

“Fire Prevention Design and the Fire Prevention System in High-Rise & large scale Buildings in Japan”

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Topics

Part – 1 : Lessons from Large Fire in Japan

Part – 2 : Fire Preventive Report & its Appraisal System

Part – 3 : Example (Completed in 2017 March)

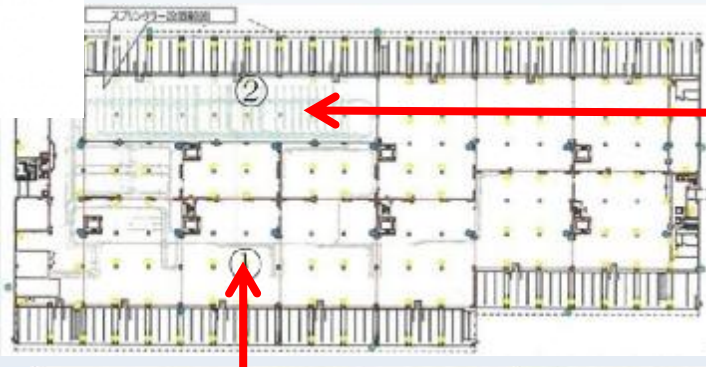
Part – 1: Large Fire in early 2017

Ratio of Burnout area : 62.5%
(TFA: 77,5000 Sq. ft)

Extended Fire Duration : 13 days

(Logistics warehouse , RC+SC structure)

Ground Floor



積み込みスペースの様子(②の付近)



入荷スペースの様子(①の付近)

The area is sorting works and the loading trucks. Also it keeps the daily necessities.

(図面:写真)埼玉県三芳町倉庫火災を踏まえた防火対策及び消防活動のあり方に関する検討会より

Second Floor



入荷スペースの様子(③の付近)

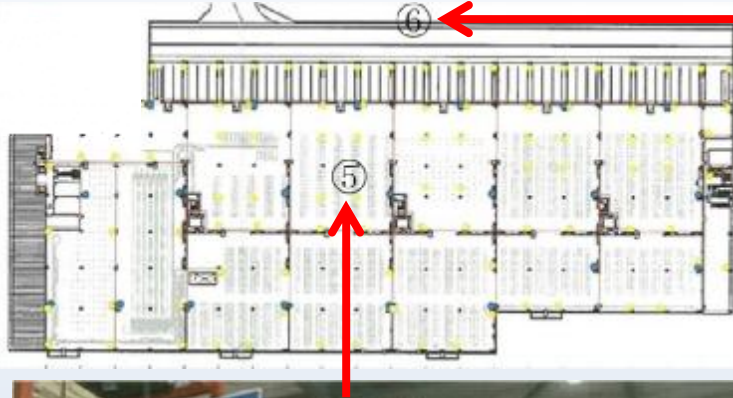


入荷スペースの様子(④の付近)

*Keeping the beverage,
Mainly*

(図面: 写真) 埼玉県三芳町倉庫火災を踏まえた防火対策及び消防活動のあり方に関する検討会より

Third Floor



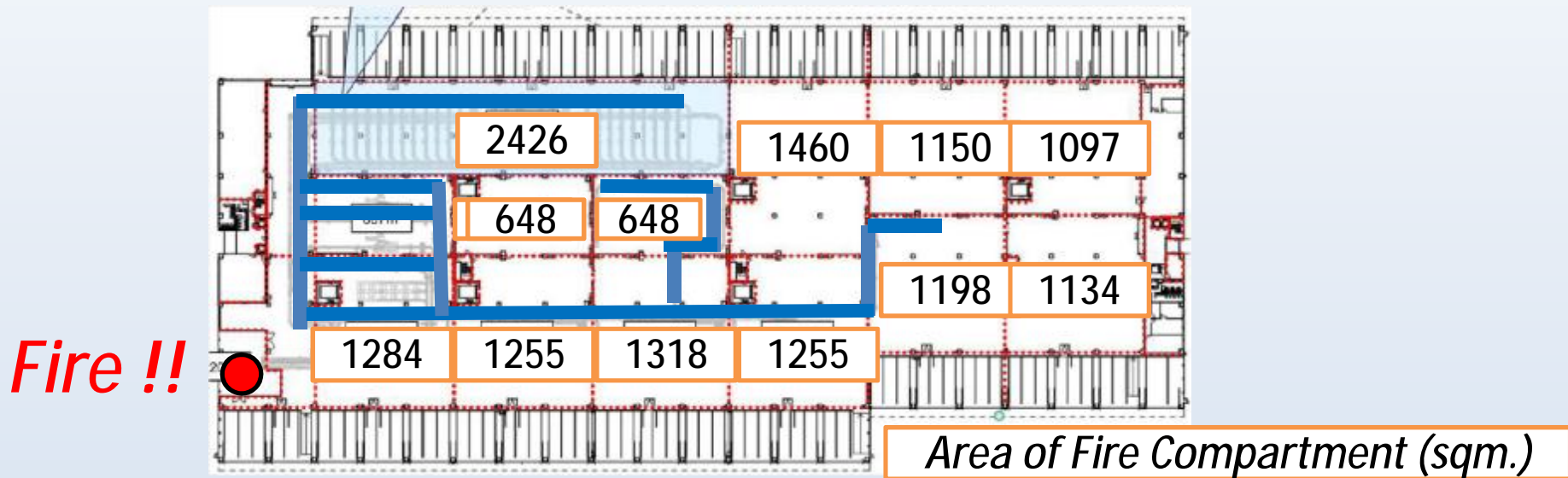
入荷車両用バースエリア様子(⑥の付近)



保管スペースの様子(⑤の付近)

*Vehicle berth &
keeping large
miscellaneous (sundry)
goods*

Fire Compartment & Location of Fire Room



- Fire Protection line (walls or Shutters)
- Conveyors

Working of Fire Shutters



*Fully Closed :
30%*

*Non Closed :
70%*

*Fire was
spreading
upper floor*

Cause of Non-Closed Shutters



(図面:写真)埼玉県三芳町倉庫火災を踏まえた防火対策及び消防活動のあり方に関する検討会より

Obstacles by conveyer

Obstacles by commodities

**Conveyers: 10 places, commodities: 10 & Others:35
(others are troubles of electric wires and fire receivers)**

Important Measures

Measures

1. Fire spread prevention in early fires stage

a *Certain operation of fire shutters*

b *Initial response by business person*

2. Effective fire fighting activity

c *Enhancement of Head of fire department*

d *Mitigation of damage in early fire stage*

Part – 2 : Preparation of “Fire Prevention Design” & “Fire Prevention System”

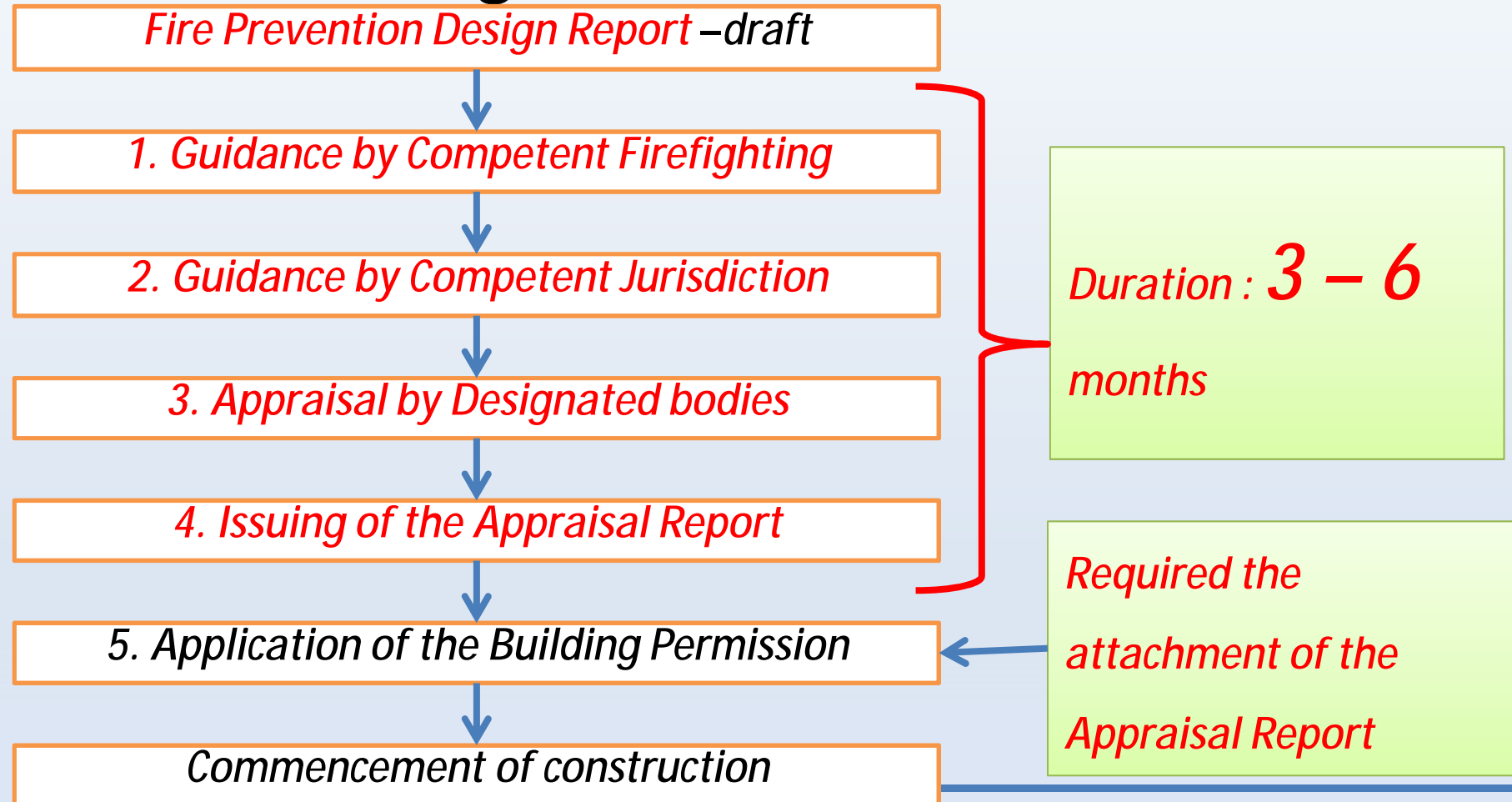
The obligation of the “Fire Prevention Design Report” and “Fire Prevention System” are utilized several jurisdictions including Osaka Prefecture for a long time.

Required Building of Fire Prevention Design

<i>Building Use and No. of Stories and others</i>	<i>Building Size & Volume</i>
<i>A. Over the 101 feet</i>	<i>All building</i>
<i>B. Lower the 101 feet and following buildings</i>	
<i>1. Inn and/or Hotel (over 5 stories)</i>	<i>Over 21,530 sq. ft</i>
<i>2. Complex Building (over 5 stories, including Hotel, Goods selling store)</i>	<i>Over 21,530 sq. ft</i>
<i>3. Theater</i>	<i>Over 2,000 seating capacity</i>
<i>4. Building that use of unspecified number (over 3 stories, including school, exercise facilities)</i>	<i>Over 10,765 sq. ft</i>

Common : assumed risk of huge fire & human damage

Fire Prevention Design Report in a cause of the Building Permission Procedure



Purpose of Fire Prevention Design

1. Take measures of more high level fire prevent solutions which not prescribed in B.S.L..
2. Guidance of high spec. requirement.
3. Described fire prevent and formation of fire extinguishing

Contents of the Appraisal Report

- 1. Out line of the building*
- 2. Basic concept of fire prevention*
- 3. Finding, reporting & evacuation induction*
- 4. Evacuation plan (Egress)*
- 5. Smoke discharge & fire fighting activities*
- 6. Management & operation*
- 7. Related drawings*
- 8. Special remarks*

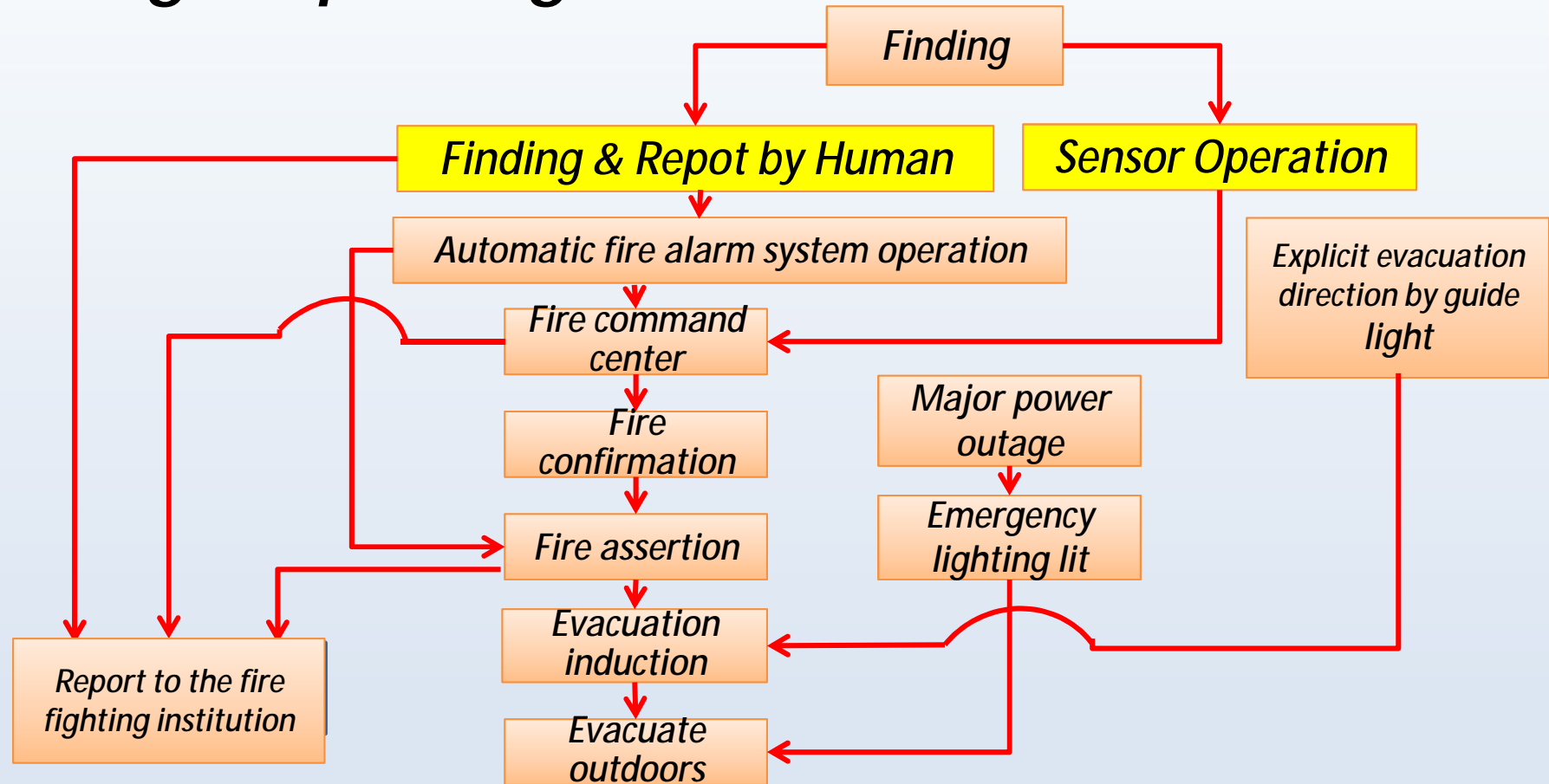
Basic Concept of Fire Prevention

Points

Decision of the fire prevention, fire extinguisher in early stage and basic policy of firefighting.

<i>item</i>	<i>description</i>
<i>1. Prevention of fire</i>	<i>Usage of non-combustible materials Guidance of fire prevention to users</i>
<i>2. Finding & report</i>	<i>Report system of automatic fire alarm system</i>
<i>3. Initial fire fighting</i>	<i>Installation of initial fire extinguishing equipment such as fire extinguisher and fire hydrant; and training</i>
<i>4. Evacuation</i>	<i>Consideration on two way evacuation and measures against closed obstruction of fire shutters</i>
<i>5. Fire spread prevention</i>	<i>Consideration on fire compartment and measures against closed obstruction of fire shutters</i>
<i>6. Consideration for fire fighting activities</i>	<i>Consideration on fire engine and firefighter entry route, traveling rules of freight vehicles during fire, emergency entry planning policy</i>

Finding, Reporting & Evacuation Induction



Point

1. Exam. with business person because user of building also involved these process
2. Exam. of planning of **emergency lights and guide lights**

Evacuation Plan – 1/3

Policy of Evacuation Plan

- 1. Outdoor evacuation staircase should be use for all evacuation from storage area.*
- 2. Indoor evacuation staircase should be use for all evacuation from office area.*
- 3. Well balanced location of evacuation staircase are required and also evacuation distance and number of evacuee should be planed equality*
- 4. Entry to the fire command center able from out side of building and located easier access to staircase*
- 5. Decide matters for the prevention of measures against closed obstruction of fire shutters*

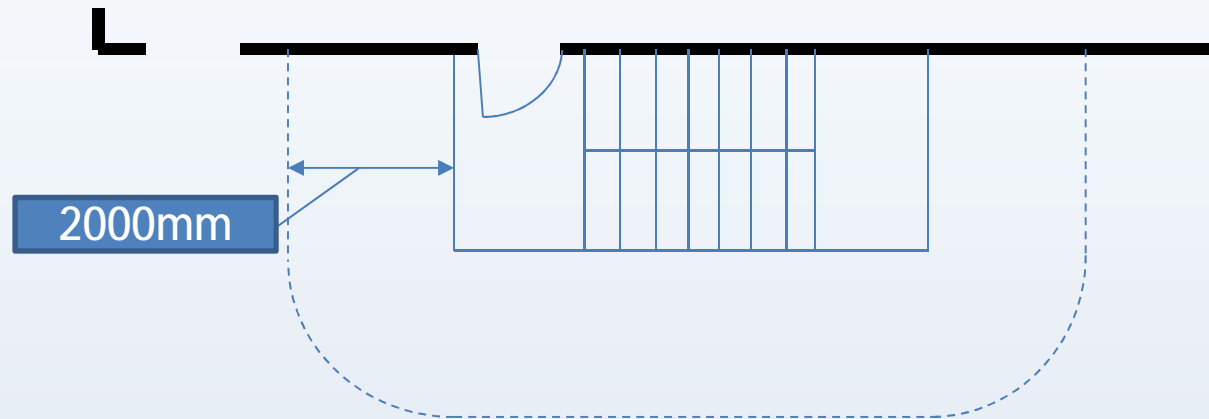
Evacuation Plan - 2/3

In order to verification of safety and properly evacuation, we required the "Evacuation Calculation".

Point : verification

- 1. Person to evacuate can arrive at staircase within a predetermined time*
- 2. Perform verification of all rooms each stories*
- 3. Perform verification of planning on evacuation route based on the rule*

Evacuation Plan - 3/3



Point : Outdoor evacuation staircase

- 1. Prohibit to design of opening surrounding door way of outdoor staircase within 2m.*
- 2. Should be fireproof structure*
- 3. Directly reach to ground*

→ Secure safety space and route
In addition,
Utilize the activity path for firefighter

Smoke Discharge & Fire Fighting Activities

Consideration of Extinction

*The contain fire in **fire compartment zones** is required for **Logistics warehouse** in addition of fire extinction*



It is necessary to ensure that the fire compartment zones function



Realizing the intent of fire fighting

If the building design becomes relaxation of the fire compartment zones, it ill mismatch with the intention of the fire fighting

Management & Operation

Point

1. *Role of the “Fire Command Center” and operating mode planning*
2. *Planning of the fire protection management system*
 - A. *24 hours & 7 days, always manned management*
 - B. *Reserve the disaster prevention related books*
3. *Planning of form and method of maintenance management of facilities*
 - C. *Inspection, prevention, training*
 - D. *Rule for installation equipment such as conveyor and renovation of interior*

Fire Prevention System - 1/2

Point

The appraisal committee consists of academic experts such as university professor, guidance administrative officials of both building and fire performed the assess the report.

Fire Prevention Design Report –draft

1. Guidance by Competent Firefighting

2. Guidance by Competent Jurisdiction

3. Appraisal by Designated bodies

4. Issuing of the Appraisal Report

5. Application of the Building Permission

Commencement of construction

Point

Stage of 1. 2. are still draft.

Stage of 4 is final of the fire prevention design Report.

Fire Prevention System – 2/2 (in a case of warehouse)

Fire Prevention Design Report –draft

1. Guidance by Competent Firefighting

2. Guidance by Competent Jurisdiction

3. Appraisal by Designated bodies

3. Appraisal by Designated bodies

4. Issuing of the Appraisal Report

5. Application of the Building Permission

Commencement of construction

The committee pointed out on the measures against **closed obstruction of fire shutter.**

Measures

1. Do not put items
2. Do not stop and park at the descent position of the shutter
3. Vehicles traveling when a fire occurs run to the outside of the building
4. When stopping, make sure that there is no descent position of the shutter, then leave the key to the wall side.

Utilization of The Report

Point

- 1. We will install it at the administrative window of building guidance*
- 2. We will install it at the fire department*
The fire department regularly conducts on-site inspections
- 3. We will install it at the fire command center*
- 4. Make it for management consignment company and use it for guidance and supervision of facility users*

Effectiveness of The Report and Appraisal

	<i>Fired Warehouse</i>	<i>Passed the Appraisal</i>
<i>classification</i>	<i>Own warehouse</i>	<i>Rented warehouse</i>
<i>Size (TFA)</i>	<i>775,000 sq. ft</i>	<i>1,264,760 sq. ft</i>
<i>Rack & Conveyor</i>	<i>exist</i>	<i>When installing, it is possible by fire consultation and administrator's approval</i>
<i>Measures on fire shutter</i>	<i>insufficient</i>	<i>To set in the plan</i>
<i>Initial response by business person</i>		
<i>Enhancement of Head of fire department</i>		
<i>Mitigation of damage in early fire stage</i>		

Part – 3 : Building that obtained the Appraisal

Outline

Structure : RC+SC, 5 stories

TFA : 1,264,760 sq. ft

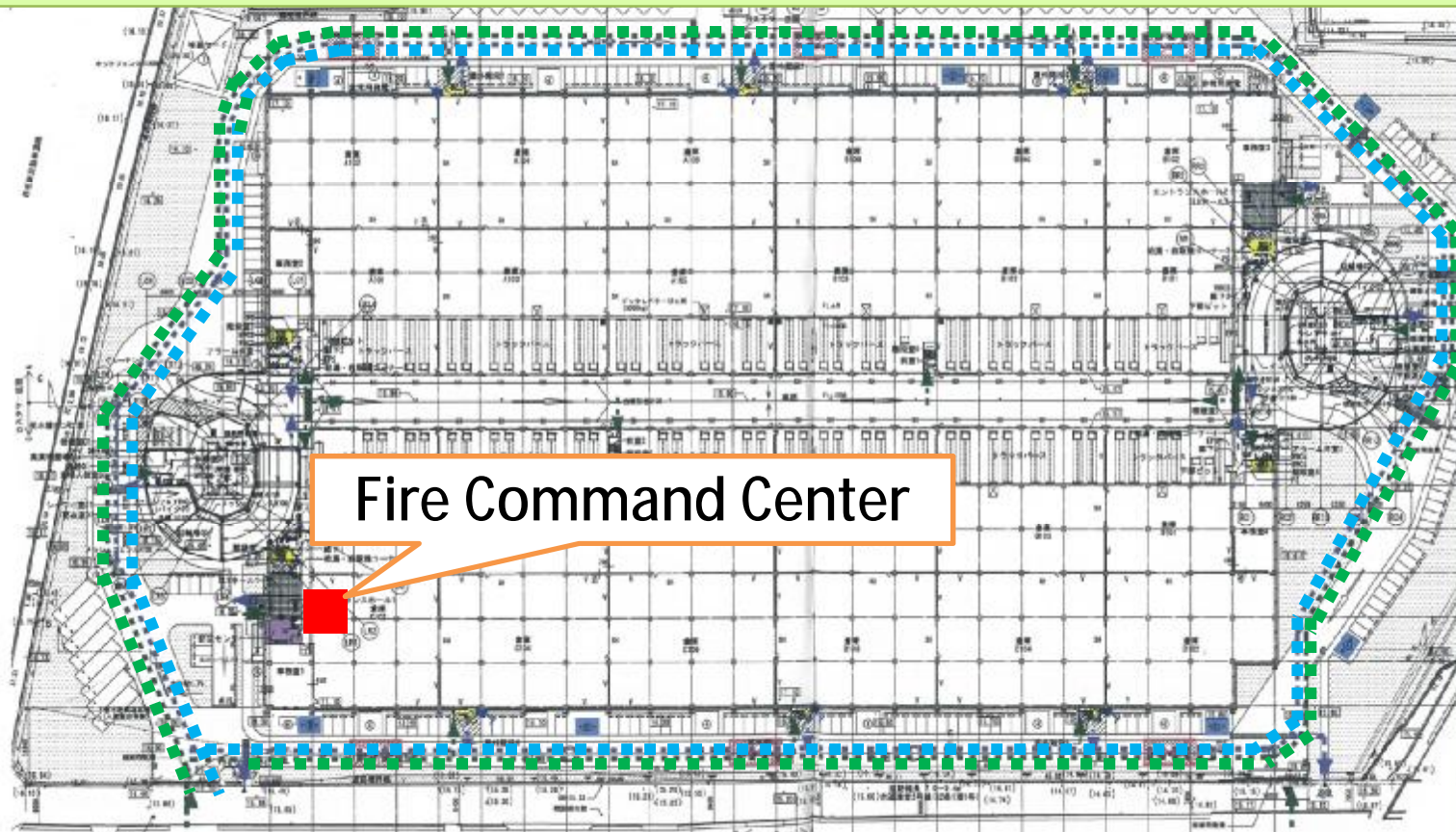
Use : Ware house

Completion : in 2017. 2



Route Planning

1. Disaster prevention center planned to be accessible from outside road
2. Firefighting vehicles can stick to all sides



Route for firefighter

Evacuation Route

Make the *Fire Prevention Design Report-1/3*

The *content of the guidance*

varies depending on the use

of the building and surrounding conditions

cont'd

Make the *Fire Prevention Design Report-2/3*

- Warehouses → *large space*
- Commercial Facility
 - *evacuation of a large number of people is performed at one time*
- Medical facilities
 - *hospitalized patients and operating rooms*
 - *Assuming that it is difficult to evacuate itself*
 - *two fire protection zones are set up*

cont'd

Make the *Fire Prevention Design Report-3/3*

Also, in assuming actual evacuation, we responded to applications and purposes

It requires a variety of knowledge, such as assistance for evacuation, assuming a person to use

We also need knowledge of correspondence

Epilogue

1. Regarding preparation of disaster prevention plan, there are cases where guidance goes beyond the law, but it is also necessary to expect feasibility.
2. We will continue to aim to further improve the safety of buildings making full use of what we gained from the fire but we hope that our efforts will help improve the safety of the buildings in each country present today thinking.

Thank you for kind attention !!