

# A Study on the Written direction Maintenance Manual to ensure the Sustainability of Hanok

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## Abstract

Hanok is the key technology of the 21st century buzzword, as 'healthy homes' and 'eco-friendly' and to meet the demands for the safety and comfort of the human body in space, the possibility is getting attention again. Hanok worth from the perspective of brand marketing, pay raises, and maintain it throughout the whole life cycle of the value based on continuous activities. The systematization, and the efficiency of the way should be carried out to maintain to achieve the purpose. This presented study is divided into three stages, the consideration of Hanok Characteristics, maintenance manual written case analysis and Hanok written direction of the manual and take advantage of the possibilities. Firstly, for the consideration of Hanok natures, we study the Hanok maintenance characteristics to analyze the use of materials and construct method based on the result of 'Hanok technology development'. Secondly, we grasp the element which can be applied on the maintenance manual, analyze the maintenance manual contents and the written direction. Lastly, proposed step of written direction, we suggest the direction of Hanok manual writing based on identified elements. "Hanok Maintenance Manual," has two dictionary definitions that one explains easily know the use and the features of Hanok as well as another describes specific knowledge needed to perform maintenance work on how to organize a 'guide'. The result as above is based on the understanding of the objective and in the pursuit of the only purpose, which express the inherent meaning and configuration on the manual, in helping the readers understand techniques of expression and the cumulative necessity of proven cases.

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Key words : Maintenance, Manual, Hanok

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## 1. Instruction

### 1-1. The background and purpose of this study

Hanok is the key technology of the 21st century buzzword, as 'healthy homes' and 'eco-friendly' and to meet the demands for the safety and comfort of the human body in interior space, the possibility is getting attention again. In addition, the government's national brand are being pursued, encompasses a wide range of civilian activities to enhance the image of the country through the 'Han style' traditional cultural content of daily life, industrialization, glottalization as well as

create employment and value-added marketing initiatives are being pursued.

The trend is to reflect the demands of the cultural power in the present and focusing on the Hangul, Korean, Hanbok, Hanji, Hanok and Korean music (traditional music) from the tactical perspective. These are the six areas among the traditional culture contents as Korean symbol.

Hanok worth from the perspective of brand marketing, pay raises, and maintains it throughout the whole life cycle of the value based on continuous activities. The systematization, and the efficiency of the way should be carried out to maintain to achieve the purpose.

Hanok is a kind of traditional architecture which form an ever-greater part associated with the field of social and cultural construction as a whole, but accounted for a proportion of only has been narrowly understanding

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1) Han-Style HomePage, Introduction of "Han-Style"  
<http://www.han-style.com/hanstyle/intro/info.jsp>

with the structure methods and materials used in the category.<sup>2)</sup>

Because traditional Hanok is not fit for modern life, it results low productivity caused by high cost and low efficiency for the construction and the maintenance.

The construction of traditional Hanok needs to constructed of natural materials readily available around, which can be categorized into three types of wood, stone, clay. The traditional Hanok materials are the three elements mentioned or derived from them.

whereas, modern Hanok has achieved the various materials innovation and systematization, social environment, economic environment and advanced science and technology, Therefore, the conditions of maintenance has been complicated.

This study explores the possibility of utilizing and analyzes the role and the written direction of 'Hanok maintenance manual' based on the awareness of the necessity, which keeps the value of Hanok and gives the guarantee of the codification and efficiency according to systematization of structural way and various material using.

#### 1-2. The Scopes and the method of the Research

New styles of recognized Hanok appears in the present which is suited to modern life. It steps into the original one within the category, to maintain the tradition and eco-friendly characteristics improve 'performance' and 'life fitness' in the sense that traditional Hanok Categories covered in this study were limited to these things, called as 'modern Hanok '3)'(hereafter'Hanok') against 'traditional Hanok'

This presented study is divided into three stages,

the consideration of Hanok Characteristics, maintenance manual written case analysis and Hanok written direction of the manual and take advantage of the possibilities.

The consideration on Hanok natures, we study the Hanok maintenance characteristics to analyze the use of materials and construct method based on the result of 'Hanok technology development'. In the analysis phase, we grasp the element which can be applied on the maintenance manual, analyze the maintenance manual contents and the written direction. Lastly, proposed step of written direction, we suggest the direction of Hanok manual writing based on identified elements

## 2. The maintenance of Hanok

### 2-1. The up-keeping of the traditional Hanok

A lot of defects has arised at the spots of joint tree-soil-stone of a heterogeneous material and especially pronounced in the wet curing required.

It is the representatives defects such as the drafts caused by wooden structure and plastering, cracks, exfoliation and where there is a more serious impact on frequently human contact frequently with indoor. Wood drying shrinkage, cracks, leaks and roof tiles of the representative defects actively involved with deep moisture.

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2) Building Code defines 'Hanok' is building or attached one made of Korean traditional form such as the wooden constructure of the pillars and beams, the traditional style of framework, interior finishing with traditional tiles and natural materials such as straw, wood, clay. In the other words, The standards of Hanok are the way of structure and specific material use.

3) On this study, Hanok referred the improvemental house in modern life categorized into private home, when we mention the traditional house referred to 'Traditional Hanok'

<Table 2> Traditional Hanok upkeeping

Up-keeping	Cycle		Expense (The first half of 2012)	Note
	warrant ty to repair defects	Persisti ng period		
re-mounting roof tiles	3years	5years	20,000₩/m <sup>2</sup>	Roof extent
roof-tile replacement	3years	10years	50,000₩/m <sup>2</sup>	
Changhoji, wallpaper	1year	5years	3,000,000₩/dong	30pyeong standard
Column puncheon	3years	20years	2,300,000₩/spot	Including the wall
Floor board repair	1year	3years	500,000₩/m <sup>2</sup>	Supplement of dry shrinkage within 3monthes after installment
Log frame repair	2years	10years	1,500,000₩/m <sup>2</sup>	
Stylobate floor repair	3years	5years	450,000₩/m <sup>2</sup>	Stylobate area
Stylobate stone repair	5years	10years	1,050,000₩/m <sup>2</sup>	Granite stone
Boiler pipe clean	-	Every year	3~50,000₩	A call-out charge
Break up principal structural parts	-	-	-	The range of the repair

It is the weak points to maintain the traditional Hanok without being composed of separately the durable dormer and the facing part of easy maintenance and replacement. The subsidiary materials and parts of the traditional Hanok are involved each other organically. On the other hand, the spatial composition which has the frame and envelope separately, offers easier remodeling conditions relatively to extend the life and value of the building. The maintenance works from the traditional Hanok are summarized below as the table.<sup>4)</sup>

Most of the occurred problem is related to the fundamental of the initial materials, not from residents of improper use or maintenance of the neglected. Therefore, we can see that the maintenance of the traditional Hanok was done at the anticipated problems in advance and endure through the whole life cycle. The traditional Hanok would offer a little bit better living environment compared to completely exposed outside as the only form of house in the past. Relative value comparisons, otherwise, come up with the

modern architectures which have the high confidentiality and durability on the basis of the development of technology in the present. The period of warranty to repair defects was notified by cultural property-related law. The legal particular about the up-keeping of the traditional Hanok related to cultural heritage, thus, applies depending on the circumstances.

## 2-2. The materials and maintenance

It can be compared with the materials used of the traditional Hanok and modern Hanok as the following <table3><sup>5)</sup>.

The natural materials of traditional Hanok are counted to the advantage the economic and productive benefits. Furthermore, it has almost no adverse effects on the human body and eco-friendly process from production to consumption to disposal

The natural materials of traditional Hanok are counted to the advantage the economic and productive benefits. Furthermore, it has almost no adverse effects on the human body and eco-friendly process from production to consumption to disposal. That is a large part of a traditional Hanok's attraction.

4) Cheon Deuk Youm, 「A study of feasibility and master plan of Hanok Town in the composition Town World Expo Yeosu」, 2010 - p.57 Refer to the Contents of Table "Hanok major refurbishment".

5) Lee Jong Shin, Cheon Deuk Youm, 「Hanok Maintenance Manual (for Residents)」, p.22, part of the 3rd year Hanok technology development research. 2012. 6.

<Table 3> Comparisons the materials used between modern and traditional Hanok

Division	Traditional Hanok	Modern Hanok	Note
structural materials	Timber	Timber, reinforcing metal	configuration of hanok structure
	Stone	Stone, reinforcing metal	Use on the foundation stone, Gomaki stone, ) the stylobate etc.
Insulation	Insulation Performance s of the lathing , Filling timber,	Insulate board	Installation on the roof and the space inside of wall, Water repellent effect
	Filling Earth mud-plastered wall	Heat reflective insulation	Blocking the heat wave under the roof
		Layer of Cavity	'Condensation' sealed air space control.
factory and shape lumber	Timber board	Plywood	Finishing surface, such as walls, ceilings.
	Flat surface of Lime Compaction	Flagstone	Finishing the flagstone floor podium by various textures.
	Flat surface of Soil compaction	Tile	Finishing the inner wall surface of the water used.
plaster	Wallpaper (Hanji)	Hanji, silk wallpaper	Various finishing materials depending on the convenience of life
	Traditional linoleum	linoleum	
	Lime Finish Ocher Finish, plastering work	Panel on the outer wall	Protection of wall insulation, traditional wall texture.
	Mud plastered on the ceiling	Plastering putty	Application on the bottom of the plywood covering the rafters
Waterproofing Materials	Traditional roof tile	Development, improved tile	Lightweight, low-cost, eco-friendly improvement
	Layer of Lime tamping (roof )	Water proofed paper of vapor permeability	Permeating moisture and preventing water
	-	Liquid water-proofing cement	water proofed tiles inside of Kitchen, toilet
wood for fixture.	Timber	Synthetic wood , PVC	Replacement of traditional window frame structure and timber
	Changhoji (Hanji)	(duplex type)Glass	Increasing the confidentiality and insulation performances
	Metal fittings (hinge. etc)	Systematization, metal fittings	'Opening' and 'lock' convenience, improved durability.

The composition of the materials used in the traditional hanok is relatively simple, all of the materials<sup>6)</sup> supplies are derived from 'tree-soil-stone', otherwise Hanok can be used to various materials along to current economy and technical condition, of course using the traditional elements too.

6) The roof tiles are made of soil baked and Hanji is made of the skin of the paper mulberry. Every kinds of steel are extracted from the iron one. That is why the composition of Hanok are divided as main and derived material.

There are five characters of Hanok materials used as above the table.

Firstly, wood and stone of Hanok traditional materials are still use as an important structural materials. The traditional materials express the identity of Hanok. The traditional materials express Hanok's identity exposed to the beauty of wooden frame as well as are used to the finishing materials on the living area where is contacted frequency by residents. Soil is avoided or used a limited range to prevent the defects and improve the durability because Soil is applied through wet curing method<sup>7)</sup>. The dry construction could solve basically the problem occurred frequently in wet curing method, such as spending time for the curing, pollution by the moisture, cracking due to expansion, heaviness of the structure. Moreover, it became simple to replace the external materials with easy desorption.

Thirdly, applying the industry standard specifications, the building cost can be saved as increasing the material dimensions of mutual relevance, causing the construction convenience and reducing waste of materials.

As the result, it can make the good maintenance environment.

Fourthly, the upgraded elements are used in the proper part.

The effective performances in the dwelling Hanok are the insulation, waterproof and sound insulation.

It is that using the insulation of the low thermal transmittance, blocking the rain water with Water proofed paper of vapor permeability, handing the compartments and preserving space with the porous panes of excellent sound insulation performance

Fifthly, It is noticeable to use 'reinforcement' materials at a specific location in order to the structural efficiency and durability.

It is estimated at the configuration of using the steel"Bracket" on the wooden furniture combined and installation of "stud" shaped of the square can to attach penal of the wall

7)'Curing' is to maintain the materials moisturized till being entirely dried without broken. (for example, Concrete curing.)

<Table 4> Hanok's various problems, symptoms and diagnosis

Division	The materials	symptoms	Analysis	Division	The materials	symptoms	Analysis
1.Surface contamination	The stylobate / Foundation stone	The stylobate discolored	· Caused by weathering and deterioration of the stone	2 The changes of materials	Outer wall	star shake	· Drafts and insulation degradation, biological intrusion
		Moss, Lichen	· The stone surface of the earth and sand + ground moisture		Eaves	Insects, birds inhabitation	· Relaxation of board, niche pushing the cause
		Coating on the stone	· Water inflow to the ingredients of lime stone surrounding			roof board distorted and damaged	· Fixed at both ends of the plate, the drying shrinkage of the wood
	Outer wall	Trail of Water	· Rain is coming into, water sprinkling		Roof	rupture of roof tile	· Roof drainage (rain, snow) does not facilitate
		Oil stain	· Pollution of using tool			exfoliation of roof tile	· High absorption, freezing damage of low strength of the tile
		Bird stool	· Droppings of birds living under eaves		Wooden structure	star shake	· Fiber direction, shrinkage difference of orthogonal direction
		Deterioration of Finishing	· The decay of materials by sun's radiation or acid rain			timber cracked	· Use of less dry wood, a large deviation of water situation
	Eaves	Blue of eaves timber	· Constantly exposed to moisture, growth of mold		Floor	timber destroyed	· The Poor support of periphery, combined wealth ruins
		Veneer smell	· The leakage and diffusion of Plywood Timber			torn the finishing materials	· Reduction in strength as moisture, deterioration of living
	Roof	Snow accumulation	· Accumulating snow affects structures, leaks	3 The lose of material efficiencies	Yard	Fence tile destroyed	· Additional factors the person and the animal on the cause of the roof
		earth and sand, sedimentation of fallen leaves	· Ruining tiles impact on indigenous plant		The stylobate	Drop out the floor and crack	· Curing lack of air masses, poor tramping basic floor inside of the stylobate
	Wooden structure	Surface pollution	· Surface contamination of organic matter that occurs in the life		Block of stone	Break	· External impact of weathering and stone, the strength degradation
		Food and drink, old set stains	· Constantly, deeply adsorption is affected in the material		Timber	Member of the framework, Joint Breakage	· External shocks, the eccentricity of the load, deformation deepening
		Dents of surface	· Hindrance of Internal appearance and the risk of injury causes		Roof	Roof tile destroyed	· The interference of the branches of the surrounding trees, high winds
	Floor	Hanji, linoleum of pollution	· Hindrance of Pleasant living environment		Floor	Plastering on the floor dent	· The decay of plastering around the heating pipe
		vinyl linoleum, tile	· Construction and expansion by floor heat, Eliminated by Expansion		Yard	Road curved, Erosion	· Poor drainage, snow accumulation persists
		lamine floor	· Relatively weak to water or moisture, expansion,	4 Location, Formation and Change of the materials	Block of stone	congeliturbatio n, Ffill a gap	· Podium, masonry internal earth pressure increases, cohesion faulty
	Inner calling	Syndactyl wall paer	· Deeply contaminated. Initial action is important		Timber	distortion, Crack,	· Bad dry wood use, sustained exposure to moisture
		Silk wall paper	· sistant to moisture, surface coating peeling attention			breakaway	· Carrying breakage of tenon deformation associated with the periphery
		Outlet, Lamp	· Having uneven dirty, hindrance of insulation		Roof	Relaxation of roof tile	· Truss internal structures ruins and relaxation
	Yard	Fallen leaves, Earth and sand	· The slope of the yard and check the drainage direction			Roof tiles falling off	· Poor fixed roof tile, strong winds, the interference of the tree
		Snow accumulation	The yard surface dents cause to continue		Floor	Finishing materials 탈락	· Poor bond due to moisture strength, the decay
		Pond	· Suspended solids, sediments, and mosquitoes, causes		Inner calling	Outlet, Relaxation of light case	· Less hard construction and decay, Fixture corrosion

### 2-3. Maintenance System

Hanok has changed the space composition in the modern life style and improved the structural method as well as developed the performance of the material and the production system.

The construction was changed to use dry composition with the materials developed from wet composition to solve the traditional Hanok's concerns.

Furthermore, Hanok reflects the situation changed from sitting custom in tradition to as standing in the

modern life, so the compromise was made in Hanok. Every kinds of techniques come up the wood structure in harmony using various facilities and equipment.

It is possible to make the superior thermal environment, improve confidentiality inside by handling technique on the niche between materials.

However, contrasting as confidentiality, the emission of the moisture inside was done to curved, so there are secondary problem such as mildew and the corrosion etc.

As diverse and complex configurations that can cause variety of symptoms in the situation .

Maintenance characteristics need to be reasonably organized category. There are the maintenance conditions to categorize the maintenance features of Hanok as following words.

Firstly, The purpose of the maintenance is to keep or arise the efficiency not for the status quo. Secondly. the residents could cope with the problem or the experts could make the problem up to the professionalism and how difficult work is in the specific situation.

Thirdly, the right maintenance could be possible when the residents as well as the experts should offer the information on the part of problem or special materials.

Fourthly, the use and composition of the members of frameworks becam complex. When finding the problems and the answers, we need to examine at the relationship of between the materials or each parts. The superficial measures can not fundamentally solve the problems.

Fifthly, it is the essential checks and investigations for the prevention

Inspections should be carried out constantly to grasp the check and the investigation based on the initial performance and specifications.

Sixthly, It contains the maintenance of external place. There are the yard, landscape and subsidiary in the Hanok place, it is extensive scope to maintain.<sup>8)</sup>

8) Kim do kyeong, 「The House built in wisdom, Korean architecture」, 1.Plat side 01.Human being and nature into one, space property of the order by Building Division, p14 -

<Table4><sup>9)</sup> analyzed every kinds difficult occurred in the maintenance.

The symptoms anticipated as parts or the kinds of materials place under four categories, dealing the surface contamination, the small deformation of the materials, efficiency loss of materials and the problem of structural safety, according to the number occurrence of maintenance activities

<Table 5> Category of maintenance

Division	Level 1	Level 2	Level 3	Level 4
Symptom	Surface contamination	Exterior material deformation	Performance loss	Structural Safety
Handling	Clean purifying	adjustment, materials replacement		Repair
Main agent	Treatments by residents			Expert
Check	Individual action	The examination the relevance of the structure and the adjacent members of framework		

The categories of four steps divided mainly 'symptoms' could be changed by 'how to handle it', 'the check range of the subject and the materials.

### 3. Manual

'Hanok maintenance Manual' is a concept combined meanings of the three words "Hanok", "Maintenance" and "Manual". We already analyzed the concepts of Hanok and the characteristic of maintenance prior to this, this chapter reports the composition of manual.

#### 3-1. Manual definition

Understand the dictionary meaning<sup>10)</sup>of are as follows. We sorted the variety of pre-defined definition of Hanok, related to maintenance actions.

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Constructure is divided 'Building Division' and 'Room Division' on the depending on how the space capabilities to meet and explain the activity use out side of Hanok from character of 'Building Division'

9) Lee Jong Shin, Cheon Deuk Youm, 「Hanok Maintenance Manual (for Residents)」, p.18~19, part of the 3rd year Hanok technology development research. 2012. 6.

10) Daum Korean Dictionary, <http://dic.daum.net/index.do?dic=kor>

<Table 6> Dictionary definition and analysis of manual

Division	Definition / analysis		
1	The easy-to-understand book describes the features such as how to use the machine or computer etc.		
	<b>Object</b>	<b>Content</b>	<b>Purpose</b>
	Such as a machine or computer(Object)	How to use or function	Explanation
2	Instructions to organize the basics about how to knowledge on the tasks required to perform the duties and tasks to undertake and proceed.		
	<b>Object</b>	<b>Content</b>	<b>Purpose</b>
	Job performance (behavior)	A working knowledge, How to proceed	Guidance

<Table 6> was identified through a preliminary search by distinguishing the two definitions of 'manual' analysis.

'Hanok' Hanok Maintenance Manual" describes about how to use the functions and easy-to-understand as well as contains the meaning of "Guideline" organized the knowledge and the method to perform the maintenance work. In the other words, it is concerned to complicate two concepts as 'Instruction' and 'Guide of how to proceed the action'

### 3-2. Hanok maintenance manual configuration

It reads the composition of the manual based on the understanding of the definition and name (Hanok / maintenance / manual) divided to sub concepts.

The study composed rough out line of table of contents of the basis of the two definitions and analysis, substituting 'traditional Hanok', 'comparison of materials' researched before.

<Table 7> Manual configuration of Hanok maintenance

Division	Content 1	Content 2
Frame	How to use, Function	A working knowledge, How to proceed
Manual, Table of Contents	1. Hanok Introduction 2. specifications of Hanok and performance	1. Maintenance concepts, procedures 2. Officials roles, responsibilities 3. Sectoral maintenance work 4. Check and Inspection Procedures 5. Maintenance and Repair

The main concepts of the two frames and the manual table of Contents into one theme are 'Hanok' and 'maintenance'.

'Hanok maintenance manual' can purposed as 1) an explanation of Hanok, 2) a guide to lead the maintenance. The additional content on the manual could be teleological if the information has an aim to enhance the main contents.

### 3-3. Classification of readers

It can be divided into two groups of Hanok 'user' and 'experts' involved in the maintenance of hierarchy. Users need to perform administrative duties and maintain the residence or owned reasons of Hanok, the professional experts referred as an group to give the Hanok advises and consultation to users or take advantage of the expertise and skills to the maintenance of Hanok. This manual is targeted to these two classifications. Manual classified according to readers interest based on the demographic, the distribution can be expressed as follows.

<Table 8> Reader Classification and interest list

Division	Reader ← (Widening understanding )	→ Expert (Maintenance work efficiency)	Note
Usage Function	Introduction of Hanok	Specipication, Function	
A working knowledge, How to proceed	Concepts, procedures  Duties by field	Inspection, Maintenance  Roles, Responsibilities	

It reports<sup>11)</sup>It reports the users have desired the broaden understanding and the indirect experience, focused to 'Instruction of Hanok', 'Hanok's Specipications and function' and the duty of maintenance' .

Wheres, the experts are regarded as not being interested in the 'Instruction of Hanok' The '제원 and function of Hanok' is classified as a common concert of users and experts, but the perspective is different. It is an index of satisfying intellectual curiosity and an

11) Lee Jong shin, Cheon deuk youm, "hanok Maintenance Manual," the study had been ranged in third year (2011 ~ 2012) for user's manual and has been ranged in the fourth year (2012 ~ 2013.) for professional separately as well as The study reports the bases of each studies are the feedback of resident in Hanok and the consultation of experts at the self assessment.

aim of maintenance.

### 3-4. Case analysis

<Table 9> Analysis Maintenance Manual Case

Case	Configuration (Table of Contents Outline)	Note
<ul style="list-style-type: none"> <li>Set of buildings</li> <li>Maintenance</li> <li>Integrated manual</li> </ul>	<ol style="list-style-type: none"> <li>1. Management business of building crowded</li> <li>2. Guidelines for maintenance</li> <li>3. Maintenance manual of building crowded</li> <li>4. Supplement</li> </ol>	Focus on maintenance work, a managing principal, internal and external affairs and report, required documents, etc
<ul style="list-style-type: none"> <li>Hanok maintenance manual</li> </ul> (For residents)	<ol style="list-style-type: none"> <li>1.General</li> <li>2. Hanok Management</li> <li>3. Inspection and Testing</li> <li>4. Maintenance and Repair</li> <li>5. Supplement</li> </ol>	The user's understanding modern concept of Hanok and maintenance procedures focusing on the layman
<ul style="list-style-type: none"> <li>Architectural Heritage</li> <li>Safety Inspection</li> <li>Foundations and practical</li> </ul>	<ol style="list-style-type: none"> <li>1. Relevant laws and Architectural Heritage Category</li> <li>2. Architectural Heritage in the general structure</li> <li>3. The type of personality of Architectural Heritage</li> <li>4. Inspection plan and the basic checks</li> <li>5. Metrology inspection and interpretation</li> <li>6. Safety inspections research items and instances</li> </ol>	Manual for maintaining the public asset, focusing on the explanation of the relevant laws and regulations and the structure of the Architectural Heritage and the formation
Eco-village Crystal Waters	<ol style="list-style-type: none"> <li>1. Crystal Waters outline</li> <li>2. Crystal Waters ideology</li> <li>3. Crystal Waters Deployment</li> <li>4. Crystal Waters of the plan</li> <li>5. Crystal Waters Housing Case</li> <li>6. <b>Owner's Manual</b></li> </ol>	Eco-village community, the establishment of the 'Crystal Waters' operations, and the contract between the members presented in the manual.

This study analyzes four different cases. The it is summarized to be the important elements to deal with and manual composition aimed to maintenance the building as below.

"Crowed building maintenance combined manual" was written for the professionals who are dedicated to the maintenance, not residents.

Administrative tasks were examined closely by because the target is experts. Also it was organized of general survey and the building-related regulations. Management Manual of Hanok ("hanok maintained for the user)," is a draft as the result of a 'Hanok Technology Development 3rd year research project'

It was set to the reader as User who do not have

an experience in the hanok. It avoids the use of the professional words and help them understand the situation, with illustrations drawn. On the beginning of the manual, it suggests to understand the concept of a Hanok, and present a simple survey and inspection tips.

"The basis and practical safety inspection of architectural heritage" suggests the standards by gauging in the form of daily inspections of the Architectural Heritage cultural property as well as targets are the owners and managers, local government officials.

Public assets, it is based on the nature of cultural property protection by laws. it addressed the structure and form of Architectural Heritage and the content commentary of laws and regulations related to safety inspections.

Australia's eco-village 'Crystal Waters' explains raging from ideologies to the housing practices and guideline"Owner's Manual". translated to Korean and commented", to be a member of the community. The manual is connected the ideologies of the village and daily contented of 'maintenance of village community. We could grasp the regular patterns on the manuals through the analysis above.

First it is listed sequentially according to the process such as object and purpose, and basic case problems and its solutions.

It could archive maximum effects to meet the purpose of the manual, considering readers to read it in advance. Moreover it contains the contrast contents to obtain the confidence on the actual content. as well as the limits of the case on the papers. It can be summarized as following table



<Table 10> An analysis of manual written direction

Division	Analysis	Note
Subject	<ul style="list-style-type: none"> <li>· Crowded buildings, Hanok, Architectural Heritage, eco-village etc</li> </ul>	Understanding Closely related to the target and Maintenance purposes
Purpose	<ul style="list-style-type: none"> <li>· Propose conduct standards of Maintain</li> <li>· Maintain or improve performance, such as the shape of the target,</li> </ul>	Characteristics vary depending on the purpose of the destination that is important
Reader	<ul style="list-style-type: none"> <li>· Make difference of the depth of content and format, depending on the degree of knowledge and understanding of the target.</li> </ul>	Owner, user · Experts, operators Administrative civil servants
Composition	<ul style="list-style-type: none"> <li>· Case-based problem solving, according to the situation</li> <li>· Way to describe the progress according to the time</li> </ul>	'Cause estimates → 'Induction solution process', added by preventive and emergency care.
Reliability	<ul style="list-style-type: none"> <li>· Limit of Practices or the floor → supplemented, amended and compared to the possibility of change</li> </ul>	<ul style="list-style-type: none"> <li>· 板本(Version).<sup>12)</sup></li> <li>· Appendix added</li> </ul>

## 4. Written direction

### 4-1. Problem prevention

Traditional Hanok are expected to occur with low performance and subject to a lot of issues. It is accounted for a large proportion related to the surrounding environment and the control of moisture. It needs the prophylactic measures to improve the durability and maintenance environment, expected to the anticipating the problem at the initial planning stage as Hanok is succeeded from a traditional hanok. Related to the surrounding environment, the problem can not be solved essentially with a prescription for the problems occurred in the Hanok, because same problem could be repeated and the range of impact across a whole Hanok. The techniques of economics review is used widely among the value engineering combined business administration and construction technology as the technique can be reconsidered the performances through the entire process ranging from planning to construction,

Stocked in the past sedentary lifestyle from the inside of the housing modernization since the change

was significant portion

The life style has been changed from in life style of sitting to standing after modernization.

Hanok also reflects this trend as compromise of both styles. 'Hanok' manual needs to reveal the lively lifestyle rather than simply limited to a description of specifications and performance of Hanok as a guide.

By doing so, it could effect to distinguish between the discomfort in the life and the problem of maintenance. Inside the Hanok is inhabited unlike other products, so safety issue is addressed importantly. The information of disaster recovery and emergency treatment should be included in. The precaution of irreversible situation in Hanok should be presented on it, Hanok is expensive products in order to minimize damage to the owner of the property.

### 4-2. Production environment

The industrial products are used to built in Hanok, the all-round quality standards should be presented such as materials and parts etc. and should include the consumer warranty on defects of the components or the finished constructions.

There are warranty liabilities linked to the law and the regulation of general construction and maintenance and repair services of cultural property to keep over the certain level of qualified constructions and facilities. New Hanok construction techniques are being developed, but soon to be completed, along with the development of technology, the proposed maintenance manual should include the standards of quality, warranty-related matters, and the legal 'Defects Liability Period' to help understands.

### 4-3. Reality responsiveness

Manual is systematized of the answer about the issues and representative case for the expected range of possible solutions. However, the faithful composition could be constrained by the cause of the complexity and the impossibility of predicting reality and the limitations of the manual papers.

This study suggests the codes in cases of 'maintenance and repair' to reconsider 'reality

<sup>12)</sup> Version(板本), modify or improve the existing system to increase completeness.

responsiveness’

<Table 11> Maintenance and repair practices coded

Division	Elements	Contents
Coded items	1. Part	• Hanok is divided into nine parts such as podium, roof etc.
	2. Material	• Configuration detailed items in each area
	3. Level	• four-levels, classified according to the proportion of site conditions (surface contamination / Deformation of Cladding / performance loss / Structural Safety
	4. serial number	• Three-digit is given to the number of frame work, because configuration complexity is low
	5. subsidiary number	• Support serial No and the alternative activities
Using the example	<Code number> Roof - rafters - L1 - 001 - 01 <Case name> Remove blue stain eaves rafters	
Cases	<b>Integration manual of the crowded building maintenance.</b> (Check)Main Category-Division-Sub-item-check-cycle-Contents (Conservative) Main Category-Division-Sub-ever and classification-Type of defects-defects cause- Repair / Replacement	

#### 4-4. Written Direction

The analysis of the previous ‘Hanok’ maintenance manuals written direction are shown in the following table as summary,

<table 12> Manual configuration and written directions

Frame	Table of Contents	
Hanok Management	1.Hanok technology and specifications 2. Hanok quality and warranty	3. Maintenance concepts and procedures
Various Standards and uidelines	1. Guidelines design considering to Maintenance 2. Defects Liability and handling	3 .The maintenance work 4. Inspection and examination tips
Maintenance duties	1. Prevention 2. Disaster recovery, and emergency measures	3. Maintenance and repair

#### 5. Concluding remarks

This study made the results to investigate the “Hanok Maintenance Manual” and analyzes Hanok and the upkeeping work and grasps the composition of the manuel.

Firstly, this research improved the weak points of traditional Hanok and make up the various problems, but it can be revealed with other problems.

Secondly, it can be identified various categories of maintenance activities depending on the symptoms of the problem and the corresponding level, subject, and depending on the scope of additional checks .

Thirdly, it was possible to make the gist and infer to the configuration on the manual through the recombination after analysis “Hanok Maintenance Manual” divided in three sub-concepts.

Fourthly, it was able to navigate the written direction of the manual based on the framework using dictionary definitions.

Fifthly, this study reports the precaution is significant in the maintenance works and identifies the needs of information, quality, compensation and guarantee against defects suitable to current surroundings. Lastly, it proposed to grant the codes up to the case by case as a composition structure of manual that can prepares reality responsiveness, unpredictability, changing the situation. This results of the study are summarized as it should faithfully express the inherent meaning and configuration of manuals and help the reader understand with effective expression and the cumulative cases based on the understanding the objects and the aim.

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