BIM work implementation plan?			
15. The model has no repeating/overlapping objects or connections.			
16. Have the intelligent/smart equipment related information been established comprehensively according to the in-depth element table?			
17. The building model names, the names of volume objects and spaces, and the categories must be correctly listed according to the element characteristics.			

III. Smart Public Housing Smart Construction Review Process-Construction Phase

- **Detailed specifications development:** The vendor shall propose the detailed smart specification plan that includes sub-item functions, construction items, design specifications, and system specifications six months before the vendor construct the smart equipment.
- **Joint review:** Joint review by Taipei City Department District Office, Department of Information Technology, Smart City Project Management Office PMO, as well as experts and scholars
- **Equipment verification and establishment:** The Taipei City Department District Office shall approve the equipment items, and the vendor shall execute according to the contents approved.
 - Smart specification review (the vendor shall provide the construction plan and quality management plan).
 - Smart construction schedule control (the vendor shall provide the schedule progress and the actual smart system implementation progress information, and the project cycle management (PCM) team commissioned by the Taipei City Department District Office).
 - Smart construction supervision (the project cycle management (PCM) team commissioned by the Taipei City Department District Office shall assist in the supervision of the smart construction project and report the construction status back to the Taipei City Department District Office).
 - Smart quality assurance audit (the project cycle management (PCM) team commissioned by the Taipei City Department District Office shall be responsible for quality regulation and coordinate with the Taipei City Department District Office to submit the control list for review).



Graph 3-2 The Smart Construction of the Public Housing- the Review Process in the Construction Stage

Chapter 4 The Completion and Acceptance Stage

I. Items to be handled before the project acceptance inspection

The vendor shall fill-out the project completion report at the anticipated completion day or at the date of complete and submit the report to the agency. The agency shall verify the project completion with the vendor within 7 days after receiving the completion report, and verify whether the facilities that have been damaged or removed by the vendor during the construction period have been repaired or restored. Before the project acceptance inspection, the vendor shall first handle the following matters:

1. The environment within the scope of the project is thoroughly cleaned up; and the remaining materials, earth and stone, garbage, etc., are transported away from the construction site.
2. The various inspection (testing, trial) reports listed in Section 21 must be complete for review.
3. The glasses at the construction site must be wiped clean, the floors must be cleaned and waxed as instructed, and the auxiliary equipment must be fully prepared.
4. The relevant temporary facilities must be dismantled.

Before the acceptance of the project, the vendor shall first prepare the following information and display them at the site or at the facilities instructed by the agency, and the primary and secondary inspectors shall spot-check the items during the initial or acceptance inspection phases.

1. Contract documents: contract, original design drawings, specifications, etc.
2. Contract performance documents:
 - (1) Estimation documents.
 - (2) Contract revision documents.
 - (3) “Construction Process Anomaly Record Statistics Table” that includes work commencement, stoppage, resumption, completion, construction period review, and the contract modification approval documents.
3. Completion Document

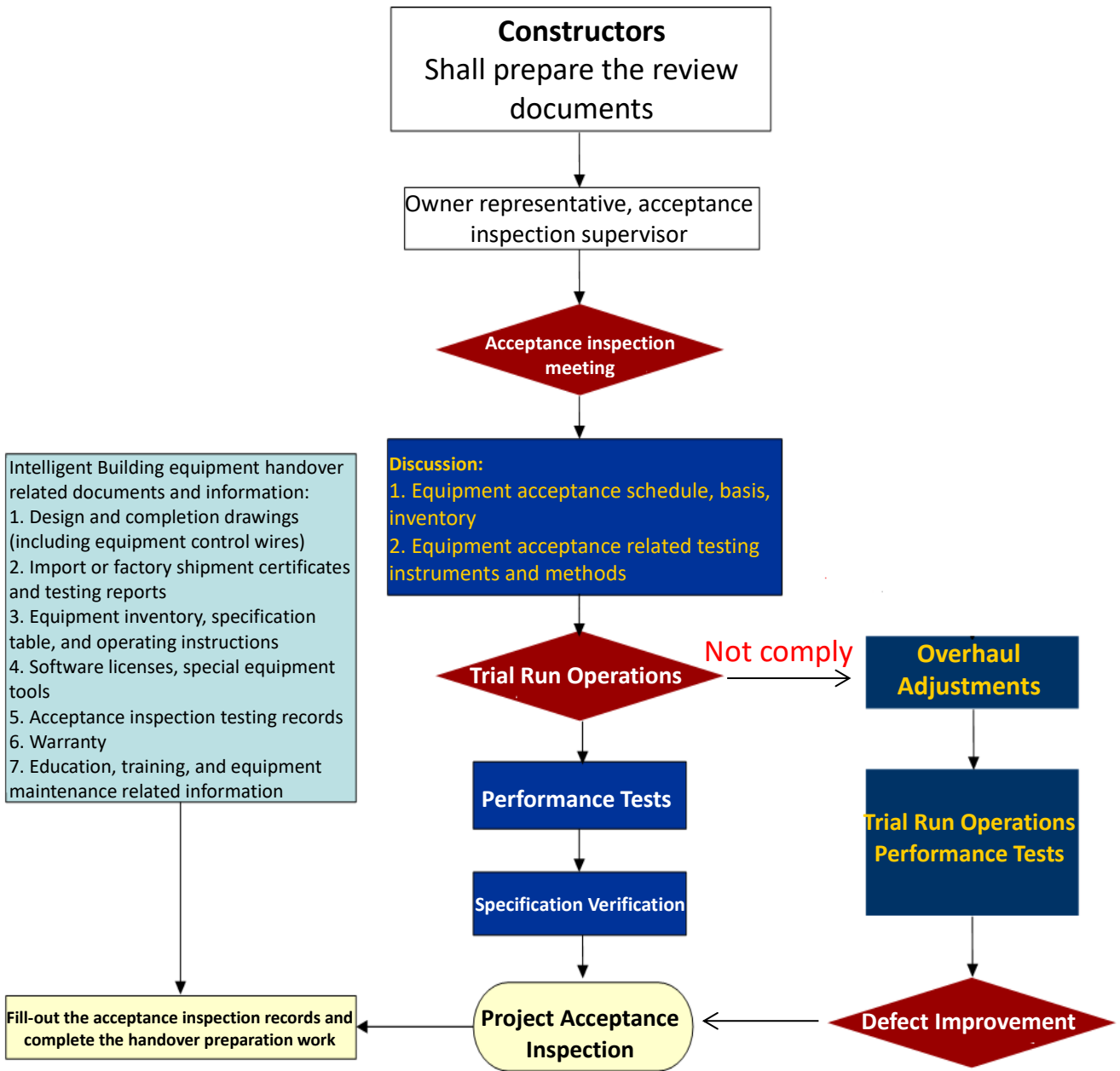
- (1) Project completion report, completion inspection records.
- (2) Completion Drawings.
- (3) Settlement Details Table.
- (4) Settlement Quantity Calculation Form.

4. Inspection (testing, trial) Record Statistics Table

The preceding inspection (testing, trial) record statistics table shall conform to the contract terms and nature of the project, and shall refer to the following detailed information statistics:

- (1) Import Certificate Documents.
- (2) Equipment Testing Reports.
- (3) Trial Run Test Records.
- (4) Insulation Test Records.
- (5) Level-III quality records, safety and health inspection records, and environmental cleaning inspection records.
- (6) Inspection checkpoint (restriction points) inspections, spot checks (tests) record table.
- (7) Level-I construction material quality inspection, test record statistics table; Level-II construction material quality assurance spot check record statistics table.
- (8) Pipelines and Wires Inspection Record Table.
- (9) Water (gas) Pressure Test Record Table.
- (10) Ground Resistance Test Record Table.
- (11) Pipe Flush-wash Record Table.
- (12) Important Equipment Part Catalogs.
- (13) Maintenance and Operation Manual.

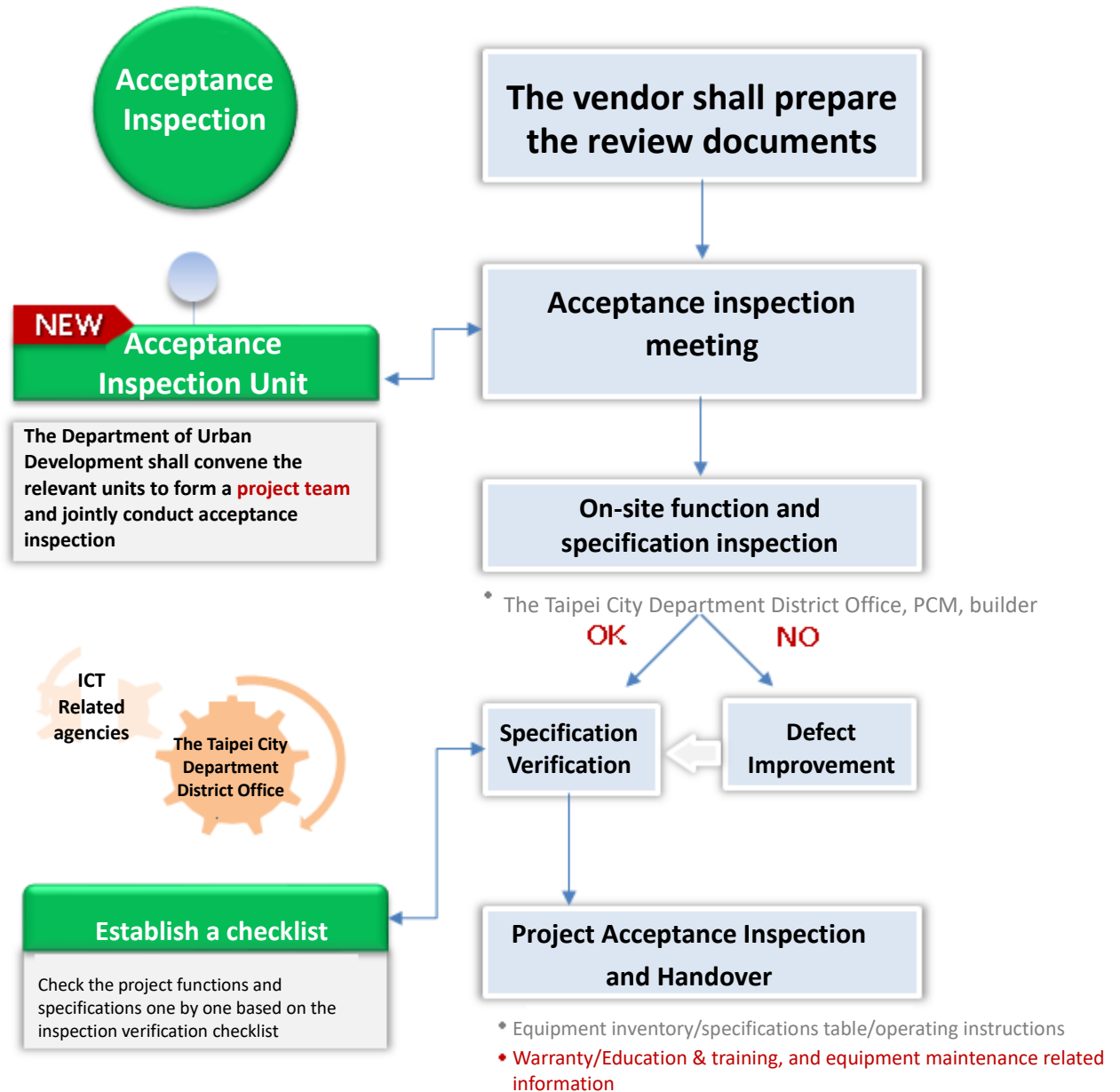
II. Acceptance Process



Graph 4-1 The Process of the Acceptance for the Completed Public Housing

III. Smart Public Housing Smart Construction Review Process- Acceptance Inspection Phase

- Accepted by: the project task force formed by related departments under the Urban Development’s lead, to accept the works jointly.
- Establish a checklist: Check the project functions and specifications one by one according to the inspection verification checklist



Graph 4-2 The Process of the Acceptance for the Smart Constructions of the Public Housing

Chapter 5 The Operation and Management Stage

I. Apply the BIM Cloud Operation to the Public Housing Management General Platform

At present, the public housing project has introduced the Building Information Modeling (BIM) technology. In each case, the relevant BIM information must be developed for the preliminary design, detailed design, construction, and completion phases in order to effectively integrate the BIM-related building and equipment information so the information can continue to be recorded and applied. The internationally accepted Construction Operations Building Information Exchange (COBie) standards format and the National Building Specification (NBS) units of the United Kingdom were referenced to provide the Royal Institute of British Architects (RIBA) British BIM element promotional platform method. The attribute fields data are classified according to the category information that must be referenced according to the actual maintenance management. Therefore, via the full process of the standard operation regulations from **(1) The standards of the component construction, (2) The coordinates of the project and setting of the direction, (3) The specifications and the principles for the model data constructions, (4) Exporting the IFC and COBie Information, and (5) Delivery of the files** (please refer to the “Operational Standards of the Completed Model Properties Data,” Taipei City), the features of the information integration and visualization in the BIM have been applied for the follow-up operation and maintenance management. Because the subsequent maintenance and management phases can last up to decades or even over a century and account for the vast majority of the life cycle of public housing buildings, this critical point cannot be ignored regardless of cost or benefit perspectives.



Figure 5-1. Completion Model and File Submission System Schematic Diagram

The public housing management general platform shall establish a BIM Cloud system and a set of BIM standard data structure such as patterns, groups, components, legends, and symbols; and establish a set of BIM tool software to perform the standard operations for the maintenance and management of public housing facilities at the various bases in order to achieve operation

standardization. This BIM Cloud system shall provide the following functions:

1. Provide and update the various public housing spaces and facility geometric (figure) information materials.
2. Provide and update the various public housing spaces and facility non-geometric (attribute) information materials.
3. Provide and update the various public housing BIM graphical information and attribute links.
4. BIM component library and tool software Cloud management platform.
5. Big Data Application for the Maintenance and Management of Public Housing BIM Cloud Facilities.
6. BIM facilities management can be combined with the Internet of Things (IoT) in the future to implement a virtual and integrated network management system.

II. Basic Contents of Property Management System

I. Property Management Basic Framework

In terms of community-based property management, value-added services have become the current demand development focus. The management operating system is divided into four categories: **Community users, Building facility equipment, Property rights and leasing, and Personnel contracts.** The innovative information and analytical technology develop services are integrated to enable the overall space, traffic flow, and functionality to conform to the user behavior patterns in the future. The goal is to create instant and professional community services, provide novel service experiences for community residents, and establish the smart living service standards.

Traditional community (AS-IS) vs. Smart community (To-Be)

Existing services:

1. Maintain community security
2. Transaction management operations
3. Environmental maintenance and management
4. Staff course arrangement
5. Purchase on resident's behalf

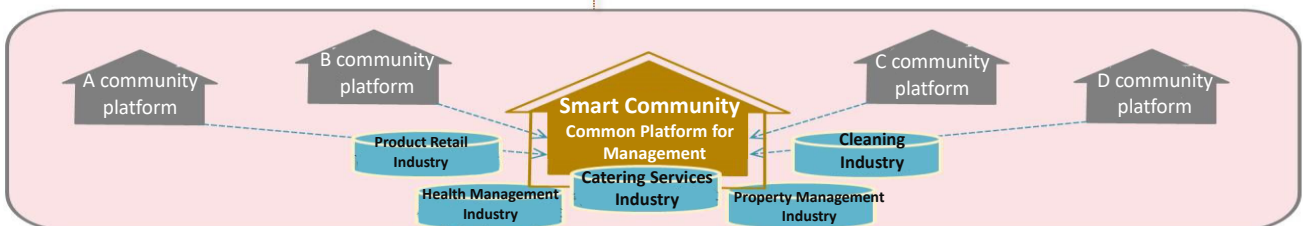
Integrated Services

1. Appropriate and adaptive information push services
2. Cross-community resource sharing integration
3. Multi-curricular matchmaking services
4. Business back-end integration services

Platform Integration
Resource Interface

Single Window
Single Item Services and Management

ICT Technology Introduction
Gather the Community Smart Life



Graph 5-2 The Property Management Platform Service Model for a Community
(Traditional Communities and Smart Communities)

The Basic Contents of Property Management System contents are divided as follows:

1. Facility Equipment Maintenance Management System

Contains equipment maintenance management, equipment failure (maintenance) management, parts inventory management, equipment self-diagnosis management, and equipment update management functions.

2. Affairs Management System

Contains administrative affairs management, equipment usage management, and supportive service management functions.

3. Equipment Operation Management System

Contains operations control setting management, operations record management, abnormal alarm management, operations specifications management and operator responsibility management functions for the various equipment systems.

4. Facility Manager Management System

Contains personnel data management, services management, as well as education and training management functions.

5. Comprehensive Information Management Department

Contains account permission management, role management, and various sub-system data collection interactive operating platform functions.

6. Residential Housing Rental Management

Contains rental conditions, renter registration, rent payment and lease management functions.



Graph 5-3 The Service Levels of the Community Property Management System

II. Property Management Establishment Platform

1. Mobile Repair and Maintenance System

- 1.1. In terms of integrated system platform, present the possible active integration and interactive behaviors for the various surveillance systems or subsystems. For example, integrate and interact the central surveillance system and property management system if it benefits the overall application service functions.
- 1.2. The repair and maintenance system can deliver messages through different mobile carrier interfaces.
- 1.3. Consider the convenience of the materials management system and combine the asset life cycle analysis to ensure that the service model is sound and can achieve long-term repair objective.

2. Community Operations Management System

- 2.1. Propose the standard operating procedures and the various electronic facility equipment specification documents management operation systems.
- 2.2. The smart community management system can apply the community website, community digital monitoring, community finance system, real-time patrol management, real-time cleaning management, real-time device management, emergency exception management, automated newsletter, and mail management functions for community household management via the functional platform provided by the system.
- 2.3. An operating manual with system architecture and functions must be provided. For example, a system specification manual that cover

the system architecture and functions must be provided for a newly developed system.

- 2.4. Establishing the functional operation of the annual equipment with smart and autonomous operation management (e-integration).
- 2.5. The community energy management system provides environmental monitoring, electricity analysis, power regulation, renewable energy application management, etc.

3. Community Facility Management System

- 3.1. Provide smart community management operation tools via form electronization, operation systemization, and informationization.
- 3.2. Use the databases establishment, auto-activated calculations, database information access, repetitive task simplification, and operation error prevention methods for smart community related data management to support data import and export while effectively complete the various work operations for organizational management.
- 3.3. The administrator shall create the system users as well as the accounts and passwords needed to log into the system in order to ensure system security.
- 3.4. Establish the application management protocols for the various facilities and equipment, including: Smart Community Rules as well as the application and management methods for the various public facilities or equipment.
- 3.5. An integrated operation platform must be built to provide the facility related management methods or application operating systems in order to provide the functional frameworks, specifications, or operation manuals for the facility management integrated operating system.
- 3.6. Establish a facility management personnel management system in order to provide a professional or licensed personnel management list that conforms to the legal regulations for the organization.
- 3.7. Establish a company procurement and maintenance signature approval form and procurement/repair details table for periodic or temporary public facility and equipment maintenance by the vendors.
- 3.8. Establish a company procurement and maintenance signature approval form and procurement/repair details table for the monthly or temporary public facility and equipment maintenance by the vendors, and record the repair warranty periods in detail as well as the vendor procurement amount and service quality.

4. Household Services Management System

- 4.1. Check the basic information such as the household size, parking spaces, license plates, credit card records, committee members, maintenance vendors, and tenants; and establish a community management information booklet.
- 4.2. Calculate the monthly management fees, parking space rental fees, and maintenance fees payable by each tenant.
- 4.3. Calculate the water and electricity fees payable by each tenant according to the water and power meter readings.
- 4.4. Provide Web Based community mail and parcel receiving/delivery management system.
- 4.5. Community messages, announcements, public appointments, and payment inquiries.

	Mobile Repair and Maintenance System	Community Operations Management System	Community Facility Management System	Household Services Management System
Subjects	Community residents/ relevant property managers	Relevant property managers	Relevant property managers	Community residents/ relevant property managers
Functions	<ul style="list-style-type: none"> ●The various surveillance systems or subsystems must be mutually integrated and interactive ●Use different mobile carrier interfaces to display messages ●Combined asset life cycle analysis 	<ul style="list-style-type: none"> ●Standard operating procedures and the various electronic facility equipment specifications ●Apply the system multi-functional platform to community tenant management ●Provide an operating manual that covers system framework and functions 	<ul style="list-style-type: none"> ●Form electronization ●Establish databases ●Establish management specifications for the various facilities and equipment ●Establish facility management personnel management system ●Purchase maintenance checklist and procurement/repair details management 	<ul style="list-style-type: none"> ●Establish a community management information booklet ●Web Based community mail and parcel receiving/delivery management system ●Community messages, announcements, public appointments, and payment inquiries ●Monthly usage fee calculation

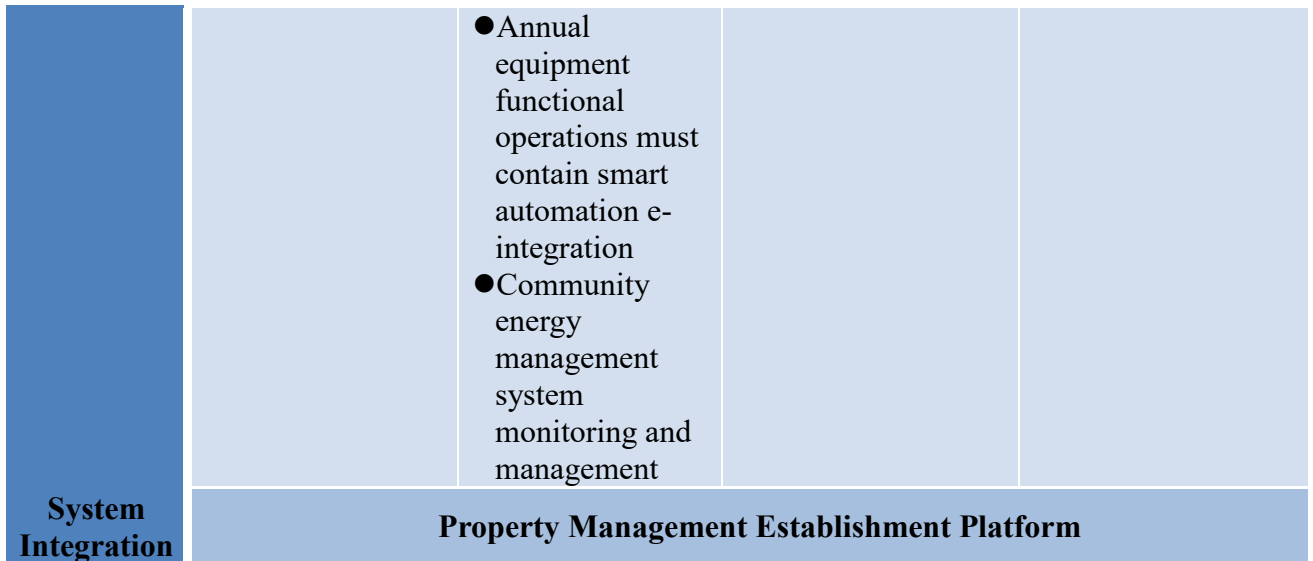


Figure 5-4. Property Management Establishment Platform

III. Smart Public Housing Smart Construction Review Process-Warranty Phase

- Construction warranty items: Vendors are required to provide 5 years of warranty maintenance to ensure the quality of the Intelligent Building project. In case of equipment failure repair, the equipment can be replaced using the same-grade or higher-grade equipment (the equipment and its functions must be reviewed and verified by the Taipei City Department District Office and the relevant units), and the Taipei City Department District Office shall implement the warranty inspection.



Graphic 5-5 The Warranty Process for the Smart Constructions of the Public Housing

Appendix

Refer to the evaluation contents of the Intelligent Building Evaluation Manual, 2016 Edition. Select the incentive items list more suitable for “residential type” buildings for Taipei city smart community recommendation for selective construction items in an effort to achieve the “Silver Level” target. The Intelligent Building level judgment table is shown in the table below.

Level	Bronze level	Silver level	Gold level	Diamond level
Score	Over 50 and less than 90	Over 90 and less than 120	Over 120 and less than 140	140 and higher

1. Integrated Wiring			
Items	Evaluation content	Score	Self-evaluation result
Wiring planning and design	Wiring planning shall comprehensively cover: telecommunications wiring, information wiring, building control wiring, residential/work area wiring, coaxial cabling, and other wiring (e.g., DAS) demands.		
	Wiring related equipment room shall adopt an elevated floor design.		
	The fiber optic architecture design shall be primarily adopted.		
	The horizontal/home wiring shall adopt the single category 5 (Cat5e) or higher-grade design.		
Wiring applications and services	Support fiber-optic communication related services (FTTB or FTTH, fiber-optic area network, fiber-optic community network, etc.).		
	Support building control systems (electricity, air conditioning, lighting, sanitary water supply and drainage, ventilation, elevators, fire protection systems).		
	Support smart service system (surveillance photography, access control management, security, intercom, parking management, emergency help, smart home automation).		
Wiring	The wiring “system grade” can be up to Cat 6 (equivalent) or higher standard.		

performance and integration	The configured cabling must support transmission rates of 300 Mbps or higher.		
Wiring management and maintenance	Must contain the wiring system completion test report or test plan description (candidate phase).		
2. Information Communication			
Regional network	Configure the right amount of wireless LAN at the appropriate public spaces.		
	The network management system provides Chinese graphical interface operation functions.		
	The network management system provides remote monitoring and operation functions.		
Video Conferencing	Two or more people can communicate with each other by image, sound, text, and graphics simultaneously.		
	Integrate exclusive space and conferencing equipment.		
Public Information Display	Set up an obvious information display devices at suitable public spaces to display various fixed or dynamic messages or multimedia images.		
3. System Integration			
Integrated Performance of Central Surveillance System	Equipment incorporated into the central monitoring system can be remotely controlled in response to a certain time frame or event.		
	Must have the surveillance system dynamic data library output capacity as well as the structured content items and integration/connection method.		
	Must have the monitoring system dynamic data graphical analysis functions and content items.		
System Integration Platform	The communication protocol for each professional subsystem must be switched to TCP/IP protocol and integrated into the central monitoring system platform.		
Specific interaction association of	Provides parking management system related auto-activation actions.		
	Provides security system related auto-activation actions.		

system integration	Provides access control system related auto-activation actions.		
	Provides surveillance video system related auto-activation actions.		
	Provides emergency rescue system related auto-activation actions.		
System integration operation and management	Set up a dedicated central surveillance room that provides operation and management for each surveillance system.		
	Provide web-based operating environment for the video recording system.		
	Provide web-based operating environment for access control system.		
System integration security mechanism	The host machine equipment system of the integrated system must contain a backup mechanism.		
4. Facility Management			
Asset Management	Asset management system (include real estate subject ownership and lease management).		
	Adopt dynamic management for facility use (include facility user, application, billing, and record management).		
Efficiency Management	It is expected to use functional needs assessment and planning (application/construction license records, functional use configuration plans for the various spaces, etc.)		
	Establish management performance evaluation criteria such as setting control issues, performance targets, and assessment methods.		
	Provide decision support system functions (creating various management reports) for information collection, recording, storage, and transmission.		
	Establish quality management systems such as: ISO and SOP, including the standard operating procedures and operating specifications, for each management operation.		
Organizational Management	Establish management systems for professional contract vendors (tendering, contracts, supervision,		

	performance, etc.)		
Maintenance Management	Establish the various facilities and equipment management and maintenance specifications (regulations, operating cycle, expense budget, water quality management, consumables details, technical specifications, human resources requirements, license projects, management methods, etc.).		
	Establish smart facility equipment crisis management and emergency response plans (information security, downtime, hacking intrusion, etc.).		
5. Safety and Disaster Prevention			
Fire Prevention System	Issue a warning signal and show the location of the fault when a fire system fails.		
Waterproof System	Set up water leak warning equipment: Detect water leakage and automatically issue warning signals at the electromechanical equipment spaces and other relevant locations.		
	Set up flood detection equipment: Install flood detection equipment at the underground or low-lying areas of buildings.		
Access Control System	The system must have remote controls that allow users to open or close access doors remotely.		
	The systems must provide the users with a direct alarm function to the central monitoring room.		
Parking Management System	The system must have the vehicle and license plate number automatic identification functions (such as e-Tag and other similar vehicle and license plate number automatic identification functions).		
Emergency Disaster Prevention and Rescue System	The emergency rescue system can be linked to the monitoring system: the system can connect to the monitoring devices of the anti-theft system and record the scene of the rescue-request location.		
6. Energy Conservation Management			

Equipment Efficiency	Adopt ice water host machines, window (wall) type, separation and box-type air conditioners with energy efficiency standards superior to that announced by the Bureau of Energy, Ministry of Economic Affairs.		
	The light source and equipment ratio shall conform to the energy-saving mark.		
Energy Conservation Technology	Smart energy-saving air-conditioning equipment (such as: human sense, limit the number of machines running at once, total heat exchanger, multi-frequency conversion, variable air volume, variable water volume, Carbon dioxide concentration outside air volume control, external air cooling room, indoor unit [window type, separate type, multi-frequency conversion], built-in human body sunshine sensing technology, APP or ICT Cloud application management, or other smart control technologies with energy-conservation benefits).		
	Lighting equipment smart energy-conservation (such as daylight utilization, time history control, personnel perception control, situation mode control, dimming control, APP or ICT Cloud application management, or other smart lighting technologies).		
7. Health and Comfort			
Health Management System	Physiological monitoring device with transmission function. (Blood pressure detection, heartbeat detection, blood glucose detection, etc.).		
	Care information and video are transmitted to the telecare service system.		
Life Services System	Contains a digital life service platform that offers convenient and fast life information inquiry for users.		
8. Smart Innovation			
Intelligent Building Standard Symbols	Use the smart housing standard symbols in the Intelligent Building light current system design diagrams.		

Total			
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