JAPAN'S MEIJI INDUSTRIAL REVOLUTION

State of Conservation Report

Sites of Japan's Meiji Industrial Revolution:
Iron and Steel, Shipbuilding, and Coal Mining (Japan) (ID: 1484)

CABINET SECRETARIAT
JAPAN

State of Conservation Report

Sites of Japan's Meiji Industrial Revolution: Iron and Steel, Shipbuilding, and Coal Mining (Japan) (No. 1484)

1. Executive Summary

The Government of Japan created this State of Conservation Report ("the Report") to provide responses to those recommendations and requests noted in Decision 42 COM 7B.10 adopted by the World Heritage Committee at its 42nd session. Prepared jointly by the Cabinet Secretariat, local governments, component part owners, and other parties, the Report is based on the *"Sites of Japan's Meiji Industrial Revolution: Kyushu-Yamaguchi and Related Areas, General Principles and Strategic Framework for the Conservation and Management"* (hereinafter referred to as "Strategic Framework"). It also contains reports on progress with those recommendations and requests noted in Decision 39 COM 8B.14 at the 39th session of the World Heritage Committee.

The response to the 42nd World Heritage Committee Session Decision (42 COM 7B 10) is described below.

- **Paragraphs 4, 5**

  Regarding conservation of the Hashima Coal Mine, the results of surveys undertaken to date have been compiled and an Action Plan for the next 10 years provided.

- **Paragraph 6**

  Regarding items concerning visitor management, a visitor management strategy has been created based on the results of quantitative and qualitative surveys undertaken over the last three years.

- **Paragraphs 7, 8, 9**

  Regarding items concerning interpretation, interpretation has been implemented properly based on the Interpretation Strategy.

- **Paragraph 10**

  Regarding dialogue with concerned parties, discussions have been carried on regularly with those involved in the Sites of Japan's Meiji Industrial Revolution, as efforts have been made to engage in a wide range of dialogue.

- **Paragraph 11**

  Regarding items concerning full implementation of Decision 39 COM 8B.14 and submission of a State of Conservation Report, a report has been included on subsequent progress with the capacity building projects noted in Recommendation f) and the development projects noted in Recommendation h) in Decision 39 COM 8B.14.

In addition, the Cabinet Secretariat also held a meeting of the Industrial Heritage Expert Committee (including Working Properties) (hereinafter "the Expert Committee"), made up of specialists from Japan and abroad, established in line with the Strategic Framework, on September 6, 2019 to hear the opinions from experts and appropriately reflected the feedback in the Report. The National Committee of Conservation and Management for the "Sites of Japan's Meiji Industrial Revolution", established as a venue for mutual exchanges of views and discussions with relevant government ministries and local governments, approved the Report on October 28, 2019. In these ways, it was endeavoured to ensure all due communication and solid consensus-building among the various parties involved with working and non-working component parts.

2. Outline of responses to the Decision of the World Heritage Committee

This report consists of 1. Main Document and 2. Appendices.

(1) Main Document

The main text of replies to each matter requested in the Decision

(2) Appendices

Additional materials relating to each of the replies in (1) Main Document.

Outline of Responses to the Decision at the 42nd Session of the World Heritage Committee the replies to each matter requested in the Decision are summarized below. For details, see 1. Main Document and 2. Appendices.

- **Paragraphs 4, 5: Matters concerning conservation management of Hashima Coal Mine**

  Regarding various surveys of the Hashima Coal Mine (Area 6 Nagasaki, component part 6-7), in addition to building surveys, Nagasaki City undertook also archaeological surveys, record surveys, and other surveys to date, and these works will be continued. Scientific exploratory committees and other bodies have been set up, drawing on expert knowledge in considering research methods and discussing conservation methods based on research results. Nagasaki City intends to undertake further research and conservation work on a systematic basis.

- **Paragraph 6: Matters concerning the establishment of acceptable visitor threshold levels for each component part**

  Regarding the visitor management strategy, acceptable visitor threshold levels was examined on the basis of quantitative and qualitative surveys of visitors undertaken to date. According to the results of a three-year multi-faceted survey to assess the current state, it was determined that preventing the constant fluctuation in visitor numbers from adversely impacting on the component part will require not static control (setting thresholds for annual or daily visitor numbers) but rather using multiple indicators to confirm the fluctuations in visitor numbers and developing appropriate responses. A visitor management strategy that effectively combines multiple indicators based on a visitor management vision was therefore created for the purpose of substantive control of acceptable visitor threshold levels.

- **Paragraphs 7, 8, 9: Matters concerning interpretation**

  Interpretation Audit was conducted again at all areas by overseas specialists in March and August 2019.

  Also, the suitable interpretation for each area was studied based on the Interpretation Strategy attached to the State of Conservation Report submitted to UNESCO on November 30, 2017. In the future, interpretation at each Visitor Centre will be developed with a focus on Outstanding Universal Value, for example, introducing the common exhibits for overall property indicated by the Cabinet

Secretariat. Tourist maps were also developed for visitors to the Nagasaki and Kamaishi Areas.

In addition, preparations are going ahead on an Industrial Heritage Information Centre under the policy of being established during this fiscal year in Tokyo, while taking into account the views of experts in and outside Japan.

As for the overall interpretation, this will be reported anew upon completion of the Industrial Heritage Information Centre.

- **Paragraph 10: Matters concerning dialogue with concerned parties**

Dialogue has been carried on proactively with parties concerned with the Sites of Japan's Meiji Industrial Revolution, namely, the relevant ministries, local government, component part owners, and managers, as well as with experts in and outside Japan, local communities, and tourism operators, and in councils comprising local government, chambers of commerce and Industry, and tourism associations.

- **Paragraph 11: Matters concerning full implementation of the 39th World Heritage Committee Session Decision (39 COM 8B.14) and submission of a State of Conservation Report**

To fully implement the 39th World Heritage Committee Session Decision (39 COM 8B.14), responses to Recommendation f) and Recommendation h) are reported as below.

- **Decision 39 COM 8B.14 Recommendation f): Matters concerning establishment and implementation an ongoing training programme**

To date, training guidelines has been set for each personnel type for each area and component part and capacity building projects has been implemented accordingly. Among specific initiatives, the books "Understanding Steel" and "Understanding Coal" were created for materials for gaining an understanding of the history of each industry, as human resource capacity building projects for those personnel engaged in permanent interpretation work on-site. Next, material for learning about the shipbuilding industry will be created, and it is planned to continue implementing guide training and various human resource development training.

- **Decision 39 COM 8B.14 Recommendation h): Matters concerning reporting on development projects in accordance with Paragraph 172 of the Operational Guidelines for the Implementation of the World Heritage Convention**

As indicated in Decision 39 COM 8B.14 Recommendation h), reports were compiled on the details and progress of multiple development projects and new building or expansion of public facilities.

A heritage impact assessment will be undertaken for the new road construction at Shuseikan. The Mietsu Naval Dock road bridge is currently under construction, and reports will be issued as soon as the project is completed. As constructing a new anchorage facility at Miike Port is still in the planning stage at this time, reports will be made in line with the status of the plan going ahead.

In addition to the three projects above, a number of previously reported are also included again here, namely, *Partial Revision of the Hagi City Landscape Plan Partial Revision of the Hagi City Landscape Plan, A control method for the buffer zone of Area 1 Hagi* (Hagi Area), the *Status of Damages Caused by Heavy Rain at the Terayama Charcoal Kiln(Component Part 2-2) and Future Measures* (Kagoshima Area), *Heritage Impact Assessment Regarding Construction of a Concrete Manufacturing Plant in the Buffer Zone of the Mietsu Naval Dock in Area 5 Saga* and *Assessment of Impact on World Heritage from Construction Work Near the Mietsu Naval Dock* (Saga Area).

An additional report on *Progress Status of Project Proposals Concerning the Imperial Steel Works and Onga River Pumping Station* (Yawata Area) is attached to this State of Conservation Report.

3. Other current conservation issues identified by the State Party which may have an impact on the property's Outstanding Universal Value

Same as the answer for WHC/16/39COM/8B.14 Recommendation h) in paragraph 11 of the main document.

4. In conformity with paragraph 172 of the Operational Guidelines, describe any major restorations and/or new construction(s) intended within the property, the buffer zone(s) and/or corridors or other areas, where such developments may affect the Outstanding Universal Value of the property, including authenticity and integrity

Same as the answer for WHC/16/39COM/8B.14 Recommendation h) in paragraph 11 of the main document.

5. Public access to the State of Conservation Report

It is available to the public.

6. Signature of the Authority

海堀 安喜

KAIBORI Yasuki

Director-General, Department of Industrial Heritage,

Cabinet Secretariat, Government of Japan

I. Main Document

Responses to World Heritage Committee Decision

The following Decision was adopted at the 42nd session of the World Heritage Committee. Also given here for reference are excerpts of the eight recommendations adopted at the 39th session of the World Heritage Committee.

Contents of the 42nd World Heritage Committee Session Decision

The World Heritage Committee,

1. Having examined Document WHC/18/42.COM/7B.Add2,
2. Recalling Decision 39 COM 8B.14[1], adopted at its 39th session (Bonn, 2015),
3. Takes note of the illustrated reports provided on conservation work carried out at various component sites, along with future priorities;
4. Commending the State Party on the details provided so far concerning Hashima Island, notes the substantial progress achieved in the development of a detailed 30-year conservation work programme for the island and the commitment of resources for the length of the plan and also notes that the programme will stabilise the island's retaining walls, conserve decaying remains and preserve the battleship form of its silhouette, and that priority will be given in the first phase to the retaining walls and researching conservation techniques;
5. Requests the State Party to submit the following information to the World Heritage Centre, for review by the Advisory Bodies, as it becomes available:
   a) One or more study(ies) on those buildings made of wood, steel, and reinforced concrete which have collapsed or irreversibly decayed since 1974, and whether they can be conserved,
   b) Further archaeological studies,
   c) More research on historical documents, structural materials and visitor movements,
   d) An Action Plan, developed by Nagasaki City, covering project deadlines, implementation techniques for phased work, and setting annual goals;
6. Further notes that monitoring of the number of visitors is being undertaken systematically for all component sites, and that a visitor management strategy, including carrying capacities, will be formulated in 2018 on the basis of these results; and also requests the State Party to submit this strategy to the World Heritage Centre, once it is completed, for review by the Advisory Bodies;
7. Notes furthermore that interpretation is available for all component sites, and that digital communications have been developed, but that further improvements are planned, including Information Centre to be opened;
8. Further requests the State Party to provide an update on overall interpretation upon completion of Information Centre;
9. Strongly encourages the State Party to take into account best international practices for interpretation strategies when continuing its work on the interpretation of the full history of the property, both during and outside of the period covered by its OUV, and in the digital interpretation materials;

10. Encourages continuing dialogue between the concerned parties;
11. Requests furthermore the State Party to fully implement Decision 39 COM 8B.14[1] and to submit to the World Heritage Centre, by 1 December 2019, an updated report on the state of conservation of the property and the implementation of the above, for examination by the World Heritage Committee at its 44th session in 2020.

[1] The World Heritage Committee takes note of the statement made by Japan, as regards the interpretive strategy that allows an understanding of the full history of each site as referred to in paragraph 4.g) of the Decision 39 COM 8B.14, which is contained in the Summary Record of the session (document WHC-15/39.COM/INF.19).

For reference: excerpts from eight recommendations in 39 COM 8B.14

4. Recommends that the State Party give consideration to the following:
   a) Developing as a priority a detailed conservation work programme for Hashima Island;
   b) Developing a prioritised conservation work programme for the property and its component sites and an implementation programme;
   c) Defining acceptable visitor threshold levels at each component part to mitigate any potential adverse impacts, commencing with those most likely to be at risk;
   d) Monitoring the effectiveness of the new partnership-based framework for the conservation and management of the property and its components on an annual basis;
   e) Monitoring the implementation of the conservation management plans, the issues discussed and the decisions made by the Local Conservation Councils on an annual basis;
   f) Establishing and implementing an on ongoing training programme for all staff and stakeholders responsible for the day-to-day management of each component to build capacity and ensure a consistent approach to the property's ongoing conservation, management and presentation;
   g) Preparing an interpretive strategy for the presentation of the property, which gives particular emphasis to the way each of the sites contributes to Outstanding Universal Value and reflects one or more of the phases of industrialisation, and also allows an understanding of the full history of each site[2];
   h) Submitting all development projects for road construction projects at Shuseikan and Mietsu Naval Dock and for new anchorage facility at Miike Port and proposals for the upgrade or development of visitor facilities to the World Heritage Committee for examination, in accordance with paragraph 172 of the Operational Guidelines;

[2] The World Heritage Committee takes note of the statement made by Japan, as regards the interpretive strategy that allows an understanding of the full history of each site as referred to in paragraph 4.g), which is contained in the Summary Record of the session.

Response to the Decision of the 42nd World Heritage Committee Session

Details of the responses to Paragraphs 4 to 11 of the 42nd World Heritage Committee Session Decision (42 COM 7B.10) are reported here.

Decision 42 COM 7B.10 Paragraphs 4, 5

4. Commending the State Party on the details provided so far concerning Hashima Island, notes the substantial progress achieved in the development of a detailed 30-year conservation work programme for the island and the commitment of resources for the length of the plan and also notes that the programme will stabilise the island's retaining walls, conserve decaying remains and preserve the battleship form of its silhouette, and that priority will be given in the first phase to the retaining walls and researching conservation techniques;
5. Requests the State Party to submit the following information to the World Heritage Centre, for review by the Advisory Bodies, as it becomes available:
   a) One or more study(ies) on those buildings made of wood, steel, and reinforced concrete which have collapsed or irreversibly decayed since 1974, and whether they can be conserved,
   b) Further archaeological studies,
   c) More research on historical documents, structural materials and visitor movements,
   d) An Action Plan, developed by Nagasaki City, covering project deadlines, implementation techniques for phased work, and setting of annual goals;

1. Background

- The "ICOMOS Evaluations of Nominations of Cultural and Mixed Properties" (WHC-15/39.COM/INF.8B) noted the following points:
  - ICOMOS considers that the plan for the Hashima Coal Mine needs to be more detailed. The state of conservation of this site is poor and requires urgent conservation work on a large scale.
  - The Conservation Management Plan provides general policies to prevent further deterioration of the attributes related to the Meiji era.
  - There is currently not a prioritised program of works based on its overall state of conservation, nor a time frame for works to commence.
  - Immediate action is required particularly for the revetment contributing to the Outstanding Universal Value to retain not only the wall but also the whole island. It was confirmed to ICOMOS that ¥200M/year was made available over five years from last fiscal year to undertake works.
- In consideration of the above points in the ICOMOS report, Recommendation a) at the 39th Session of the World Heritage Committee (39COM 8B.14) called for "Developing as a priority a detailed conservation work programme for Hashima Island."

- With the cooperation of Nagasaki City, the Cabinet Secretariat created a Conservation Work Programme and submitted this to the UNESCO World Heritage Centre as part of the State of Conservation Report on November 30, 2017.
- As noted above, the Decision (42 COM 7B.10) at the 42nd World Heritage Committee Session indicated additional matters to note and requests.

2. Surveys implemented to date and outlines

(1) Surveys regarding Requests a), b), and c) in Paragraph 5 of the Decision

After inscription of "Sites of Japan Meiji Industrial Revolution (Kyusyu, Yamaguchi, and related area" on a tentative list of World Heritage in 2009, in response to Hashima Coal Mine became a candidate for a future component part, an exploration of the cultural value of the Hashima Coal Mine and related facilities was launched in 2013, with intensive surveys and studies undertaken toward having Hashima Island designated as a cultural asset and creating a Conservation Management Programme. Surveys addressed not just remains above ground but the island as a whole, including ruins from the various time periods that were thought to remain underground.

1) List of surveys carried out to date by Nagasaki City

The following table lists the surveys and studies undertaken to date on the Hashima Coal Mine inclusive of constituent elements contributing to Outstanding Universal Value and other remains. The results of these surveys have already been summarized in reporting. These include excavation surveys and associated development projects, as well as building surveys and record surveys, etc., which are sorted out based on Requests a), b) and c) of Paragraph 5 of the Decision as follows.

Table 1. Outline of Surveys on Hashima Coal Mine

Survey	Content	Fiscal Year conducted	Survey outline
a) Building surveys	(i) 3D laser measurement, creation of 3D model	2013 2014	3D laser measurements and UAV photography used to create a 3D model to ascertain the current status of the whole island
	(ii) Creation of a production facility diagram	2014 2015	Results of the 3D model used to create ground plans, cross-sections, elevations and structural drawings to ascertain the current status of production facility remains
	(iii) Structural survey of mine entry landing	2016	Measurement, creation of a survey map, creation of a damage map, materials experiments, and creation of a structural drawing to ascertain the current status of the mine entry landing as part of production facility

Survey	Content	Fiscal Year conducted	Survey outline
	(iv) Survey of current status of Building No. 70	2014	Calculation of the extent of foundational degradation through a degradation survey and 3D elastic FEM analysis to ascertain the current status of Building No. 70, the foundations of which were severely scoured
b) Archaeological surveys	(i) Environmental restoration	2014	Environmental restoration to enable surveys of remains
	(ii) The mouth of the Pit record survey	2015	Record survey of the mouth of the Pit No. 1 and 2 and Pit No.3 remains
	(iii) Surveys confirming scope of underground remains	2014 2015	Excavation survey of Pit No.1 winding machine room and survey confirming whether revetment remains within the elementary and junior high school grounds
	(iv) Survey on current status of masonry work remains	2014	Record survey on stone masonry bank protection remains in scoured areas (next to Buildings No. 31 and 51)
		2014 2015 2016	Record survey on stone masonry retaining wall and stone masonry bank protection remains
	(v) Survey on state of deterioration of revetment remains, etc.	2014	Underwater survey of revetment foundations to ascertain the current status of scoured areas (next to Buildings No. 31 and 51); confirmation of state of damage underwater
		2015 2016	Degradation status checked underwater and by eye to ascertain the current status of revetment remains; creation of damage maps and a cross-section; assessment of revetment stability
c) (1) Survey of historical documents	(i) Collection of old photos	2014 2015 2016 2017 2018	Collection of old photos related to the Hashima Coal Mine (ongoing)
c) (2) Survey of	(i) Degradation survey	2015	Survey on degree of degradation of reinforced concrete housing facilities, forecast of how long

Survey	Content	Fiscal Year conducted	Survey outline
structural materials			materials are expected to last, assessment of structural safety
	(ii) Materials strength testing	2016	Detailed survey of reinforced concrete housing facilities Blocks 3, 16, and 65, assessing whole building stability
	(iii) Structural survey of Pit No. 3 winding machine room	2017	Survey of current status of Pit No. 3 winding machine room (production facility remains) through measurement of the General Office adjoining the room, creation of a diagram and damage map, materials experiments, and creation of a structural drawing.
c) (3) Visitor movement survey	(i) Visitor numbers survey	2016 2017 2018	Survey undertaken to ascertain visitor numbers
	(ii) Behaviour observation survey		Visitor behaviour within the component part at busy times and usual times was compared, surveying the adverse impact at busy times.
	(iii) Survey amount of time spent at the component part		Number of people at the component part at the same time and the amount of time spent there ascertained to conduct behaviour observation and a cross-analysis in relation to the adverse impact by crowding.
	(iv) Visitor satisfaction survey		Questionnaire survey on the degree of customer satisfaction to ascertain visitor understanding of the component part's value and the psychological impact of the component part.

Table 2. Outline of surveys related to Hashima Coal Mine

Survey	Content	Fiscal year conducted	Survey outline
(1) Route restoration work for excavation surveys, etc.	(i) Gate installation	2014	Installation of a gate on the viewing route guard pipe to secure the excavation survey route
	(ii) Installation of a temporary route	2014	Installation of temporary routes in collapsed areas to secure the excavation survey route
(2) Monitoring surveys	(i) Camera installation	2014	Installation of monitoring cameras to monitor illicit visitors and record the current status of Hashima Island buildings which continue to age and

Survey	Content	Fiscal year conducted	Survey outline
(stationary cameras)			deteriorate
	(ii) Camera repair	2015	Monitoring camera peripheral facilities replaced and data backup devices, etc., installed

2) Survey accomplishments and issues

As indicated below, results were obtained to a certain extent from the various surveys conducted by Nagasaki City described above.

Decision Paragraph 5 a) Building surveys

In the building surveys, 3D data was obtained by 3D laser scanning and UAV measurements. Having obtained 3D data, further excavation surveys should be more efficient, since when the surveys are conducted it will be possible to know in advance the basic data (dimensions, shape, etc.) of adjoining structures. In addition, detailed structural surveys of the production facilities, mine entry landing and other elements contributing to Outstanding Universal Value, and building surveys conducted along with the urgent repairs of Building No. 70 with its severely scoured-out foundations, were able to provide basic data on the current state.

In future, specific considerations will be needed such as studies on effective construction methods for the building shape and materials and determination of the relationship between building structure and the ground for carrying out conservation and repair work,.

Decision Paragraph 5 b) Archaeological studies

The excavation surveys were able to confirm remains relating to the Pit No. 1 winding machine room, and current state surveys of the masonry revetment remains found revetment stones from 1899 and confirmed the foundation portion of the former elementary school building. Unearthed articles (roof tiles) believed to have been used in the former elementary school building were also unearthed. The results of these surveys made it possible to verify the land uses around the surveyed area from an archaeological standpoint.

It was also learned from the excavation surveys that under the ground of the Hashima Coal Mine, remains from earlier than the historical buildings in the historic site are preserved in good condition. In carrying out further conservation work on the historic site, care must be taken not to damage these underground archaeological remains.

Decision Paragraph 5 c) Surveys of historical documents, structural materials, and visitor movements

As surveys of historical documents, collection of old photographs continues. While results have been obtained to a certain extent, it will be necessary to continue gathering such materials to obtain a further grasp of the situation.

As surveys of structural materials, deterioration level surveys of the accommodation facilities showed that Building No. 16 and Building No. 65 have deficient structural performance, raising fears of enormous damage even in a moderate earthquake. The deterioration and damage have progressed irreversibly at these concrete structures surveyed, due to their constant exposure to salt damage in the harsh environment; yet methods for permanent preservation have not yet been technologically established. Material analysis and strength testing will be performed on structures made of steel-reinforced concrete, stone, and brick, for a scientific appraisal of structural deterioration, leading to research on methods for preserving these structures and specific restoration methods.

Results of surveys on visitor movement are discussed on the next section.

See appendices to this report regarding following representative survey results.

- Decision Paragraph 5 a) Results of building surveys: Table 1 a)-(v) Survey of current status of Building No. 70 (Appendix 1)
- Decision Paragraph 5 b) Results of archaeological surveys: Table 1 b)-(ii) Pithead record survey (Appendix 2-1), (iii) Survey confirming scope of underground remains (Appendix 2-2)
- Decision Paragraph 5 c) Results of surveys of structural materials: Table 1 c)-(2)-(iii) Structural survey of Pit No. 3 winding machine room (Appendix 3)

(2) Surveys of visitor movements as per Decision Paragraph 5 c)

As viewing routes and viewing squares have already been set up, visitor movement in the Hashima Coal Mine is maintained in a proper state with no adverse impacts on visitor safety. In relation to Paragraph 5 c) of the Decision, quantitative and qualitative surveys were undertaken from FY2016 to FY2018 to ascertain the impact of visitor numbers and tourism pressure on conservation. The viewing routes and results of three years of surveys are as follows.

1) Visitor movements

Viewing routes and viewing squares have been developed to illustrate and explain the mining system at Hashima Coal Mine, making it possible for visitors to view the component part safely in a guided tour format. Fences have been installed on both sides of the viewing routes so that visitors cannot freely enter areas outside the viewing routes. The viewing routes are shown in the figure below.

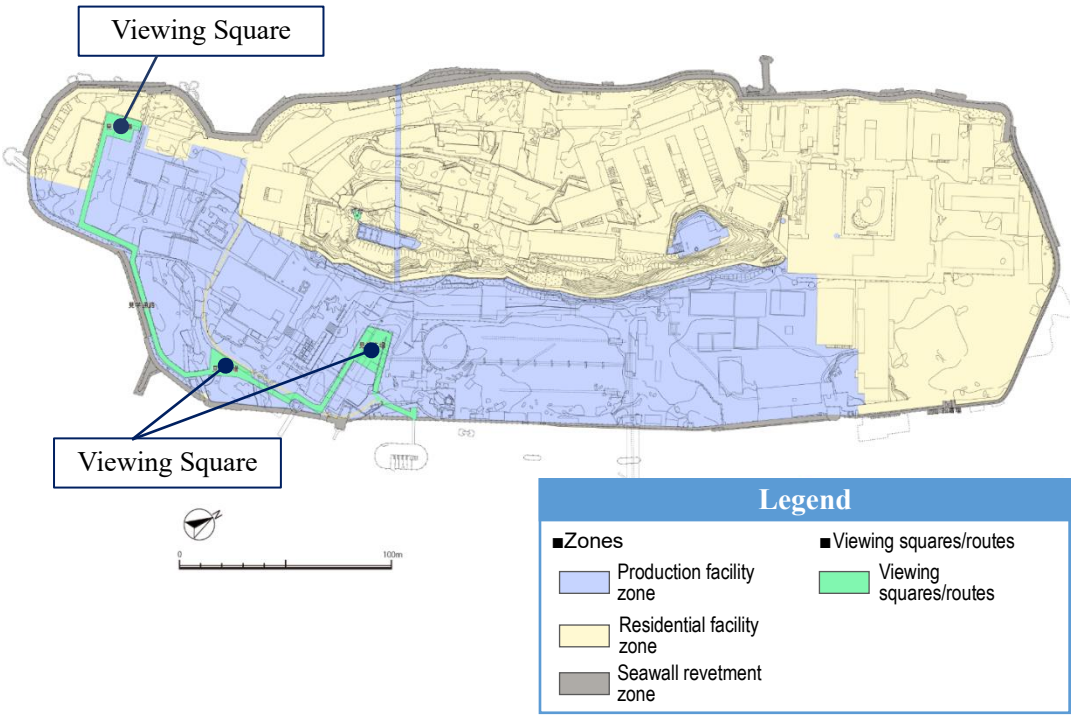


Figure 1. Map of Hashima Coal Mine viewing squares and viewing routes

2) Quantitative surveys

Survey method

Visitor numbers were collated daily to ascertain fluctuation. Where a noteworthy impact on the component part was discovered, this was recorded.

Survey results

Visitor number trends and the maximum number of visitors in a year are as follows.

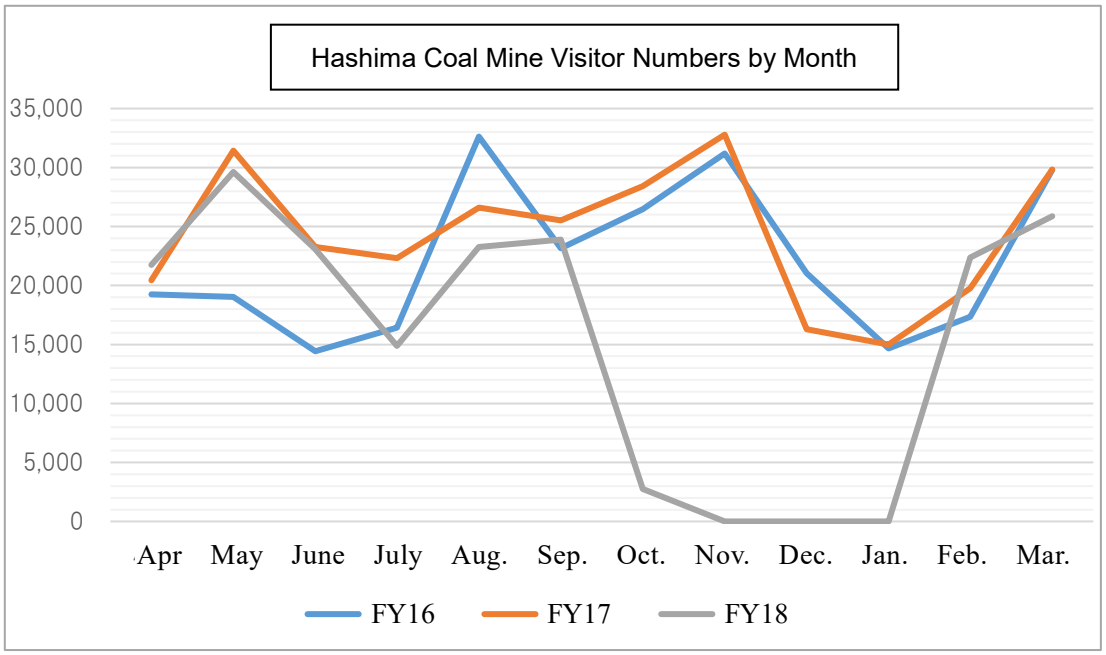


Figure 2. Trends in visitor numbers over three years

Table 3. Maximum number of visitors in a year (1Q to 4Q)

Day of maximum visitors	Number of visitors on that day	Number of visitors per hour on that day (approx.)
November 4, 2016	1,282	237
May 5, 2017	1,403	259
April 29, 2018	1,408	260

3) Qualitative surveys (behaviour observations)

Survey method

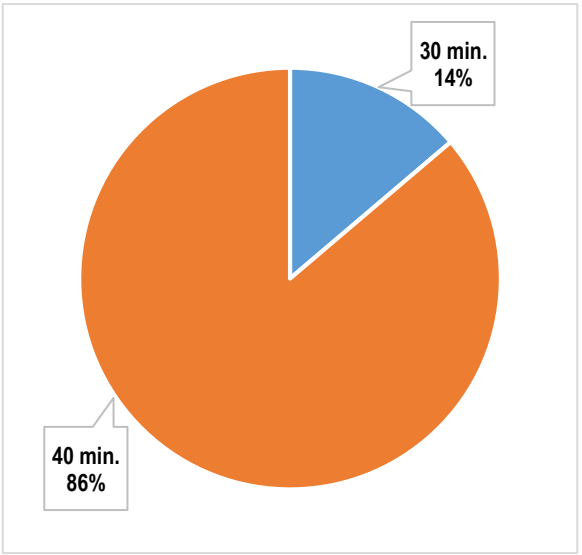
The impact of fluctuations in visitor numbers over the course of one day on the component part and on visitor safety, peace of mind, and comfort was observed and recorded. The amount of time that visitors spend at the component part was also ascertained.

Survey results

Items impacted by visitors: None (Component part wear and tear, etc., erosion, etc., destruction, pollution, waste, obstruction of safety, obstruction of communication, etc.)

Figure 3. Results of survey on amount of time spent at the component part

(Sampled day) November 3, 2017　　Avg. 38.6 min.



4) Survey results

The three-year quantitative survey revealed that 265,475 people visited the Hashima Coal Mine in FY 2016, 291,665 in FY 2017, and 187,455 in FY 2018. At busy times, there were 30,000 monthly visitors to the Hashima Coal Mine, while the monthly average was 23,000 visitors. The steep drop in visitor numbers in FY 2018 was due to typhoon damage to the pier in October 2018, which meant that no one could land on the island until January 2019. Because Hashima Island lies a long way out, there is often a drop in visitor numbers because bad weather, etc., has prevented boats from berthing.

On busy days, daily visitor numbers top 1,400, with around 260 visitors going through per hour at such times.

The results of the qualitative survey revealed no adverse visitor impact on the Hashima Coal Mine. This is strongly related to the fact that even after people land on Hashima Island, they are taken around the island by guides. Once on shore, visitors follow the viewing routes shown in Figure 1 to view the island, but route crowding during busy times can be eased through direction by guides. In addition, visitors are not permitted to stray from the viewing routes in the component part, and the fact that visitors are always part of tour parties keeps the amount of time spent on the island to a nearly uniform time of around 30-40 minutes.

Regarding Hashima Coal Mine visitor movement, it can be therefore said that no adverse impacts by visitors are seen, and that both visitor safety and protection of the component part are achieved. The monitoring will be appropriately carried out through regular qualitative and quantitative surveys based on the visitor management strategy.

3. Future directionality and specific methods for surveys

(1) Directionality in relation to surveys noted in Decision Paragraph 5 a), b), and c)

The State of Conservation Report submitted by the Japanese government on November 30, 2017 also reported on policies and methods in relation to surveys in the Conservation Work Program, which are reproduced below. Surveys will continue to be undertaken appropriately based on these policies and methods.

Research and study policies

- **Promoting research and study**

Naagasaki city plans to launch the following projects in order to reaffirm and enhance the Outstanding Universal Value of the Hashima Coal Mine as a component part of the World Heritage Property: studies of the remains; studies of historical documents that show how the industrial (mining) system worked; studies of landscape of the component part and its surrounding; and studies of visitor number and their impact on the component part. Furthermore, the city will conduct annual monitoring by using monitoring charts in order to assess the condition of the component part of the World Heritage property and its buffer zone. Then the city will provide the assessment and an annual report to the Nagasaki Conservation Council, and reflect the Council’s feedback in the process of conservation, restoration, presentation and public utilization.

Research and study methods

(a)Archaeological excavation and field study

Aboveground structures of the coal production facilities were demolished to be replaced by new facilities. This means that the coal production facilities continued to be upgraded. The housing facilities were also rebuilt anew after suffering a disaster or when their features needed upgrading. The masonry revetment remains were also rebuilt when a typhoon devastated them. Given these historical facts, it is unlikely that any of the original aboveground structures still remain, while it is likely that underground structures from that time still do.

For part that are likely to be the remains of production facilities from Meiji era, such as mine pits and winding machine rooms areas, survey of underground remnants as much as possible during structural repair, etc.

(b) Study of historical documents

With the aim to clarify the production system at each period and grasp detailed information about production facilities, the way of operation and technology, the city will study documents archived at research institutes, labor unions' publications, newspaper articles at the time, and old videos and photographs to ensure that the city have accurate knowledge of the history of Hashima as a thriving island of a coal mine. The city will also work with citizen groups to interview former miners and their families to learn about the realities of their labor and day-to-day lives in Hashima at the time.

(c)Research on structural materials

The city will analyse the materials of the reinforced concrete, masonry, and brick structures and test their strength to scientifically assess the structures' degradation levels. The city also plan to research how to conserve regular and reinforced concrete structures as well as specific ways of conservation in the current environment where no essential utilities are available. Before any conservation work on structures, the city will survey the facilities and research their structures, and the ground upon which they are built in order to ensure the safety of on-site research and conservation work and to assess the safety performance of the structures. Comparative study with similar cluster housing facilities will also be undertaken.

(d)Research on the number and movement of visitors

The city will research the number and movement of visitors to assess the impact of intense tourism on the remains and reflect the results in better utilization of Hashima.

(e)Monitoring

The city will prepare monitoring charts that systematically collect complete information about the constituent elements of Hashima in order to regularly assess the current condition of the component part and buffer zone. The city will also compile the results of monitoring into an annual report to provide it to the Nagasaki Conservation Council for feedback in accordance with the operation system for the "Sites of Japan's Meiji Industrial Revolution". If any negative impact on Hashima and/or its

buffer zone is found, the city will take action to eliminate the cause or to reduce the impact, conduct a follow-up inspection, and examine the effects of the measures the city have taken.

The city have surveyed the whole of the island with a 3-D laser (Figure 4), and will install four stationary cameras to record and monitor the current state. The city plans to identify individual spots on the remains of seawall revetments, coal production and housing facilities that are likely to need monitoring in order to measure any slant and widths of cracks every six months.

Figure 4. 3D model of Hashima Coal Mine made from 3-D laser survey

(2) Decision Paragraph 5 d) Project deadlines, implementation method for phased work, and Action Plan

1) Establishment of the Working Group on Conservation, etc., of the Hashima Island Revetments

Because conservation of the Hashima Coal Mine requires phased and ongoing work, expert considerations have been undertaken at the Nagasaki City Takashima Coal Mine Conservation and Utilization Committee and the Conference for the Consideration of Construction Methods attached to that committee. The Working Group on Conservation, etc., of the Hashima Island Revetments ("Hashima Island Revetment Working Group") has also been established under the Nagasaki Conservation Council (non-working properties) in order to engage in comprehensive coordination on restoration methods, etc., for the revetments, which are elements contributing to the Outstanding Universal Value (inside the National Historic Sites designated under the Law for the Protection of Cultural Properties), as well as on purpose of moving ahead with conservation and restoration and studying utilization as a tourism resource. The WG members, meetings held to date, and agenda are as given below.

Members

The Hashima Island Revetment WG is made up of the following members.

Study members:

Cabinet Secretariat, Members of Industrial Heritage Expert Committee (including Working Properties)
Counsellor, Department of Industrial Heritage

Cabinet Office, Counsellor, Office for Promotion of Regional Revitalization

Agency for Cultural Affairs, Director, Cultural Resources Utilization Division

Japan Tourism Agency, Director, Tourism Resources Division, Regional Development Department

Ministry of Land, Infrastructure, Transport and Tourism (MLIT) Director, Sea Coast Division, Water and Disaster Management Bureau

Director, Coastal Administration and Disaster Management Division, Ports and Harbours Bureau

Nagasaki Prefecture, Director, Harbor Division, Public Works Department
Director, Fine Arts and Culture Division, Education Agency
Director of World Heritage Division, Culture, Tourism and International Department

Secretariat:

Cabinet Secretariat Department of Industrial Heritage

Nagasaki City, World Heritage Division, Culture and Tourism Department

Nagasaki City, Public Works and Construction Division, Public Works Department

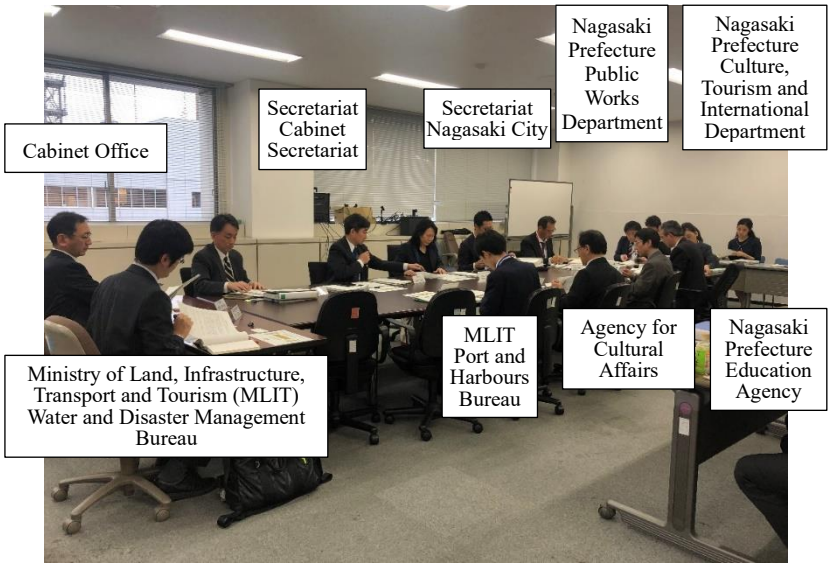


Figure 5. Members of the Hashima Island Revetment WG (4th meeting in progress)

Meetings held to date and agenda

- 1st meeting

  Date: April 23, 2018

  Agenda: 1. Establishment of Hashima Island Revetment WG

  2. Considerations and coordination to date in relation to the Hashima Island revetments

  3. Plan for of Hashima Island Revetment WG

- 2nd meeting

  Date: July 24, 2018

  Agenda: 1. Draft minutes of the 1st Hashima Island Revetment WG meeting

  2. Report on the Decision of the 42nd World Heritage Committee Session

  3. Plan for Hashima Island Revetment WG

- 3rd meeting

  Date: January 30, 2019

  Agenda: 1. Amendment of the agreement

  2. Draft minutes of the 2nd Hashima Island Revetment WG meeting 3. Status of Hashima Island typhoon damage and response policy going ahead

  4. Hashima Island revetment surveys, etc.

- 4th meeting

  Date: October 15, 2019

  Agenda: 1. Amendment of the agreement

  2. Draft minutes of the 3rd Hashima Island Revetment WG meeting

  3. Status of studies on additional study items concerning the Hashima Island revetment

  4. Status of Hashima Island typhoon damage and response

Looking ahead

The Hashima Island Revetment Working Group will continue to consider the conservation and restoration of the Hashima Island revetments, including crosscutting coordination of restoration methods among component part owner Nagasaki City, Nagasaki Prefecture, and related government ministries.

2) Hashima Island restoration schedule

The State of Conservation Report submitted on November 30, 2017 also reported a 30-year restoration schedule for the conservation of Hashima Island, comprising three 10-year phases: Phase I, Part 1 (1-5 years) and Part 2 (6-10 years); Phase II (11-20 years); and Phase III (21-30 years). Considerations continued subsequently, and Nagasaki City also created a detailed schedule in line with restoration content (Table 4).

Nagasaki City created a 10-year plan for Phase I as an annual plan that includes the establishment of goals for restoration and other work for each fiscal year, and also took budget measures. The city's approach to conservation measures is as below, with a 10-year schedule for Phase I (Table 4) created accordingly.

Restoration approach for the purpose of conservation based on the nature and present status of the remains

In implementing the conservation work for the Hashima Coal Mine, the following three points are important:

1) Ensuring the sustainment and preservation of the Hashima Island with its revetments and retaining walls in order to protect the landscape of the island, which provides the foundation for preserving the remains and remnants on the island.

2) Maintaining in a stable condition the remains that represent the intrinsic value of the National Historic Site and contribute to the Outstanding Universal Value as a World Heritage component part.

3) Maintaining the relict landscape of the Hashima Island, including its unique silhouette resembling a battleship when looked from afar as well as the closeup view of decayed abandoned buildings and structures

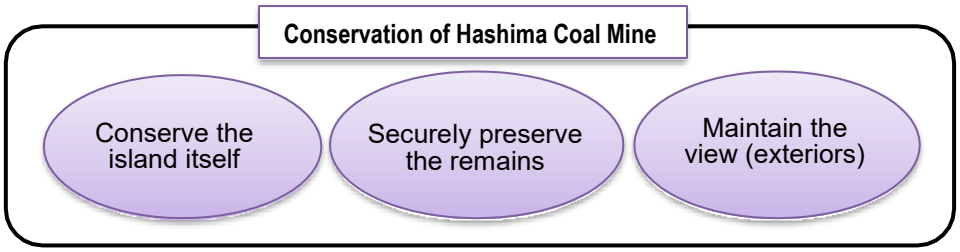


Figure 6. Conservation of the Hashima Coal Mine

The city will holistically look at each of the elements in terms of these three principles and prioritize them to plan and carry out physical improvement measures. It is technically impossible at this moment to keep intact the remains of reinforced concrete production and housing facilities that are increasingly deteriorating and damaged. However, the city plan to carry out conservation in stages, taking account

of technical and financial issues.
The above three points can be rearranged as follows from the perspective of Outstanding Universal Value.

1) Conserve and restore elements that contribute to the Outstanding Universal Value (including the Meiji era seawall revetment, and production facility remains) to keep them stable.
2) Apart from elements that contribute to the Outstanding Universal Value, repair those elements that represent the intrinsic value of the National Historical Site (including concrete production and residential facility remains) to maintain the unique battleship-like silhouette, showcase the development and decline of the coal industry and preserve evidence of the realities of the community.
3) Make comprehensive and diverse evaluations and prioritize from a range of perspectives, including the state of deterioration of elements, the availability or absence of applicable conservation techniques, the degree of contributions to the Outstanding Universal Value, the impact of other constituent elements and visitor safety, and budget requirements, and commence restoration and conservation in phases.
4) Some steel reinforced concrete remains at the Hashima Coal Mine could be hard to conserve owing to advanced deterioration and damage. Although structural density will gradually decline of the long term, accord maximum care to maintaining the battleship-like silhouette when viewed from the surrounding sea.

Table 4. Hashima Coal Mine restoration schedule

	Preparatory period				Phase I 1H (1st to 5th years)					Phase I 2H (6th to 10th years)				
					1	2	3	4	5	6	7	8	9	10
Name	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Masonry retaining wall remains														
Measurement of masonry retaining wall displacement					↔							↔		
Production facility remains														
Repair and reinforcement of Pit No. 3 winding machine room	←	—	—	→		←	—	—	→					
Repair and reinforcement of mine entry landing (physical inspection screening)		←	→				←	—	—	→				
Repair and reinforcement of coal storage yard belt conveyor								←	—	—	→			
Repair and reinforcement of Dorr thickener									←	—	—	→		
Repair and reinforcement of Pit No. 4 winding machine room										←	—	—	→	
Repair and reinforcement of Pit No. 4											←	—	—	→
Repair and reinforcement of Pit No. 4 tower foundation											←	—	—	→
Repair and reinforcement of Building No. 1												←	—	→
Repair and reinforcement of loading belt conveyor (sea side)												←	—	→
Repair and reinforcement of substation													←	→
Repair and reinforcement of compressor room (large)														← →
Repair and reinforcement of compressor room (near freshwater tank)														← →
Repair and reinforcement of main fan room														← →
Repair and reinforcement of Pit No. 4 wind tunnel														← →
Residential facility remains														
Repair of Building No. 3											←	—	—	→
Reinforcement of Building No. 3														
Reburial of Building No. 70 lower part (urgent work)			←	—	→									
Other														
Provision of passageway for construction work (L=530m)											←	—	—	→
Trimming of trees					←	—	—	—	—	—	—	—	—	—
Installation of new tour passageway														
Installation of shelter facilities for survey personnel														
Monitoring (camera observation) (single)					←	—	—	—	—	—	—	—	—	—
3D measurement 1 time/6 years						↔						↔		
Updating of Basic Plan for Development													↔	
Investigative studies of remains							←	—	→		←	—	→	

3) Project deadlines

To maintain the component part into the future, repairs need to be undertaken in order of priority. Nagasaki City has laid out the above long-term 30-year plan and also 10-year plans so that conservation measures can be tackled in phases. The first deadline of the annual plans for ten years is assumed in 2027, when Phase I is completed. The thirty-year long-term plan will be reviewed every 10 years. Overall project deadlines may change in response to plan reviews and future consideration of construction methods, as aspects for which construction methods have not yet been established are included in some of the Hashima Coal Mine restoration.

4. Reference materials

Appendix 1	Results of the survey of Hashima Coal Mine buildings etc.
Appendix 2-1	Archaeological excavation report (A survey of mine entries at the Hashima Coal Mine remains)
Appendix 2-2	Archaeological excavation report (Survey of underground remains boundaries at the Hashima Coal Mine remains)
Appendix 3	Survey of the structure of Pit No. 3 winding machine room (Survey of Hashima Coal Mine buildings, etc.)

Decision 42 COM 7B.10 Paragraph 6

6. Further notes that monitoring of the number of visitors is being undertaken systematically for all component sites, and that a visitor management strategy, including carrying capacities, will be formulated in 2018 on the basis of these results; and also requests the State Party to submit this strategy to the World Heritage Centre, once it is completed, for review by the Advisory Bodies;

1. Background

- The "ICOMOS Evaluations of Nominations of Cultural and Mixed Properties" (WHC-15/39.COM/INF.8B) noted the following points:
  - The number of visitors at component sites is likely to increase based on the trend for previously inscribed properties in Japan. The level of increase will vary at each component due to their geographical location, ease of access, and the number of hours they are open for public access. Monitoring measures will be put in place to record the level of visitation if the nominated property is inscribed.
  - ICOMOS considers that a strategy needs to be developed to assess and determine the acceptable carrying capacity at each component site to ensure that there are no adverse impacts on the fabric particularly at such sites as the Shokasonjuku Academy (Area 1, component part 1-1) and Glover House and Office(Area 6, component part 6-8)."
- Recommendation c) in the Decision of the 39th Session of the World Heritage Committee (39 COM 8B.14) calls for "Defining acceptable visitor threshold levels at each component part to mitigate any potential adverse impacts, commencing with those most likely to be at risk;"
- Surveys were conducted for three years from FY2016 to 2018 to ascertain the current status of visitor numbers.
- On November 30, 2017, a report was made to the UNESCO World Heritage Centre on progress with the creation of a visitor management strategy.
- Carrying capacity and other elements were considered on the basis of survey results, resulting in the creation of a visitor management strategy in November 2019.

2. Outline of visitor management strategy

(1) Procedure for visitor management strategy consideration

The specific visitor management strategy consideration procedure was as follows, as noted in the State of Conservation Report submitted on November 30, 2017.

1) Surveys of the current status will be conducted over FY2016-2018 to ascertain the current state of and trends in visitor numbers at each of the component parts.
2) In parallel with these surveys, a common visitor management vision for all component parts ("common visitor management vision") will be identified as a future target.
3) The current state of visitor management and issues faced at each of the component parts will be ascertained and policies and methods for improving that situation indicated, ensuring consistency with the common visitor management vision.
4) The results of the survey of current visitor numbers will be analysed in FY 2019, and a visitor

management strategy based on the common visitor management vision drawn up in parallel to the survey will be created as the process for realizing that vision.

(2) Outline of current status survey results

Quantitative surveys: These surveys ascertained the daily number of visitors to each of the component parts and fluctuations in that numbers. Where any impact meriting special note was observed at a component part, this was recorded.

Assessment of visitor numbers at each component part was made using the appropriate method for that part given its particular scale, nature, and location, as well as visitor management staffing arrangements.

It was discovered that daily visitor numbers at the various component parts fluctuated greatly according to whether it was a weekday, weekend, or vacation period, and whether or not an event was being held, for example. No impact meriting special note was reported at any component part.

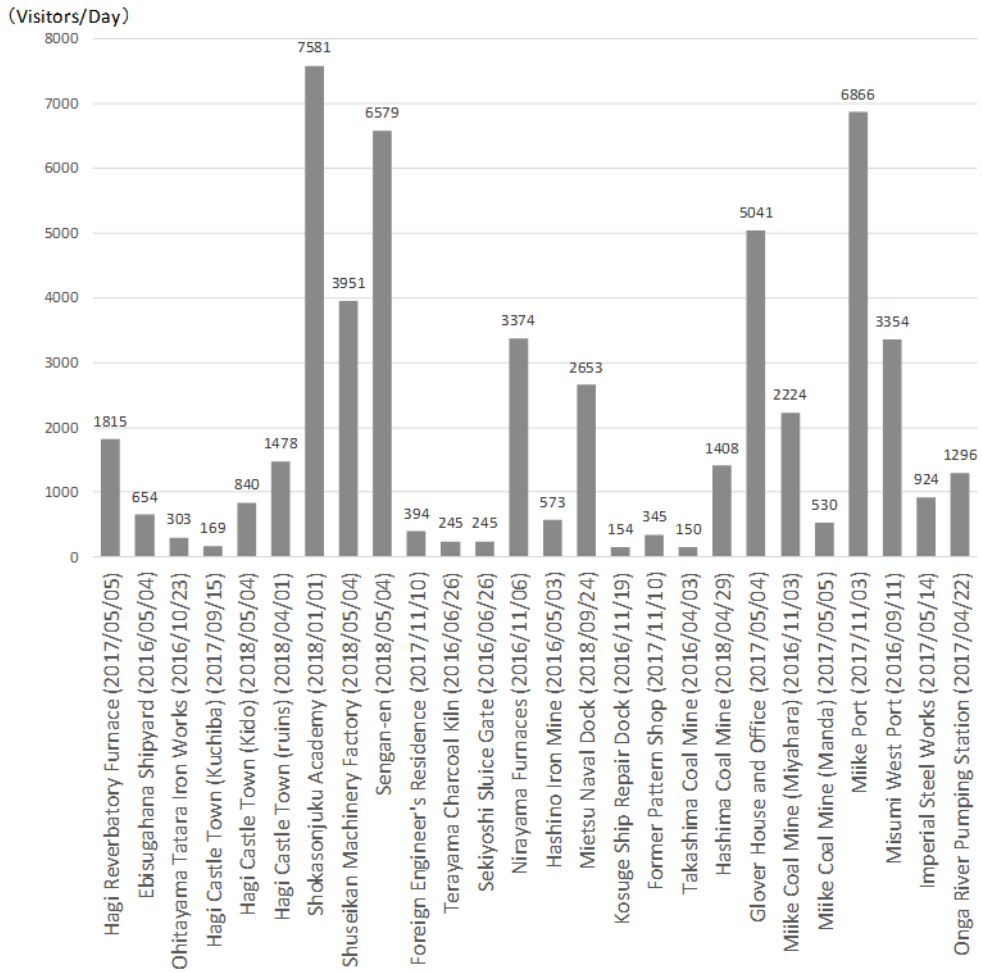


Figure 7. Maximum scale of daily visitor numbers outside event days (Manda Pit, Miike Coal Mine)
(April 2016 to March 2018)

Qualitative surveys: The impact of daily fluctuations in visitor numbers on the component part, as well as on the safety, security, and comfort of visitors, was observed and recorded. The amount of time which visitors spent at the component parts was also ascertained.

In FY 2017, qualitative surveys were undertaken of all component parts and the results analysed in order to identify indicators for management of component part impact and of promoting visitors' understanding of the component part and boosting visitor satisfaction.

These surveys confirmed cases of visitors stumbling and being unable to find an exhibit they were interested in, and, at component parts where visitors enter buildings, cases of crowding where travel groups, etc., large enough to impede smooth visitor movement are concentrated in entrance areas, etc. These situations are seen as likely to impact visitor enjoyment and satisfaction. (This could be prevented by changing visitor flows and managing the number of travel groups/visitors visiting a component part at the same time.)

To increase understanding of a component part, the longer visitors spend there, the better. However, in cases where there are many daily visitors, people may not have sufficient time to experience the component part and the interpretation thereof.

Table 5. Number cases in which fluctuations in visitor numbers impacted on the component part and/or on visitor safety, security, and comfort (April 2017 to March 2018)

Area	Component Part	Current Value (based on qualitative survey results)
Hagi	Hagi Castle Town (Kuchiba Family Residence)	1 incident/year
Nagasaki	Takashima Coal Mine	9 incidents/year
	Glover House and Office	46 incidents/year
Other		0 incidents/year

Visitor satisfaction surveys: The degree of visitor satisfaction, issues, and prospects were ascertained by collecting questionnaires from component part visitors, primarily during Golden Week (holiday season) in May and the summer vacation in August when visitor numbers are greatest.

From the results, it was showed that visitors spending two hours or more at a component part tend to understand the value of the component part and be satisfied by their experience, though this may vary with the scale of the component part. The lessons are therefore that factors such as time spent and the service of guides have a major impact in terms of achieving high levels of visitor satisfaction, and that these could serve as indicators for managing target levels.

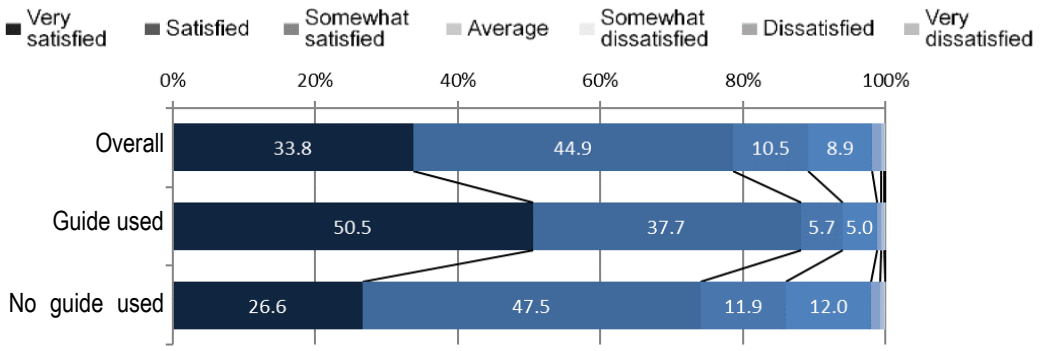


Figure 8. Relationship between guide availability and satisfaction with the component parts

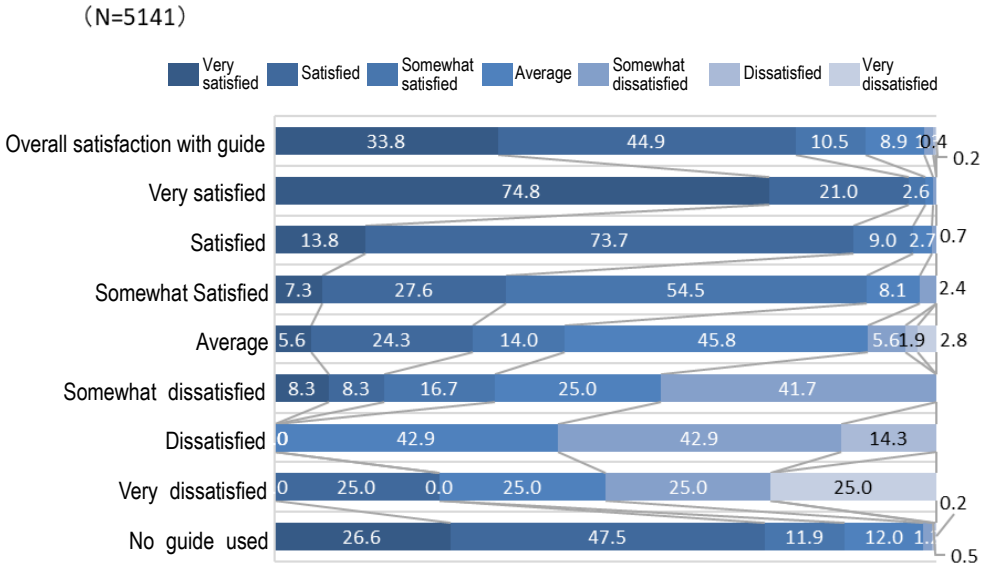


Figure 9. Relationship between satisfaction with guide and satisfaction with the component parts

(3) Contents of visitor management strategy

- Basic approach to Visitor Management Strategy

In drawing up the visitor management strategy, it was decided that the scope of management would be the component part (A), the surrounding environment (B), and visitors (C). Component part (A) will be monitored to check whether visitors (C) are having a physical impact on (A), with any risk of this to be forestalled. The surrounding environment (B) of the component part (A) will be checked for the appropriate provision of information and services to encourage the understanding and boost the satisfaction of visitors (C) (Figure 10).

Based on the results of the three-year surveys noted above, a visitor management vision was developed and the visitor management strategy created accordingly. The structure of the strategy is shown in Figures Figure 10 and Figure 11.

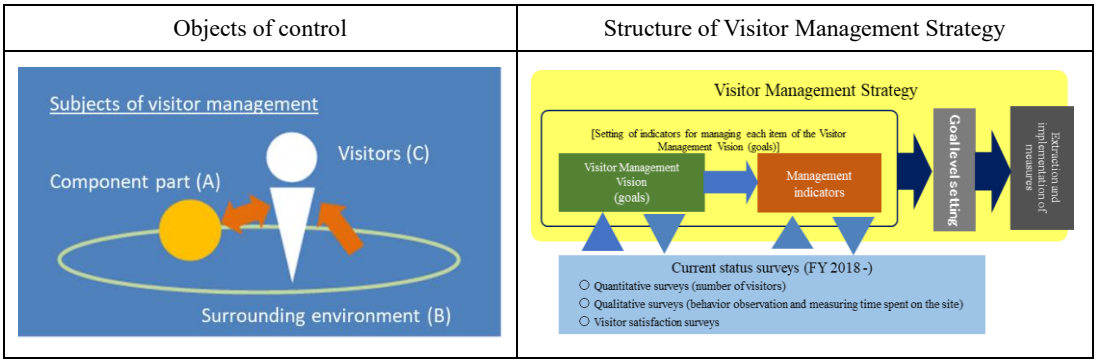


Figure 10. Management scope and structure of visitor management strategy

Management scope	Visitor Management Vision (targets)	
① **Component part (A)**	Physical damage No physical harm to land and materials of component part	1. The facilities and equipment are in place for physically protecting the component part
		2. The operational arrangement for this purpose is in place
② **Component part (A) / Surrounding environment (B)**	-1 Safety and security Visitors' feeling of safety and security is sufficient	1. The facilities and equipment are in place for ensuring the safety and security of visitors
		2. The operational arrangement for this purpose is in place
	-2 Promotion of understanding Visitors' feeling of satisfaction is sufficient	1. The facilities and equipment are in place to contribute to promoting and deepening understanding by visitors
		2. The operational arrangement for this purpose is in place
	-3 Hospitality The comfort of visitors is sufficient	1. The facilities and equipment are in place for promoting enjoyment by visitors
		2. The operational arrangement for this purpose is in place
③ **Visitors (C)**	A state in which visitors feel safety, security, comfort, and a sense of satisfaction, spend a sufficient amount of time at the component part to understand its contribution to the Outstanding Universal Value, and are motivated to visit again	

Figure 11. Visitor Management Vision

While Recommendation c) of the Decision by the 39th Session of the World Heritage Committee (39 COM 8B.14) (hereinafter, "39 COM 8B.14 Recommendation c)") calls for setting the carrying capacity for component parts, the results of multifaceted surveys conducted over a three-year period found no adverse impact caused solely by fluctuations in visitor numbers, or any serious cases which could potentially have an adverse impact.

Neither did the results of the qualitative, quantitative and other multifaceted surveys suggest that it

would be possible to prevent an adverse impact by setting visitor thresholds. Visitor density and mode also differed even across the course of the day according to whether it was a peak or off-peak time and whether or not groups were visiting, etc. It would therefore not necessarily be effective to set a single figure as the acceptable visitor threshold based on cause and effect.

In fact, to prevent constantly fluctuating visitor numbers from having an adverse impact on component parts, rather than static management (setting annual or daily thresholds for visitor numbers), using multiple indicators to ascertain the impact of fluctuation and developing appropriate responses will be essential in terms of achieving a substantive response to 39 COM 8B.14 Recommendation c).

It was consequently decided that in order to mitigate any potential adverse impacts most likely to bring a risk to component parts, which is the purpose of 39 COM 8B.14 Recommendation c), a visitor management strategy would be created that effectively combines multiple indicators designed around a visitor management vision to enable dynamic impact monitoring and situational management.

Visitor surveys to date revealed that the possible situations to have an adverse impact arise intensively when groups of visitors arrive, or when all visitors are temporarily concentrated inside because of sudden weather changes, etc. This is partly because the buildings comprising the Sites of Japan's Meiji Industrial Revolution include private facilities like Glover House and Office and Shokasonjuku Academy, which, unlike large-scale temples and public facilities, were not originally designed with simultaneous use by unspecified large numbers of people in mind.

It was therefore analysed that the conservation of such buildings hinges not on absolute visitor numbers but rather on directing visitors through smoothly.

At Glover House and Office, for example, the impacts observed from large numbers of visitors were not so much on the component part itself as on the safety, security, and comfort of visitors. Effective ways of enabling visitors to tour safely and smoothly include installing guidance signs with the common logo design, revising tour routes, and instituting "tour rules" defining visitor courses that restrict the exits and entrances that can be used. It is important to take such measures in consideration of safety, within the scope that free movement of visitors is not hindered.

Further, interpreting 39 COM 8B.14 Recommendation c) as requiring both reduction of adverse visitor impact and promoting understanding of Outstanding Universal Value, we decided that visitor management vision must envisage a state whereby adverse visitor impact is managed while visitors understand more about Outstanding Universal Value, and this state was made the target of the visitor management strategy.

- Visitor management strategy framework

① Definition of a state of no adverse visitor impact
- ✓ Definition of ideal situation in terms of the component part, surrounding environment, and visitors

("Visitor Management Vision": State of Conservation Report (November 2017))

② Design of indicators for confirmation of a state of no adverse visitor impact
- ✓ Common indicators, individual indicators (established based on results of three years of current status surveys)

③ Actions to maintain a state of no adverse visitor impact
- ✓ Establish indicators and target values based on the features of individual component parts
- ✓ Initiatives/projects to maintain and improve indicators
- ✓ Design monitoring methods and steps to be taken where indicators deteriorate

- Strategy duration

Eight years, with FY2019 as the initial fiscal year.

- Implementation structure of the strategy

Component part managers will each execute the visitor management strategy for their particular component part, with the Cabinet Secretariat providing support.

- The ideal visitor state: "Visitor Management Vision"

The visitor management vision in visitor management strategy envisages a state that provides visitors with safety, security, comfort, and a sense of satisfaction; ensures that they spend sufficient time at the component part to understand its value; and motivates them to visit again.

To manage and confirm the "visitor management vision", the vision has been structuralized along with each management scope and presented as the target of management, with this framework then used to create strategies for individual component parts.

- Establishment of indicators and target values

Indicators to manage and confirm the "visitor management vision" is being achieved comprise common indicators used commonly by all component parts to confirm whole management levels for component parts and individual indicators to confirm management levels for individual component parts based on their particular issues.

Common indicators have been set from key indicators based on the results of visitor surveys to date. Individual indicators have been set by managers of individual component parts based on the current state of the particular component part, management directionality in future, and planned initiatives, noting these in their visitor management strategies.

Common indicators

- ✓ Incidents impacting the component part and visitor safety, security, and comfort
  Impacts by visitors as determined from qualitative surveys (observation surveys)
  - Wear and tear on the resources, corrosion, damage, contamination, trash, safety hazards, obstacles to communication, etc.
- ✓ Existence of facilities/equipment for separation between visitors and the component part
  The existence or not of separation facilities means whether there are facilities or equipment for preventing physical damage to places in the component part that are prone to such damage. These include facilities and equipment such as fences, rails, or other barriers to ensure prevention of entry into such places.
- ✓ Degree of satisfaction
- ✓ Time spent
- ✓ Understanding
- ✓ Sparking of interest
- ✓ Intention to visit again
- ✓ Percentage of problems indicated
  Percentage of problems indicated is set from a choice of five indicators, namely, crowding, damage, lack of entertainment value, food facilities, and toilet provision, etc. Of these, crowding and damage are mandatory.

Individual indicators (examples)

Indicators relating to physical damage
- ✓ Whether fire-prevention facilities are being provided and improved
- ✓ Number of inspection patrols
- ✓ Number of security cameras installed

Indicators relating to visitor safety and security
- ✓ Whether flow lines are set
- ✓ Patrols by staff, etc.
- ✓ Installation of fences and handrails to prevent falls

Indicators relating to promotion of understanding
- ✓ Whether guidance and explanatory signs are provided and kept up to date
- ✓ Multi-language pamphlet availability
- ✓ Provision of guidance facility
- ✓ Guide training

Indicators relating to hospitality
- ✓ Renewal of administrative and convenience facilities
- ✓ Going around to visitors to find out their needs
- ✓ Holding of various events, opening at night

- Monitoring

While quantitative surveys do not map exactly to the management indicators used in visitor management strategies, we do need to remain constantly aware of annual and daily changes in visitor numbers, so we will continue to implement these. Where marked fluctuations (increases) occur, the managers of individual component parts will implement qualitative surveys to ascertain the impact on management indicators as well as analysing fluctuation causes and considering countermeasures, where necessary revising their visitor management strategies even during the eight-year duration set for the overall strategy.

Where qualitative surveys cannot be implemented with the same frequency as to date, in the course of inspection patrol of the component part, etc., cases where the component part or the safety, security, and comfort of visitors is being impacted shall be identified.

It is expected that visitor satisfaction surveys, widely used in common indicators, will be large-scale surveys. Since the applicable period is eight years, they will be conducted five years into the period, with the support of the Cabinet Secretariat, in time for the revision work for the next strategy.

Where monitoring reveals a marked rise in annual or daily levels of visitor numbers as a factor causing indicators to deteriorate, the approach is to study time periods and visitor patterns prone to the occurrence of adverse impacts, and devise measures for levelling visitor numbers to more closely approach “the visitor management vision.” More specifically, we will consider measures such as introducing entry limits for individual time periods, permitting entry only when with a guide, and controlling visitor number through fee-setting.

Designing and introducing these new systems will fall primarily to the managers of individual component parts, with the Cabinet Secretariat and other government agencies providing the necessary information and advice.

- Visitor management strategies for individual component parts

Visitor management strategies for individual component parts have been designed around a framework that enables to check that the specific visitor management vision is being realized based on actual data, connecting data with those visitor management measures implemented for management purposes so that a PDCA cycle can be operated. Because many specific visitor management measures are noted in Conservation, Restoration, Presentation and Public Utilization Plans, the particular measures and periods of validity, etc., have been made consistent with these plans.

In addition, to raise the level of whole management across the component parts while reflecting the situation at individual component parts, management indicators have been divided into common indicators and indicators for individual component parts (individual indicators) and utilized as such.

As working properties in the Nagasaki Area such as No. 3 Dry Dock and the Giant Cantilever Crane at the Mitsubishi Heavy Industries Nagasaki Shipyard, the Former Pattern Shop, and Senshokaku Guest House are not currently open to the public, they are not included in the current visitor

management strategy. A strategy may need to be considered in future that balances component part operation and conservation.

3. Reference materials

Appendix 4 Visitor Management Strategy (including for individual component parts)

Decision 42 COM 7B.10 Paragraphs 7, 8, 9

7. Notes furthermore that interpretation is available for all component sites, and that digital tools have been developed, but that further improvements are planned, including Information Centre to be opened;
8. Further requests the State Party to provide an update on overall interpretation upon completion of Information Centre;
9. Strongly encourages the State Party to take into account best international practices for interpretation strategies when continuing its work on the interpretation of the full history of the property, both during and outside of the period covered by its OUV, and in the digital interpretation materials;

1. Background

- The report "ICOMOS Evaluations of Nominations of Cultural and Mixed Properties" (WHC-15/39.COM/INF.8B) noted the following points regarding interpretation:
  - "The presentation of the components is mainly site specific and does not necessarily present the OUV or indicate how each component relates to each other or to the whole property."
  - "What is urgently needed is clear interpretation to show how each site or component part relates to the whole property, particularly in terms of the way they reflect one or more phases of Japan's industrialization and convey their contribution to OUV."
- In the Decision adopted by the World Heritage Committee at its 39th session (39 COM 8B.14), Recommendation g) calls for Preparing an interpretive strategy for the presentation of the property, which gives particular emphasis to the way each of the component sites contributes to Outstanding Universal Value and reflects one or more of the phases of industrialization.
- In a footnote to the decision on inclusion on the UNESCO World Heritage List, the statement made by Japan regarding interpretative strategy is noted, and the following points are made.
  - The interpretive strategy should also allow an understanding of the full history of each site.
- In drawing up the Interpretation Strategy, interpretation audits were conducted by independent international experts regarding the two main levels : World Heritage as a whole, and the component part/site-specific level. The Chair of the ICOMOS International Scientific Committee on Interpretation and Presentation pf Cultural Heritage Sites was invited to visit component parts and advice was received regarding the approach to interpretation of the full history of each site.
- On this basis, an Interpretation Strategy was drawn up and submitted November 30, 2017 as an attachment to the State of Conservation Report.
- As for the overall interpretation, this will be reported anew upon completion of the Industrial Heritage Information Centre.

2. Methods of response and accomplishments

(1) Methods of response

The Japanese Government adopted the following methods for responding to the requests in paragraphs 7, 8, and 9 of the Decision by the World Heritage Committee 42nd session (42 COM 7B 10).

- Conducting interpretation audits
  Detailed interpretation audits were conducted by international experts who are very familiar with industrial heritage sites, worldwide, and their interpretation and presentation.
- Studying interpretation in each Area
  Interpretation in each Area were studied, taking into account the results of the interpretation audits and the need for consistency with the Interpretation Strategy.
- Properly revising explanations in the interpretation facilities in each Area
  Reviews were begun of the explanations at each of the exhibits in visitor centres and elsewhere at each site, starting with confirmations being carried out over time by international experts, to ensure their consistency with the story of the Sites of Japan's Meiji Industrial Revolution.
- Conducting studies and making preparations for the establishment of the Industrial Heritage Information Centre
  Studies were conducted on interpretation to be made at the Industrial Heritage Information Centre, which is being planned for establishment during this fiscal year, toward further improvement of interpretation by following the Interpretation Strategy and taking into account the views of experts in and outside Japan.

(2) Accomplishments

1) Report on interpretation audits of the property as a whole (February to August 2019, prepared by the Cabinet Secretariat and overseas experts)

In line with the Interpretation Strategy, audits were conducted by overseas experts of the current state of interpretation at the sites of the component parts in each area and visitor centres, in collaboration with the Cabinet Secretariat, World Heritage Council for the Sites of Japan's Meiji Industrial Revolution (former Consortium for the World Heritage Inscription of Modern Industrial Heritage (Kyushu-Yamaguch)), and the National Congress of Industrial Heritage (here after NCIH).

- 1st interpretation audit
  When implemented: Tuesday, February 26 to Friday, March 1, 2019
  Areas covered: Nagasaki Area (February 26-28), Saga Area (March 1)
  Auditors: Sarah Jane Brazil and Barry Gamble
- 2nd interpretation audit
  When implemented: Tuesday, August 20 to Thursday, August 29, 2019
  Areas covered: Kagoshima Area (August 20), Miike Area (August 21-22), Yawata Area (August 23), Hagi Area (August 24), Nirayama Area (August 26), Kamaishi Area (August 27-28), consultation meeting (August 29)

Auditors: Sarah Jane Brazil and Barry Gamble

2) Studies of interpretation in each Area

From the standpoint of taking a comprehensive approach to raising the quality of interpretation in each Area, in line with the Interpretation Strategy, assessments of interpretation were made in all eight Areas.

As part of these studies, the hierarchy and correlation of interpretation facilities in each Area were examined, and a list of facilities enabling understanding of the full history of each site was considered. Making use of the study results, Area guide maps were created for visitors to the Nagasaki Area and Kamaishi Area by NCIH, with assistance from the Agency for Cultural Affairs.

In the ICOMOS Charter for the Interpretation and Presentation of Cultural Heritage Sites (2008), interpretation is regarded as "part of the overall process of cultural heritage conservation and management." For interpretation of World Heritage values, pamphlets and other interpretation tools that accurately reflect these values need to be provided in the World Heritage visitor centres and the interpretation facilities of each component part.

There is one unified World Heritage value – the acknowledged "Outstanding Universal Value" - for the whole property. While this may exist alongside the interpretation of local value, or of the value as cultural property assessed by the national government, at World Heritage visitor centres World Heritage value must be given absolute priority. The display of World Heritage value (Outstanding Universal Value) must be presented in a way that stands out above all others, and greets the visitor on arrival in a way that helps them to understand that they are in a World Heritage Site and why it is significant. In visitor centres, moreover, Outstanding Universal Value and how the component parts contribute to it must be properly and accurately reflected in exhibit descriptions, publications, digital materials, public lectures, direct and indirect educational programs, supplementary texts, community activities. This is also crucially important in research, training, and assessment of interpretation.

As for interpretation tools, the basic tools are the Nomination document (contributed to and endorsed by a number of national and international experts), Summary of Nomination, and Mini Pamphlet, along with area guide maps and smartphone applications. The pamphlets created independently by each local government for distribution at each visitor centre are to be seen as no more than supplements to the pamphlets explaining World Heritage value. Each visitor centre must prepare the Summary of Nomination and Mini Pamphlet so they can always be viewed or distributed. The Cabinet Secretariat will take measures to ensure these materials are always available at each visitor centre for viewing or distribution.

In the pamphlets and websites created independently by each local government, even when an original story is told in which the property in that location takes centre stage, insistence is made that they mention the Mini Pamphlet about the Sites of Japan's Meiji Industrial Revolution or refer to the official website of the Sites of Japan's Meiji Industrial Revolution.

As shown in the figure below, the Cabinet Secretariat and NCIH cooperate closely to ensure interpretation is implemented properly in each Area; and at the World Heritage visitor centres, suitable guidance and consultation is undertaken so that the interpretation of the World Heritage

value of the Sites of Japan's Meiji Industrial Revolution is in harmony with the historical and cultural values of each region.

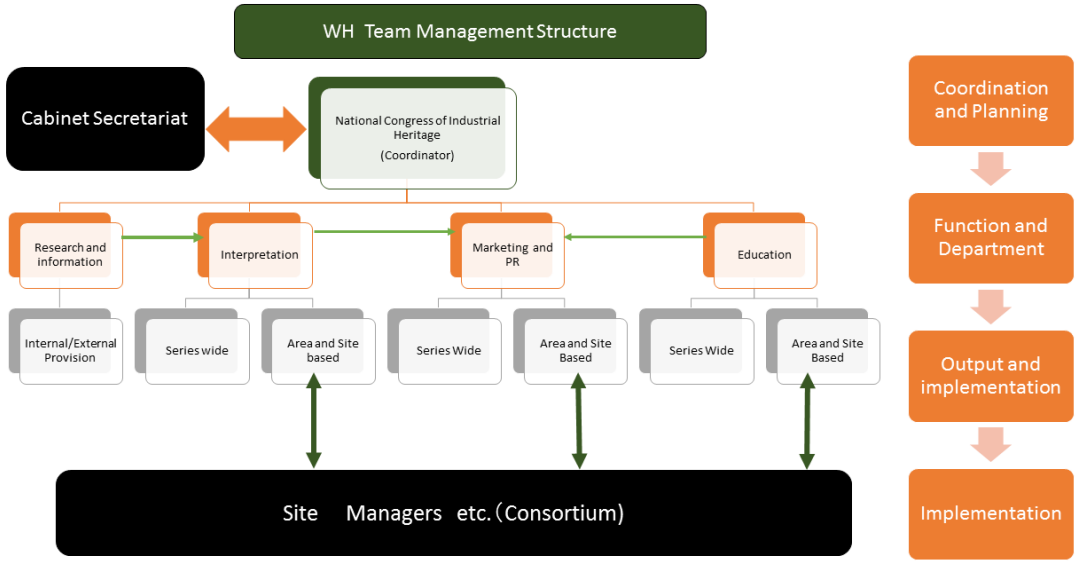


Figure 12. Organizational framework for management of interpretation

- Studies for interpretation in each Area

The main points of discussion are as follows.

(1) Approach to interpretation strategy

(2) Hierarchy and correlation of physical interpretation and presentation

(3) Interpretation facilities and exhibit contents

(4) Visitor centres in the Area

(5) Facilities providing explanations of the history of heavy industry

(6) Facilities providing explanations of the full history of each site

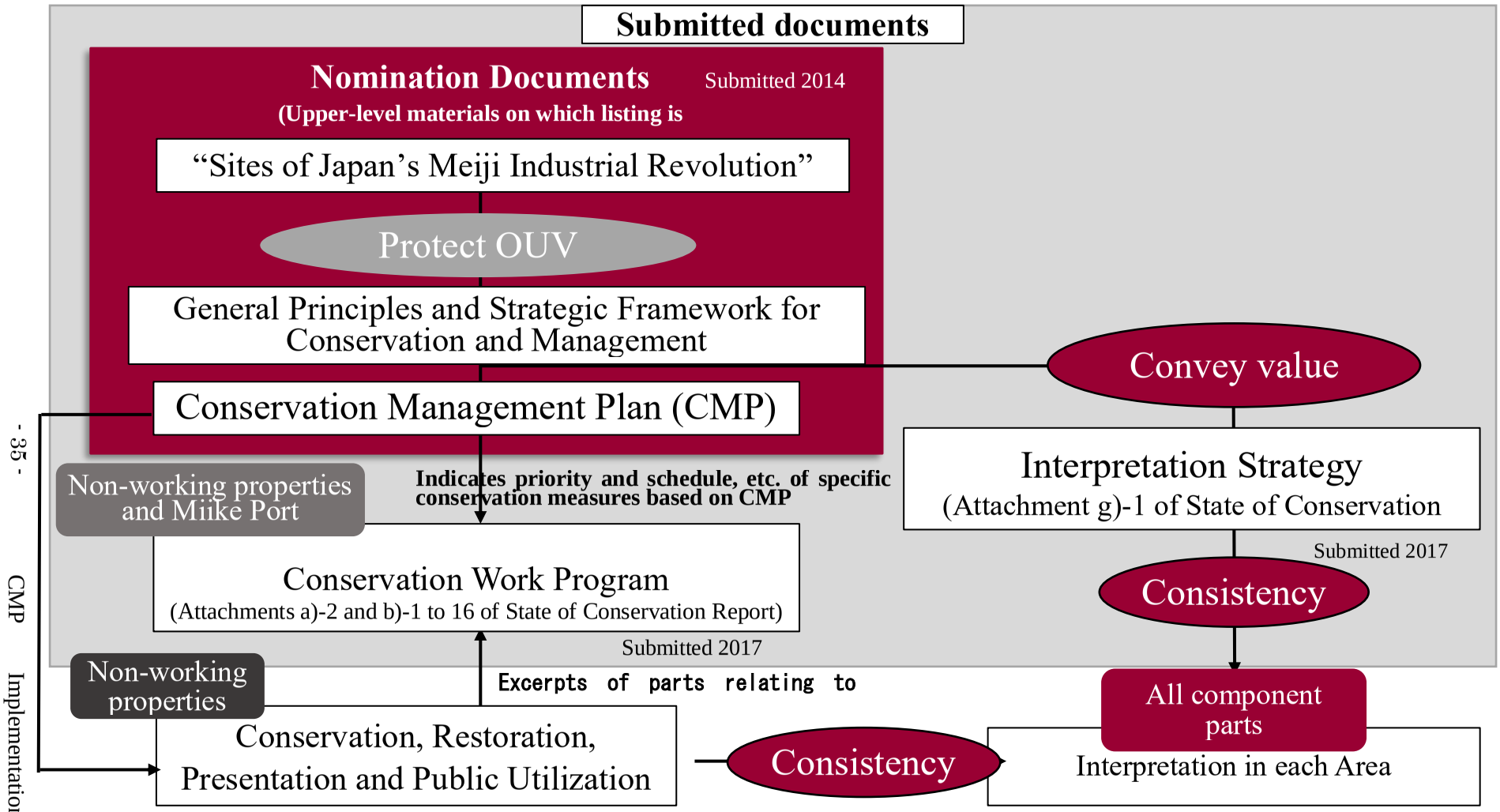
(7) Exhibits a, etc. at each component part

(8) Installation of road signs using the common logo

(9) Enhancement of digital content

Figure 13. Relationship among programs, etc. relating to the Sites of Japan's Meiji Industrial Revolution

Relationship among programs, etc. relating to the Sites of Japan's Meiji Industrial Revolution



Regarding the four properties of the Mitsubishi Nagasaki Shipyard (No. 3 Dry Dock, Giant Cantilever Crane, Former Pattern Shop, and Senshokaku Guest House), since the OUV is being properly retained through everyday ongoing maintenance efforts based on the Conservation Management Plan (CMP), a Conservation, Restoration, Presentation and Public Utilization Plan and a Conservation Work Program have not been drawn up.

In the case of Miike Port, a Conservation Work Program has been prepared, and its abstract was submitted in December 2017 as Attachment b)-15-2 to the State of Conservation Report. A separate Conservation, Restoration, Presentation and Public Utilization Plan has not been drawn up.

For the Yawata Imperial Steel Works, a restoration plan was submitted in September 2017 based on the Operational Guidelines for the Implementation of the

3) World Heritage Visitor Centre provision

- Provision of World Heritage Visitor Centres in each Area is being carried out in accordance with the Interpretation Strategy. Some of such centres developed or upgraded since the inscription in 2015 are the Nirayama Reverberatory Furnaces Guidance Centre (Nirayama Area) and Hashino Iron Mine and Smelting Site Information Centre (Kamaishi Area) in 2016, and the Meiringakusha Visitor Centre (Hagi Area) in 2017.

4) Area guide maps

- In the process of studying approaches to Area-specific interpretation, provision of Area guide maps was promoted by NCIH with assistance from the Agency for Cultural Affairs. A Nagasaki Area map was made in FY2018, and a Kamaishi Area map in FY2019. Area guide maps of other areas are also planned to be promoted sequentially from this year, aiming to complete all eight areas.
- These guide maps show not only the component parts of the Sites of Japan's Meiji Industrial Revolution, but also the local World Heritage Visitor Centre, other interpretation facilities in the area --facilities that support understanding of the full history of each site, and other World Heritage sites or cultural heritage sites than the Sites of Japan's Meiji Industrial Revolution--contributing to comprehensive information dissemination to Area visitors.
- In conjunction with smartphone applications, the guide maps can also be used for communication about inaccessible assets, such as by using augmented reality functions to show 3D images of closed heritage assets. The application is available in several languages: Japanese, English, Korean, Simplified Chinese, and Traditional Chinese.

Figure 14. Display of 3D images making use of Nagasaki Area guide map and AR functions

Figure 15. Display of 3D images making use of Kamaishi Area guide map and AR functions

5) Interpretation assistance tools

- In 2017, the Human Resource Development Committee for the Sites of Japan's Meiji Industrial Revolution issued two textbooks sponsored by Agency of Cultural Affairs. These served as educational materials for helping staff to perform guidance duties at interpretation facilities in each area, to assist in the correct understanding of Outstanding Universal Value, and being able to accurately convey World Heritage values. These are "Interpretation Guide manual: Sites of Japan's Meiji Industrial Revolution" and "Communicating World Heritage".
- Moreover, the Human Resource Development Committee for the Sites of Japan's Meiji Industrial Revolution chaired by NCIH issued two books, again sponsored by the Agency of Cultural Affairs. In 2017 "Understanding Steel: History of Steel" was issued. Then in 2019, "Understanding Coal: History of Coal Industry" was issued. In the same year "Understanding Shipbuilding: History of Shipbuilding" is planned to be issued. Further details of those auxiliary education and learning materials are described in 2) Developments and accomplishments since FY2017.

6) Properly revising explanations in the interpretation facilities in each Area

- The work began in rewording, as necessary, the explanations at each World Heritage Visitor Centre and elsewhere in each Area, following the start of confirmations by overseas experts, to ensure their consistency with the story of the Sites of Japan's Meiji Industrial Revolution.

7) World Heritage Route promotion

- In accordance with the Interpretation Strategy, also presented in pages 395-396 of the nomination document, the World Heritage Route Promotion Council was founded to understand World Heritage as a whole, and for promoting the World Heritage Route. World Heritage Value of the Sites of Japan's Meiji Industrial Revolution cannot be understood by just visiting one site, it requires one to study all. Included in these promotion efforts are the creation of guide maps and applications, provision of GPS navigation, and installation of road signs with the standard logo, to guide visitors to all component parts and related sites. There was an increase in the installation of places with road signs using common logo: from 291 in 2017 to 301 places in 2019. The World Heritage Route Promotion Council is made up of World Heritage Site stakeholders, tourism and travel agents, and transportation providers including railway companies, airlines, and bus companies and taxi companies.

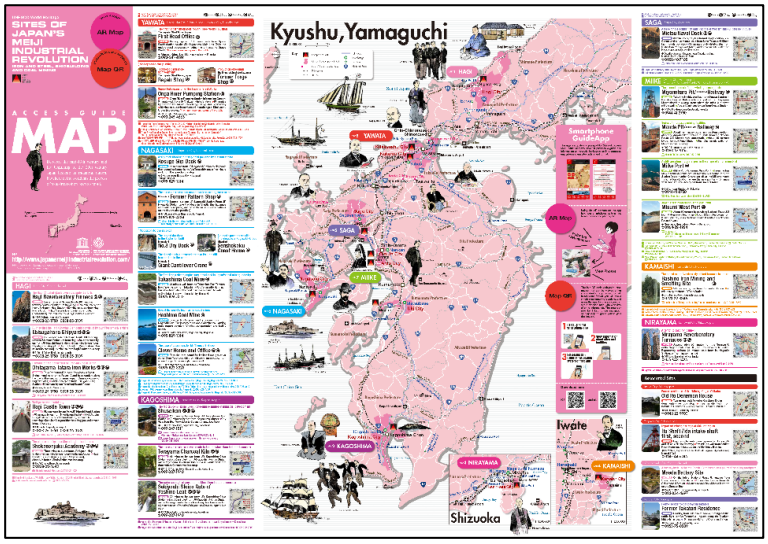


Figure 16. World Heritage Route

Figure 17. General meeting of the World Heritage Route Promotion Council（November, 2019）

Table 6. Installation of road signs using the common logo

(As of November 2019)

Prefecture	City	Number installed
Fukuoka Prefecture	Kitakyushu City	53
	Omuta City	20
	Nakama City	15
Saga Prefecture	Saga City	25
Nagasaki Prefecture	Nagasaki City	20
Kumamoto Prefecture	Arao City	41
	Uki City	18
Kagoshima Prefecture	Kagoshima City	37
Yamaguchi Prefecture	Hagi City	47
Iwate Prefecture	Kamaishi City	20
	Otsuchi Town	1
Shizuoka Prefecture	Izunokuni City	3
	Kannami Town	1
Total		301

Figure 18. Examples of road signs with common logo

●Examples of promotion activities

Figure 19. Promotion activities being conducted

- NCIH, with the support of Japan Tourism Agency, organised a World Heritage tourism familiarisation trip to Hagi, Kitakyushu, Nagasaki, Miike, and Kagoshima. Travel agents and influencers, mostly from the US and Europe, were specially invited to see the Sites of Japan's Meiji Industrial Revolution (2019)

- As a promotion project supported by Japan National Tourism Organization (JNTO), a travel magazine introduced the destinations of Sites of Japan's Meiji Industrial Revolution in their special featured articles in 2018 and followed by SNS to foreign travellers (2018-19).

Figure 20. Promotion using a classic car (2017/Area 1 Hagi, component part 1-4 Hagi Castle Town)

Figure 21. Promotion at a travel fair (2016)

Figure 22. Special promotion by JR Kyushu (Area 7 Miike, 2015)

"Special limited 80-person-per-day tour: Romantic Cruise and A train, visiting Manda Pit and Misumi West Port"

8) Conducting studies and making preparations for the establishment of the Industrial Heritage Information Centre establishment

- As for the Industrial Heritage Information Centre, preparations such as renovation of the existing facility in Wakamatsu-cho, Shinjuku Ward, Tokyo are going ahead steadily toward establishing the Centre, by following the Interpretation Strategy, and taking into account the advice of experts in and outside Japan. The Centre is being planned for establishment during this fiscal year.

3. Reference materials

Appendix 5 Report on interpretation audits of the "Sites of Japan's Meiji Industrial Revolution"

Decision 42 COM 7B.10 Paragraph 10

10 Encourages continuing dialogue between the concerned parties

1. Background and directionality

- The “Sites of Japan’s Meiji Industrial Revolution” consist of 23 component parts in 11 cities of 8 prefectures. These component parts are diverse in many ways, including their geographical situation, working state, and owners and managers.
- This situation demands that close partnerships be formed among a wide range of concerned parties, from relevant ministries of the Japanese government to local government organizations, owners, managers, and the local communities, and that an effective and efficient environment be established for carrying on conservation and management of the component parts.
- Given this background, active efforts have been made to provide opportunities for dialog among concerned parties in these relevant ministries, local government organizations, owners, managers, and local communities. Dialog with a wide range of concerned parties will be continued hereafter as well, to enable sharing of awareness.

2. Examples of dialog initiatives

The Japanese government, in response to Paragraph 10 of the World Heritage Committee Decision (42 COM 7B.10), is actively conducting dialog with a wide range of concerned parties, such as by convening various meetings as in the examples below.

(1) Industrial Heritage Expert Committee (including Working Properties)

Along with assessment of the suitability of conservation measures and of heritage value, this Committee selects candidates for World Heritage listing.

Members: 22 experts from in and outside Japan

Experts in industrial archaeology, modern economic history, heritage conservation, and others from mass media and overseas specialists

Meetings: Once or twice per year

(2) National Committee of Conservation and Management for the “Sites of Japan’s Meiji Industrial Revolution”

The Committee exchanges information and views and decides general matters for conservation and management, and matters covering the sites as a whole such as the overall results of monitoring, taking into consideration the wishes of stakeholders of all kinds.

Members: 29 representatives of relevant government ministries and municipalities

Cabinet Secretariat, Agency for Cultural Affairs, Ministry of Land, Infrastructure, Transport and Tourism (MLIT), Ministry of Economy, Trade and Industry (METI), Forestry Agency,

municipalities (prefectures, cities) related to the component parts

Meetings: Once or twice per year

(3) Local Conservation Councils

These councils, formed in each of the eight Areas of the Sites of Japan's Meiji Industrial Revolution as World Heritage partners for promoting effective implementation of the conservation management plans, play the role of supporting managers and owners of each of the component parts to make proper decisions on conservation of the component parts. Local Conservation Council members exchange information and views, discuss issues, and propose improvements to the Conservation Management Plan.

Members: Representatives of relevant ministries, local governments, business owners, tourism associations, volunteer groups, fishing industry groups, neighbourhood associations, etc.

Meetings: Multiple times a year in each of the eight Areas

(4) World Heritage Route Promotion Council

Considering that there is one World Heritage value linking all 23 sites, the Council conducts PR activities in and outside Japan, making use of maps, smartphone applications and other tools, aimed at promoting initiatives relating to Sites of Japan's Meiji Industrial Revolution World Heritage Route (hereinafter, "World Heritage Route") for sharing and spreading the World Heritage value of the property as a whole. Among these initiatives are creation of World Heritage route that incorporate multiple component parts.

Members: Approximately 130 organizations including relevant municipalities, business owners, Chambers of Commerce and Industry, tourism associations, railway operators, highway operators, airlines, cruise operators, and travel agencies

Meetings: Once a year (four meetings have been held since 2016)

(5) Meetings for local residents and other events in each Area

Lectures, historic site tours, panel displays and various other events are held in each Area to make local residents and visitors feel greater familiarity with the sites, such as by explaining how the site came to add to the world heritage list and conveying their appeal.

Event details: Visiting lectures, historic site tours, panel displays, bus tours, factory tours, etc.

(6) Interpretation training

Based on the Interpretation Strategy, workshops are held for staff performing guide services at component parts or related facilities in each of the eight Areas, aimed at promoting understanding of the Outstanding Universal Value and of the connections among industries and the 23 component parts in the eight Areas. See Decision 39 COM 8B.10 Recommendation f) for details.

Dates of workshops: October 2017 to February 2018 (nine sessions in eight Areas)

Participants: Approx. 340

Workshops are held for staff of local government organizations who are engaged in the conservation

and management of each of the component parts and various measures for their restoration, presentation and public utilization, as opportunities to learn about the World Heritage Convention, the Outstanding Universal Value of the Sites of Japan's Meiji Industrial Revolution, and methods for their conservation and management.

Dates of workshops: May 2017 to October 2019 (total of six sessions)

Participants: Approx. 230

Decision 42 COM 7B.10 Paragraph 11

> Requests furthermore the State Party to fully implement Decision 39 COM 8B.14[1]and to submit to the World Heritage Centre, by 1 December 2019, an updated report on the state of conservation of the property and the implementation of the above, for examination by the World Heritage Committee at its 44th session in 2020.

1. Background

- A State of Conservation Report was submitted November 30, 2017 covering the following matters, in response to each of the recommendations in the Decision of the World Heritage Committee at its 39th session.

Recommendation a)

The Cabinet Secretariat prepared Conservation Work Programme for Hashima Coal Mine under the cooperation with Nagasaki City.

Recommendation b)

The Cabinet Secretariat prepared Conservation Work Programmes and Implementation Programmes for each component part under the cooperation with the owners and local governments.

Recommendation c)

The number of visitors at each component part is under investigation for three years. Based on the results, a visitor management strategy is planned to be formulated and the possibility or need for determining visitor threshold levels is also planned to be examined in FY 2019.

Recommendation d)

A checklist was produced and monitored to determine whether the governance framework properly functions. Meetings are regular and working well and the mutual communication and cooperation setup is functioning thoroughly through monitoring annual reports and other means, so the governance framework is operating appropriately.

Recommendation e)

Monitoring charts have been produced to systematically monitor the elements of component part and the landscape of buffer zone. Annual observations in monitoring charts will be incorporated into annual reports for confirmation by the Local Conservation Councils.

Recommendation f)

Based on the assessment of current state on capacity building of human resources in each Area and component part, policies and techniques that are common to the overall property have been created, including items for training and project to be implemented.

Recommendation g)

The Cabinet Secretariat developed the Interpretation Strategy, based on a full Interpretation Audit by independent international experts, as well as specific advice by the President of the ICOMOS International Scientific Committee on Interpretation and Presentation on the

interpretation of the “full history” of each site.

Recommendation h)

Based on paragraph 172 of the Operational Guidelines, information was compiled regarding the contents and progress of a number of development plans and new development plans for public facilities listed in this Recommendation.

- In addition to the matters indicated in the Decision of the 42nd session of the World Heritage Committee, the matters reported in the State of Conservation Report submitted this time are indicated below, including items regarding Recommendations f) and h) of the above-noted Decision of the 39th session of the World Heritage Committee, as well as the background and progress status of each item. Note that regarding Recommendation f), in addition to the policies and methods for staff training programmes indicated in the State of Conservation Report submitted in FY2017, each of the programmes and initiatives conducted to date are reported; and regarding Recommendation h), currently recognized matters concerning conservation are reported along with the matters indicated in the 39th Meeting Decision.

Recommendation f) of Decision 39 COM 8B.14

Establishing and implementing an on ongoing training programme for all staff and stakeholders responsible for the day-to-day management of each component to build capacity and ensure a consistent approach to the property's ongoing conservation, management and presentation;

1. Background

- The report of "ICOMOS Evaluations of Nominations of Cultural and Mixed Properties" (WHC-15/39.COM/INF.8B) noted the need for regular ongoing training and human resource capacity building on appropriate conservation and management methods. Emphasized in particular is the need to better articulate capacity building through training, and to provide training to management and staff concerning the component parts, in order to ensure a consistent conservation and management approach across all components of the property.
- In the State of Conservation Report submitted November 30, 2017, human resources were classified into four types, the capacities considered necessary for each type were defined, and a human resource development policy common to all sites was formulated, including education topics for each personnel type and the human resource development programme items to be implemented. The state of and issues for human resource development in each Area and at each component part were determined, policies were articulated, and current status, issues, and directionality in each Area were also indicated.

➢ (For Reference) Four types of human resources

(1) Owners and managers of component parts
(2) Personnel engaged in actual conservation and management work at the site (designated administrators, etc.)
(3) Personnel engaged in routine maintenance and management work (including cleaning and repairs) at the site
(4) Personnel engaged in permanent interpretation work at the site, including volunteer guides

2. Developments and accomplishments since FY2017, and direction hereafter

Human resource development programmes that have shown notable progress since FY2017 are as follows.

(1) Establishing and implementing an on ongoing training programme for all interpreters responsible for the day-to-day management of each component to build capacity and ensure a consistent approach to the property's ongoing conservation, management and presentation;

While various training programmes are conducted in most Areas for interpreters, the training topics were not always adequate. Accordingly, in the Executive Committee for Capacity Building Projects of Human Resources for the Sites of Japan's Meiji Industrial Revolution, a human resource

development programme was started in FY2017 as a nationally funded project of the Agency for Cultural Affairs. Specifically, the programme consists of producing auxiliary teaching and learning materials for interpretation guides and municipalities, and for capacity building and providing workshops for local interpreters at each of the component parts.

Those auxiliary educational materials for human resource development are distributed to interpreters and site managers through relevant agencies, and are already openly accessible to the public as digital books on the web page of Sites of Japan's Meiji Industrial Revolution (www.japansmeijiindustrialrevolution.com). The following materials are currently available or will be available in 2019.

1) Interpretation Guide Manual: Sites of Japan's Meiji Industrial Revolution

Auxiliary interpretation guide manual for Sites of Japan's Meiji Industrial Revolution, Iron and Steel, Shipbuilding and Coal mining.

Issued by Human Resource Development Committee for the Sites of Japan's Meiji Industrial Revolution Produced by NCIH

Sponsored by Agency of Cultural Affairs.

Published in October 2017

Publisher: Seikosha

Figure 23. Interpretation Manual

2) "Communicating World Heritage"

Auxiliary Educational Material for Interpreter to improve communication skills and interpretation technique related to the Sites of Japan's Meiji Industrial Revolution: Iron and Steel, Shipbuilding and Coal Mining"

Divided into two sections: Fundamentals and Practice

Issued by Human Resource Development Committee for the Sites of Japan's

Meiji Industrial Revolution

Produced by NPO Satoyama wo Kangaerukai

Sponsored by Agency of Cultural Affairs Published in 2017

Figure 24. Interpretation Textbook

3) “Understanding Steel: History of Steel

Auxiliary Educational material with special focus on Iron and Steel Industry, for the Sites of Japan’s Meiji Industrial Revolution, Iron and Steel, Shipbuilding and Coal Mining

Issued by: Human Resource Development Committee for the Sites of Japan’s Meiji Industrial Revolution

Produced and authored by NCIH with Tadahiro Inazumi, Kazuhiko Suga,

Sponsored by Agency of Cultural Affairs

Printed by Nikkatsu Ad Agency

Published in Nov.2017

Figure 25. Understanding Steel

4) “Understanding Coal : History of Coal Industry

Auxiliary Educational Material with the focus on the history of Coal mining industry for the Sites of Japan’s Meiji Industrial Revolution, Iron and Steel, Shipbuilding and Coal Mining:

Issued by Human Resource Development Committee for the Sites of Japan’s Meiji Industrial Revolution

Produced by NCIH with JCOAL

Sponsored by Agency of Cultural Affairs

Printed by Nikkatsu Ad Agency,

Published in Nov. 2019

Figure 26. Understanding Coal

5) “Understanding Shipbuilding: History of Shipbuilding

Auxiliary Educational Materials with the focus on history of Shipbuilding for the Sites of Japan’s Meiji Industrial Revolution, Iron and Steel, Shipbuilding and Coal Mining

Issued by Human Resource Development Committee for the Sites of Japan’s Meiji Industrial Revolution

Produced by NCIH

Sponsored by Agency of Cultural Affairs

Published by Nikkatsu Ad Agency, 2019

Coming Soon in FY 2019

The Executive Committee for Capacity Building Projects of Human Resources has also produced learning materials from parts of the above guidebooks for use in training for capacity building. In 2017, workshops were held for staff performing guide activities at component parts or related facilities in all

eight Areas.

Table 7. Implementation of Human Resources Development Training (for Guides)

	Date	Area	Venue		Participants
1	17/10/31	Kamaishi	Kamaishi City	Kamaishi Information & Community Centre	30
2	17/11/29	Yawata	Kitakyushu City	(3) Com City (Yahatanishi Ward Office) Lifelong Learning Centre	54
3	17/12/04	Nirayama	Izunokuni City	Izunokuni City Nirayama Theater	28
4	17/12/05	Nirayama	Izunokuni City	Izunokuni City Nirayama Theater	22
5	18/01/18	Kagoshima	Kagoshima City	Soho Kagoshima	46
6	18/01/23	Hagi	Hagi City	Hagi Meiringakusha Visitor Centre (Main Building)	23
7	18/01/29	Miike	Uki City	Uki City Office (new wing of main building)	52
8	18/02/06	Saga	Saga City	Tsunetami Sano Memorial Museum	29
9	18/02/08	Nagasaki	Nagasaki City	Nagasaki Prefecture Agricultural Cooperative Hall	54

These workshops, based on the Interpretation Strategy, have two main objectives (1) promoting understanding of the Outstanding Universal Value of the Sites of Japan's Meiji Industrial Revolution, and (2) promoting understanding of the connections between industries (iron and steel, shipbuilding, and coalmining) and the 23 component parts in the eight Areas of the Sites of Japan's Meiji Industrial Revolution. At the same time, the workshops have the purpose of sharing an awareness of "communicating" the value of the sites, and promoting a smartphone application, as a tool for this communication. Note that workshops have a consistent content each time they are held.

The Executive Committee plans to continue holding similar workshops; and as the textbooks for each industry are completed, capacity building training will be implemented in each Area.

The schedule will be as follows:

2019;

December Area1 Hagi

2020;

January Area2 Kagoshima, Area5 Saga, Area6 Nagasaki, Area7 Miike, Area8 Yawata

February Area3 Nirayama, Area4 Kamaishi

In addition to the above workshops, guide workshops are held by the World Heritage Council for the Sites of Japan's Meiji Industrial Revolution. These differ from the previously described workshops in emphasizing greater understanding of the value of the Sites of Japan's Meiji Industrial Revolution as World Cultural Heritage—and its proper conservation and management —, and in aiming for information exchange and collaboration with other areas regarding guide activities. Moreover, by holding workshops where persons serving as guides at each of the component parts get together in one venue, it is hoped that guide quality and activities will be improved in each area. Since these are held annually in various areas, they serve also as local training, and will continue to be held in the future.

(2) Establishing and implementing an on ongoing training programme for all stakeholders responsible for the day-to-day management of each component to build capacity and ensure a consistent approach to the property's ongoing conservation, management and presentation;

The World Heritage Council for the Sites of Japan's Meiji Industrial Revolution—the consortium of local municipalities of the sites of Japan's Meiji Industrial Revolution (Former Consortium for the World Heritage Inscription of Modern Industrial Heritage (Kyushu-Yamaguchi)) organize the workshop twice a year to date, in cooperation with the Cabinet Secretariat. These workshops are intended for staff of local government organizations to provide training on conservation and management of each of the component parts and various measures for their restoration, presentation and public utilization. These are used as opportunities to learn about the programmes of the World Heritage Convention, the Outstanding Universal Value of the Sites of Japan's Meiji Industrial Revolution, and methods for their conservation and management. The training sessions held up to now are summarized in the table below. Due to personnel transfer in local government organizations, the staff responsible for conservation and management may change over time. It is therefore necessary to continue this programme in the future to make sure new staff receive an appropriate standard of training.

Table 8. Implementation of Human Resources Development Training (for site owners)

Date	Venue	Participants	Details
17/5/22	Fukuoka Prefecture West Government Complex	38	○Training for new appointees ・ Background of the listing of Sites of Japan's Meiji Industrial Revolution, their value, and conservation and management ・ ・Overview of World Heritage Committee Decisions and response status
17/12/21	Conference ASC (Fukuoka City, Fukuoka Prefecture)	48	・ Response after submission of report to UNESCO ・ Report to the 41st session of the World Heritage Committee Session ・ ・Lecture on using World Heritage sites as a hook

			for successfully attracting overseas visitors to a region (Tourism Promotion Committee member)
18/5/9	Fukuoka Prefecture Kasuya Government Complex	48	○Training for new appointees ・ Background of the listing of Sites of Japan's Meiji Industrial Revolution, their value, and conservation and management ・ Overview of World Heritage Committee Decisions and response status
18/9/5	Fukuoka Prefecture East Government Complex	46	・ Lecture: Results and trends in deliberation of heritage conservation status by the World Heritage Committee (Section Head, Tokyo National Research Institute for Cultural Properties) ・ Devising visitor management strategy ・ ・Status of Industrial Heritage Information Centre provision
19/5/14	Fukuoka Prefecture East Government Complex	46	○Training for new appointees ・ Background of the listing of Sites of Japan's Meiji Industrial Revolution, their value, and conservation and management ・ Overview of World Heritage Committee Decisions and response status

(3) Capacity building of human resources in each municipality and Area

In addition to the foregoing programmes, workshops continue to be held in each municipality and each Area. Among these are workshops for volunteer staff regarding the Sites of Japan's Meiji Industrial Revolution, and new guide training courses. Contents on the Sites of Japan's Meiji Industrial Revolution are also woven into various workshops for tourism business operators, newly hired staff in municipalities, and local teachers. Such training is not limited to indoor sessions but includes visits to actual sites as necessary.

As an example of a human resource development programme for those carrying out management duties, training is provided each year for designated administrators at the Manda Pit of Area 7 Miike.

Such training specific to individual municipalities and Areas, which has taken place around 15 times so far in various locales, is included in the annual report of the Local Conservation Councils.

Recommendation h) of Decision 39 COM 8B.14

h) Submitting all development projects for road construction projects at Shuseikan and Mietsu Naval Dock and for new anchorage facility at Miike Port and proposals for the upgrade or development of visitor facilities to the World Heritage Committee for examination, in accordance with paragraph 172 of the Operational Guidelines

1. Background

- The ICOMOS Evaluations of Nominations of Cultural and Mixed Properties (WHC-15/39.COM/INF.8B, page 96) notes the proposals for a road at Shuseikan, a road at Mietsu Naval Dock, development of Miike Port, and visitor centres and facilities at Miike Port.
- The ICOMOS Technical Evaluation Report of June 2017 recommended for heritage impact assessments (HIA) to be conducted for all projects that have the potential for adverse impacts on the Outstanding Universal Value, to identify impacts on the attributes of component parts contributing to overall Outstanding Universal Value.
- The State of Conservation Report submitted November 30, 2017 included reports on the Proposed road at Shuseikan, the Proposed road at Mietsu Naval Dock, Proposed construction of a visitor facility (guidance facility) at the Nirayama Reverberatory Furnaces, Opening of a new visitor centre in the Hagi buffer zone, and Repair of the Onga River Pumping Station at the Imperial Steel Works. (Some of the contents already reported, in accordance with paragraph 172 of the Operational Guidelines for the Implementation of the World Heritage Convention, are repeated here.)

2. Progress status

• Proposed road at Shuseikan

The State of Conservation Report submitted November 30, 2015 reported on the state of progress at that time. (Repeated in the November 30, 2017 State of Conservation Report)

Regarding this project, the ICOMOS Technical Evaluation Report issued by UNESCO June 1, 2017 recommended that a heritage impact assessment be conducted and reported to the World Heritage Centre.

Currently, deliberations about this project are being carried out among concerned parties. When the budget for the construction is secured by the national government and work is started on the final design, its impact on the site will be assessed and a report will be submitted anew to the World Heritage Centre.

• Proposed road at Mietsu Naval Dock

A World Heritage Impact Assessment Report was submitted November 30, 2015 along with the State of Conservation Report. (Repeated in the November 30, 2017 State of Conservation Report)

Regarding this project, the ICOMOS Technical Evaluation Report issued by UNESCO June 1, 2017

recommended that upon completion of this project, a report be submitted to the World Heritage Centre. Since this project has not yet been completed, a report will be submitted upon its completion.

• Proposed development at Miike Port

The plans for development of a new anchorage facility for small boats at Miike Port are currently under review, including the timing. When the details of the plans and timing have been generally decided, a progress report will be submitted.

3. Other conservation issues identified by the State Party

(1) Matters for which State of Conservation Reports have already been issued from 2018 to 2019

1) Partial Revision of the Hagi City Landscape Plan, The Control Method for Buffer Zone（Area 1, Hagi）

This was reported in January 2019 in accordance with paragraph 172 of the Operational Guidelines for the Implementation of the World Heritage Convention. (Repeated)

The Hagi Landscape Plan, applicable as a conservation method to the buffer zones in this Area, is being partially revised inside the buffer zone of Hagi Castle Town and outside the buffer zone of Shokasonjuku Academy. Accordingly, in the process of defining in more detail the character and use categories of each subdistrict in the buffer zones, a clear delineation is made of part of these buffer zones as dedicated commercial districts, and height regulations are partially revised, limited to these commercial districts and the area along the bypass roads. Note that the elements (attributes) representing the Outstanding Universal Value of the component part are the portion of the Hagi Castle Town including the castle ruins, and the small wooden building of the Shokasonjuku Academy.

Nonetheless, the landscape will continue to be controlled in a way that prevents any direct impact on these elements Moreover, there are no specific development plans at present.

2) Status Report of Heavy Rain Damage to the Terayama Charcoal Kiln and Measures to Be Taken (Area 2, Kagoshima)

This was reported in November 2019. (Repeated)

The status of damage and restoration measures for the Terayama Charcoal Kiln, which was affected by landslips caused by heavy rains in the area from late June to early July of 2019, was reported in November 2019.

3) Heritage Impact Assessment on World Heritage from Building a Concrete Manufacturing Plant in the buffer zone of the Mietsu Naval Dock (Area 5, Saga)

This was reported in January 2019 in accordance with paragraph 172 of the Operational Guidelines for the Implementation of the World Heritage Convention. (Repeated)

In the buffer zone of the Mietsu Naval Dock, a concrete manufacturing plant is being moved to a new location and a partial change is made to the protection status. The elements (attributes)

representing the Outstanding Universal Value of the Mietsu Naval Dock are the underground archaeological remains and the natural terrain in which they are buried. The construction work has no direct impact on these elements as it will take place outside the scope of the component part. In carrying out the heritage impact assessment, multiple discussions were made involving Saga City, Okawa City, and the private business owner of the concrete manufacturing plant to ensure the work would be conducted so as to minimize any impact on the views from inside the component part. Through these discussions, Saga City confirmed that there are no future plans such as for expanding the plant site.

4) Progress Status of Construction Work near the Mietsu Naval Dock

This was reported in November 2019, in accordance with paragraph 172 of the Operational Guidelines for the Implementation of the World Heritage Convention. (Repeated)

The parking area currently located inside the component part will be replaced by one outside the property, to enhance protection of the component part. The relocation will be carried out in conjunction with the construction of a new local community centre (Nakakawasoe Community Centre) which will be built in the buffer zone, taking into consideration visitor access to the component part.

Saga City plans to implement maintenance of the historical remains and renovation of a visitor centre under a unified development plan to clearly highlight the shipbuilding and repair systems. This plan involves renovating and expanding the Tsunetami Sano Memorial Museum adjoining the remains as an enhanced visitor centre.

(2) Matters appended this time as part of the State of Conservation Report

- Progress Status of Project Proposals Concerning the Imperial Steel Works and Onga River Pumping Station in Area 8 Yawata

This is a progress report on project proposals for which a report was submitted September 30, 2017.

In the First Head Office, following on the large-scale seismic reinforcement completed in March 2014, restoration of the interior and conservation of the inside shape and decorations will be implemented.

In the Former Forge Shop and Repair Shop, aseismic design was carried out based on the results of the aseismic survey.

In the Onga River Pumping Station, an additional aseismic survey was conducted, taking into consideration that it is a brick and steel-frame structure, and the aseismic design is currently under study.

All the projects are for preservation of properties for which entry by the general public is currently restricted. The two component parts are the Imperial Steel Works and the Onga River Pumping Station.

First Head Office: Interior restoration and conservation was begun in May 2018, and by the end of July 2019, the work was completed on the east portion of the ground floor.

Former Forge Shop: Aseismic design was conducted based on the results of the aseismic survey implemented in 2018. Construction methods are being studied that will enable the seismic reinforcement work to be performed in parallel with the building exterior conservation work.

Repair Shop: Exterior conservation work will be performed, and seismic retrofitting will be started. Aseismic design was conducted based on the results of the aseismic survey implemented in 2018. Construction methods are being studied that will enable the seismic reinforcement work to be performed in parallel with the building exterior conservation work.

Onga River Pumping Station: An additional aseismic survey was conducted, taking into consideration that it is a brick and steel-frame structure, and the aseismic design is currently under study.

(3) Further response measures

As experience with handling of individual development projects continues to be accumulated, it will also be important to clarify the standard response and handling procedures for relevant agencies, local municipalities and other concerned parties when such projects arise in the future. To this end, systematic compilation and sharing of information among concerned parties regarding development projects and their handling will continue to be carried out.

4. Reference materials

Appendix 6 Partial Revision of the Hagi City Landscape Plan A Control Method in Buffer Zone of Area 1 Hagi

Appendix 7 Heritage Impact Assessment Regarding Construction of a Concrete Manufacturing Plant in the buffer zone of the Mietsu Naval Dock

Appendix 8 Assessment of Impact on World Heritage from Construction Work near the Mietsu Naval Dock

Appendix 9 Status Report of Heavy Rain Damage to the Terayama Charcoal Kiln and Measures to Be Taken

Appendix 10 Progress Status of Project Proposals Concerning the Imperial Steel Works and Onga River Pumping Station

II. Appendices

The 42nd World Heritage Committee Session Decision(42COM 7B.14)

Result of the survey of Hashima Coal Mine buildings, etc.

Survey of accommodation facilities deterioration level

The current deterioration condition, etc. (as of fiscal 2014) were surveyed to understand the present situation of deteriorated concrete constructions including Building No.70 (Former Hashima Elementary School and Hashima Junior High School), the foundation of which has considerably been scoured out.

(1) Survey of the current condition of Building No.70

Building No.70 used to be used as the school building of Takashima Municipal Hashima Elementary School and Hashima Junior High School. The existing school building was built as a six-story reinforced concrete structure in 1958, to which a seventh story was added in 1961 to form the current structure. Before the construction of Building No.70, there used to be a two-story wooden school building, which had been built in 1934, on the north side of the current location, but it was destroyed by a fire in 1957. The remains that appear to be the foundation of the destroyed school building was confirmed in the archaeological excavation of fiscal 2015 (see Chapter 2, Section 3, 3. Archaeological excavation).

Since its construction 60 years ago, Building No.70 has been deteriorating: collapses and cracks are confirmed in some external walls; and the foundation, which has been eroded by sea water, exposes the pile head and has been partially lost. Moreover, many cracks have been confirmed in columns and beams inside the building (Photo 2-4-111). To understand the deformed state of Building No.70, the foundation of which has been considerably scoured out, we measured the altitude twice by using the eastern corner of the building as a reference point and recorded the progress of subsidence, while marking the measurement points so that we can find them in the future. For the slant (north-south and east-west directions) of the building too, we measured the gradient twice and recorded the current state and the progress, while marking the measurement points so that we can find them in the future. After completing the survey, we created a deformed state drawing on the basis of the survey results. For the scoured part, a drawing was created in fiscal 2014 (see Chapter 2, Section 3, 2. (4)).

It was estimated that several concrete pile foundations supporting the structure of Building No.70 have been lost or broken after having been scoured by sea water, losing their proper function. Therefore, a survey was conducted to understand the deterioration levels of the building and the foundation. To the deterioration level of the building, we applied the methods of deterioration survey and durable year prediction based on the category of damage degree of structures, which was calculated in the “Deterioration survey of concrete structures in Gunkanjima” conducted by the working group for the Deterioration survey of concrete structures in Gunkanjima in March 2013.

Meanwhile, the deterioration level of the foundation was calculated using the three-dimensional elastic analysis by FEM, in which foundation piles and the undermost layer of the structure were turned into a model, and the results obtained were summarized as the current deterioration level. In considering the deterioration level of the foundation, the “Foundation status drawing” created in fiscal 2014 was used as a reference (see Chapter 2, Section 3, 2. (4)).

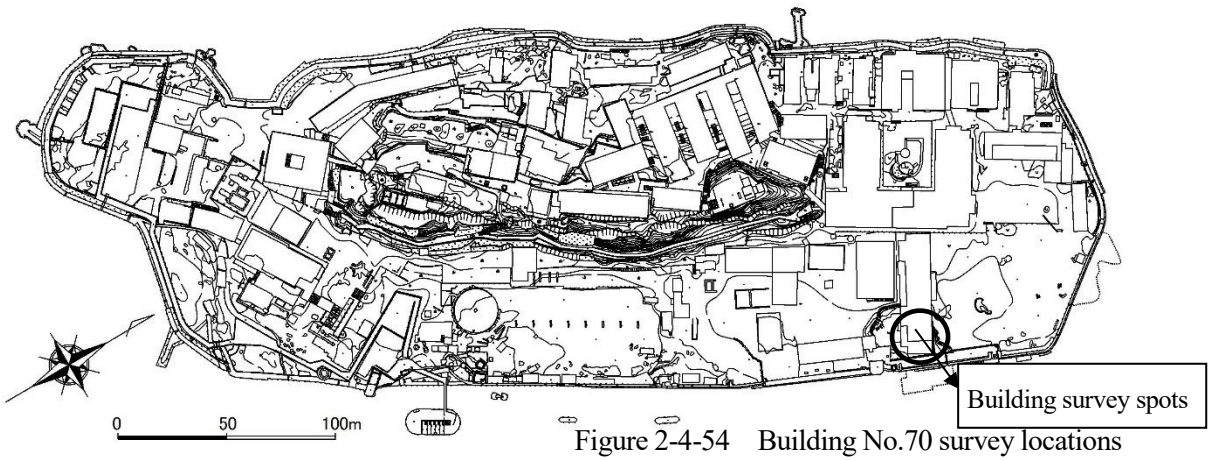


Figure 2-4-54 Building No.70 survey locations

Building No.70 appearance

Building No.70 foundation

North side front view

From the southeast side

Foundation on the north side of the building

Enlarged foundation

Photo 2-4-111 Current condition of Building No.70

1) Slant estimation and deformed state drawing (damage drawing) creation for Building No.70

① Measurement plan

The altitude was measured twice by using the eastern corner of the building as a reference point, and the progress of subsidence was recorded; the gradient (north-south and east-west directions) was also measured twice, and the current state and progress were recorded. The two measurements were conducted on the dates below.

・The first measurement: October 3, 2014

・The second measurement: February 27, 2015

② Setting of measurement points

②-1Basic policy

Before measurement, we set two points to measure altitude and slant on each of the east and north faces of Building No.70. In setting them, we selected the points at which there was no floating of concrete and a decoration mortar wall had peeled off. For the continual measurement of altitude and slant, there were the two possible methods for setting measurement points: using survey rivets and marking with a paint marker. Because the measurement surfaces were severely deteriorated (Photo 2-4-112) and mortar on the surfaces might peel off during the drilling of rivets, and there was no stable footing on the lower part of the eastern end of Building No.70 due to scouring, we adopted marking with a paint marker. Nevertheless, we adopted survey rivets only for the north end on the east face of Building No.70 to use it as the general standard.

②-2 Measurement point observation

The point without the danger of surface peeling-off, etc. was selected from among the four points selected, and rivets were placed at 70-2 (see Figure 2-4-55), which served as a reference. As a result of leveling using the near third-order control point (NO. 2 H=5.171) (Photo 2-4-113), the altitude of 70-2 was H = 6.550 m. Then, we set all of the four points at the same altitude (H = 6.550 m) so that we can promptly calculate displacement at the time of next measurement.

Photo 2-4-112 Building No.70 east face

Photo 2-4-113 Third-order control point (No. 2)

Photo 2-4-114　Leveling

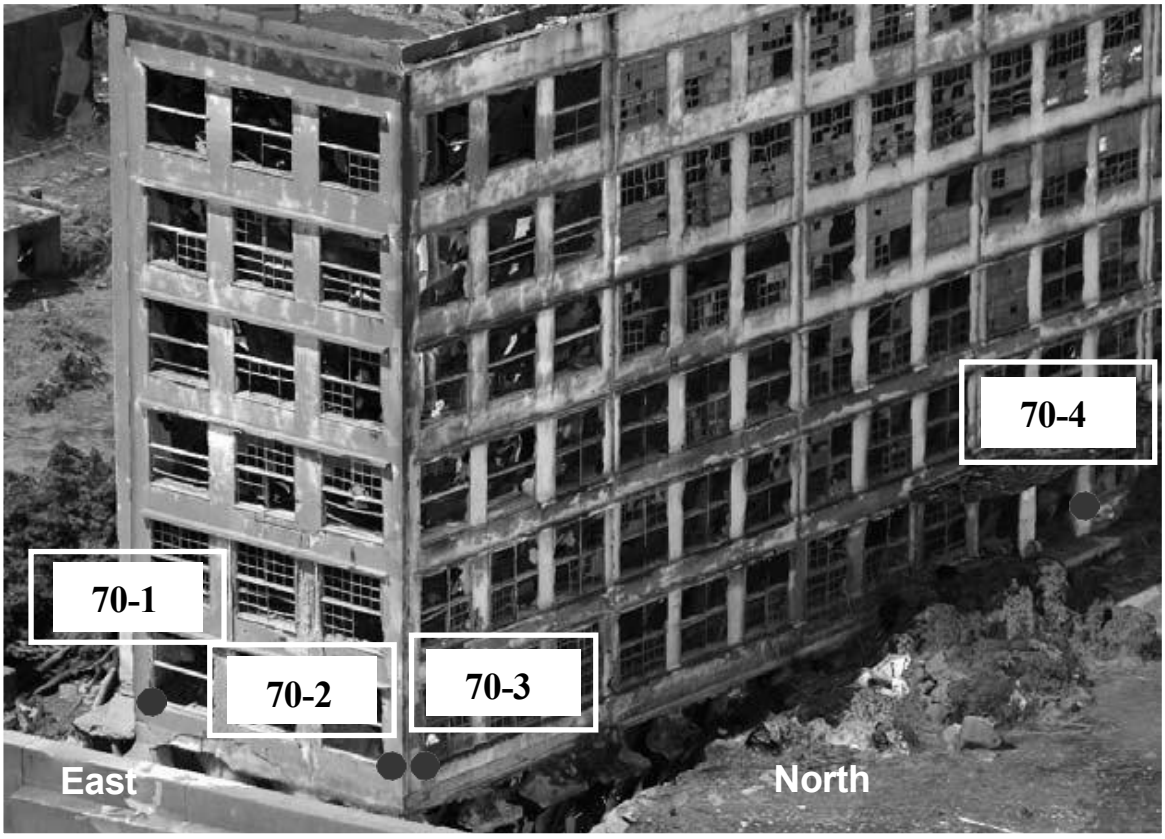


Figure 2-4-55　Locations where measurement points were set

②-3 Measurement for confirmation

After setting the measurement points with an automatic level, we calculated distances between the points 70-1 and 70-2 and between the points 70-2 and 70-3 with a total station and confirmed the altitudes of the points at the same time. As a result, the difference in altitude among all points was confirmed to be within 3 mm (Table 2-4-47).

Table 2-4-47 Result of measurement for conformation

Point	Altitude	Difference from "70-2"
70-1	6.549 m	-0.001 m
70-2	6.550 m	0
70-3	6.551 m	+0.001 m
70-4	6.552 m	+0.002 m

③ Altitude measurement

The results of altitude measurement were shown in Table 2-4-48. The difference between first and second measurements reading was 1 mm at all measurement points.

Table 2-4-48 Altitude measurement results

Measurement timing	Measurement date	Measurement result (altitude)			
		70-1	70-2	70-3	70-4
First measurement	Oct. 3, 2014	6.550 m	6.550 m	6.550 m	6.550 m
Second measurement	Feb. 27, 2015	6.551 m	6.551 m	6.551 m	6.551 m

④ Slant measurement

For the slant, the initial values, or the gradients, obtained from the altitude of each point measured on October 3, 2014 was set as "0" and the values measured on February 27, 2015 were compared with those.

The slant and the horizontal distance that were measured twice were compared, and as a result, the difference was within 2 mm for the both. Since the results include measurement errors, it is unlikely that there were changes in the gradient. Conducting measurements at the four points regularly in the future will make continual monitoring of the gradient possible, which is considered to contribute to the collection of basic data for maintenance. (The gradient was calculated by using the initial value of horizontal distance as a reference.)

Table 2-4-49 List of slant measurement results

	Oct. 3, 2014		Feb. 27, 2015	
Point	Altitude [m]	Displacement [m]	Altitude [m]	Displacement [m]
70-1	6.550	0.000	6.551	0.001
70-2	6.550	0.000	6.551	0.001
70-3	6.550	0.000	6.551	0.001
70-4	6.550	0.000	6.551	0.001
Between points	Distance [m]	Displacement [m]	Distance [m]	Displacement [m]
70-1 and 70-2	9.892	0.000	9.89	-0.002
70-3 and 70-4	33.290	0.000	33.288	-0.002
Between points	Difference in altitude [m]	Gradient [deg]	Difference in altitude [m]	Gradient [deg]
70-1 and 70-2	0.000	0.000	0.000	0.000
70-3 and 70-4	0.000	0.000	0.000	0.000

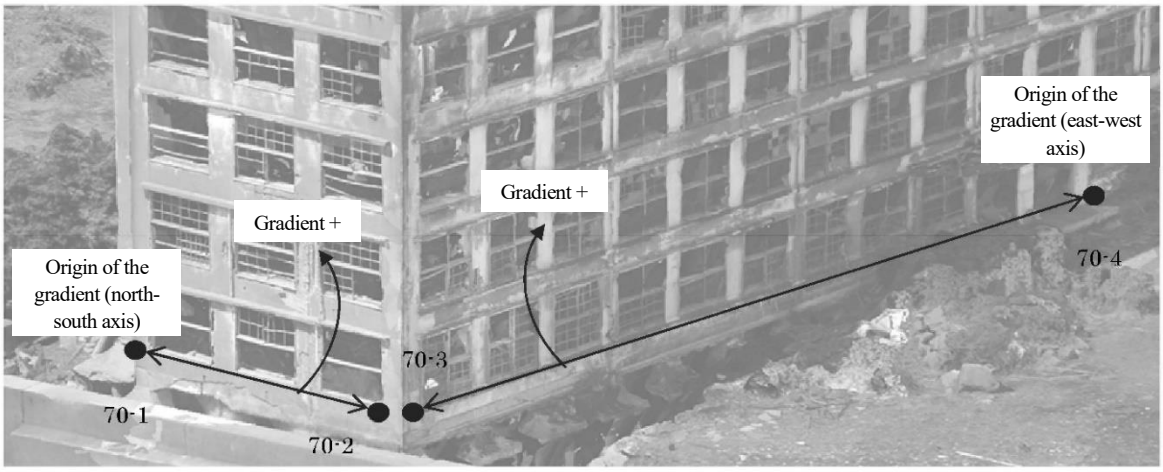


Figure 2-4-55 Direction of the gradient

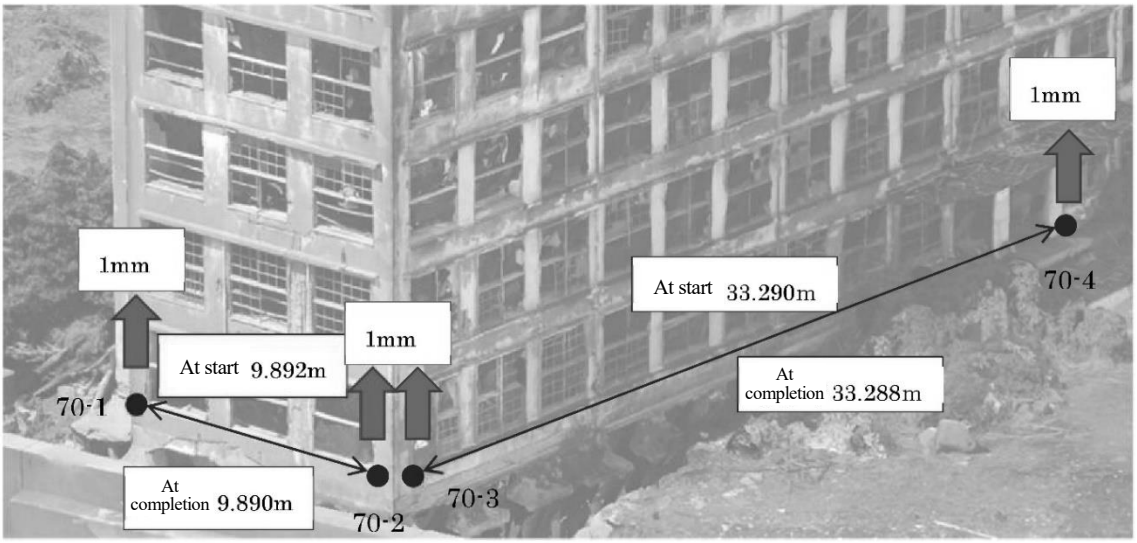


Figure 2-4-56 Measurement results of altitude/distance between two points

④-1 Three-dimensional laser measurement

In calculating the gradient of Building No.70, a three-dimensional laser measurement was performed supplementarily. Shown below is the result obtained by combining a total of 10 cuts measured around Building No.70 as well as in the east end room within Building No.70. All the data are expressed as points with three-dimensional coordinates. Extracting an arbitrary section is also possible; the thickness of wall/slab can be calculated by measuring the inside and outside of the building.

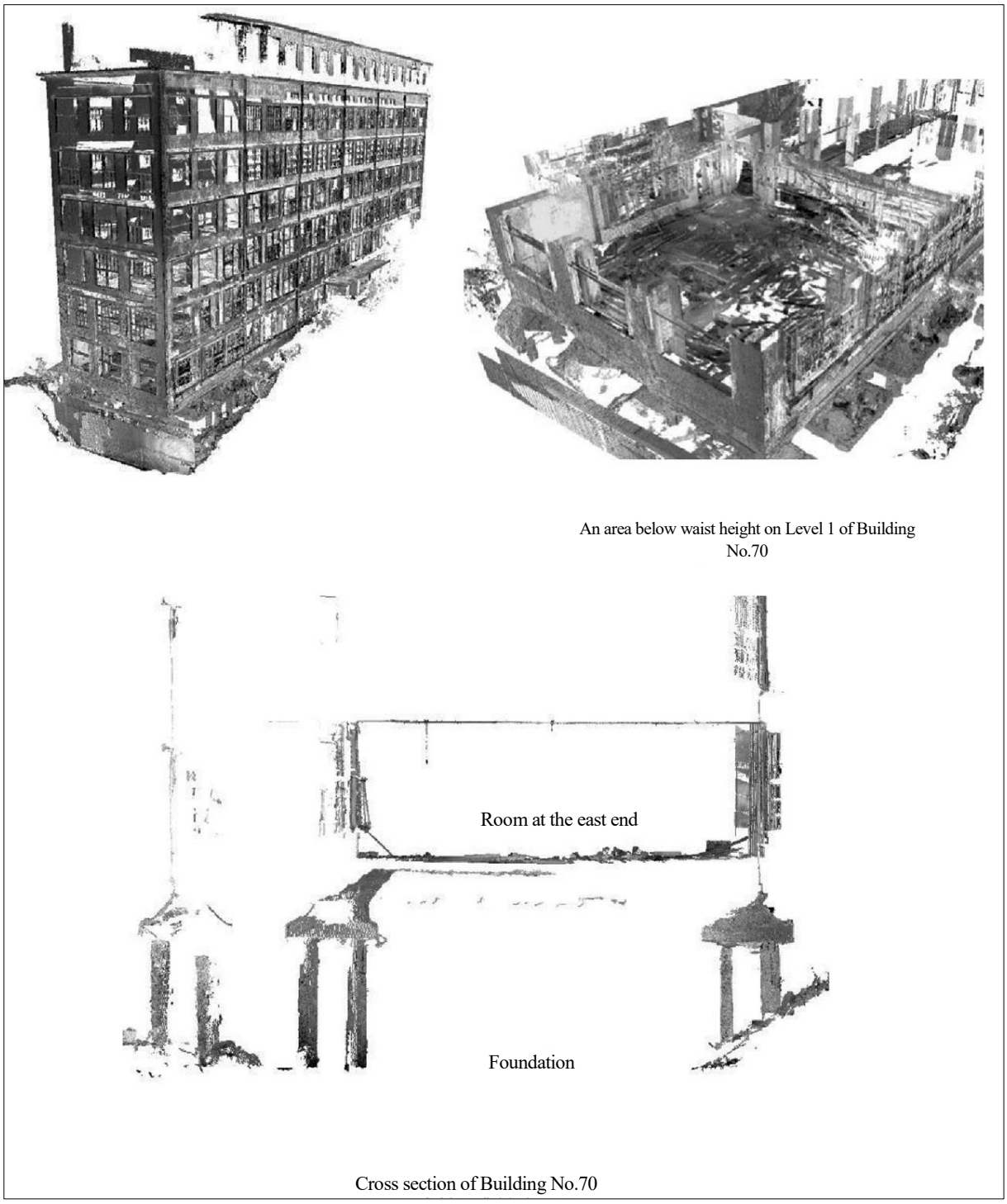


Figure 2-4-57 Building No.70 data of a group of three-dimensional points

⑤ Deformed state drawing

The deformed state drawing (damage drawing) that reflects the two measurements and the three-dimensional laser measurement is shown in Figure 2-4-58.

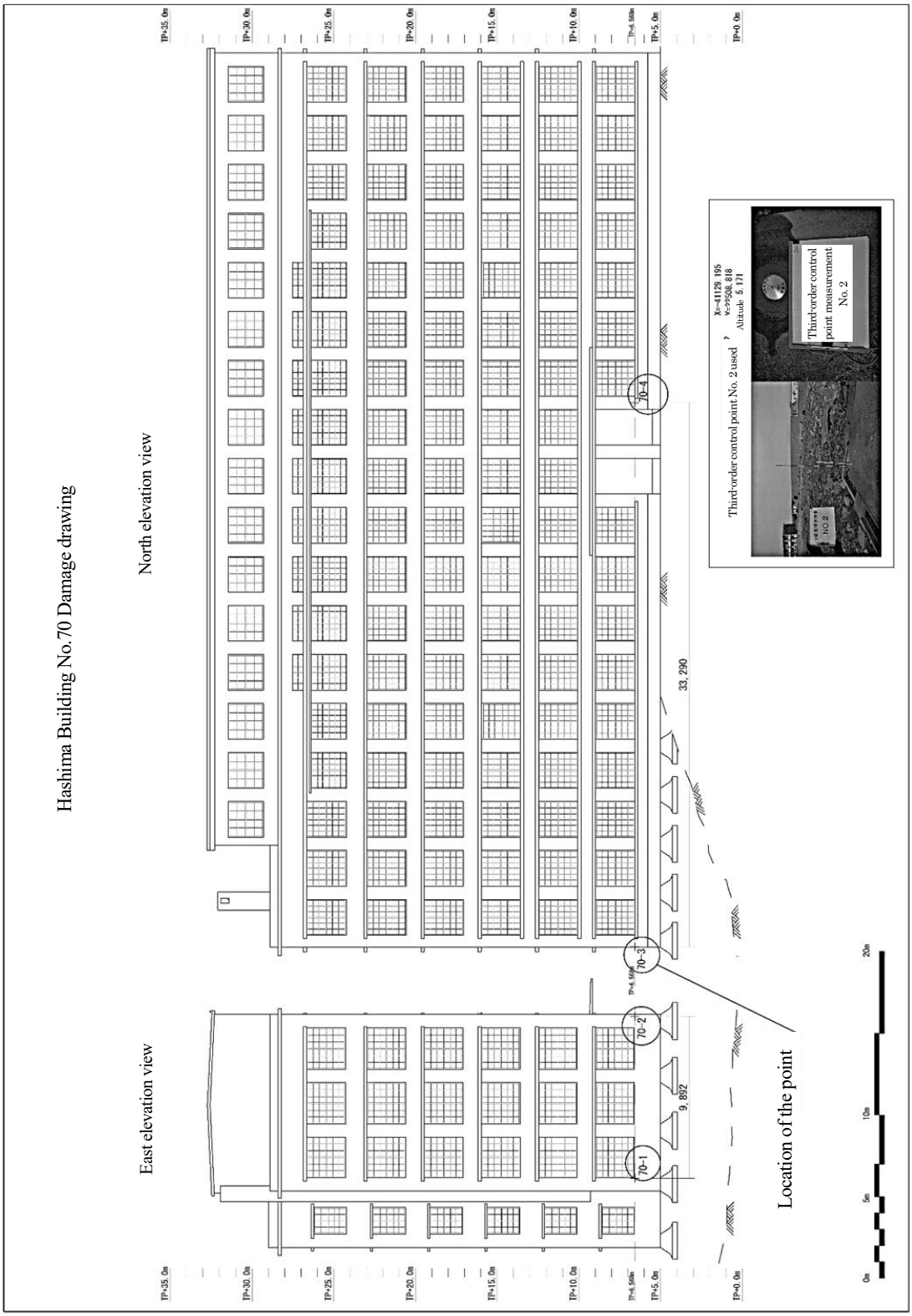


Figure 2-4-58 Building No.70 Deformed state drawing

⑥ Slant estimation

Figure 2-4-59 shows the displacement of a wall surface from a plane vertical to a reference line, which is set below the window on Level 1 of the east face of Building No.70, using colors. As the legends show, the green color is used as a reference, while the red and blue colors indicate the groups of points measured on the wall surfaces 30 mm front and 30 mm back of the reference plane, respectively. It should be noted that measurements were conducted only from the ground this time, and accordingly, the point density is low in the upper areas. Observation of measurement results show the upper areas exhibit colors closer to blue, suggesting that wall surfaces are at the back of the reference plane. However, because only Level 1 strongly shows a green to red color, Level 1 appears to project to the east side by 15–20 mm compared with Level 2 and upper floors.

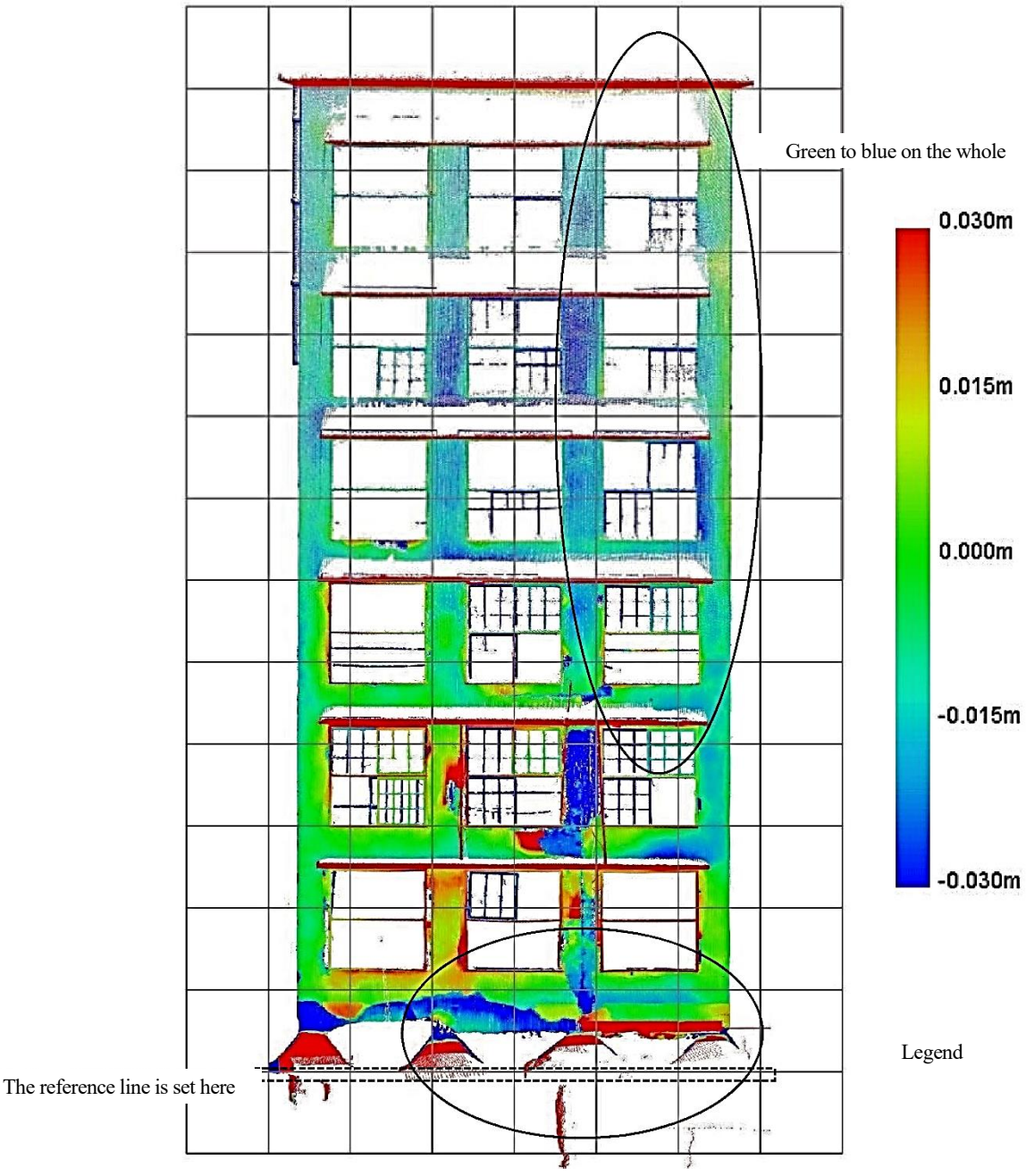


Figure 2-4-59 Building No.70 east face color contour drawing (± 30 mm)

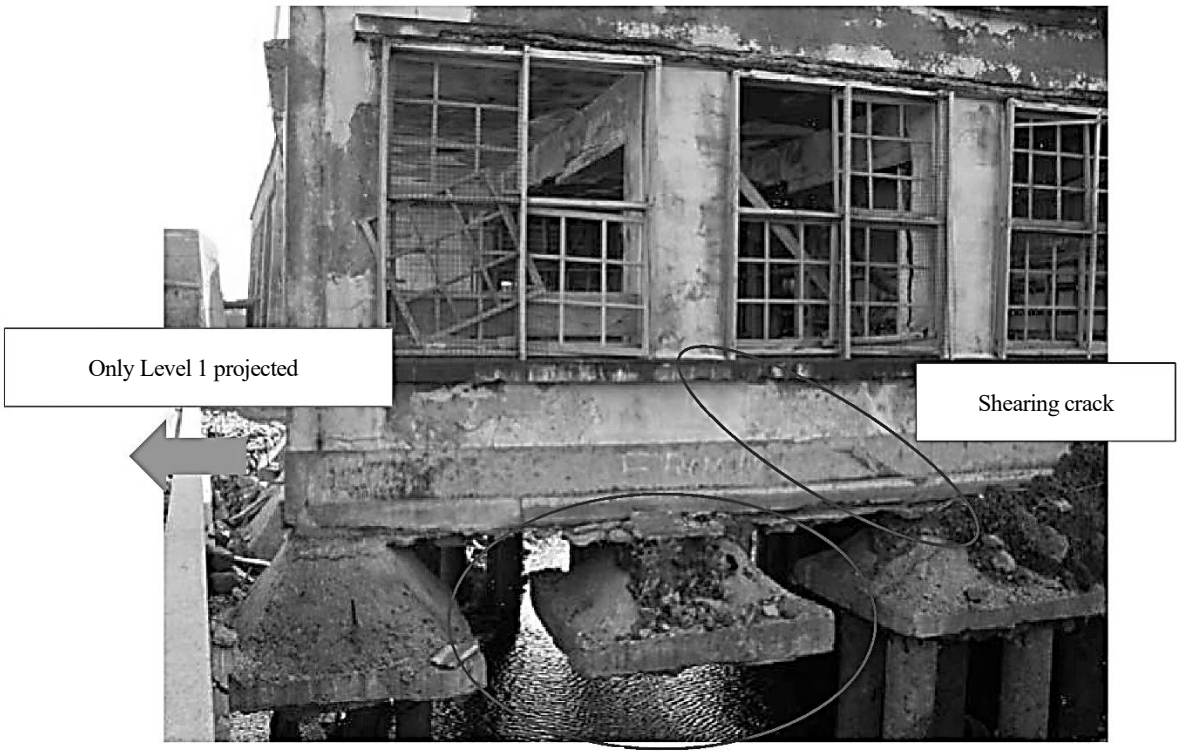


Photo 2-4-115 Building No.70 north face east end

2) Survey of the current deterioration level of Building No.70

① Outline of the survey

To determine the current deterioration level of Building No.70 structures, "Corrosion grading," which focuses on the corrosion of rebars, and "Structural performance grading," which focuses on structural performance, were used. For each grading, the methods based on those described in the "Report of deterioration survey of concrete structures in Gunkanjima (Architectural Institute of Japan, 2013)" were used.

② Corrosion grading evaluation

Visual inspection of columns and beam members is made, and the damage degree is determined on the basis of the condition of cracks, rust fluid, and rebar exposure on the surface. Described below are criteria tables and reference examples (Photo 2-4-116), as well as the results of corrosion grading visual inspection for Level 1 to Level 6 of Building No.70 (Figure 2-4-60 / 61). Table 2-4-50 shows the ordinary classification of damage degrees, and Table 2-4-51 indicates evaluation criteria that reflect the current circumstances of Hashima, which were established by the Architectural Institute of Japan. In this visual inspection, Table 2-4-51 was used for evaluation.

Through the observation of the evaluation results, we can find marked deteriorations on the east side on many Levels. In addition, deteriorations are more serious on the north side than on the south side. This is presumably because there are no structures that block wind and rain as well as sea breezes on the east side and the north side.

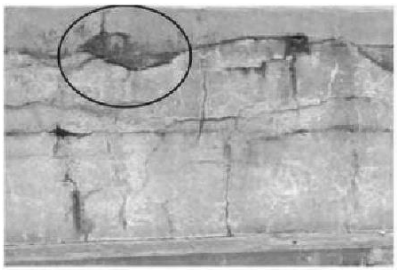
Table 2-4-50 Ordinary classification of damage degrees

Damage degrees	Damaged condition
No damage	No damage is found
I	Only minor cracks and rust fluid are found
II	Cracks , rust fluid, or peeling is found in some parts
III	Cracks , rust fluid, peeling, or falling is found successively
IV	Exposure or rupture of steel materials, or a loss of cross-sectional area in concrete is found

Table 2-4-51 Evaluation criteria tailored to the current circumstances of Hashima

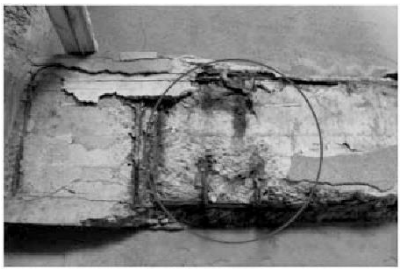
Damage degree	Damaged condition	Legend
Grade I	Cracks + rust fluid on the surface	
Grade II		
Grade III	Corroded rebar is exposed	
Grade IV		
Grade V	Rebar leaves its trace but has decayed (does not exist)	

Grade I



Grade II

Grade III

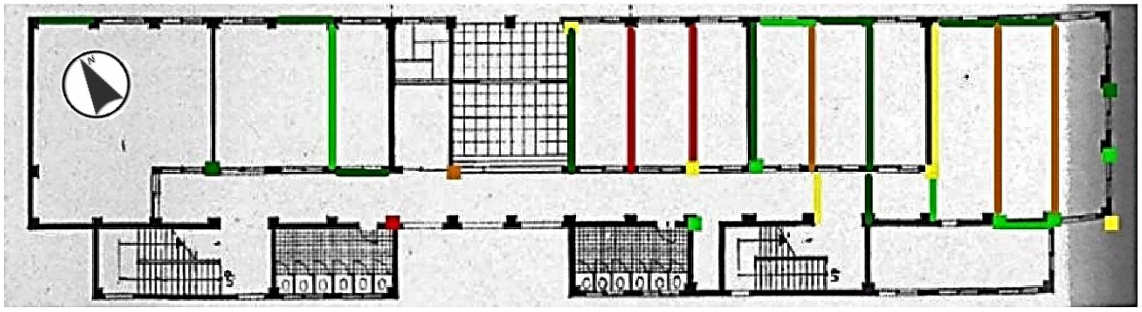


Grade IV

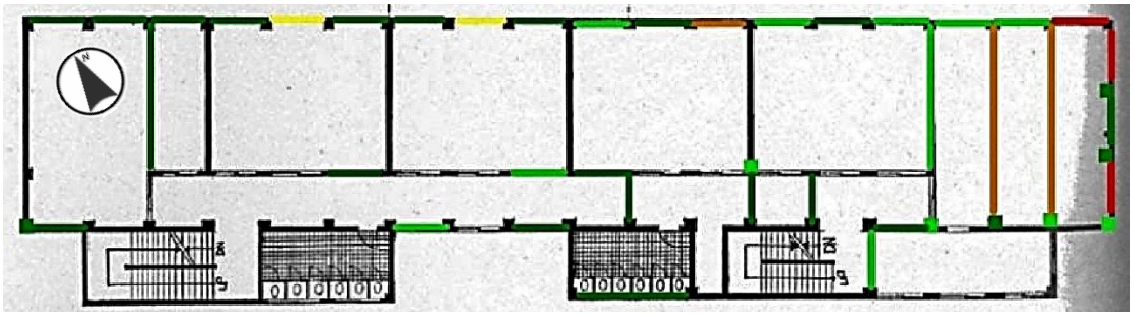
Grade V

Source: Report of the Architectural Institute of Japan

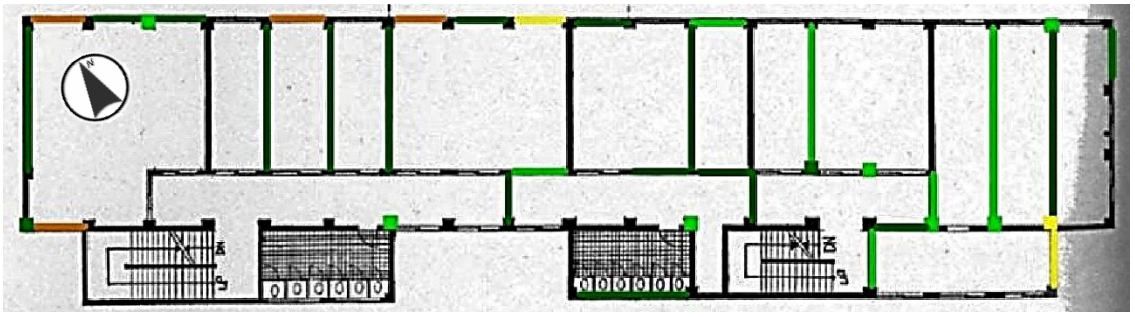
Photo 2-4-116 Examples of deterioration grades tailored to the current state of Hashima



Building No.70 deterioration level distribution map (Level 1)

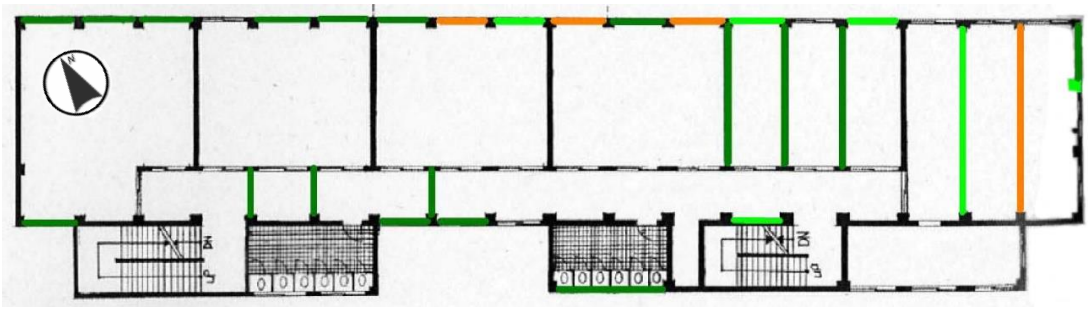


Building No.70 deterioration level distribution map (Level 2)

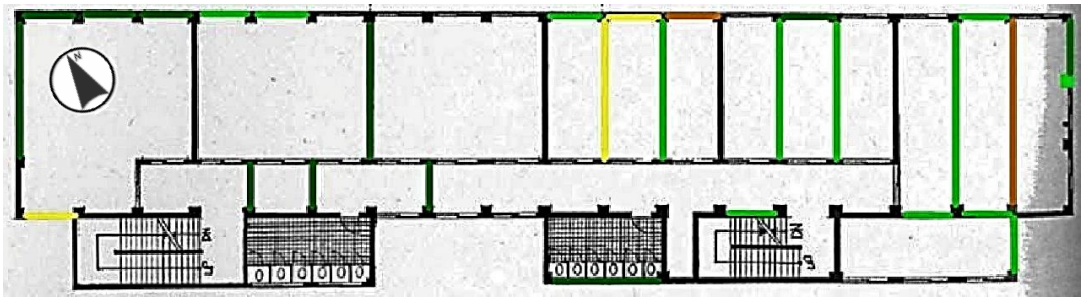


Building No.70 deterioration level distribution map (Level 3)

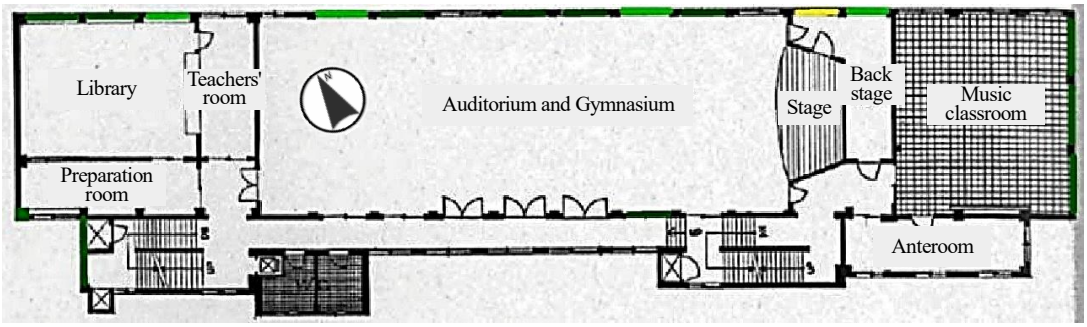
Figure 2-4-60 Building No.70 deterioration level distribution maps (Level 1 to Level 3)



Building No.70 deterioration level distribution map (Level 4)



Building No.70 deterioration level distribution map (Level 5)



Building No.70 deterioration level distribution map (Level 6)

Figure 2-4-61 Building No.70 deterioration level distribution maps (Level 4 to Level 6)

③Structural performance grading evaluation

Visual inspection of vertical members (i.e., shear columns, bending columns, walls without a column, walls with a column on one side, and walls with columns on both sides) of the building is made, and the damage degree is evaluated on the basis of surface crack width, falling of concrete cover, and the condition of rebar. Described below are the criteria table (Table 2-4-52) and reference examples (Photo 2-4-117), as well as the results of structure grading visual inspection for Level 1 to Level 6 of Building No.70 (Figure 2-4-62 and -63). From the observation of the evaluation results, we can find that deteriorations are more serious on the east side than on the west side, with no variations in damage seen for Level 3.

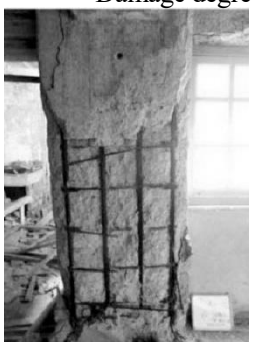
Table 2-4-52 Damage degree and damage description

Damage degree	Damage
0	No damage
I	Crack width: ≤ 0.2 mm
II	Crack width: 0.2–1.0 mm
III	Crack width: 0.2–1.0 mm, limited concrete falling
IV	Crack width: ≥ 2.0 mm, concrete falling
V	Buckling or rapture / axial contraction of rebar

Damage degree III

Damage degree IV

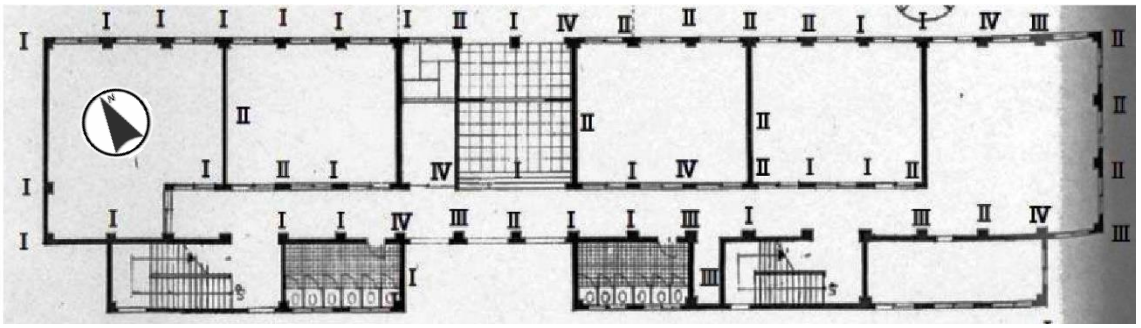
Column: Damage degree III



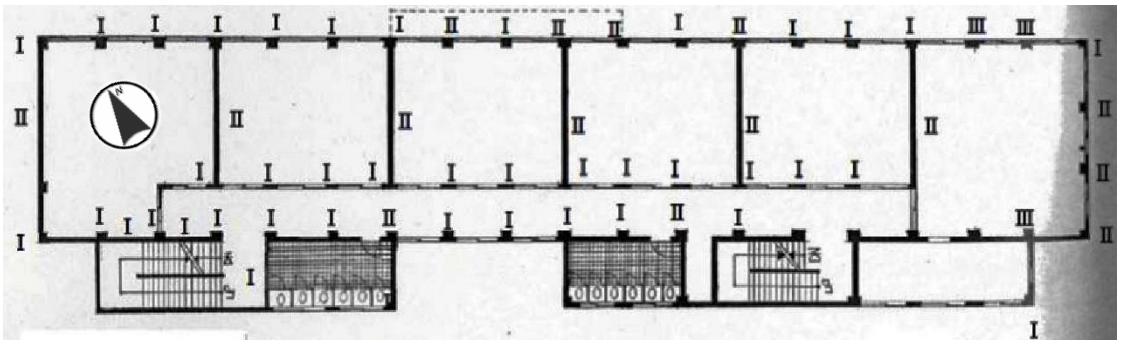
Column: Damage degree IV

Wall: Damage degree IV

Photo 2-4-117 Examples of structural performance grading

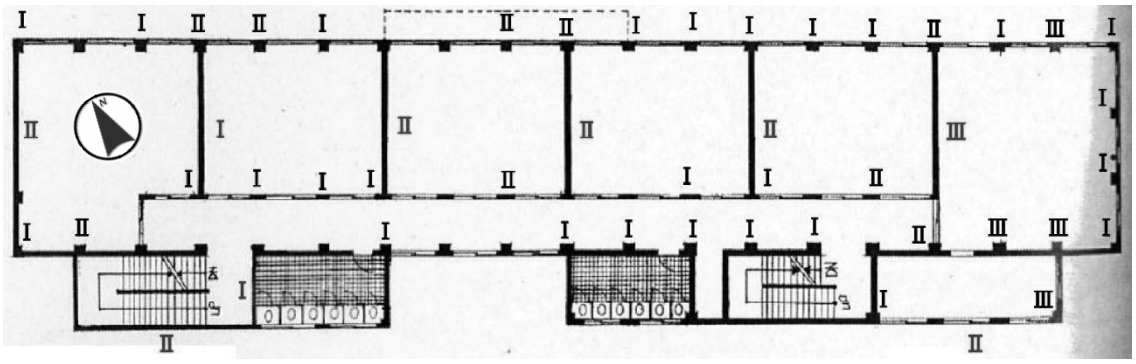


Building No.70 damage degree determination result (Level 1)

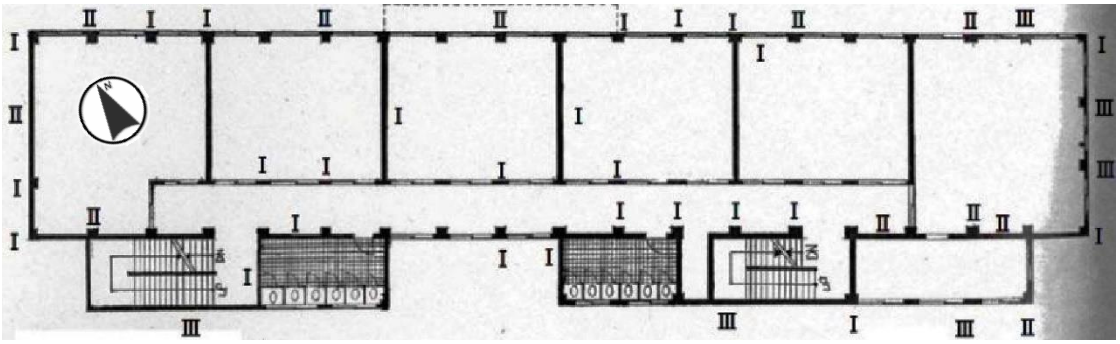


Building No.70 damage degree determination result (Level 2)

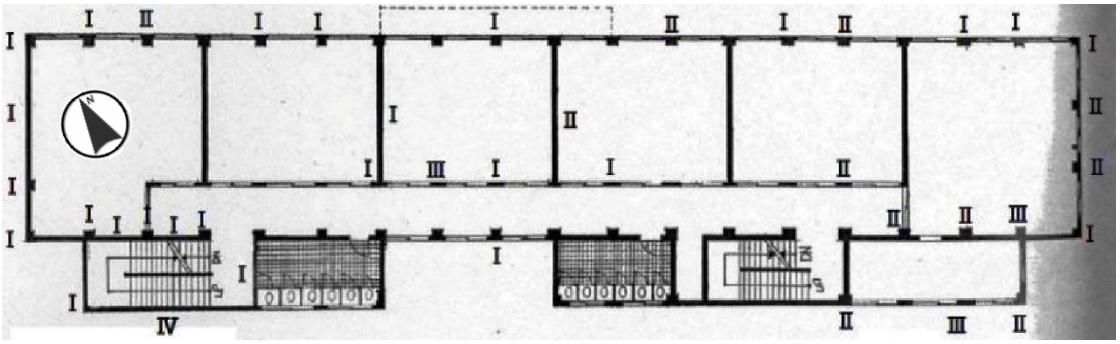
Figure 2-4-62 Building No.70 damage degree determination result (Level 1 and Level 2)



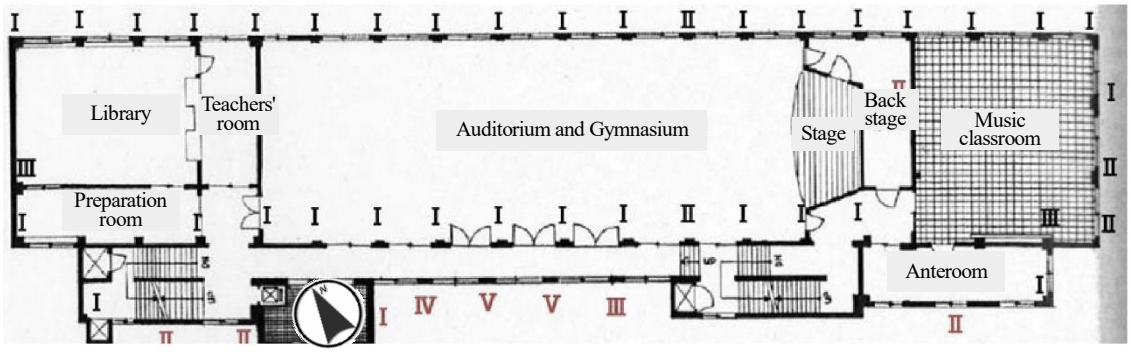
Building No.70 damage degree determination result (Level 3)



Building No.70 damage degree determination result (Level 4)



Building No.70 damage degree determination result (Level 5)



Building No.70 damage degree determination result (Level 6)

Figure 2-4-63 Building No.70 damage degree determination result (Level 3 to Level 6)

④ Calculation of deterioration grades

The tables used to calculate deterioration grades are shown below (Tables 2-4-53 and 54). From the totaled results, the residual seismic performance ratio was lowest on Level 2 at 71.7% and highest on Level 5 at 94.3%. Concerning the determination of damage, Level 2 was determined to be “Intermediate damage” and the other Levels to be “Minor damage.”

Residual seismic performance ratio (R)	Damage degree
R=100	No damage
95 ≤ R < 95	Slight
80 ≤ R < 95	Minor damage
60 ≤ R < 80	Intermediate damage
R < 60	Major damage

Table 2-4-53 Damage degree summary sheet (Level 1 to Level 3)

Table: Damage degree tabulation (Level 1)

	Shear column			Bending column			Wall without a column			Wall with a column on one side			Wall with columns on both sides			Total	
No. of total members	61		+	0		+	3		+	5		+	25		=		
No. of members surveyed	61		+	0		+	3		+	5		+	25		=		
	No. of members inspected	× 1	+	No. of members inspected	× 1	+	No. of members inspected	× 1	+	No. of members inspected	× 2	+	25	× 6	=	224	Aorg
Damage degree 0	14	× 1	+	0	× 1	+	2	× 1	+	5	× 2	+	21	× 6	=	152	A0
Damage degree I	23	× 0.95	+	0	× 0.95	+	0	× 0.95	+	0	× 1.9	+	1	× 6	=	27.55	A1
Damage degree II	14	× 0.6	+	0	× 0.75	+	0	× 0.6	+	0	× 1.2	+	3	× 4	=	19.2	A2
Damage degree III	5	× 0.3	+	0	× 0.5	+	1	× 0.3	+	0	× 0.6	+	0	× 2	=	1.8	A3
Damage degree IV	5	× 0	+	0	× 0.1	+	0	× 0	+	0	× 0	+	0	× 0	=	0	A4
Damage degree V	0	× 0	+	0	× 0.0	+	0	× 0	+	0	× 0	+	0	× 0	=	0	A5
															Σ Aj = A0+A1+A2+A3+A4+A5	=	200.55	
															Residual seismic performance ratio	= Σ Aj / Aorg	= 89.5	Minor damage

Table: Damage degree tabulation (Level 2)

	Shear column			Bending column			Wall without a column			Wall with a column on one side			Wall with columns on both sides			Total	
No. of total members	60		+	0		+	1		+	5		+	26		=		
No. of members surveyed	60		+	0		+	1		+	5		+	26		=		
	No. of members inspected	× 1	+	No. of members inspected	× 1	+	No. of members inspected	× 1	+	No. of members inspected	× 2	+	No. of members inspected	× 6	=	227	Aorg
Damage degree 0	12	× 1	+	0	× 1	+	1	× 1	+	5	× 2	+	10	× 6	=	83	A0
Damage degree I	37	× 0.95	+	0	× 0.95	+	0	× 0.95	+	0	× 1.9	+	3	× 6	=	52.25	A1
Damage degree II	9	× 0.6	+	0	× 0.75	+	0	× 0.6	+	0	× 1.2	+	6	× 4	=	27	A2
Damage degree III	2	× 0.3	+	0	× 0.5	+	0	× 0.3	+	0	× 0.6	+	0	× 2	=	0.6	A3
Damage degree IV	0	× 0	+	0	× 0.1	+	0	× 0	+	0	× 0	+	0	× 0	=	0	A4
Damage degree V	0	× 0	+	0	× 0.0	+	0	× 0	+	0	× 0	+	0	× 0	=	0	A5
															Σ Aj = A0+A1+A2+A3+A4+A5	=	162.85	
															Residual seismic performance ratio	= Σ Aj / Aorg	= 71.7	Intermediate damage

Table: Damage degree tabulation (Level 3)

	Shear column			Bending column			Wall without a column			Wall with a column on one side			Wall with columns on both sides			Total	
No. of total members	60		+	0		+	1		+	5		+	26		=		
No. of members surveyed	60		+	0		+	1		+	5		+	26		=		
	No. of members inspected	× 1	+	No. of members inspected	× 1	+	No. of members inspected	× 1	+	No. of members inspected	× 2	+	No. of members inspected	× 6	=	227	Aorg
Damage degree 0	21	× 1	+	0	× 1	+	1	× 1	+	3	× 2	+	19	× 6	=	142	A0
Damage degree I	26	× 0.95	+	0	× 0.95	+	0	× 0.95	+	2	× 1.9	+	2	× 6	=	39.9	A1
Damage degree II	9	× 0.6	+	0	× 0.75	+	0	× 0.6	+	0	× 1.2	+	4	× 4	=	19.8	A2
Damage degree III	4	× 0.3	+	0	× 0.5	+	0	× 0.3	+	0	× 0.6	+	1	× 2	=	3	A3
Damage degree IV	0	× 0	+	0	× 0.1	+	0	× 0	+	0	× 0	+	0	× 0	=	0	A4
Damage degree V	0	× 0	+	0	× 0.0	+	0	× 0	+	0	× 0	+	0	× 0	=	0	A5
															Σ Aj = A0+A1+A2+A3+A4+A5	=	204.7	
															Residual seismic performance ratio	= Σ Aj / Aorg	= 90.2	Minor damage

Table 2-4-54 Damage degree summary sheet (Level 4 to Level 6)

Table: Damage degree tabulation (Level 4)

	Shear column				Bending column				Wall without a column				Wall with a column on one side				Wall with columns on both sides				Total	
No. of total members	61			+	0			+	1			+	5			+	25			=		
No. of members surveyed	61			+	0			+	1			+	5			+	25			=		
	No. of members inspected	×	1	+	No. of members inspected	×	1	+	No. of members inspected	×	1	+	No. of members inspected	×	2	+	25	×	6	=	222	Aorg
Damage degree 0	28	×	1	+	0	×	1	+	1	×	1	+	2	×	2	+	19	×	6	=	147	A0
Damage degree I	22	×	0.95	+	0	×	0.95	+	0	×	0.95	+	0	×	1.9	+	3	×	6	=	38	A1
Damage degree II	8	×	0.6	+	0	×	0.75	+	0	×	0.6	+	0	×	1.2	+	3	×	4	=	15.6	A2
Damage degree III	3	×	0.3	+	0	×	0.5	+	1	×	0.3	+	0	×	0.6	+	0	×	2	=	2.7	A3
Damage degree IV	0	×	0	+	0	×	0.1	+	0	×	0	+	0	×	0	+	0	×	0	=	0	A4
Damage degree V	0	×	0	+	0	×	0.0	+	0	×	0	+	0	×	0	+	0	×	0	=	0	A5
																			Σ Aj = A0+A1+A2+A3+A4+A5	=	203.3	
																			Residual seismic performance ratio = Σ Aj / Aorg	=	91.6	Minor damage

Table: Damage degree tabulation (Level 5)

	Shear column				Bending column				Wall without a column				Wall with a column on one side				Wall with columns on both sides				Total	
No. of total members	60			+	0			+	1			+	5			+	26			=		
No. of members surveyed	60			+	0			+	1			+	5			+	26			=		
	No. of members inspected	×	1	+	No. of members inspected	×	1	+	No. of members inspected	×	1	+	No. of members inspected	×	2	+	No. of members inspected	×	6	=	227	Aorg
Damage degree 0	31	×	1	+	0	×	1	+	1	×	1	+	3	×	2	+	21	×	6	=	164	A0
Damage degree I	18	×	0.95	+	0	×	0.95	+	0	×	0.95	+	0	×	1.9	+	4	×	6	=	39.9	A1
Damage degree II	9	×	0.6	+	0	×	0.75	+	0	×	0.6	+	0	×	1.2	+	1	×	4	=	9	A2
Damage degree III	2	×	0.3	+	0	×	0.5	+	0	×	0.3	+	1	×	0.6	+	0	×	2	=	1.2	A3
Damage degree IV	0	×	0	+	0	×	0.1	+	0	×	0	+	1	×	0	+	0	×	0	=	0	A4
Damage degree V	0	×	0	+	0	×	0.0	+	0	×	0	+	0	×	0	+	0	×	0	=	0	A5
																			Σ Aj = A0+A1+A2+A3+A4+A5	=	214.1	
																			Residual seismic performance ratio = Σ Aj / Aorg	=	94.3	Minor damage

Table: Damage degree tabulation (Level 6)

	Shear column				Bending column				Wall without a column				Wall with a column on one side				Wall with columns on both sides				Total	
No. of total members	56			+	0			+	1			+	4			+	12			=		
No. of members surveyed	56			+	0			+	1			+	4			+	12			=		
	No. of members inspected	×	1	+	No. of members inspected	×	1	+	No. of members inspected	×	1	+	No. of members inspected	×	2	+	No. of members inspected	×	6	=	137	Aorg
Damage degree 0	9	×	1	+	0	×	1	+	0	×	1	+	1	×	2	+	11	×	6	=	77	A0
Damage degree I	35	×	0.95	+	0	×	0.95	+	1	×	0.95	+	0	×	1.9	+	0	×	6	=	34.2	A1
Damage degree II	5	×	0.6	+	0	×	0.75	+	0	×	0.6	+	3	×	1.2	+	1	×	4	=	10.2	A2
Damage degree III	4	×	0.3	+	0	×	0.5	+	0	×	0.3	+	0	×	0.6	+	0	×	2	=	1.2	A3
Damage degree IV	3	×	0	+	0	×	0.1	+	0	×	0	+	0	×	0	+	0	×	0	=	0	A4
Damage degree V	0	×	0	+	0	×	0.0	+	0	×	0	+	0	×	0	+	0	×	0	=	0	A5
																			Σ Aj = A0+A1+A2+A3+A4+A5	=	122.6	
																			Residual seismic performance ratio = Σ Aj / Aorg	=	89.5	Minor damage

⑤ Three-dimensional elastic analysis by FEM

To understand the current deterioration level of the overall structure, the deterioration level of the foundation was calculated using the three-dimensional elastic analysis by FEM, in which foundation piles and the undermost layer of the structure were modeled.

Concerning the analytical method, the three-dimensional elastic model of analysis objects (i.e., foundation piles as well as underground beams and slabs in the undermost layer of the structure) is created first, and then, the fixed load of the structure is calculated for each of a wall, column, beam, floor slab, and staircase. After that, a verification was conducted by setting analysis cases to evaluate the vertical and horizontal load-carrying capacity of the foundation of the structure, and the stability of the overall foundation was evaluated.

⑤-1 Modeling of analysis objects

The three-dimensional elastic model was created for foundation piles (made of concrete) as well as underground beams and slabs in the undermost layer of the structure as analysis objects (Table 2-4-55 and Figure 2-4-64).

Table 2-4-55 Methods for modeling members

	Member	Material	Model element	Remarks
1	Foundation pile	Reinforced concrete	Beam (bar) element	・Model each pile ・Reflect current condition ・Estimate the bar arrangement at the time of construction ・Regard a footing as a rigid body
2	Underground beam	Reinforced concrete	Beam (bar) element	・Estimate the bar arrangement of from the section size
3	Slab	Reinforced concrete	Shell element	・Do not model rebar
4	Ground	Soil	Spring element	・Consider the condition of pile embedment

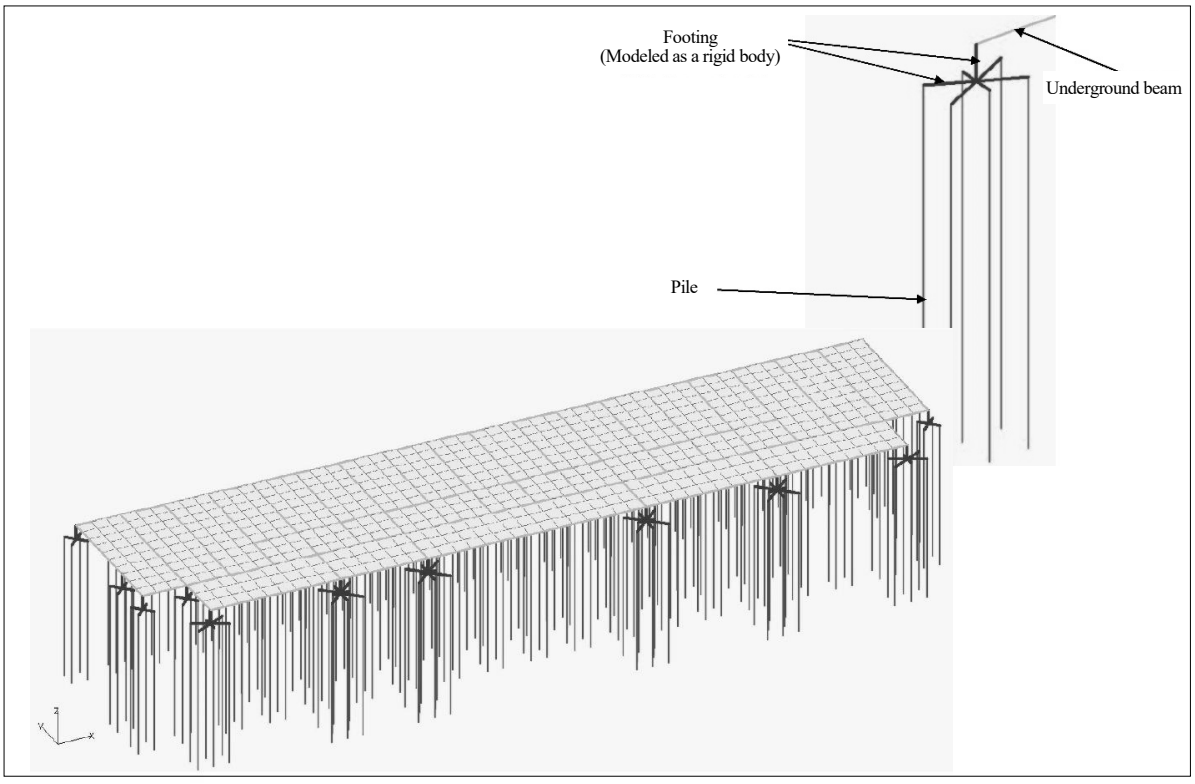


Figure 2-4-64 Model of three-dimensional elastic analysis by FEM
(the whole / foundation pile and footing)

⑤-2 Calculation of fixed load (deal load)

With regard to the fixed load of the structure, the weight was calculated for each of a wall, column, beam, floor slab, and staircase. Table 2-4-56 shows the results of fixed load calculation. In calculating the inertial force at the time of earthquake, the analysis model treats the weight shared by each Level as the weight concentrated in the location of the floor slab. For the totalization of the weight shared by each Level, the weights of the wall, column, and staircase were divided into two halves, and each half was allocated to the upper and lower Levels; then, the weights of the beam and floor slab of that Level were added. The item "Total Level weight Wi (kN)" in Table 2-4-56 shows the result of calculation performed in the manner described above. The calculation of the fixed load was mainly performed based on the assumptions of the notes ① to ⑥ for Table 2-4-56. The height of the structure was calculated through scaling based on the drawing data shown in Figure 2-4-65.

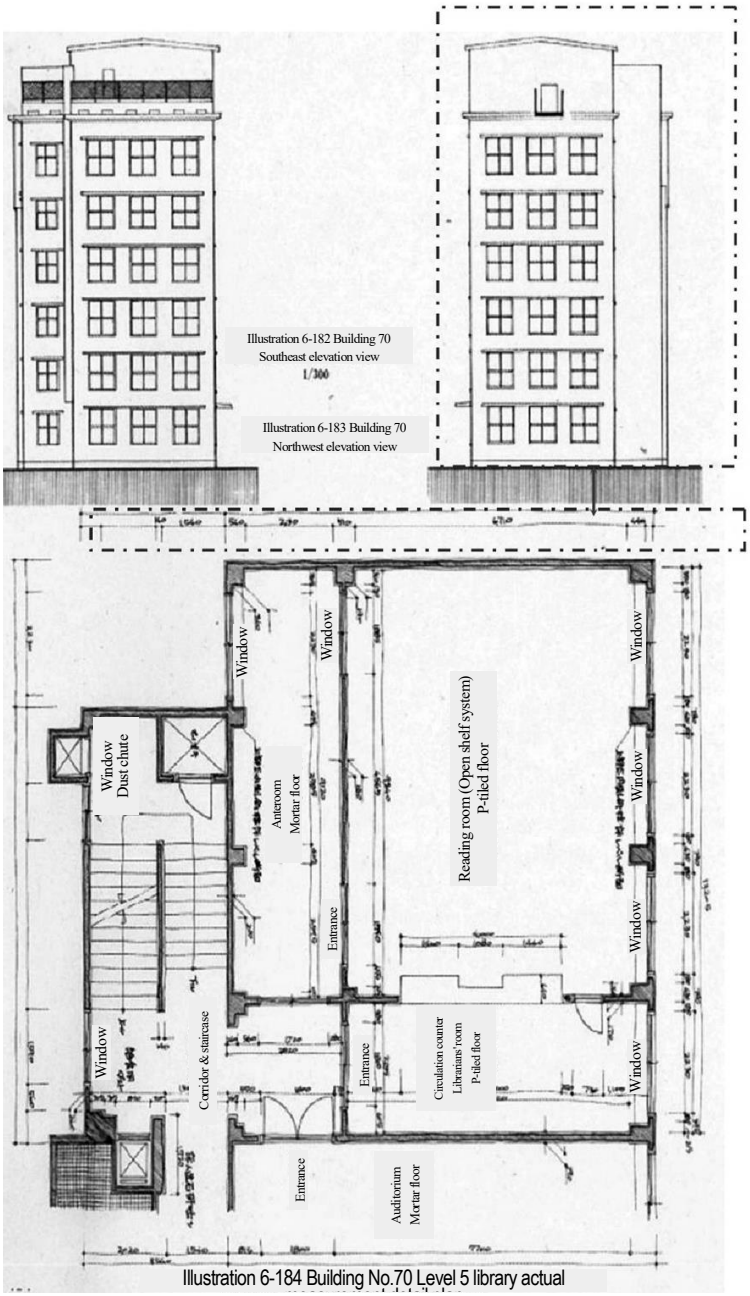


Figure 2-4-65 "Gunkanjima measurement survey data" (Akui, et al., 1984)

Table 2-4-56 Fixed load calculation result

Floor	Total Level weight Wi (kN)	Wall					Column								Beam							Floor slab							Staircase				
		Height Hw Note 7 (m)	Wall area (before deduction) Sw (m^2)	Thickness Bw Note 1 (m)	Window area (deduction) Sw (m^2)	Total volume (m^3)	Height Hp (m)	Column (type 1) Note 2			Column (type 2) Note 2			Total volume (m^3)	Longer direction (ridge direction) Note 3			Shorter direction (span direction) Note 3			Total volume (m^3)	Width Bs Note 4 (m)	Excluding restroom and preparation room		Restroom and preparation room		Total area (m^2)	Total volume (m^3)	Width HK (m)	Length LK (m)	Area AK (m^2)	Weight per unit area Note 5 (kN/m^2)	Weight WK (kN)
								Width Ap (m)	Thickness Bp (m)	No. of columns	Width Ap (m)	Thickness Bp (m)	No. of columns		Height HG (m)	Length LG (m)	Width BG (m)	Height HG (m)	Length LG (m)	Width BG (m)			Width Hs (m)	Length Ls (m)	Width Hs (m)	Length Ls (m)							
Roof	3.673																					0.10	45.825	10.53			482.54	48.25					
7 Note 6	7.489	4.30	883.62	0.15	191.16	103.87	4.30								0.35	139.86	0.32	0.65	61.99	0.25	13.69	0.20	55.01	10.53	3.56	22.65	659.89	131.98	3.56	16.61	59.13	4.80	283.83
6	7.999	5.00	920.01	0.20	214.91	141.02	5.00	0.55	0.43	46				54.40	0.35	155.40	0.32	0.65	75.39	0.25	15.94	0.20	55.01	10.53	3.56	22.65	649.01	129.80	3.56	16.61	59.13	4.80	283.83
5	7.502	3.60	727.45	0.20	231.52	99.19	3.60	0.55	0.55	48	0.30	0.30	14	56.81	0.35	155.40	0.32	0.65	75.39	0.25	15.94	0.20	55.01	10.53	3.56	22.65	644.11	128.82	3.56	16.61	59.13	4.80	283.83
4	7.502	3.60	727.45	0.20	231.52	99.19	3.60	0.55	0.55	48	0.30	0.30	14	56.81	0.35	155.40	0.32	0.65	75.39	0.25	15.94	0.20	55.01	10.53	3.56	22.65	644.11	128.82	3.56	16.61	59.13	4.80	283.83
3	7.673	3.60	727.45	0.20	231.52	99.19	3.60	0.55	0.55	48	0.30	0.30	14	56.81	0.35	155.40	0.32	0.65	75.39	0.25	15.94	0.20	55.01	10.53	3.56	22.65	644.11	128.82	3.56	16.61	59.13	4.80	283.83
2	8.442	3.60	727.45	0.20	231.52	99.19	3.60	0.70	0.55	48	0.30	0.30	14	71.06	0.35	155.22	0.32	0.65	77.03	0.25	15.88	0.20	55.01	10.53	3.56	22.65	640.15	128.03	3.56	16.61	59.13	4.80	283.83
1	16.138	4.30	900.81	0.20	216.32	136.9	4.30	0.70	0.55	48	0.30	0.30	14	84.88	1.15	155.22	0.55	1.15	77.03	0.55	99.99	0.35	55.01	10.53	3.56	22.65	640.15	224.05	3.56	16.61	59.13	4.80	283.83

Note 1: For wall thickness, concrete walls with a general thickness of 20 cm were assumed for Level 1 to Level 6. For Level 7, though containing steel members, the weight was assumed to be equivalent to that of a 15 cm thick concrete wall.

Note 2: Dimensions of columns were divided into two types for assumption on the basis of simplified measurements obtained in the on-site survey.

Note 3: Dimensions of beams were divided into two types (longer direction [ridge direction] and shorter direction [span direction]) for assumption on the basis of simplified measurements obtained in the on-site survey.

Note 4: Regarding the thickness of floor slabs, simplified measurements obtained in the on-site survey were used for Level 1; a general thickness of 20 cm were assumed for the other Levels. For the roof, the weight was assumed to be equivalent to that of 10 cm thick concrete.

Note 5: For the staircase, the weight per unit area equivalent to the weight of 20 cm thick concrete (= 24 kN/m^3 x 0.2 m = 4.80 kN/m^3)

Note 6: The weight of the steel frame part of Level 7 was calculated by assuming the dimensions on the basis of the pictures taken during the on-site survey.

Note 7: The height of the structure was calculated through scaling based on drawing data.

⑤-3 Setting of analysis cases and modeling of surcharge loads

To evaluate the vertical and horizontal load-carrying capacity required for the foundation of the structure, analysis cases were set as described in Table 2-4-57. The surcharge load was modeled using methods indicated in Table 2-4-58.

Table 2-4-57 Analysis cases

Analysis Case	Analysis condition	Items checked	Remarks
0	Restoration of the construction at the time of completion	・Stability of foundation ・Bearing capacity of pile ・Stress of pile	・Stationary (only deal load) ・Confirm a case where the foundation is sound (→ Verify the validity of modeling)
1	Current condition	・Stability of foundation ・Bearing capacity of pile ・Stress of pile	・Stationary (only deal load) ・ Determine the theoretical destruction state (deterioration level) ・Identify points to note for restoration work
2	After restoration work	・Stability of foundation ・Bearing capacity of pile ・Stress of pile	・Stationary (only deal load) ・Confirm the effect of restoration work (→ Identify points to note for maintenance)
3 (3.1–3.4)	After restoration work (at the time of Level 1 earthquake)	・Bearing capacity of pile ・Stress of pile	・Stationary (only deal load) + at the time of earthquake (horizontal load) ・Input each seismic force from four directions (both longer side directions, both shorter side directions)

Table 2-4-58 Surcharge load modeling method

1	Dead load	・Calculate the weight of the upper layer part on the basis of existing data ・Uniformly distribute the weight calculated, and apply it vertically downward on the slab
2	Seismic force	・Apply the horizontal inertial force equivalent to that at the time of earthquake on each Level, and thereby calculate the shearing force and bending moment that act on the undermost layer ・Apply the shearing force and bending moment calculated to the undermost layer * Evaluate Level 1 earthquake motion in accordance with the Building Standards Act

⑤-4 Results of Analysis Case 0 (Restoration of the construction at the time of completion)

The restoration of the construction at the time of completion was performed with respect to the stationary load. In the restoration analysis of the construction at the time of completion, the live load was added in addition to the fixed load. For the live load, in accordance with the Building Standards Act, a value of 2,100 N/m^2 was used, which is the value used for “the case where structural calculations of a girder, column, or foundation are performed” and “where classroom is selected as the room type.” For the specifications of the pile, the result of the on-site survey showed that the outside diameter of the pile (D) = 500 mm. Therefore, it was assumed to be an 80 mm thick hollow prefabricated pile by taking into account the situation at that time. From the situation of exposed rebar, the bar arrangement of the pile was assumed to be eight round axial reinforcing bars with a diameter of 13 mm. Table 2-4-59 shows the settings of material property values used for the analysis, and Tables 2-4-60 to 63 indicate the items checked and results of checking.

The results of checking show that the design of the restoration of the construction at the time of completion, which was based on various assumptions, was safe as the stress and bearing capacity of piles as well as the stability

of the overall foundation were all OK.

Table 2-4-59 Settings of material property values

Item		Code	Long term	Short term	Remarks
Concrete (beam/floor slab)	Design strength (N/mm²)	σck	24		Assumption
	Elastic coefficient: E (N/mm²)	Ec	23004		Page 51 (Explanation 5.1, *AIJ Standards for Structural Calculation of Reinforced Concrete Structures*, (Architectural Institute of Japan, Revised 2010)
	Poisson's ratio	ν	0.2		Page 50 (Table 5.1, *AIJ Standards for Structural Calculation of Reinforced Concrete Structures*, (Architectural Institute of Japan, Revised 2010)
	Unit weight (kN/m³)	γ	24		Page 59 (Table 7.1, *AIJ Standards for Structural Calculation of Reinforced Concrete Structures*, (Architectural Institute of Japan, Revised 2010)
Concrete (pile)	Design strength (N/mm²)	σck	40		Assumption (JIS・A・5372)
	Elastic coefficient: E (N/mm²)	Ec	28058		Page 51 (Explanation 5.2, *AIJ Standards for Structural Calculation of Reinforced Concrete Structures*, (Architectural Institute of Japan, Revised 2010)
	Poisson's ratio	ν	0.2		Page 50 (Table 5.1, *AIJ Standards for Structural Calculation of Reinforced Concrete Structures*, (Architectural Institute of Japan, Revised 2010)
	Unit weight (kN/m³)	γ	24.5		Page 59 (Table 7.1, *AIJ Standards for Structural Calculation of Reinforced Concrete Structures*, (Architectural Institute of Japan, Revised 2010)
	Allowable bending and compressive strength (N/mm²)	σca	13.3	26.6	Page 53 (Table 6.1, *AIJ Standards for Structural Calculation of Reinforced Concrete Structures*, (Architectural Institute of Japan, Revised 2010)
	Allowable shearing unit stress (N/mm²)	τa	0.890	1.335	Page 53 (Table 6.1, *AIJ Standards for Structural Calculation of Reinforced Concrete Structures*, (Architectural Institute of Japan, Revised 2010)
Rebar	Material (main reinforcement, distributing bar)	SR	235		Page 53 (Table 6.2, *AIJ Standards for Structural Calculation of Reinforced Concrete Structures*, (Architectural Institute of Japan, Revised 2010)
	Allowable tensile/compressive stress (N/mm²)	σs, a	155	235	Page 53 (Table 6.2, *AIJ Standards for Structural Calculation of Reinforced Concrete Structures*, (Architectural Institute of Japan, Revised 2010)

Table 2-4-60 Analysis Case 0 checking results

	Item checked	Checking result	Observations
1	Checking of bending stress of the pile	OK	The stress was checked with respect to the parts that yielded the maximum bending moment value, the maximum axial force value, and the minimum axial force value for each of the longer side and shorter side directions, and the results did not exceed the allowable unit stress and were considered OK. Thus, all the results of checking of bending stress is considered OK for the whole pile.
2	Checking of shear stress of the pile	OK	The stress was checked with respect to the parts that yielded the maximum shearing force value for each of the longer side and shorter side directions, and the results did not exceed the allowable unit stress and were considered OK. Thus, all the results of checking of shearing stress is considered OK for the whole pile.
3	Checking of bearing capacity of the pile	OK	As no boring data are available, the fictional resistance of the intermediate layer was ignored and it was assumed that the bearing layer is a gravel layer with an N value of 40 and the embedment of the pile is 2D (D = 500 mm pile diameter). To achieve a safe side design with this stratum structure, the allowable bearing capacity and drawing power of the pile are calculated in accordance with *Pile Foundation Design Manual* (January 2007). The FORUM8's pile foundation calculation program calculated the allowable bearing capacity at Ra = 468 kN and the allowable drawing power at Pa = 17 kN per pile at the normal

			time. From PNmax (= 433.9 kN) < Ra (= 468 kN), the bearing capacity of all the piles is considered OK. No drawing power of the piles was generated.
4	Checking of the overall foundation stability	OK	This checking was conducted using the eccentric distance: e = M/N (M: overturning moment, N: foundation reaction force) with respect to the center of gravity of the bottom slab. For the allowable eccentric distance value, the spread foundation normal-time allowable value B/6 (B: foundation width) was used. As the result of checking, the eccentric distances of both the longer side and shorter side directions did not exceed their allowable values; thus, the stability of the overall foundation is considered OK.

Table 2-4-61 Results of checking of shear stress of the pile

1) Shorter side direction

Item		Pile cross-sectional property			Section force response	Unit stress response	Allowable unit stress	Checking result	
		Diameter Φ (m)	Wall thickness t (m)	Cross-sectional area A (m^2)	Searing force Q (kN)	Average shearing unit stress τm (N/mm^2)	Shear τa (N/mm^2)	Shear $\tau m/\tau a$	Checking of shear
Pile	Shearing force maximum	0.5	0.08	0.1056	0.95	0.009	0.890	0.010	OK

2) Longer side direction

Position		Pile cross-sectional property			Section force response	Unit stress response	Allowable unit stress	Checking result	
		Diameter Φ (m)	Wall thickness t (m)	Cross-sectional area A (m^2)	Searing force Q (kN)	Average shearing unit stress τm (N/mm^2)	Shear τa (N/mm^2)	Shear $\tau m/\tau a$	Checking of shear
Pile	Shearing force maximum	0.5	0.08	0.1056	0.35	0.003	0.890	0.004	OK

Table 2-4-62 Results of checking of bending stress of the pile

1) Shorter side direction

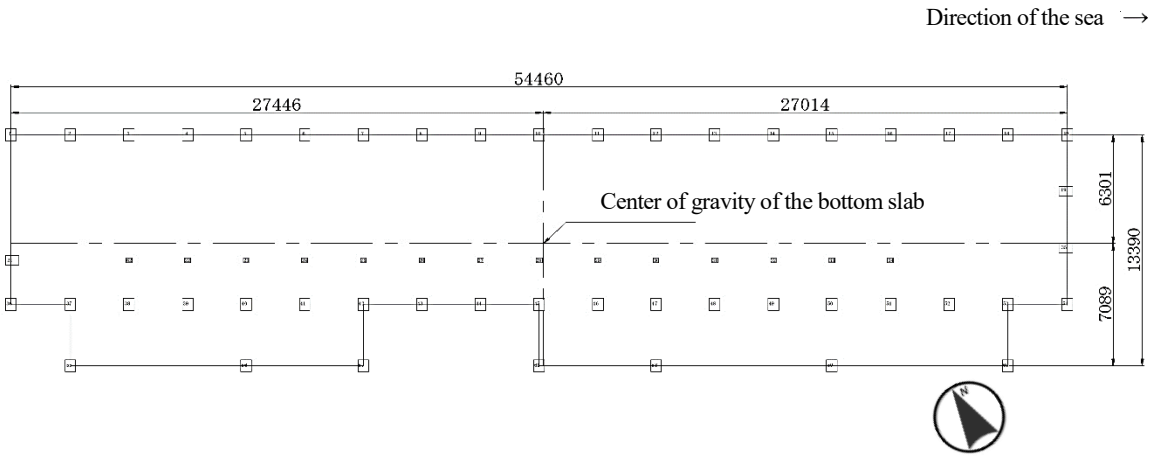
Item		Pile cross-sectional property			Section force response		Unit stress response			Allowable unit stress			Checking result					
		Diameter Φ (m)	Wall thickness t (m)	Cross-sectional area A (m^2)	Bending moment M (kN/m)	Axial force N (kN)	Concrete compression σs (N/mm^2)	Steel tension σs (N/mm^2)	Steel compression σs' (N/mm^2)	Concrete bending compression σca (N/mm^2)	Steel tension σsa (N/mm^2)	Steel compression σsa' (N/mm^2)	Concrete bending compression σca/σca (N/mm^2)	Concrete bending compression checking	Steel tension σs/σsa	Steel tension checking	Steel compression σs'/σsa'	Steel compression checking
Pile	Bending moment maximum	0.5	0.08	0.1056	8.53	278.72	3.000	Not caused	-45.000	13.30	155.00	-155.00	0.226	OK	-	-	0.290	OK
	Axial force maximum	0.5	0.08	0.1056	0.36	433.91	3.600	Not caused	-54.000	13.30	155.00	-155.00	0.271	OK	-	-	0.348	OK
	Axial force minimum	0.5	0.08	0.1056	1.53	135.16	1.200	Not caused	-18.600	13.30	155.00	-155.00	0.090	OK	-	-	0.120	OK

2) Longer side direction

Item		Pile cross-sectional property			Section force response		Unit stress response			Allowable unit stress			Checking result					
		Diameter Φ (m)	Wall thickness t (m)	Cross-sectional area A (m^2)	Bending moment M (kN/m)	Axial force N (kN)	Concrete compression σs (N/mm^2)	Steel tension σs (N/mm^2)	Steel compression σs' (N/mm^2)	Concrete bending compression σca (N/mm^2)	Steel tension σsa (N/mm^2)	Steel compression σsa' (N/mm^2)	Concrete bending compression σca/σca (N/mm^2)	Concrete bending compression checking	Steel tension σs/σsa	Steel tension checking	Steel compression σs'/σsa'	Steel compression checking
Pile	Bending moment maximum	0.5	0.08	0.1056	3.17	272.83	2.500	Not caused	-37.600	13.30	155.00	-155.00	0.188	OK	-	-	0.243	OK
	Axial force maximum	0.5	0.08	0.1056	0.06	433.91	3.600	Not caused	-53.600	13.30	155.00	-155.00	0.271	OK	-	-	0.346	OK
	Axial force minimum	0.5	0.08	0.1056	0.97	135.16	1.200	Not caused	-17.900	13.30	155.00	-155.00	0.090	OK	-	-	0.115	OK

Table 2-4-63 Results of checking of the overall foundation stability

Foundation reaction force	Overturning moment total		Bottom slab eccentric distance		Calculated bottom slab width (pillar centerline)		Allowable eccentric distance value		Result of checking of the overall foundation stability	
N (kN)	Longer direction (kN·m)	Shorter direction (kN·m)	Longer direction ex(m)	Shorter direction ey(m)	Longer direction width Bx(m)	Shorter direction width By(m)	Longer direction Bx/6	Shorter direction By/6	Longer direction (ex<Bx/6)	Shorter direction (ey<By/6)
74,316.16	-12,265.32	-9,383.83	0.165	0.126	54.460	13.39	9.077	2.232	OK	OK



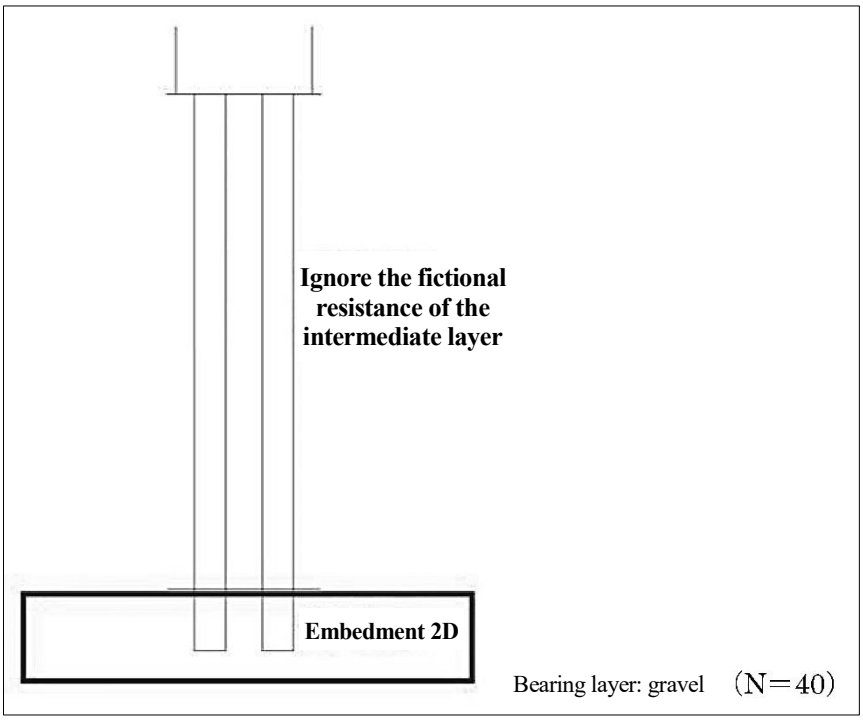


Figure 2-4-66 Assumption of stratum structure for pile bearing capacity calculation

⑤-5 Results of Analysis Case 1 (current condition)

Figure 2-4-67 shows the result of pile soundness. On the basis of the result of pile soundness, piles that have been lost and that no longer function were excluded from the model for analyzing the construction at the time of completion, and a model for analyzing the current condition was created. The analysis and checking of the current condition at the normal time were performed by considering only the fixed load because no people enter and thus the live load can be ignored. The items checked and results of checking are shown in Tables 2-4-64 to 67 and Figures 2-4-68 to 70.

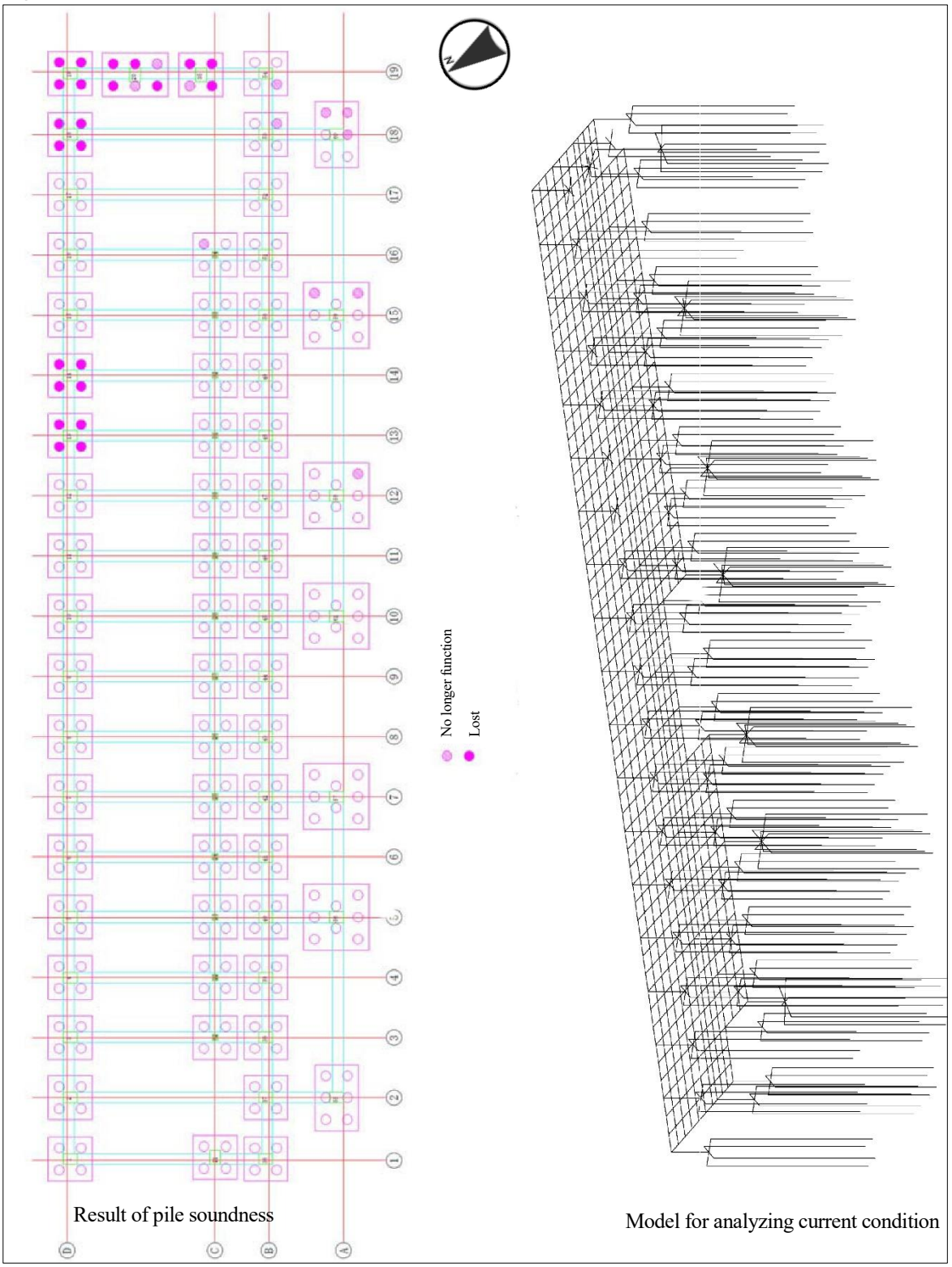


Figure 2-4-67 Result of pile soundness / Model for analyzing current condition

Table 2-4-64 Analysis case 1 checking results

Items checked		Checking result	Findings
1.	Checking of bending stress of the pile	NG	The stress was checked with respect to the parts that yielded the maximum bending moment value, the maximum axial force value, and the minimum axial force value for each of the longer side and shorter side directions, and the results exceed the allowable unit stress and were considered NG.
2.	Checking of shear stress of the pile	OK	The stress was checked with respect to the parts that yielded the maximum shearing force value for each of the longer side and shorter side directions, and the results did not exceed the allowable unit stress and were considered OK. Thus, all the results of checking of shearing stress is considered OK for the whole pile.
3.	Checking of bearing capacity of the pile	—	Some piles exceeded the allowable bearing capacity of Ra = 468 kN and the allowable drawing power of Pa = 17 kN per pile at the normal time, which were calculated in analysis case 0 (at the time of completion).
4.	Checking of the overall foundation stability	OK	As with Analysis case 0 (at the time of completion), checking was conducted using the eccentric distance: e = M/N (M: overturning moment, N: foundation reaction force) with respect to the center of gravity of the bottom slab. For the allowable eccentric distance value, the spread foundation normal-time allowable value B/6 (B: foundation width) was used. As the result of checking, the eccentric distances of both the longer side and shorter side directions did not exceed their allowable values; thus, the stability of the overall foundation is considered OK.

Table 2-4-65 Results of checking of shear stress (current condition)

1) Shorter side direction

Item		Pile cross-sectional property			Section force response	Unit stress response	Allowable unit stress	Checking result	
		Diameter Φ (m)	Wall thickness t (m)	Cross-sectional area A (m²)	Searing force Q (kN)	Average shearing unit stress τm (N/mm²)	Shear τa (N/mm²)	Shear τm/τa	Checking of shear
Pile	Shearing force maximum	0.5	0.08	0.1056	22.70	0.215	0.890	0.242	OK

2) Longer side direction

Position		Pile cross-sectional property			Section force response	Unit stress response	Allowable unit stress	Checking result	
		Diameter Φ (m)	Wall thickness t (m)	Cross-sectional area A (m²)	Searing force Q (kN)	Average shearing unit stress τm (N/mm²)	Shear τa (N/mm²)	Shear τm/τa	Checking of shear
Pile	Shearing force maximum	0.5	0.08	0.1056	18.17	0.172	0.890	0.193	OK

Table 2-4-66 Results of checking of bending stress of the pile (current condition)

1) Shorter side direction

Position		Pile cross-sectional property			Section force response		Unit stress response			Allowable unit stress			Checking result					
		Diameter Φ (m)	Wall thickness t (m)	Cross-sectional area A (m^2)	Bending moment M (kN/m)	Axial force N (kN)	Concrete compression σs (N/mm^2)	Steel tension σs (N/mm^2)	Steel compression σs' (N/mm^2)	Concrete bending compression σca (N/mm^2)	Steel tension σsa (N/mm^2)	Steel compression σsa' (N/mm^2)	Concrete bending compression σca/σca (N/mm^2)	Concrete bending compression checking	Steel tension σs/σsa	Steel tension checking	Steel compression σs'/σsa'	Steel compression checking
Pile	Bending moment maximum	0.5	0.08	0.1056	204.33	1900.60	33.600	20.200	-488.200	13.30	155.00	-155.00	2.526	OUT	0.130	OK	3.150	OUT
	Axial force maximum	0.5	0.08	0.1056	0.67	2647.47	21.900	Not caused	-327.700	13.30	155.00	-155.00	1.647	OUT	-	-	2.114	OUT
	Axial force minimum	0.5	0.08	0.1056	203.89	-774.02	27.500	2192.000	-332.100	13.30	155.00	-155.00	2.068	OUT	14.142	OUT	2.143	OUT

2) Longer side direction

Position		Pile cross-sectional property			Section force response		Unit stress response			Allowable unit stress			Checking result					
		Diameter Φ (m)	Wall thickness t (m)	Cross-sectional area A (m^2)	Bending moment M (kN/m)	Axial force N (kN)	Concrete compression σs (N/mm^2)	Steel tension σs (N/mm^2)	Steel compression σs' (N/mm^2)	Concrete bending compression σca (N/mm^2)	Steel tension σsa (N/mm^2)	Steel compression σsa' (N/mm^2)	Concrete bending compression σca/σca (N/mm^2)	Concrete bending compression checking	Steel tension σs/σsa	Steel tension checking	Steel compression σs'/σsa'	Steel compression checking
Pile	Bending moment maximum	0.5	0.08	0.1056	163.57	466.84	25.400	567.900	-351.200	13.30	155.00	-155.00	1.910	OUT	3.664	OUT	2.266	OUT
	Axial force maximum	0.5	0.08	0.1056	9.09	2647.47	22.600	Not caused	-338.100	13.30	155.00	-155.00	1.699	OUT	-	-	2.181	OUT
	Axial force minimum	0.5	0.08	0.1056	10.01	-774.02		809.100	Not caused	13.30	155.00	-155.00			5.220	OUT	-	-

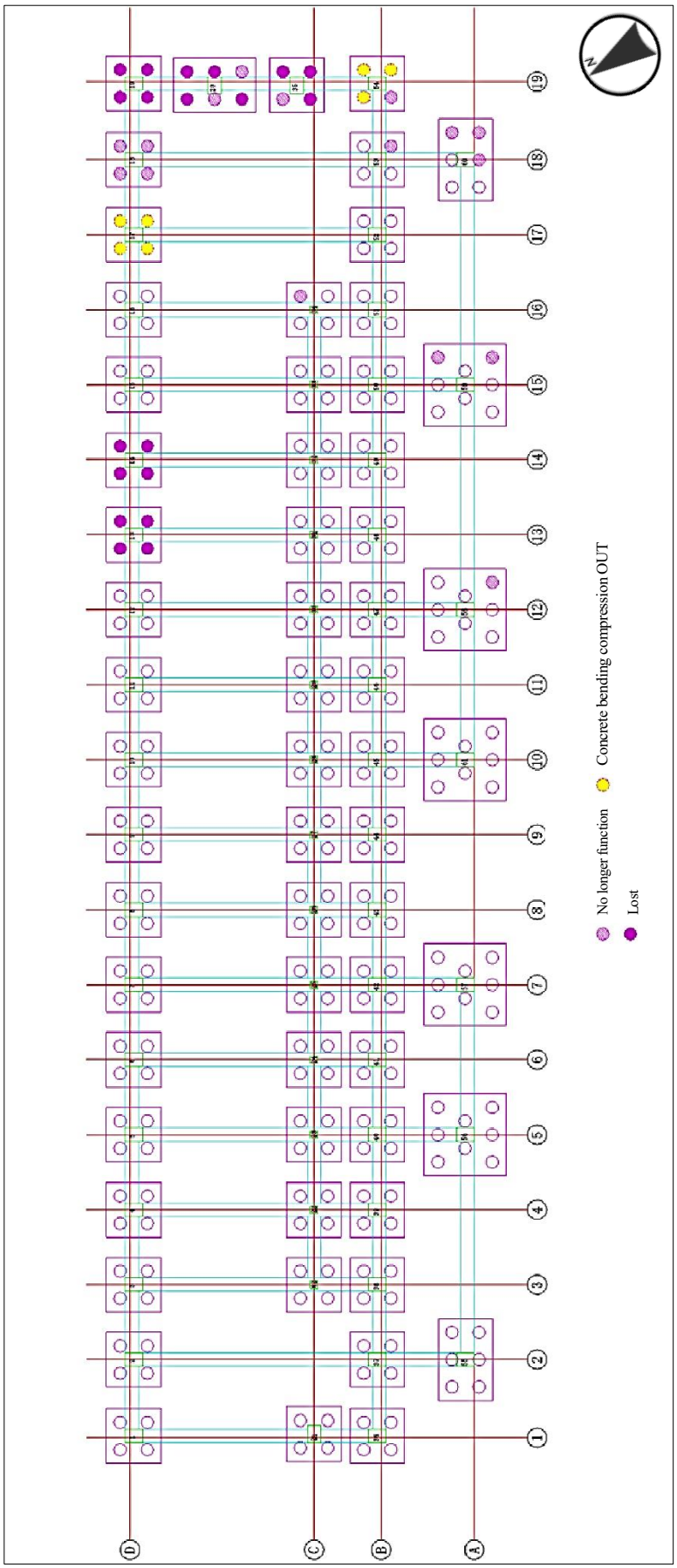


Figure 2-4-68 Current condition: Pile bending checking – concrete bending compressive stress OUT parts

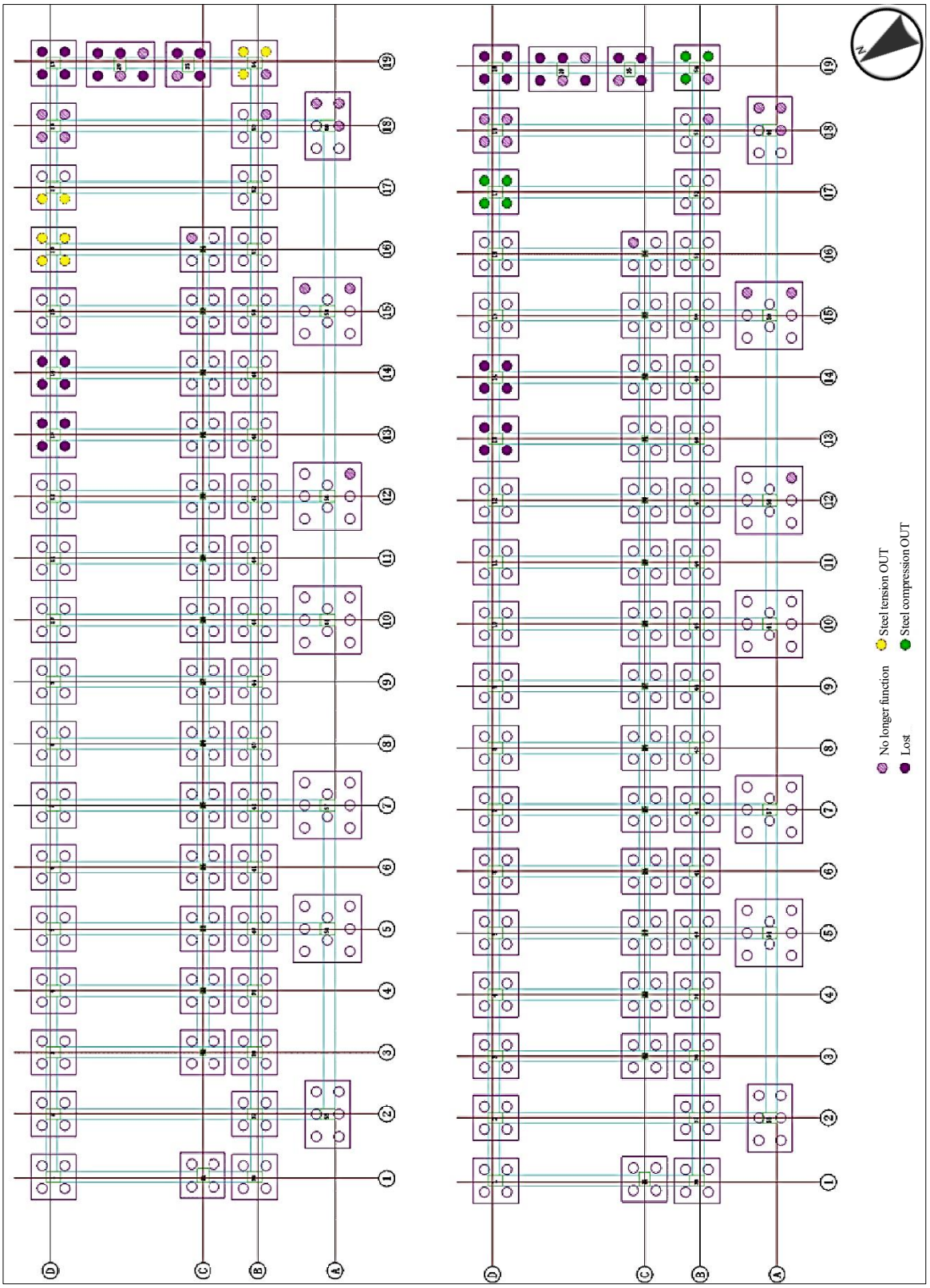


Figure 2-4-69 Current condition: Pile bending checking – Rebar tension / compressive stress OUT parts

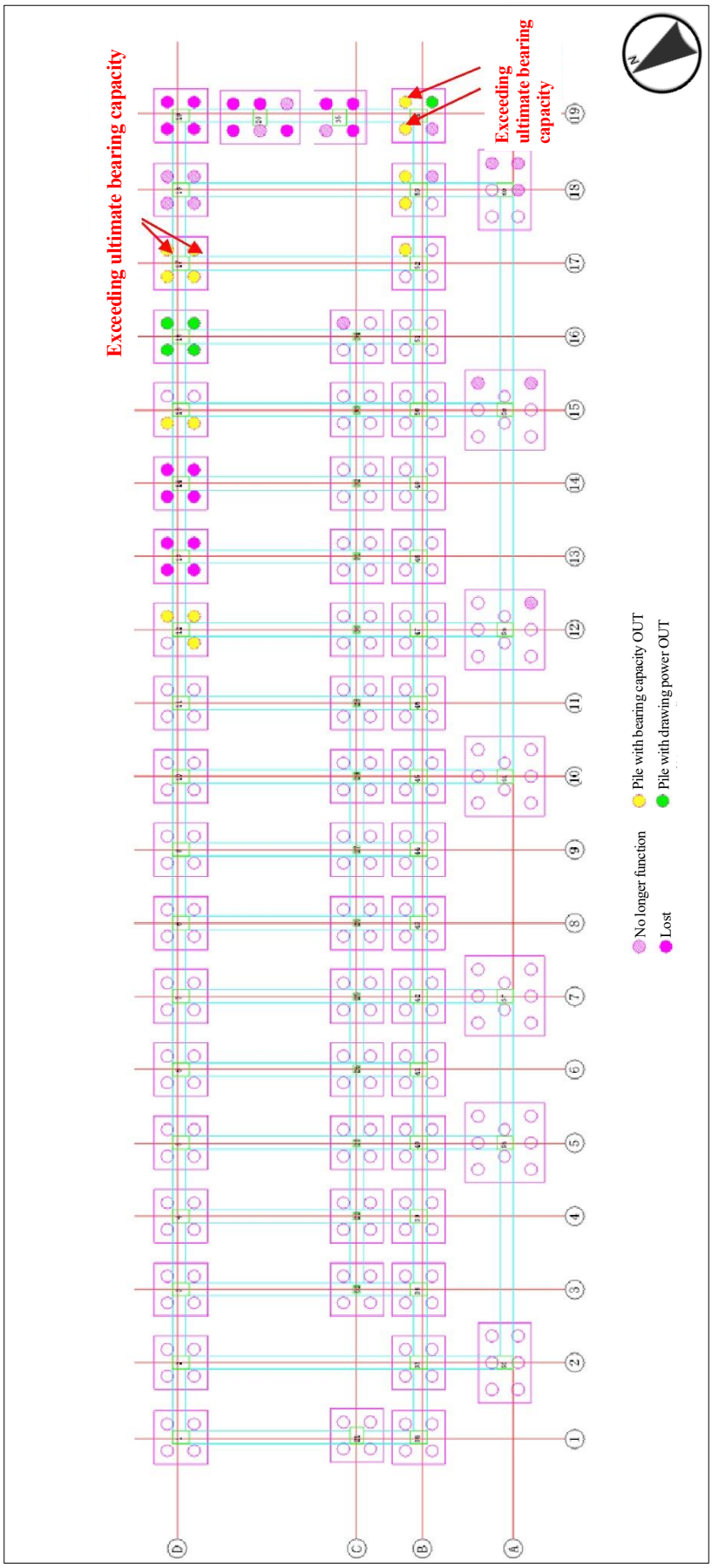
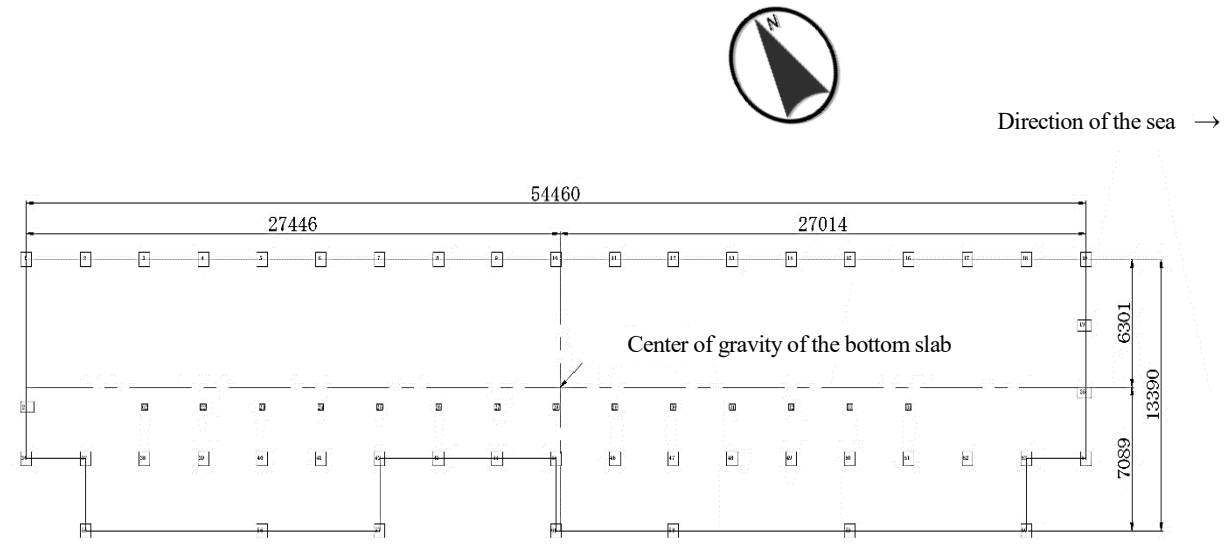


Figure 2-4-70 Pile bearing capacity / drawing power OUT parts

Table 2-4-67 Results of checking of the current overall foundation stability

Foundation reaction force	Overturning moment total		Bottom slab eccentric distance		Calculated bottom slab width (pillar centerline)		Allowable eccentric distance value		Result of checking of the overall foundation stability	
N (kN)	Longer direction (kN･m)	Shorter direction (kN・m)	Longer direction ex(m)	Shorter direction ey(m)	Longer direction width Bx(m)	Shorter direction width By(m)	Longer direction Bx/6	Shorter direction By/6	Longer direction (ex<Bx/6)	Shorter direction (ey<By/6)
64,002.74	-10,785.37	-8,112.2	0.169	0.127	54.460	13.39	9.077	2.232	OK	OK



⑥ Summary

For the Building No.70, the displacement survey, slant survey using three-dimensional laser measurement, and deterioration level survey were conducted. The displacement survey did not detect displacement. Concerning the slant of the building, Level 1 was found to project to the east side by 15–20 mm compared with Level 2 and upper floors.

As for the deterioration of the building, serious deterioration was found on the east side and deterioration was more noticeable on the north side than on the south side on many Levels. This is presumably because there are no structures that block wind and rain as well as sea breezes on the east side and the north side.

Regarding seismic performance, the residual seismic performance ratio was lowest on Level 2 at 71.7% and highest on Level 5 at 94.3%. Concerning the determination of damage, Level 2 was determined to be “Intermediate damage” and the other Levels to be “Minor damage.” Therefore, seismic performance has not decreased to the level that requires emergency measures.

As for the current deterioration level of the foundation, the bending stress of the piles was determined to be NG, and the bearing capacity exceeding the allowable value was confirmed in some piles.

(2) Survey of deterioration level

1) Outline of the survey

To understand the current condition of accommodation facilities existing in the Hashima Coal Mine remains, the deterioration levels of reinforced concrete structures were visually inspected, and "Evaluation results of the residual vertical load bearing capacity ratio,", "Evaluation results of the residual seismic performance ratio," and Evaluation results of the future residual vertical load bearing capacity ratio and residual seismic performance ratio" were put together.

The contents of the surveys are as described below.

・The survey of deterioration condition and the prediction of durable years with respect to accommodation facilities that were not evaluated in "Report of the deterioration survey of concrete structures in Gunkanjima" (March 2013)

・The survey of deterioration condition and the prediction of durable years with respect to accommodation facilities that were evaluated in "Report of the deterioration survey of concrete structures in Gunkanjima" (March 2013), for which one of the survey of deterioration condition or the prediction of durable years was not performed.

・ The structural safety evaluation of structures to which high priority is given to delay the progress of deterioration, among accommodation facilities.

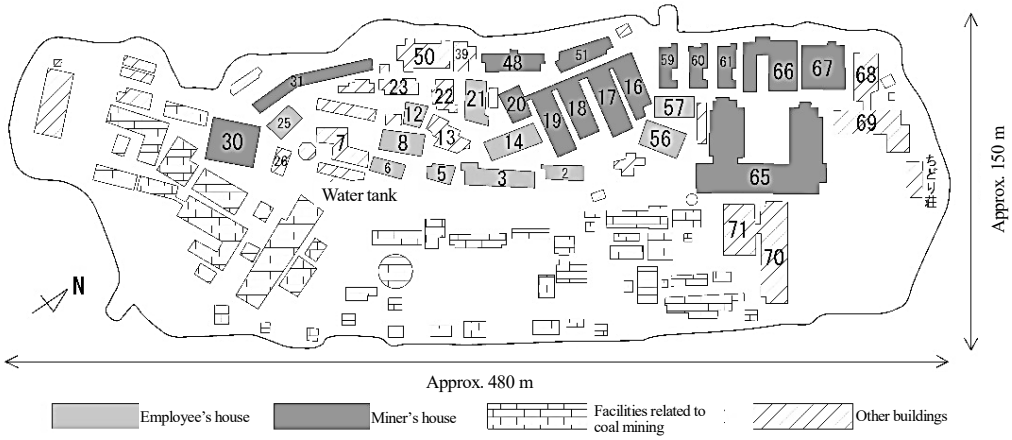


Figure 2-4-71 Map showing Hashima building numbers

Table 2-4-68 List of buildings for the deterioration level survey

Building	Constructed	Structure/Levels	Use	Building	Constructed	Structure/Levels	Use
2	1950	RC / 3 Levels + semibasement	Employee's house	51	1961	RC / 8 Levels + semibasement	Miner's house
3	1959	RC 4 Levels + semibasement	Employee's house (for executives / with bath)	56	1939	RC / 3 Levels	Miner's house
8	1919	RC + 3 story wooden house	Employee's house / communal bath	57	1939	RC / 4 Levels	Miner's house / shops
13	1967	RC / 4 Levels	Town-managed housing (for school personnel)	59	1953	RC / 5 Levels + basement	Miner's house / Basement kobaikai
14	1941	RC / 5 Levels	Employee's house (Central house)	60	1953	RC / 5 Levels + basement	Miner's house / Basement kobaikai
16	1918	RC / 9 Levels	Miner's house (daily wage miner's house)	61	1953	RC / 5 Levels + basement	Miner's house / Communal bath
17	1918	RC / 9 Levels	Miner's house (daily wage miner's house)	65 North	1945	RC / 9 Levels + basement	Miner's house
18	1918	RC / 9 Levels	Miner's house (daily wage miner's house)	65 East	1949	RC / 9 Levels + basement	Miner's house / Rooftop kindergarten

19	1922	RC / 9 Levels	Miner's house (daily wage miner's house)	65 South	1958	RC / 10 Levels	Miner's house
20	1922	RC / 6 Levels	Miner's house (daily wage miner's house)	66	1940	RC / 4 Levels + basement	Miner's lodging (Keimei dormitory)
21	1954	RC / 5 Levels	Miner's house / Police box	67	1950	RC / 4 Levels	Miner's lodging (bachelor dormitory)
22	1953	RC / 5 Levels	Town-managed housing (public employees) / public office, etc.	68	1958	RC / 2 Levels	Isolation ward
25	1931	RC / 5 Levels + basement	Employee's house / hostel	69	1958	RC / 4 Levels	Hashima hospital
30	1916	RC / 7 Levels	Former miner's house (contractor's house)	70	1958	RC + S / 7 Levels	Hashima Elementary School and Hashima Junior High School
31	1957	RC / 6 Levels + basement	Miner's house / Post office / Basement communal bath	71	1970	RC + S / 2 Levels	Gymnasium
39	1964	RC / 3 Levels	Public hall	Chidori-so	1958	Wood and plaster / 2 Levels	School personnel house
48	1955	RC / 5 Levels + basement	Miner's house	Water tank	-	-	-
50	1927	RC / 2 Levels	Movie theater (Showa-kan)				

2) Evaluation of member deterioration levels

① Outline

To evaluate decreases in structural performance due to the deterioration of buildings, deterioration levels were classified from the deterioration condition of structural members, which was obtained through the on-site survey, and the structural performance decreasing rate was defined for each deterioration level.

② Classification of member deterioration levels

The deterioration levels of members were classified according to the state of concrete cracks and the corrosion condition of rebar confirmed by visual inspection.

Deterioration levels were classified into eight stages (0, I, II, III one side, III both sides, IV one side, IV both sides, and V, with larger numbers indicating more serious condition) for columns; six stages (0, I, II, III, IV, and V) for beams and wallboards; and four stages (A, B, C, and D) for slabs. Criteria for classification are as described below. Note that the terms "one side" and "both sides" were used depending on "whether the deterioration condition of the deterioration level III or IV is found on one side or both sides of the member." The deterioration levels of slabs were classified into A: No deterioration; B: Rebar exposed and rusted; C: Many losses in the rebar section; or D: Fallen or lost, and then recorded.

Table 2-4-69 Deterioration level classification table

Deterioration level I	The level at which a small number of cracks are found
Deterioration level II	The level at which slight bond deterioration is seen
Deterioration level III	The level at which there is almost no concrete cover, but bond performance of the core side is likely to be provided, or the corrosion of rebar shows floating rust.
Deterioration level IV	The level at which virtually no bond appears to be present, or rebar has become iron oxide with more than around 70% of the cross section remaining.
Deterioration level V	The condition in which the concrete of the core part has fallen, or the level at which the cross section of rebar is determined to be less than 70%.

③ Examples of member deterioration levels and damaged condition

Shown below are examples of determination of deterioration levels. Values in parentheses are the long-term and seismic performance decreasing rates.

③-1 Deterioration level I (long-term: 0.95, seismic: 0.95)

The condition in which a small number of cracks are found.

Photo 2-4-118 Deterioration level I

③-2 Deterioration level II (long-term: 0.90, seismic: 0.8)

The condition in which there is a boundary crack between rebar and concrete, and slight bond deterioration is seen.

Photo 2-4-119 Deterioration level II

③-3 Deterioration level III (long-term: 0.90, seismic: 0.65 for one side/0.33 for both sides)

The condition in which concrete cover has fallen or appears to have almost fallen, and the concrete cover side of rebar virtually shows a boundary crack but the bond remains on its core side.

Photo 2-4-120 Deterioration level III

③-4 Deterioration level IV (long- term: 0.8 for column/0.5 for beam, seismic: 0.25 for one side and beam/0.10 for both sides)

The level at which strength can be expected and proof strength should not be lowered to as low as 0. Cases in which concrete cover has peeled and inside rebar has seriously deteriorated were categorized as Deterioration level IV.

Photo 2-4-121 Deterioration level IV

③-5 Deterioration level (long-term: 0.3 for shear column/0.8 for bending column/0.0 for beam, seismic: 0.0)

The condition in which either one of shear reinforcement or main reinforcement shows a loss of cross-sectional area due to corrosion, with less than 70% of that remaining.

④Shear column deterioration level classification and structural performance decreasing rate

Table 2-4-70 shows deterioration levels and condition as well as performance decreasing rates for shear columns.

Table 2-4-70 Performance decreasing rate

Deterioration level	Deterioration condition	Long-term performance	Seismic performance
0	There is no deterioration	1.00	1.00
I	Crack width is approx. 1 mm or less; rebar is unlikely to have bond deterioration	0.95	0.95
II	Corrosion has caused a boundary crack between rebar and concrete; slight bond deterioration is seen	0.90	0.80
III one side	The concrete cover on one side of the member has fallen and the concrete cover side of rebar virtually shows a boundary crack, but the bond remains on the core side of rebar, with floating rust observed on the whole surface of rebar	0.90	0.65
III both sides	The concrete cover on both sides of the member has fallen and the concrete cover side of rebar virtually shows a boundary crack, but the concrete of the core part is sound, and the bond remains on the core side of main reinforcement, with floating rust observed on the whole surface of rebar	0.90	0.33
IV one side	The concrete cover on one side of the member has fallen, there is a boundary crack between rebar and concrete, and there is almost no adhesion force; however, the cross-sectional area of rebar is determined to be approx. 70% or greater, or iron oxide is determined to be present only on the surface	0.90	0.25
IV both sides	The concrete cover on both sides of the member has fallen, there is a boundary crack between rebar and concrete, and there is almost no adhesion force; however, the cross-sectional area of rebar is determined to be approx. 70% or greater, or iron oxide is determined to be present only on the surface	0.80	0.10
V	The boundary crack between rebar and concrete is so complete that even the core part concrete is missing, and there is no adhesion force; the cross-sectional area of rebar is determined to be less than 70%, or rebar is splitting in layers	0.30	0.00

3) Evaluation of the structural performance deterioration level of the entire building

① Outline

Here, we describe methods for evaluating the structural performance deterioration level of the entire building using the deterioration level classification shown in “2) Evaluation of member deterioration levels” and

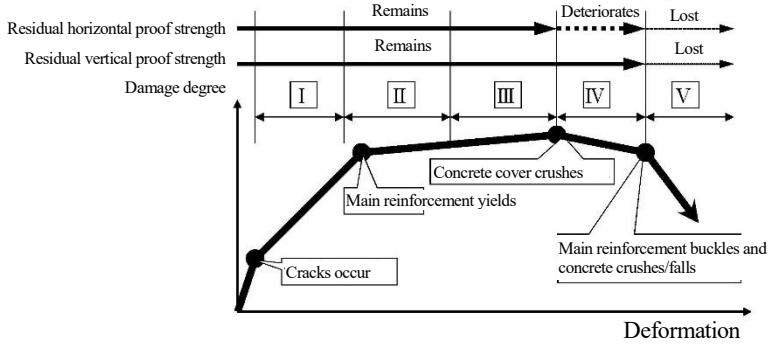
performance reduction coefficient.

② Basic policy for the structural performance evaluation of the entire frame

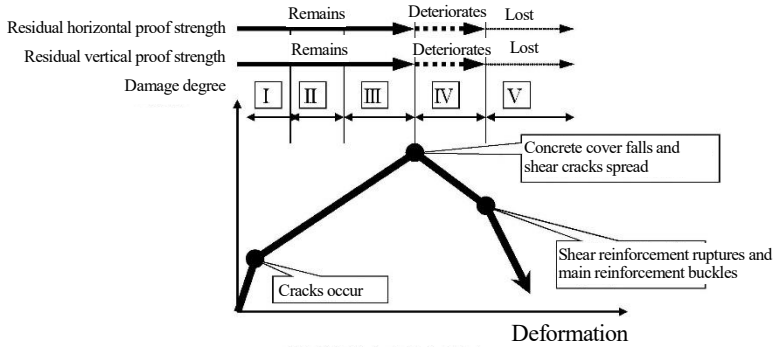
In the survey of reinforced concrete structure ("RC structure") architectural buildings in Hashima, which was conducted in September 2015, deterioration levels were evaluated with respect to vertical load bearing performance and seismic performance as structural performance. To evaluate structural performance deterioration levels, we used a principle for RC structure buildings, which is provided in "Criteria for determination of quake-hit building damage degree categories ("Damage degree determination criteria") published by the Japan Building Disaster Prevention Association. In the Damage degree determination criteria, the degree of damage of a quake-hit building is determined through quantitative evaluation using the residual seismic performance ratio: R (the ratio of the post-quake seismic performance to pre-quake seismic performance).

Figure 2-4-72 is a conceptual drawing of the relationship between the damage degree of member and deformation under load, which was cited from the Damage degree determination criteria. For damage degrees (0 and I to V) of columns, beams, walls, etc., the degree of structural performance degrease (seismic performance reduction coefficient: η) is numerically expressed by estimating the maximum deformation caused in the member at the time of earthquake on the basis of damaged condition, including cracks in the member. It is thought that the residual seismic performance ratio R for the entire building can be roughly calculated from the proof strength ratio between each member (shear column: bending column: wall without a column: wall with a column on one side: wall with columns on both sides = 1 : 1 : 1 : 2 : 6) and the seismic performance reduction coefficient η.

It should be noted that the residual seismic performance ratio R does not evaluate the absolute value of structural performance but does evaluate the residual rate as compared with the initial performance (degree of decrease). In this survey, the principle of the residual seismic performance ratio R, which is intended for earthquake damage, was applied to the structural performance decrease of buildings in Hashima, which have deteriorated over time.



(a) Members with high plastic deformation capacity (bending member)



(b) Members which cause brittle fracture (shear member)

Figure 2-4-72 Deterioration level calculation methods for walls and beams

③ Evaluation of the residual structural performance ratios R_L and R_E of RC structure buildings that have deteriorated with time

As described above, in this survey, the principle of the residual seismic performance ratio R in the Damage degree determination criteria was applied to evaluate the structural performance of RC structure buildings in Hashima, which have deteriorated over time. The two kinds of structural performance (vertical load bearing performance and seismic performance) were set as evaluation objects; deterioration levels were classified into five stages (I to V) on the basis of the condition of damage of members due to age deterioration; the performance reduction coefficient was established for each deterioration level in accordance with the Damage degree determination criteria; and the residual performance ratio of the entire building was calculated. The details are as described below.

③-1 Vertical load bearing performance

The capacity to bear long-term loads including axial force is one of the important structural performance elements; it was called the vertical load bearing performance and evaluated as the residual ratio R_L in this survey. Since it is the capacity to bear the vertical load, the residual ratio for the entire frame was basically calculated on the basis of the deterioration levels (I to V) of vertical members (i.e., columns, bearing walls) that bear axial force; the calculation of the residual ratio R_L did not take into consideration the deterioration levels of beams. However, for the parts where the deterioration levels of beams and floor slabs are high (Deterioration level of IV and higher), their locations and damaged condition were separately recorded in light of dangers including local floor collapse.

The residual vertical load bearing performance ratio R_L for the entire frame was calculated using Table 2-4-71 and the formula below. The evaluation objects of this survey were buildings in Hashima, which were designed in accordance with the former earthquake resistance standards; therefore, we did not differentiate between bending columns and shear columns and treated all the columns as shear columns.

$$R_L = \frac{\sum A_j}{A_{org}} \times 100 = \frac{(\quad)}{(\quad)} \times 100 = (\quad)$$

Table 2-4-71 Calculation table for the residual vertical load bearing performance ratio R_L due to deterioration

	Shear column	Bending column	Wall without a column	Wall with a column on one side	Wall with columns on both sides	Total	
No. of total members	( ) +	( ) +	( ) +	( ) +	( ) =	( )	
No. of members surveyed	( )① +	( )② +	( )③ +	( )④ +	( )⑤ =	( )	
	①×1 +	②×1 +	③×1 +	④×2 +	⑤×6 =	( )	$=A_{org}$
Deterioration level 0	( ) +	( ) +	( ) +	( )×2 +	( )×6 =	( )	$=A_0$
Deterioration level I	( )×0.95 +	( )×0.95 +	( )×0.95 +	( )×1.9 +	( )×5.7 =	( )	$=A_1$
Deterioration level II	( )×0.9 +	( )×0.9 +	( )×0.9 +	( )×1.8 +	( )×5.4 =	( )	$=A_2$
Deterioration level III	( )×0.9 +	( )×0.9 +	( )×0.9 +	( )×1.8 +	( )×5.4 =	( )	$=A_3$
Deterioration level IV	( )×0.8 +	( )×0.8 +	( )×0.8 +	( )×1.6 +	( )×4.8 =	( )	$=A_4$
Deterioration level V	( )×0.3 +	( )×0.8 +	( )×0.8 +	( )×1.6 +	( )×4.8 =	( )	$=A_5$

$$\Sigma A_j = A_0 + A_1 + A_2 + A_3 + A_4 + A_5 = (\quad)$$

③-2 Seismic performance

The residual seismic performance ratio R_E due to age deterioration for the entire frame was basically calculated on the basis of the method provided in the Damage degree determination criteria (the performance reduction coefficients of members are different). When the deterioration level of a beam was higher than that of a vertical member (i.e., column, bearing wall) to which the member clung, the deterioration level of the beam was replaced by that of the vertical member concerned, and the residual seismic performance ratio R_E for the entire frame was

calculated using Table 2-4-72 and the formula below.

$$R_E = \frac{\sum A_j}{A_{org}} \times 100 = \frac{(\quad)}{(\quad)} \times 100 = (\quad)$$

Table 2-4-72 Calculation table for the residual seismic performance ratio RE due to deterioration

	Shear column	Bending column	Wall without a column	Wall with a column on one side	Wall with columns on both sides	Total	
No. of total members	( ) +	( ) +	( ) +	( ) +	( ) =	( )	
No. of members surveyed	( )① +	( )② +	( )③ +	( )④ +	( )⑤ =	( )	
	①×1 +	②×1 +	③×1 +	④×2 +	⑤×6 =	( )	$=A_{org}$
Deterioration level 0	( ) +	( ) +	( ) +	( )×2 +	( )×6 =	( )	$=A_0$
Deterioration level I	( )×0.95 +	( )×0.95 +	( )×0.95 +	( )×1.9 +	( )×5.7 =	( )	$=A_1$
Deterioration level II	( )×0.6 +	( )×0.75 +	( )×0.6 +	( )×1.2 +	( )×3.6 =	( )	$=A_2$
Deterioration level III	( )×0.65 ( )×0.33 +	( )×0.5 ( )×0.2 +	( )×0.65 ( )×0.33 +	( )×1.3 ( )×0.66 +	( )×3.9 ( )×1.98 =	( )	$=A_3$
Deterioration level IV	( )×0.25 ( )×0.1 +	( )×0.25 ( )×0.1 +	( )×0.25 ( )×0.1 +	( )×0.5 ( )×0.2 +	( )×1.5 ( )×0.6 =	( )	$=A_4$
Deterioration level V	( )×0 +	( )×0 +	( )×0 +	( )×0 +	( )×0 =	( )	$=A_5$

* Damage degree III and IV: the top indicates falling on one side of the concrete cover, the bottom shows falling on both sides of the concrete cover

$$\sum A_j = A_0 + A_1 + A_2 + A_3 + A_4 + A_5 = (\quad)$$

4) Survey of bar arrangement

① Outline of the survey

For the structural safety evaluation of buildings to which high priority is given to delay the progress of deterioration, among accommodation facilities, a survey of bar arrangement was conducted using various non-destructive inspection equipment to collect data necessary for the evaluation of the structures.

The survey was conducted for 10 of the 11 buildings listed in Table 2-4-73, which shows buildings for structural safety evaluation; Building 16 was excluded from this survey as a bar arrangement survey was conducted in 2012 for this building.

Table 2-4-73 Buildings for the bar arrangement survey

Building	Structure / No. of Levels
3	RC structure / 4 Levels + semibasement
16	RC structure / 9 Levels
17	RC structure / 9 Levels
18	RC structure / 9 Levels
19	RC structure / 9 Levels
20	RC structure / 6 Levels
50	S structure / 2 Levels (Level 1 front chamber RC structure)
65 North	RC structure / 9 Levels + basement
65 East	RC structure / 9 Levels + basement
65 South	RC structure / 10 Levels
70	RC structure / 6 Levels + S structure roof floor (extension)

*RC structure: Reinforced concrete structure. S structure: Steel structure

② Survey methods

The bar arrangement survey was conducted by focusing on columns and walls that are set as survey objects in the Damage degree determination criteria as well as in the secondary diagnosis of the standard for seismic diagnosis.

In addition, by assuming the conduct of the third diagnosis of the standard for seismic diagnosis as well as push-over analysis, beams and floors were also surveyed in a simplified manner to the extent possible.

②-1 Policy for selecting members to be surveyed

The policy for selecting members to be surveyed is as described below.

1. For each building, the columns, beams, and walls of the same section size are grouped on the basis of past drawing data.
2. The columns, beams, and walls of the same section size are assumed to have the same bar arrangement, and a member code is given to each of them. However, even when a corner pillar and a center pillar have the same section size, the bar arrangement is assumed to be different and different column codes are given, unless drawing data show that the bar arrangement is the same. In some cases, it is impossible to differentiate between an RC wall and a brick wall from past drawing data; the walls that were assumed to be RC walls and given the relevant code need to be verified on site if they were RC walls or not.
3. The on-site bar arrangement survey is conducted for one member per member code, with the location of the member being arbitrary. Measuring planes are four sides for columns, and one plane or two sides for walls depending on the thickness. As a rule, beams are visually inspected, and one side (the bottom) is inspected to the extent possible. When the bar arrangement cannot be confirmed with one member, multiple members are surveyed.

②-2 Items surveyed

The items surveyed are as described below.

- Rebar diameter (column/beam: main and shear reinforcements, wall: vertical and horizontal reinforcements)
- No. of rebars (column/ beam: main reinforcement)
- Reinforcement interval (column/beam: shear reinforcement, wall: vertical and horizontal reinforcements)
- Section size (column, beam, wall, and floor)
- Depth of concrete cover (column, beam, and wall)

For the items above, beams were surveyed through visual inspection as a rule to the extent possible.

②-3 Survey methods

To understand bar arrangement condition and member sections, the survey was conducted for each part using the method described in Table 2-4-74.

For the use of non-destructive inspection equipment, a policy that can serve as the standard was established to ensure that measurement results do not vary depending on the inspector. The survey was conducted by changing the policy as necessary, taking into account the condition of measurement instrument used by the inspector and circumstances at the site.

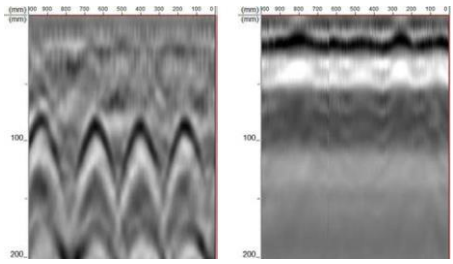
Table 2-4-74 Survey methods

Method used with equipment	Item	Part surveyed
Electromagnetic wave radar method	No. and interval of rebars	Column, wall
Electromagnetic induction method	Diameter*, numbers, and interval of rebars, Depth of concrete cover	
Measure / visual inspection	Member size, etc.	Beam, floor

③ Results

③-1 Survey of bar arrangement using the electromagnetic wave radar method

Figure 2-4-73 shows the result of an exploration using the electromagnetic wave radar method, which was conducted for a column of Building No.70. In an image obtained from an exploration using the electromagnetic wave radar method, rebar is usually shown as "mountain shapes" as in the image (a). The image (b) does not clearly show "mountain shapes" that were seen in the image (a), and rebar inside the member was extremely corroded at this part. These images indicate that the depth of concrete cover is greater in (a), but at the same time confirms that even if the depth of concrete cover is small, reinforcement corrosion can make an image unclear. Reinforcement corrosion has progressed in most of the buildings in Hashima, which prevented the confirmation of rebar with the electromagnetic wave radar method in some cases. In a survey using the electromagnetic induction method too, the location of rebar was not accurately detected in some cases when rebar was corroded or the depth of concrete cover was great. With these fundamental limits of measuring instruments, individual inspectors conducted the exploration by adapting to circumstances at the site.



(a)Waveform of sound reinforcement (b)Waveform of corroded reinforcement

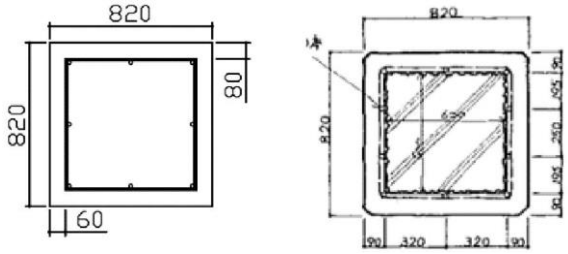
Figure 2-4-73 Electromagnetic wave radar image

③-2 Member section

A list of members was created using information obtained from the survey of bar arrangement. As mentioned earlier, from its fundamental limits, the reinforcement exploration with non-destructive testing did not confirm the condition of bar arrangement for all members. Moreover, due to circumstances including the accuracy of formwork at the time of construction, the same member on a drawing sometimes had different sizes; thus, the size of each member was checked for the survey at the site.

As an example of the results, the member structure of a column from Building No.17 is shown in Figure 2-4-74. While (a) shows the result obtained through the survey, (b) is a reinforcement plan for the member, which was confirmed in "Gunkanjima measurement survey data: Supplement revision - Empirical study of modern buildings in the Taisho and early Showa periods" (Akui, et. al, 2005). Concerning this particular member, both the data indicated the same size, and rebar was also confirmed to be the same.

In this way, a list of members was created to the extent possible with respect to those that could be explored at each building, as information used for the evaluation of structural safety.



(a)Survey result (b)Data

Figure 2-4-74 Electromagnetic wave radar image

③-3 Problems

The survey of bar arrangement was conducted for various buildings in Hashima through visual inspection and using non-destructive inspection equipment; as a result, the problems below emerged, which need to be solved to identify the condition of bar arrangement.

- Structural drawings do not survive.
- The change of design during construction and repeated reinforcement after completion led to a low degree of regularity in cross-sectional shape/condition of bar arrangement.
- Construction accuracy is not high, causing significant variations in cross-sectional shape/condition of bar arrangement.
- Conducting a reinforcement exploration using non-destructive inspection equipment is difficult for parts where a wall is clung to a column as well as parts where finishing material is thick on a member.
- In exposed rebar, expansion and a loss of cross-sectional area have progressed due to corrosion; the original reinforcement diameter cannot be identified.
- Reinforcement corrosion sometimes prevents non-destructive testing from producing accurate exploration results.

5) Survey and deterioration level of Building No.3

① Outline of the survey

To maintain and conserve RC structure buildings that have markedly deteriorated, it is necessary to evaluate structural safety performance by taking into account the deterioration level of each building and to use the results to consider proper repair measures. To this end, a survey was conducted for Building No.3 to understand deterioration levels and assess their effects on structural performance.

Standing at the highest altitude in Hashima, Building No.3 is a symbolic building. Photo 2-4-122 shows the appearance from the south, and Figure 2-4-75 indicates the location of Building No.3 within the island. Building No.3 has a semibasement, but it has not been investigated in detail; therefore, the survey covers the four Levels above ground excluding the semibasement. Table 2-4-75 provides an overview of the building. A framing plan was developed on the basis of "Gunkanjima measurement survey data: Supplement revision - Empirical study of modern buildings in the Taisho and early Showa periods" (Akui, et. al, 2005) and the survey results. It is common to all Levels, and Figure 2-4-76 shows the framing plan with member codes for the reference floor. As the figure indicates, the ridge direction (long axis) is X and the span direction (short axis) is Y.

Photo 2-4-122 Building No.3 appearance

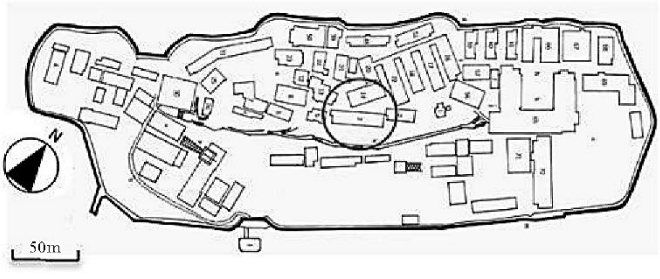
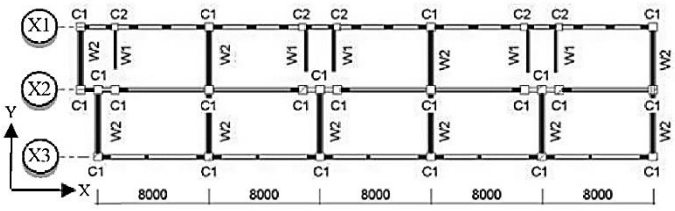


Figure 2-4-75 Building No.3 location map

Table 2-4-75 Building overview

Building		3
Constructed		1959
Use		Employee's house
Structure classification	Ridge direction	RC rigid-framed structure
	Span direction	RC rigid-framed structure with quake resisting walls
No. of Levels		Above ground 4 Levels + 1 semibasement Level
Total floor area		1,588 ㎡

Figure 2-4-76 Reference floor framing plan



Floor height	1–4 Levels: 2.9 m
Ground and foundation type	Onto rocks, spread foundation

② Survey

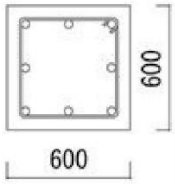
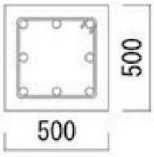
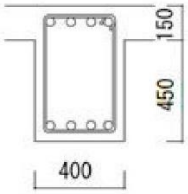
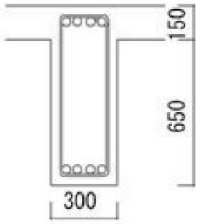
②-1 Member information

From the results of major frame dimensional measurement and reinforcement exploration, the column, beam, and wall were assumed as described in Table 2-4-76. The bar arrangement is unknown for floor slabs. Figures 2-4-77 and 2-4-78 show frame drawings for the base lines X1 and X3, respectively, which were created from the assumed member dimensions and the results of a non-structural wall location survey. The shaded areas represent openings. As an example, the measurement of beam dimensions is shown in Photo 2-4-123.

②-2 Deterioration conditions of structural members

In accordance with the standard described earlier, the deterioration levels of columns, walls, and beams were surveyed on each Level. The results are shown in Figure 2-4-79. The deterioration level of colorless members is 0. Damage of Deterioration level III or higher was not found in the columns, and damage of Deterioration level IV was confirmed in beams on Level 2 to Level 4 on the west side of the building.

Table 2-4-76 Building overview

Code	Column C1	Column C2	Ridge direction Beam	Span direction Beam
Cross section				
Dimensions	600×600	500×500	400×600	300×800
Main reinforcement	8-19Φ	8-19Φ	8-19Φ	8-19Φ
Hoop	□-Φ9@220	□-Φ9@220	□-Φ9@250	□-Φ9@250

Code	Quake resisting wall W1	Quake resisting wall W2
Thickness	200	250
Vertical reinforcement	Φ9@230	Φ9@230
Horizontal reinforcement	Φ9@230	Φ9@230

(mm)

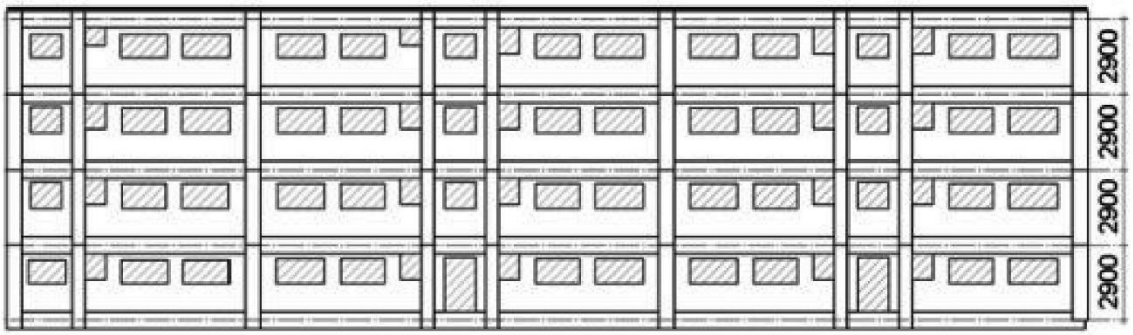


Figure 2-4-77 Frame drawing on base line X1

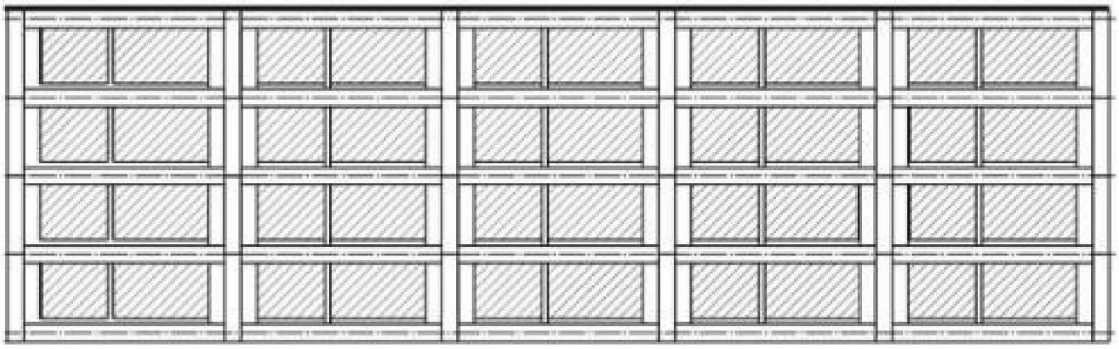


Figure 2-4-78 Frame drawing on base line X3

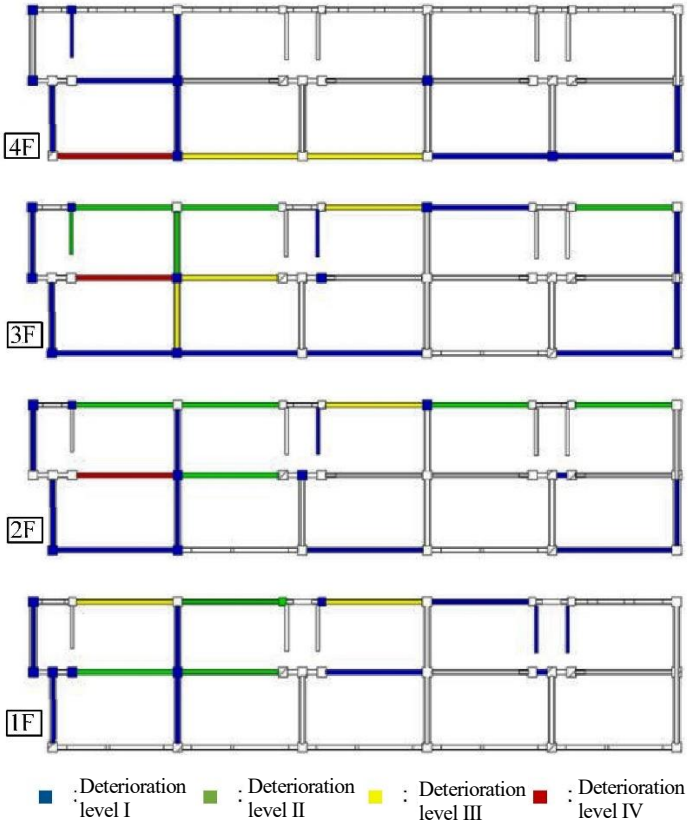


Figure 2-4-79 Structural member deterioration condition

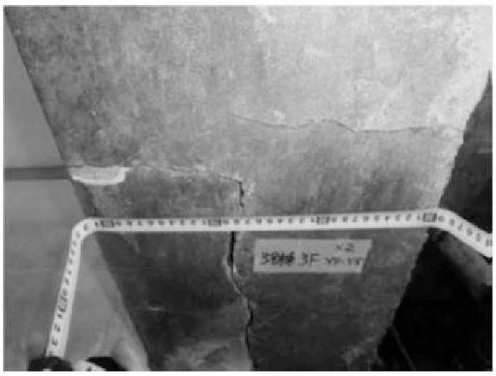


Photo 2-4-123 Beam dimension measurement

Photo 2-4-124 Interior fixture deterioration condition

③ Decrease in structural performance due to deterioration

Table 2-4-77 shows the residual vertical load bearing performance ratio R_L and the residual seismic performance ratio R_E of Building No.3, which were obtained using the methods described earlier. R_L is the lowest for Level 2 at 98%, indicating that deterioration had a small effect. Meanwhile, R_E is lower in the X direction than in Y direction, with a lowest ratio of 83%, which was obtained for Level 2 X direction. As Photo 2-4-124 shows, interior wooden fixtures are markedly deteriorated and damaged, but the progress of deterioration was relatively slow with respect to the structure.

Possible reasons for the relatively minor deterioration of the Building No.3 structure are that the building was completed in 1959 and is relatively new among the buildings in the island, and that it stands on high ground in the center of the island, making the building less likely to be affected by sea breezes than other buildings.

Table 2-4-77 Residual vertical load bearing performance ratio R_L / Residual seismic performance ratio R_E

Level		1	2	3	4
R_L		99%	98%	99%	99%
R_E	X direction	90%	83%	85%	87%
	Y direction	97%	96%	97%	98%

④ Summary

For Building No.3 in Hashima, the residual structural performance ratio was determined by surveying member details and deterioration levels. The results found that the deterioration of Building No.3 was relatively minor compared with that observed at other buildings.

6) Seismic diagnosis and static incremental analysis of Building No.3

① Outline of the survey

To maintain and conserve Hashima's RC buildings of high historical value, it is necessary to evaluate structural performance by taking into account deterioration levels. To this end, the seismic diagnosis and static incremental analysis of Building No.3 were performed to understand the seismic performance of target structures at the time of construction. The target structures are four Levels above ground, and a semibasement is excluded; only the weight is considered for the penthouse. Because material strength has not been surveyed, concrete and rebar are assumed to be Fc15 and SR235, respectively.

② Seismic diagnosis

The secondary seismic diagnosis is conducted in accordance with the "Standard and Technical Manual for Seismic Evaluation of Existing Reinforced Concrete Buildings" (Japan Building Disaster Prevention Association, 2001). To understand the seismic performance at the time of construction, the aging indicator T = 1.0 is used here. The evaluation results are shown in Table 2-4-78. The failure type and ductility index F of the member with respect to the X direction are shown in Figure 2-4-80, and the C_T-F relationship is shown in Figure 2-4-81. The Y direction, which has a large number of quake resisting walls, was determined to be Safe, with the seismic index of structure (Is) exceeding the seismic determination index of structure Iso (which was set at 0.6). Meanwhile, the X direction, which has a small number of quake resisting walls, was determined to be Questionable for Level 1 and Level 2 as many ultra-brittle columns were found on the north side X1 structure plane. However, the Is value is relatively high for a building constructed between 1955 and 1964.

Table 2-4-78 Residual vertical load bearing performance ratio R_L / Residual seismic performance ratio R_E

Direction	Level	EO	SD	T	IS	CTU・SD	Determination
X (ridge)	4	1.11	1.00	1.00	1.11	0.91	Safe
	3	0.76			0.76	0.48	Safe
	2	0.59			0.59	0.48	Questionable
	1	0.54			0.54	0.44	Questionable
Y (span)	4	2.53	1.00	1.00	2.53	2.53	Safe
	3	1.47			1.47	1.47	Safe
	2	1.02			1.02	1.02	Safe
	1	0.86			0.86	0.86	Safe

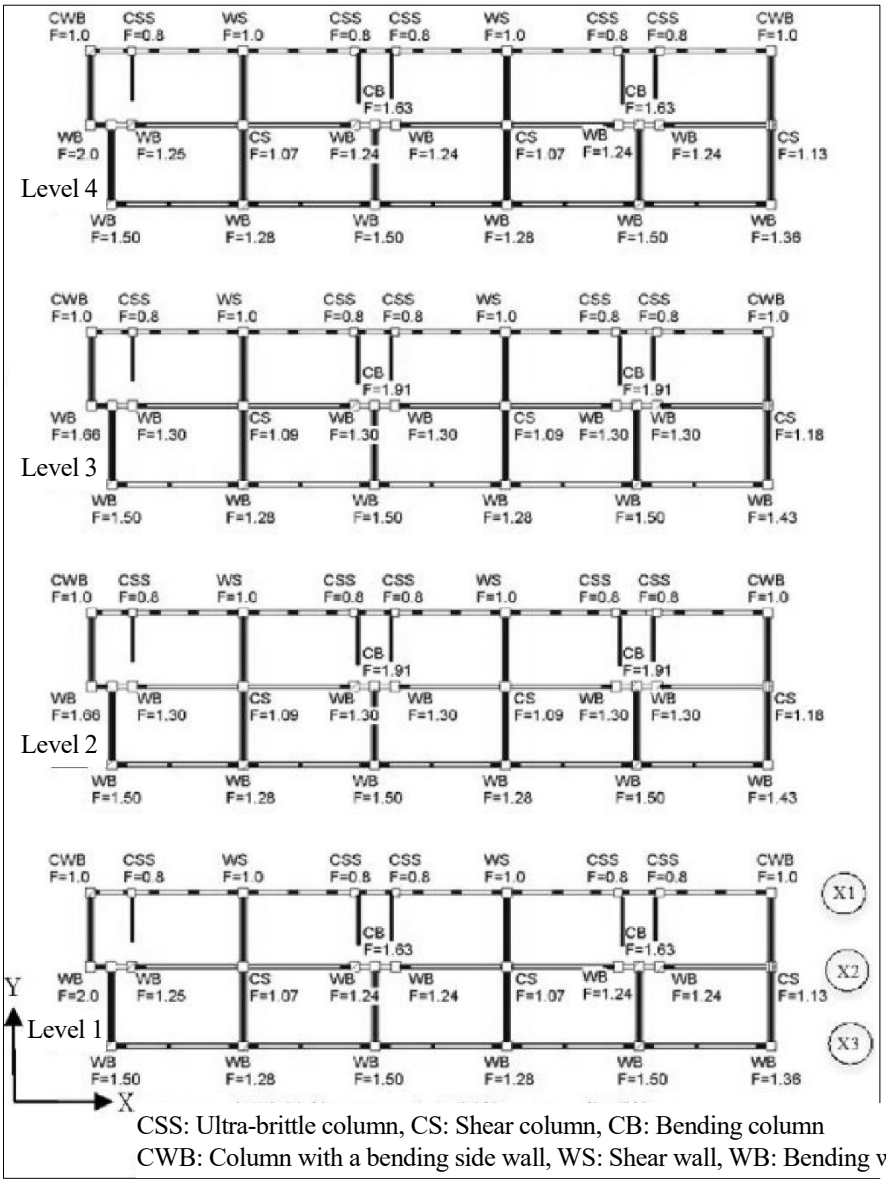


Figure 2-4-80 Failure type and ductility index F of the member (X direction)

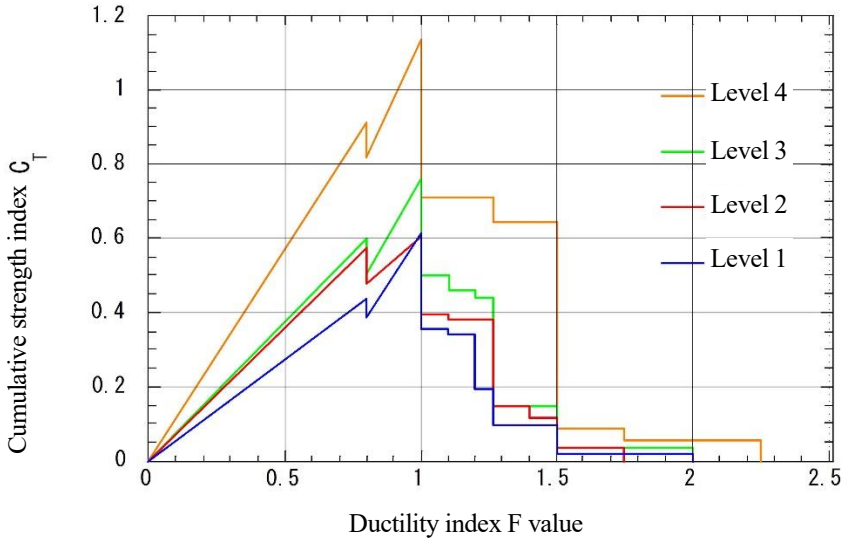


Figure 2-4-81 C_T-F relationship drawing (X direction)

③Analysis

The target structure Building No.3 was replaced by a three-dimensional frame model as shown in Figure 2-4-82, and elastoplastic response analysis was performed using analysis software SNAP Ver. 6.0.1.3 (Kozo System Inc.)

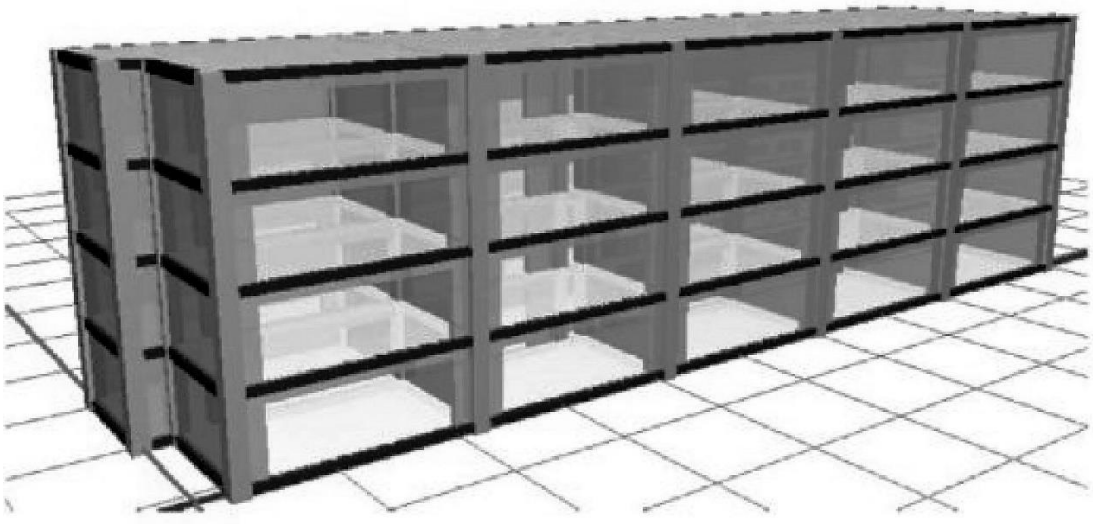


Figure 2-4-82 Three-dimensional frame model for analysis

③-1 Member model

Figure 2-4-83 shows a member spring model. For the column and beam, it is a composite model of a bending spring, shear spring, and axle spring as indicated in Figure 2-4-83 (a), while a quake resisting wall is replaced by three columns and rigid beams as shown in Figure 2-4-83 (b). For restoring force characteristics, based on the assumption of earthquake response analysis in the future, the Takeda model (Figure 2-4-84(a)) is adopted for the bending spring, the origin oriented type model (Figure 2-4-84 (b)), which considers proof strength deterioration, for the shear spring, and the linear elastic model for the axle spring. The flexural strength and shear capacity of a member are the same as values of the seismic evaluation.

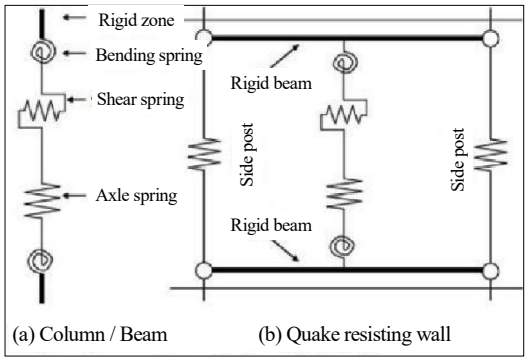


Figure 2-4-83 Member spring model

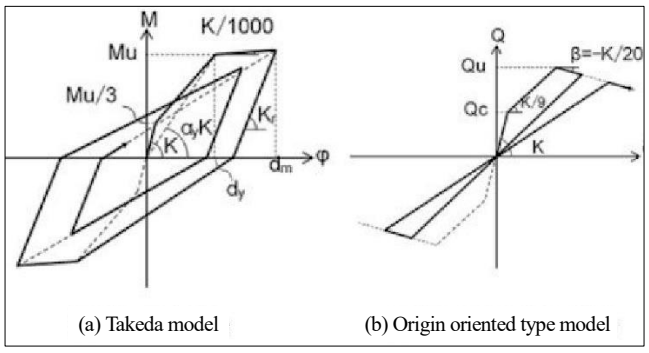


Figure 2-4-84 Restoring force characteristics

③-2 Static incremental analysis

The static incremental analysis was performed using incremental displacement until one of the stories reaches a story deformation angle of 1/200. Figure 2-4-85 shows the relationship between the story-shearing force of each story Q and the story deformation angle R with respect to the X direction. It indicates Level 1, which showed the minimum Is value in the seismic diagnosis, first achieved R = 1/200. Figure 2-4-86 shows the damaged condition of the X3 frame, which had the most noticeable damage. This figure reveals that damage is concentrated in beam ends and gradually exhibiting a beam yielding preceding total collapse mechanism. However, floor slabs have not been surveyed, and thus the beam model for analysis does not consider rebar of a floor slab, etc. under the current condition; detailed studies are required in the future.

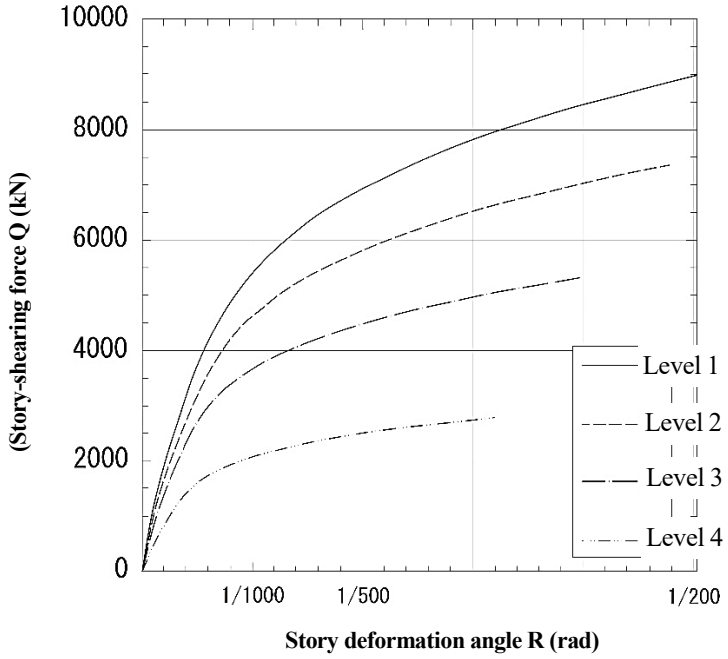


Figure 2-4-85 Story-shearing force Q - Story deformation angle R relationship (X direction)

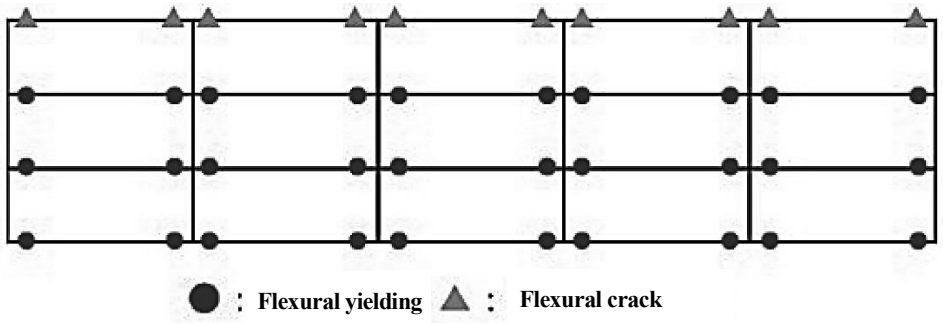


Figure 2-4-86 X3 frame damaged condition

④ Summary

For the maintenance and conservation of RC buildings in Hashima, the seismic performance of Building No.3 at the time of construction was evaluated. The seismic diagnosis revealed that seismic performance is insufficient in the ridge direction on Level 1 and Level 2, and the static incremental analysis found that the evaluation needs to be conducted using a beam model that considers floor slabs. This study evaluated the structural performance at the time of construction, but it is essential to conduct performance evaluations in the future by taking into account deterioration condition.

7) Structural performance decreasing rates for other buildings

① Outline

The structural performance decreasing rates for other buildings in Hashima were calculated using the method for classifying member deterioration levels described in "3) Evaluation of the structural performance deterioration level of the entire building" and the methods for calculating long-term performance and seismic performance decreasing rates shown in "4) Survey of bar arrangement," as explained in 5) and 6) by taking Building No.3 as an example. The buildings surveyed were the 30 buildings listed in Table 2-4-79, among the buildings that constitute Hashima. The number of Levels ranges from one to ten. Some buildings have a semibasement, which was treated as Level 1 above ground in the calculation of decreasing rates. The long-term performance of Building No.2 and the seismic performance (X direction) of Building 66 were excluded as it was difficult to conduct on-site surveys.

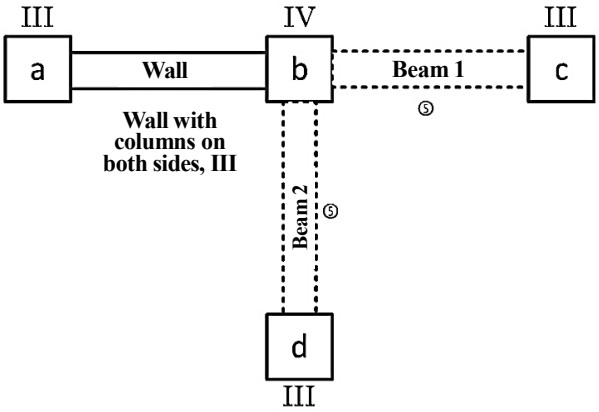
Table 2-4-79 Buildings surveyed and the calculation results of decreasing rates

Building	No. of Levels	Long-term performance	Seismic performance		
			X direction	Y direction	Minimum value
Building No.2	4	–	83%	100%	83%
Building No.3	4	98%	83%	96%	83%
Building No.8	1	72%	40%	17%	17%
Building No.13	4	95%	79%	83%	79%
Building No.16	9	73%	24%	30%	24%
Building No.17	9	79%	48%	20%	20%
Building No.18	9	81%	61%	50%	50%
Building No.19	9	82%	60%	56%	56%
Building No.20	6	77%	54%	51%	51%
Building No.21	5	78%	56%	26%	26%
Building No.25	4	66%	30%	6%	6%
Building No.30	7	44%	3%	3%	3%
Building No.31	6	73%	11%	26%	11%
Building No.39	3	88%	49%	73%	49%
Building No.50	1	75%	15%	27%	15%
Building No.51	9	83%	42%	18%	18%
Building No.56	3	83%	65%	57%	57%
Building No.57	6	42%	4%	13%	4%
Building No.60	5	83%	23%	25%	23%
Building No.61	5	77%	45%	27%	27%
Building No.66	5	76%	—	40%	40%
Building No.67	1	37%	1%	4%	1%
Building No.68	2	97%	78%	73%	73%
Building No.70	6	92%	66%	72%	66%
Building No.71	2	67%	35%	18%	18%
Building No.65 North	9	56%	12%	12%	12%
Building No.65 East	10	68%	20%	24%	20%
Building No.65 South	10	88%	80%	68%	68%
Chidori-so	2	46%	0%	86%	0%
Water tank	1	69%	18%	37%	18%

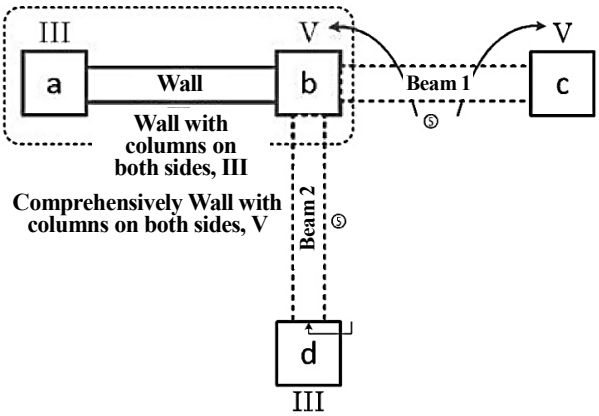
② Survey methods

In the survey, the deterioration levels of columns, beams, and bearing walls on each Level of each building were classified using the method described in "3) Evaluation of the structural performance deterioration level of the entire building" and recorded. The deterioration levels of the lower faces of the slabs were also classified although they are not used this time. The deterioration levels of walls were classified by dividing the walls into three types: walls with columns on both sides, walls with a column on one side, and walls without columns. Figure 2-4-87 shows the method for totaling the deterioration levels of wall and beam. First, the deterioration level of each member is recorded in a framing plan that is prepared in advance. When deterioration levels were calculated for long-term performance, only the deterioration levels of vertical members such as columns and walls were used without considering the influence of beams. This was based on the assumption that the vertical load acting on a slab can transfer mainly through the slab, even if the beams are deteriorated.

Meanwhile, concerning the seismic performance decreasing rate, the deterioration level of a beam is considered only when it works in the direction of consideration; when the deterioration level of a beam is greater than those of vertical members connecting to the both ends of the beam, the deterioration levels of those vertical members are replaced by the deterioration level of the beam. For example, if the deterioration level of each member is classified as shown in Figure 2-4-87 (a), in considering the seismic performance in the X direction, the deterioration levels of Column b (IV) and Column c (III) are replaced by V because the deterioration level of Beam 1 is ⑤ as shown in Figure 2-4-87(b). Further, when the seismic performance of a quake resisting wall is considered, the deterioration level is evaluated by including the side posts; it is replaced by the deterioration level of the column or the wall slab, whichever is greater, and determined to be V comprehensively as shown in Figure 2-4-87 (b). Note that Column d is not affected by the deterioration level of Beam 2 when the X direction is considered.



(a) Classification of member deterioration levels



(b) Totalization of the seismic performance in the X direction

Figure 2-4-87 Method for totalizing the deterioration levels of wall and beam

③ Calculation results of decreasing rates

Table 2-4-79 and Figure 2-4-88 shows the calculation results of long-term performance decreasing rates and seismic performance decreasing rates, respectively. For the long-term performance, decreasing rates are shown to be relatively low, with the exception of some buildings including Building No.30. For the seismic performance, decreasing rates are low around Building No.3, which is located in the center of the island; however, deterioration is noticeable particularly along the coast, with single-digit decreasing rates obtained for Buildings No.25, 30, 57, 67, and Chidori-so, indicating extremely low residual seismic performance.

(a) Long-term performance decreasing rate

(b) Short-term performance decreasing rate

Figure 2-4-88 Long-term and short-term performance decreasing rates calculated

8) Predictions of deterioration/structural performance decrease with the Markov chain based on the deterioration environment classification

① Outline

As mentioned in the section 2), the deterioration levels of RC structure buildings in Hashima were visually inspected. Among those buildings, Buildings No.16 to 20 (Figure 2-4-89) were selected to make predictions of member deterioration based on the Markov chain. In addition, the structural performance decrease was predicted for the buildings by calculating the future residual vertical load bearing performance ratio R_L and the residual seismic performance ratio R_E.

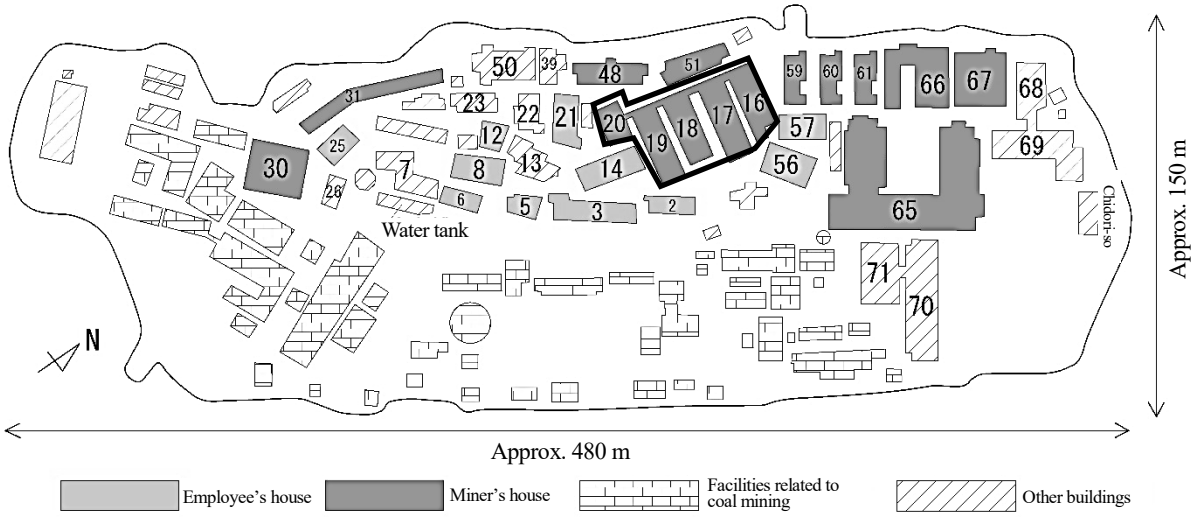


Figure 2-4-89 Buildings No.16 to 20 layout drawing

② Markov chain application method

②-1 Creation of a matrix

The deterioration transition matrix based on the Markov chain was set as Equation (1). It was assumed that the deterioration levels were 0 at the time of construction completion for all members and that the deterioration levels of the members that were repaired/reinforced at some point in time were 0 for that year. That is, assuming $X_0' = 1$ and $X_{I-V}' = 0$, the number of years elapsed to date was substituted for t, and the transition probabilities P_{0-4} were calculated so that they are consistent with the percentage of current deterioration level X_{0-V}.

$$\begin{pmatrix} X_0 \\ X_I \\ X_{II} \\ X_{III} \\ X_{IV} \\ X_V \end{pmatrix} = \begin{pmatrix} 1-P_0 & 0 & 0 & 0 & 0 & 0 \\ P_0 & 1-P_1 & 0 & 0 & 0 & 0 \\ 0 & P_1 & 1-P_2 & 0 & 0 & 0 \\ 0 & 0 & P_2 & 1-P_3 & 0 & 0 \\ 0 & 0 & 0 & P_3 & 1-P_4 & 0 \\ 0 & 0 & 0 & 0 & P_4 & 1 \end{pmatrix}^t \begin{pmatrix} X_0' \\ X_I' \\ X_{II}' \\ X_{III}' \\ X_{IV}' \\ X_V' \end{pmatrix}$$

Equation (1) :

X_{0-V}: Percentage of current deterioration level P_{0-4} : Transition probability
X_{0-V}': Percentage of deterioration level for t years ago t: Number of years elapsed

②-2 Classification of deterioration environments

In applying the Markov chain to the prediction of deterioration progress, it is necessary to assume that the members in question are in the same deterioration environment. That is, for members having distinct rates of deterioration progress, their transition probabilities should be separately calculated. Since the corrosion of rebar plays a dominant role in the deterioration progress of RC members, the deterioration environments were classified by focusing on factors related to the corrosion rate of rebar. Although there are wide-ranging, direct and indirect

factors related to the corrosion of rebar, water content, salt content, and the depth of concrete cover were considered in this survey. The other factors were regarded as factors that should be included in the probability and evaluated because these factors are considered the same between members, or a clear difference cannot be found for these factors.

From the survey of Building No.16, there were differences between column and beam members in the frequency of the depth of concrete cover (Figure 2-4-90). Because Buildings No.16 to 20 were constructed in almost the same form in almost the same period, the depth of concrete cover was assumed to be similar across all the buildings, and the classification was made with respect to column and beam members. As environments related to water content and salt content, the presence or absence of areas exposed to the rain as well as the incoming salt amount were considered. In classifying incoming salt environments, we used the salinity transport equations for Hashima (Equations 2-1 and 2-2) (Shun Shimizu, et al., "Discussions on the state of incoming salt transport in Gunkanjima, Nagasaki Prefecture" 2015 / Shun Shimizu, et al., "Salt damage in Gunkanjima, Nagasaki Prefecture: Result of a three-year survey and creation of an incoming salt transport estimation map"), and tried to minimize variations in the number of members surveyed between classifications. From these, the deterioration environments in Hashima were classified as shown in Table 2-4-80.

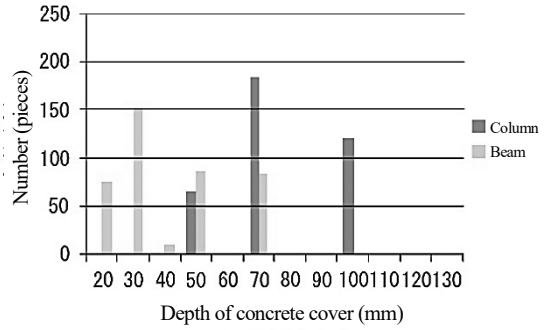


Table 2-4-80 Deterioration environment classification

Presence or absence of areas exposed to the rain	Annual average incoming salt amount	Effect of the depth of concrete cover
Outside	High (20 mdd～)	Column, beam
	Medium (4～20 mdd)	
	Low (～4 mdd)	
Inside	Hardly reaches due to the external wall	Column, beam

$$A_0 = 2.2784 \times (V_a - 1)^2 \quad (V_a \geqq 1) \qquad \text{Equation (2-1)}$$

$$A = A_0 \left(\frac{D \cdot H}{D_0 \cdot H_0}\right)^{-\alpha} \qquad \text{Equation (2-2)}$$

A_0: Incoming salt amount generated at a given point (mg/dm²/day) V_a: Average wind speed(m/s)
A: Incoming salt amount at a given point (mg/dm²/day) D: Distance from the coast at a given point (m)
H: Altitude of a given point (m) D_0: Distance from the coast at the hospital (m)
H_0: Altitude of the hospital (m) α: Attenuation coefficient (1.47)

Figure 2-4-90 Frequency distribution of the depth of concrete cover for Building No.16

③ Transition probabilities and deterioration curves

Figure 2-4-91 shows the transition probabilities for columns (including walls without a column) and beams calculated using the method described above. Figure 2-4-92 shows the deterioration curves drawn by the expected values, which are calculated from each transition probability and deterioration level. The expected values were rounded off to the closest whole number.

As a general trend, members existing outside rather than inside and those in severer incoming salt environments were shown to have higher transition probabilities and deterioration progress rates. The deterioration curves indicated that the deterioration progress is faster in beams than in columns for all the classifications.

The areas that do not follow the trend above may have members that do not fit the environments classified in this survey. For example, even members that are determined to be inside could have areas exposed to the rain or salt adhesion if there are large openings around them, or even areas that are determined to have a large incoming salt amount could have a small amount of salt adhesion depending of the direction of the building or wind conditions in the neighborhood.

Therefore, it is important to have more appropriate environment classifications to obtain more reliable transition probabilities, but members in severer deterioration environments are predicted to be faster in deterioration progress

and those in milder deterioration environments are forecast to be lower in deterioration progress (Figures 2-4-91 and 2-4-92); thus, the predictions can be at least more realistic than a case where no classification is made.

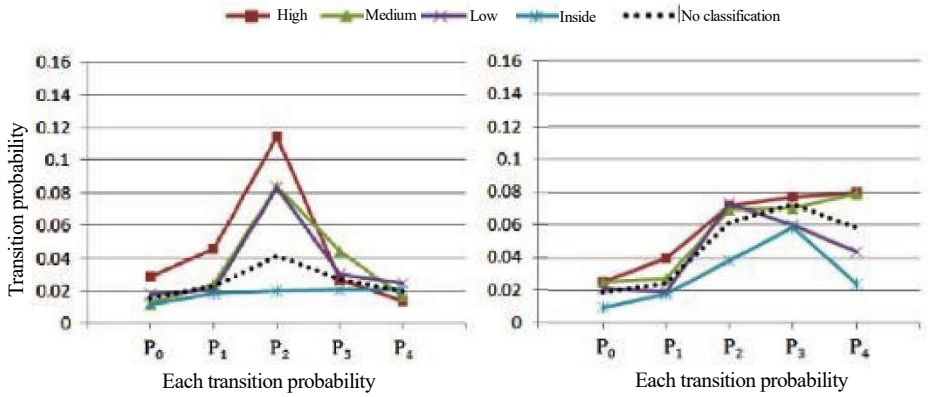


Figure 2-4-91 Transition probability (left: column, right: beam)

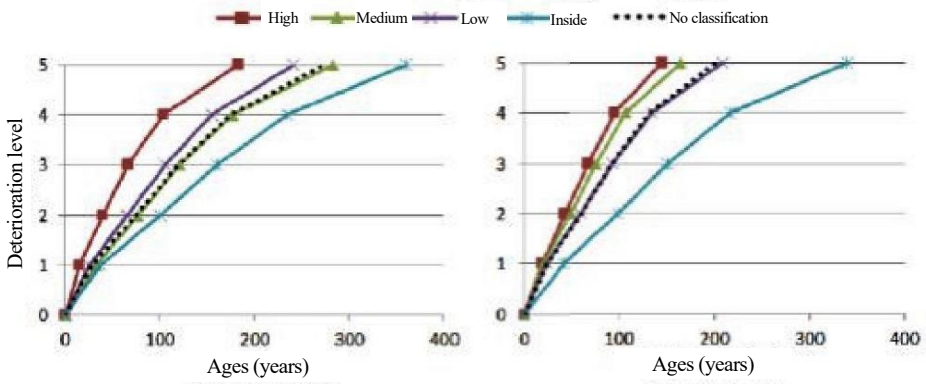


Figure 2-4-92 Deterioration curve (left: column, right: beam)

④ Prediction results for structural performance

Figure 2-4-93 shows the results of calculation and prediction of R_E for all Levels. For each building, the long-side direction is the X direction and the short-side direction the Y direction. The figure indicates that the Y direction has higher values of R_E and is lower in deterioration progress than the X direction across all the buildings. This is attributed to the fact that in the Y direction there are many inside wall members that have a low deterioration progress rate. Figure 2-4-94 shows the results of calculation and prediction of R_L for all Levels. Concerning R_L values, it was predicted that the values will not significantly change over the next 30 years for all the buildings, and after that, Building No.16 will deteriorate at a relatively high rate while Building No.20 will deteriorate at a relatively low rate. This difference may be affected by the distances from the coast.

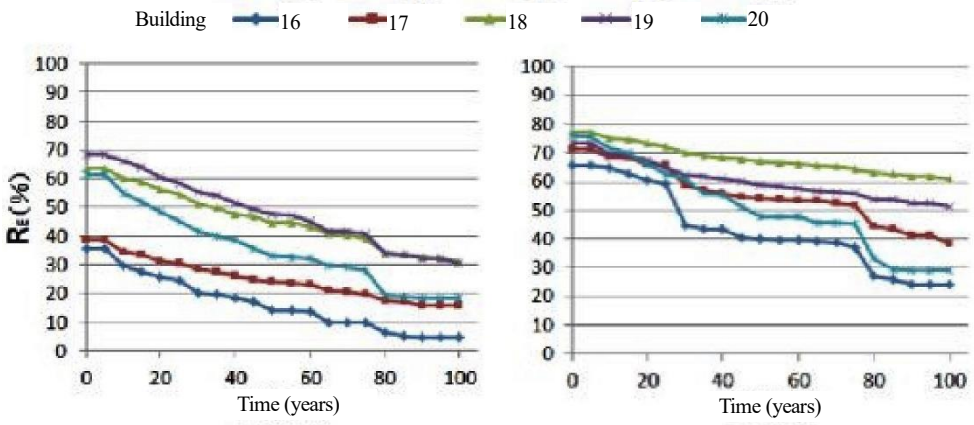


Figure 2-4-93 Prediction of residual seismic performance ratio R_E (left: X direction, right: Y direction)

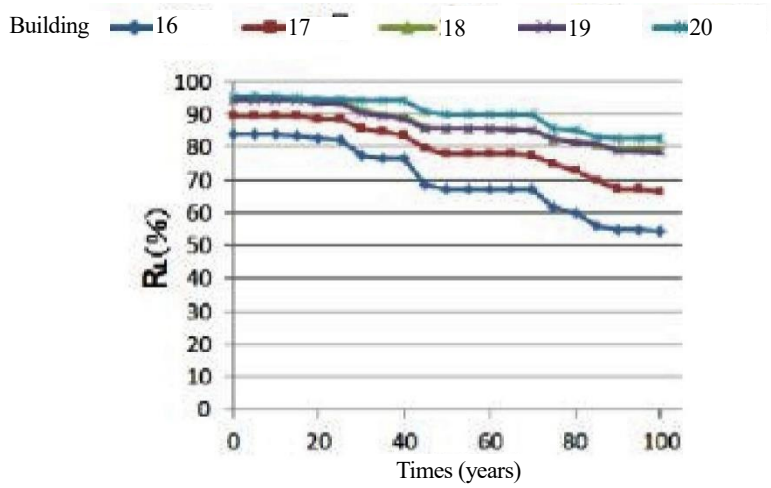


Figure 2-4-94 Prediction of residual vertical load bearing performance ratio R_L

⑤ Summary

1. The deterioration environments of RC members in Hashima were classified by the presence or absence of areas exposed to the rain, the incoming salt amount, and the depth of concrete cover. As a result, members having areas exposed to the rain and larger incoming salt amounts tended to show higher deterioration progress rates. In a comparison between columns and beams, deterioration progress was confirmed to be faster in beams. This may be affected by the depth of concrete cover.
2. The residual seismic performance ratio R_E was predicted for Buildings No.16 to 20. As a result, it was predicted that the Y direction will show greater values and be slower in progress of decrease than in the X direction across all the buildings.
3. The residual vertical load bearing performance ratio R_L was predicted for Buildings No.16 to 20. As a result, it was predicted that current residual ratio will not significantly change over the next 30 years for all the buildings, and after that, R_L will decrease relatively fast for Building No.16 while it will decrease relatively slowly for Building No.20.

9) Effect of material properties on the deterioration rate

① Outline

Since it is important to understand factors affecting deterioration in order to conserve buildings in Hashima, the degree of effect of material properties on the deterioration rate was evaluated. As material properties of members, the items listed in Table 2-4-81 were evaluated, and their measurement points are as shown in Table 2-4-82.

Table 2-4-81 Material properties

Code	Item	Measurement method
a	Initial total chloride ion concentration	Calculated through regression analysis using Fick's diffusion equation from the EPMA result of drilled core, and averaged for each building
b	Apparent diffusion coefficient of chloride ion	Same as above
c	Mass moisture content	A concrete piece near the rebar location was collected; then calculated by measuring the mass immediately after collection and absolute dry condition after drying it using a 105°C dryer
d	Surface air permeability coefficient	Measured using a Torrent tester
e	Depth of concrete cover	Measured through core drilling and chipping, or using an RC radar
f	Total pore quantity	A concrete piece near the rebar location was collected; then measured using the mercury press-in method

Table 2-4-82 Measurement point

Code	Location	Material age at survey (y)	Deterioration level	Items measured					
				a	b	c	d	e	f
①	Level 1 of Building No.30	99	V						
②	Level 1 of Building No.16	97	III	○		○	○	○	○
③	Level 3 of Building No.16	97	III	○	○	○	○	○	○
④	Level 3 of Building No.16	97	III	○	○	○	○	○	○
⑤	Level 1 of Building No.25	84	V	○	○	○	○	○	○
⑥	Level 1 of Building No.57	76	0	○	○	○	○	○	○
⑦	Level 1 of Building No.65 North	70	V	○	○	○	○	○	○
⑧	Level 1 of Building No. 65 North	70	IV	○	○	○	○	○	○
⑨	Level 1 of Building No.65 North	70	II			○	○		
⑩	Level 1 of Building No.65 East	66	I	○	○	○	○	○	○
⑪	Level 1 of Building No.65 East	66	V				○		
⑫	Level 2 of Building No.65 East	66	0			○	○		
⑬	Level 2 of Building No.65 East	66	II				○		
⑭	Level 1 of Building No.59	62	I				○		
⑮	Level 1 of Building No.59	62	0				○		
⑯	Level 1 of Building No.59	62	I			○			
⑰	Level 1 of Building 65 No.South	57	I	○	○	○	○	○	○

② Deterioration rate

②-1 Transition probability

The transition probability of each building is shown in Figure 2-4-95. This transition probability was calculated on the basis of the deterioration levels of a shear column, wall without a column, wall with a column on one side, wall with columns on both sides, and beam. To obtain accurate transition probabilities, only the buildings that had at least one member for each of all the deterioration levels were surveyed.

The transition probability is a probability of an increase in the deterioration level in a certain unit of time; in other words, it is a value that has a relationship with a kind of deterioration rate (Kenichi Komure, et al, "Development of a deterioration progress model due to salt damage at landing bridge upper part work," 2002). Figure 2-4-95 indicates that each deterioration level has a different rate of transition to the following deterioration level. Particularly, they tend to be $P_1 < P_2 < P_3$, that is, the transition of deterioration levels accelerates from Deterioration level I to IV. Toyoaki Miyagawa, et al argue that the corrosion rate increases after corrosion cracks are caused; the characteristics of the transition probabilities obtained in this study are thought to have a trend similar to that (Toyoaki Miyagawa, et al, "Life prediction and durability design of concrete structures in a saline atmosphere," 1988) .

②-2 Expected value of the deterioration level

In an attempt to eliminate the influence of aging in deterioration, the future deterioration level of each member was predicted as an expected value and adjusted to the same material age. Equation (1) is used to obtain the expected value of the deterioration level for the member that was determined to be Deterioration level II in 2015.

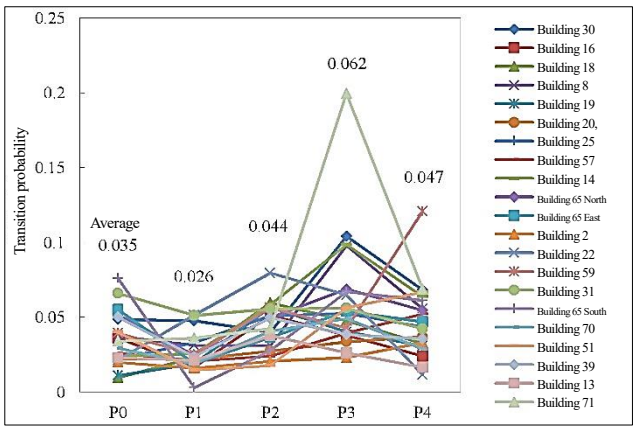


Figure 2-4-95 Transition probability

$$E = (0 \quad 1 \quad 2 \quad 3 \quad 4 \quad 5) \begin{pmatrix} 1-P_0 & 0 & 0 & 0 & 0 & 0 \\ P_0 & 1-P_1 & 0 & 0 & 0 & 0 \\ 0 & P_1 & 1-P_2 & 0 & 0 & 0 \\ 0 & 0 & P_2 & 1-P_3 & 0 & 0 \\ 0 & 0 & 0 & P_3 & 1-P_4 & 0 \\ 0 & 0 & 0 & 0 & P_4 & 1 \end{pmatrix}^{t-t_{2015}} \begin{pmatrix} 0 \\ 0 \\ 1 \\ 0 \\ 0 \\ 0 \end{pmatrix}$$

Equation (1)

where,

E : Expected value of the deterioration level

$P_0 \sim P_4$: Transition probabilities for buildings

t : A given material age

t_{2015} : Material age at 2015

③ Material properties and deterioration rates

③-1 Initial total chloride ion concentration and transition probability

Figures 2-4-96 to 2-4-100 show the relationship between the initial total chloride ion concentration and each transition probability. As these figures indicate, the higher initial total chloride ion concentration was, the higher P_1 to P_4 tended to become. Higher initial total chloride ion concentrations seem to have shorter time to reach the chloride ion threshold for corrosion and hence higher deterioration rates. It should be noted that many buildings in Hashima have chloride ion concentrations that already exceed the chloride ion threshold for corrosion provided in the "Standard Specifications for Concrete Structures" (Japan Society of Civil Engineers, 2012). No correlation was seen for P_0, for which further studies are required.

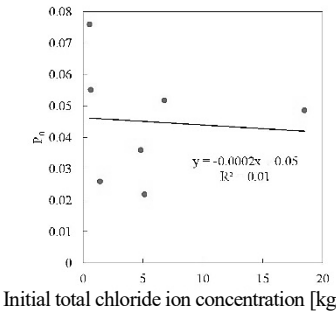


Figure 2-4-96 Initial total chloride ion concentration and P_0

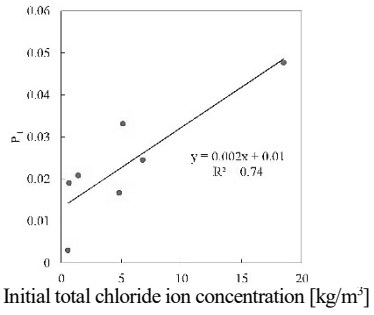


Figure 2-4-97 Initial total chloride ion concentration and P_1

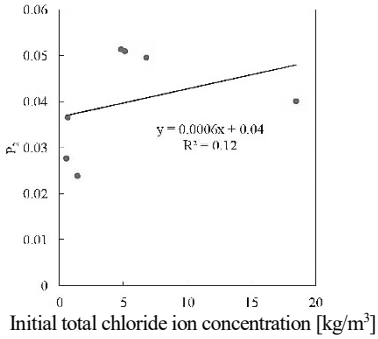


Figure 2-4-98 Initial total chloride ion concentration and P_2

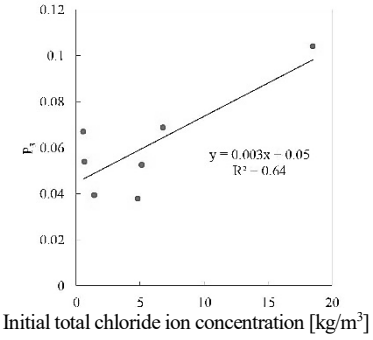


Figure 2-4-99 Initial total chloride ion concentration and P_3

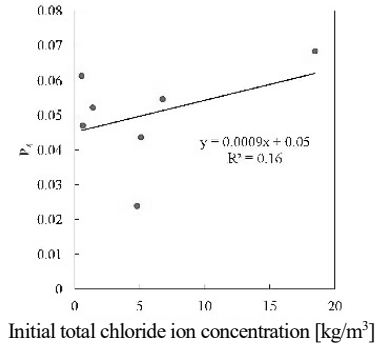


Figure 2-4-100 Initial total chloride ion concentration and P_4

③-2 Other material properties and expected values of deterioration levels

Figures 2-4-101 to 105 show the relationships between the expected values of deterioration levels and the apparent diffusion coefficient of chloride ion, mass moisture content, surface air permeability coefficient, and depth of concrete cover. Here, the expected values of deterioration levels were calculated for each member by excluding Buildings No.30 and 16, for which repair records remain, and by adjusting the material ages to 84 years, which is the material age of Building No.25, the oldest building. As these figures indicate, the higher the mass moisture content and the surface air permeability coefficient are, the greater the expected values of deterioration levels at material age 84 tended to become. The mass moisture content seems to affect the flowability of corrosion current, while the surface air permeability coefficient is considered to influence the degree of ease of the ingress of oxygen, which is a steel corrosion factor, into members. A mortar finish has been applied to all of these members with the exception of Member ⑭, which is exposed concrete. No clear trend was shown in the apparent diffusion coefficient of chloride ion, depth of concrete cover, or total pure quantity.

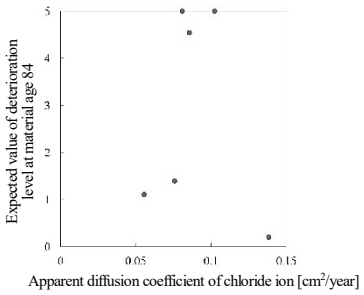


Figure 2-4-101 Apparent diffusion coefficient of chloride ion and expected value of deterioration level

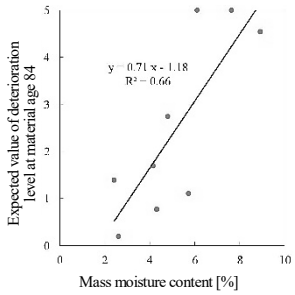


Figure 2-4-102 Mass moisture content and expected value of deterioration level

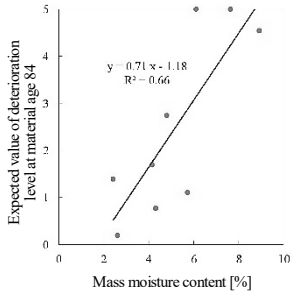


Figure 2-4-103 Surface air permeability coefficient and expected value of deterioration level

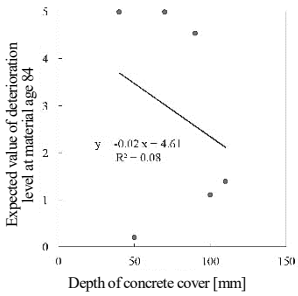


Figure 2-4-104 Surface air permeability coefficient and expected value of deterioration level

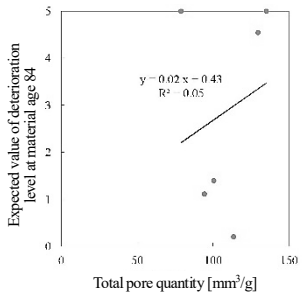


Figure 2-4-105 Surface air permeability coefficient and expected value of deterioration level

④ Summary

Table 2-4-83 shows the correlation coefficients obtained from the studies described above. The initial total chloride ion concentration, mass moisture content, and surface air permeability coefficient were found to have a relatively large effect on the deterioration rate.

Table 2-4-83 Correlation coefficient

Item	Correlation coefficient
Initial total chloride ion concentration	0.01–0.74
Apparent diffusion coefficient of chloride ion	-
Mass moisture content	0.66
Surface air permeability coefficient	0.35
Depth of concrete cover	0.08
Total pore quantity	0.05

10) Summary and future tasks

All of the reinforced concrete structures that exist today in the Hashima Coal Mine remains have damage in reinforced concrete members caused by reinforcement corrosion and are in a condition that requires repair/reinforcement. However, the degrees of reinforcement corrosion and damage of reinforced concrete members vary depending on the number of years that have elapsed since construction, the incoming salt amount, and the state of water supply to reinforced concrete members. Some buildings, including Building No.3, which is a reinforced concrete structure with a small number of years elapsed and a small amount of incoming salt, have high residual vertical load bearing performance ratios and residual seismic performance ratios, maintaining the structural safety at the time of construction to some degree. On the other hand, in some of the reinforced concrete structures built in locations where there is a large amount of incoming salt, reinforcement corrosion has excessively progressed, and part of members has collapsed; there are even buildings that are considered to barely maintain vertical load bearing performance without any seismic performance (Buildings No.25, 30, 57, 67, and Chidori-so).

However, in order to properly evaluate the vertical load bearing performance and seismic performance of the reinforced concrete structures that exist today in the Hashima Coal Mine remains, it is necessary to evaluate the vertical load bearing performance and seismic performance in the condition at the time of construction, in which no deterioration is caused. To do that, the concrete strength and the condition of bar arrangement need to be accurately understood for each reinforced concrete structure. On the basis of these data, the current vertical load bearing performance and seismic performance need to be estimated by considering the residual vertical load bearing performance ratio and residual seismic performance ratio that reflect the state of deterioration progress.

(3) Material strength testing

To understand the present condition of accommodation facilities in the Hashima Coal Mine remains, the surveys below were conducted with the aim of scientifically studying/analyzing the current deterioration state.

1) Studies including concrete compressive strength for accommodation facilities (Buildings No.3, 16, and 65)
2) Distributions of pH and chloride ion in concrete as the present condition of accommodation facilities
3) Deterioration prediction using the Markov chain

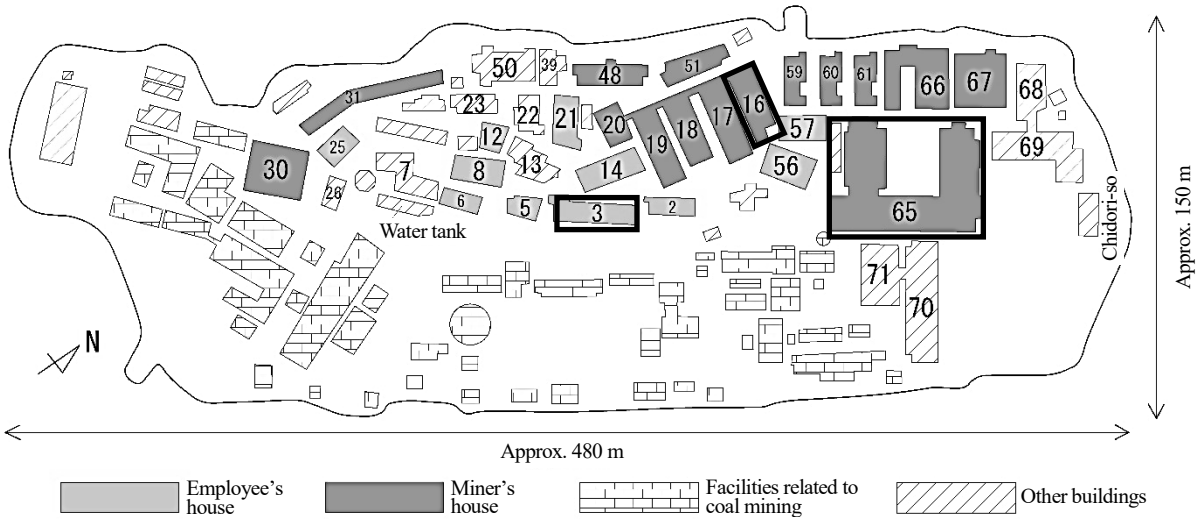


Figure 2-4-106 Location map of buildings surveyed

1) Results of concrete compressive testing for Buildings No.3, 16, and 65

Concrete cores were sampled at Buildings No.3, 16, and 65 and compressive testing was conduct. Core sampling locations and results of compressive testing at each building are shown in Figures 2-4-107 to 109 and Tables 2-4-84 to 86, respectively. Despite a large standard deviation noted for all the buildings, the average compressive strength was 18.4 (N/mm^2) for Building No.3, 21.6 (N/mm^2) for Building No.16, and 15.2 (N/mm^2) for Building No.65, showing values equivalent or superior to concrete strength generally seen at the time of construction. When the structural safety is evaluated by considering the current deterioration state, Building No.3 has almost no problems in light of the current earthquake standards and is unlikely to collapse in case of a moderate earthquake, although there is a concern in case of a large earthquake.

On the other hand, Buildings No.16 and 65 have insufficient structural performance and there is a fear of suffering huge damage even from a moderate earthquake.

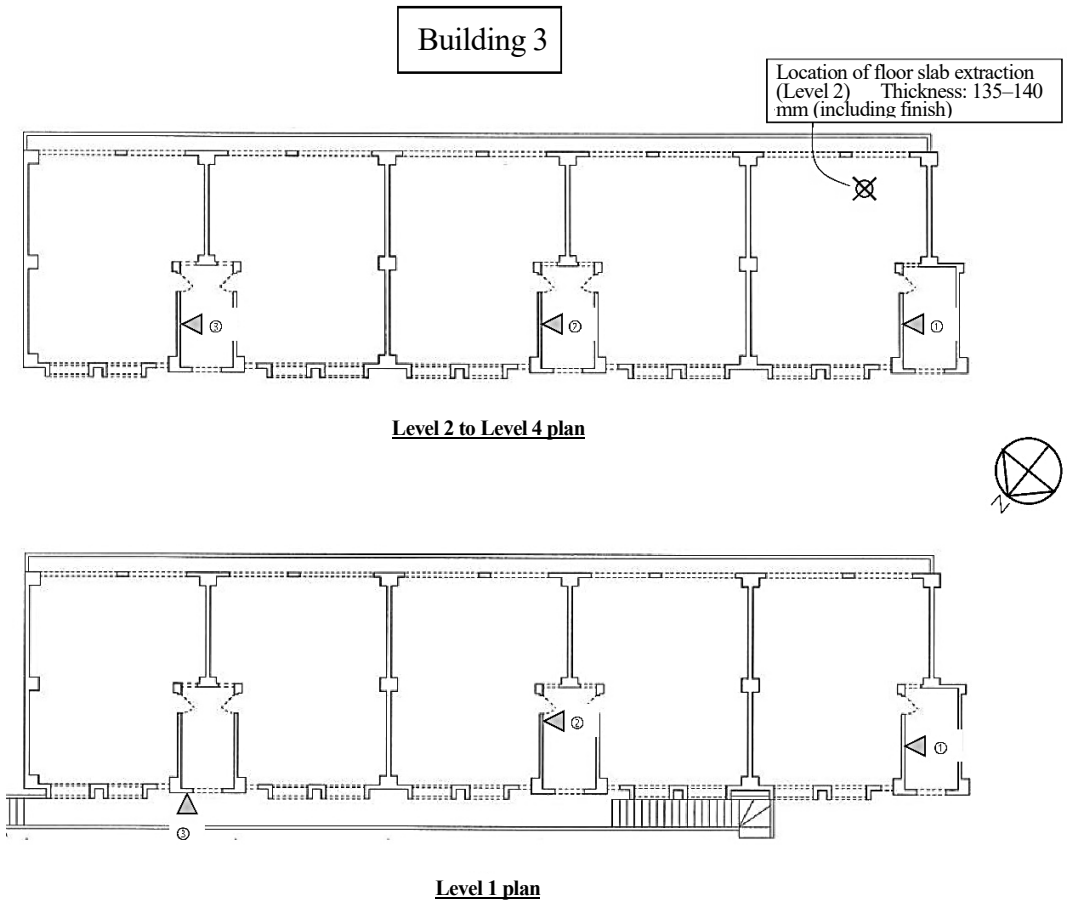


Figure 2-4-107 Locations of concrete core sampling for compressive testing at Building No.3

Table 2-4-84 Results of concrete compressive testing (Building No.3)

Level	Core number	Diameter d (mm)	Height h (mm)	h/d	Correction coefficient JISA 1107	Compressive strength (N/mm2)		Young's modulus
						Before correction	After correction	(104N/mm2)
4	①	103	113	1.10	0.893	31.2	27.8	1.32
	②	103	129	1.26	0.931	15.4	14.3	1.46
	③	103	133	1.29	0.935	19.6	18.3	1.65
					Average	22.0	20.1	1.48
3	①	104	136	1.31	0.937	22.3	20.9	1.30
	②	103	131	1.27	0.932	21.0	19.6	1.86
	③	104	132	1.28	0.933	13.8	12.9	1.58
					Average	19.0	17.8	1.58
2	①	103	137	1.33	0.939	20.6	19.3	2.37
	②	103	137	1.33	0.940	20.3	19.0	1.57
	③	103	125	1.21	0.921	17.5	16.1	1.15
					Average	19.4	18.1	1.70
1	①	103	145	1.41	0.949	18.3	17.4	1.70
	②	103	150	1.46	0.955	19.0	18.1	1.89
	③	103	124	1.21	0.919	18.7	17.2	1.09
					Average	18.7	17.6	1.56
					Over-all average	19.8	18.4	1.58
					Standard deviation	4.3	3.7	0.36

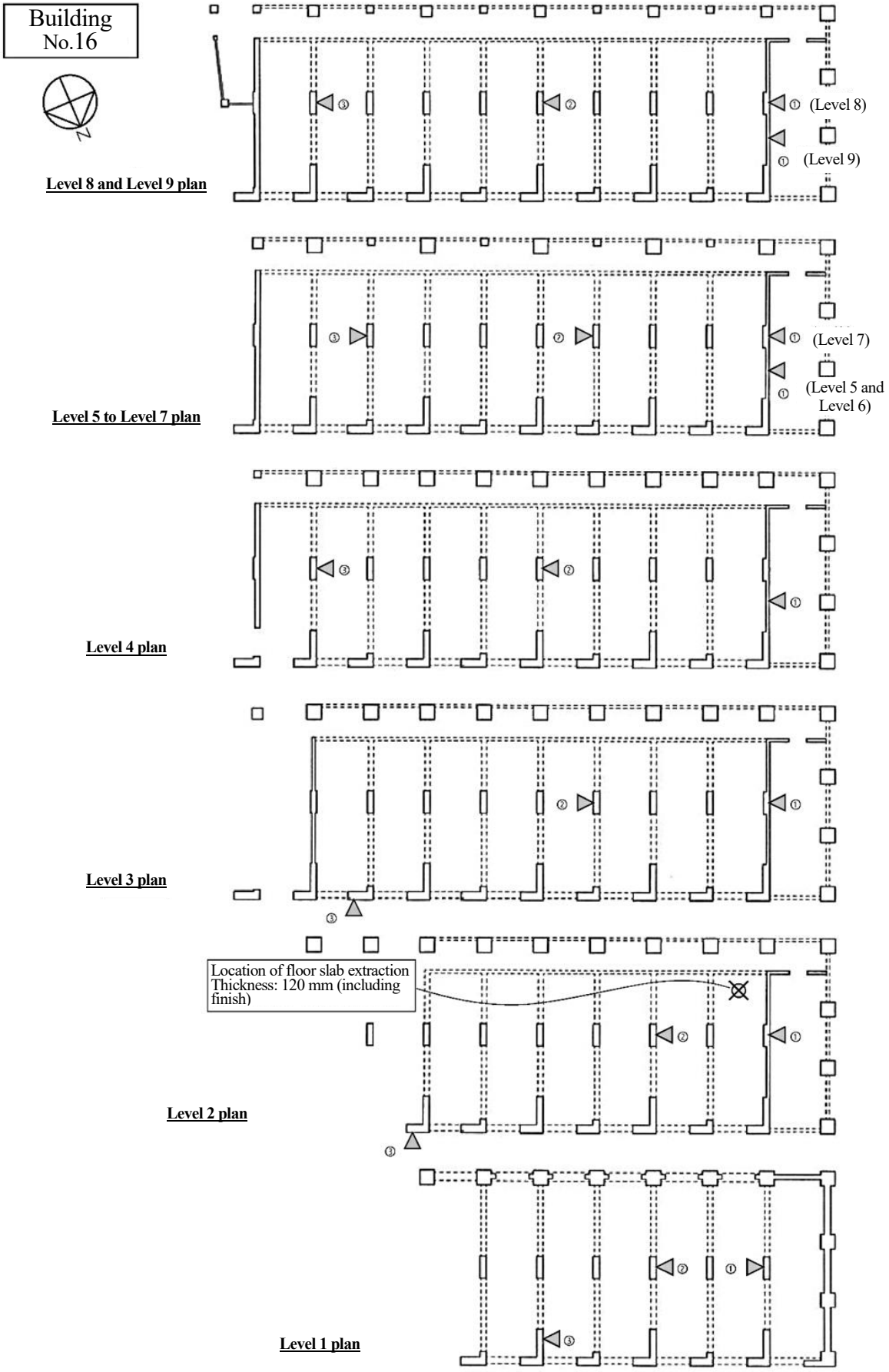


Figure 2-4-108 Locations of concrete core sampling for compressive testing at Building No.16

Table 2-4-85 Results of concrete compressive testing (Building No.16)

Level	Core number	Diameter d (mm)	Height h (mm)	h/d	Correction coefficient JISA 1107	Compressive strength (N/mm2)	
						Before correction	After correction
9	①	104	207	1.99	1.000	24.3	24.3
	②	104	193	1.86	0.989	17.8	17.6
	③	104	174	1.67	0.974	24.5	23.8
					Average	22.2	21.9
8	①	104	180	1.74	0.979	18.5	18.1
	②	104	171	1.64	0.971	18.4	17.9
	③	104	178	1.72	0.977	29.0	28.3
					Average	22.0	21.4
7	①	104	190	1.83	0.986	27.2	26.8
	②	104	192	1.84	0.987	15.9	15.7
	③	104	171	1.65	0.972	16.9	16.4
					Average	20.0	19.6
6	①	104	146	1.41	0.949	27.6	26.1
	②	104	204	1.97	1.000	23.6	23.6
	③	104	192	1.84	0.988	27.4	27.1
					Average	26.2	25.6
5	①	104	141	1.35	0.943	27.8	26.2
	②	104	212	2.04	1.000	20.0	20.0
	③	104	201	1.93	1.000	15.8	15.8
					Average	21.2	20.6
4	①	104	138	1.33	0.939	20.0	18.8
	②	104	145	1.40	0.948	32.8	31.1
	③	104	126	1.22	0.922	34.2	31.6
					Average	29.0	27.1
3	①	104	145	1.39	0.947	13.1	12.4
	②	104	208	2.00	1.000	18.6	18.6
	③	104	164	1.58	0.966	22.5	21.8
					Average	18.1	17.6
2	①	104	157	1.51	0.961	22.1	21.2
	②	104	148	1.43	0.951	23.5	22.4
	③	104	203	1.96	1.000	15.2	15.2
					Average	20.3	19.6
1	①	104	190	1.83	0.987	26.1	25.7
	②	104	195	1.87	0.990	13.9	13.7
	③	104	209	2.01	1.000	24.4	24.4
					Average	21.5	21.3
					Over-all average	22.3	21.6
					Standard deviation	5.60	5.30

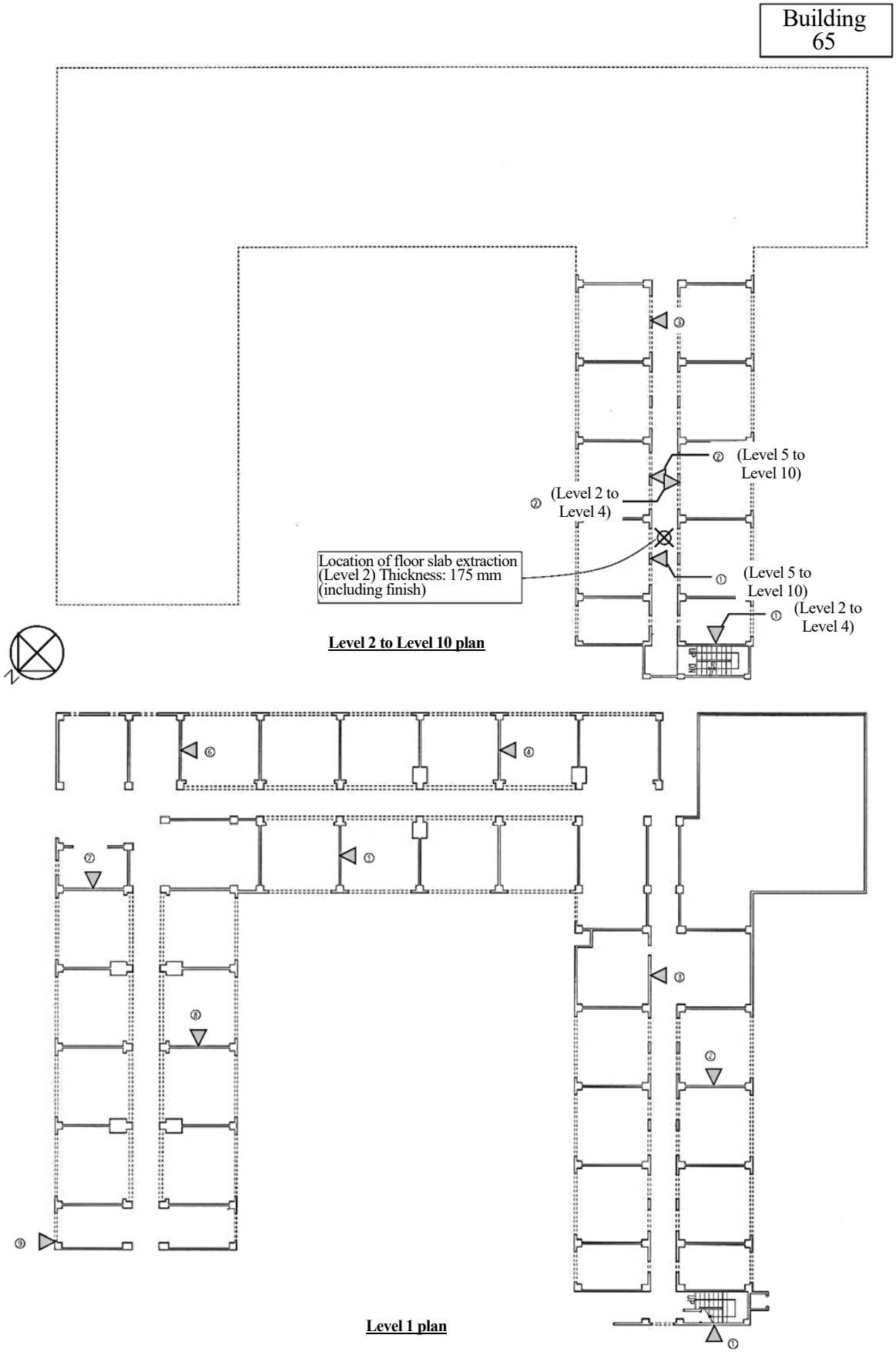


Figure 2-4-109 Locations of concrete core sampling for compressive testing at Building No.65

Table 2-4-86 Results of concrete compressive testing (Building No.65)

Level	Core number	Diameter d (mm)	Height h (mm)	h/d	Correction coefficient JIS A 1107	Compressive strength (N/mm2)		Young's modulus (104N/mm2)
						Before correction	After correction	
10	①	84	96	1.15	0.907	15.7	14.2	1.33
	②	84	96	1.15	0.905	7.2	6.5	1.11
	③	84	102	1.23	0.924	10.3	9.5	2.28
					Average	11.1	10.1	1.57
9	①	84	113	1.36	0.943	17.3	16.3	1.09
	②	84	106	1.27	0.932	20.3	18.9	1.93
	③	83	107	1.28	0.934	14.5	13.5	1.66
					Average	17.4	16.3	1.56
8	①	84	106	1.27	0.932	11.8	11.0	1.77
	②	83	110	1.32	0.939	13.3	12.5	3.74
	③	84	99	1.18	0.914	15.0	13.7	1.61
					Average	13.4	12.4	2.37
7	①	84	111	1.32	0.939	14.0	13.2	0.97
	②	83	92	1.1	0.895	16.9	15.1	1.09
	③	83	101	1.21	0.92	11.5	10.5	0.93
					Average	14.1	12.9	1.00
6	①	83	113	1.36	0.943	12.5	11.8	6.84
	②	84	95	1.14	0.903	11.6	10.5	2.93
	③	84	109	1.3	0.937	15.2	14.3	1.95
					Average	13.1	12.2	3.91
5	①	84	111	1.32	0.938	25.4	23.8	1.95
	②	84	102	1.22	0.923	23.9	22.1	2.27
	③	84	110	1.32	0.938	15.8	14.9	2.16
					Average	21.7	20.2	2.13
4	①	83	152	1.82	0.986	24.9	24.5	1.70
	②	84	86	1.02	0.876	18.1	15.9	0.67
	③	83	100	1.19	0.917	17.5	16.0	2.72
					Average	20.2	18.8	1.70
3	①	83	171	2.05	1.000	13.9	13.9	1.29
	②	83	95	1.14	0.903	21.2	19.1	1.38
	③	104	95	0.92		16.6	—	1.56
					Average	17.3	16.5	1.41
2	①	104	181	1.74	0.979	15.1	14.7	1.50
	②	84	93	1.11	0.896	17.3	15.5	1.02
	③	104	92	0.89		11.9	—	0.54
					Average	14.7	15.1	1.02
1	①	104	187	1.8	0.984	20.1	19.8	1.89
	②	84	172	2.05	1.000	14.9	14.9	1.32
	③	104	205	1.98	1.000	12.7	12.7	1.09
	④	104	129	1.24	0.927	23.4	21.7	2.61
	⑤	103	192	1.85	0.988	11.5	11.4	1.93
	⑥	104	183	1.76	0.981	13.9	13.6	1.97
	⑦	104	192	1.85	0.988	8.3	8.2	1.13
	⑧	104	185	1.79	0.983	15.7	15.4	1.96
	⑨	84	118	1.41	0.949	26.9	25.5	1.96
					Average	16.4	15.9	1.76
					Over-all average	16.0	15.2	1.83
					Standard deviation	4.7	4.5	1.08

2) Distributions of pH and chloride ion in concrete as the present condition of accommodation facilities

Concrete cores were sampled at Buildings No.3, 16, and 65, and the distribution of chloride ion was measured. Regarding core codes at each building, "3-1-1C" represents "Building No.3, Level 1, ①" for example. A vertical dotted line indicated neutralization depth, and hatching shows an area that has not been neutralized yet.

For all of the Buildings No.3, 16, and 65, the surface parts of an area facing the outside of the building had higher chloride ion content, which demonstrates the influence of incoming salt. In terms of the amount of salt contained, at Building No.3, chloride ion content is not more than 1kg/m3 for the inside of the building as well as parts that are deep from the surface layer, and thus the amount of salt contained is estimated to be small.

At Building No.16, chloride ion content varies among different locations even inside the building, indicating that the amount of salt contained varies depending on the location.

As for Building No.65, although chloride ion content is high on the outdoor side, indoor chloride ion content is low at each construction period, and therefore, chlorides derived from incoming salt are estimated to be dominant.

As described below, there are three possible factors for very high concentrations of salt contained; however, in-depth studies need to be conducted to reach a conclusion in the future.

・Seawater may have been used as water for concrete mixing.
・Unwashed sea sand/sea gravel may have been used as concrete aggregate.
・Seawater have splashed over the building many times at high tide and may have penetrated inside.

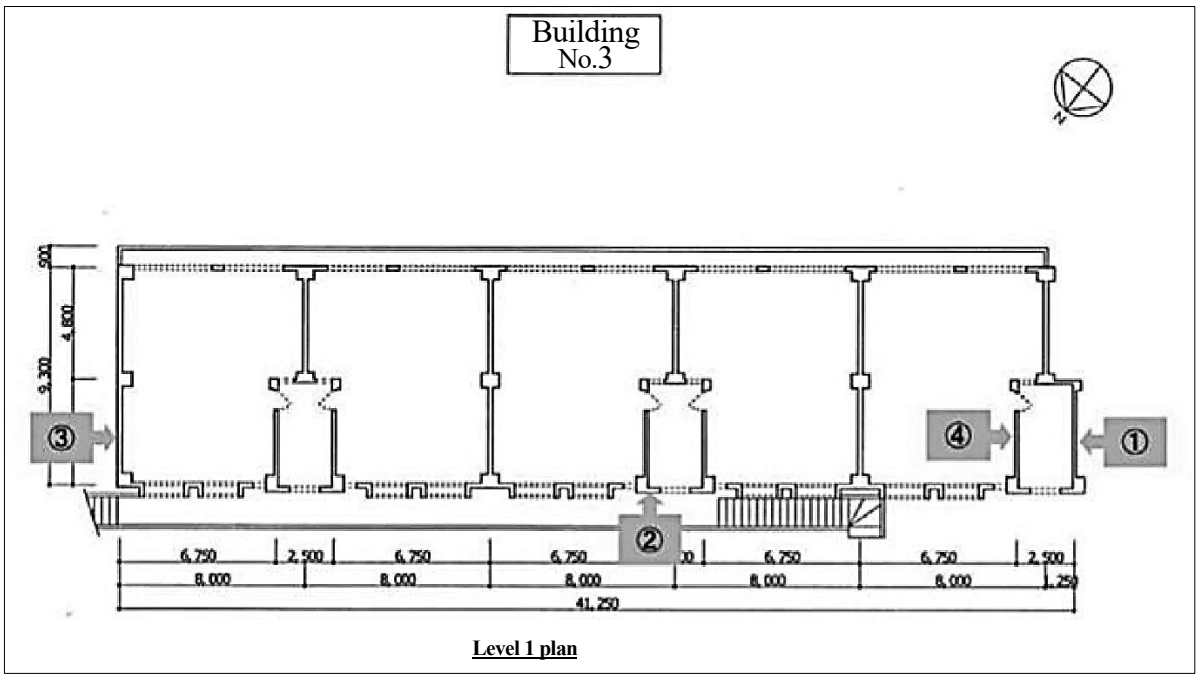
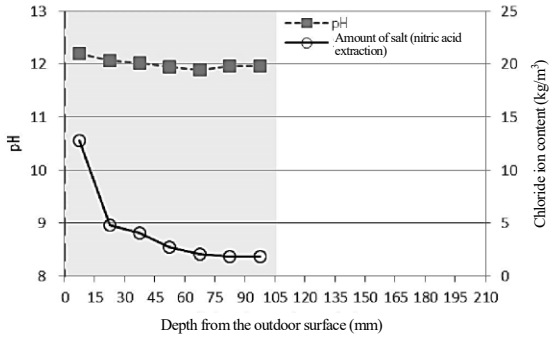
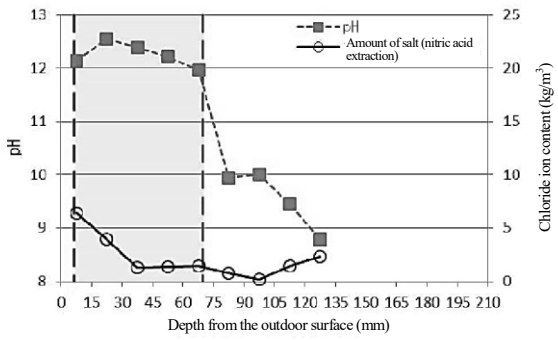


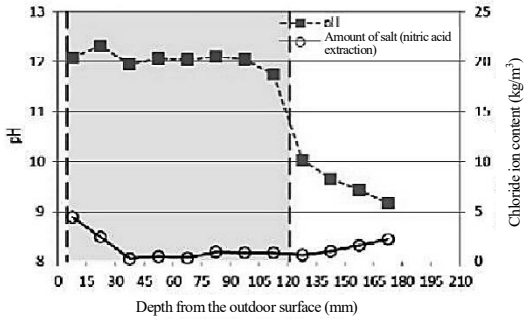
Figure 2-4-110　Locations of concrete core sampling at Building No.3



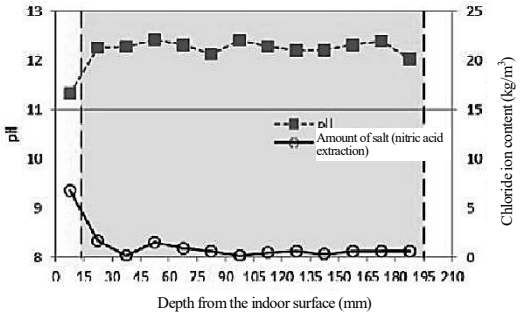
3-1-1C



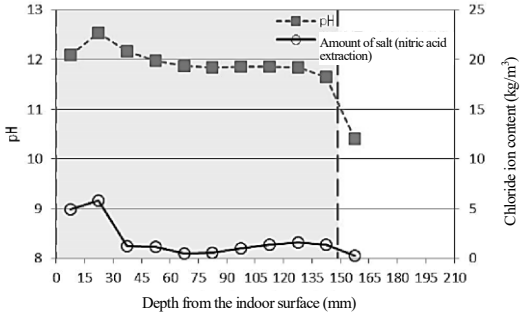
3-1-2C



3-1-3C



3-1-4C



3-B1-1C

Figure 2-4-111 Distribution of chloride ion in concrete at Building No.3

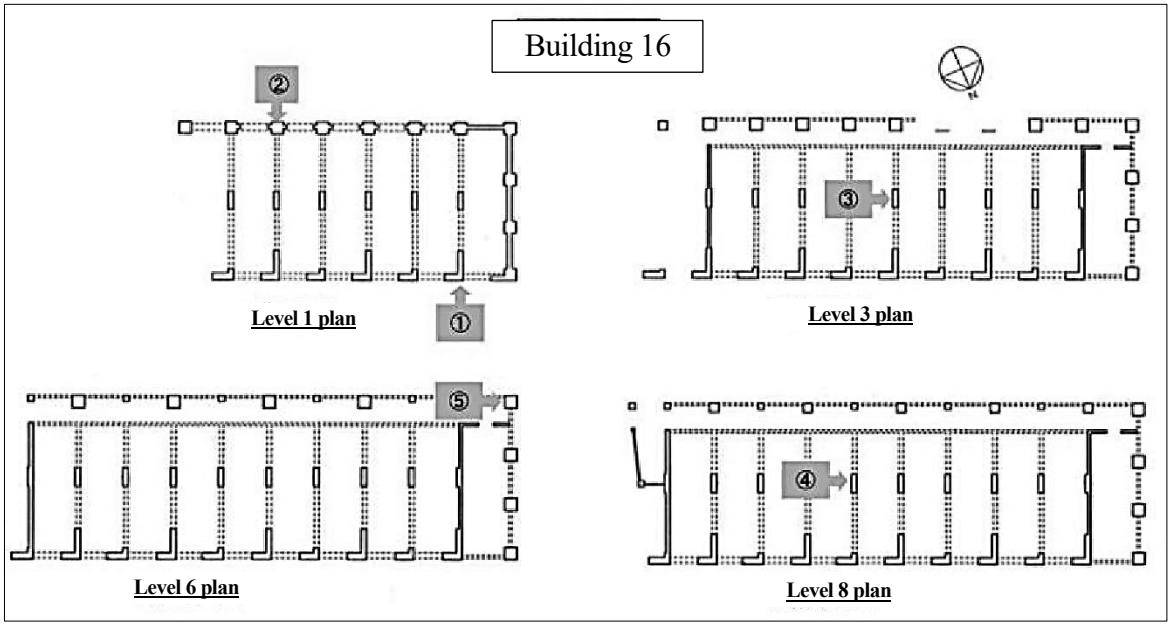
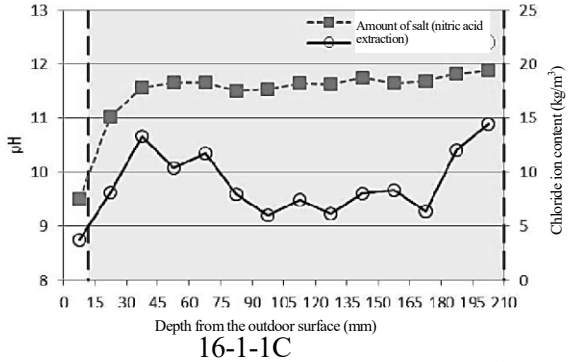
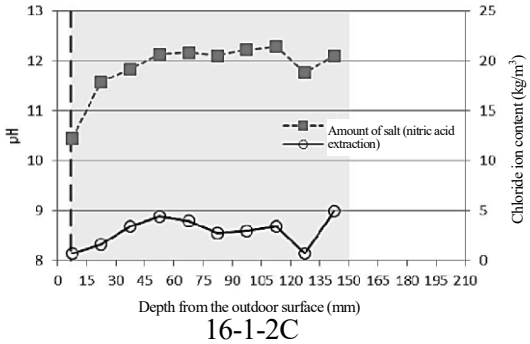


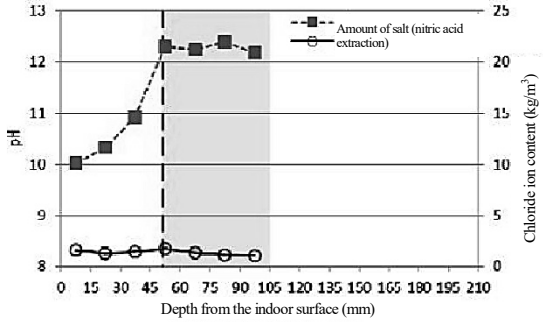
Figure 2-4-112 Locations of concrete core sampling at Building No.16



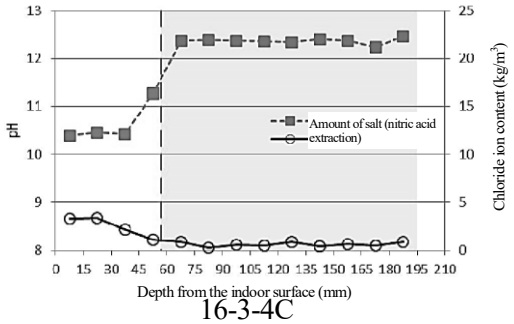
16-1-1C



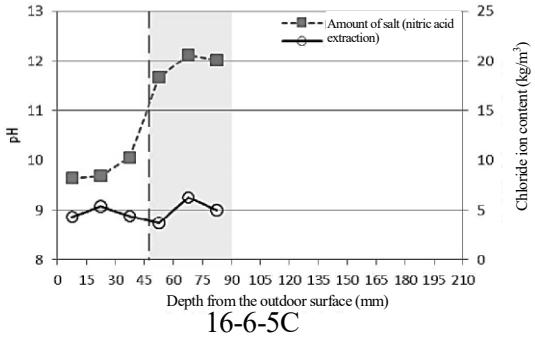
16-1-2C



16-3-C



16-3-4C



16-6-5C

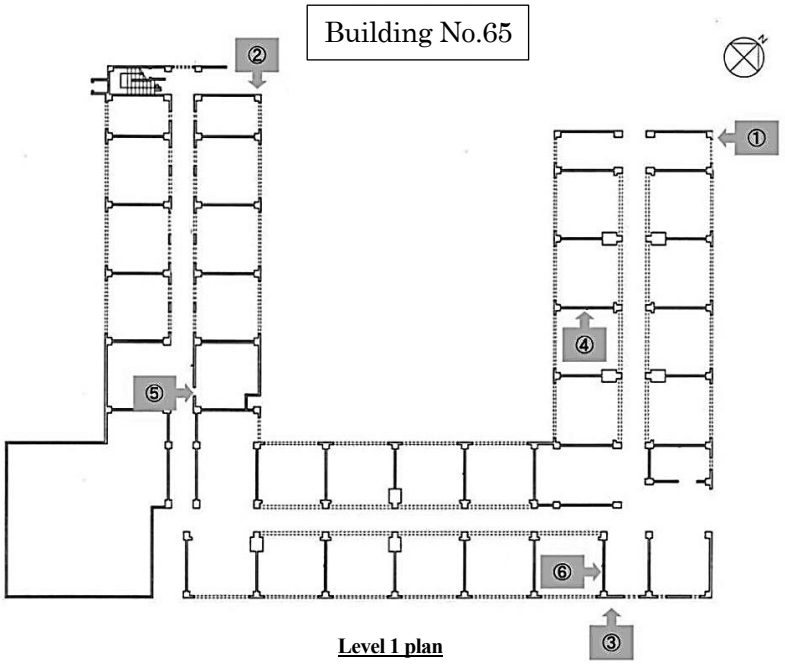


Figure 2-4-114 Locations of concrete core sampling at Building No.65

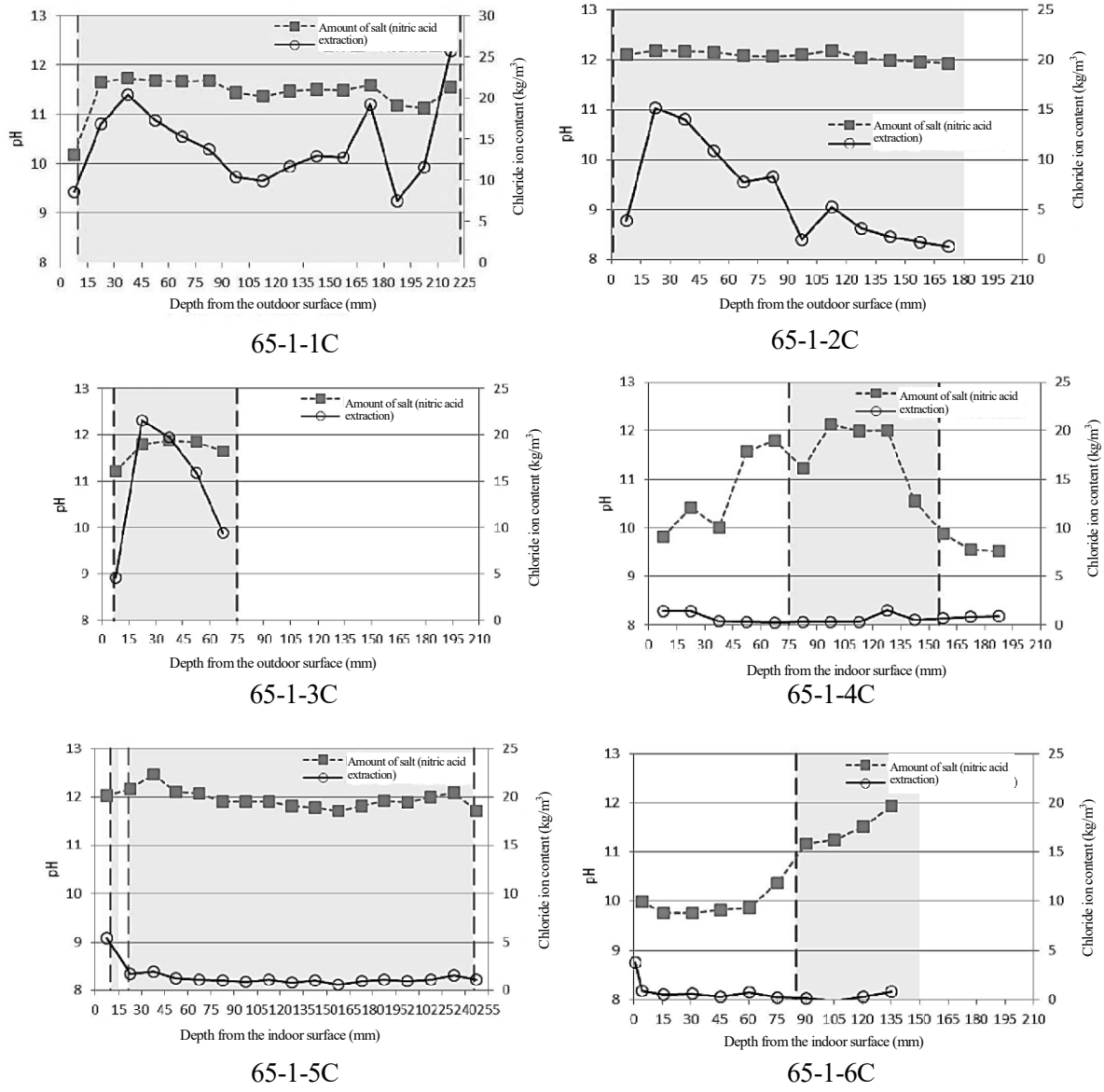


Figure 2-4-115 Distribution of chloride ion in concrete at Building No.65

3) Deterioration prediction using the Markov chain

In regard to reinforced concrete structure buildings in the Hashima Coal Mine remains, we studied a method for predicting deterioration of reinforced concrete members using the Markov chain, which are based on the classification of deterioration environments, and predicted the future residual structural performance ratios of buildings through on-site surveys, in order to calculate the years of structural performance limit and determine repair priority for Buildings No.3, 16, 17, 18, 19, 20, 65, and 70.。

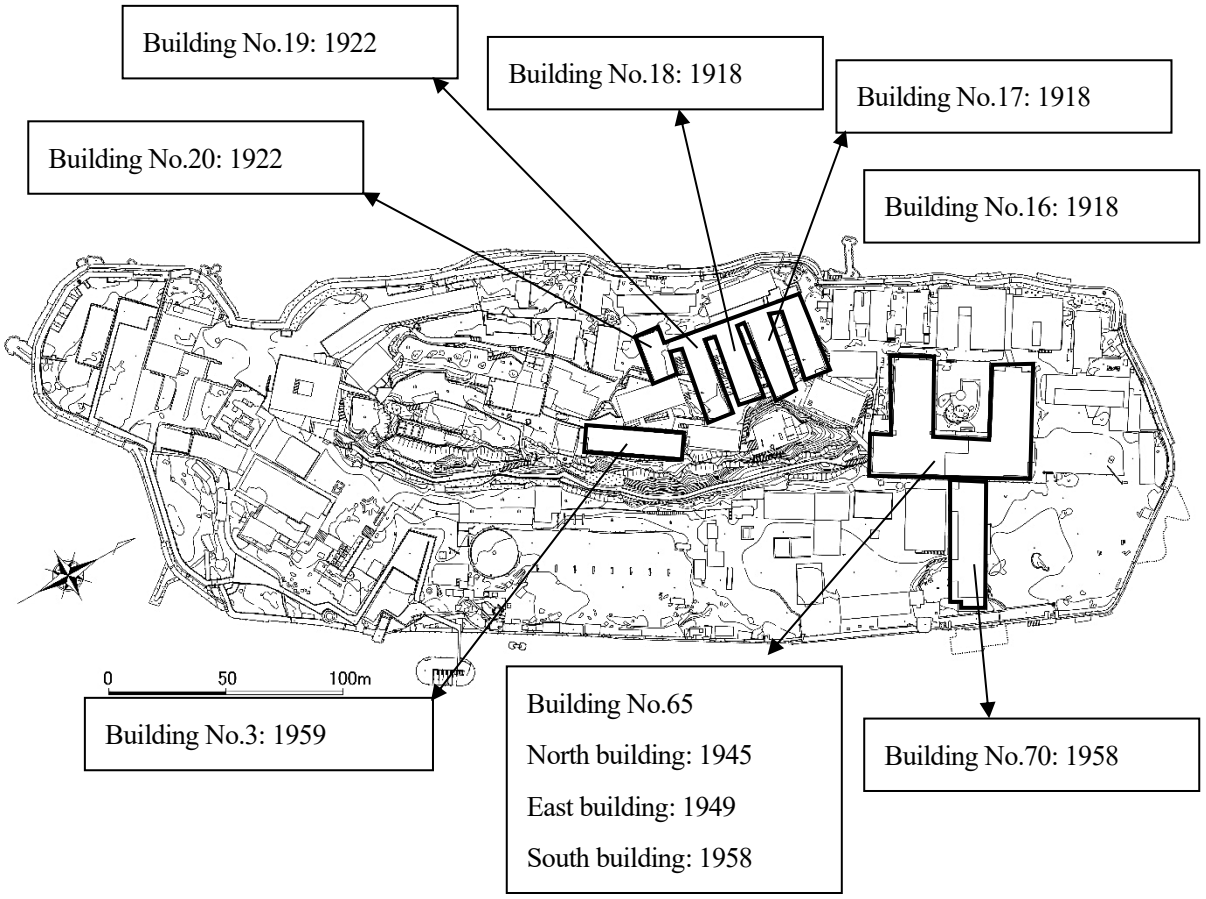


Figure 2-4-116　Location map and construction year for buildings surveyed

① Survey of deterioration levels and environments of members of the buildings in Hashima

To devise a method for classifying the deterioration environments of members, we organized information on member deterioration levels, depth of concrete cover, amount of rain received by members, and incoming salt environments, through on-site surveys and by using past literature as a reference.

In fiscal 2015, the survey of deterioration levels of columns, beams, and wall members for all of the 27 buildings in Hashima as well as the bar arrangement survey for major buildings were conducted. Moreover, in fiscal 2016, the projection lengths of eaves in the upper parts of members were measured, and shields against raindrops such as shutter boxes were visually inspected; further, the yearly amounts of rain received by members were calculated using the past literature “Estimation of the tilt angle of a raindrop colliding against a wall surface: Basic study on the assessment of a rainfall load acting on an external wall surface” (Ishikawa, et al., 2007) as a reference. In addition, the annual average incoming salt amount in Hashima was determined using “Discussions on the state of incoming salt transport in Gunkanjima, Nagasaki Prefecture” (Shimizu et al., 2015) and “Salt damage environment in Gunkanjima, Nagasaki Prefecture” (Shimizu) as references. For data on the amount of rainfall and wind conditions, we referred to Meteorological Agency's data (Nomozaki, 2006 to 2015).

② Results: Relationships between member deterioration levels and depth of concrete cover / yearly amounts of rain received by members / annual average incoming salt amount

Only the results for Buildings No.16, 17, 18, 19, and 20 are shown here as survey results are similar for the other buildings. Figure 2-4-117 shows the relationship between the graph gradient (ζ) of the expected deterioration level (an expected value calculated from the ratios of deterioration level for different members in the same area exposed to the rain within the same building) and the average annual incoming salt amount.

In almost all cases, the graph gradient shows a positive value; the greater annual average incoming salt amount is, the higher the expected deterioration level becomes. Figure 2-4-118 shows the relationship between the yearly amount of rain received and the mean value of expected deterioration level in the total incoming salt range. Basically, the smaller the depth of concrete cover is and the larger the yearly amount of rain received is, the higher the expected deterioration level becomes; however, the larger the depth of concrete cover is, the smaller the increment of the expected deterioration level with respect to an increase in the yearly amount of rain received becomes, with the depth of concrete cover as great as around 80 mm being hardly affected by the amount of rain received.

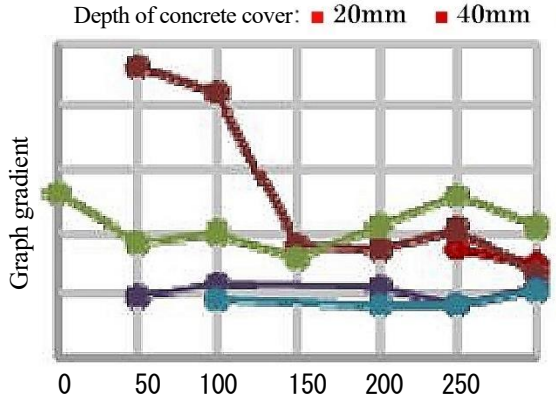


Figure 2-4-117 Yearly amount of rain received and graph gradient

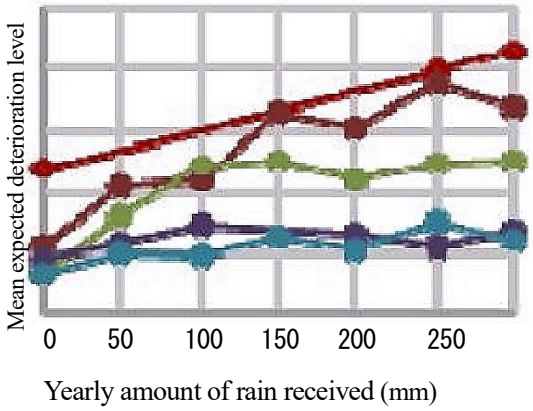


Figure 2-4-118 Yearly amount of rain received and mean expected deterioration level

③ Deterioration environment classification with the deterioration environment grade G_E

As an index to determine the severity of deterioration environment for each member, the deterioration environment grade G_E was created by following the steps below.

1. The equations were formulated using survey results and reinforcement corrosion rate evaluation equations in the past as references and based on the assumption that the depth of concrete cover acts as resistance against the ingress of substances causing corrosion including salt content and water content. In addition, it was assumed that the depth of concrete over equal to or greater than 80 mm is not affected by the amount of rain received.
2. For data on the annual average incoming salt amount, annual average amount of rain received, depth of concrete cover, and expected deterioration levels, the data for Buildings No.16, 17, 18, 19, and 20, which have the largest number of data, were used, and each coefficient was obtained using multiple regression analysis. In this step, the expected deterioration level $\fallingdotseq G_E$ was used.
3. The equation for evaluating G_E was formulated in a similar manner also for cases in which no data are available concerning the depth of concrete cover.

   Equations 1 and 2 show the evaluation equations derived for G_E. Figure 2-4-119 shows a comparison between the calculated value of G_E and the actual expected deterioration level. While proper evaluations were generally made in the case of Equation 1, slightly large variations were shown in the case of Equation 2. Therefore, data on the depth of concrete cover should not be omitted in essence in order to properly evaluate G_E. Table 2-4-87 shows the transition probabilities obtained for each value of G_E using Equation 3, after the deterioration

environment grade GE was calculated for members using Equations 1 and 2. The value of transition probability increases as the value of GE increases, suggesting that an appropriate classification of deterioration environments has been made.

1 When data on CI, R, and C are available,

$$\begin{cases} GE = \dfrac{3.07\ C\xi^{-} + 0.139R + 42.1}{C} & (C < 80) \\ GE = \dfrac{1.16C\xi^{-} + 69.8}{C} & (C \geq 80) \end{cases}$$

Equation 1

2 When data on C is not available,

$$GE = 0.00159\ C\xi^{-} + 0.00174R + 0.91$$

Equation 2

G_E : Deterioration environment grade

Cl : Annual average incoming salt amount [mmd]

R : Yearly amount of rain received [mm]

C : Depth of concrete cover [mm]

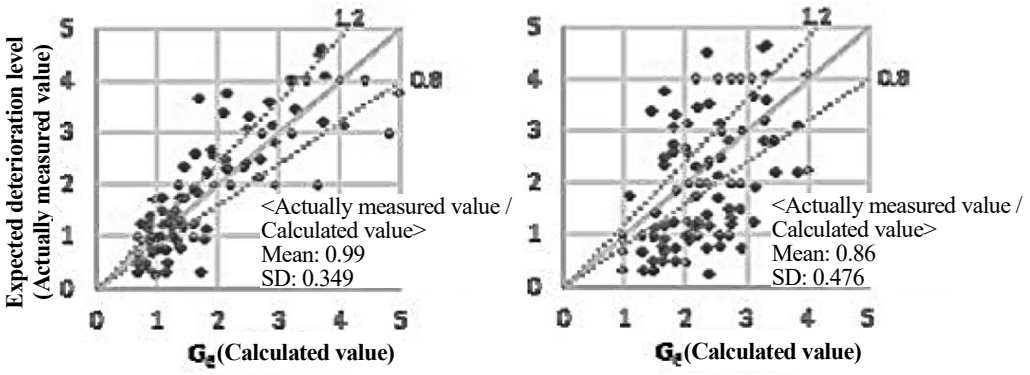
$$\begin{bmatrix} X_{0} \\ X_{I} \\ X_{II} \\ X_{III} \\ X_{IV} \\ X_{V} \end{bmatrix} = \begin{bmatrix} 1-P_0 & 0 & 0 & 0 & 0 & 0 \\ P_0 & 1-P_1 & 0 & 0 & 0 & 0 \\ 0 & P_1 & 1-P_2 & 0 & 0 & 0 \\ 0 & 0 & P_2 & 1-P_3 & 0 & 0 \\ 0 & 0 & 0 & P_3 & 1-P_4 & 0 \\ 0 & 0 & 0 & 0 & P_4 & 1 \end{bmatrix}^{t} \begin{bmatrix} 1 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}$$

Equation 3

$X_{0\sim V}$: Percentage of the current deterioration level

$P_{0\sim 4}$: Transition probability

t : Years since construction



(a) Application of Equation 1

(b) Application of Equation 2

Figure 2-4-119 Comparison between actually measured values and calculated values: Buildings No.16 to 20

Table 2-4-87 Transition probability for each building after deterioration environment classification

GE	Transition probability	Buildings No.16 to 20	Building No.3	Building No.65 (North)	Building No.65 (East)	Building No.65 (South)	Building No.70	Average value
1	P0	0.0088	0.0079	0.0109	0.0075	0.0104	0.0136	0.0099
	P1	0.0179	0.0172	0.0378	0.0226	0.0163	0.0183	0.0217
	P2	0.0344	0.0245	0.0397	0.0269	0.0149	0.0341	0.0291
	P3	0.0307	0.1164	0.0334	0.0266	0.0246	0.0401	0.0453
	P4	0.0266	0.0387	0.0314	0.0355	0.0250	0.0348	0.0320
2	P0	0.0184	0.0148	0.0148	0.0148	0.0130	0.0127	0.0148
	P1	0.0214	0.0188	0.0417	0.0795	0.0175	0.0229	0.0336
	P2	0.0546	0.0607	0.0237	0.0350	0.0545	0.0798	0.0514
	P3	0.0350	0.1059	0.0553	0.0583	0.0726	0.0480	0.0620
	P4	0.0209	0.0390	0.0301	0.0703	0.0801	0.0403	0.0468
3	P0	0.0250	0.0185	0.0133	0.0303	0.0145	0.0176	0.0198
	P1	0.0470	0.0303	0.0852	0.0385	0.0483	0.0323	0.0469
	P2	0.0540	0.1020	0.0502	0.0334	0.2141	0.1206	0.0957
	P3	0.0329	0.1496	0.0680	0.1003	0.0864	0.0400	0.0795
	P4	0.0189	0.0404	0.0385	0.0661	0.0393	0.0421	0.0409
4	P0	0.0464	–	0.0245	0.0193	–	0.0776	0.0419
	P1	0.0377		0.0715	0.0385		0.0319	0.0449
	P2	0.0647		0.0719	0.1522		0.1034	0.0981
	P3	0.0506		0.1104	0.1161		0.0472	0.0811
	P4	0.0239		0.0394	0.0414		0.0473	0.0380
5	P0	0.0464	–	0.0637	–	–	–	0.0550
	P1	0.0492		0.0483				0.0488
	P2	0.0839		0.0623				0.0731
	P3	0.0710		0.2130				0.1420
	P4	0.0201		0.0376				0.0289
No classification	P0	0.0116	0.0118	0.0124	0.0141	0.0113	0.0142	0.0126
	P1	0.0215	0.0252	0.0435	0.0516	0.0236	0.0203	0.0309
	P2	0.0457	0.0596	0.0417	0.0390	0.0363	0.0430	0.0444
	P3	0.0361	0.1238	0.0492	0.0530	0.0625	0.0440	0.0615
	P4	0.0240	0.0493	0.0374	0.0613	0.0598	0.0419	0.0456

④ Prediction of future structural performance of major buildings

Changes in the expected deterioration level of each member were predicted using the transition probabilities included in Table 2-4-87, and the prediction of the minimum value of the residual vertical load bearing performance ratio R_L for each Level of each building was made.

The allowable value of R_L was defined as 60% by using the standard for major damage of the residual seismic performance ratio R as a reference; Figure 2-4-120 shows the buildings for which R_L reaches 60% early in order of increasing period required for R_L to reach 60%.

As Figure 2-4-120 indicates, repair priority was, in order of priority, Building No.16, Building No.20, Building No.65 (North), Building No.65 (East), Building No.19, Building No.17, Building No.18, Building No.65 (South), Building No.70, and Building No.3.

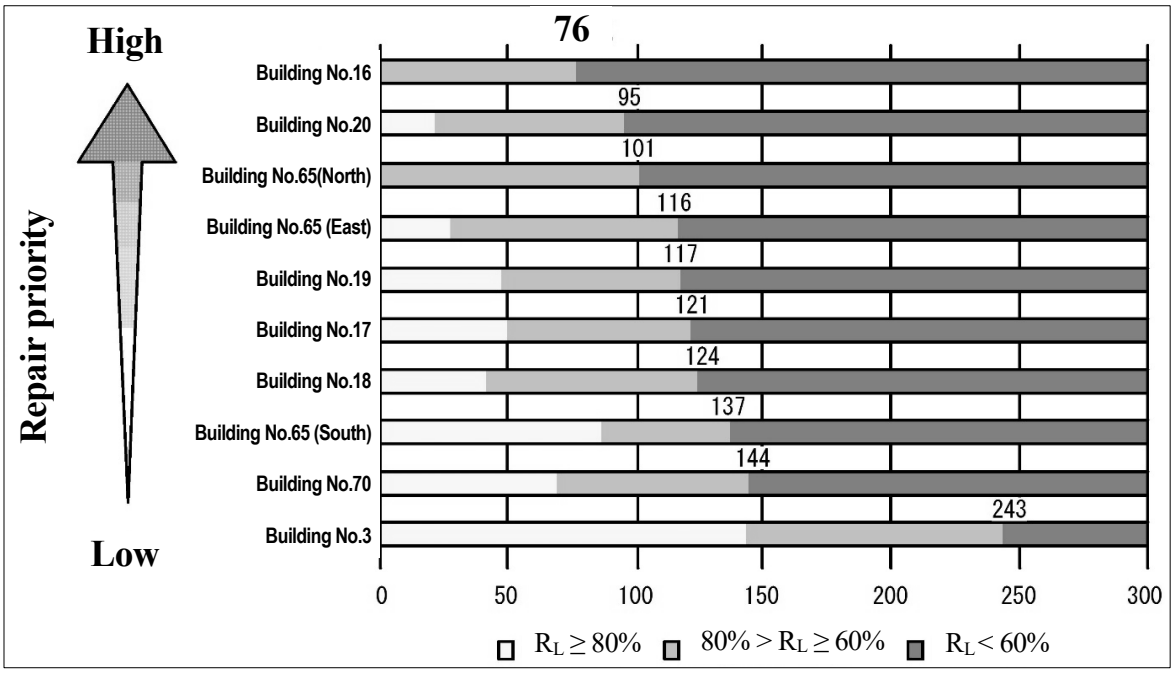


Figure 2-4-120 Determination of repair priority based on the prediction of future R_L

4) Summary

The survey produced the outcomes below.

1. On-site surveys and results of past surveys in Hashima confirmed that the greater annual average incoming salt amount, the greater yearly amount of rain received, and the smaller depth of concrete cover lead to the higher expected deterioration level. However, the depth of concrete cover 80 mm or greater was shown to be hardly affected by rain received.
2. The index of the deterioration environment grade G_E was created from the relationships between the annual average incoming salt amount / yearly amount of rain received / depth of concrete cover, and the expected deterioration level. The proper evaluation of transition probability was made possible by using G_E to classify deterioration environments of members and applying the Markov chain.
3. Repair priority was determined by predicting future structural performance of the buildings through a combination of deterioration predictions based on the Markov chain and the evaluation of R_L, the residual vertical load bearing performance ratio.

Appendix 1

Archaeological excavation report
(A survey of the mouth of Pit at the Hashima Coal Mine remains)

As part of studies to record the current status of the site, a survey of the remains of mouth of Pit was conducted in 2015, and archaeological excavations in 2014 and 2015.

(1) Survey of remains of the mouth of Pit

A survey was conducted by taking photographs and creating drawings of the remains of three mouth of Pit at the Hashima Coal site, namely the remains of Mouth of Pit No. 1, Mouth of Pit No. 2, and Pit No. 3. At the two locations that are currently closed off, namely M No. 1 and No. 2, two 10-cm holes were drilled open on the concrete wall, and photographs were taken with digital cameras through these holes, and some of the drawings were created. As for Pit No. 3, investigators went underground through the existing opening, and took digital photographs and videos and created simple drawings (ground area and elevation plans) there.

Appendix 2-1

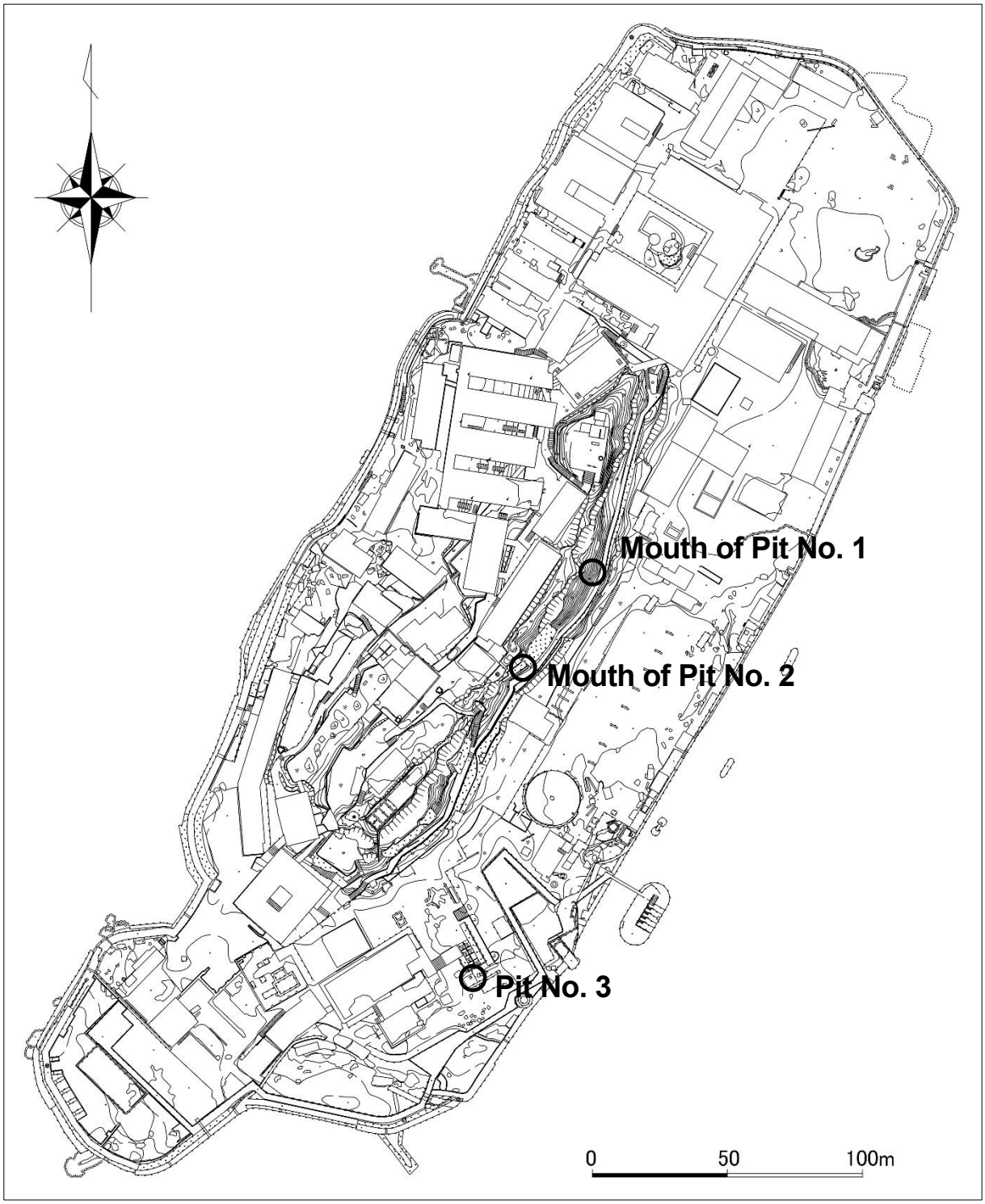


Figure 2-3-72. Locations for survey of mouth of Pit remains

1) Mouth of Pit No. 1

① Outline of survey

At the entry that was currently sealed off with a concrete wall, two 10-cm holes were drilled open. Through these holes, photographs were taken with digital cameras, at angles of 360 degrees longitudinally, and 180 degrees horizontally.

The inclined passage at Mouth of pit No. 1 is estimated to have been used as drainage following the opening of the mine in 1875. According to the statement of former miners working at Hashima, this pit was connected to

an underground pit ("debris tunnel") in the island. No structure was observed outside the mouth of Pit.

Today, the entire mouth of pit is sealed off in concrete, covering an area of a semicircular shape, with a radius of 2.0 meters. It is likely that no rebar was used to seal off the entry, since none was found when two holes were opened using a core drill.

Photographs taken there were organized using the photo file names created in the following manner; they correspond to the identifiers in the diagram of photography points.

[File name (Example)]

1 – R 01

[Survey locations]
1: Mouth of Pit No. 1
2: Mouth of Pit No. 2
3: Pit No. 3

[Angles of photography]
R: Longitudinal (360°)
F: Horizontal (front)
A: Other (broad view, etc.)

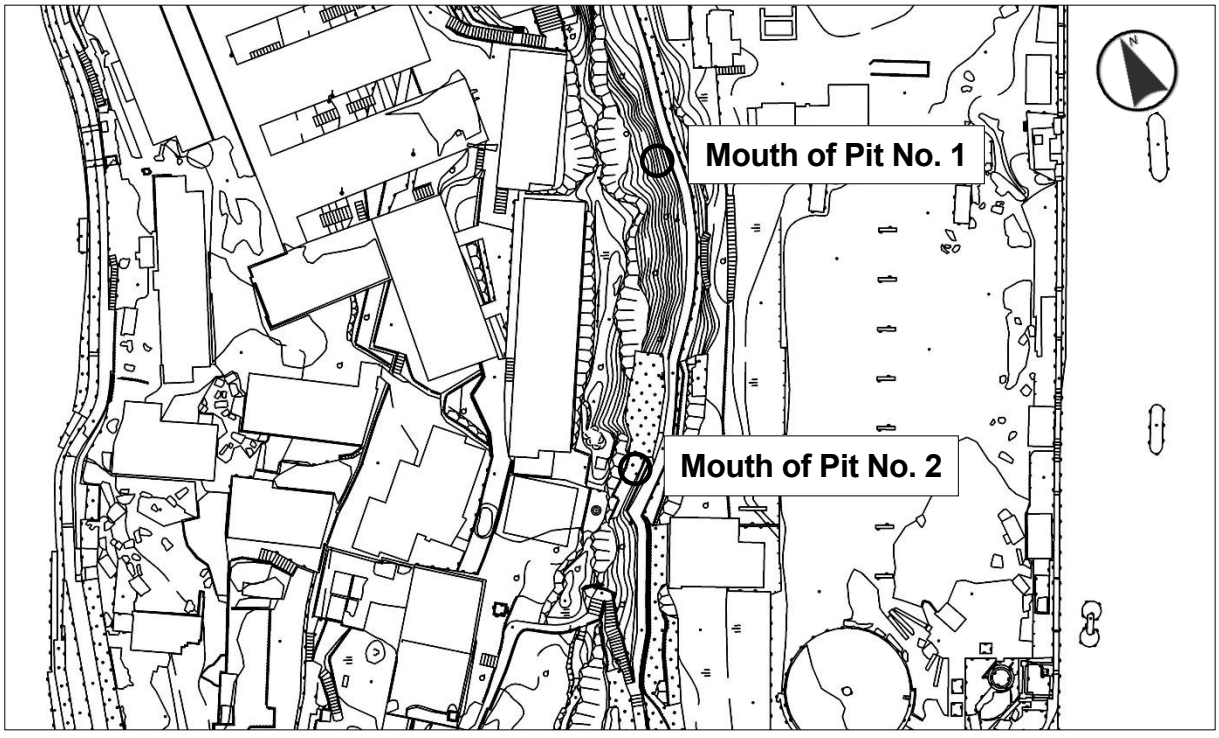


Figure 2-3-73. Diagram of survey locations

② Findings

The survey found that the inclined passage at Mouth of Pit No. 1 was covered in concrete on the walls, with the pit running slightly to the left (west) for a length of approximately 5 meters based on visual estimates. At the end of the pit, the walls were not covered in concrete but rocks were exposed (Photo 2-3-51).

The concrete walls showed clear signs of forms being used there (Photo 2-3-52). It is possible that the large quantity of lumber pieces scattered around near the entry may have been remnants of forms that had fallen off (Photo 2-3-53). Assuming that the pieces of lumber had been the material of forms, it would mean that the forms

were left there at the time the business was opened. Since the scattered pieces of lumber were boards, rather than rods as those photographed in Photo 2-3-50, it is likely that they were used for forms. A pipe can be seen on the floor, what it was used for is unclear.

As mentioned above, the pit runs slightly to the left (west). This was clear based on a picture taken through a hole created at the center of the concrete wall that seal off the mouth of pit; it was a view straight in front of the camera, in which a portion of the right-hand side (eastern) wall of the mouth of Pit is visible (Photo 2-3-51). While the photo suggests that the walls of the rocks make the dead end of the pit, it is also possible that it may lead to underground parts. The fact that the end of the pit is walls of rocks seems to suggest it was not sealed off on purpose. Combined with statements made by former employees, this indicates a likelihood that the pit may lead underground near the apparent dead-end.

Photo 2-3-50. June 1956; Structure of the mouth of Pit

Photo 2-3-51. 1-F100; Direct front view

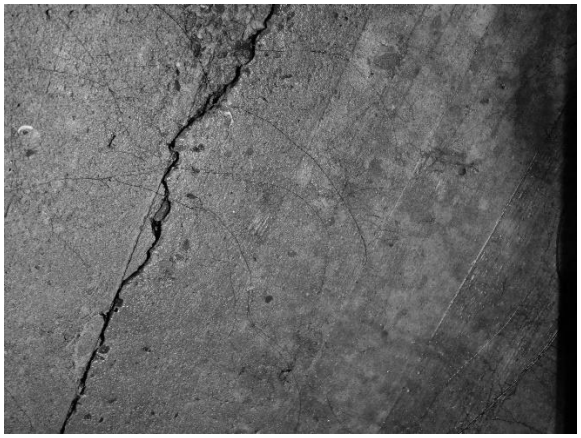


Photo 2-3-52. 1-R101; Ceiling

Photo 2-3-53. 1-R105; Floor

③ Conditions of surviving structures inside

Judging by the pictures taken during the survey, the area appeared to be in good condition, with no toxic gas, etc. identified although pieces of lumber and pipes were scattered. Likewise, the concrete walls that cover the rock walls beneath, although some cracks were observed, did not appear to be in an immediate danger of falling off (Photo 2-3-54).

If the scattering pieces of lumber and pipes are removed, it will not be difficult to look closely inside the pit to the rock walls at the end, meaning it should be possible to investigate to determine if the pit is designed to lead down to underground areas near the exposed rock walls.

Photo 2-3-54. 1-R107; Wall

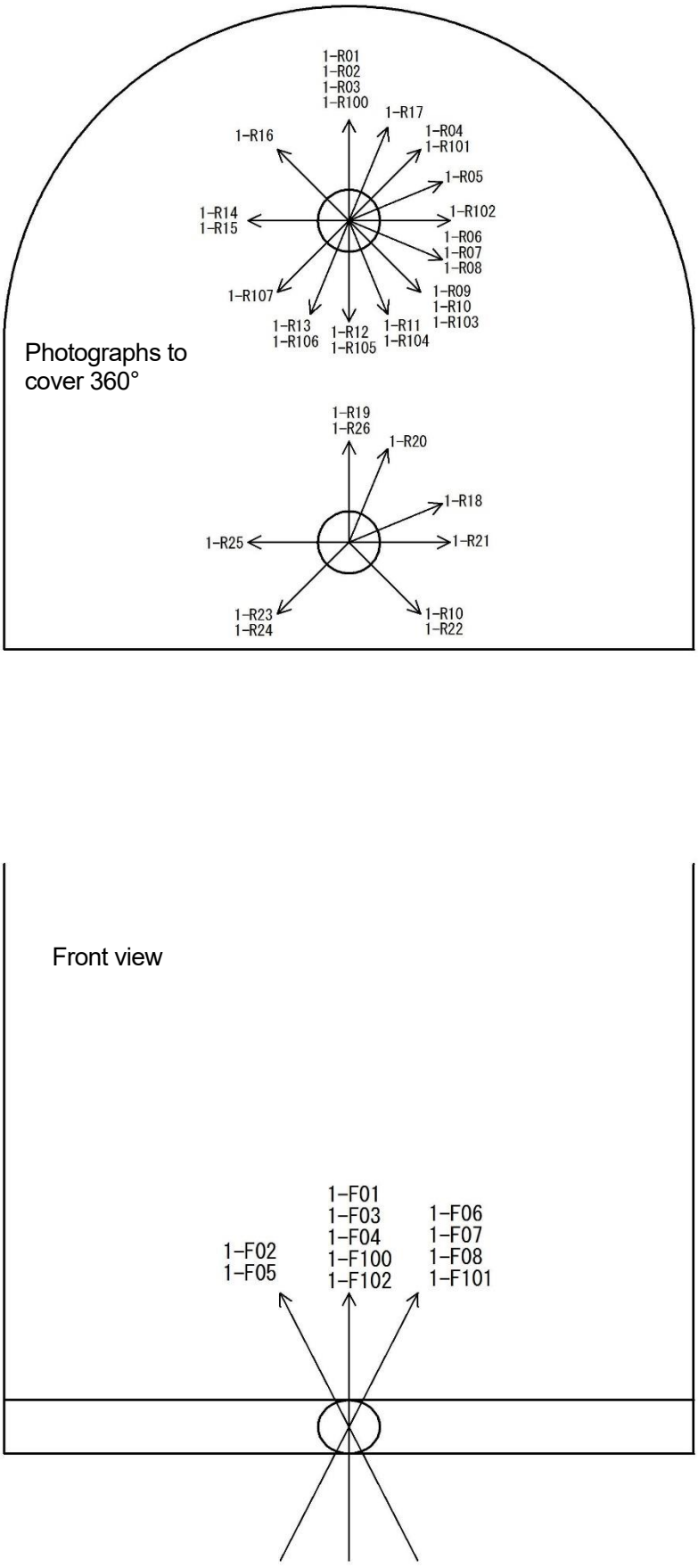
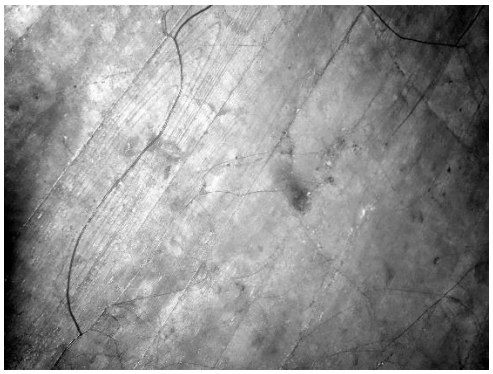
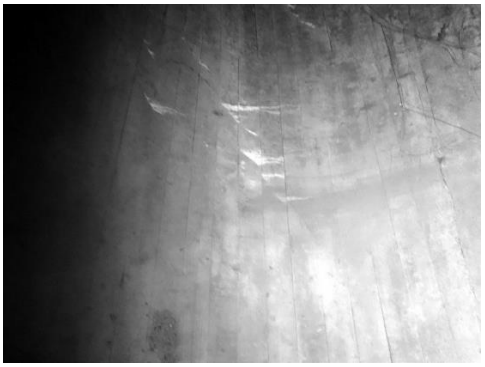


Figure 2-3-74. Diagram of photography points at Mouth of Pit No. 1



1-R01

1-R17



1-R25

1-R105

1-F05

1-F100

1-F101

1-F102

Photo 2-3-55. Pictures taken during survey at Mouth of Pit No. 1

2) Mouth of Pit No. 2

① Outline of survey

At the entry that was currently sealed off with a concrete wall, two 10-cm holes were drilled open. Through these holes, photographs were taken with digital cameras, at angles of 360 degrees longitudinally, and 180 degrees horizontally.

The inclined passage at Mouth of Pit No. 2 is estimated to have been used as drainage, as was the case with the one at Mouth of Pit No. 1. Sections of tram tracks could be seen near the entry. Again, this pit was connected to an underground pit ("debris tunnels") in the island, according to a statement of a former miner working at Hashima.

Today, the entire mouth of Pit is sealed off in concrete, covering an area of approximately 2 meters in height and 3 meters in width. It is likely that no rebar was used to seal off the entry, since none was found when two holes were opened using a core drill.

Photographs taken there were organized using the photo file names created in the following manner; they correspond to the identifiers in the diagram of photography points. A simplified drawing has also been created, which combines a front elevation with speculated structure inside.

[File name (Example)]

2 - F 01

[Survey locations]	[Angles of photography]
1: Mouth of Pit No. 1	R: Longitudinal (360°)
2: Mouth of Pit No. 2	F: Horizontal (front)
3: Pit No. 3	A: Other (broad view, etc.)

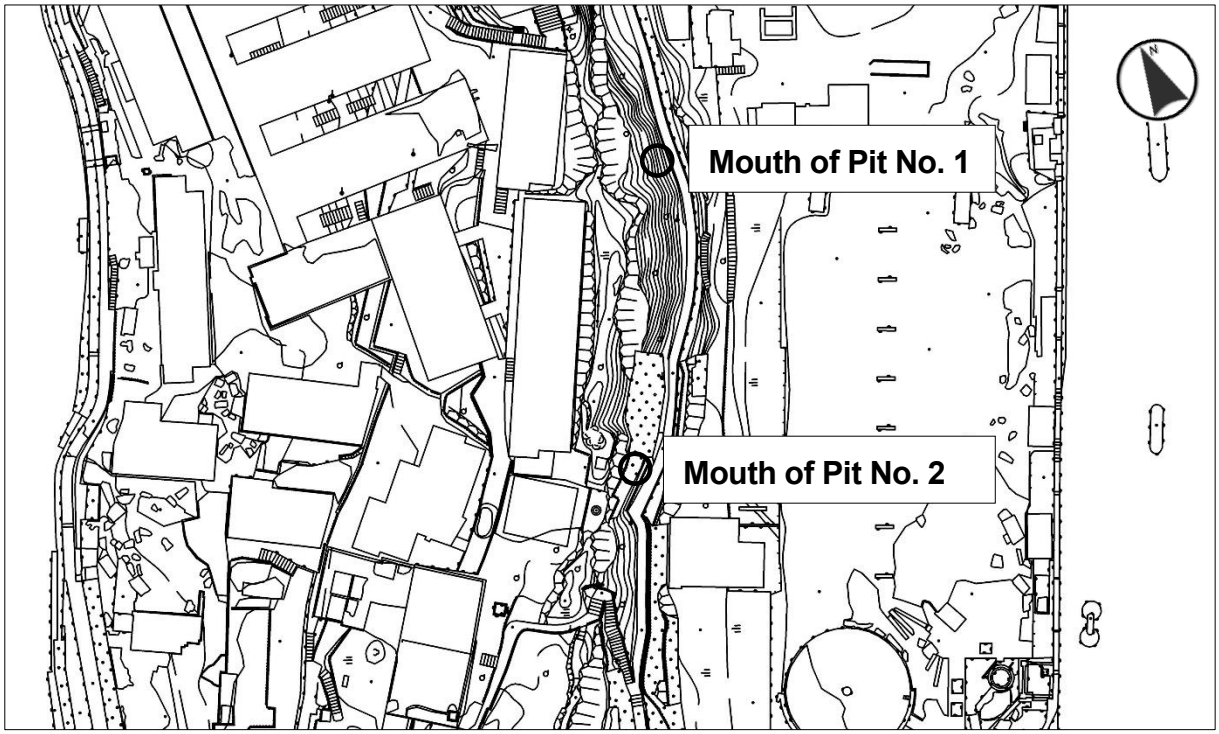


Figure 2-3-75. Diagram of survey locations

② Findings

The entrance of the mouth of Pit was sealed off in concrete, after the tram tracks had been buried with soil (Photo 2-3-56). Parts of the tracks still remain outside the entrance (Photo 2-3-57). While pictures taken in 1957 show four tram tracks inside the mine, only two could be confirmed through the views from the outside of the entrance (Photos 2-3-57, -58, and -59).

Review of the pictures taken through the holes drilled open revealed that the pit was forked into two at a few meters from the entry (Photos 2-3-60 and -61), that the walls were rocks exposed (Photo 2-3-62), and that the tram tracks, which had been found outside the mine, were not visible buried under pieces of wood and coal (Photo 2-3-63).

Unlike the inclined passage at Mouth of Pit No. 1, the walls inside Mouth of Pit No. 2 were not cast in concrete. The picture taken in 1957 (Photo 2-3-59) shows wood framings along the walls. While Photo 2-3-59 shows four tracks, or two pairs of tracks, they were not visible in the pictures taken during the present survey due to the buildup of wooden and coal pieces. Given the sections of tracks which still exist outside the entrance, however, it is likely that the tracks may be made visible if the pieces of wood are removed. Judging by the directions in which the remaining sections of tracks run, the tracks were considered to be leading to the right (northern) fork of the pit.

Although it is a matter of speculation, assuming that Photo 2-3-59 was a picture of the inside of the inclined passage at Mouth of Pit No. 2, it is possible that tracks were laid in each of the two forks of the pit, running deeper into the mine. That only two tracks, or one pair of tracks, remain outside the mine may be because the fork was inside of the pit, not outside (Figure 2-3-76).

Photo 2-3-56. Mouth of Pit survey 2; Full view

Photo 2-3-57. Mouth of Pit survey 2; Tram tracks

Photo 2-3-58. Mouth of Pit survey 2; Tram tracks

Photo 2-3-59. Mouth of Pit survey 2; Picture taken in 1957; Diagonal mouth of Pit in the bomb shelter

Appendix 2-1

Given the buildup of coal pieces inside the pit, and the fact that sections of tram tracks remain outside the pit, it is doubtful if the inclined passage at Mouth of Pit No. 2 was used as drainage. A possibility of it having been for coal mining cannot be ruled out, either.

Photo 2-3-60. 2-F01_Direct front view

Photo 2-3-61. 2-F03_ Direct front view

Photo 2-3-62. 2-R01_Wall

Photo 2-3-63. 2-F03_Floor

③ Conditions of surviving structures inside

Other than the buildups of pieces of wood and coal on the floor inside the pit, no damage was observed on the walls of exposed rocks, and the area appeared to be in good condition. If the pieces of wood on the floor are removed, it will be possible to see any remaining sections of tracks inside the pit. Examining such tracks may also help offer clues to understanding how they may have been related to the pit fork, and what the inclined passage may have been used for.

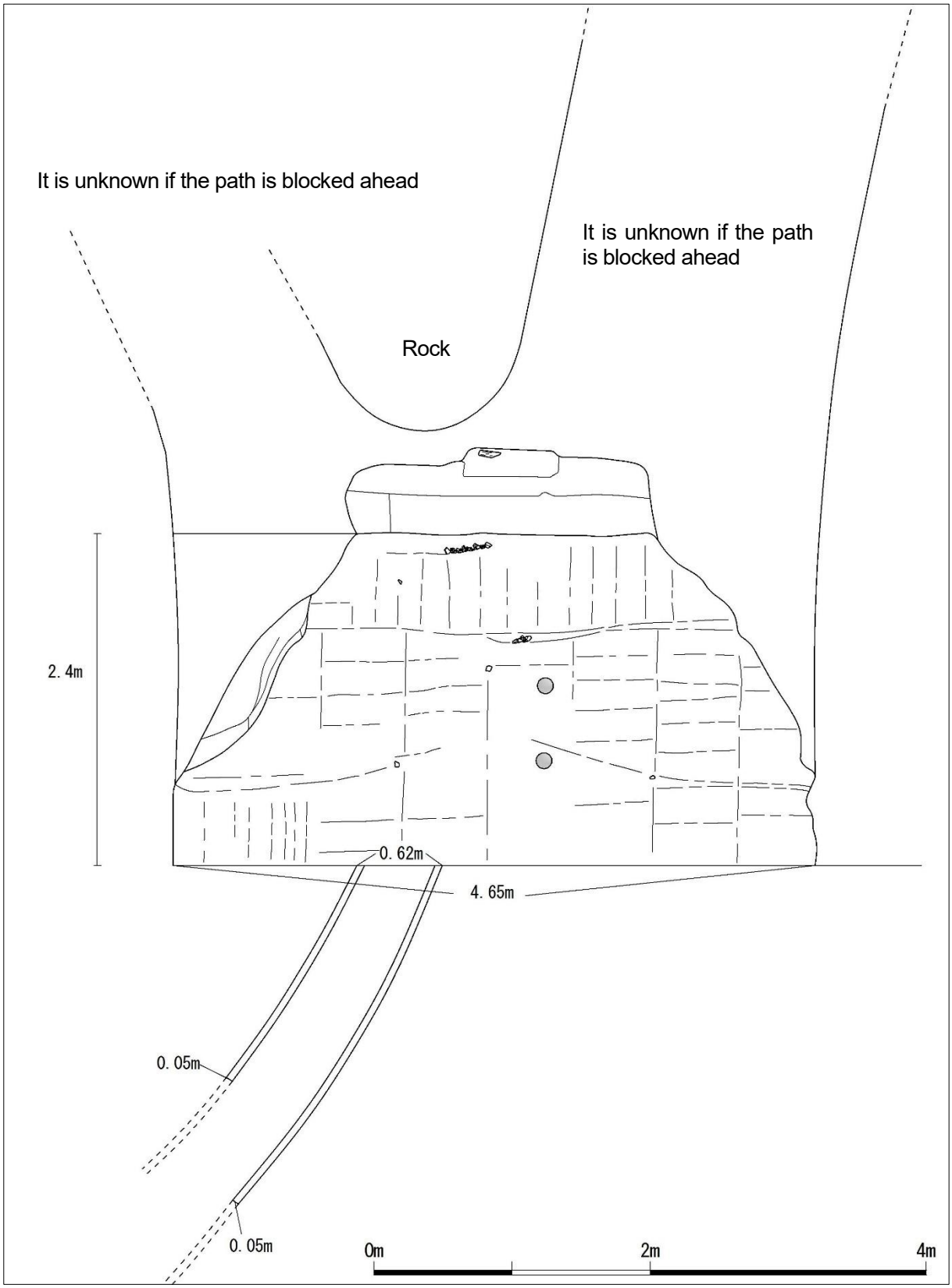


Figure 2-3-76. Simplified drawing of mouth of Pit

Appendix 2-1

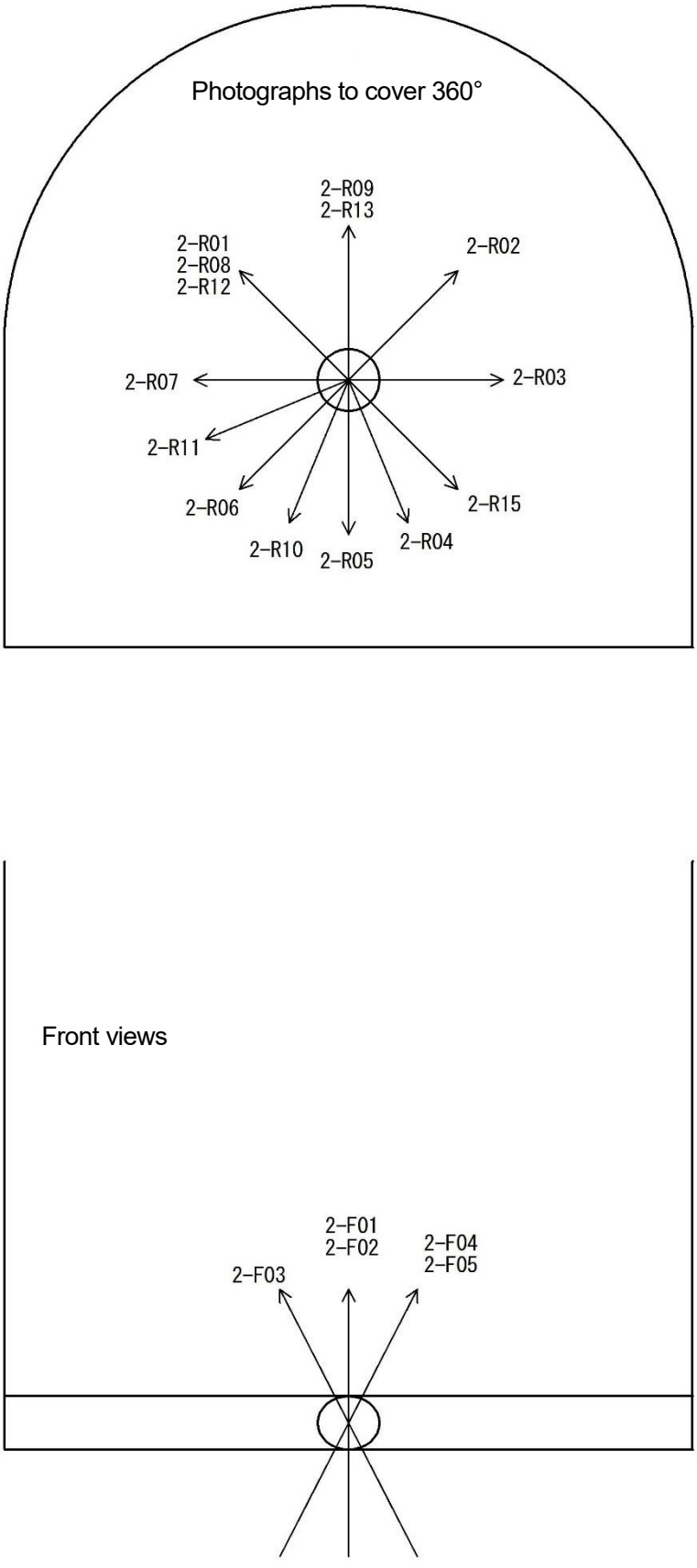
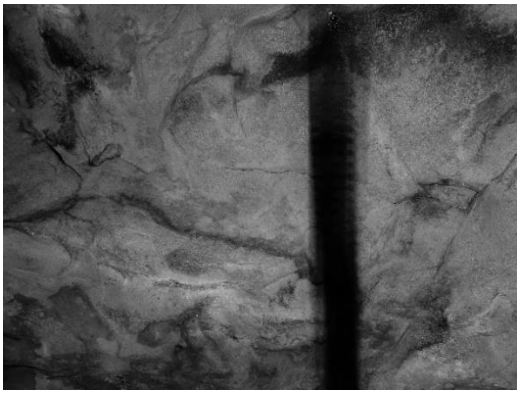


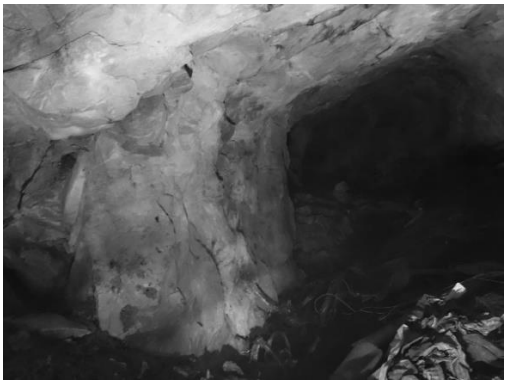
Figure 2-3-77. Diagram of photography points at Mouth of Pit No. 2



2-R09

2-R10

2-F01



2-F02

2-F03

2-A02

2-A21

2-A12

Photo 2-3-64. Pictures taken during survey at Mouth of Pit No. 2

3) Pit No. 3

① Outline of survey

At the remains of the Pit No. 3 mouth of Pit, investigators measured the levels of oxygen through the existing opening to ensure safety, before going down underground to take digital photography and videos, and create simplified drawings (ground area and elevation plans). In creating the simplified drawings, measurements were taken either manually or using a ground type 3D laser scanner (Topcon GLS-2000) and a simplified laser rangefinder (TruPulse 360).

The Pit No. 3 mouth of Pit is believed to be the entry to Pit No. 3, which was first opened in 1894 and closed in 1936.

Today, it is closed off in concrete save for a 0.97-m × 0.93-m opening, with most of the pit filled. One may however go down to approximately 7.45 meters underground.

[File name (Example)]

3 - E 01

[Survey locations]	[Angles of photography]
1: Mouth of Pit No. 1	E: Eastern walls (east); W: Western walls (west)
2: Mouth of Pit No.2	N: Northern walls (north); S: Southern walls (south)
3: Pit No. 3	A: Other

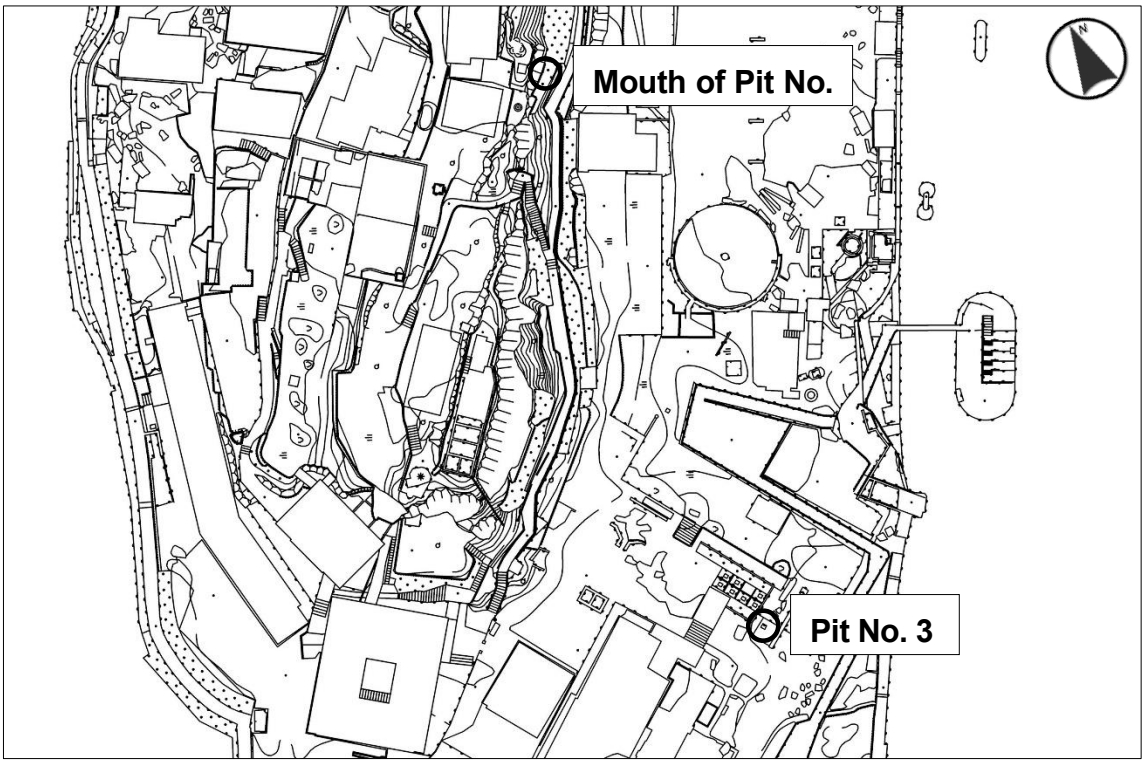


Figure 2-3-78. Diagram of survey locations

② Mouth of Pit survey

②-1 Overview of area inside mouth of Pit

At Pit No. 3, one could go approximately 7.45 meters below the opening (0.97 m × 0.93 m) to reach soiled surface, beneath which was filled. Inside the pit, there was spring water in part (Photos 2-3-65 and -66), and there was a 6.0-m × 3.81-m space observed. The walls surrounding this space were partly ashlar masonry of sandstone from the ground up to approximately 4-meter levels; the upper parts of the eastern, western, and southern walls above the masonry were cast in concrete with forms still remaining (Photo 2-3-68). The upper parts of the northern wall, meanwhile, were brickwork, laid to form an inverted arch, and above the brickwork the empty space continued further on (Photos 2-3-69 and -70).

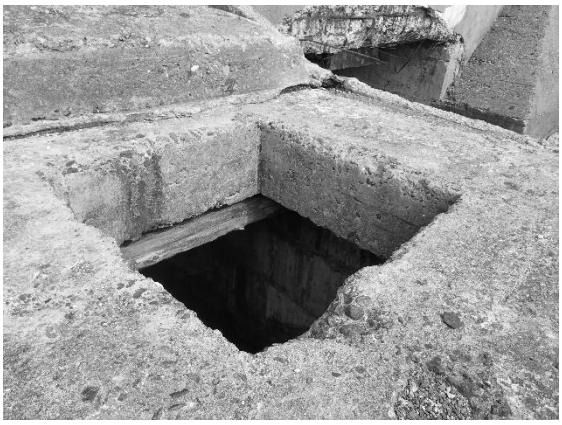


Photo 2-3-65. 3-A26_Opening

Photo 2-3-66. 3-A35_Underground

Photo 2-3-67. 3-E37_Eastern wall, lower parts

Photo 2-3-68. 3-A04_Eastern wall, upper parts

Photo 2-3-69. 3-N18_Nothern wall

Photo 2-3-70. 3-A32_Nothern wall

②-2 Eastern wall

The lower parts of the eastern wall were masonry where cut blocks of sandstone were laid in mortar or Amakawa, and the upper parts were a protruding concrete wall, with the forms still remaining in them.

The ashlar masonry technique used here were the same as those observed in the masonry revetment and elsewhere on Hashima Island, namely the Nunozumi, which uses squared blocks of stone. What characterized these structures was the use of squared blocks of stones, rather than fieldstone. The blocks of stone used here had varying widths ranging from approximately 30 cm to 50 cm, while their height was all standardized to approximately 35 cm. It is noteworthy that the eastern wall had a hole in it at the southern parts (Photo 2-3-71) and that it was laid with bricks at the northern parts (Photo 2-3-72). While it is unclear why these were so, the hole in the southern parts of the eastern wall may have been used for tools to pass through, such as piping.

Photo 2-3-71. 3-E35

Photo 2-3-72. 3-E38

②-3 Western wall

The western wall had generally the same structure as that of the eastern wall. The western wall differed from the eastern wall in that the former did not have a hole such as the one observed in the latter, and that there were square concrete columns hanging from the ceiling at the southern and northern ends (Photos 2-3-73 and -74). The square concrete columns had forms remaining intact. While the column on the southern side was located on the corner, the northern column was located at some 0.5 meters from the corner. It is unclear as to their structures and purposes. As mentioned above, the western wall was also laid with bricks at the northern end, as were the eastern wall. These may be related to the bricks in the northern wall, but details were not clear.

Photo 2-3-73. 3-S25

Photo 2-3-74. 3-A34

②-4 Southern wall

Similar to the other walls, the southern wall was also a Nunozumi masonry made of cut blocks of sandstone, and the protruding concrete portion of the eastern wall could be seen in the upper parts on the right (eastern) side, and the concrete column attached to the western wall in the upper parts on the left (western) side (Photo 2-3-75). It was not possible to investigate the southern wall up close, due to spring water observed around the wall (Photo 2-3-76).

Photo 2-3-75. 3-S02

Photo 2-3-76. 3-S10

②-5 Northern wall

The northern wall, in the lower parts, was a Nunozumi masonry made of cut blocks of sandstone similar to that of the other walls in the lower parts. The upper parts, on the other hand, were brickwork laid to form an inverted arch, with the empty space continuing further on above the brickwork.

While the stone masonry in the lower parts were in general done in the same manner as with the other walls, there were horizontally long remnants of metal observed in three locations at approximately 1.4 meters from the floor (Photo 2-3-77). It is speculated that these may have been connected to a tool or machinery, but no definite sign could be found nearby, and details are unknown. In the meantime, the bricks observed on the eastern and western walls were laid in such a manner that they were connected to the arch-shaped brickwork of the northern wall (Photo 2-3-78). This suggests the bricks were probably supposed to serve their roles when connected to something, but this, too, remains unknown.

As for the opening in the upper parts of the northern wall, portions of concrete with brick and gravels attached to them could be seen on the ceiling, and the floor (of the space beyond the masonry) was laid with bricks (Photos 2-3-79 and -80).

Photo 2-3-77. 3-N05

Photo 2-3-78. 3-N19

Beyond the opening, a portion of brick wall could be seen on the western side, which showed that the area was closed off on the left (western) side. As for the center and right (eastern) side, it was unclear if it was closed off with a brick wall, too. Given this was a pit shaft, it would not be strange if it did not run further on, although it is also possible that it may be connected to other pits for air release or other purposes. Whatever the case may be, the purpose of the opening itself is unclear.

Photo 2-3-79. 3-A31

Photo 2-3-80. 3-A32

②-6 Pit entry

With respect to the dimensions of the pit shaft at the Pit No. 3 remains, *Mitsubishi Kogyo Shashi (History of Mitsubishi Mining Company)* had a reference to a "4.8-m × 3.0-m wooden frame," which differs from the actual dimensions as measured in the present survey, namely 6.0 m × 3.81 m. It is difficult to form a specific conclusion as to this discrepancy in dimensions, since the interpretation for it may differ depending on a few factors, such as if this reference of a "4.8-m × 3.0-m wooden frame" in *Mitsubishi Kogyo Shashi* was made during the mine was still in operation, or at the time of its closure (1936), and whether the form of the shaft remained the same from when the mine was opened until it was closed.

Observing the other side of the existing opening, wooden beams could be seen running across the structure. While it is unknown if the form of the opening remained unchanged from when the mine was opened or it was altered to the current form after the mine closure, it is likely that the pit entry was larger than it is currently seen because the existing opening (0.97 m × 0.93 m) is too small to be used for the purpose of coal mining. It is unclear why an opening was created instead of the entry having been completely sealed off, but a possible explanation is that it was to be used for the purpose of ventilation even after the mine closure.

Photo 2-3-81. 3-S12

Photo 2-3-82. 3-S24

②-7 Conditions of surviving structures inside

The ashlar walls and the brickwork on the northern wall all remained in good condition, and the concrete portions in the upper parts of the walls and concrete columns were not in a danger of falling off, either. As for the floor, if it was in a danger of caving in could not be determined, although spring water appeared to be deep on the southern side. It will be dangerous to access the spring water.

As for the opening with bricks laid created in the upper parts of the northern wall, it will be possible to determine if the space beyond it is sealed off or continues further on if the floor is cleared of rubble.

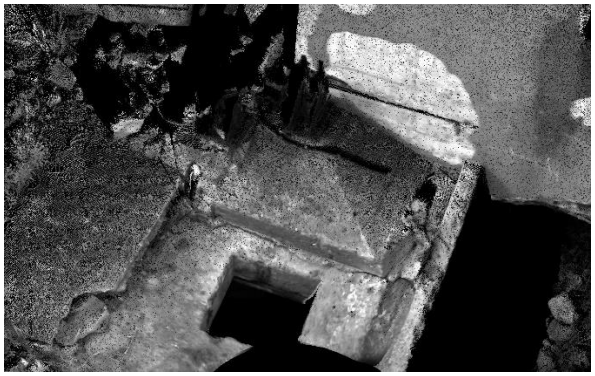


Photo 2-3-83. 3D laser measuring

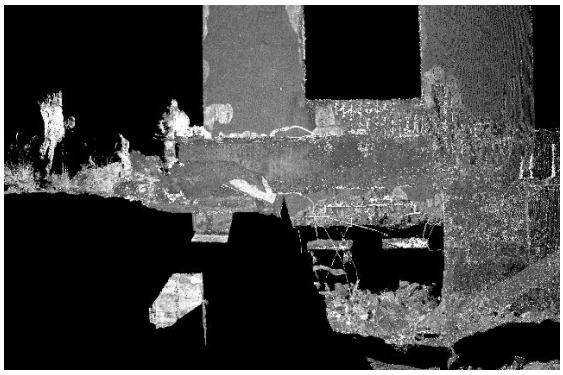


Photo 2-3-84. 3D laser measuring

Photo 2-3-85. Pit No. 3, eastern wall

Photo 2-3-86. Pit No. 3, western wall

Photo 2-3-87. Pit No. 3, southern wall

Photo 2-3-88. Pit No. 3, northern wall

Appendix 2-1

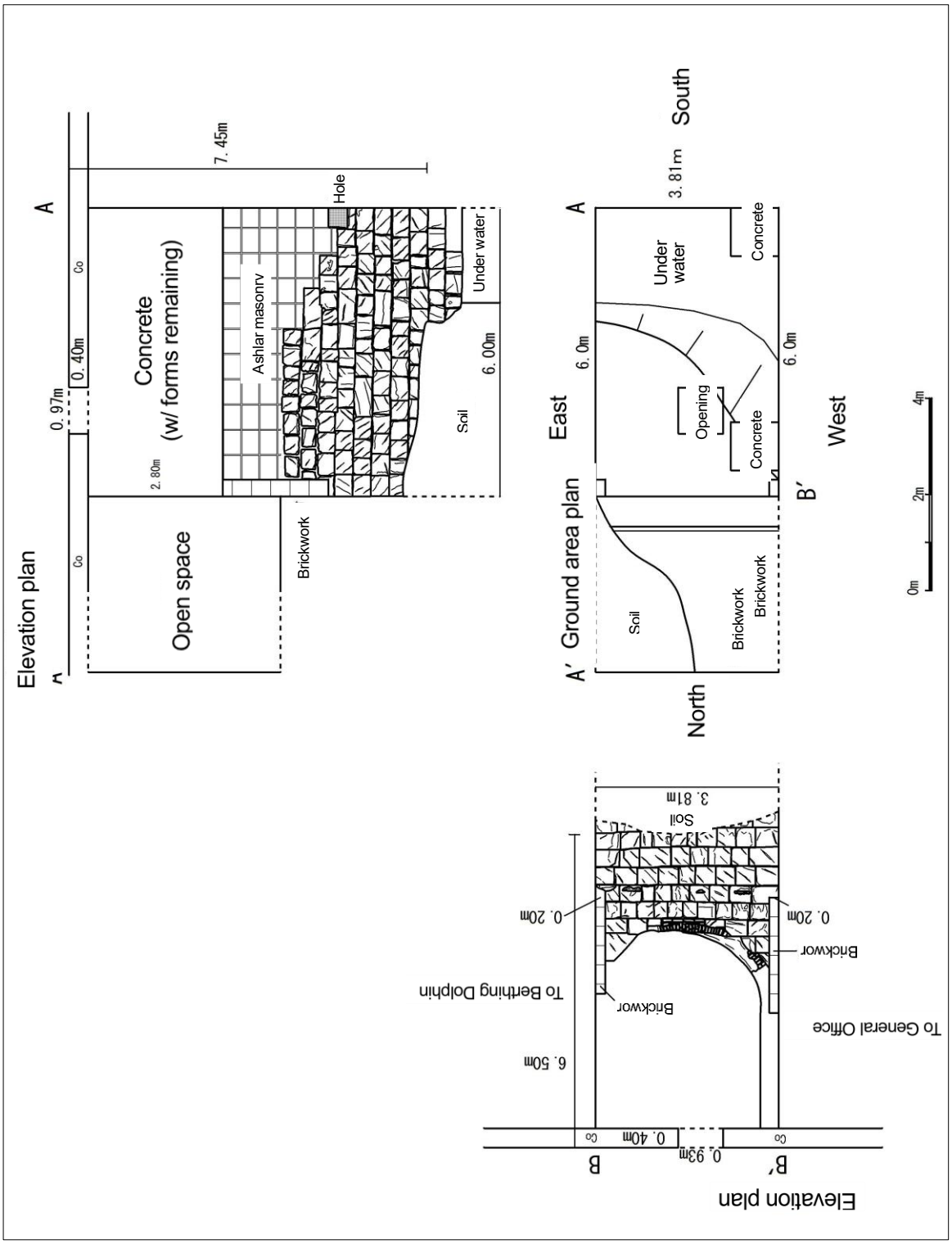


Figure 2-3-79. Diagram of Pit No. 3

Archaeological excavation report (Survey of underground remains boundaries at the Hashima Coal Mine remains)

For the purpose of examining the production facilities and the seawalls, an excavation study was conducted at the remains of the Pit No. 1 winding machine room in 2014, and a survey to find out whether or not any remains of seawalls were preserved at the schoolyards of the former Takashima Town Hashima Municipal Elementary and Junior High Schools in 2014 and 2015.

An outline of the studies is provided in the following:

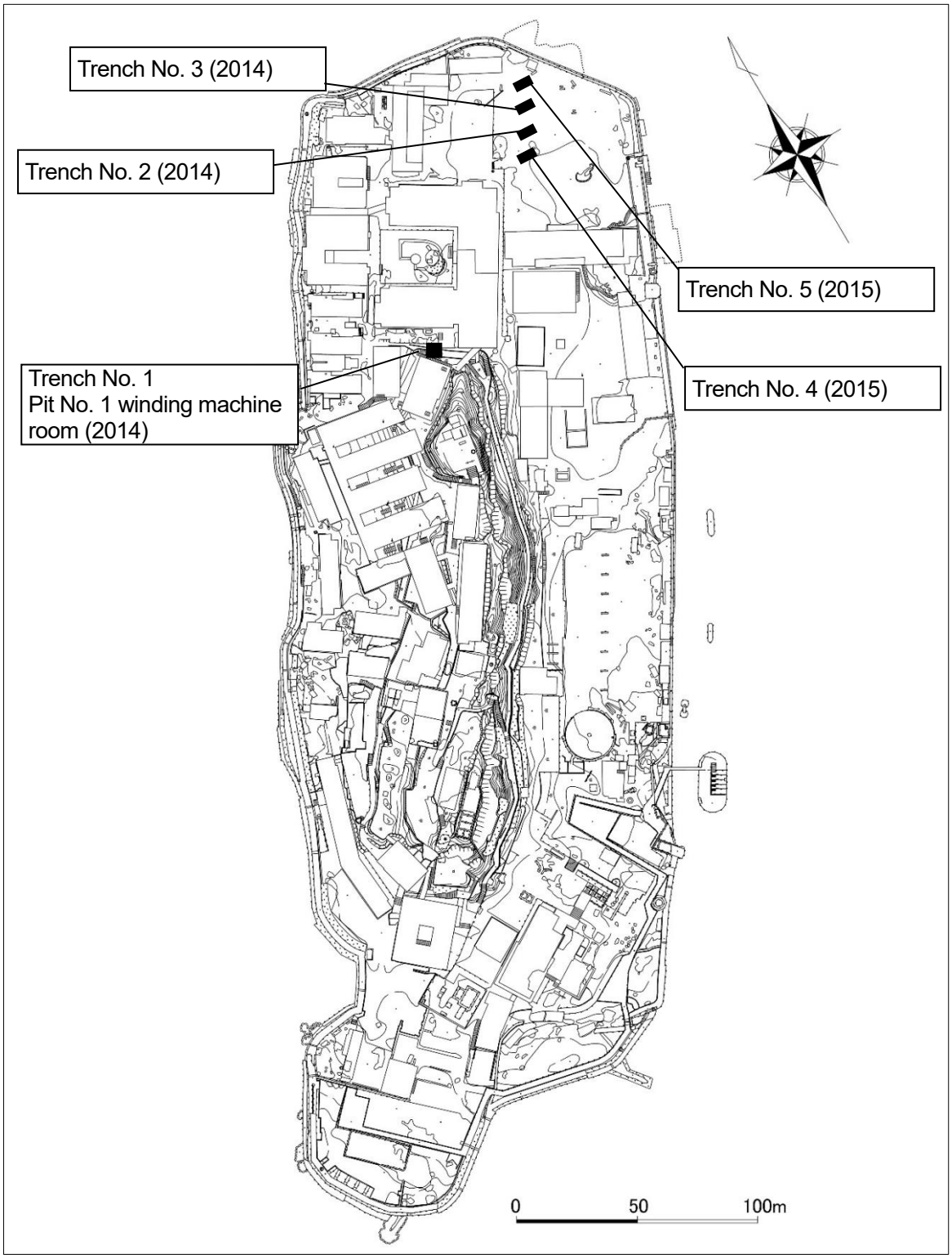
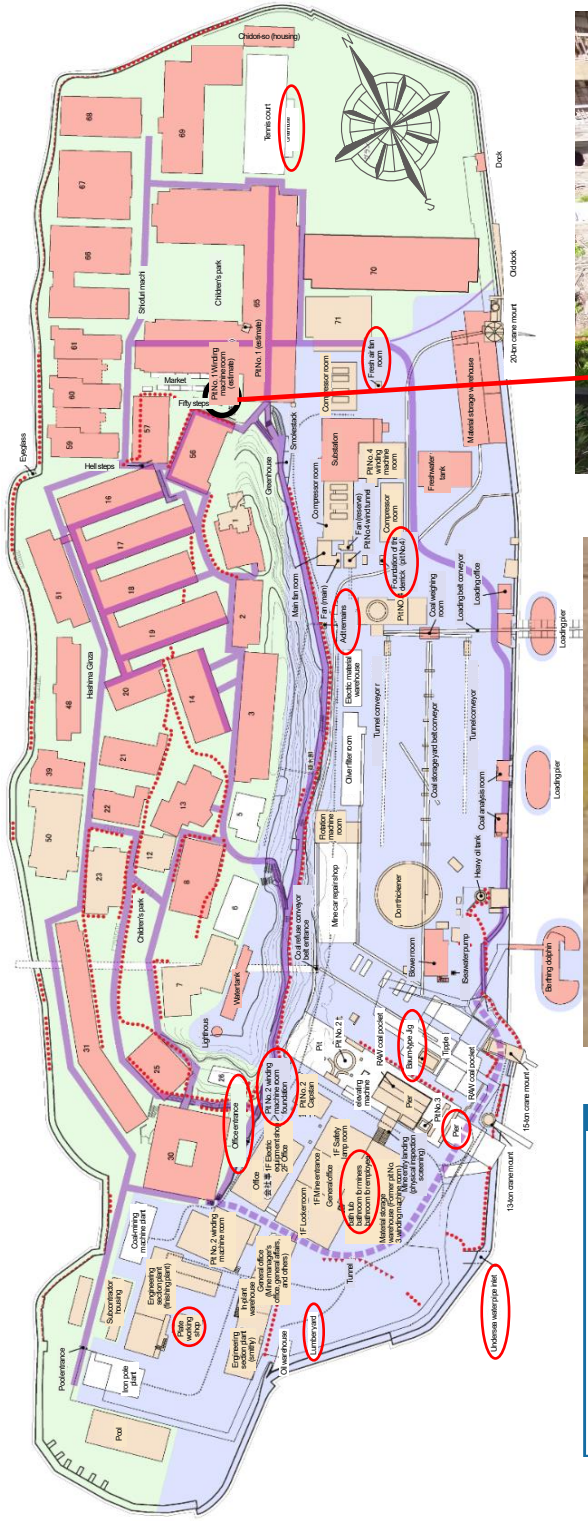


Figure 2-3-80. Diagram of locations for excavation study

1) Pit No. 1 winding machine room excavation

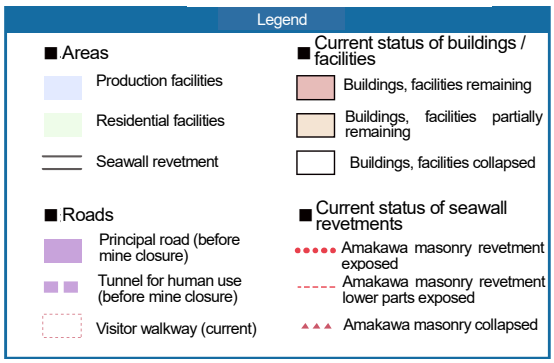
a) Outline of survey

Pit No. 1 was a pit shaft that was opened in the early days of the Hashima Coal Mine. Mining was started in 1886, and the mine was closed in 1898. Based on a study of a topographic map of the present day overlaid on an old map, it was estimated that the mine entry was beneath Building No. 65, and it would therefore be not possible to conduct an investigation there. At a location estimated to have been the Pit No. 1 winding machine room, however, several exposed patches of brickwork were observed. An excavation study was therefore conducted to determine whether or not there were any remains of the structure there.



Site of excavation

An old map, from 1917



b) Findings

At Trench No. 1, rema Figure 2-3-81. Diagram of Pit No. 1 winding machine room study locations ı
the area between the two curves also made of bricks, although partially ruined. Each of the arcs formed a part of a cylinder, which was mortared. Inside the larger arc, another, smaller cylinder, which was also laid in bricks, was built. Structures and functions of this brick structure were not yet known. Considering that the bricks used here were those with a thickness of approximately 4 cm, or so-called “konjac bricks,” it is likely that this structure was related to Pit No. 1 winding machine room.

Figure 2-3-82. Trench No. 1. Ground area plan

Photo 2-3-89. Work at Trench No. 1

Photo 2-3-90. Trench No. 1, excavation work completed

2) Survey on presence of remains of seawalls

a) Outline of survey

For the purpose of finding out whether or not any remains of the seawalls, which were built in 1899 and subsequently buried underground at the Hashima Coal Mine remains, were presented, a survey was conducted over a period of two years, in 2014 (Trenches No. 2 and No. 3) and 2015 (Trenches No. 4 and No. 5). The locations of the trenches are as shown in Figures 2-3-83 and -84. The survey was conducted manually to determine whether or not remains were presented, and their shapes, if any.

The locations of the trenches to study were determined based on Takashima Coal Mine Survey Report, published in March 2014 (City of Nagasaki, 2014).

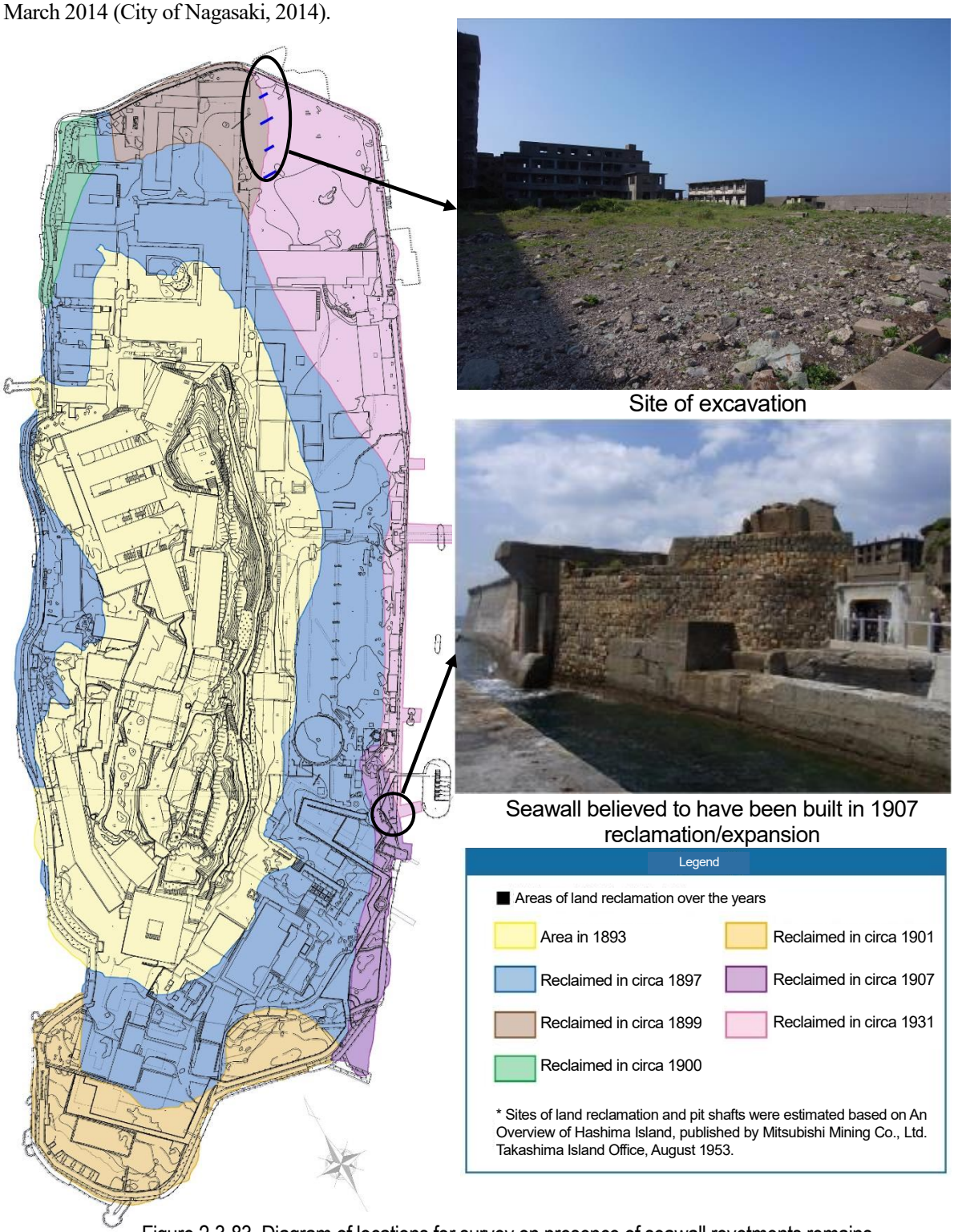


Figure 2-3-83. Diagram of locations for survey on presence of seawall revetments remains

b) Findings

At Trenches No. 2 and No. 3, remains of the stone seawalls built in 1899 were found at the locations predicted. There were foundations of buildings above the stone walls found at Trench No. 2, where it was observed that remains of structures from the Meiji to the early Showa eras (the late 19th to early 20th century) were preserved in good condition. As the purpose of the 20014 survey was to determine the locations of stone seawalls, the stone walls were not dug up in their entirety. Nevertheless, three rows of stone walls were observed, in which stones were laid in mortar using the Nunozumi technique. The upper parts were finished in Amakawa, a type of traditional earth mixture that is light orange in color and is often used in this region. Given that the Amakawa-covered parts extended further beyond the estimated counterfort length, it is possible that the Amakawa finish may not have been used only in the stone walls but extended to the ground surface of that time (Figure 2-3-88 and Photo 2-3-111).

At Trenches No. 4 and No. 5, concrete foundations built on brickwork were observed. Given their locations, they are considered to have been the foundations of the former primary school building, whose construction was completed in 1934, after the 1931-32 land reclamation. Although remains of the stone seawall built in 1899, which was the original target of the survey, could not be found definitively, it is likely that they may remain underground, beneath the foundation of the former primary school building. As was the case with the remains exposed above ground, the shaft line of the foundations ran along the topographical features, namely diagonal to the Japanese national coordinate.

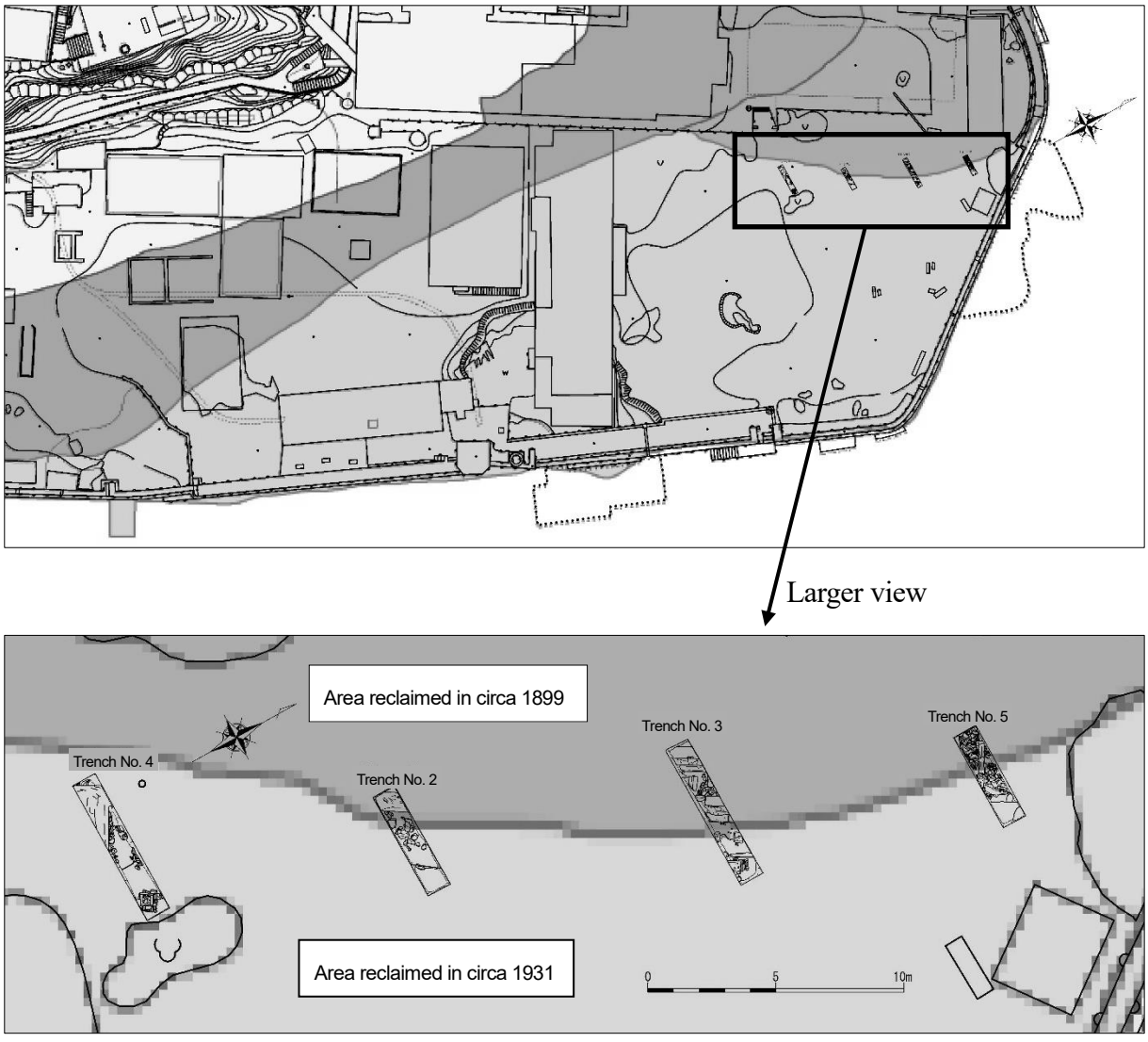
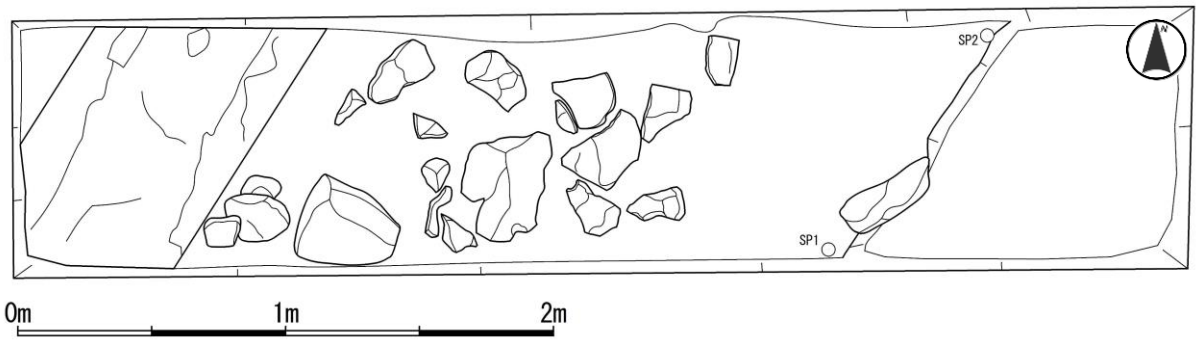
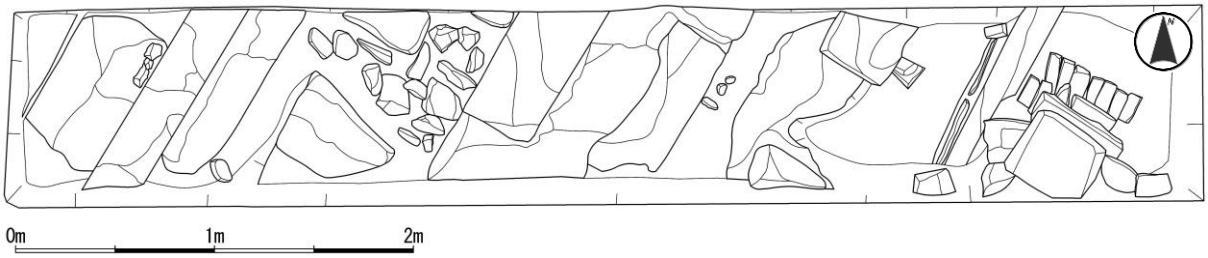


Figure 2-3-84 Locations of trenches (Composite of maps showing areas of land reclamation over the years)

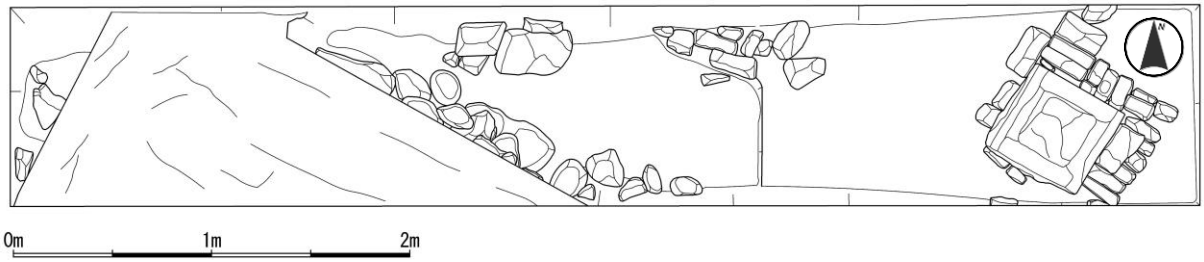
Appendix 2-2



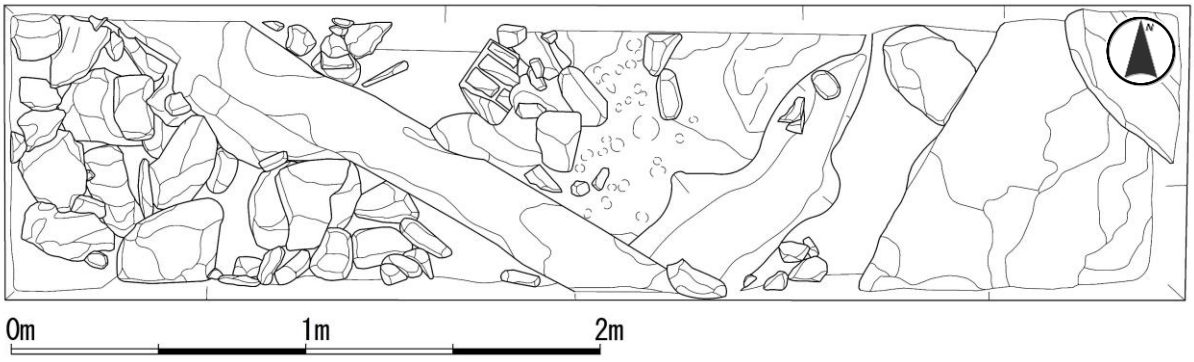
Trench No. 2



Trench No. 3



Trench No. 4



Trench No. 5

Figure 2-3-85. Ground area plans of trenches

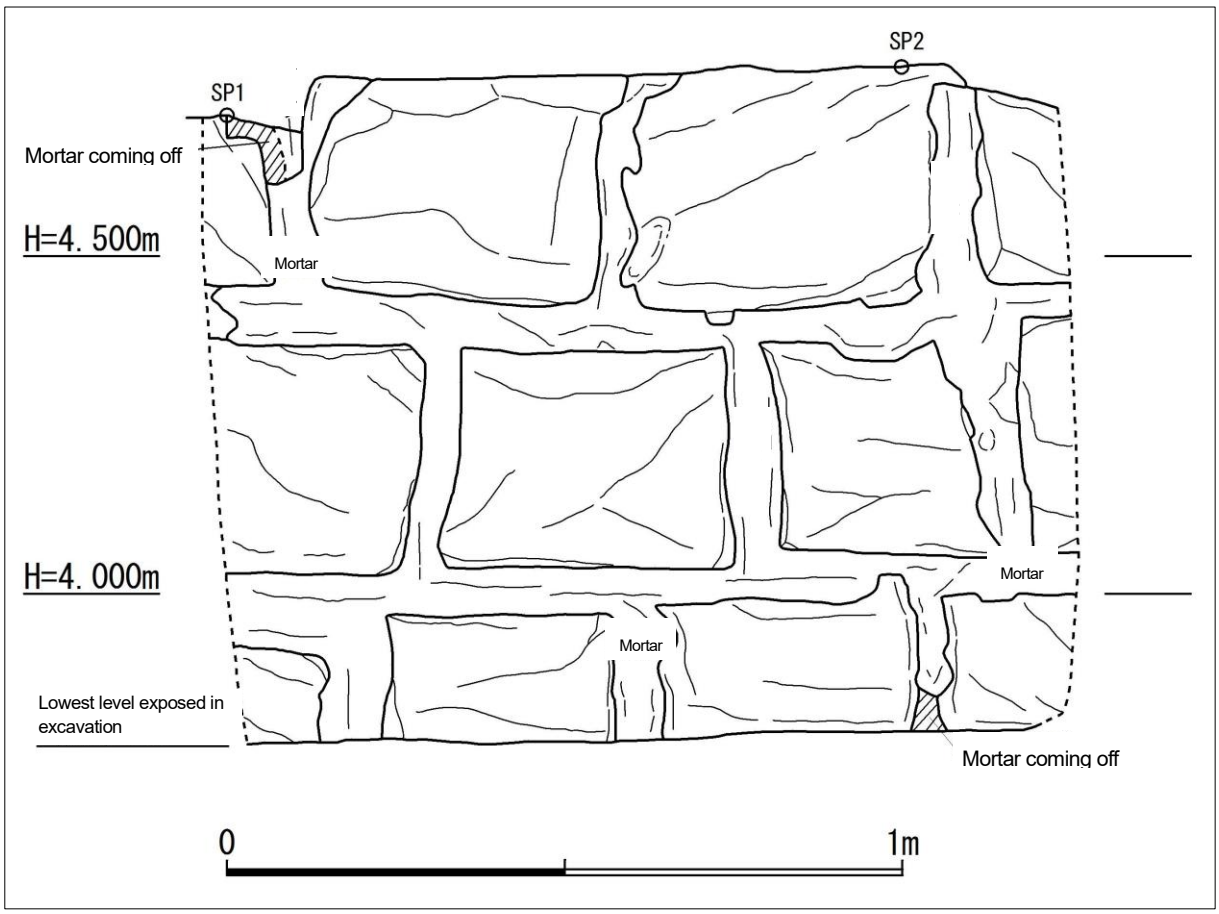


Figure 2-3-86. Elevation plan of former seawall revetment (Trench No. 2)

c) Unearthed items

A total of 51 items were unearthed from Trench No. 4, including bricks, roof tiles, hardware, and porcelains. One unearthed items of note was engraved pieces of a roof tile that appear to bear the letters "上 吉武." The engraving is believed to indicate the name of the manufacturer that created the roof tiles.

Photo 2-3-91. Unearthed items

Photo 2-3-92 Unearthed items (engraved rood tile)

Appendix 2-2

Photo 2-3-93. Trench No. 1, excavation work completed

Photo 2-3-94. Trench No. 2, stone seawall

Photo 2-3-95. Trench No. 3, excavation work completed

Photo 2-3-96. Trench No. 3, remains of foundation

Photo 2-3-97 Trench No. 4, excavation work completed

Photo 2-3-98. Trench No. 4, remains of foundation

Photo 2-3-99. Trench No. 5, excavation work completed

Photo 2-3-100. Trench No. 5, soil layers

Appendix 2-2

Survey of the structure of Pit No. 3 winding machine room (Survey of Hashima Coal Mine buildings, etc.)

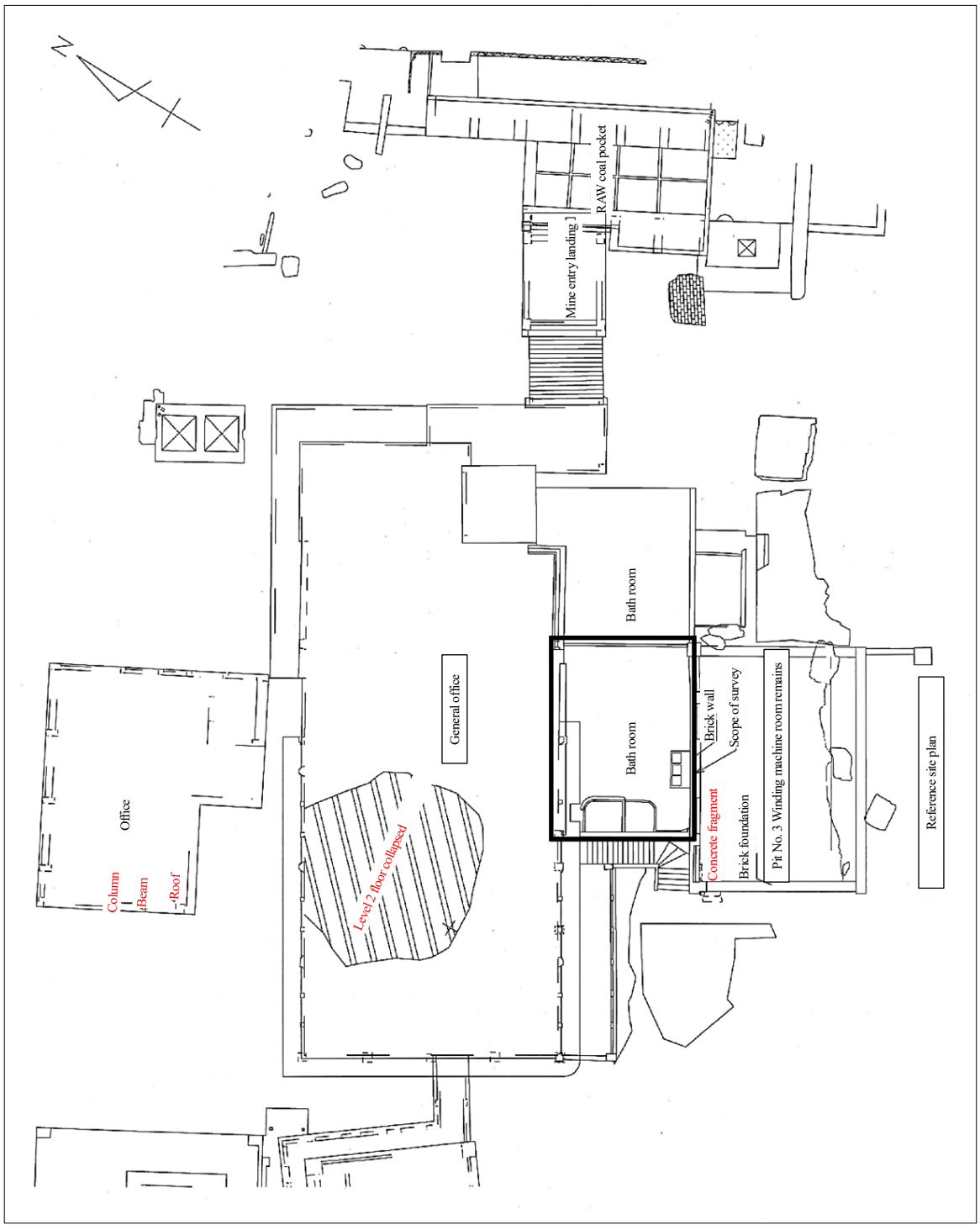


Figure 2-4-33 Survey locations inside building

Appendix 3

1) Content of survey

① Measurements

The following measurement surveys were conducted:

1. Measurements required to create site plans and measure the land subsidence
2. 3D laser measurements required to create drawings of the current conditions of the building
   Laser measurements were taken using a scanning pitch of 7 mm or smaller per 10 m.
3. Rubbles (excluding those that could not be moved manually), wooden pieces, steel shelves, and temporary scaffolding materials that would interfere with 3D laser measurement were moved to the adjacent office. Moving of such objects, however, was kept to minimum in order to preserve the current conditions as much as possible.

② Investigation of damage

The outer walls, floors, inner walls, columns, beams, ceilings, and roofs were examined for damage (cracks, floating, concrete cover falling off, rebars exposed, rebars lost, mortar finishes floating, etc.), visually and by tapping on the surface. Investigation was also made to examine the joint between the brick walls and the General Office, cracked walls inside Arch No. 4 of brick walls, and rainwater infiltration at the top of the brick walls.

③ Creation of drawings of current conditions

Based on the results of measurement surveys, a series of line drawings of the current conditions of the site were created. A list of drawings created is provided in Table 2-4-30. The southern side elevation plan was compared to the drawings that had been created based on measurements taken in FY2015 survey.

④ Creation of drawings of damage

1. Based on the results of the investigation of damage, the conditions of damage were summarized in the drawings of the current conditions to create drawings of damage. A list of drawings created is provided in Table 2-4-30.
2. The conditions of damage were documented in photographs in the following manner:
   a) Pictures of an object were taken alongside a whiteboard that contained the name of the task, date, and location on it. As an exception, close-up pictures were taken without a whiteboard in them, by preparing a diagram indicating the locations of the images.
   b) Pictures were taken in parallel or perpendicular to the object.
   c) Photo resolution: Approximately 2 megapixels (1204 × 1606); 300 dpi

Table 2-4-30. List of diagrams and plans (Drawings of current conditions / damage)

No	Name of diagram/plan	Scale	Category	Drawings of current conditions	Drawings of damage	Remarks
01	Site plan	1/300	Site plan	○		A-01
02	Diagram of land subsidence measurements (Shown in site plan)	1/300	Site plan	○		
03	Level 1 plan view	1/50	Plan view	○	○	A-02
04	Diagram of land subsidence measurements (Shown in plan view)	1/50	Plan view	○		
05	Level 2 plan view	1/50	Plan view	○	○	A-03
06	Northern side elevation view	1/50	Elevation view	○	○	A-04
07	Western side elevation view	1/50	Elevation view	○	○	A-05
08	Southern side elevation view	1/50	Elevation view	○		A-06
09	Cross-section view (1)	1/50	Cross-section view	○		A-07
10	Cross-section view (2)	1/50	Cross-section view	○		A-08
11	Level 1 developed view (1)	1/50	Developed view	○	○	A-09
12	Level 1 developed view (2)	1/50	Developed view	○	○	A-10
13	Level 1 developed view (3)	1/50	Developed view	○	○	A-11
14	Level 2 developed view (1)	1/50	Developed view	○	○	A-12
15	Level 2 developed view (2)	1/50	Developed view	○	○	A-13
16	Level 1 reflected ceiling plan	1/50	Plan view	○	○	A-14
17	Beam developed key plan	1/50	Plan view	○		A-14a
18	Level 1 ceiling beam developed view (1)	1/50	Developed view	○	○	A-15
19	Level 1 ceiling beam developed view (2)	1/50	Developed view	○	○	A-16
20	Level 1 ceiling beam developed view (3)	1/50	Developed view	○	○	A-17
21	Level 2 eaves framing plan	1/50	Framing plan	○	○	A-18
22	Comparison of southern side developed plans	1/50	Elevation view	○		A-19

Appendix 3

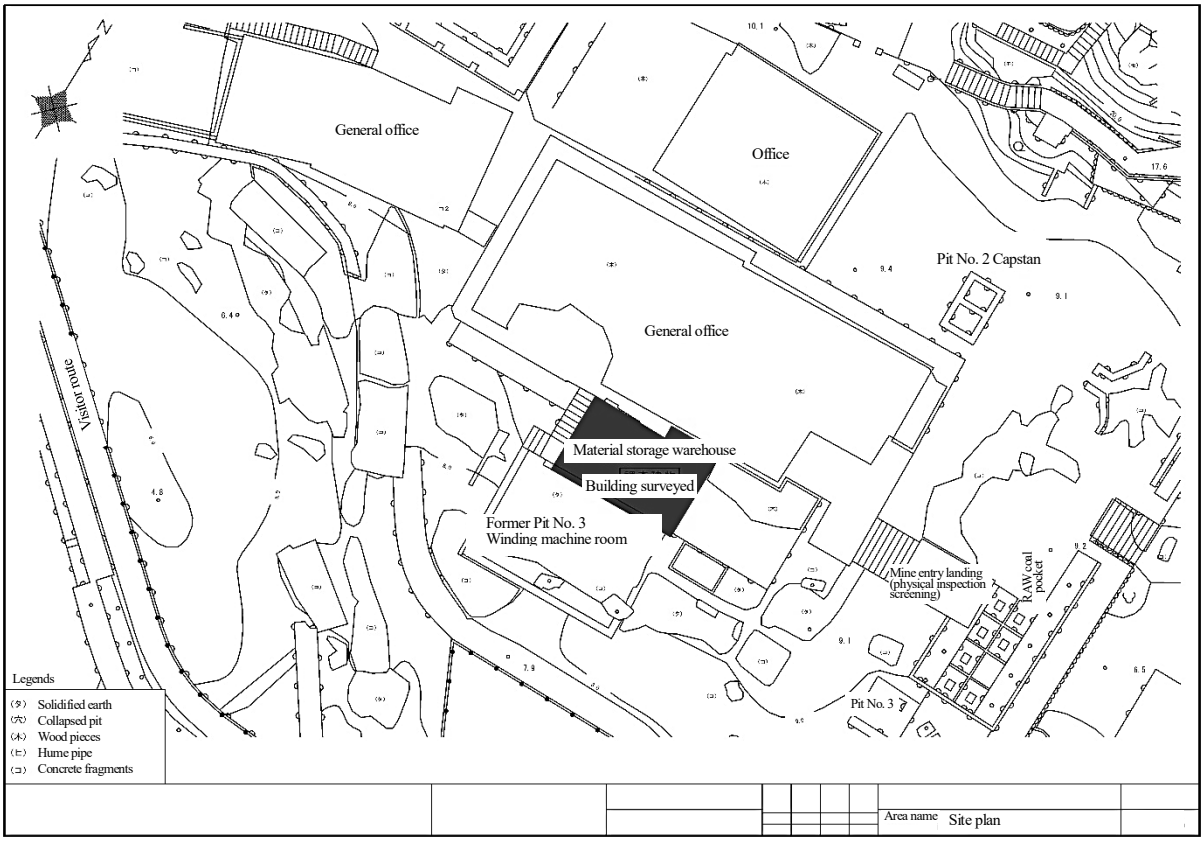


Figure 2-4-34. Site plan

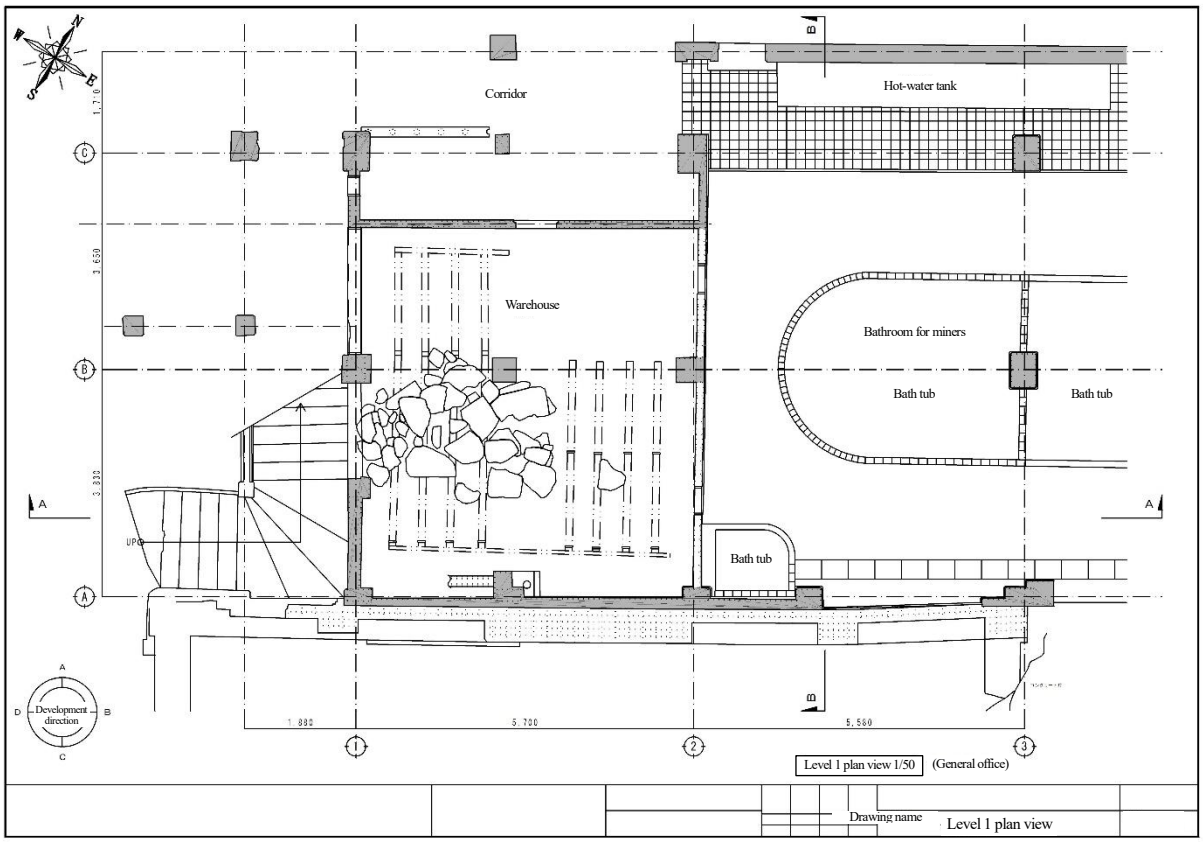


Figure 2-4-35. Level 1 plan view

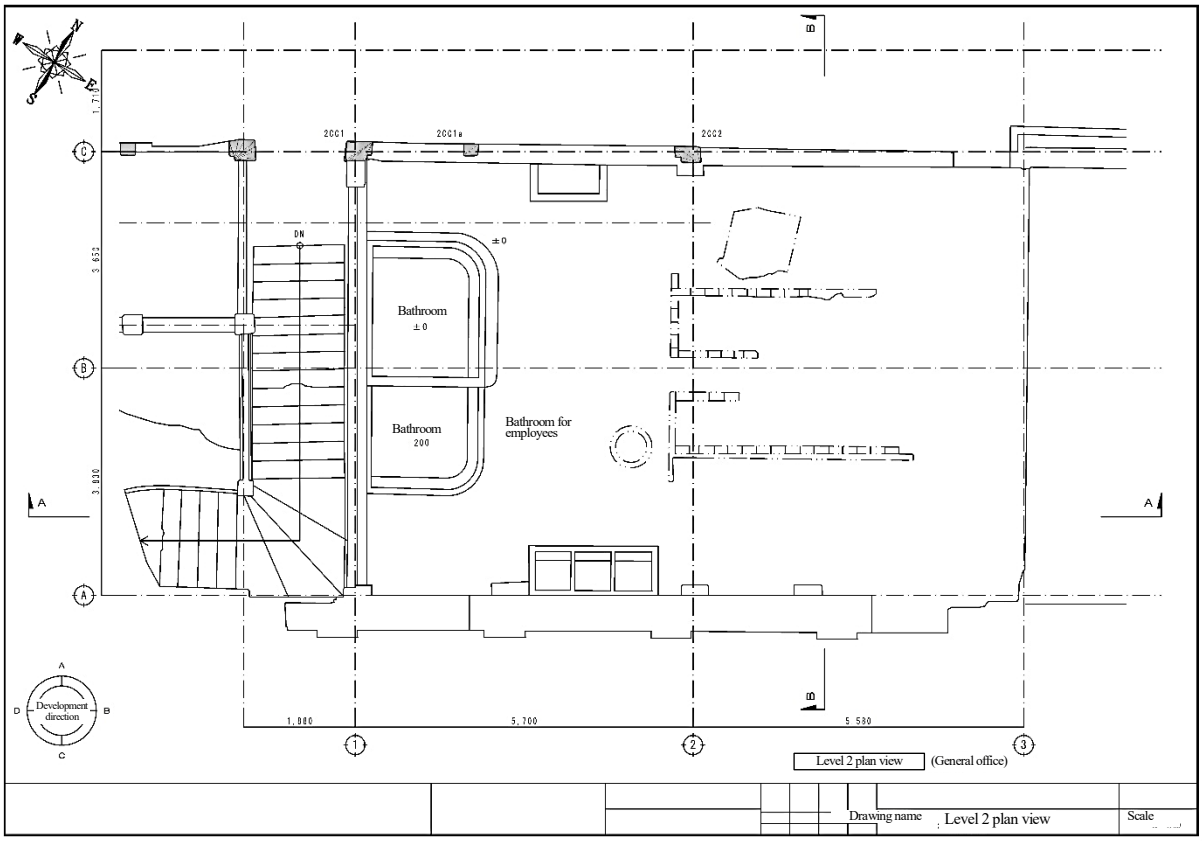


Figure 2-4-36. Level 2 plan view

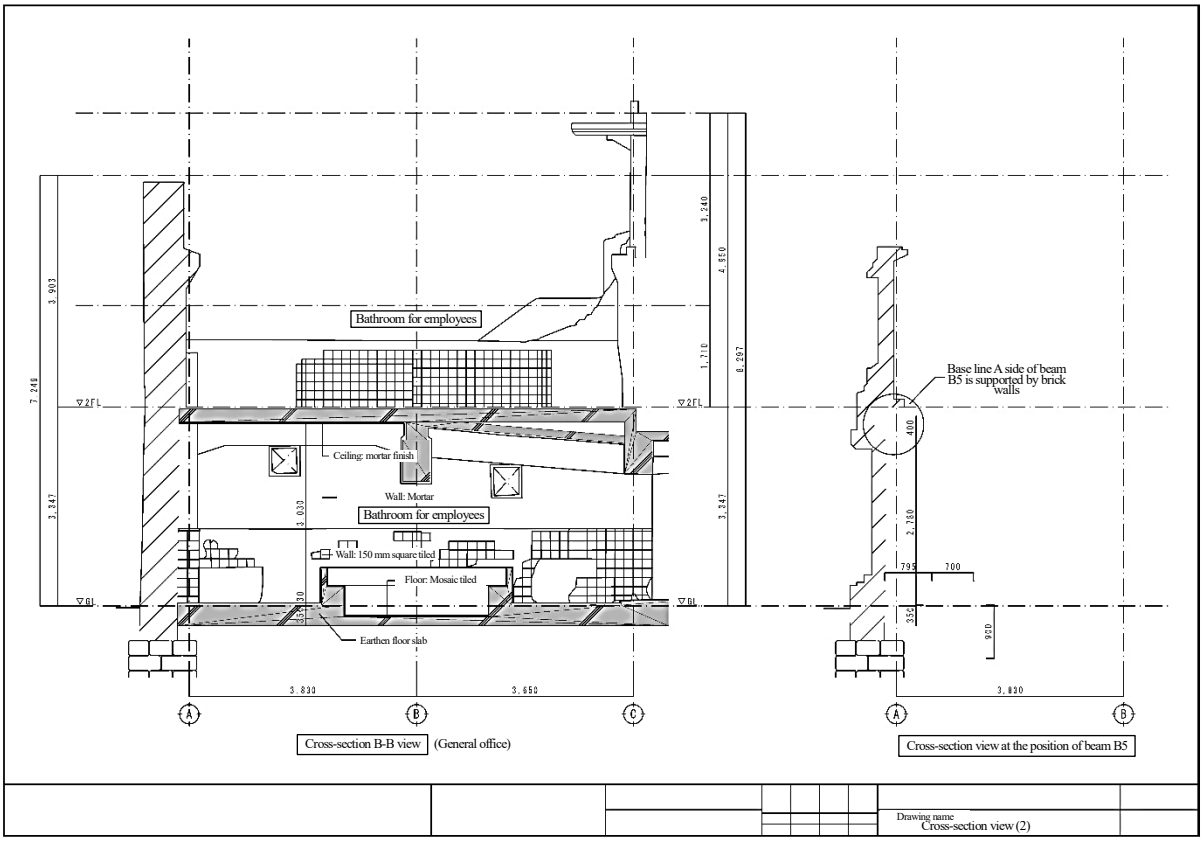


Figure 2-4-37. Cross-section view

Appendix 3

⑤ Surveys / tests

The following surveys and tests were conducted to collect data to understand the current conditions of the reinforced concrete:

⑤-1 Collection of samples and post-sampling restoration

- Core (⌀100): 4 locations
- Chippings (W200 × H200 × D40): 3 locations

* After the sampling, the sites were restored using non-shrink mortar.

⑤-2 Investigation of reinforced concrete for deterioration, etc.

- Visual examination of rebars: 3 sites (examination of thickness of concrete cover, rebar diameter, and degree of corrosion)
- Examination of bar arrangement: 26 sites (examination of locations and diameter of rebars using electromagnetic induction method)
- Compressive strength test: 4 bars
- Neutralization depth measurement: 7 bars
- Chloride ion content measurement: 12 slices
- Rebound hammer test: 26 sites
- Static elastic modulus test: 4 sites
- Reinforcement corrosion degree survey: 2 sites (self-potential measurement and polarization resistance measurement)
- Core drilling (to determine if there were foundations / underground beams): 2 sites

* After the sampling, the sites were restored using non-shrink mortar.

⑤-3 Microtremor measurement to observe the remains' characteristic period, etc.

Per the Common Specifications for the Site Surveys (established December 2011) (4.6.5 Microtremor measurement).

- Locations of measurement: 3 sites: upper, middle, and lower levels
- Directions of measurement: 3 components: horizontal (x and y axes) and vertical (z axis)
- Measurements: Microtremor (remains / ground) - 3 times; sandbag impact test (remains) - 1 time
- Measurement item: Acceleration
- Analyses: Predominant frequency of the ground and predominant frequency of the remains

⑤-4 Measurement of wind speed and direction, temperature, and humidity

- Locations of measurement: 3 m above the floor of Level 2
- Measurements: Zonal wind speed, meridional wind speed, vertical wind speed, and 10-minute average wind

speed

- Measurement period: Same with microtremor measurement

⑤-5 Survey of the foundations (exploratory drilling)

- Locations of exploratory drilling: 2 sites
  - ① Area of 1 m2 / depth of 0.9 m
  - ② Area of 1.6 m2 / depth of 0.78 m
- Objectives: Examining the conditions of the foundations (geometry, materials, etc.)
  Checking for any deterioration, subsidence, sloping, etc. of the foundations
  Determining whether or not there were underground pipework, and any damage to it at Site ②

⑥ Creation of structural drawings

Based on the results of the measurement, the visual examination of rebars and the Examination of bar arrangement, a series of structural drawings were created. A list of the drawings created is provided in Table 2-4-31. The Level 2 beams framing plan and the lists of column, girders, and beams were created based on the actual measurements taken of the cross-sectional dimensions of the members.

Table 2-4-31. List of drawings (structural drawings)

No	Name of drawing	Scale	Category	Remarks
01	Underground beams framing plan	1/50	Framing plan	S-01
02	Level 2 beams framing plan	1/50	Framing plan	S-02
03	Framing elevation (1)	1/100	Framing elevation	S-03
04	Framing elevation (2)	1/100	Framing elevation	S-04
05	Column / girder / beam / slab list	1/50	List	S-05

2) Outline of building surveyed

Name: General Office

Location: Hashima, Takashima-cho, Nagasaki City

Constructed in: 1896-1960

Structure: Reinforced concrete

Levels: 2

Current conditions: The building remains as part of a structure that contains brick walls of No. 3 winding machine room remains. The columns, beams, and the underside of the floor slab had the surface peeling off with rebars exposed, and the deterioration may progress even further. The roof and the outer walls of Level 2 have collapsed.

Surveyed building, outside (Eastern side)

Surveyed building, outside (Western side)

Surveyed building, inside (Bath)

Surveyed building, inside (Warehouse)

Photo 2-4-63. Appearance of General Office

3) Collection of samples and post-sampling restoration

① Objectives of survey

As a part of data collection to understand the current conditions of the reinforced concrete, concrete cores were drilled out as necessary for performing compressive strength test, static elastic modulus test, neutralization depth measurement, and chloride ion content measurement, and chipping was carried out as necessary for performing neutralization depth measurement, reinforcement corrosion degree survey, reinforcement corrosion survey, and visual check of the conditions and dimensions of rebars.

② Survey methods

Prior to core drilling and concrete chipping, rebar exploration was performed using the electromagnetic wave radar method. Based on the results of the rebar exploration, the bar arrangements were marked with tape for identification, before core drilling and concrete chipping were performed (Figure 2-4-38).

The diameter of a concrete core was determined based on the bar arrangements; it was drilled out at the diameter of 77 mm. The length of a core was to be from the starting point for drilling to the finished surface at the end (penetration) for the floors, and approximately twice the length of the diameter for beams, columns, and underground beams. The cores drilled out were wound with plastic wrap to protect them against neutralization before storage (Photo 2-4-64).

Chipping was performed where rebars ran orthogonal, within a range of 200 mm × 200 mm, and deep enough to determine the thickness of concrete cover for the rebars.

Rebar exploration

Core drilling work

Concrete chipping work

Curing of drilled cores

Photo 2-4-64. Core drilling and chipping work

Appendix 3

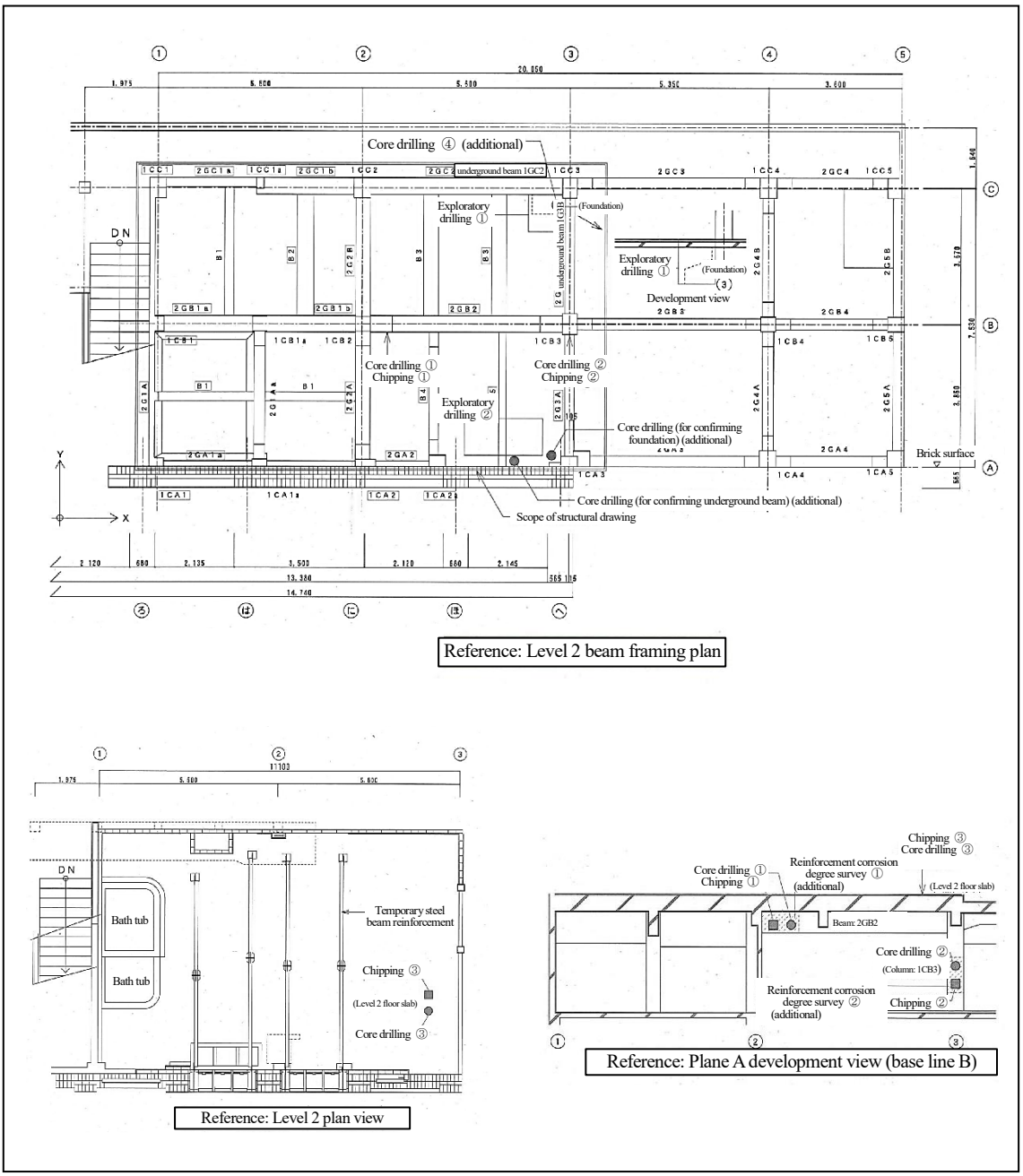


Figure 2-4-38. Core drilling / chipping locations

4) Investigation of reinforced concrete for deterioration, etc.

① Objectives of survey

A series of tests and surveys were performed on the cores collected and at the chipping sites to understand the current conditions of the reinforced concrete, for the purpose of preparing basic materials necessary in discussing future preservation and repair, as well as structural reinforcement. A list of the test / survey items and quantities is provided in Table 2-4-32, and diagrams of survey locations in Figures 2-4-39 and -40.

Table 2-4-32. Test / survey items and quantities

Item	Quantity	Summary
Visual examination of rebars	3 sites	Chipping Sites ①-③
Examination of bar arrangement (electromagnetic induction method)	34 sites	Areas shown in ☐
Compressive strength test	4 sites	Cores ①-④
Neutralization depth measurement	7 sites	Cores ①-④ and Chipping Sites ①-③
Chloride ion content measurement	12 slices	Cores ①-④ (3 slices for each core)
Rebound hammer test	34 sites	Areas shown in ☐
Static elastic modulus test	4 sites	Cores ①-④
Reinforcement corrosion survey (Self-potential measurement)	2 sites	Chipping Sites ① and ②
Reinforcement corrosion survey (Polarization resistance measurement)	2 sites	Chipping Sites ① and ②
Core drilling (to determine if there were foundations / underground beams)	2 sites	Cores marked with ●

Appendix 3

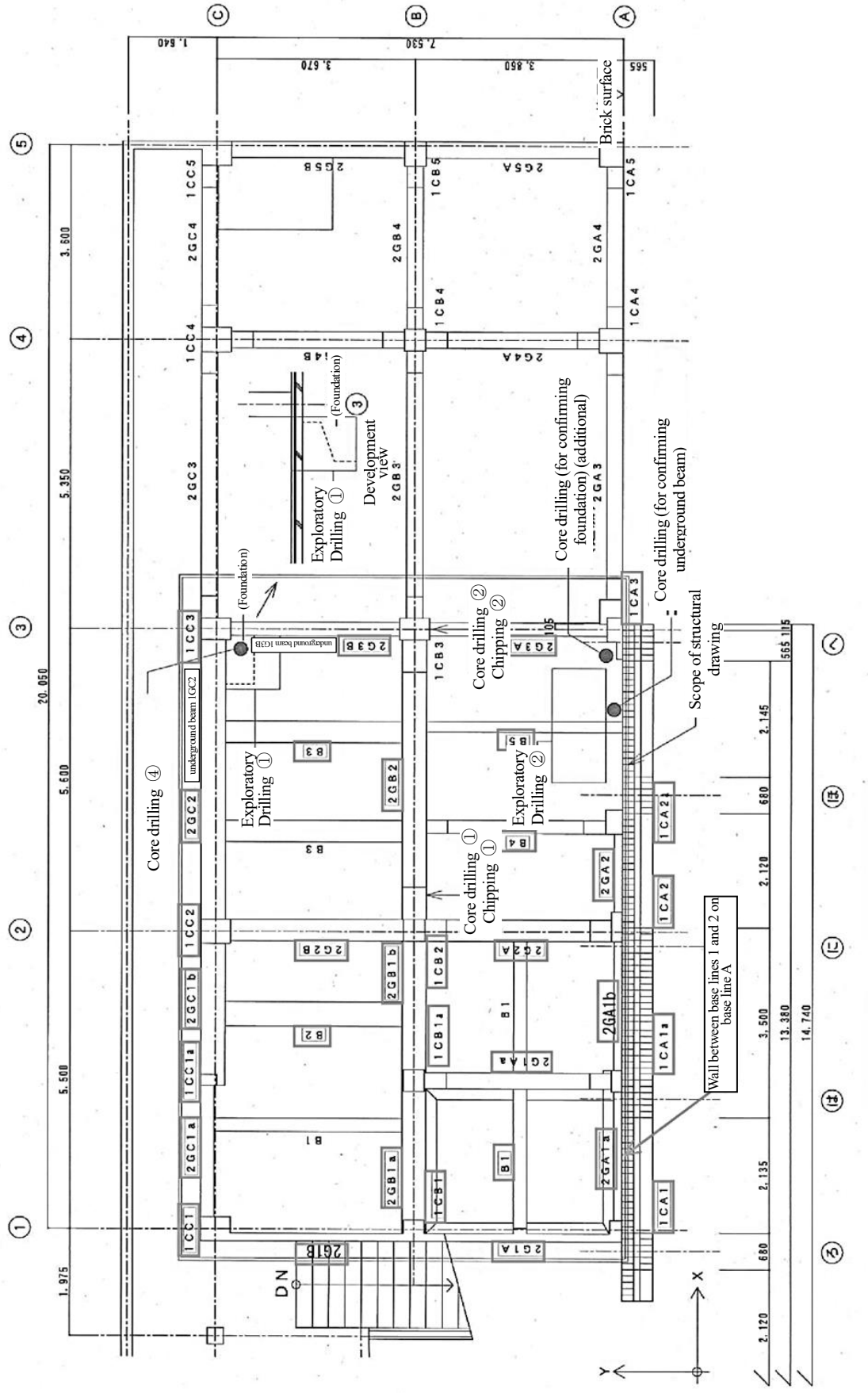


Figure 2-4-39. Test / survey locations (1)

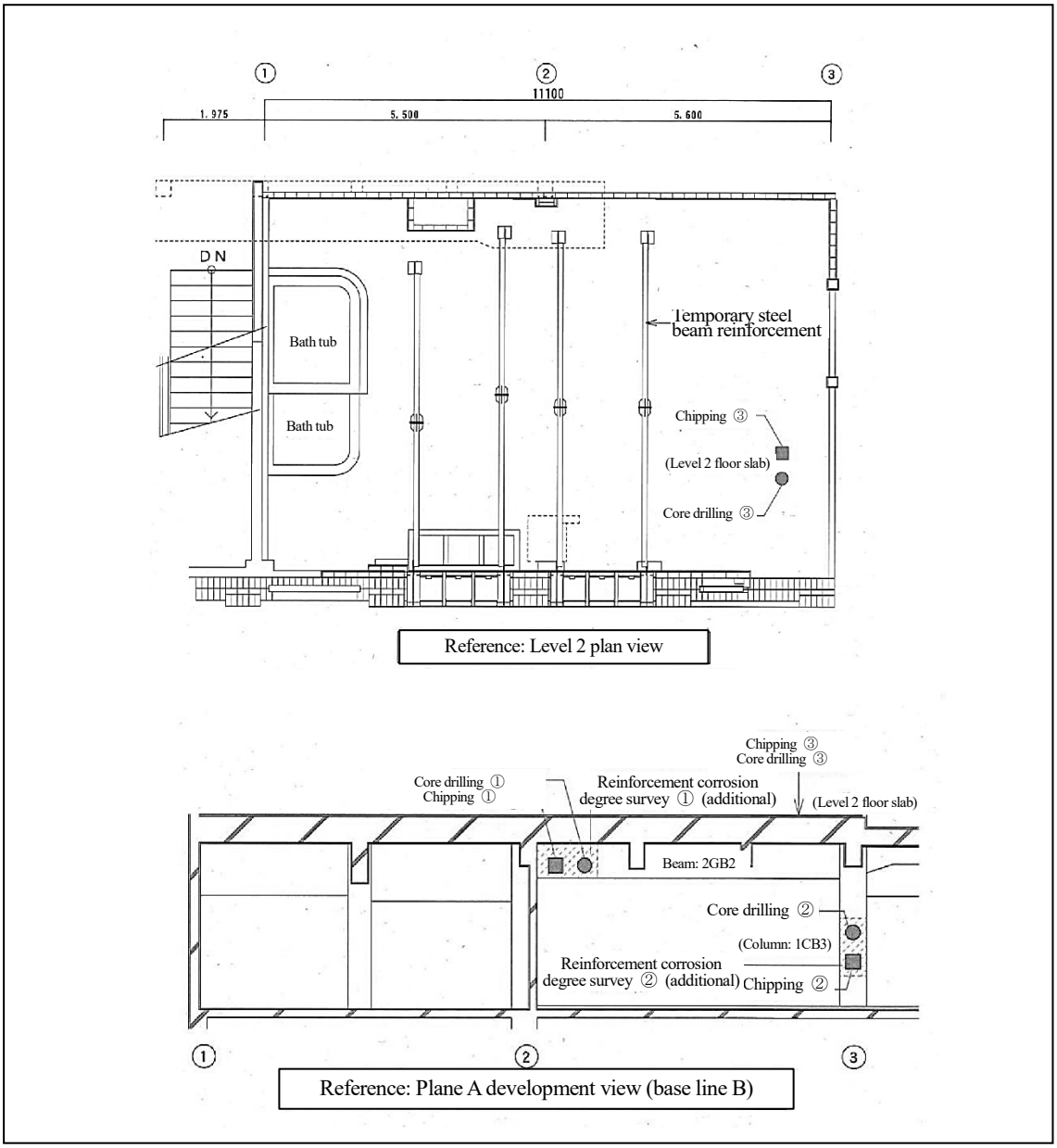


Figure 2-4-40. Test / survey locations (2)

② Visual examination of rebars

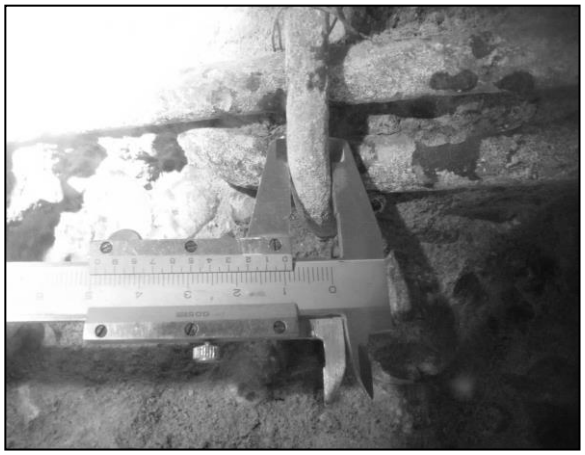
The examination was conducted in order to determine the bar arrangement, thickness of concrete cover, rebar diameter, and degree of rebar corrosion (at the chipping sites).

②-1 Survey methods

The rebar arrangements were examined using a rebar explorer (the electromagnetic wave radar method), and the bar arrangements were marked with tape for identification. Measurements were taken of the rebar spacing. The thickness of concrete cover for the rebars and rebar diameters were measured using scales and calipers at the chipping sites. The state of reinforcement corrosion was examined visually at the chipping sites, and graded according to the criteria for the levels of corrosion provided in *Concrete Diagnostic Techniques* (Japan Concrete Institute).

Rebar exploration (electromagnetic wave radar method) work

Rebar arrangement



Measuring rebar diameter

Measuring concrete cover thickness

Photo 2-4-65. Visual examination of rebars

②-2 Results

For the beams, columns, and floor, chipping was carried out to take measurements and examine the degree of corrosion visually. Reinforcement corrosion degree survey using self-potential measurement and polarization resistance measurement was also taken for the beams and columns, as well as measurements of the rebar diameter and concrete cover thickness using the electromagnetic induction method as a part of the Examination of bar arrangement.

The rebar diameter, rebar spacing, concrete cover thickness, and degree of rebar corrosion (as determined visually) measured at each measurement sites are provided in Table 2-4-33. The degree of rebar corrosion was Class III for the beams and columns, with floating rust observed around the circumference and along the entire length of the rebars. The rebars in the columns, in particular, had the hoops showing a loss of cross-sectional area, indicating significant levels of corrosion.

The thickness of concrete cover was greater at all the sites compared to the standards specified in the Order for Enforcement of the Building Standard Act (Photo 2-4-66).

A rebar exploration conducted on the beams from down below showed that there were only two rebars for the bottom reinforcement.

Rebar conditions (column)

Rebar conditions (beam)

Rebar conditions

Rebar arrangement at bottom of beams

Photo 2-4-66. Conditions of rebars

Appendix 3

Table 2-4-33. Summary of rebar survey results

No.	Site	Diameter of rebar		Rebar spacing (hoop and stirrup)	Concrete cover thickness	Level of corrosion
		Main reinforcement	Hoop (stirrup)			
①	Beam	13φ	9φ	150 mm	32 mm	III
②	Column	16φ	13φ	250 mm	43 mm	III
③	Floor	9φ	9φ	250 mm (along X axis) 200 mm (along Y axis)	53 mm	II

Table 2-4-34. Criteria for the levels of corrosion of rebar

Level of corrosion	Condition of rebar
I	Mill scale surface, or no rust formed or thin and fine layer of rust in general, and no rust on the concrete surface.
II	Spots of floating rust, but only in small speckles.
III	No loss of cross-sectional area observed visually, although floating rust observed around the circumference and along the entire length of the rebar.
IV	Loss of cross-sectional area

Table 2-4-35. List of concrete cover thickness specified in Order for Enforcement of the Building Standard Act

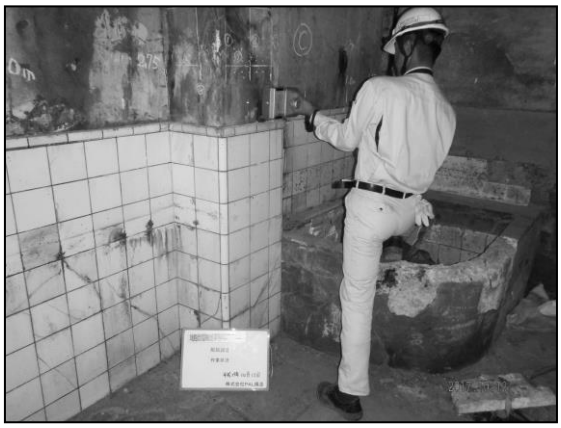
Areas			Values specified in the Enforcement Order
Areas not in contact with soil	Floor slabs / roof slabs Non-bearing walls	Indoor	20 or greater
		Outdoor	
	Columns / beams / Bearing walls	Indoor	30 or greater
		Outdoor	
	Retaining walls		-
Areas in contact with soil	Column / beam / floor slabs / roof slabs / walls Rising edge of continuous footing		40 or greater
	Foundations / retaining walls		60 or greater

③ Examination of bar arrangement

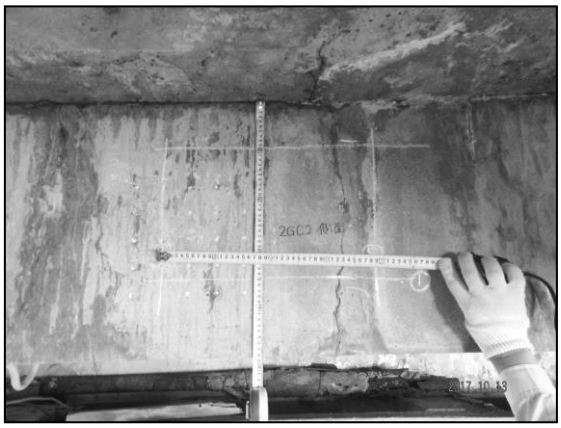
For the members for which chipping was not performed, non-destructive testing was conducted to determine the bar arrangements, diameters of rebars, and the thickness of concrete cover.

③-1 Testing methods

Rebar exploration was performed using the electromagnetic induction method at 34 sites of members for which chipping was not performed. A rebar explorer (with electromagnetic radars) was used to mark along the bar arrangements with chalk, while the electromagnetic induction method was used to measure the rebar diameter and concrete cover thickness.



Examining bar arrangement



Examining bar arrangement (2GC2, side)

Examining bar arrangement

Explorer display

Photo 2-4-67. Examination of bar arrangement

③-2 Results

Measurements were taken once along the x axis and another along the y axis for the columns, and on either side and the lower surface the of beams.

When the measurements taken of Chipping Site ① (beam) were compared to the diameter of rebar determined using the electromagnetic induction method, the measured diameter was 13 φ and 10 φ for the main reinforcement and the stirrup, respectively, while the diameter determined using the electromagnetic induction method was 16φ for both, namely the rebar diameters determined using the electromagnetic induction method were greater than those based on actual measurements. As similar results were produced in previous surveys conducted in Hashima, it was decided that the rebar diameter data based on the electromagnetic induction method should be used only as

a guide. Considering that the structures in the areas of survey had been constructed in around the same period, that the chipping sites were of typical columns and beams representative of the building, and that the actual measurements were credible, the actual measurements of rebar diameters taken at the chipping sites were chosen to be used as estimates.

Table 2-4-36. Summary of rebar survey results

Site	ID	Rebar diameter (actual measurements and non-destructive testing)		Rebar diameter (estimate)		Rebar spacing (iron hoop and strap)	Concrete cover thickness	Remarks
		Rod	Iron hoop (strap)	Rod	Iron hoop (strap)			
Column	1CA1	16 φ	13 φ	16 φ	13 φ	250 mm	65 mm	
Column	1CA1a	25φ	16 φ	16 φ	13 φ	300 mm	66 mm	
Column	1CA2	16 φ	16 φ	16 φ	13 φ	250 mm	62 mm	
Column	1CA2a	19 φ	16 φ	16 φ	13 φ	300 mm	47 mm	
Column	1CA3	16 φ	16 φ	16 φ	13 φ	300 mm	82 mm	
Column	1CB1	16 φ	16 φ	16 φ	13 φ	250 mm	70 mm	
Column	1CB1a	19 φ	13 φ	16 φ	13 φ	200 mm	51 mm	
Column	1CB2	19 φ	16 φ	16 φ	13 φ	250 mm	63 mm	
Column	1CB3	**16 φ**	**13 φ**			250 mm	53 mm	Actual measurement
Column	1CC1	16 φ	10 φ	16 φ	13 φ	300 mm	35 mm	
Column	1CC1a	6 φ	6 φ	6 φ	6 φ	150 mm	120 mm (estimate)	Spiral reinforcement
Column	1CC2	19 φ	16 φ	16 φ	13 φ	300 mm	51 mm	
Column	1CC3	19 φ	13 φ	16 φ	13 φ	250 mm	38 mm	
Girder	2GA1a	19 φ	10 φ	13 φ	10 φ	200 mm	41 mm	
Girder	2GA1b	16 φ	16 φ	13 φ	10 φ	250 mm	53 mm	
Girder	2GA2	22 φ	16 φ	13 φ	10 φ	200 mm	79 mm	
Girder	2GB1a	19 φ	6 φ	13 φ	10 φ	350 mm	35 mm	
Girder	2GB1b	19 φ	6 φ	13 φ	10 φ	150 mm	37 mm	
Girder	2GB2	**13 φ** 16 φ	**10 φ** 16 φ			150 mm	44 mm	Actual measurement
Girder	2GC1a	22 φ	6 φ	13 φ	10 φ	250 mm	43 mm	
Girder	2GC1b	13 φ	10 φ	13 φ	10 φ	150 mm	38 mm	
Girder	2GC2	19 φ	13 φ	13 φ	10 φ	400 mm	84 mm	
Girder	2G1A	16 φ	13 φ	13 φ	10 φ	200 mm	59 mm	
Girder	2G1B	16 φ	6 φ	13 φ	10 φ	300 mm	48 mm	
Girder	2G1Aa	19 φ	16 φ	13 φ	10 φ	200 mm	53 mm	
Girder	2G2A	19 φ	13 φ	13 φ	10 φ	300 mm	55 mm	
Girder	2G2B	16 φ	16 φ	13 φ	10 φ	150 mm	83 mm	
Girder	2G3A	—	—	—	—	—	—	Unmeasurable due to rebar explosion
Girder	2G3B	16 φ	19 φ	13 φ	10 φ	150 mm	50 mm	
Beam	B1	16 φ	13 φ	13 φ	10 φ	200 mm	48 mm	
Beam	B2	16 φ	6 φ	13 φ	10 φ	150 mm	64 mm	
Beam	B3	16 φ	10 φ	13 φ	10 φ	150 mm	49 mm	
Beam	B4	19 φ	10 φ	13 φ	10 φ	250 mm	49 mm	
Beam	B5	13 φ	9 φ	13 φ	10 φ	200 mm	14 mm	
Floor	S1	**9 φ**	**9 φ**			250 mm (along X axis) 200 mm (along Y axis)	53 mm	Actual measurement

Figures in red represent actual measurements taken at a chipping site

④ Neutralization depth measurement

The depth of neutralization, which is a factor that deteriorates reinforced concrete, was measured to help understand the conditions that corrode the steel.

④-1 Testing methods

Measurements were taken at three points each of the drilled cores and the chipping sites. The test was performed by spraying a phenolphthalein solution 1% in ethanol over concrete, and areas taking on a reddish purple color was determined as not having been neutralized, and areas not taking on any color as having been neutralized. The depth of the latter was measured using a scale (Photo 2-4-68).

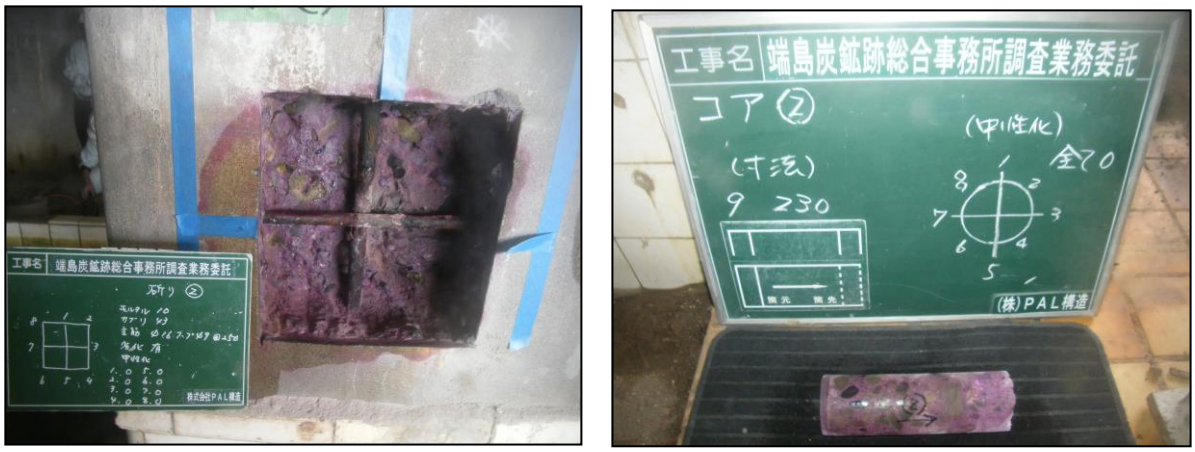


Photo 2-4-68. Testing for neutralization

④-2 Results

As shown in Table 2-4-37, the depth of neutralization was 0 mm for all measurement points, indicating that no neutralization had occurred. The results suggest that the corrosion of the rebars had not been caused by neutralization of concrete but by some other factors.

Table 2-4-37. Summary of neutralization depth measurement

No.	Site	Depth of neutralization (mean)		Thickness of concrete cover
		Core	Chipping site	
①	Beam	0 mm	0 mm	32 mm
②	Column	0 mm	0 mm	43 mm
③	Floor	0 mm	0 mm	53 mm
④	Foundation	0 mm	—	—

Appendix 3

⑤ Chloride ion content measurement

The chloride ion content, which is a factor that deteriorates reinforced concrete, was measured to help understand the conditions that corrode the steel.

⑤-1 Testing methods

Test was performed on the drilled cores ①-④ by an officially certified institution (Aso Co.), according to the "Methods of test for chloride ion content in hardened concrete (JIS A 1154)." The drilled cores were cut at an interval of 2 cm, and the resulting slices were pulverized to measure the chloride ion content in concrete for each slice from different depth, using potentiometric titration. The mass of concrete per unit volume used for the calculation of chloride ion content was based on the apparent density determined by using the dimensions and mass measured in the compressive strength test. Three slices were cut from each core, and a total of 12 slices were tested (Photo 2-4-69).

Photo 2-4-69. Measurement of chloride ion content

⑤-2 Results

The results of this test showed that the chloride ion level exceeded the chloride threshold for corrosion in all of the cores on the surface, with the levels generally turning lower in deeper parts. In areas near rebars, the chloride ion levels exceeded the chloride threshold for corrosion in the columns and floor. The rebar corrosion levels were Class III for the columns and Class II for the floor, which show that the high salt levels near the rebars are likely to have been one of the causes of the rebar corrosion.

⑥ Compressive strength test and static elastic modulus test

The tests were conducted to determine the strength and deformation properties (i.e. the relationship between stress and distortion) of concrete in a direct manner to ascertain its soundness.

⑥-1 Testing methods

Tests were performed on the drilled cores ①-④ by an officially certified institution (Aso Co.), according to the

"Method of sampling and testing for compressive strength of drilled cores of concrete (JIS A 1107)" and the "Method of test for static modulus of elasticity of concrete (JIS A 1149)." Because the same samples were used for the chloride ion content measurement, they were not immersed in water, which is usually done to ensure the same wet-dry conditions.

For the cores ②-④, the test specimens' height-diameter ratio was smaller than 1.90; a correction factor was therefore used to calculate the compressive strength.

Photo 2-4-70. Performing compressive strength / static elastic modulus tests

⑥-2 Results

The test results are shown in Table 2-4-38. The compressive strength determined in the test ranged between 11.6 N/mm^2 and 42.4 N/mm^2. It was lower than the original design specification of 13.5 N/mm^2 for the beams. The static elastic modulus, meanwhile, was lower than the original design specifications for the columns, beams, and slabs. The decline in concrete strength may have been due to the blend of materials made at the time of construction, or deterioration with age.

Table 2-4-38. Summary of compressive strength / static elastic modulus tests

No.	Site	Mean diameter (mm)	Mean height (mm)	Maximum load (x 10^{3}N)	Correction factor	Compressive strength (N/mm^2)		Static elastic modulus (kN/mm^2)	Apparent density (g/cm^3)
						Before correction	After correction		
①	Beam	76.7	150.0	53.4	1.00	11.6	11.6	16.9	2.33
②	Column	76.7	143.8	89.8	0.99	19.4	19.2	11.8	2.21
③	Floor	76.7	134.1	200	0.98	43.3	42.4	16.3	2.36
④	Foundation	77.4	93.8	194	0.92	41.2	37.9	26.6	2.33

Appendix 3

⑦ Rebound hammer test

Rebound hammer test was performed in order to determine in a simplified manner the strength of concrete from which cores had not been collected, and ascertain its soundness.

⑦-1 Testing methods

Rebound hammer test was performed at the same 34 sites where the examination of bar arrangement was conducted. A Schmidt hammer was used to make the surface of concrete flat and smooth, and being placed perpendicular to the surface where the measurements were taken, pressed slowly to produce impact.

Measurements were taken at 25 points for each site as a rule. Where it was difficult to take measurements at 25 points, the test was performed at 20 points at minimum.

Photo 2-4-71. Performing rebound hammer test

⑦-2 Results

The results from this test range between 18.3 N/mm^2 and 59.6 N/mm^2. When the data obtained from the compressive strength test were compared to those from the rebound hammer test for the core ① (Beam 2GB2), there was a large discrepancy was observed, with the former being 11.6 N/mm^2 compared to 59.3 N/mm^2 for the latter. Possible reasons for this discrepancy may include the unevenness of the finished surface and floating. The varying results in the estimated strength also suggest a possibility that some parts of the concrete may have lower strength than in other parts. This is suggested also by the results of the compressive strength test, as well.

⑧ Reinforcement corrosion degree survey

The survey was conducted to determine the likelihood of rebar corrosion and corrosion rates.

⑧-1 Survey methods

The survey was conducted on the Chipping Sites ① and ②, namely the column and beam which play important roles in structural performance of the building. The likelihood of corrosion was determined using self-potential measurement, and the corrosion rate by polarization resistance measurement (Photo 2-4-72).

Photo 2-4-72. Measuring reinforcement corrosion degree

⑧-2. Results

The assessment of corrosiveness and corrosion rate of rebars was performed according to the criteria provided in the *Concrete Diagnostic Techniques* (Japan Concrete Institute). With respect to the likelihood of corrosion, parts of the beam were judged to be "corroded with a probability of 90% or higher," while others were "indeterminate" or "not corroded with a probability of 90% or higher." According to visual inspection of the chipping sites, however, the level of corrosion was Class III for the column and beam, creating discrepancies in the assessment. Similarly, the corrosion rate as determined by the polarization resistance measurement also produced discrepancies with the results of "no corrosion" at all of the measurement points. A reason for these discrepancies may have been that even though the rust on the surface of the rebars had been polished off, corrosion had progressed deep inside, and taking measurements over the surface of the rust resulted in increased resistance.

⑨ Core drilling (to determine if there were foundations / underground beams)

At Exploratory Drilling Site ②, it was difficult to see foundations or underground beams by means of exploratory drilling. Core drilling was therefore carried out to determine if there were foundations or underground beams (Photo 2-4-73).

⑨-1 Survey methods

Rebar exploration was performed in the slab within the area of Exploratory Drilling Site ② to check for bar arrangements. The results found no rebar. Cores were collected by drilling straight into the slab in order to determine whether or not there were foundations or underground beams. The cores were drilled out at 100φ so that any layers could be recognizable on the surface.

Appendix 3

Drilling out a core

After a core has been drilled out

Cores drilled out

Restoration completed

Photo 2-4-73. Measuring reinforcement corrosion degree

⑨-2 Results

In this survey, a thin concrete foundation with a thickness of approximately 250 mm was observed. As a result of the core drilling and rebar exploration, however, it was confirmed that there was no underground beam there.

At both of the two core drilling sites, a layer of unreinforced concrete with a thickness of approximately 350 mm on the surface, and foundation stones were observed at about 600 mm below the surface. Considering that the concrete foundation was laid on the foundation stones and that no rebar had been found as a result of rebar exploration, it can be surmised that the foundation on the side of the brick walls was an unreinforced, eccentric foundation.

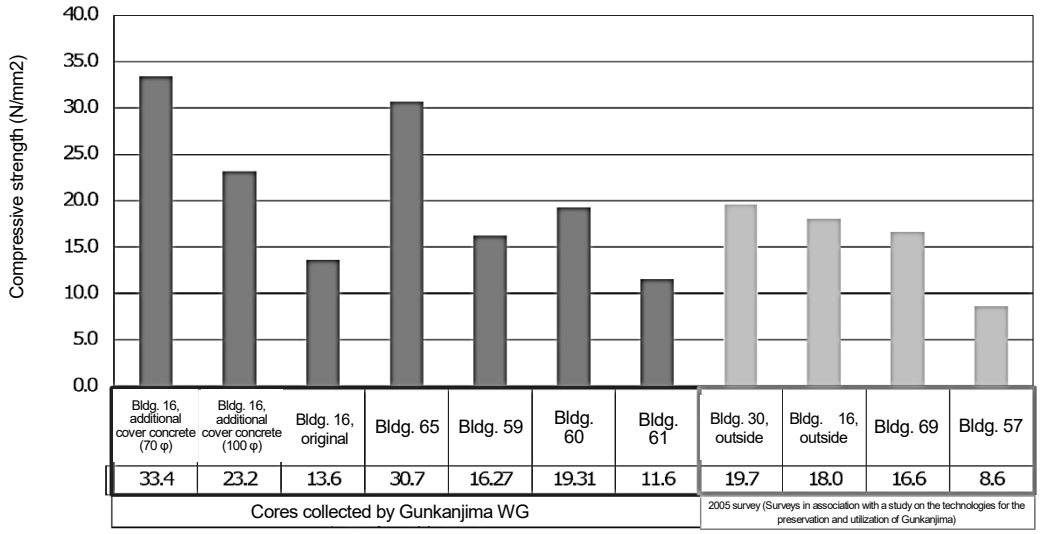
⑩ Discussion

The results of these tests and surveys showed that the compressive strength was lower than the original design specification of 13.5 N/mm^2 for the beams, and that the static elastic modulus, too, was lower than the original design specifications for the columns, beams, and slabs. The decline in concrete strength may have been due to the blend of materials made at the time of construction, or deterioration with age. The chloride ion content, meanwhile,

was found to be higher at shallow levels. The chloride ion level exceeded the chloride threshold for corrosion where the rebars were, and rebar corrosion was also observed. Neutralization depth measurement, on the other hand, found little neutralization. Compared to other buildings on the island, this building had slightly lower levels of concrete strength.

Based on these findings about the current conditions of the General Office building, the concrete used in the building may have partial deterioration or decline in strength due to external factors or as a result of the blend of materials made at the time of construction. This also means that the corrosion of rebars may have partially progressed as a result.

Table 2-4-39. Compressive strength of buildings on Hashima Island



* Excerpt from "Report on the deterioration survey of concrete structures in Gunkanjima", Architectural Institute of Japan, et al.

5) Measurement of microtremor, wind speed and direction, temperature, and humidity

① Objectives of survey

As a part of the surveys to understand the current conditions of the remains of the General Office at Hashima Coal Mine, measurements of microtremor were taken for the purpose of obtaining data as a basis for the discussion of preservation, repair, and structural reinforcement.

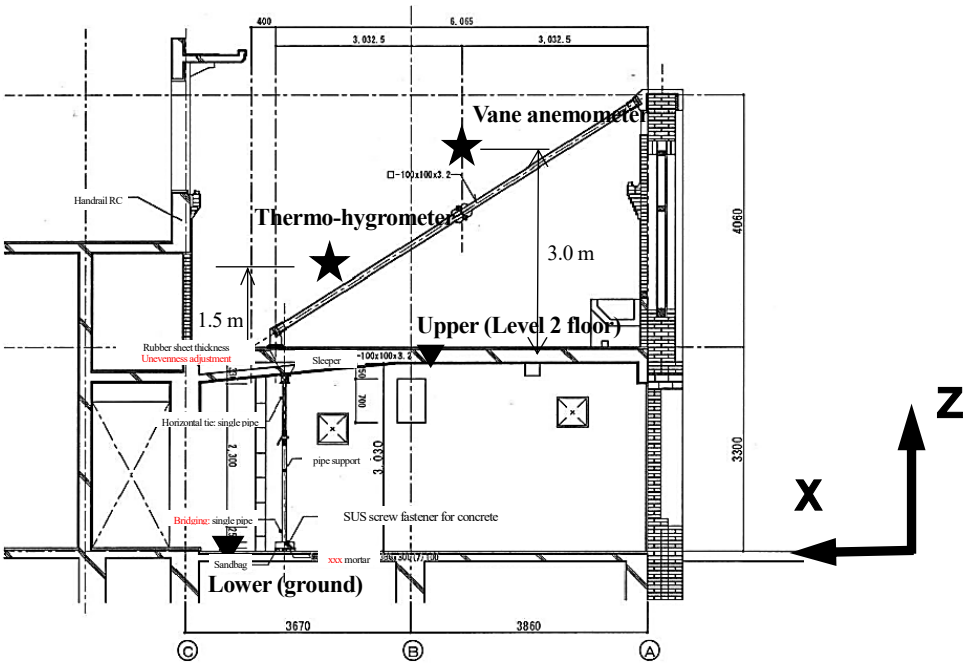
② Survey items and the quantities of samples

A list of measurement items and diagrams indicating the locations of measurement for the survey are provided in Table 2-4-40 and Figure 2-4-41, respectively. The survey took place from 8:00 until 17:00 on November 6, 2017.

Appendix 3

Table 2-4-40. Measurement items

Item		Locations of measurement	Measurements		Unit
Microtremor	Upper level	Floor, Level 2	3 components	X: Along shorter side of remains; Y: Along longer side of remains; Z: Vertical	Gal
	Middle level	Stairway	3 components	X: Along shorter side of remains; Y: Along longer side of remains; Z: Vertical	Gal
	Lower level	Ground	3 components	X: Along shorter side of remains; Y: Along longer side of remains; Z: Vertical	Gal
Wind speed and direction	Zonal (EW)	Level 2, 3.0 m from floor	Zonal wind speed during microtremor measurement (Eastward +)		m/s
	Meridional (NS)		Meridional wind speed during microtremor measurement (Northward +)		m/s
	Vertical (UD)		Vertical wind speed during microtremor measurement (Upward +)		m/s
	Average wind speed		10-minute average wind speed during microtremor measurement		m/s
Temperature and humidity	Temperature	Level 2, about 1.5 m from floor	External temperature during microtremor measurement		°C
	Humidity		Relative humidity during microtremor measurement		%RH



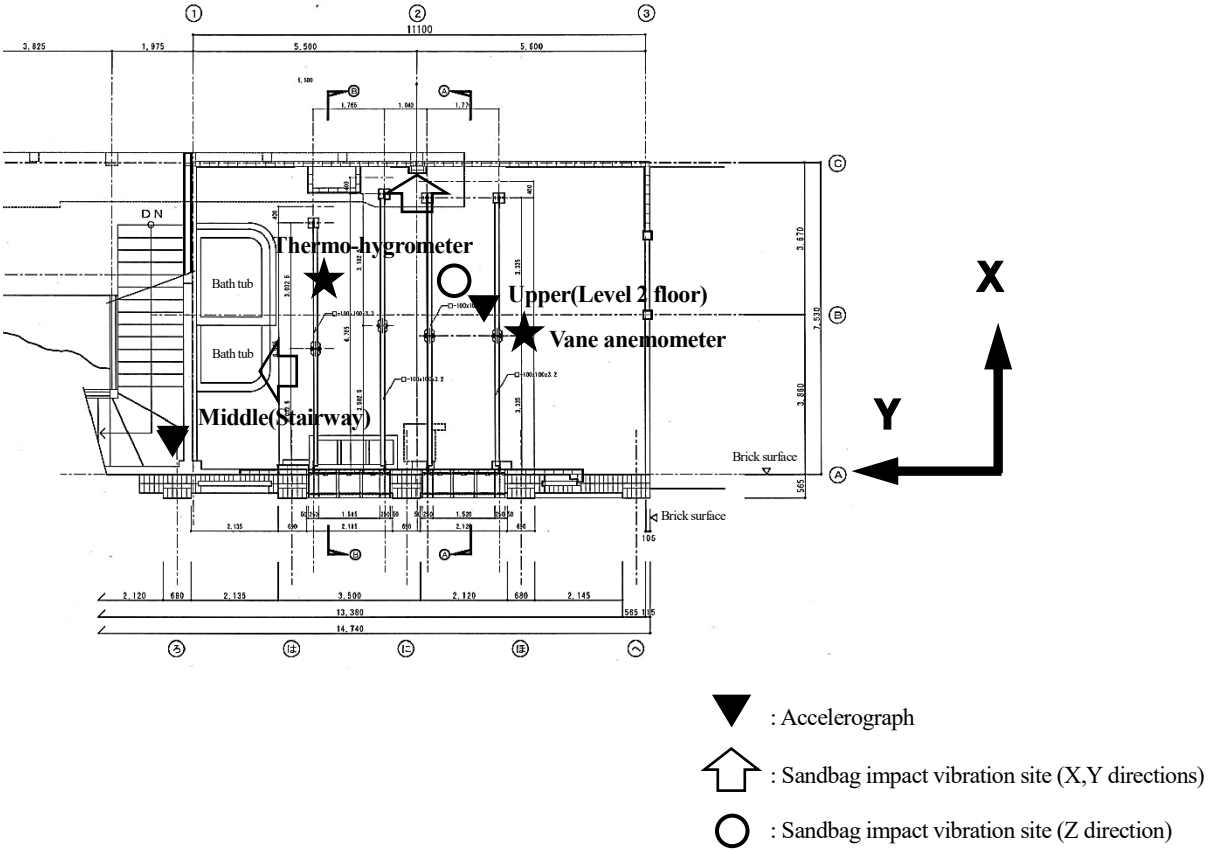


Figure 2-4-41. Locations of measurement

③ Measurements

At each measurement point, measurements were taken in 3 components, i.e. in horizontal (x and y axes) and vertical (z axis) directions, where the x direction is along the shorter sides of the remains and the y direction the longer side. The methods of measurement are shown in Table 2-4-41.

Table 2-4-41. Methods of measurement

Measurements	Measurement item	Sampling interval	Measurement time	Directions of measurement
Microtremor (remains / ground)	Acceleration	0.005 s (200 Hz)	600 s	x, y, and z directions
Sandbag impact vibration (remains)	Acceleration	0.005 s (200 Hz)	41 s	x, y, and z directions
Wind speed and direction	Wind direction / wind speed	1.0 s	Same with microtremor measurement	-
Temperature and humidity	Temperature / relative humidity	5 min	Same with microtremor measurement	-

④ Equipment

A list of pieces of equipment used and their key specifications are provided in Table 2-4-42.

Table 2-4-42. Equipment and specifications

Equipment	Model	Mfr.	Quantity	Key specs	Remarks
Servo accelerometer	LS-10C	Rion	9 (3 per measurement point)	1 ch / unit LS-10C in combination with LF-20 Frequency range: 0.02 - 100 Hz Acceleration range: ±3000 gal	—
Power-supply unit	FL-20	Rion	3 (3 per measurement point)		—
Data recorder	EDX-10B EDX-12A	Kyowa Electronic Instruments	1 3	3 x 4 ch / unit Resolution: 24bit	—
Process control PC	—	—	1	—	For controlling of data recording
Vane anemometer	SAT-600	Sonic	1	Ultrasonic Measurement range: 0 - 60 m/s	—
Thermo-hygrometer	HM-70	Vaisala	1	Temperature: -20 - 60°C Humidity: 0 - 100%RH	—
Miscellaneous: A set of equipment including extension cable dedicated to vibration meter, BNS cables to connect between devices, and connecting terminal block, etc.					

⑤ Measurement system

The system for the measurement of microtremor, wind speed and direction, temperature and humidity is shown in Figure 2-4-42. Readings from the accelerometer and the vane anemometer were recorded directly on the process control PC, while those from the thermo-hygrometer were first recorded to the memory of the device, then data were extracted from it.

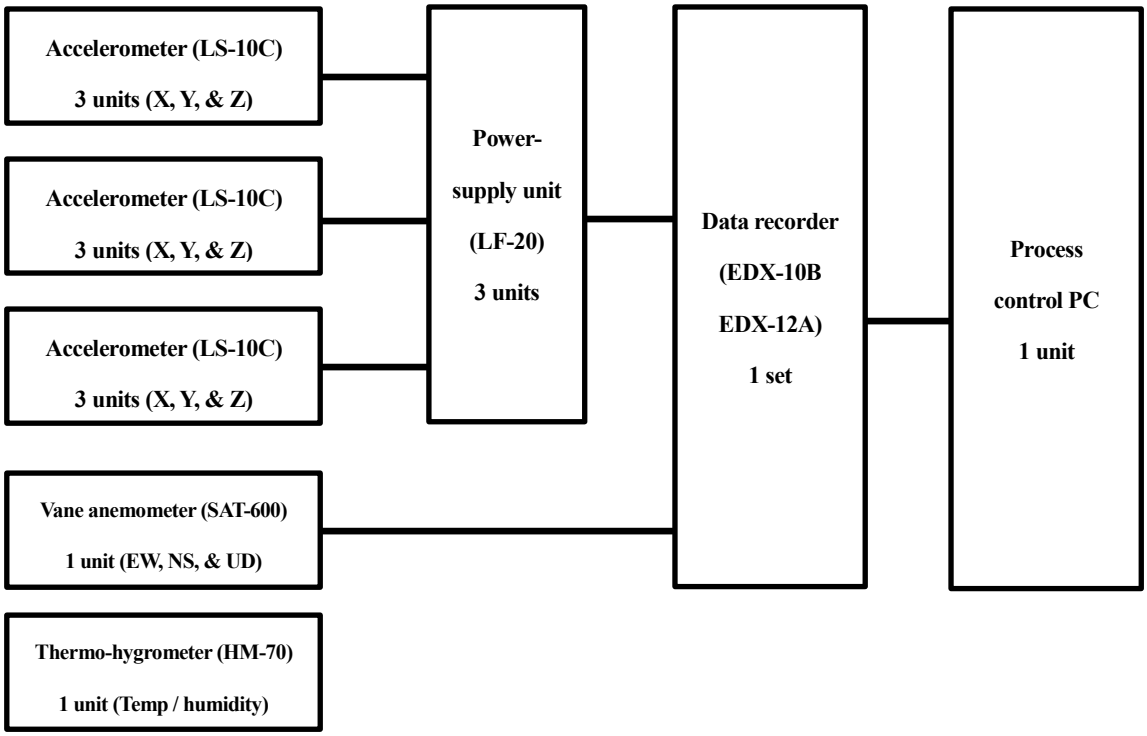


Figure 2-4-42. Block diagram of measurement system

⑥ Results

The results of the analysis are shown in Table 2-4-43.

Table 2-4-43. Recorded data

Microtremor ①	Mean wind speed: Approx. 3.5 m/s	Measurement started at 11:00
Microtremor ②	Mean wind speed: Approx. 3.0 m/s	Measurement started at 11:38
Microtremor ③	Little to no tremor	Measurement started at 13:27
Sandbag impact	A sandbag was let strike the surface from inside the building	Carried out between 12:34 and 12:49

Appendix 3

⑥-1 Results of microtremor measurements

The results of microtremor measurement (predominant frequency of the ground and the remains [Level 2 floor]) are shown in Table 2-4-44. The predominant frequency of the ground and of the remains was calculated using the H/V spectrum and the Fourier spectrum, respectively.

The calculations were performed in the manners described below.

○ Predominant frequency of the ground

1) Calculate the Fourier spectrum for different components (X, Y, and Z) from acceleration data of the ground.
2) Calculate the square-root of sum of squares of horizontal components (X, Y) of the Fourier spectrum.
3) Calculate the H/V spectrum by dividing the square-roots calculated in 2) by the Fourier spectrum of the Z-component.
4) Calculate the predominant frequency of the ground from the H/V spectrum calculated in 3).

○ Predominant frequency of the remains

1) Extract appropriate intervals from among the data for the Level 2 floor and stairways, and calculate Fourier spectrum by FFT.
2) Calculate the peak of the Fourier spectrum and the predominant frequency of the remains.

The results of the analyses are as follows:

Predominant frequency of the ground: Within the frequency range covered by the analysis, the H/V spectrum ratio 1.0 - 1.5, remaining largely constant with no clearly predominant frequency peak observed.

Predominant frequency of the remains: According to the results of the microtremor measurement and the sandbag impact test, the predominant frequency was 20.4 Hz (mean) for the X direction and 32.1 - 33.3 Hz (mean) for the Z direction. The values for the X and Z directions were reproducible, and were expected to represent the predominant frequency of the remains. For the Y direction, however, no clear peak or reproducibility was observed, and the predominant frequency was regarded as being unknown.

Table 2-4-44. Results of microtremor analysis

Methods of measurement				Predominant frequency (Hz)			
				Ground	Stairway	Level 2	
Microtremor		①		---	---	Z	32.0
		②		---	---	Z	29.5
		③		---	---	Z	34.8
Sandbag impact	Level 2 Wall / floor	X direction	1	---	---	X	20.1
			2	---	---	X	20.5
			3	---	---	X	20.6
		Y direction	1	---	---	Y	---
			2	---	---	Y	---
			3	---	---	Y	---
		Z direction	1	---	---	Z	33.4
			2	---	---	Z	33.3
			3	---	---	Z	33.2

⑥-2 Results of weather measurements (wind speed and direction, temperature, and humidity)

In parallel with the measurement of microtremor, measurements of wind speed and direction, temperature, and humidity were taken. The measurement period was the same as that for the microtremor measurement. The wind speed and direction were both plotted based on 10-minute averages. The results of the measurement are shown in Figures 2-4-43 and -44.

The results of weather measurement showed that the average wind speed peaked at around 10:10 at 4.6 m/s, then it became lighter into the afternoon, with the average speed falling below 1.0 m/s between around 12:30 and 13:40, indicating little to no wind. As for wind direction, it remained east-northeasterly in the morning, then turned largely southeasterly and southwesterly in the afternoon when the wind started becoming lighter.

Over the period of measurement of temperature and humidity, the average temperature was 20.3°C, and the average relative humidity was 62.9%RH. The lowest temperature was 17.0°C, from which it rose towards the midday, to the highs of 24.4°C. As the temperatures rose, the humidity gradually dropped, peaking at 82.3%RH first thing in the morning, down to the lowest at 42.2%RH. No violent change that might interfere with the microtremor measurement was observed either in the wind speed / direction, temperature, or humidity.

Appendix 3

Results of Hashima weather measurements (10-min average wind speed and direction)

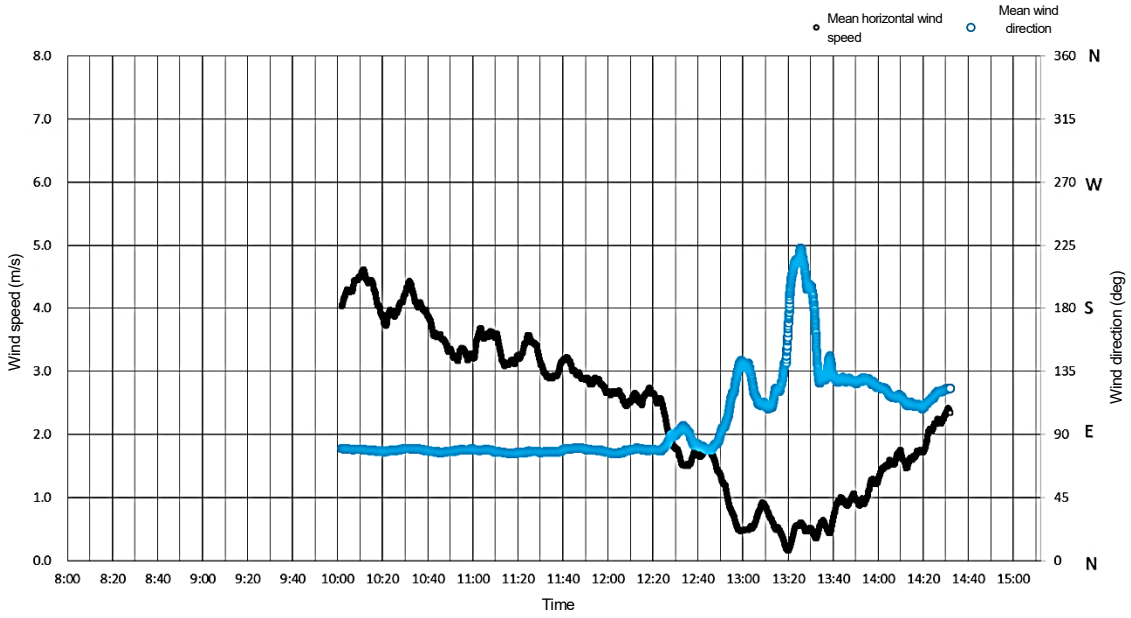


Figure 2-4-43. Measurements of wind speed and direction (10-minute average)

Results of Hashima weather measurements (temperature and relative

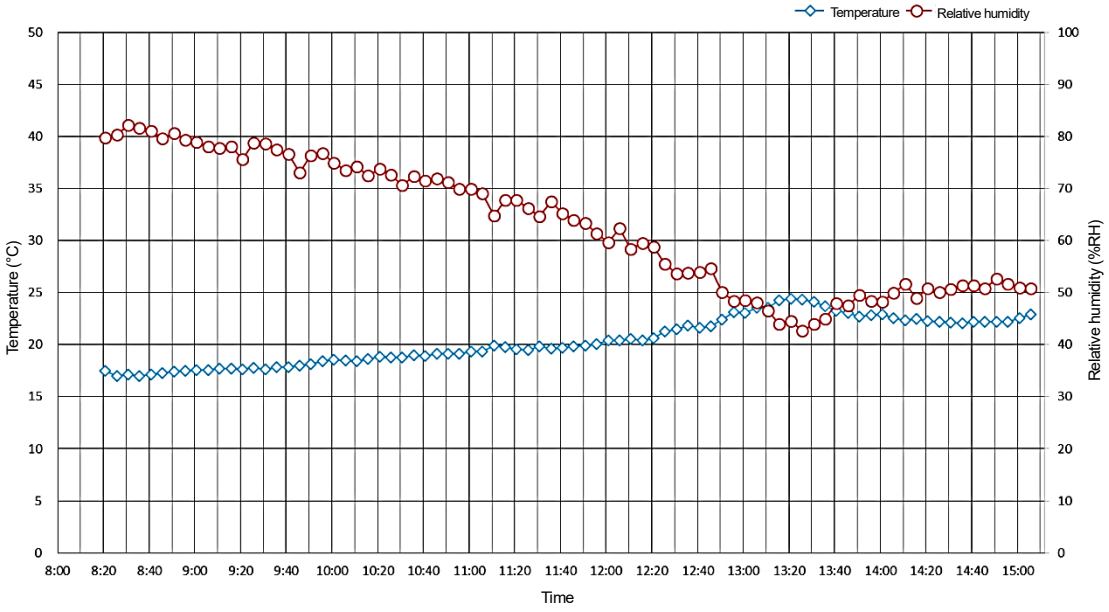


Figure 2-4-44. Measurements of temperature and humidity

⑦ Discussion

⑦-1 Predominant frequency of the remains

The General Office building covered in this survey had a relatively hard-to-vibrate structure compared to the remains surveyed in the past (FY2016: Brick walls of Pit No. 3 winding machine room; and FY2017: Mine entry landing), and the predominant frequency was determined only at two points: the X direction and the Z direction on Level 2. Predominant frequency could not be clearly determined in the Y direction, which ran along the longer sides of the remains, and the stairways.

Based on the predominant frequency determined, namely 20.4 Hz (mean) in the X direction on Level 2, and 32.1 - 33.3 Hz (mean) in the Z direction on Level 2 (floor vibration), it may be surmised that the building should not experience large resonance phenomena in the event of earthquake. However, if the rigidity of the building frame declines with the progress of deterioration at the remains, a possibility of the predominant frequency also becoming lower and thus inducing resonance phenomena cannot be ruled out.

As for the predominant frequency of the ground, the H/V spectrum ratio remained around 1.5 with no change (peak) in any frequency range, which suggests that the ground was relatively homogeneous with moderately firm soil.

⑦-2 Wind speed and direction, temperature, and humidity

No strong wind that might interfere with the microtremor measurement was observed.

6) Survey of foundations (exploratory drilling)

① Survey overview

A survey of the foundations was performing by means of exploratory drilling to examine the geometry and materials, and check for any deterioration, subsidence, etc., to understand the current conditions of the buried foundations of the remains, for the purpose of preparing basic materials necessary in discussing future preservation and repair, as well as structural reinforcement. An overview of the survey is provided below:

Date of survey: October 20, November 9, and November 21, 2017

Area and depth: Exploratory Drilling Site ① (Area: 1 m^2; depth: 0.9 m) / Exploratory Drilling Site ② (Area: 1.6 m^2; depth: 0.78 m)

Items unearthed: None

② Choice of sites of exploratory drilling

The object of the survey, the General Office building, is located in the southwestern part of Hashima Island, inside the area reclaimed in 1897. It is a reinforced concrete building, where Level 1 primarily housed a public bath for miners. For the purpose of examining the building foundations, the following sites were selected for exploratory drilling in the present survey: Exploratory Drilling Site ①, on the northern side of the bathtub in the

Appendix 3

west of the public bath; and Exploratory Drilling Site ②, on the southern side of the bathtub (Figure 2-4-45). The survey was performed by manually drilling out the floor, after the concrete laid over the floor had been removed. The diagrams of soil layers for Exploratory Drilling Sites ① and ② were created of the layers in the northern wall and in the southern wall, respectively. The reference altitude for the diagrams of soil layers was set at 8.934 m, or the altitude of the floor of the public bath.

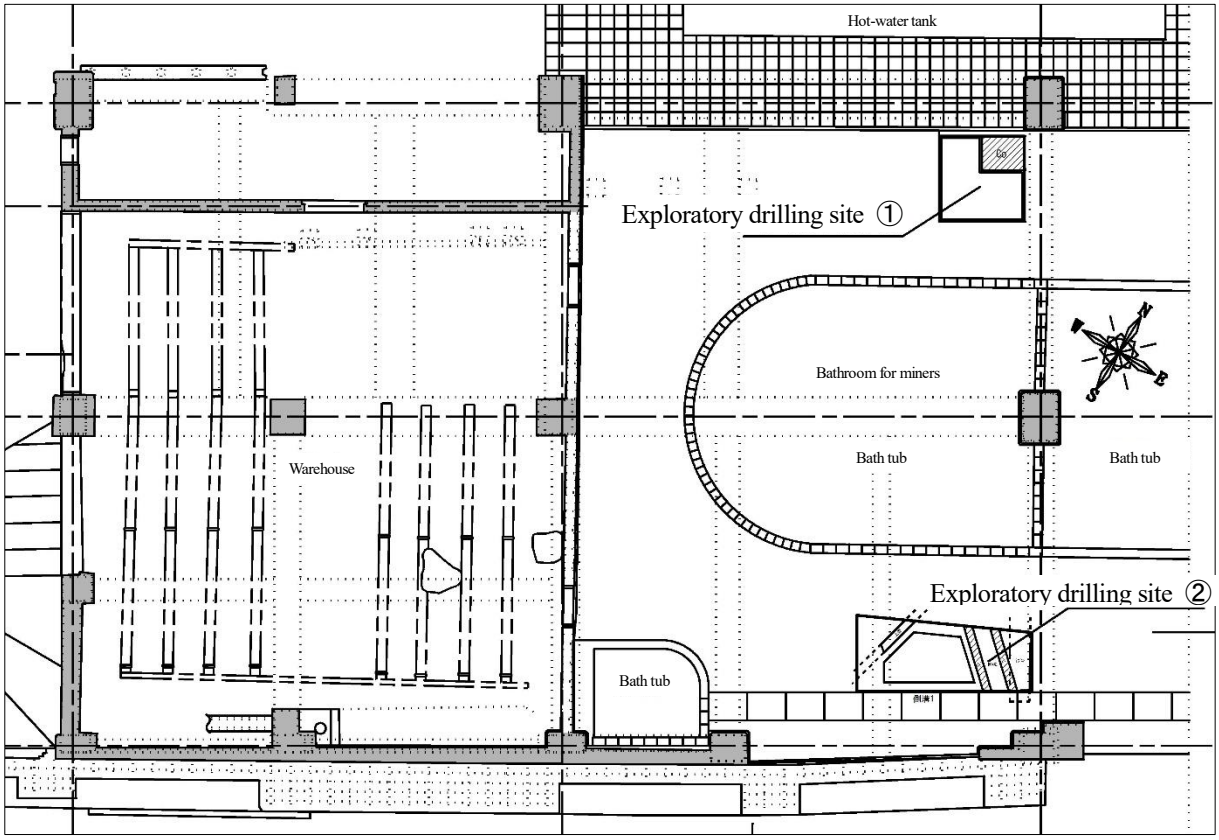


Figure 2-4-45. Locations of exploratory drilling sites

Photo 2-4-74. Exploratory Drilling Site ①, before start

Photo 2-4-75. Exploratory Drilling Site ①, survey underway

Photo 2-4-76. Exploratory Drilling Site ①, drilling completed

Photo 2-4-77. Exploratory Drilling Site ②, before start

Photo 2-4-78. Exploratory Drilling Site ②, survey underway

Photo 2-4-79. Exploratory Drilling Site ②, drilling completed

Photo 2-4-80. Exploratory Drilling Site ①, backfilling completed

Photo 2-4-81. Exploratory Drilling Site ②, backfilling completed

③ Exploratory Drilling Site ①

③-1 Base layers

A close inspection of the soil layers at Exploratory Drilling Site ① found a 35-cm concrete layer, laid over Layers 1 and 2 which are considered to have been filling soil layers (Table 2-4-45; Photo 2-4-82; Figure 2-4-47). No remnants were observed in either Layer 1 or 2. What is noteworthy is that the beginning of the sediment of filling soil layers (Level 1) was at nearly the same altitude (approx. 8.6 m above sea level) for both Exploratory Drilling Sites ① and ②. These sediment formations, combined with the fact the thickness of the concrete layer was approximately the same, appear to indicate that Exploratory Drilling Sites ① and ② were built in the same

period.

Table 2-4-45. Exploratory Drilling Site ①, Summary of soil layers

Layer	Name	Soil color	Notes
1	Gray-brown sandy soil	Hue 2.5Y6/1 Yellowish brown	Sandy soil containing gravel of approx. 5 cm. Presumably laid for the purpose of filling the areas around the concrete foundation. No remnant found. Found at about the same altitude (approx. 8.6 m above sea level) as that for Layer 1 at Exploratory Drilling Site ②, though of a different soil type.
2	Blackish-brown soil with gravel	Hue7.5YR1/3 Blackish brown	Soil containing gravel and coal fragments of approx. 5 - 15 cm. Found beneath the concrete foundation, and considered to be filling soil , as with Layer 1.

Photo 2-4-82. Exploratory Drilling Site ①, Eastern wall

Photo 2-4-83. Exploratory Drilling Site ①, foundation

③-2 Exploratory drilling

Prior to manual drilling, a layer of concrete with a thickness of approximately 35 cm was removed from the floor, to reveal a concrete structure that was presumed to be the foundation (Photos 2-4-84 and -85). When the areas around the foundation were drilled out, the undersurface was observed at 40 cm deep. The depth from the floor level to the undersurface of the foundation was 75 cm. At Exploratory Drilling Site ①, the existence of a concrete structure that was presumed to be a foundation of the building was confirmed. No deterioration or subsidence was observed with the foundation.

Photo 2-4-84. Exploratory Drilling Site ①, drilling completed

Photo 2-4-85 Exploratory Drilling Site ①, foundation

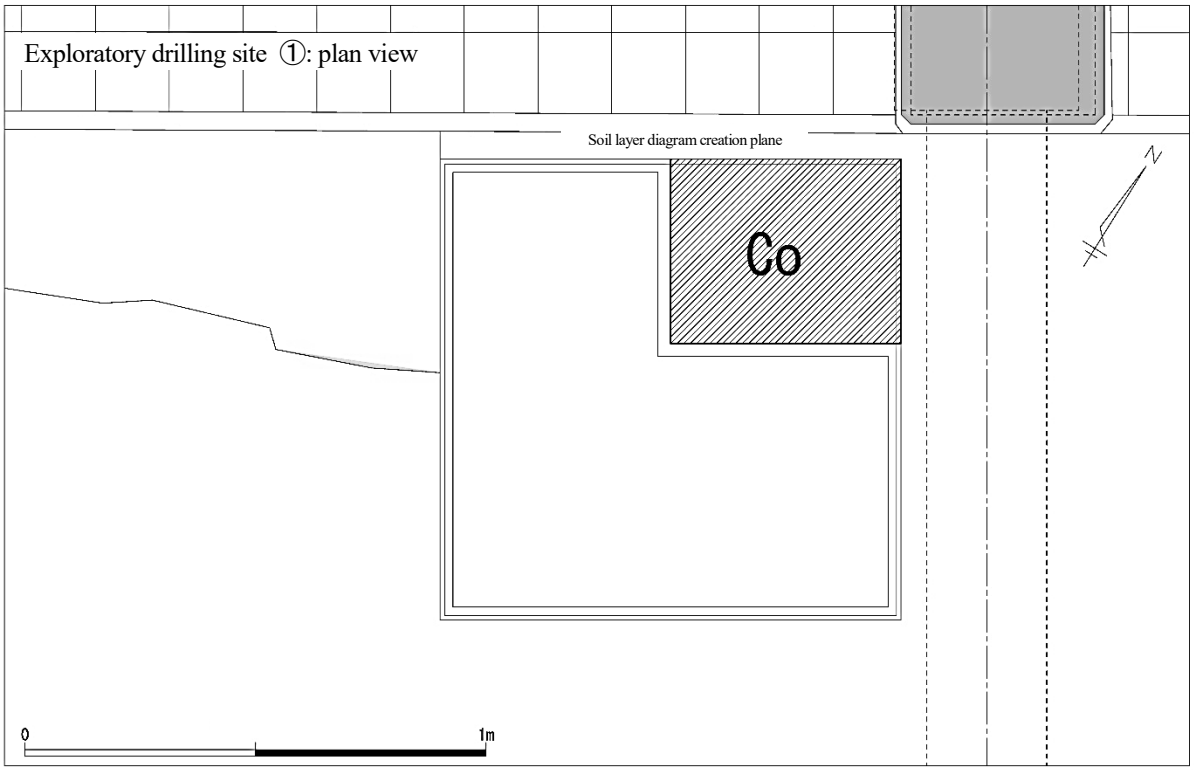


Figure 2-4-46. Exploratory Drilling Site ①, plan view

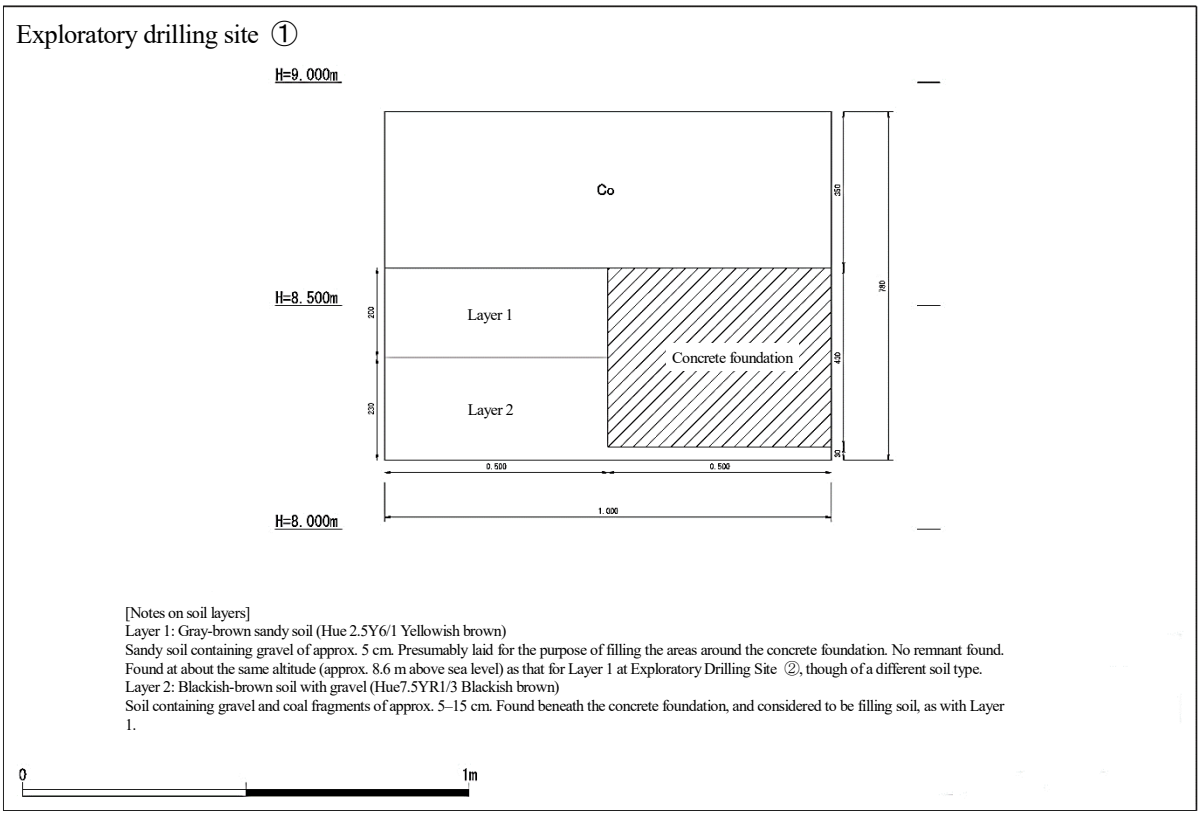


Figure 2-4-47. Exploratory Drilling Site ①, diagram of soil layers in Northern wall

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④ Exploratory Drilling Site ②

④-1 Base layers

A close inspection of the soil layers at Exploratory Drilling Site ② found a 5-cm concrete layer, beneath which was a layer of crushed stone with a thickness of approximately 5 cm, followed by another layer of concrete and crushed stone with a thickness of approximately 25 cm. Underneath these concrete layers with the combined thickness of approximately 35 cm was a 20-cm filling soil layer, or Layer 1, under which was a layer of a traditional earth mixture, presumably Amakawa, with a thickness of approximately 5 cm (Layer 2). Underneath the Amakawa layer was a deposition of sandy soil (Layer 3) (Photos 2-4-86 and -87). No remnant was found in either Layers 1, 2, or 3.

Table 2-4-46. Exploratory Drilling Site②, Summary of soil layers

Layer	Name	Soil color	Notes
1	Dark brown soil with gravel	Hue 7.5YR3/3 Dark brown	Sedimentary soil found above Layer 2 (Amakawa soil), containing small gravel and concrete and coal fragments of approx. 5 cm. Presumably placed during the construction of the building. No remnant found. Found at about the same altitude (approx. 8.6 m above sea level) as that for Layer 1 at Exploratory Drilling Site ①, though of a different soil type.
2	Dark reddish-brown stiff soil	Hue 5YR3/4 Dark reddish brown	Very stiff, compacted red soil. Containing red soil as well as plaster; considered a type of traditional earth mixture ("Amakawa"). Presumably placed in the process of land reclamation and gutter installation, for the purpose of packing the ground and protecting against water infiltration from the lower layer.
3	Dark brown sandy soil with gravel	Hue 5YR4/2 Gray brown	Sedimentary soil found under Layer 2 (Amakawa soil). Sandy soil containing gravel of about 10 - 15 cm. The lower it gets, the wetter it becomes. It is unknown if it was soil brought in to fill the areas around the General Office, or it was sedimentary soil that had naturally deposited on the rock reef. Being sandy soil, it may also have been soil that had deposited in the area prior to the land reclamation. No remnant found.

Photo 2-4-86. Exploratory Drilling Site②, Southern wall

Photo 2-4-87. Exploratory Drilling Site②, Southern wall

④-2 Exploratory drilling

Exploratory Drilling Site ② was situated along the gutter (Gutter 1) on the southern side of the building (Photo 2-4-88). Prior to manual drilling, a layer of concrete was removed from the floor, to reveal a gutter that ran northwestward (Gutter 2) (Photos 2-4-88 and -89). When a layer of crushed stones of approximately 5 cm in

thickness that had deposited underneath the concrete was removed, a surface of what appeared to have been a concrete floor slab was observed (Photo 2-4-88). The concrete floor slab was cut off diagonally on the western side, suggesting a possibility of it being one side of a gutter. Details are unknown, however.

Underneath the concrete floor slab was a layer of crushed stones, and together they were approximately 25 cm thick. The level below the concrete floor slab was Layer 1, which consisted of filling soil. Beneath this was a layer of a traditional earth mixture, presumably Amakawa. On the eastern side, an iron pipe with a diameter of approximately 23 cm was found at 20 cm below the ground level (Photos 2-4-89 and -90). The iron pipe was laid so that it ran through Gutter 2 and Gutter 1 (Photo 2-4-90). As the iron pipe and Gutter 2 both led towards the bathtub, it can be surmised that they were used to drain water in the bathtub. As for in what order the gutter and the pipe were built, it was either "the iron pipe was laid first, then the gutter was installed so that it overlapped the pipe," or "the gutter and the pipe were laid at the same time," considering it is difficult to lay an iron pipe through a concrete gutter. Whatever the case may have been, it would be difficult to create such a formation as this using a standardized gutter, it is likely that Gutters 1 and 2 were formed on site. The thickness of the bottom was approximately 7 cm. Meanwhile, a soil pipe with a diameter of approximately 10 cm was observed from directly above Layer 2 on the eastern side. While it ran in the opposite direction from Gutters 1 and 2, it is possible that it may also have been used for bathtub drain (Photo 2-4-90).

Photo 2-4-88. Exploratory Drilling Site ②, viewed from south

Photo 2-4-89. Exploratory Drilling Site ②, examination of iron pipe and Layer 2, viewed from south

Photo 2-4-90. Close-up (iron pipe)

Appendix 3

Photo 2-4-91. Exploratory Drilling Site ②, side of Gutter 1 and Layer 2, viewed from north

Photo 2-4-92 Exploratory Drilling Site ②, plane view of Layer 2 and soil pipe

While the depth of the gutters was approximately 55 cm and 50 cm for Gutter 1 and Gutter 2, respectively, the undersurface of the gutters was almost same at around 8.4 m above sea level for both of them, with a layer of Amakawa laid at the level of the undersurface (Photo 2-4-94). While the reason why a layer of Amakawa was laid at the level of the undersurface of the gutters is unknown, it may have been done for the purpose of packing the ground and cementing the gutters during land reclamation, as well as to shut out the moisture coming from the lower layer (Layer 3) and protect the lower layer against infiltration with water that might leak from the gutters. Beneath Layer 2, or the Amakawa layer, was Layer 3, which presumably consisted of soil fills. Layer 3 was sandy soil with gravel, and was wetter in lower parts. Considering that it was sandy soil and that it was wet, it is possible that Layer 3 contained soil that had deposited there from before the land reclamation.

Photo 2-4-93. Exploratory Drilling Site ②, drilling completed; viewed from south

Photo 2-4-94 Exploratory Drilling Site ②, Southern wall

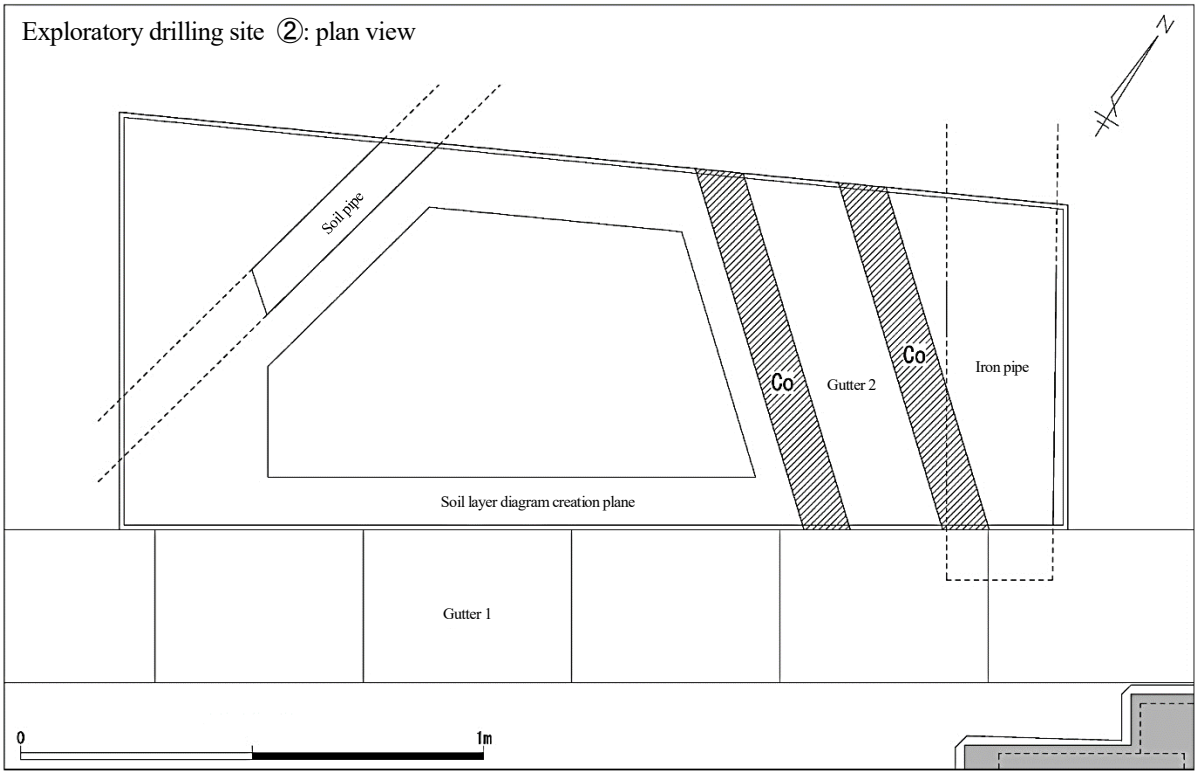
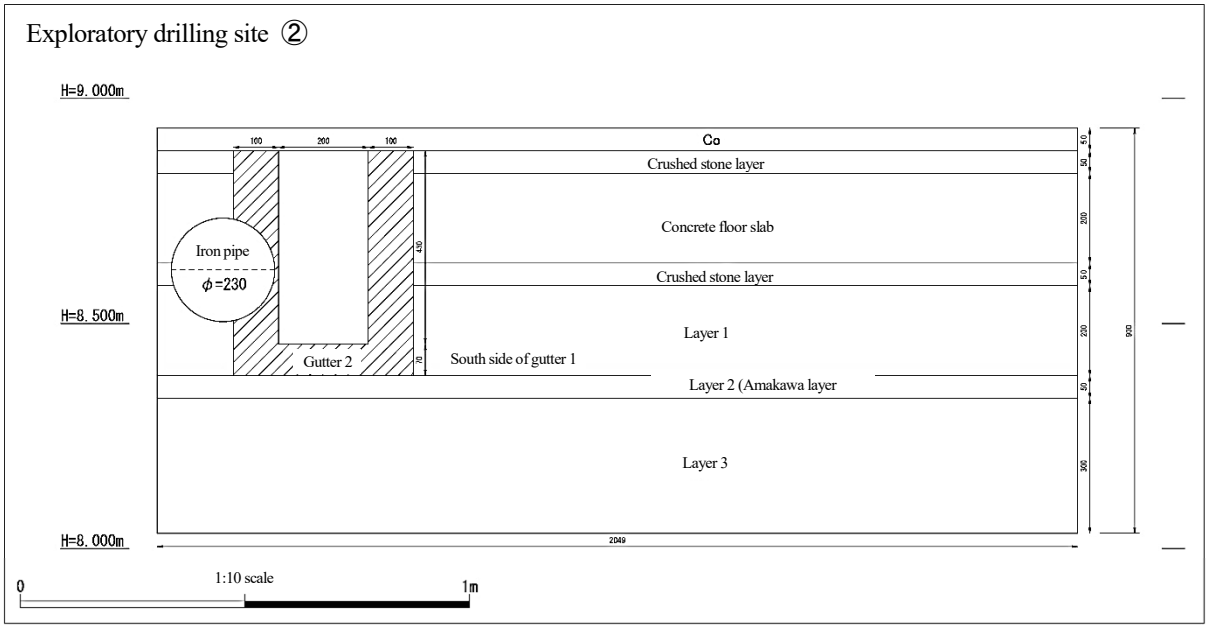


Figure 2-4-48. Exploratory Drilling Site ②, plan view

Appendix 3



[Notes on soil layers]

Layer 1: Dark brown soil with gravel (Hue 7.5YR3/3 Dark brown)

Sedimentary soil found above Layer 2 (Amakawa soil), containing small gravel and concrete and coal fragments of approx. 5 cm. Presumably placed during the construction of the building. No remnant found. Found at about the same altitude (approx. 8.6 m above sea level) as that for Layer 1 at Exploratory Drilling Site ①, though of a different soil type.

Layer 2: Dark reddish-brown stiff soil (Hue 5YR3/4 Dark reddish brown)

Very stiff, compacted red soil. Containing red soil as well as plaster; considered a type of traditional earth mixture ("Amakawa"). Presumably placed in the process of land reclamation and gutter installation, for the purpose of packing the ground and protecting against water infiltration from the lower layer.

Layer 3: Dark brown sandy soil with gravel (Hue5YR4/2 Gray brown)

Sedimentary soil found under Layer 2 (Amakawa soil). Sandy soil containing gravel of 10 - 15 cm. Wetter in lower parts. It is unknown if it was soil brought in to fill the areas around the General Office, or it was sedimentary soil that had naturally deposited on the rock reef. Being

Figure 2-4-49. Exploratory Drilling Site ②, diagram of soil layers in Southern wall

⑤ Summary

As a result of the exploratory drilling, the foundation of the building could be observed at Exploratory Drilling Site ①, but not at Exploratory Drilling Site ②, where it was necessary to preserve the gutters and drilling could not be continued further. However, the existence of the foundation was confirmed at Exploratory Drilling Site ② by means of core drilling. At Exploratory Drilling Site ①, the foundation showed no damage, and no evidence of subsidence was found, although it was based only on visual examination. The rebar exploration found that foundation to be unreinforced. No underground beam was found at either Exploratory Drilling Site ① or ②. In addition to the findings mentioned above, Exploratory Drilling Site ② was found to have underground structures including gutters, iron pipe, soil pipe, and earth mixture preserved in favorable condition. This has provided us with invaluable information that helps us to understand the structures of the building.

7) Measurement of land subsidence

Considering the land subsidence observed on the eastern side of the brick walls, a slip were placed for the purpose of checking the altitude at the front of the brick walls, so that the data should serve as a reference for any change in the amount of subsidence over time.

⑦-1 Survey methods

An automatic level was used to measure the altitude at four points where a slip was placed in front of the brick walls, and at three points on top of the bricks. For the purpose of measurement, Class III reference mark No. 4 (10.652 m above sea level), which is placed along the southern coast of Hashima Island, was used. In case of a loss of reference marks due to waves or the collapse of seawall, a supplementary reference mark was established further inland at TP (Tokyo Peil, 8.877 m above sea level).

⑦-2 Results

Date of measurement: December 7, 2015

Level measurements	
Measurement point	Altitude
№1	8.883
№2	8.874
№3	8.889
№4	8.830
№5	9.286
№6	9.302
№7	9.232

8) Discussion

① Current conditions

①-1 Conditions of damage

General Office

Mortar had fallen off, or was floating, in many parts in the following areas: the outer walls and the eaves on Level 2, the inner walls and the underside of the slabs on Level 2 of the warehouse, and some of the columns and beams on Level 1. A possible cause for the mortar to float may have been mortar shrinkage due to changes in temperatures, allowing water to infiltrate.

Parts of the southeast side of the inner wall of plane C (South) (Photo 2-4-95), which is situated on the back side of the brick walls, were not reinforced concrete wall but had mortar laid directly on the back side of the brick walls. There were cracks in the mortar finish along the cracks in Arch No. 4 of the brick walls, in addition to mortar floating or fallen off in other parts.

Cracks were observed in the entire area. While many were smaller than 1.0 mm in width, some cracks were wider than 5.00 mm or grown almost causing damage. Hexagonal pattern cracks in mortar such as those found in plane A (North) (Photo 2-4-96) are considered to have been caused by the mortar expanding and shrinking due to changes in temperature. Hexagonal pattern cracks such as these were found primarily in the column, beams, and walls of the warehouse on Level 1, and the slabs on Level 2. Cracks running vertically along the columns, such as those found in the Column on the intersection between base lines C and 2, Level 1 (Photo 2-4-97), occurred along the main reinforcements and are considered to have been caused as a result of the expansion of the main reinforcements. Other cracks were presumably caused by mortar shrinkage due to changes in temperature.

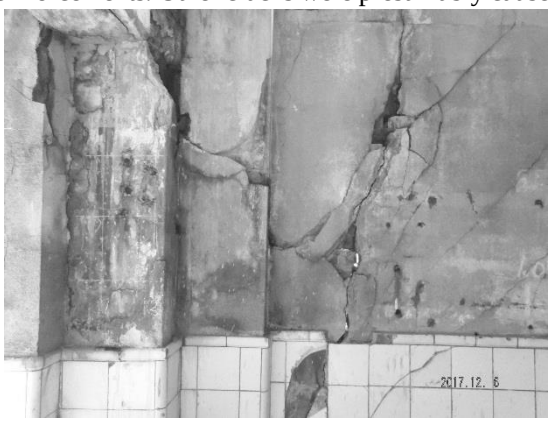


Photo 2-4-95. Mortar cracks and falling-off; plane C (South), inner wall

Photo 2-4-96. Plane A (North), outer wall

Photo 2-4-97. Cracks; column on base lines C and 2 intersection, Level 1

Some of the columns on Level 1 and beams on Level 2 suffered explosion in several parts, including those where rebars inside corroded following explosion, as seen on base lines A and 2 intersection, Level 1 (Photo 2-4-98) and on base lines B and 1 intersection, Level 1 (Photo 2-4-99). With some of the beams, lower parts of the rebars for the bottom reinforcement had fallen off due to explosion, and the rebars suffered a loss of cross-sectional area due to corrosion, as seen in Beam 2G1Aa, Level 2 (Photo 2-4-100) and Beam 2G3A, Level 2 (Photo 2-4-101). These damages parts require urgent repair, as corrosion and loss of rebars significantly affect the durability of the building. Rust fluid was also observed in some parts, which suggests that there may well be internal explosion. Causes for the explosion include salt damage as can be surmised based on the building's location, and for the inside of the warehouse, the affect by conditions during the period of time when it was used.

On Level 2, the roof had originally been made of wood at the time of its construction, while the brick walls were finished with mortar or tiles inside. The wooden roof had collapsed, however, and the inside of Level 2 was at present mostly exposed outdoors. The walls all had numerous cracks, many of which were large, measuring 2.0 mm or larger. As with the other parts of the building, the cracks were likely to have been caused by mortar shrinkage due to changes in temperature. One possible reason for the cracks being wider in these parts is because they were more exposed to direct sunlight, which would cause greater temperature swings, resulting in greater degrees of expansion and shrinkage. Another possible is that the base of the walls was bricks.

The eaves of Level 2 were in general rife with greater degrees of concrete cracks, explosion, falling-off, and corrosion. As seen in the eaves on base lines C and 2 intersection (Photo 2-4-102), the north-facing sides of the columns generally suffered a loss of cross-sectional area due to explosion, and in some parts, corrosion and a loss of cross-sectional area of reinforcement were observed and the column had entirely disappeared. The eaves themselves had also suffered explosion in some parts of the back side as seen in (Photo 2-4-103). The causes, again, are presumed to have been mortar shrinkage due to temperature changes, insufficient size of cover, and salt damage.

Given the loss of the main reinforcements of the columns which provide resistance to the horizontal load, and a large loss of cross-sectional area of the columns, the structure was at an extremely high risk of collapsing.

Photo 2-4-98. explosion and corrosion;
on base lines A and 2 intersection, Level 1

Photo 2-4-99. explosion and corrosion;
on base lines B and 1 intersection, Level 1

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Photo 2-4-100. explosion and corrosion;
Beam 2G1Aa, Level 2

Photo 2-4-101. Cracks and falling-off;
Beam 2G3A, Level 2

Photo 2-4-102. explosion; Eaves on base lines C and 2 intersection

Photo 2-4-103. explosion; back side of eaves

①-2 Analysis of test results

The purpose of this survey was to examine the concrete structure for damage. To this end, compressive strength test and static elastic modulus test were performed on concrete, as well as testing for salt damage and neutralization, which can be causes of deterioration, while reinforcement in concrete were tested for the degree of corrosion. In addition, measurement of microtremor, wind speed and direction, temperature, and humidity, and a survey of the foundations were conducted.

In the tests on concrete, the compressive strength was lower than the original design specification of 13.5 N/mm^2 for the beams. The static elastic modulus, meanwhile, was lower than the original design specifications for the columns, beams, and slabs. The decline in concrete strength may have been due to the blend of materials made at the time of construction, or deterioration with age. The chloride ion content, meanwhile, was found to be higher at shallow levels. The chloride ion level exceeded the chloride threshold for corrosion where the rebars were, and rebar corrosion was also observed. Neutralization depth measurement, on the other hand, found little neutralization.

As for the concrete frames and rebars of the building, the progress of partial concrete deterioration and rebar corrosion is implied, even in areas where no explosion had occurred.

In the microtremor measurement, the natural frequency of the remains was 20 - 30 Hz, compared to 1 - 3 Hz for the typical predominant frequency of earthquakes. It may there be surmised that the building should not experience major resonance phenomena in the event of earthquake.

In the measurement of wind speed and direction, temperature, and humidity, the average wind speed was below 2.0 m/s in the morning and below 1.0 m/s in the afternoon, showing a trend toward calm winds. The wind direction remained mostly stable in the afternoon, largely southeasterly and southwesterly. Over the period of measurement

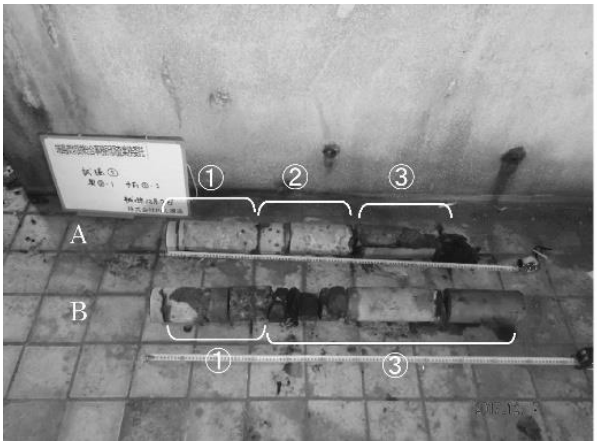
of temperature and humidity, the average temperature was 20.3°C, and the average relative humidity was 62.9%RH; both remained stable.

①-3 Understanding the conditions of the foundations

In this survey, exploratory drilling was carried out to understand the conditions of the foundations and footing beams of the General Office building. At Exploratory Drilling Site ② (lower parts of Column on base lines A and 3 intersection), which was situated near the brick walls, gutters were found buried underground and the geometry of footings could not be determined. However, the cores drilled out vertically from the foot of the column (Area A) (Photo 2-4-104) and from where footing beams were estimated to be (Area B) (Photo 2-4-105) showed the existence of a layer of unreinforced concrete with a thickness of approximately 350 mm on the surface in both Areas A and B, as shown in (Photo 2-4-105). Underneath this layer were bricks and foundation stones which were presumably the foundations of the brick walls in Area B. In Area A, meanwhile, beneath the unreinforced concrete layer was a layer of concrete with a thickness of approximately 250 mm which was presumably the footings, under which there were foundation stones that were presumed to be the foundation of the brick walls. Similarly, a layer of unreinforced concrete with a thickness of approximately 350 mm and independent footings of unreinforced concrete with a thickness of approximately 400 mm were observed at Exploratory Drilling Site ①. Estimated cross-section views of the drilling sites are provided in (Figure 2-4-50).

Based on these findings, it is surmised that the foundations of the building are independent, unreinforced footings. For the foundation of the columns where the building was connected to the brick walls, it is presumed that the footings were laid on top of the foundations of the brick walls, which had already existed and were left as is. There was no footing beams found, as a result of core boring and rebar exploration.

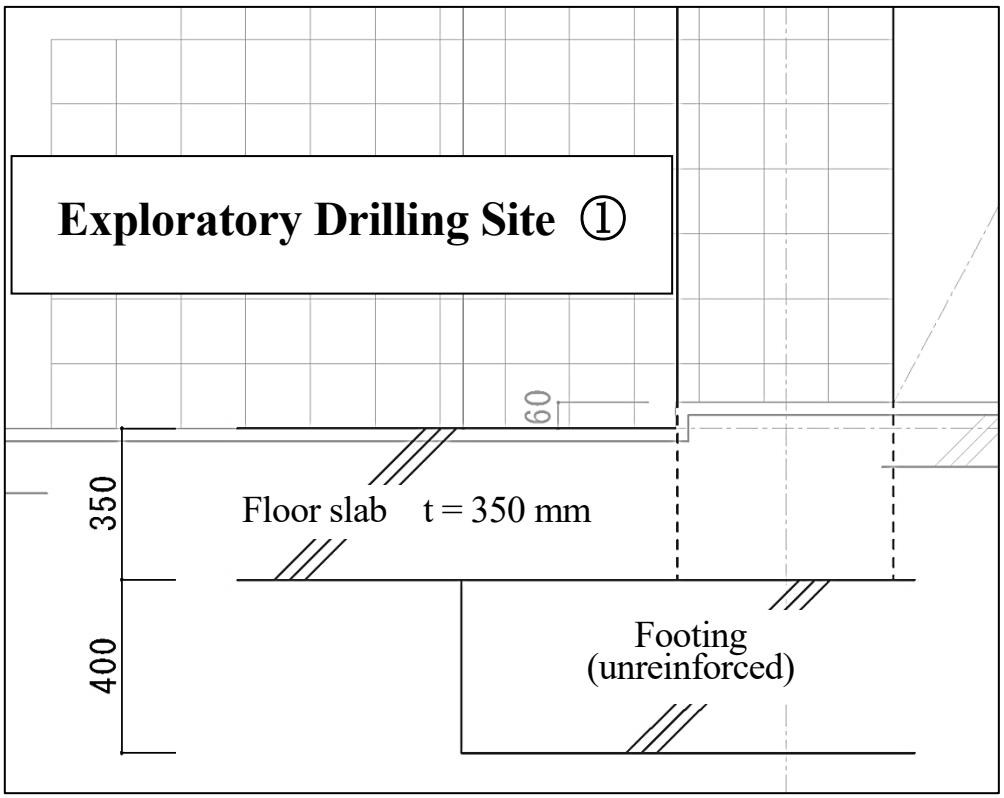
Photo 2-4-104. Core boring site; on base lines A and 3 intersection



① Floor slab 350 mm
② Footing
③ Foundations of brick walls

Photo 2-4-105. Cross-section view of drilled cores

Appendix 3



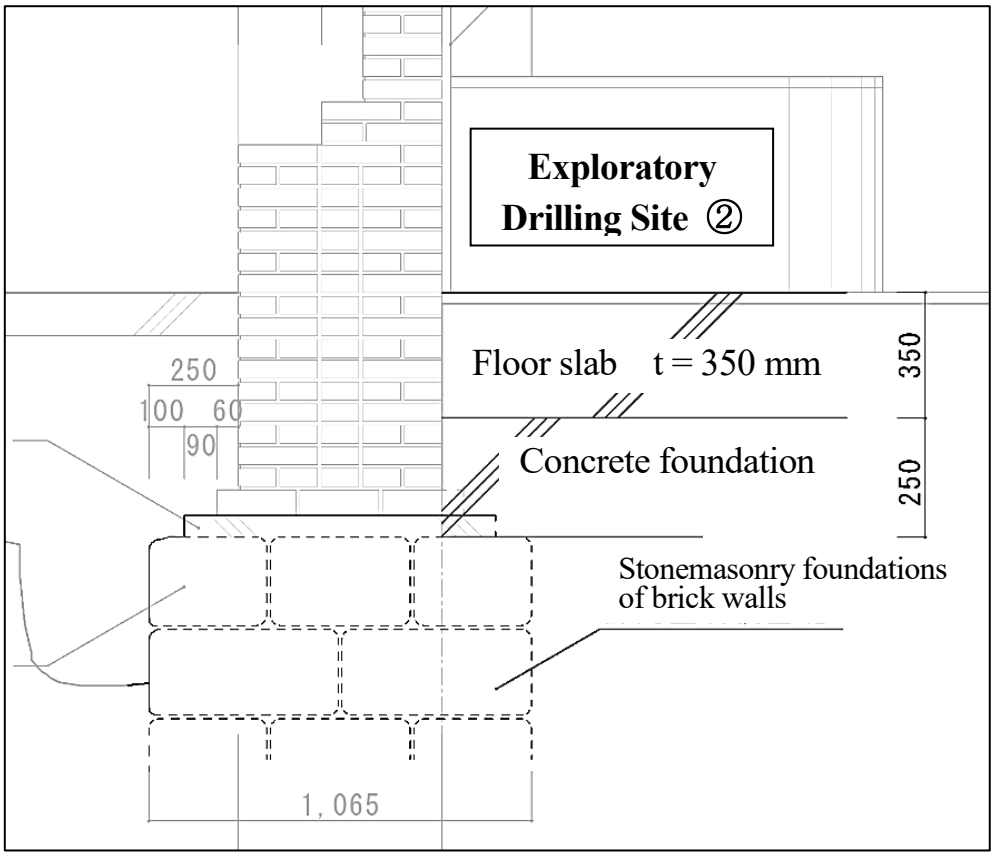


Figure 2-4-50. Estimated cross-section views of foundation exploratory drilling sites

①-4 Joint condition between the brick walls and the General Office

Based on the results of visual examination, it is surmised that the General Office building was mostly built after the brick-walled building had been built, where the structure of brick walls was left intact and the newer building was constructed so that it was completely jointed to the brick walls, without leaving clearance.

As for the foundations, the newer building was built with the foundations of the brick walls left intact, which resulted in the foundations of the brick walls bearing part of the load of the General Office building.

The beam in the General Office (Figure 2-4-51), meanwhile, was installed directly on the top of Arch No. 4 of the brick walls, as illustrated in (Figure 2-4-52) and (Photo 2-4-106). This leaves the upper part of the arch to bear the load.

Visual examination found that the slab supported by this beam showed signs of having been newly placed or re-cast. This indicates that the beam which was laid on top of the arch, too, would have been added at the same timing.

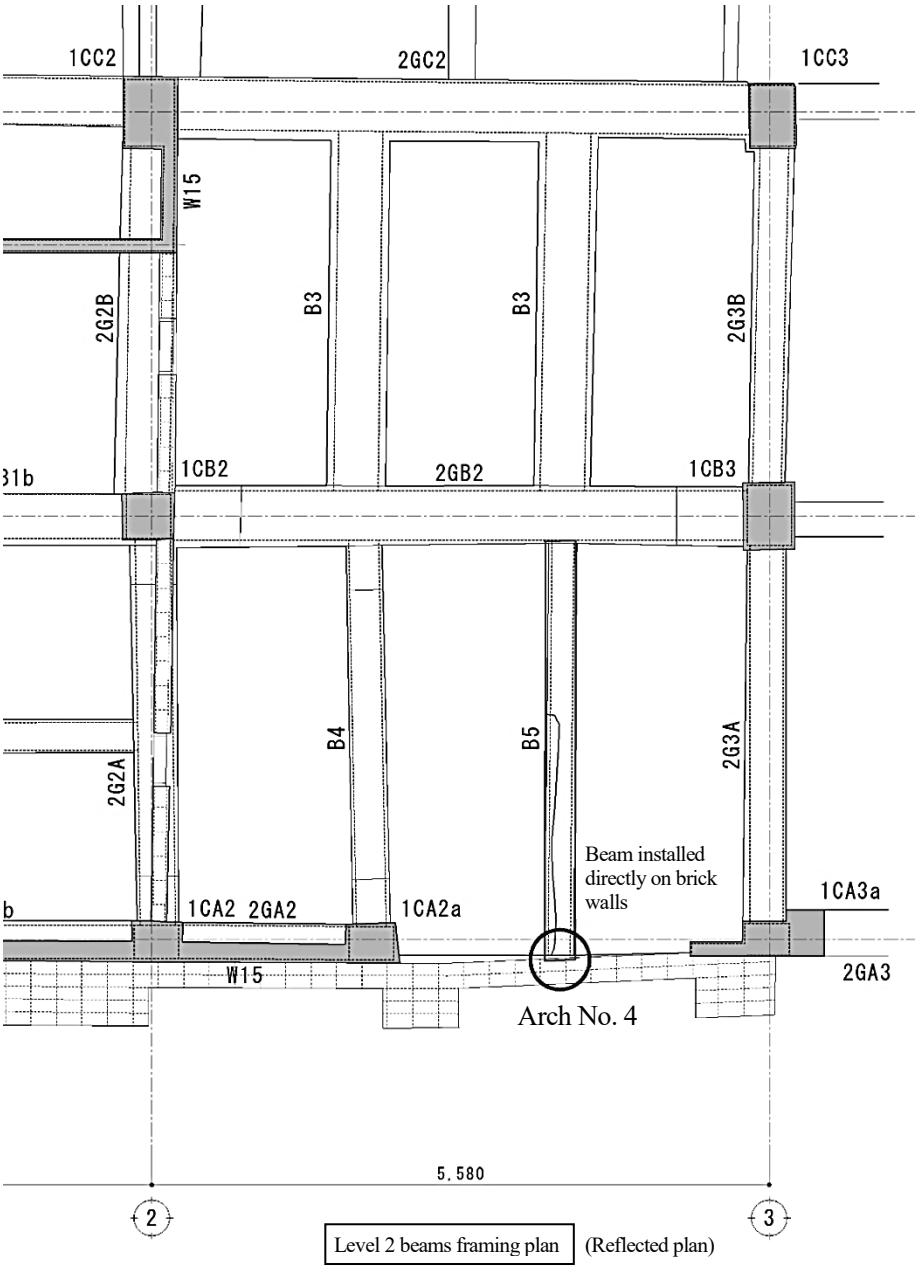


Figure 2-4-51. Level 2 beams framing plan

Appendix 3

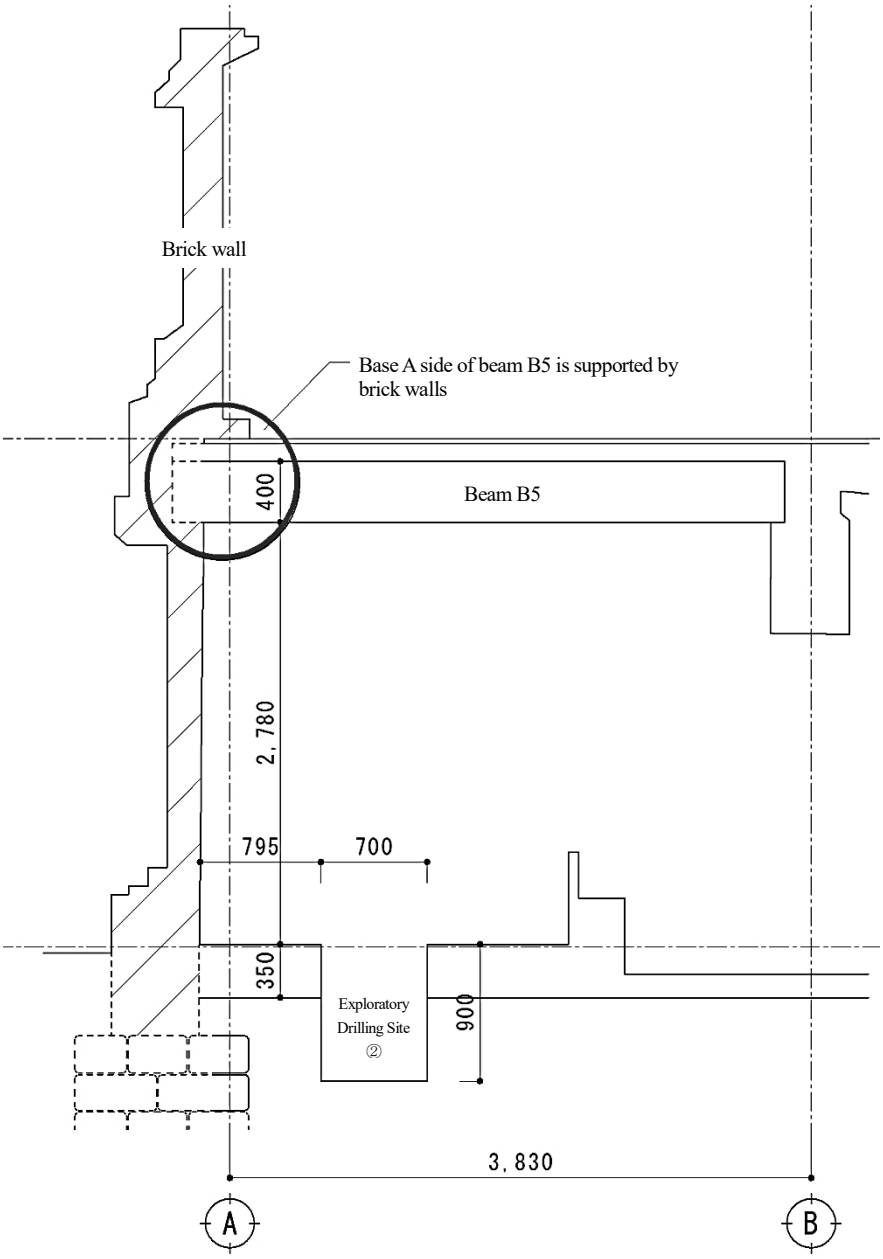


Figure 2-4-52. Relationship between beam and arch

Photo 2-4-106. Joint condition between Beam B5 and brick walls

①-5 Current conditions of damage and issues to be addressed

1. Considering that some parts of the concrete had lower strength than in other parts and that the chloride ion levels in the areas where the rebars were exceeded the chloride threshold for corrosion, there are possibilities of partial deterioration of concrete, even in parts where no explosion, etc., had occurred. In addition, parts of the rebars inside corroded, while some of the columns and beams suffered a loss of cross-sectional area in concrete and rebars. As shown in the drawings of damage, concrete around the areas where explosion had occurred was floating and in danger of eventually falling off. It is necessary to take measures to prevent concrete from falling off.

2. The eaves of Level 2 were in general rife with greater degrees of concrete cracks, explosion, falling-off, and corrosion. The north-facing sides of the columns generally suffered a loss of cross-sectional area due to explosion, and in some parts, corrosion and a loss of cross-sectional area of reinforcement were observed and the column had entirely disappeared. The collapse of the eaves may put the frame of the General Office building at risk of damage, and it calls for repair or other measures to protect the lower parts of the building frame against damage caused by possible collapse of the eaves.

3. The foundations of the columns and wall of the General Office building on the side that is connected to the brick walls were laid on top of the stonemasonry foundations of the brick walls. This means that the foundations of the brick walls have a high possibility to be under excessive strain. The foundations on base lines C and 3 intersection, in particular, is under load of the foundations of the columns in General Office as well as that of adjacent columns, which are considered to have been installed at the time of building expansion on the eastern side of base line 3. This was presumably the cause of the subsidence on the eastern side of the brick walls. The subsidence is considered to have been caused by structural disproportion rather than by weak ground, as there was no evidence of subsidence of the concrete floor slab on the side of the General Office building.

4. Arch No. 4 of the brick walls had large cracks in the lower parts, as shown in (Photo 2-4-107). Judging by the absence of subsidence or deformation with the crown of the arch itself and by the conditions of the joints on the surface of the walls with the cracks, the cause for these cracks is considered to have been the ground subsidence around the center, which caused the entire area of the walls surrounded by the white border in (Photo 2-4-107) to sink. The column on the right-hand side of the crown of the arch, meanwhile, appears to be leaning outward, as indicated by the blue arrow in Photo 2-4-107. This may have occurred as a result of the cracks in the wall; the cracks turned the part on the right-hand side of the arch into something similar to an independent masonry structure, which then were acted by stress of the arch. Furthermore, the part under the crown of the arch had some bricks missing as a result of deterioration of the joints with age, which may

eventually lead the arch itself to collapse. Because a collapse of the arch could in turn cause the brick walls to fall apart, this calls for measures to address this issue.

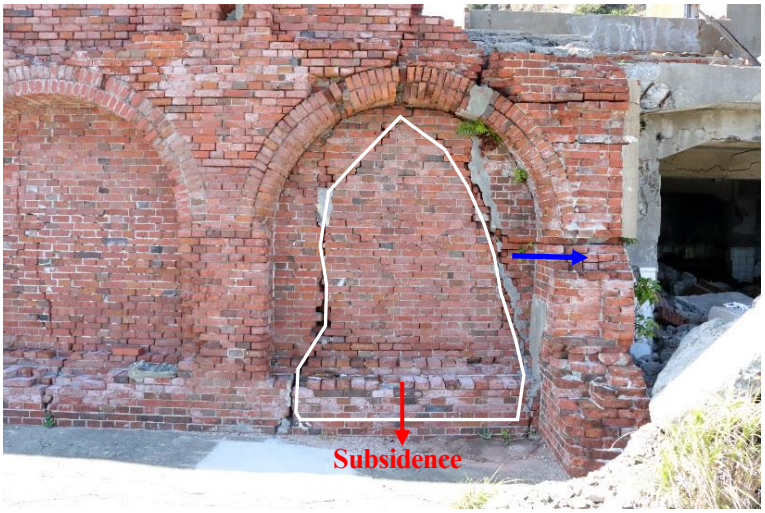


Photo 2-4-107. Damage to Arch No. 4 of brick walls

5. Beam B5, which was laid over base lines A and B and between base lines 2 and 3, was installed directly on the top of Arch No. 4 of the brick walls. This means that the floor load of the General Office building was put on the upper part of the arch, as shown in (Figure 2-4-53). Considering one side of Arch No. 4 was leaning outward as mentioned in 4. above, this load put to the arch may deform the arch even further, potentially leading it to collapse. Measures need to be taken to prevent such an eventuality, such as by removing the load on the beam.

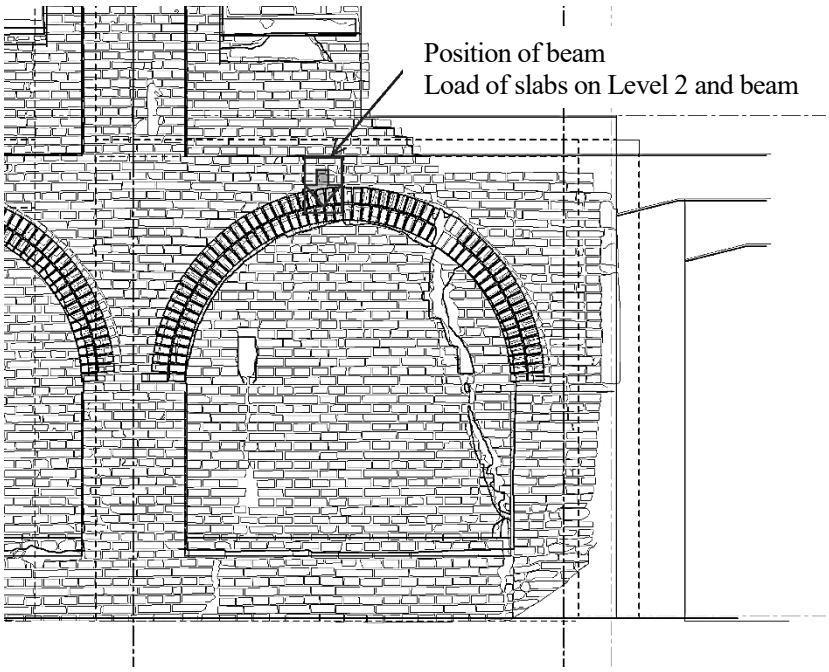


Figure 2-4-53. Drawing of damaged parts of brick walls

6. There was no underground beam laid in the General Office building. The rotational stiffness of the column bases on Level 1 was therefore low, and while they could resist horizontal force in the north-south direction as a portal moment frame, their horizontal load bearing capacity is considered small, given the loss of cross-sectional area in concrete and the loss of rebars in two of the girders that run in the north-south direction.

9) Rainwater infiltration at the top of the brick walls and measures

Visual examination was conducted on possible routes of rainwater infiltration into the brick walls, including the top of the brick walls, rain gutters, and the counters under the arch.

The top of the walls on Level 2 had a number of gaps created as a result of deterioration of joints, as shown in (Photo 2-4-108). The same could be said with the counters under the arch. On the western side, the joints became completely separated, with a few bricks fallen off at the end as shown in (Photo 2-4-109). On the eastern side, meanwhile, there was substantial damage to the bricks in the upper parts of Arch No. 4 with large cracks visible, as shown in (Photo 2-4-110); it is highly likely that rainwater went in through them. The mortar rain gutters, on the other hand, had no severe deterioration, and did not require repair.

Although it could not be determined in this examination whether or not rainwater was penetrating inside through the walls, considering that joints of the top of the walls were significantly deteriorated, rainwater infiltration was entirely possible. It will be necessary to repair the damaged joints and the large cracks, and make the wall waterproof.

Photo 2-4-108. Top of brick walls

Photo 2-4-109. Western side of brick walls

Photo 2-4-110. Eastern side of brick walls

Appendix 3

Visitor Management Strategy
FY 2018 Edition

2019

Cabinet Secretariat

*Some of the numbers and wording herein are subject to change.

Contents

1 Process to date

39th Session Recommendation c) Define acceptable visitor threshold levels at each component part to mitigate any potential adverse impacts, commencing with those most likely to be at risk.

42nd Session Recommendation 6 Further notes that monitoring of the number of visitors is being undertaken systematically for all component sites, and that a visitor management strategy, including carrying capacities, will be formulated in 2018 on the basis of these results; and also requests the State Party to submit this strategy to the World Heritage Centre, once it is completed, for review by the Advisory Bodies;

2018※:The same decision, 42 COM 7B.10, also "Requests furthermore the State Party to fully implement Decision 39 COM 8B.141 and to submit to the World Heritage Centre, by 1 December 2019, an updated report on the state of conservation of the property and the implementation of the above, for examination by the World Heritage Committee at its 44th session in 2020."

The following points are stated as premises to Recommendation c) being referred for discussion and resolution at the 39th Session of the World Heritage Committee.

- Judging from the trends with Japan's sites registered up to now on the World Heritage List, an increase in visitors to the component parts can be anticipated. While the extent of this increase will likely vary with the location of each component part, the convenience of access, and the hours of their opening to the public, monitoring measures will be needed after listing for recording the change in visitor numbers.
- To mitigate any adverse impacts on the basic structure of the component parts, strategies are needed for assessing and deciding their capacity to receive visitors. Such strategies are especially needed in the case of Shokasonjuku (Area 1, component part 1-1) and Glover House (Area 6, component part 6-8). In model course studies, the views of experts from overseas familiar with overseas market trends were obtained and reflected in the concrete plans.

Against the above background, the response to Recommendation c) was decided along the following lines and studies were carried out.

Surveys were conducted of the current status of visitor numbers with the aim of reducing the adverse impact that increasing visitor numbers could have on the component parts, and a Visitor Management Strategy was drafted based on the results. The possibility and necessity of setting visitor threshold levels was also carefully examined, factoring in the scale, nature, and location of each of the component parts.

Appendix 4

Timeline of (and Plans for) Studies on the Response to Recommendation c)

FY 2016: Current status surveys started (quantitative surveys + some qualitative surveys)
FY 2017: Current status surveys carried out (quantitative, qualitative, and visitor satisfaction surveys)
Structure of Visitor Management Strategy designed

Results of the above surveys were reported in the November 2017 State of Conservation Report
June 2018: Decision of 42nd World Heritage Committee meeting

FY 2018: Current status surveys carried out (quantitative, qualitative, and visitor satisfaction surveys)
Visitor Management Strategy (FY 2018 edition) drawn up

FY 2019: (Drawing up of Visitor Management Strategy (FY 2019 final edition))

Note that the Decision of the World Heritage Committee of June 2018 states "Visitor numbers for each component site have been monitored since 2016, and a visitor management strategy, including carrying capacities, will be formulated in 2019 on the basis of these results.* It is recommended that this Strategy be submitted to the World Heritage Conservation Center when it is completed."

*2019: The Decision also states that the State Party will be asked to submit to the World Heritage Centre, by 1 December 2019, an updated report on the state of conservation of the property and the implementation of the above Decision, for examination by the World Heritage Committee at its 44th session in 2020

1.1 Summary of State of Conservation Report

The November 2017 State of Conservation Report describes as follows the specific procedures for the study work.

1) Surveys of visitor numbers, to ascertain the current state of and trends in visitor numbers at each of the component parts, are being conducted from FY 2016.
2) In parallel with these surveys, a common Visitor Management Vision for all component parts will be identified as a future target.
3) The current state of visitor management and issues faced at each of the component parts will be ascertained and policies and methods for improving that situation indicated, ensuring consistency with the common Visitor Management Vision.
4) The results of the current status surveys will be analyzed in FY 2019, and a Visitor Management Strategy based on the common Visitor Management Vision drawn up in parallel with the surveys will be created as the process for realizing that vision.
5) The possibility and necessity of setting visitor threshold levels will also be carefully examined for each of the component parts.

The results of current status surveys are as follows.

Quantitative surveys: The surveys showed that daily visitor numbers to the component parts fluctuate significantly over weekdays, weekends, and vacation periods, as well as according to whether or not an event was being held. No noteworthy impact on the component parts was reported.

Qualitative surveys: It was confirmed that in the case of sites where visitors go indoors, crowding occurs when concentrations of visitors, such as in group tours, reach a scale where visitors cannot move smoothly at the entrance, etc.

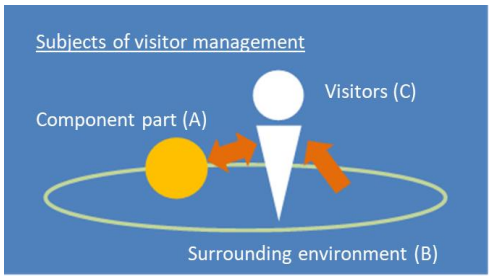
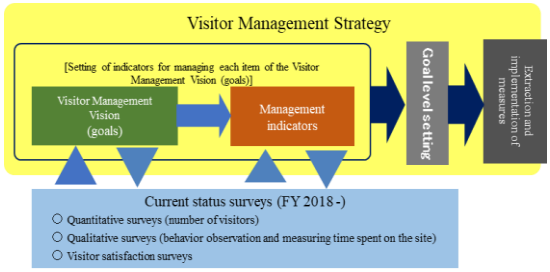
- ✓ Note that it is possible to eliminate such situations by properly designing people flow, and by controlling the number of group tours or visitors admitted at the same time.

While it can be considered preferable to have visitors spend a long time at component sites to

raise their understanding of the site, on days of high visitor turnout it is possible they will not be able to stay long enough to experience the site and its interpretation adequately.

Visitor satisfaction surveys: It was determined that time spent, the quality of guides, and facility, equipment, and operational aspects each have a major impact in terms of achieving high levels of visitor understanding and satisfaction, and that these could serve as indicators in the management of target standards.

It has been indicated that Recommendation c) will be responded to by the drawing up of a Visitor Management Strategy based on the results of these current status surveys that will realize the respective visitor management visions for the Component parts (A), the Surrounding environment (B), and Visitors (C).

Subjects of visitor management	Structure of Visitor Management Strategy
	

Subject	Visitor Management Vision (targets)	
(1) Component part (A)	Physical damage No physical harm to land and materials of component part	1. The facilities and equipment are in place for physically protecting the component part
		2. The operational arrangement for this purpose is in place
(2) Component part (A) / Surrounding environment (B)	-1 Safety and security Visitors' feeling of safety and security is sufficient	1. The facilities and equipment are in place for ensuring the safety and security of visitors
		2. The operational arrangement for this purpose is in place
	-2 Promotion of understanding Visitors' feeling of satisfaction is sufficient	1. The facilities and equipment are in place for promoting and deepening understanding by visitors
		2. The operational arrangement for this purpose is in place
	-3 Hospitality The comfort of visitors is sufficient	1. The facilities and equipment are in place for promoting enjoyment by visitors
		2. The operational arrangement for this purpose is in place
(3) Visitors (C)	A state in which visitors feel safety, security, comfort, and a sense of satisfaction, spend a sufficient amount of time at the component part to understand its contribution to the Outstanding Universal Value, and are motivated to visit again	

Source: Update to State of Conservation Report (November 2017)

Figure 1. Subjects and structure of Visitor Management Strategy

1.2 Purpose for drawing up strategy this time

Recommendation c) asks that the visitor "carrying capacity" of component parts be defined; but in three years of multifaceted surveys of the current status, no adverse impact by visitors as a result of fluctuations in visitor levels, and no major cases that would have an adverse impact, were confirmed. For this reason, it is difficult to set numerical upper thresholds on visitor carrying capacity that are based in causal relationships.

Accordingly, for each individual component parts, a state in which there is no adverse impact by visitors has been defined, and a visitor management strategy has been formulated that maintains such a state by means of dynamic processes, while constantly monitoring the status of the component part and of visitors.

(Management by means of dynamic processes making use of diverse elements)

The results of multi-faceted surveys also do not suggest the possibility of preventing adverse impacts by setting visitor level thresholds. Moreover, visitor density and patterns are not uniform even on a daily basis, depending on such factors as peak versus non-peak times and whether there are tour groups.

Accordingly, to prevent adverse impacts by the constantly fluctuating visitor levels, in place of static management -- setting annual or daily thresholds of visitor numbers -- it was deemed important to use diverse indicators to confirm the impact of fluctuations and to take suitable measures in response.

Based on this thinking, the setting of multiple and varied indicators of the visitor management vision, and the dynamic monitoring of impacts and managing of the situation were made key points of the Visitor Management Strategy. This was seen as the best way to "mitigate any potential adverse impacts on the component part," which after all is the real objective of Recommendation c).

According to the results of visitor surveys conducted to date, situations in which adverse impacts are unavoidable tend to be occur in situations such as visits by tour groups all at once, or temporary concentrations of visitors indoors due to sudden inclement weather. One reason these situations occur lies in the nature of the buildings making up the Sites of Japan's Meiji Industrial Revolution. Unlike large temples or public facilities, these buildings include private facilities such as Glover House and Office and Shokasonjuku Academy that were never intended to accommodate unspecified large numbers of visitors at once.

Analysis showed that rather than the absolute number of visitors, important for proper conservation of these buildings is smoothly directing visitors in the manner of guests at a typical home.

Moreover, based on the awareness that the real objectives of Recommendation c) are to mitigate adverse impacts by visitors while also promoting their understanding of the OUV, the ideal state (visitor management vision) was defined as one in which adverse impacts by visitors are managed, and also one in which visitor understanding of the OUV is advanced; and these were made the objectives of the Visitor Management Strategy.

(Preventing adverse impact by visitors)

The Visitor Management Strategy will make possible monitoring by means of indicators suitable for each management subject and implementation of initiatives based thereon, so that visitors do not harm elements with outstanding universal value.

To this end, adverse impacts were defined as wear and tear on the resources, corrosion, damage, contamination, trash, safety hazards, obstacles to communication, etc., and the situation regarding these was determined by three years of current status surveys and qualitative surveys. The relation between visitor levels and the occurrence of adverse impacts was also determined by current status surveys and quantitative surveys.

(Promoting OUV understanding)

The Visitor Management Strategy will make possible monitoring by means of indicators suitable for each management subject and implementation of initiatives based thereon, to promote visitor understanding of the OUV of individual component parts and the OUV of the Sites as a whole.

To this end, the degree of visitor understanding of the OUV and the factors affecting this understanding were determined by two years of current status surveys and satisfaction surveys. It was further determined that visitor levels impact the promotion of OUV understanding through such

situations as the occurrence of crowding and shortening of time spent.

2 Results of three years of visitor surveys

The results of current status surveys (quantitative, qualitative, and visitor satisfaction surveys) conducted for three years starting in FY 2016 are indicated below.

(Summary)

The results of quantitative and qualitative surveys showed that nearly all impacts of daily fluctuations in visitor numbers on the component parts, as well as on the safety, security, and comfort of visitors, were due to the number of visitors at daily peak hours; and these impacts were not notable except at Glover House and a few component parts.

The surveys also showed that the daily visitor levels at which adverse impacts occurred varied greatly from one component part to another.

As for the visitor satisfaction surveys, the results confirmed that the standpoints in the Visitor Management Vision of ensuring safety, security, and comfort of visitors and obtaining high levels of understanding and satisfaction were largely influenced by time spent at the component part, the quality of guides, and the status of facility, equipment, and operational aspects.

2.1 Results of quantitative surveys and response to expected future changes in visitor levels

(Survey method)

The number of visitors per day to each component part and the fluctuation in visitor levels were determined. Record was also made of any noteworthy impact on a component part.

The methods for determining visitor numbers were chosen for each component part as appropriate to its scale, nature, and location as well as such factors as the staffing systems for visitor management.

(Survey results)

- Number of daily visitors (results compiled as of March 31, 2018)

  The surveys showed that daily visitor numbers to the component parts fluctuate significantly over weekdays, weekends, and vacation periods, as well as according to whether or not an event was being held.

  The maximum scale of daily visitor numbers excluding event days was from around 100 to 8,000 per day **(Figure 2)**. No noteworthy impact on the component parts was reported.

Appendix 4

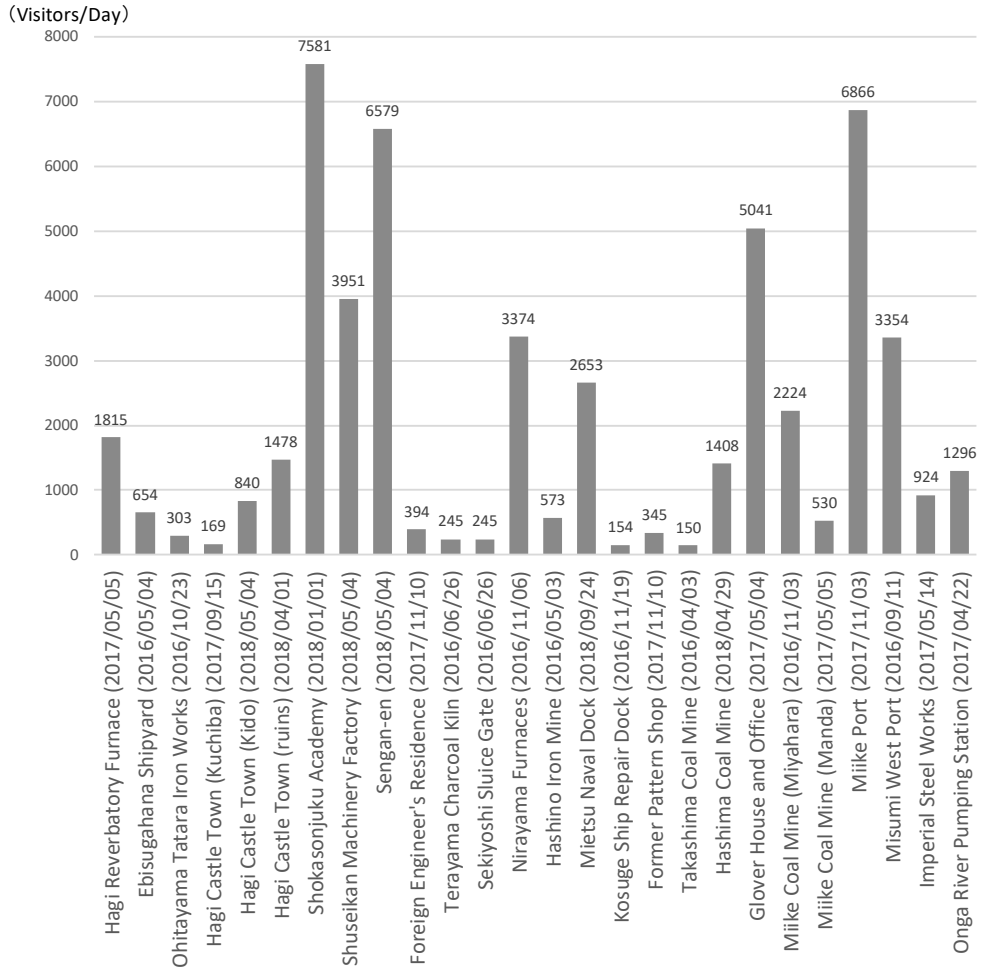


Figure 2: Maximum scale of daily visitor numbers other than on event days (Miike Coal Mine (Manda Pit)) (April 2016 to March 2018)

(Response to expected future changes in visitor levels)

Based on the results of three years of visitor surveys, the setting of multiple and varied indicators of the visitor management vision, and the dynamic monitoring of impacts and managing of the situation were made key points of the Visitor Management Strategy. This was seen as the best way to "mitigate any potential adverse impacts on the component part," which after all is the real objective of Recommendation c).

The Visitor Management Strategy created based on this thinking is aimed at conservation of the component parts by devising measures for alleviating time periods and visitor patterns prone to the occurrence of adverse impacts, even if the total year-long number of visitors increases in coming years.

On the other hand, if the overall visitor levels see a considerable rise, it is assumed that strengthening of measures for conservation and changing the methods themselves will become necessary. Monitoring of year-long and daily visitor numbers will therefore continue to be carried out.

(For reference)

- Component parts showing downward trends

*Component parts other than the following

- Component parts showing upward trends or expecting increases due to region-related plans:

* Manda Pit (7-1; peak number)

*Shokasonjuku (1-5; maintained), Shuseikan (2-1; maintained), Glover House and Office (6-8) .....Total 4 component parts

2.2 Results of qualitative surveys

(Survey method)

Impact of changes in daily visitor levels at each component part and on visitor safety, security, and comfort were observed and recorded. The amount of time spent by visitors at each component part was also determined.

Note that qualitative surveys were conducted for all component parts during fiscal 2017, and that by analyzing the results of these surveys, indicators were determined for visitor management that will be positive for the component parts and visitor understanding and that will have an effect on improved satisfaction.

(Survey results)

- Impact of fluctuation in daily visitor numbers on the component part and visitor safety, security, and comfort (results compiled as of March 31, 2018)

  Impacts on the safety, security, and comfort of visitors are factors that can lessen visitor safety, security, and comfort and their understanding and satisfaction. Specific examples are wear and tear on the resources, corrosion, damage, contamination, trash, safety hazards, or obstacles to communication, etc., at places on the property where crowding occurs.

  The number of such impacts confirmed was greatest at Glover House (46 incidents in one year), while at other locations the numbers were fewer than 10 per year, or no impact was confirmed in most component sites.

  At Glover House and Office, during certain times on days of high visitor turnout, impacts such as concentration of people in the same place occur.

  Of the 46 impacts confirmed at Glover House, those impacting the site itself, consisting of wear and tear (2: floor creaking, chipping of brick floor) and damage (2: damage to wood display stand, damage to interior cloth), were minor and did not lead to major trouble. However, there were also incidents such as stumbling on the entrance slope or mat (22), being unable to hear explanations due to heavy crowding (10), or dumping of pamphlets (10), many of which impacted visitor safety, security, and comfort.

  After renovation of Glover House has been completed, “tour rules” are to be instituted defining visitor flow lines that restrict the exits and entrances that can be used, aimed at achieving safe and smooth viewing.

Table 1: Number of incidents confirmed where fluctuation in daily visitor numbers impact the component part and visitor safety, security, and comfort
(April 2017 to March 2018)

Area	Component Part	Current Value (based on qualitative survey results)
Hagi	Hagi Castle Town (Kuchiba Family Residence)	1 incident/year
Nagasaki	Takashima Coal Mine	9 incidents/year
	Glover House	46 incidents/year
All others		0 incidents/year

2.3 Results of visitor satisfaction surveys, main points of OUV understanding promotion, and future target levels

(Survey method)

Questionnaires were collected from visitors to each component part, in order to learn their level of satisfaction and any problems or requests they had.

(Survey results; factors for promoting OUV understanding)

- Time spent by visitors at the component part and their degree of satisfaction

Regarding the importance of time spent by visitors at each of the component sites, the results of visitor satisfaction surveys indicate that, while there is some variation based on such factors as the scale of the component part, visitors spending two hours or more at the site tend to understand the value of the component site and be satisfied with their experience.

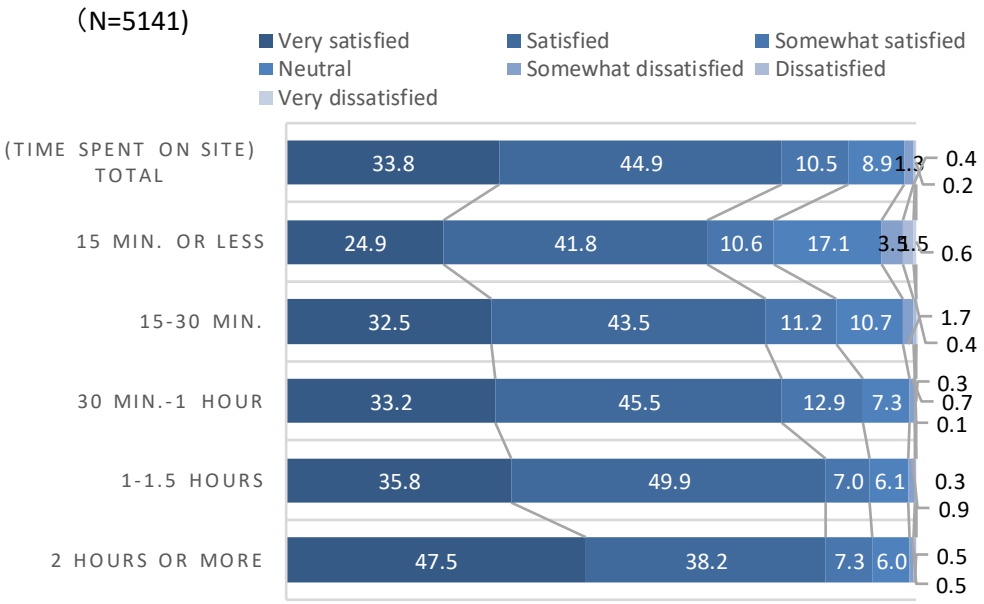


Figure 3: Relationship between amount of time spent at the component part and satisfaction with the component part

- Quality and quantity of interpretation and visitor satisfaction

Explanations by guides were found to play an important role in promoting visitor understanding. The degree of satisfaction that visitors felt in relation to a component part changed according to whether or not they experienced a high-quality guide with whom they were "very satisfied." While based on a small sample, the Sites of Japan's Meiji Industrial Revolution guide application is also helping to boost visitor satisfaction.

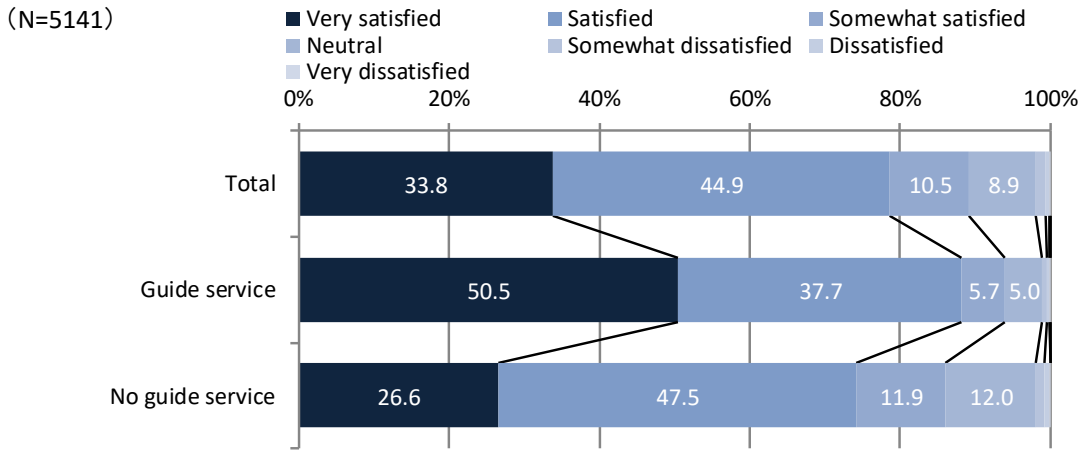


Figure 4: Relationship between satisfaction with guide and satisfaction with the component part

- Food, beverage, shopping, and other service opportunities, and degree of satisfaction

Visitors were asked whether they felt there were problems with various items indicating visitor comfort. Those who felt there were problems were 20% of the total; the remaining 80% said there were no problems.

Looking at details of the problems, facility, equipment, and operational aspects such as convenience of access, restaurant and café facilities, and toilets presented problems in a relatively high percentage of cases. Arranging facilities and equipment that provide visitors with a comfortable experience will therefore also be an important aspect in ensuring that visitors spend a sufficient amount of time at the component part and understand its contribution to the OUV.

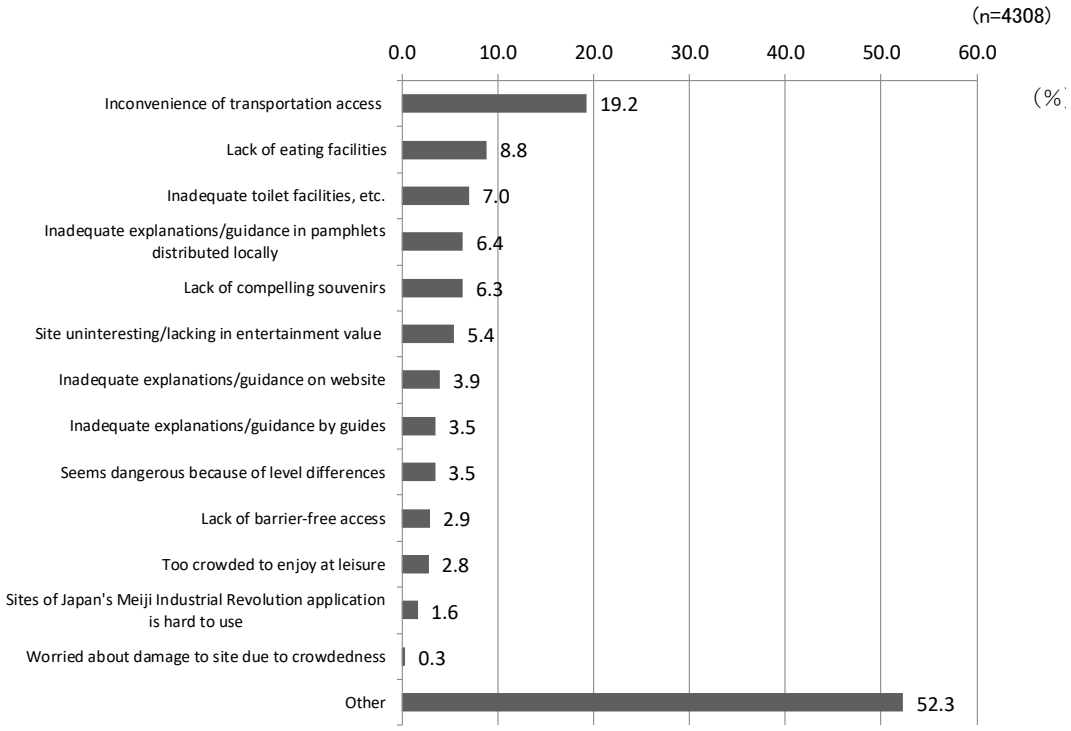


Figure 5. Component part problems and percentage of problems indicated (visitor requests, time spent, guide availability, etc.)

Appendix 4

- The current state of OUV understanding promotion

  The current degree of promotion of OUV understanding was determined by indicators of the visitors' state such as their satisfaction and their understanding of the value, both of the sites as a whole and of individual component parts. While time spent on site, which has been confirmed to affect satisfaction, was determined through the quantitative surveys, the visitor satisfaction survey allows for increased sample sizes and analysis, and therefore table 2 lists current values.

  Specific methods were also set based on current values for confirming the extent of promotion of OUV understanding in the future.

Table 2. Current values for indicators of OUV understanding, and methods of confirming extent of OUV understanding promotion

Indicators		Methods of confirming extent of promotion of OUV understanding
Degree of satisfaction (percentage of "Very satisfied")	34.4%	Confirm that the percentage of "Very satisfied" is being maintained or growing.
Time spent (percentage of "Less than 15 min.")	10.3%	Of those spending less than 15 minutes at a component part, the percentage of those saying they were dissatisfied reached 25%. Accordingly, for reducing the percentage of those dissatisfied, taking into consideration the features of individual component parts, confirm that the ratio of those spending less than 15 minutes at a component part is decreasing.
Understanding of OUV (all component parts) (percentage of "Don't know" responses)	12.7%	Confirm that the percentage of those answering "Don't know" is decreasing.
Understanding of OUV (individual component part overall) (percent of "Don't know" responses)	15.4%	Confirm that the percentage of those answering "Don't know" is decreasing.
Sparking of interest (percentage of "Very much desire" to learn more)	24.9%	Confirm that the percentage of those answering. "Very much desire" or "Desire" (to learn more about the component part) is increasing.
Intention to visit again (the particular component part) (percentage of "Definitely want to return")	13.4%	Confirm that the percentage of those answering "Definitely want to return" is increasing.
Intention to visit again (other component parts) (percentage of "Definitely want to visit")	21.5%	Confirm that the percentage of those answering "Definitely want to visit" is increasing.
Percentage of problems indicated • Percentage of those dissatisfied due to crowding • Percentage of those concerned about damage from crowding	2.8% 0.3%	To eliminate adverse impacts, confirm that the percentage of those answering "dissatisfied due to crowding" and percentage of those answering "concerned about damage from crowding" are declining.

3 Visitor Management Strategy

3.1 Defining the Visitor Management Strategy

(Elements of Visitor Management Strategy)

Since the Visitor Management Strategy is a strategy for maintaining a state in which there is no adverse impact by visitors, this state has been defined, various indicators for confirming this state been set, and actions formulated as the framework for maintaining this state.

Table 3: Elements of Visitor Management Strategy

(1) Definition of a state with no adverse impact by visitors
- ✓ A vision defined of the desirable state for the component part, surrounding environment, and visitors
  ("Visitor Management Vision": State of Conservation Report (November 2017))

(2) Setting of indicators for confirming a state with no adverse impact by visitors
- ✓ Common indicators, individual indicators (set based on results of three years of current status surveys)

(3) Implementation of actions for maintaining a state with no adverse impact by visitors
- ✓ Indicators and targets set taking into account the features of each component part
- ✓ Initiatives and projects for maintaining and improving indicators
- ✓ Monitoring methods determined and measures prepared to be taken if indicators worsen

(Structure of Visitor Management Strategy)

The Visitor Management Strategy consists of two parts, the common strategy for the Site as a whole and strategies for individual component parts.

The common strategy part indicates, among other matters, the approach to strategy-making; that the applicable period of the strategy is eight years to align it with the Conservation, Restoration, Presentation and Public Utilization Plans of individual component parts; and that as monitoring methods, quantitative surveys will continue to be carried out by individual component site managers, and visitor satisfaction surveys will be conducted in the fifth year of the applicable period to check common indicators defined by the Cabinet Secretariat.

The individual component part strategies, based on a standard format, indicate trends in visitor numbers, monitoring indicators and target levels, and measures (initiatives), etc.

Table 4: Structure of Visitor Management Strategy

I. Strategy common to all component parts
- Strategy approach and applicable period
- Visitor Management Vision
- Methods of setting indicators and targets, monitoring methods, measures to be taken if indicators worsen
- Operational arrangement for carrying out visitor management

II. Strategies for individual component parts
- Trends in visitor numbers, monitoring indicators and target levels, measures (initiatives), etc.

3.2 Strategy common to all component parts

(Strategy approach and applicable period)

The Visitor Management Strategy indicates the applicable period and the operational arrangements to ensure visitor management strategies for individual component parts are drawn up and implemented.

3.2.1 Ensuring that visitor management strategies for individual component parts drawn up and implemented

- Managers of individual component parts each have drawn up and implement a Visitor Management Strategy focused on the visitor management targets and based on the initiatives in the Conservation, Restoration, Presentation and Public Utilization Plan.
- The Cabinet Secretariat takes measures to ensure the visitor management strategies for individual component parts are implemented precisely, and assists with implementation of the visitor management strategies for the key component parts of Shokasonjuku Academy, Glover House and Office, and other component parts.

3.2.2 Applicable period of Visitor Management Strategy

- In three years of current status surveys conducted before and after the major event of World Heritage listing, no large fluctuations in visitor levels have been seen, and no indication of plans that would induce such changes.
- Accordingly, considering the ending time of the short-term plans for each of the Conservation, Restoration, Presentation and Public Utilization Plans on which the individual visitor management strategy initiatives are based, and the timing of revisions to the interim plans, a plan period of eight years has been set forth, starting from FY2019.

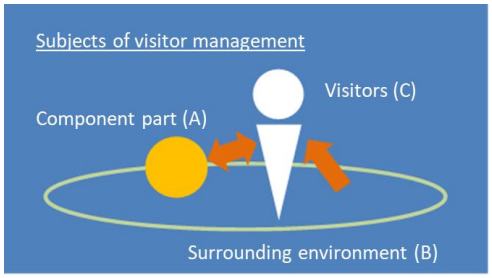
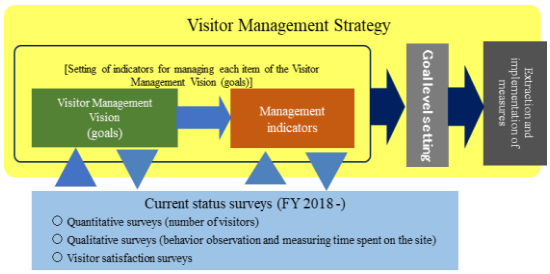
3.2.3 Operational arrangement for carrying out Visitor Management Strategy

- The visitor management strategies of each of the component parts are to be carried out by their respective managers, with support by the Cabinet Secretariat.

(Visitor Management Vision)

The Visitor Management Vision to be sustainably realized by the Visitor Management Strategy is a state in which visitors feel safety, security, comfort, and a sense of satisfaction, spend a sufficient amount of time at the component part to understand its contribution to the Outstanding Universal Value, and are motivated to visit again.

To manage and confirm this desirable state, the subjects of visitor management are divided up and structured, and indicated as targets. Strategies for individual component parts have been created making use of this framework.

Subjects of visitor management	Structure of Visitor Management Strategy
	

Subject	Visitor Management Vision (targets)	
(1) Component part (A)	Physical damage No physical harm to land and materials of component part	1. The facilities and equipment are in place for physically protecting the component part
		2. The operational arrangement for this purpose is in place
(2) Component part (A) / Surrounding environment (B)	-1 Safety and security Visitors' feeling of safety and security is sufficient	1. The facilities and equipment are in place for ensuring the safety and security of visitors
		2. The operational arrangement for this purpose is in place
	-2 Promotion of understanding Visitors' feeling of satisfaction is sufficient	1. The facilities and equipment are in place for promoting and deepening understanding by visitors
		2. The operational arrangement for this purpose is in place
	-3 Hospitality The comfort of visitors is sufficient	1. The facilities and equipment are in place for promoting enjoyment by visitors
		2. The operational arrangement for this purpose is in place
(3) Visitors (C)	A state in which visitors feel safety, security, comfort, and a sense of satisfaction, spend a sufficient amount of time at the component part to understand its contribution to the Outstanding Universal Value, and are motivated to visit again	

Source: State of Conservation Report (November 2017) updated

Figure 6: Visitor Management Vision (repeat of Figure 1)

(Methods of setting indicators and targets, monitoring methods, measures to be taken if indicators worsen)

- Methods of setting indicators and targets

  The indicators for managing and confirming the ideal state of the vision consist of indicators used in common for all component parts to confirm the overall management level (common indicators) and individual indicators for confirming the management levels regarding the problems of individual component parts.

  The common indicators were selected from the key indicators obtained from visitor surveys to date. The individual indicators were set by the managers of each component part in light of the current state of the component part, the future direction of management, and planned initiatives, and are given in the Visitor Management Strategy.

  The target values for each of the indicators during the period of the Visitor Management

Strategy are set individually for each component part. The approach to setting targets, such as catching up those that are below the overall average, and maintaining the current values that achieve the desirable state, is set by each component part manager and given in the Visitor Management Strategy.

Table 5: Common Management Indicators

☆Incidents impacting the component part and visitor safety, security, and comfort Impacts by visitors as determined from qualitative surveys (observation surveys) • Wear and tear on the resources, corrosion, damage, contamination, trash, safety hazards, obstacles to communication, etc.
☆Whether there are facilities/equipment for separation between visitors and the component part The existence or not of separation facilities means whether there are facilities or equipment for preventing physical damage to places in the component part that are prone to such damage. These include fences, rails, or other barriers to ensure prevention of entry into such places.
☆Satisfaction
☆Time spent
☆Understanding
☆Sparking of interest
☆Intention to visit again
☆Percentage of problems indicated Percentage of problems indicated is set from a choice of five indicators, namely, crowding, damage, lack of entertainment value, food facilities, and toilet provision, etc. Of these, crowding and damage are mandatory.

- Monitoring methods

  Monitoring methods for each of the multiple and varied common indicators and independent indicators were included in the management strategies for individual component parts. Since visitor satisfaction surveys, used as monitoring methods for many common indicators, are large-scale surveys, they will be conducted, with the support of the Cabinet Secretariat, before the end of the plan period (five years into the plan), in time for the revision work for the next-term strategy.

  These monitoring methods given in the management strategies for individual component parts will be used to assess the current state at the time of monitoring and extent of target achievement, and measures will be revised if needed.

  It should be noted that, in assessing the status of visitor management, it must be verified against the visitor trends, which are factors for changes in indicators. The surveys of annual or daily visitor numbers that have been conducted up to now will therefore be continued.

  If there are significant changes (increases) in visitor numbers, the managers of individual component parts will determine the impact on management indicators by conducting qualitative surveys, or will analyze the factors behind the changes and consider measures to be taken, revising the Visitor Management Strategy as necessary even during the applicable period.

- Measures to be taken if indicators worsen

  In case a significant rise in annual or daily visitors is identified as a factor for worsening of indicators, measures will be devised for alleviating time periods or visitor patterns prone to the occurrence of adverse impacts.

  Among specific measures are setting entry limits per time period in fine increments, allowing entry only to those accompanied by a guide, or controlling by admission fee setting.

  The design and introduction of such new measures are mainly up to the managers of component parts, but the Cabinet Secretariat will also provide information and advice as needed.

(Division of visitor management roles)

Component part managers have primary responsibility for individual visitor management strategies. To assist with the implementation of these strategies, the Cabinet Secretariat will provide comprehensive support, making use of the governance system given in the General Principles and Strategic Framework for Conservation and Management of the Sites of Japan's Meiji Industrial Revolution (hereinafter, “Strategic Framework”) and obtaining the advice of the Industrial Heritage

Expert Committee (including Working Properties) (hereinafter, "Expert Committee").

Note that there are cooperative relations with the central government and local agencies of the government at each level of the National Committee of Conservation and Management, Local Conservation Councils, and individual component part managers. The visitor management strategies will also be implemented according to the governance system of the Strategic Framework as up to now.

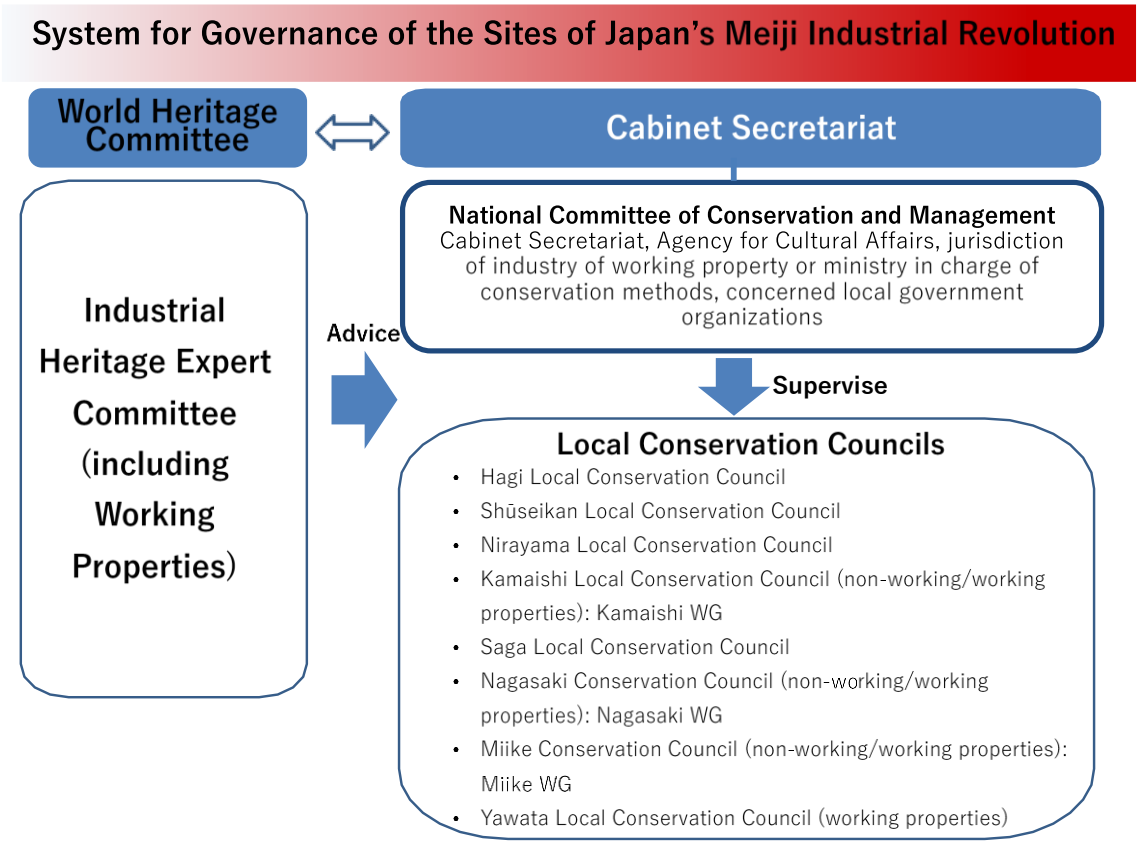


Figure 7 Governance system of the Strategic Framework

- Support for devising visitor management strategies for individual component parts

  The Cabinet Secretariat has prepared a manual of the procedures to guide managers of individual component parts in drawing up their Visitor Management Strategy. This manual sets out a vision of the ideal visitor management and defines suitable indicators for each of the subjects of target level management, based on the results of three years of status surveys and qualitative surveys and the prevention scheme regarding prevention of adverse impacts by visitors, and on the results of two years of status surveys and visitor satisfaction surveys regarding promotion of OUV understanding.

  After deepening common understanding by distributing this manual and holding workshops, visitor management strategies for individual component parts were drawn up by their managers.

- Supporting steady implementation of visitor management strategies for individual component parts

  The Cabinet Secretariat will support managers of individual component parts in carrying out their visitor management by conducting status surveys and visitor satisfaction surveys before the end of the applicable period (five years into the plan period) to confirm the effectiveness of the visitor management strategy, and will provide feedback to the managers based on the results.

3.3 Strategies for individual component parts

Managers of individual component parts have drawn up visitor management strategies for their respective component parts based on the situation of each component part.

(Approach to visitor management strategies of individual component parts)

Strategies for individual component parts serve as a framework for confirming, based on data, progress in realizing the Visitor Management Vision, and also were designed to enable iteration of the PDCA cycle by linking data with the specific visitor management strategies to be carried out. Considering that many specific visitor management measures are already given in the Conservation, Restoration, Presentation and Public Utilization Plans of component parts, the measures and applicable periods of these Visitor Management Strategies were decided in conformance with these existing plans.

Further, to raise the overall management level while also taking into consideration the situation of individual properties, it was decided to classify management indicators into common indicators and individual (property-specific) ones and make use of these.

(Structure of Visitor Management Strategies for individual component parts)

The Visitor Management Strategy for individual component parts provides a list setting out management indicators, target level setting and calculation methods, and specific visitor management measures to be carried out, relative to the Visitor Management Vision for each subject of management, while taking into account trends in visitor numbers.

Table 6: Structure of "Strategies for individual component parts"

I. Visitor number trends
(1) Number of visitors (year-long total): FY 2014-2017
(2) Number of visitors (daily peak): FY 2014-2017
II. Visitor Management Strategy
(1) Subject: (1) Component part (A), (2) Component part (A)/Surrounding environment (B), (3) Visitors (C)
(2) Visitor Management Vision (targets)
(3) Management indicators
(4) Target level setting: Current state, targets, method of measuring/calculating indicators, etc.
(5) Identification and implementation of measures: (a) Current state, (b) Issues, (c) Directionality of response, (d) Methods and measures

Appendix 4

Visitor Management Strategies for Individual Component Part

No.	Component part name
1-1	Hagi Reverbatory Furnace
1-2	Ebisugahana Shipyard
1-3	Ohitayama Tatara Iron Works
1-4	Hagi Castle Town (Ruins of Hagi Castle)
1-5	Shokasonjuku Academy
2-1	Shuseikan (Shoko Shuseikan)
2-2	Terayama Charcoal Kiln remains (I. Trends in daily visitors only)*
2-3	Sekiyoshi Sluice Gate
3-1	Nirayama Reverbatory Furnaces
4-1	Hashino Iron Mining and Smelting Site
5-1	Mietsu Naval Dock
6-1	Kosuge Ship Repair Dock
6-6	Takashima Coal Mine
6-7	Hashima Coal Mine
6-8	Glover House and Office
7-2	Miike Coal Mine (Miyahara Pit)
7-1	Miike Port
7-1	Miike Coal Mine (Manda Pit)
7-2	Misumi West Port
8-1	Imperial Steel Works
8-2	Onga River Pumping Station

2-2 Terayama Charcoal Kiln remains (I. Trends in daily visitors only)*
As the component part was damaged by heavy rains in late June to early July 2019, the visitor management strategy of the individual component part is being reconsidered (will be studied along with future measures for dealing with heavy rain damage).

*Regarding the No. 3 Dry Dock, Giant Cantilever Crane, Former Pattern Shop, and Senshokaku Guest House of Nagasaki Shipyard working properties, it is possible that in the future, it may become necessary to study a visitor management strategy for these elements, while maintaining balance between the need for operation of the individual properties and their conservation.

Hagi Reverbatory Furnace (Component part 1-1)

Visitor Management Strategy for Individual Component Parts (Form C)

I. Trend in daily visitors

Number of visitors (year-long total)	FY 2014	–	FY 2015	154,069	FY 2016	166,316	FY 2017	129,820	FY 2018	100,240
Number of visitors (daily peak)	FY 2014	–	FY 2015	2,498	FY 2016	1,406	FY 2017	1,815	FY 2018	1,574

II. Structure of Visitor Management Strategy for Individual Component Part

Visitor Management Strategy for Individual Component Part

(1) Subject	(2) Visitor management vision (targets)		(3) Management indicators *Select or add suitable indicators	(4) Setting of target levels			(5) Identification and implementation of measures			
			Indicators ☆: Common	Current state	Targets	Method of measuring/calculating indicators *Making use of quantitative, qualitative, and visitor satisfaction surveys; making use of separate surveys, etc.	(a) Current state	(b) Issues	(c) Directionality of response	(d) Methods and measures
Component part (A)	Physical damage No harm to land and materials of component part	1. The facilities and equipment are in place for physically protecting the component part	☆Number of close calls	0 incidents/year	0 incidents/year	Monitoring method: Records kept by manager/guides Target: 0 (zero) incidents	➢ Erection of fencing around reverbatory furnaces ・Fences are erected to prevent visitors from directly touching the reverbatory furnace	➢ Washing away of protective earth layer ・Part of earth layer for protecting underground remains has washed away.	➢ Laying of protective earth layer ・If impact on the remains is detected in monitoring and everyday management by guides, protective earth layers will be laid	➢ Laying of protective earth layer
			☆Whether there are facilities/equipment for separation between visitors and the component part	Yes	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes		➢ Impact of tree roots ・There are concerns that tree roots growing into the protective layers will impact the underground remains	➢ Tree trimming, etc. ・If impact on the remains is detected in monitoring and everyday management by guides, tree trimming or root cutting, etc. will be performed.	➢ Trimming trees and cutting roots, etc.
			・Whether tour routes are set	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes			➢ Setting of tour route ・A tour route will be set between the parking area and reverbatory furnaces, and visitors will be guided to observe it.	➢ Provision of tour routes
			・Whether protective earth layer has been laid	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes				➢ Monitoring and everyday management by guides
			・Whether trees are trimmed	None	Performed as needed	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Performed as needed				
		2. The operational arrangement for this purpose is in place	・Number of persons participating in training sessions	70/year	100/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan	➢ Assignment of manager/guides ・A guide organization in Hagi provides daily management and guide services.	➢ Decline in number of manager/guides ・Most of the manager/guides are retirees in their 60s and 70s, raising concern their numbers may decline.	➢ Develop new manager/guides through regular guide training ・Through regular training including lecture classes on the Sites of Japan's Meiji Industrial Revolution and on the Hagi Reverbatory Furnace, as well as observation of component parts in other areas, it will be aimed to develop new manager/guides of various generations.	➢ Regular guide training ➢ Development of new manager/guides ➢ Training including observation of component parts in other areas
			・Number of training sessions	2 times/year	3 times/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan				
			・Number of observed areas	1 area in 3 years	1 area in 2 years	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan				➢ (Monitoring and everyday management by guides)
			・Number of new guide mentors	0/year	1/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration,				

			・Number of inspection patrols	1 time/day	1 time/day	Presentation and Public Utilization Plan Monitoring method: Records kept by manager/guides Targets: 1 time/day				
Component part (A) / Surrounding environment (B)	-1 Safety and security Visitors' feeling of safety and security is sufficient	1. The facilities and equipment are in place for ensuring the safety and security of visitors	☆Whether there are facilities/equipment for separation between visitors and the component part	Yes	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Provision of new trail not using stairs ・A new trail using slopes was created for visitors who have difficulty climbing stairs. ➢ Erection of fencing around reverbatory furnaces ・Safety of visitors is assured by keeping them a certain distance from the reverbatory furnaces, as a precaution in case of deteriorated materials dropping, etc.	➢ Pedestrian safety measures inside parking area ・There are no clear pedestrian routes inside the parking area. ➢ Tour route not set ・There is no clear tour route between the parking area and reverbatory furnaces. ➢ Quake resistance measures not instituted ・It is difficult to implement structural surveys and quake resistance diagnosis by appropriate methods. It is also difficult to come up with practical reinforcement methods that will not harm the appearance of the reverbatory furnaces.	➢ Pedestrian safety measures inside parking area ・Set pedestrian routes in the parking area. ➢ Setting of tour route ・A tour route will be set between the parking area and reverbatory furnaces, and visitors will be guided to observe it. ➢ Safety measures in case of earthquakes, etc. ・Since structural reinforcement of the reverbatory furnaces would be difficult, visitors will be kept at a distance from the reverbatory furnaces as a precaution in case of toppling, etc., while taking consideration for the impact on viewing.	➢ Will set pedestrian routes in the parking area ➢ Provision of tour routes ➢ Maintaining separation from the body of the reverberatory furnace
			・Whether pedestrian routes are provided	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes				
			・Whether tour routes are set	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes				
			・Whether route guidance signs, etc. are provided	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes				
		2. The operational arrangement for this purpose is in place	・Whether a management operational arrangement is in place that includes the parking area	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Deployment of security staff ・Security staff are deployed in the parking area during Golden Week and other busy periods. ➢ Assignment of manager/guides ・A guide organization in Hagi provides daily management and guide services.	➢ Supervision inside component part and in parking area ・Supervision cannot be performed by one person alone, since there is no vantage point covering both the component part and the parking area. ➢ Raising skills of manager/guides ・Disaster drills and the like are not being conducted for ensuring safety in the event of an earthquake or other disaster.	➢ Supervision inside component part and in parking area ・In the future, a management operational arrangement will be created that can supervise the parking area in addition to the area inside the component part. ➢ Holding of disaster drills for manager/guides ・Disaster drills and the like will be conducted for ensuring safety of visitors in the event of an earthquake or other disaster.	➢ Create an operational arrangement that includes supervision of the parking area ➢ Disaster drills, etc. will be conducted for manager/guides
			・Whether disaster drills are conducted	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes				
	-2 Promotion of understanding Visitors' feeling of satisfaction is sufficient	1. The facilities and equipment are in place for promoting and deepening understanding by visitors	・Whether the contents of explanatory signs are updated	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Provision of guidance facility ・A World Heritage Site Visitor Center was opened March 4, 2017 as a central facility for guidance. ➢ World Heritage Plaque installation ・A World Heritage Plaque was installed at the entrance.	➢ Lack of detail on explanatory signs ・While explanatory signs have been installed, explanations are not given of such matters as the Outstanding Universal Value of the Sites of Japan's Meiji Industrial Revolution and the role of the Hagi Reverbatory Furnace. ➢ Linking with Ebisugahana Shipyard ・There are no descriptions of the neighboring Ebisugahana Shipyard or introduction of the route	➢ Installation of explanatory signs ・Explanatory signs will be installed providing information on the Outstanding Universal Value of the Sites of Japan's Meiji Industrial Revolution, the roles of the 23 component parts, the changes that the Hagi Reverbatory Furnace went through and the course of its development, and the industrial systems, etc. ➢ Linking with Ebisugahana Shipyard ・Views of the Ebisugahana Shipyard from the Hagi Reverbatory Furnace will be secured, and	➢ Updating contents of explanatory signs ➢ Securing views of the Ebisugahana Shipyard ➢ Installation of explanatory signs about the Ebisugahana
			・Whether obstructing trees are trimmed	None	Performed as needed	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Performed as needed				
			・Whether related explanatory signs are provided	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes				

			・Multi-language pamphlet availability (Jpn./Eng./Chn./Kor./Taiwan)	Some	All	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: All	➢ Pamphlet preparation ・Pamphlets are being prepared that introduce the Hagi Reverbatory Furnace, component parts of the Hagi Area, and the Sites of Japan's Meiji Industrial Revolution.	to it. ➢ ・Multi-language pamphlet availability ・Some of existing pamphlets are in Japanese and English only, as multi-language support is inadequate.	explanatory signs will be installed about the Ebisugahana Shipyard. ➢ ・Provision of multi-language pamphlets ・Multi-language pamphlets will be prepared to meet the needs of visitors from overseas.	Shipyard ➢ Multi-language pamphlet availability (Jpn./Eng./Chn./Kor./Taiwan)
		2. The operational arrangement for this purpose is in place	・Number of persons participating in training sessions ・Number of training sessions ・Number of observed areas ・Number of new guide mentors	70/year 2 times/year 1 area in 3 years 0/year	100/year 3 times/year 1 area in 2 years 1/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan	➢ Assignment of manager/guides (repeated from above) ・A guide organization in Hagi provides daily management and guide services.	➢ Decline in number of manager/guides (repeated from above) ・Most of the manager/guides are retirees in their 60s and 70s, raising concern their numbers may decline. ➢ Raising skills of guides ・Visitors have come to desire explanations of the roles of each component part in the Sites of Japan's Meiji Industrial Revolution and the connections to component parts in other areas. Following World Heritage inscription, training sessions were held on the Sites of Japan's Meiji Industrial Revolution; but the guides themselves lack sufficient knowledge and have not attained the level needed for giving detailed guidance to visitors.	➢ Holding of regular guide training ・By holding regular training sessions consisting of lecture classes on the Sites of Japan's Meiji Industrial Revolution and on the Hagi Reverbatory Furnace, as well as observation of component parts in other areas, it will be aimed to develop new guides and raise their guide skills by having them acquire sufficient knowledge.	➢ Regular guide training ➢ Training including observation of component parts in other areas ➢ Development of new manager/guides
	-3 Hospitality The comfort of visitors is sufficient	1. The facilities and equipment are in place for promoting enjoyment by visitors	・Whether applications are updated ・Introduction to applications in pamphlets	None One type of pamphlet	Yes Two or more types of pamphlets	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan	➢ Application development ・Applications are being developed that introduce the component parts of the Hagi Area and the Sites of Japan's Meiji Industrial Revolution.	➢ Application publicity ・The applications are not being publicized sufficiently.	➢ Promoting wider application use ・To promote wider use of the applications, they will be updated regularly and actively publicized.	➢ Application updating ➢ Greater effort at application publicity
		2. The operational arrangement for this purpose is in place	・Number of persons participating in training sessions ・Number of training sessions ・Number of times giving explanations using tablet	70/year 2 times/year 50 times/year	100/year 3 times/year 200 times/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan	➢ Application use ・At the Hagi Reverbatory Furnace, manager/guides issue tablets for use of the applications introducing the component parts of the Hagi Area and the Sites of Japan's Meiji Industrial Revolution.	➢ Application publicity ・The availability of tablets for application use has not been publicized sufficiently. There are also cases where the guides, who tend to be older, are unable to explain use of the tablet adequately to visitors.	➢ Promoting wider application use ・Application use will be promoted actively, such as by making sure the guides themselves can use them well enough to be able to explain their use to visitors while using the tablet.	➢ Provision of training that includes how to use the applications ➢ Giving explanations using tablet

Visitors (C)	A state in which visitors feel safety, security, comfort, and a sense of satisfaction, spend a sufficient	☆Satisfaction	Current State 15.0%	Targets 33.8%	Monitoring method: Similar satisfaction surveys as conducted in the past year Targets: Attain average value

	amount of time at the component part to understand its contribution to the Outstanding Universal Value, and are motivated to visit again	☆Time spent		56.7%	10.5%	Targets: Attain average value
		☆Understanding	Q14	16.7%	12.6%	Targets: Attain average value
			Q15	21.7%	15.2%	Targets: Attain average value
		☆Sparking of interest		13.3%	24.4%	Targets: Attain average value
		☆Intention to visit again	Q18	3.3%	13.2%	Targets: Attain average value
			Q22	11.7%	20.8%	Targets: Attain average value
		☆Percentage of problems indicated	Crowding	1.7%	0.0%	Targets: Reduce percentage of problems indicated to 0
			Damage	0.0%	0.0%	Targets: Reduce percentage of problems indicated to 0
			Lack of entertainment value	13.3%	5.2%	Targets: Attain average value
			Toilet provision, etc.	6.7%	0.0%	Targets: Reduce percentage of problems indicated to 0

Relationship between Visitor Management Strategy and the Subjects and Targets of Visitor Management

Visitor Management Strategy for Individual Component Parts (Form C)

Ebisugahana Shipyard (Component part 1-2)

I. Trend in daily visitors

Number of visitors (year-long total)	FY 2014	–	FY 2015	56,204	FY 2016	55,639	FY 2017	37,658	FY 2018	26,258
Number of visitors (daily peak)	FY 2014	–	FY 2015	947	FY 2016	654	FY 2017	377	FY 2018	349

II. Structure of Visitor Management Strategy for Individual Component Part

Visitor Management Strategy for Individual Component Part

(1) Subject	(2) Visitor management vision (targets)		(3) Management indicators *Select or add suitable indicators	(4) Setting of target levels			(5) Identification and implementation of measures			
			Indicators ☆: Common	Current state	Targets	Method of measuring/calculating indicators *Making use of quantitative, qualitative, and visitor satisfaction surveys; making use of separate surveys, etc.	(a) Current state	(b) Issues	(c) Directionality of response	(d) Methods and measures
Component part (A)	Physical damage No harm to land and materials of component part	1. The facilities and equipment are in place for physically protecting the component part	☆Number of close calls	4 incidents/year	0 incidents/year	Monitoring method: Records kept by manager/guides Target: 0 (zero) incidents	➢ Existence of areas with steep inclines and risk of ground collapse ・There are steep inclines on the site and in the forests forming a backdrop to the site, where there is a risk of accident from falling rocks. Signposts are installed to urge caution. ➢ Existence of underground archaeological remains ・The site contains remains that are under the ground. The underground remains are shown to the public only at the time of excavation surveys, and under management by experts in buried cultural property.	➢ Concerns of damage from falling rocks, etc. ・There is concern that falling rocks or inflow of earth due to landsides in the forests behind the site could damage the component part or harm visitors. ➢ Protection of underground archaeological remains ・Ongoing measures are needed for protecting the remains confirmed in excavation surveys and the remains and artifacts in the area not yet surveyed.	➢ Falling rock preventive measures ・The minimum necessary structures will be installed to prevent falling rock and inflow from landslides in the forests behind the site, for protection of the component part and for ensuring safety of visitors. ➢ Maintaining the underground archaeological remains in stable state ・Following the excavation surveys, the remains will promptly be reburied and protected by layers of earth. When placing markers on the surface to indicate the accurate location and scale of the underground archaeological remains, care will be taken to minimize excavation, including in the area not yet surveyed.	➢ Work to prevent falling objects ➢ Work to protect underground archaeological remains
			☆Whether there are facilities/equipment for separation between visitors and the component part	Yes	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes				
			・Whether work to prevent falling objects has been performed	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes				
			・Whether work to protect underground archaeological remains has been performed	Some	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes				
		2. The operational arrangement for this purpose is in place	・Number of persons participating in training sessions	70/year	100/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan	➢ Assignment of manager/guides ・Daily site administration and guide duties are performed by a guide group in Hagi.	➢ Decline in number of manager/guides ・Most of the manager/guides are retirees in their 60s and 70s, raising concern their numbers may decline.	➢ Develop new manager/guides through regular guide training ・Through regular training including lecture classes on the Sites of Japan's Meiji Industrial Revolution and the remains of the Ebisugahana Shipyard, as well as observation of component parts in other areas, it will be aimed to develop new manager/guides of various generations.	Regular guide training ➢ Training including observation of component parts in other areas ➢ Development of new manager/guides ➢ (Monitoring and everyday management by guides)
			・Number of training sessions	2 times/year	3 times/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan				
			・Number of observed areas	1 area in 3 years	1 area in 2 years	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan				
			・Number of new guide mentors	0/year	1/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan				
			・Number of inspection patrols	1 time/day	1 time/day	Monitoring method: Records kept by manager/guides Targets: 1 time/day				

Component part (A) / Surrounding environment (B)	-1 Safety and security Visitors' feeling of safety and security is sufficient	1. The facilities and equipment are in place for ensuring the safety and security of visitors	☆Whether there are facilities/equipment for separation between visitors and the component part	Yes	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Parking lot ・Parking areas are not provided in or around the site. Visitors themselves find places to park in areas that do not impede passage or touring, and tour the site.	➢ Lack of parking ・Parking areas will need to be provided in suitable places, as promptly as possible, in consultation with the owners of the land in the component part.	➢ Provision of parking areas ・If parking areas cannot readily be provided on the site, will consider provision in the nearby vicinity of the component part.	➢ Provision of parking areas for visitors
			・Whether parking areas are provided	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Tour routes ・Provisional tour routes are currently provided for safe viewing of the site while excavation surveys are being conducted.	➢ Provisional tour route establishment ・The current provisional tour routes, giving priority to the location of excavation surveys and the safety of visitors, are not adequate for increasing understanding of the industrial system.	➢ Tour route establishment ・When the excavation surveys are completed, tour routes and an observation deck will be provided aimed at promoting understanding and improving ease of movement.	➢ Provision of tour routes and observation deck
			・Whether tour routes have been established	Temporary facilities	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes				
			・Whether toilets are provided	Temporary facilities	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Toilet provision ・Simple temporary toilets are provided on the site for the convenience of visitors.	➢ Temporary toilet provision ・Permanent toilets that visitors can use with assurance will need to be provided.	➢ Toilet provision ・Toilets of the optimal scale, based on trends in visitor numbers, will be installed in suitable places.	➢ Toilet provision
			・Whether work to prevent falling objects has been performed	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Existence of areas with steep inclines and risk of ground collapse ・There are steep inclines on the site and in the forests forming a backdrop to the site, where there is a risk of accident from falling rocks. Signposts are installed to urge caution.	➢ Concerns of damage from falling rocks, etc. ・There is concern that falling rocks or inflow of earth due to landsides in the forests behind the site could damage the component part or harm visitors.	➢ Falling rock preventive measures ・Installation of the minimum necessary structures to prevent falling rock and inflow from landslides in the forests behind the site will be considered, for protection of the component part and for ensuring safety of visitors.	➢ Work to prevent falling rocks
			・Whether work to prevent visitors from falling has been performed	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Top of stone seawall ・Fencing to prevent falling from the seawall has not yet been installed. There are also many gaps in the stone joints.	➢ Ensuring safety of the stone seawall ・There are risks of visitors falling from the top of the seawall or getting their feet caught in gaps in the stones.	➢ Stone seawall safety measures ・Assuming agreement is reached with the related parties, installation of a guard wall will be considered to the extent it does not impact the value of the component part. If such installation is not possible, managers will warn visitors walking on the seawall to be careful, and signs will be posted urging caution.	➢ Installation of guard wall to keep visitors from falling, or having managers urge caution
		2. The operational arrangement for this purpose is in place	・Whether a management operational arrangement is in place for urging caution	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Assignment of manager/guides ・Daily site administration and guide duties are performed by a guide group in Hagi.	➢ Decline in number of manager/guides ・Most of the manager/guides are retirees in their 60s and 70s, raising concern their numbers may decline. ➢ Raising skills of manager/guides ・Disaster drills and the like are not being conducted for ensuring safety in the event of an earthquake, tsunami or other disaster.	➢ Holding of disaster drills for manager/guides ・Disaster drills and the like will be conducted for ensuring safety of visitors in the event of an earthquake, tsunami or other disaster.	➢ Disaster drills, etc. will be conducted for manager/guides
			・Whether disaster drills are conducted	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes				
	-2 Promotion of understanding Visitors' feeling of satisfaction is sufficient	1. The facilities and equipment are in place for promoting and deepening understanding by visitors	・Whether explanatory signs are provided	Yes	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Explanatory panel This was put up in FY 2014, prior to inscription. In Japanese and English, it outlines the history of the remains of the Ebisugahana Shipyard, describes the remains, gives a time line, and indicates the status of excavation surveys. ➢ World Heritage Plaque installation ・A World Heritage Plaque was installed inside the component part.	➢ Lack of detail on explanatory signs ・Although explanatory signs were installed before inscription, they do not include explanations of the Outstanding Universal Value of the Sites of Japan's Meiji Industrial Revolution or the role of the component parts. Permanent installation of new explanatory signs is necessary.	➢ Provision of permanent explanatory signs ・Various explanatory signs will be installed providing information on positioning of the site in the 23 component parts of the Sites of Japan's Meiji Industrial Revolution, positioning in Area 1 Hagi, and the industrial systems, etc. specific to the Ebisugahana Shipyard, to promote visitor understanding.	➢ Installation of explanatory signs
			・Whether multi-language pamphlets are available (Jpn./Eng./Chn./Kor./Taiwan)	Some	All	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: All				
			・Whether markers are provided on the surface of the remains	Temporary facilities	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan	➢ Pamphlet preparation ・Pamphlets are being prepared that introduce the remains of the Ebisugahana Shipyard,	➢ Multi-language pamphlet availability ・Some of existing pamphlets are in Japanese and English	➢ Provision of multi-language pamphlets ・Multi-language pamphlets will be prepared to meet the needs	➢ Multi-language pamphlet availability (Jpn./Eng./Chn./Kor./Taiwan)

			・Whether tour routes and observation deck are provided	None	Yes	Targets: Yes Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan	component parts in the Hagi Area, and the overall Sites of Japan's Meiji Industrial Revolution. ➢ Markers on the surface of the remains ・For the shipyard remains, drawings and simple markers are provided on the surface of the remains indicating the position and scale of each of the remains.	only, as multi-language support is inadequate. ➢ Simple markers on the surface of the remains ・Being simple surface markers using plastic chain, their visual appeal is weak and they do not adequately help visitor understanding.	of visitors from overseas. ➢ Providing better surface markers on the remains ・After the excavation surveys are completed, proper markers will be providing on the surface of the remains aimed at promoting visitor understanding.	➢ Markers on the surface of the remains
			・Whether a guidance facility is provided	None	Yes	Targets: Yes Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Provision of guidance facility ・No guidance facility has been provided on the site. As a central facility for guidance, however, a World Heritage Site Visitor Center was opened March 4, 2017.	➢ Guidance facility in component part ・It would be difficult to provide a guidance facility on the site due to the lack of sufficient space.	➢ Tour route provision ・Along with provision of surface markers, tour routes and an observation deck will be provided aimed at promoting understanding and improving ease of movement. ➢ Provision of guidance facility in the nearby area ・After consultation with related parties, a guidance facility will be provided in the nearby area.	➢ Provision of tour routes and observation deck ➢ Provision of guidance facility
		2. The operational arrangement for this purpose is in place	・Number of persons participating in training sessions	70/year	100/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan	➢ Assignment of manager/guides ・A guide organization in Hagi provides daily management and guide services.	➢ Decline in number of manager/guides ・Nearly all the manager/guides are retired persons in their 60s and 70s, and there are concerns that their number will decline in coming years. ➢ Raising skills of guides ・Visitors desire explanations of the roles of each component part in the Sites of Japan's Meiji Industrial Revolution and the connections to component parts in other areas. Training sessions have been held aimed at raising the skills of guides, but they have not attained the level needed for giving guidance to visitors informed by adequate knowledge.	➢ Holding of regular guide training ・By holding regular training sessions consisting of lecture classes on the Sites of Japan's Meiji Industrial Revolution and on the remains of the Ebisugahana Shipyard, as well as observation of component parts in other areas, it will be aimed to develop new guides and raise their guide skills by having them acquire sufficient knowledge.	➢ Regular guide training ➢ Training including observation of component parts in other areas ➢ Development of new manager/guides
			・Number of training sessions	2 times/year	3 times/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan				
			・Number of observed areas	1 area in 3 years	1 area in 2 years	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan				
			・Number of new guide mentors	0/year	1/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan				
	-3 Hospitality The comfort of visitors is sufficient	1. The facilities and equipment are in place for promoting enjoyment by visitors	・Whether applications are updated	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Application development ・Applications are being developed that introduce the component parts of the Hagi Area and the Sites of Japan's Meiji Industrial Revolution.	➢ Application publicity ・The applications are not being publicized sufficiently.	➢ Promoting wider application use ・To promote wider use of the applications, they will be updated regularly and actively publicized.	➢ Application updating ➢ Introduction to applications in pamphlets, etc.
			・Introduction to applications in pamphlets	One type of pamphlet	Two or more types of pamphlets	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan				
		2. The operational arrangement for this purpose is in place	・Number of persons participating in training sessions	70/year	100/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan	➢ Application use ・At the remains of the Ebisugahana Shipyard, manager/guides lend tablets for use of the applications introducing the component parts of the Hagi Area and the Sites of Japan's Meiji Industrial Revolution.	➢ Application publicity ・The availability of tablets for application use has not been publicized sufficiently. There are also cases where the guides, who tend to be older, are unable to explain use of the tablet adequately to visitors.	➢ Promoting wider application use ・Application use will be promoted actively, such as by making sure the guides themselves can use them well enough to be able to explain their use to visitors while using the tablet.	➢ Provision of training that includes how to use the applications ➢ Giving explanations using tablet
			・Number of training sessions	2 times/year	3 times/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration,				

			・Number of times giving explanations using tablet	50 times/year	100 times/year	Presentation and Public Utilization Plan Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan			
Visitors (C)	A state in which visitors feel safety, security, comfort, and a sense of satisfaction, spend a sufficient amount of time at the component part to understand its contribution to the Outstanding Universal Value, and are motivated to visit again			Current State	Targets	Monitoring method: Similar satisfaction surveys as conducted in the past year			
			☆Satisfaction	30.8%	33.8%	Targets: Attain average value			
			☆Time spent	46.2%	10.5%	Targets: Attain average value			
			☆Understanding Q14	15.4%	12.6%	Targets: Attain average value			
			Q15	15.4%	0.0%	Targets: Attain minimum value per component part			
			☆Sparking of interest	38.5%	39.8%	Targets: Attain maximum value per component part			
			☆Intention to visit again						
			Q18	7.7%	13.2%	Targets: Attain average value			
			Q22	30.8%	37.5%	Targets: Attain maximum value per component part			
			☆Percentage of problems indicated Crowding	7.7%	0.0%	Targets: Reduce percentage of problems indicated to 0			
			Damage	15.4%	0.0%	Targets: Reduce percentage of problems indicated to 0			
			Lack of entertainment value	15.4%	5.2%	Targets: Attain average value			
			Food facilities	0.0%	0.0%	Targets: Reduce percentage of problems indicated to 0			
			Toilet provision, etc.	0.0%	0.0%	Targets: Reduce percentage of problems indicated to 0			

Relationship between Visitor Management Strategy and the Subjects and Targets of Visitor Management

Visitor Management Strategy for Individual Component Parts (Form C)

Ohitayama Tatara Iron Works (Component part 1-3)

I. Trend in daily visitors

Number of visitors (year-long total)	FY 2014	–	FY 2015	14,869	FY 2016	10,028	FY 2017	6,447	FY 2018	4,584
Number of visitors (daily peak)	FY 2014	–	FY 2015	359	FY 2016	303	FY 2017	154	FY 2018	138

II. Structure of Visitor Management Strategy for Individual Component Part

Visitor Management Strategy for Individual Component Part

(1) Subject	(2) Visitor management vision (targets)		(3) Management indicators *Select or add suitable indicators	(4) Setting of target levels			(5) Identification and implementation of measures			
			Indicators ☆: Common	Current state	Targets	Method of measuring/calculating indicators *Making use of quantitative, qualitative, and visitor satisfaction surveys; making use of separate surveys, etc.	(a) Current state	(b) Issues	(c) Directionality of response	(d) Methods and measures
Component part (A)	Physical damage No harm to land and materials of component part	1. The facilities and equipment are in place for physically protecting the component part	☆Number of close calls	0 incidents/year	0 incidents/year	Monitoring method: Records kept by manager/guides Target: 0 (zero) incidents	➢ Laying of earth layer to protect underground archaeological remains ・The underground remains are protected by an earth layer of approximately 50 cm.	➢ Impact on underground remains from protective earth layer runoff ・There are concerns that runoff from the protective earth layer due to rainfall, etc. may impact the underground remains. ➢ Ultraviolet rays and tourism impact on exposed remains ・In addition to natural deterioration of exposed remains from ultraviolet rays, etc., the surface of exposed stones is deteriorating from being walked on, and stone structure looseness is evident.	➢ Maintaining of earth cover soil on surface of remains ・The earth cover soil on top of the exposed remains will be fortified and hardened. ➢ Restoration of exposed remains ・After a test run, the substrate will be strengthened using preservation science methods. ➢ Tour route provision ・Tour routes will be provided to reduce the impact on the exposed remains from being walked on by visitors, and to promote understanding of the smelting processes.	➢ Fortification of protective earth layer ➢ Restoration of exposed remains ➢ Tour route establishment
			☆Whether there are facilities/equipment for separation between visitors and the component part	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes				
			・Whether protective earth layer has been laid	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes				
			・Whether exposed remains have been restored	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes				
			・Whether tour route provision is carried out	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes				
		2. The operational arrangement for this purpose is in place	・Number of persons participating in training sessions	70/year	100/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan	➢ Assignment of manager/guides ・Guide organization in Hagi provides daily management and guide services.	➢ Decline in number of manager/guides ・Most of the manager/guides are retirees in their 60s and 70s, raising concern their numbers may decline.	➢ Develop new manager/guides through regular guide training ・Through regular training including lecture classes on the Sites of Japan's Meiji Industrial Revolution and the Ohitayama Tatara Iron Works, as well as observation of component parts in other areas, it will be aimed to develop new manager/guides of various generations.	➢ Regular guide training ➢ Training including observation of component parts in other areas ➢ Development of new manager/guides ➢ (Monitoring and everyday management by guides)
			・Number of training sessions	2 times/year	3 times/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan				
			・Number of observed areas	1 area in 3 years	1 area in 2 years	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan				
			・Number of new guide mentors	0/year	1/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan				
			・Number of inspection patrols	1 time/day	1 time/day	Monitoring method: Records kept by manager/guides Targets: 1 time/day				

Component part (A) / Surrounding environment (B)	-1 Safety and security Visitors' feeling of safety and security is sufficient	1. The facilities and equipment are in place for ensuring the safety and security of visitors	☆Whether there are facilities/equipment for separation between visitors and the component part	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Installation of mobile phone base stations ・Base stations of Japan's major mobile phone operators have been installed.	➢ Narrow access road ・Some places along the access road to the component part are narrow, making it difficult for vehicles to pass each other.	➢ Make access road safe ・Measures will be considered for improving the narrow places on the access road to the component part.	
			・Whether tour route provision is carried out	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Tour route establishment ・As the pathways are built by taking advantage of the natural terrain, the surface is covered with gravel and there are notable drop-offs and level differences.	➢ Tour route structure ・The surface structure of the pathways, and the drop-offs and level differences, hinder passage by wheelchair.	➢ Tour route provision ・Tour routes will be provided that adopt Universal Design.	➢ Tour route establishment ➢ Monitoring and everyday management by guides
		2. The operational arrangement for this purpose is in place	・Number of new guide mentors	0/year	1/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan	➢ Assignment of multiple managers ・Two managers are on duty at all times.	➢ Decline in number of managers ・Nearly all the managers are retired persons in their 60s and 70s, and there are concerns that their number will decline in coming years.	➢ Recruiting and training of managers ・Active efforts will made to recruit and train new managers, in cooperation with local organizations.	➢ Development of new manager/guides
	-2 Promotion of understanding Visitors' feeling of satisfaction is sufficient	1. The facilities and equipment are in place for promoting and deepening understanding by visitors	・Whether tour route provision is carried out	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Provision of guidance facility ・A World Heritage Site Visitor Center was opened March 4, 2017 as a central facility for guidance. In addition, a rest facility with exhibits was opened March 25, 2017 on land next to the Ohitayama Tatara Iron Works.	➢ Indicating clear tour routes ・There is no tour route that traces the smelting processes.	➢ Tour route provision ・Tour routes will be provided to reduce the impact on the exposed remains from being walked on by visitors, and to promote understanding of the smelting processes by setting routes that trace those processes.	➢ Tour route establishment ➢ Enhancement of explanations ➢ Model installation in rest area ➢ Installing and improving guidance and explanatory signs
			・Whether models are made	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes				
			・Whether AR (artificial reality) functions are enhanced	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Pamphlet preparation ・Pamphlets are being prepared that introduce Ohitayama Tatara Iron Works, the component parts in the Hagi Area and the overall Sites of Japan's Meiji Industrial Revolution.	➢ Multi-language pamphlet availability ・Some of existing pamphlets are in Japanese and English only, as multi-language support is inadequate.	➢ Provision of multi-language pamphlets ・Multi-language pamphlets will be prepared to meet the needs of visitors from overseas.	➢ Multi-language pamphlet availability (Jpn./Eng./Chn./Kor./Taiwan)
			・Whether guidance and explanatory signs are provided and improved	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes				
			・Multi-language pamphlet availability (Jpn./Eng./Chn./Kor./Taiwan)	Some	All	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: All	➢ World Heritage Plaque installation ・A World Heritage Plaque was installed at the entrance.			
		2. The operational arrangement for this purpose is in place	・Number of persons participating in training sessions	70/year	100/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan	➢ Assignment of manager/guides ・A guide organization in Hagi provides daily management and guide services.	➢ Decline in number of manager/guides (repeated from above) ・Most of the manager/guides are retirees in their 60s and 70s, raising concern their numbers may decline. ➢ Raising skills of guides ・Visitors have come to desire explanations of the roles of each component part in the Sites of Japan's Meiji Industrial Revolution and the connections to component parts in other areas. Following World Heritage inscription, training sessions were held on the Sites of Japan's Meiji Industrial Revolution; but the guides themselves lack sufficient knowledge and have not attained the level needed for giving detailed guidance to visitors.	➢ Holding of regular guide training ・By holding regular training sessions consisting of lecture classes on the Sites of Japan's Meiji Industrial Revolution and on the Ohitayama Tatara Iron Works, as well as observation of component parts in other areas, it will be aimed to develop new guides and raise their guide skills by having them acquire sufficient knowledge.	➢ Regular guide training ➢ Training including observation of component parts in other areas ➢ Development of new manager/guides
			・Number of training sessions	2 times/year	3 times/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan				
			・Number of observed areas	1 area in 3 years	1 area in 2 years	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan				
			・Number of new guide mentors	0/year	1/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan				

	-3 Hospitality The comfort of visitors is sufficient	1. The facilities and equipment are in place for promoting enjoyment by visitors	・Whether applications are updated	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Application development ・Applications are being developed that introduce the component parts of the Hagi Area and the Sites of Japan's Meiji Industrial Revolution.	➢ Application publicity ・The applications are not being publicized sufficiently.	➢ Promoting wider application use ・To promote wider use of the applications, they will be updated regularly and actively publicized.	➢ Application updating ➢ Introduction to applications in pamphlets, etc.
			・Introduction to applications in pamphlets	One type of pamphlet	Two or more types of pamphlets	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan				
		2. The operational arrangement for this purpose is in place	・Number of persons participating in training sessions	70/year	100/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan	➢ Application use ・At the Ohitayama Tatara Iron Works, manager/guides lend tablets for use of the applications introducing the component parts of the Hagi Area and the Sites of Japan's Meiji Industrial Revolution.	➢ Application publicity ・The availability of tablets for application use has not been publicized sufficiently. There are also cases where the guides, who tend to be older, are unable to explain use of the tablet adequately to visitors.	➢ Promoting wider application use ・Application use will be promoted actively, such as by making sure the guides themselves can use them well enough to be able to explain their use to visitors while using the tablet.	➢ Provision of training that includes how to use the applications ➢ Giving explanations using tablet
			・Number of training sessions	2 times/year	3 times/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan				
			・Number of times giving explanations using tablet	100 times/year	200 times/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan				

			Current State	Targets	
Visitors (C)	A state in which visitors feel safety, security, comfort, and a sense of satisfaction, spend a sufficient amount of time at the component part to understand its contribution to the Outstanding Universal Value, and are motivated to visit again				Monitoring method: Similar satisfaction surveys as conducted in the past year
		☆Satisfaction	25.0%	33.8%	Targets: Attain average value
		☆Time spent	6.3%	6.3%	Targets: Status quo maintained
		☆Understanding Q14	0.0%	0.0%	Targets: Attain maximum value per component part
		Q15	6.3%	0.0%	Targets: Attain maximum value per component part
		☆Sparking of interest	25.0%	39.8%	Targets: Attain maximum value per component part
		☆Intention to visit again Q18	12.5%	13.2%	Targets: Attain average value
		Q22	18.8%	20.8%	Targets: Attain average value
		☆Percentage of problems indicated Crowding	0.0%	0.0%	Targets: Reduce percentage of problems indicated to 0
		Damage	0.0%	0.0%	Targets: Reduce percentage of problems indicated to 0
		Lack of entertainment value	6.3%	5.2%	Targets: Attain average value
		Toilet provision, etc.	0.0%	0.0%	Targets: Reduce percentage of problems indicated to 0

Relationship between Visitor Management Strategy and the Subjects and Targets of Visitor Management

Visitor Management Strategy for Individual Component Parts (Form C)

Hagi Castle Town (Component part 1-4)

I. Trend in daily visitors

Number of visitors (year-long total)	Castle ruins	FY 2014	44,963	FY 2015	81,920	FY 2016	57,693	FY 2017	60,930	FY 2018	65,595
	District of the Upper Class Samurai		6,230		8,481		6,150		5,663		5,437
	District of the Merchant Class		41,866		61,579		42,935		38,837		43,377
Number of visitors (daily peak)	Castle ruins	FY 2014	724	FY 2015	2,319	FY 2016	1,391	FY 2017	1,072	FY 2018	1,478
	District of the Upper Class Samurai		455		260		165		169		158
	District of the Merchant Class		622		1,045		838		725		840

II. Structure of Visitor Management Strategy for Individual Component Part

Visitor Management Strategy for Individual Component Part

(1) Subject	(2) Visitor management vision (targets)		(3) Management indicators *Select or add suitable indicators	(4) Setting of target levels			(5) Identification and implementation of measures			
			Indicators ☆: Common	Current state	Targets	Method of measuring/calculating indicators *Making use of quantitative, qualitative, and visitor satisfaction surveys; making use of separate surveys, etc.	(a) Current state	(b) Issues	(c) Directionality of response	(d) Methods and measures
Component part (A)	Physical damage No harm to land and materials of component part	1. The facilities and equipment are in place for physically protecting the component part	☆Number of close calls	3 incidents/year	0 incidents/year	Monitoring method: Records kept by manager/guides Target: 0 (zero) incidents	➢ Installation of fire prevention equipment, etc. at main buildings and other structures ・Fire prevention equipment and security systems are installed in the main buildings and other structures of Hagi Castle Town.	➢ Deterioration of fire prevention equipment ・The installed fire prevention equipment, etc. is deteriorating year by year.	➢ Planned renewal of fire prevention equipment ・Regular inspections of fire prevention equipment, etc. will be conducted, renewing as needed before it becomes no longer functional due to deterioration.	➢ Renewal of fire prevention equipment ➢ Monitoring and everyday management by guides
			☆Whether there are facilities/equipment for separation between visitors and the component part	Yes	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes				
			・Renewal of fire prevention equipment	Yes	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes				
		2. The operational arrangement for this purpose is in place	・Number of persons participating in training sessions	70/year	100/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan	➢ Deployment of manager/guides at main structures, etc. ・Daily manager and guide duties at main structures in Hagi Castle Town are performed by a guide group in the city.	➢ Decline in number of manager/guides ・Most of the manager/guides are retirees in their 60s and 70s, raising concern their numbers may decline.	➢ Educating new guides by holding regular training sessions ・Periodically, training sessions will be offered including lecture classes on the Sites of Japan's Meiji Industrial Revolution and Hagi Castle Town, and observation of component parts in other areas, aimed at developing new manager/guides of diverse generations.	➢ Regular guide training ➢ Training including observation of component parts in other areas ➢ Development of new manager/guides
			・Number of training sessions	2 times/year	3 times/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan				
			・Number of observed areas	1 area in 3 years	1 area in 2 years	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan				
			・Number of new guide mentors	0/year	1/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan				
Component part (A) / Surrounding environment (B)	-1 Safety and security Visitors' feeling of safety and security is sufficient	1. The facilities and equipment are in place for ensuring the safety and security of visitors	☆Whether there are facilities/equipment for separation between visitors and the component part	Yes	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Tour route establishment ・The trails in Mt. Shizukiyama behind the castle ruins have places with stone steps remaining from the feudal era, but other places have been newly carved out after repeated landslides, etc.	➢ Lack of tour route safety ・Fallen trees and inflow of mud due to heavy rain and wind storms are common occurrences on the mountain trails of Mt. Shizukiyama behind the castle ruins.	➢ Tour route provision ・Over the long term, work will be performed to achieve safe and secure use of the mountain trails of Mt. Shizukiyama behind the castle ruins. In so doing, care will be taken not to harm the value of Mt. Shizukiyama as a	➢ Improvement of tour routes (mountain trails)
			・Whether tour routes	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and				

			(mountain trails) are improved			Public Utilization Plan Targets: Yes			nationally designated natural treasure.	
		2. The operational arrangement for this purpose is in place	・Whether surveys are made of dangerous places	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Favored means of visitor movement ・The main means of getting around Hagi Castle Town are by rental bicycles or on foot.	➢ Safety of visitor movement ・Most of the roads in Hagi Castle Town have the same widths as in early-modern times, so that the safety of visitors going around by bicycle or on foot can be threatened by vehicle traffic.	➢ Ensuring safety of visitor movement ・For the safety of visitors who go around Hagi Castle Town by bicycle or on foot, long-term studies will be carried out including surveys on dangerous places and determining the feasibility of vehicle traffic restrictions, etc.	➢ Surveys of dangerous places ➢ Study of traffic restrictions, etc.
			・Whether traffic restrictions are under consideration	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes				
	2 Promotion of understanding Visitors' feeling of satisfaction is sufficient	1. The facilities and equipment are in place for promoting and deepening understanding by visitors	・Whether protection of the remains in the castle keep is monitored	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Establishment of Hagi Museum as a core facility for communication, investigation, and research ・The Hagi Museum located in Hagi Castle Town is a core facility for communication and for investigation and research concerning the castle town, where explanations of the castle town are provided including changes and development of the site over the years.	➢ Maintenance inside the keep of the castle ruins ・From the keep of the castle ruins it is difficult to envisage the way things were at the time of the Bakumatsu, due to dismantling of structures and planting of cherry trees.	➢ Protection and maintenance of remains inside the keep of the castle ruins ・In preparation for future long-term maintenance enabling the castle keep to be envisaged as it was at the Bakumatsu, regular monitoring of the impact of cherry trees on the underground archaeological remains will be carried on, and trees will be relocated or trimmed in case a potential impact is seen. The eastern garden that was inside the keep will also be improved to promote understanding of the Bakumatsu era.	➢ For protection of the remains inside the castle keep, monitoring of tree impact will be carried on, and if potential impact on the remains is seen, measures such as tree trimming and root cutting will be carried out. ➢ Maintenance of eastern garden (To-en)
			・Monitoring the impact of cherry trees	1 time/year	1 time/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan				
			・Whether cherry tree trimming and root cutting are carried out	None	Performed as needed	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Performed as needed				
			・Whether the eastern garden (To-en) is being improved	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Provision of guidance facility ・A World Heritage Site Visitor Center was opened March 4, 2017 as a central facility for guidance. ➢ Pamphlet preparation ・Pamphlets have been prepared that introduce Hagi Castle Town, component parts in the Hagi Area, and the overall Sites of Japan's Meiji Industrial Revolution. ➢ World Heritage Plaque installation ・A World Heritage Plaque was installed at the entrance.	➢ Lack of viewing point for gaining an overview of Hagi Castle Town ・The overall Hagi Castle Town component part and much of the buffer zone can be seen from the peak of Mt. Shizukiyama behind the castle ruins, but currently the view is obstructed by tree overgrowth. ➢ Multi-language pamphlet availability ・Some of existing pamphlets are in Japanese and English only, as multi-language support is inadequate.	➢ Provision of viewing point for gaining an overview of Hagi Castle Town ・The peak of Mt. Shizukiyama will be prepared as a viewing point for promoting understanding of Hagi Castle Town. This work will be carried out according to a long-term plan, taking care not to harm the value of Mt. Shizukiyama as a nationally designated natural treasure. ➢ Provision of multi-language pamphlets ・Multi-language pamphlets will be prepared to meet the needs of visitors from overseas.	➢ Provision of viewing point on peak of Mt. Shizukiyama ➢ Multi-language pamphlet availability (Jpn./Eng./Chn./Kor./Taiwan)
			・Whether viewing points are provided	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes				
			・Multi-language pamphlet availability (Jpn./Eng./Chn./Kor./Taiwan)	Some	All	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: All				
		2. The operational arrangement for this purpose is in place	・Number of persons participating in training sessions	100/year	150/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan	➢ Assignment of manager/guides at main structures, etc. (repeated from above) ・Daily manager and guide duties at main structures in Hagi Castle Town are performed by a guide group in the city.	➢ Decline in number of manager/guides (repeated from above) ・Most of the manager/guides are retirees in their 60s and 70s, raising concern their numbers may decline. ➢ Raising guide skills ・Visitors have come to desire explanations of the roles of each component part in the Sites of Japan's Meiji Industrial Revolution and the connections to component parts in other areas. Following World Heritage inscription, training sessions were held on the Sites of	➢ Holding of regular guide training ・Training sessions will be conducted periodically, consisting of lecture classes on the Sites of Japan's Meiji Industrial Revolution and Hagi Castle Town and observation of component parts in other areas, aimed at developing new guides and raising guide skills by having them acquire the level of knowledge required for guide work.	➢ Development of new manager/guides ➢ Regular guide training ➢ Training including observation of component parts in other areas
			・Number of training sessions	2 times/year	3 times/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan				
			・Number of observed areas	1 area in 3 years	1 area in 2 years	Monitoring method: Reflect implementation status of				

						Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan		Japan's Meiji Industrial Revolution; but the guides themselves lack sufficient knowledge and have not attained the level needed for giving detailed guidance to visitors. ➢ Setting of recommended tour routes ・Recommended tour routes that would aid in understanding the structures of early modern feudal society represented by Hagi Castle Town have not been set.	➢ Setting of recommended tour routes ・Recommended tour routes will be set enabling ready understanding of the structures of early modern feudal society represented by Hagi Castle Town, and will be indicated to visitors.	➢ Setting of recommended tour routes
			・Number of new guide mentors	0/year	1/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan				
			・Whether recommended tour routes are designated	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes				
	-3 Hospitality The comfort of visitors is sufficient	1. The facilities and equipment are in place for promoting enjoyment by visitors	・Whether applications are updated	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Application development ・Applications are being developed that introduce the component parts of the Hagi Area and the Sites of Japan's Meiji Industrial Revolution.	➢ Application publicity ・The applications are not being publicized sufficiently.	➢ Promoting wider application use ・To promote wider use of the application, they will be updated regularly and actively publicized.	➢ Application updating ➢ Greater effort at application publicity
			・Introduction to applications in pamphlets	One type of pamphlet	Two or more types of pamphlets	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan				
		2. The operational arrangement for this purpose is in place	・Development of new guides	0/year	1/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan	➢ Assignment of tour guides ・Guides are assigned to take people around to each of the facilities in Hagi Castle Town, giving enjoyable descriptions with interesting episodes mixed in	➢ Training and obtaining tour guides ・Nearly all the tour guides are retired persons in their 60s and 70s, and there are concerns that their number will decline in coming years.	➢ Holding of regular guide training ・Training sessions will be offered periodically, including lecture classes on the Sites of Japan's Meiji Industrial Revolution and Hagi Castle Town, and observation of component parts in other areas, aimed at developing new guides and raising guide skills by having them acquire the level of knowledge required for tour guide work. ➢ Promoting wider application use ・Application use will be promoted actively, such as by making sure the guides themselves can use them well enough to be able to explain their use to visitors while using the tablet.	➢ Regular guide training ➢ Training including observation of component parts in other areas ➢ Development of new manager/guides

			Current State	Targets	Monitoring method: Similar satisfaction surveys as conducted in the past year
Visitors (C)	A state in which visitors feel safety, security, comfort, and a sense of satisfaction, spend a sufficient amount of time at the component part to understand its contribution to the Outstanding Universal Value, and are motivated to visit again	☆Satisfaction	26.7%	33.8%	Targets: Attain average value
		☆Time spent	8.9%	0.0%	Targets: Attain minimum value per component part
		☆Understanding Q14	17.8%	12.6%	Targets: Attain average value
		Q15	22.2%	15.17%	Targets: Attain average value
		☆Sparking of interest	17.8%	24.4%	Targets: Attain average value
		☆Intention to visit again Q18	13.3%	23.4%	Targets: Attain maximum value per component part
		Q22	4.4%	20.8%	Targets: Attain average value
		☆Percentage of problems indicated Crowding	4.4%	0.0%	Targets: Reduce percentage of problems indicated to 0
		Damage	0.0%	0.0%	Targets: Reduce percentage of problems indicated to 0
		Lack of entertainment value	6.7%	1.1%	Targets: Attain minimum value per component part
		Food facilities	24.4%	8.4%	Targets: Attain average value
		Toilet provision, etc.	6.7%	0.0%	Targets: Reduce percentage of problems indicated to 0

Relationship between Visitor Management Strategy and the Subjects and Targets of Visitor Management

Visitor Management Strategy for Individual Component Parts (Form C)

Shokasonjuku Academy (Component part 1-5)

I. Trend in daily visitors

Number of visitors (year-long total)	FY 2014	462,206	FY 2015	817,257	FY 2016	516,084	FY 2017	493,591	FY 2018	454,907
Number of visitors (daily peak)	FY 2014	6,900	FY 2015	9,906	FY 2016	6,410	FY 2017	7,581	FY 2018	7,486

II. Structure of Visitor Management Strategy for Individual Component Part

Visitor Management Strategy for Individual Component Part

(1) Subject	(2) Visitor management vision (targets)		(3) Management indicators *Select or add suitable indicators	(4) Setting of target levels			(5) Identification and implementation of measures			
			Indicators ☆: Common	Current state	Targets	Method of measuring/calculating indicators *Making use of quantitative, qualitative, and visitor satisfaction surveys; making use of separate surveys, etc.	(a) Current state	(b) Issues	(c) Directionality of response	(d) Methods and measures
Component part (A)	**Physical damage** No harm to land and materials of component part	1. The facilities and equipment are in place for physically protecting the component part	☆Number of close calls	0 incidents/year	0 incidents/year	Monitoring method: Records kept by owner (administrator) Targets: 0 (zero) incidents	➢ Installation of fencing and security cameras ・Fencing has been erected around the building to control entry inside. Security cameras have also been installed as a crime-prevention measure.	➢ Physical impact/harm to component part by visitors ・There are concerns about arson or other deliberate damage.	➢ Provision of fire prevention equipment ・Automatic fire alarms and other equipment will be upgraded.	➢ Upgrading of fire prevention equipment
			☆Whether there are facilities/equipment for separation between visitors and the component part	Yes	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes				
			・Whether fire-prevention equipment is improved	Yes	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes				
		2. The operational arrangement for this purpose is in place	・Whether a vehicle gate is installed	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Preventing visitors from entering the building ・Normally, visitors are not allowed to enter the academy building.	➢ Regular access to shrine ・Shoin Shrine, where the Shokasonjuku Academy is located, is open to the public 24 hours a day. A guard on night duty patrols the area even at night, but less attention is paid to management of the component part than during daytime.	➢ Restricting night access to shrine ・A pole for stopping vehicle entry will be installed at the shrine entrance to restrict night-time entry by vehicles.	➢ Installation of pole as vehicle gate
Component part (A) / Surrounding environment (B)	-1 Safety and security Visitors' feeling of safety and security is sufficient	1. The facilities and equipment are in place for ensuring the safety and security of visitors	☆Whether there are facilities/equipment for separation between visitors and the component part	Yes	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Provision of shrine approach ・An entrance path has been established to show visitors where they are allowed to walk.	➢ Damage on surface of shrine approach ・There are places on the shrine approach where tree roots protruding from the ground have caused unevenness or damaged the surface.	➢ Improvement of shrine approach ・Improvement of the shrine approach is incorporated in the overall plans for shrine maintenance, and will be carried out at an opportune time.	➢ Carrying out improvements to the shrine approach
			・Whether the approach to the shrine is improved	Yes	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes				
		2. The operational arrangement for this purpose is in place	Whether separate flow lines have been set for visitors to the academy and worshippers at the shrine	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Dealing with crowding ・During busy times such as the New Year's and spring and summer breaks, personnel are deployed inside the shrine for visitor control.	➢ Crowding by visitors ・When there are large numbers of visitors, sometimes they overflow the approach to the shrine, which is one of the flow lines.	➢ Dealing with crowding ・Flow lines for visitors to Shokasonjuku and for worshippers at Shoin Shrine, respectively, will be made clear to ease crowding and promote understanding of Shokasonjuku.	➢ Setting of separate flow lines for visitors to the academy and worshippers at the shrine

	-2 Promotion of understanding Visitors' feeling of satisfaction is sufficient	1. The facilities and equipment are in place for promoting and deepening understanding by visitors	・Whether explanatory signs are provided	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan	➢ Provision of guidance facility ・A World Heritage Site Visitor Center was opened March 4, 2017 as a central facility for guidance. ➢ World Heritage Plaque installation ・A World Heritage Plaque was installed along the approach to the shrine. ➢ Building and opening of Shoin Shrine sanctuary "Shiseikan" ・Items that belonged to Yoshida Shoin and his calligraphic works are on display in Shiseikan, a museum dedicated to Yoshida Shoin and Shokasonjuku.	➢ Lack of detail on explanatory signs ・Although explanatory signs have been installed, they are showing deterioration and do not include explanations of the Outstanding Universal Value of the Sites of Japan's Meiji Industrial Revolution or the role of Shokasonjuku. ➢ Guidance to related historic sites in the vicinity ・Various historic sites are located around Shokasonjuku, but there are no signs directing people to them.	➢ Installation of explanatory signs ・Explanatory signs will be installed providing information on the Outstanding Universal Value of the Sites of Japan's Meiji Industrial Revolution, the roles of the 23 component parts, and the changes that the Shokasonjuku Academy went through and the course of its development, etc. ➢ Guidance directing people to related historic sites in the vicinity ・Tour routes linking to the surrounding historic sites will be introduced to visitors by posting guidance signs showing the routes.	➢ Installation of explanatory signs ➢ Installation of guidance signs
			・Whether guidance signs have been posted to indicate the tour route	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes				
			・Multi-language pamphlet availability (Jpn./Eng./Chn./Kor./Taiwan)	Some	All	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: All	➢ Pamphlet preparation ・Pamphlets are being prepared that introduce the component parts in the Hagi Area and the overall Sites of Japan's Meiji Industrial Revolution.	➢ Multi-language pamphlet availability ・Some of existing pamphlets are in Japanese and English only, as multi-language support is inadequate.	➢ Provision of multi-language pamphlets ・Multi-language pamphlets will be prepared to meet the needs of visitors from overseas.	➢ Multi-language pamphlet availability (Jpn./Eng./Chn./Kor./Taiwan)
		2. The operational arrangement for this purpose is in place	・Number of persons participating in training sessions	70/year	100/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan	➢ Assignment of local guides ・Guide services at the site are provided by a guide group in the city.	➢ Decline in number of guides ・Nearly all the guides are retired persons in their 60s and 70s, and there are concerns that their number will decline in coming years. ➢ Raising guide skills ・Visitors have come to want explanations of the role of each component part in the overall Sites of Japan's Meiji Industrial Revolution, and its connection to component parts in other areas. Training sessions on the Sites of Japan's Meiji Industrial Revolution were held following World Heritage listing, but the guides themselves have not yet reached the level of being able to provide explanations to visitors based on sufficient knowledge.	➢ Holding of regular guide training ・Training sessions will be offered periodically, consisting of lecture classes on the Sites of Japan's Meiji Industrial Revolution and Shokasonjuku and observation of component parts in other areas, aimed at developing new guides and raising guide skills by having them acquire the level of knowledge required for guide work.	➢ Regular guide training ➢ Training including observation of component parts in other areas ➢ Development of new manager/guides
			・Number of training sessions	2 times/year	3 times/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan				
			・Number of observed areas	1 area in 3 years	1 area in 2 years	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan				
			・Number of new guide mentors	0/year	1/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan				
	-3 Hospitality The comfort of visitors is sufficient	1. The facilities and equipment are in place for promoting enjoyment by visitors	・Whether applications are updated	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Application development ・Applications are being developed that introduce the component parts of the Hagi Area and the Sites of Japan's Meiji Industrial Revolution. ➢ Establishment of Yoshida Shoin historical museum ・An unusual exhibit facility is provided that uses more than 70 dolls to show the life and times of Yoshida Shoin.	➢ Application publicity ・The applications are not being publicized sufficiently. ➢ Deterioration of the Yoshida Shoin historical museum ・The historical museum was built in 1978 and is showing deterioration.	➢ Promoting wider application use ・To promote wider use of the applications, they will be updated regularly and actively publicized. ➢ Rebuilding of the Yoshida Shoin historical museum or construction of a new facility ・In the future, consideration will be given to rebuilding the historical museum or building a new one in its place, etc., while taking into account the impact on the surrounding landscape.	➢ Application updating ➢ More active application publicity ➢ Obtain the views of experts in the necessary areas, such as landscape
			・Introduction to applications in pamphlets	One type of pamphlet	Two or more types of pamphlets	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan				
			・Whether opinions are sought from experts regarding new construction or refurbishment of buildings inside the buffer zone	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes				

		2. The operational arrangement for this purpose is in place	・Inclusion of information about Shiseikan in pamphlets prepared by Shoin Shrine or on website	Yes	Satisfactory	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Satisfactory	➢ Sale of original products, etc. ・The Shiseikan museum shop has products available only there, as well as writings of Yoshida Shoin and rubbed copies of his calligraphic works.	➢ Visitors to Shiseikan ・The number of people entering Shiseikan is small relative to the number of visitors to Shokasonjuku Academy.	➢ Encouraging visitors to go inside Shiseikan ・Visitors will be encouraged to enter Shiseikan by publicizing the museum shop and the nature of the exhibits.	➢ Enhancement of information about Shiseikan in pamphlets prepared by Shoin Shrine or on the website

Visitors (C)	A state in which visitors feel safety, security, comfort, and a sense of satisfaction, spend a sufficient amount of time at the component part to understand its contribution to the Outstanding Universal Value, and are motivated to visit again		Current State	Targets	Monitoring method: Similar satisfaction surveys as conducted in the past year
		☆Satisfaction	29.3%	33.8%	Targets: Attain average value
		☆Time spent	3.3%	0.0%	Targets: Attain minimum value per component part
		☆Understanding Q14	15.1%	12.6%	Targets: Attain average value
		Q15	23.4%	15.17%	Targets: Attain average value
		☆Sparking of interest	29.3%	39.8%	Targets: Attain maximum value per component part
		☆Intention to visit again	19.2%	23.4%	Targets: Attain maximum value per component part
		Q18	19.7%	20.8%	Targets: Attain average value
		Q22	11.3%	0.0%	Targets: Reduce percentage of problems indicated to 0
		☆Percentage of problems indicated Crowding	0.4%	0.0%	Targets: Reduce percentage of problems indicated to 0
		Damage	6.3%	5.2%	Targets: Attain average value
		Lack of entertainment value	18.8%	8.4%	Targets: Attain average value
		Food facilities	10.9%	0.0%	Targets: Reduce percentage of problems indicated to 0
		Toilet provision, etc.			

Relationship between Visitor Management Strategy and the Subjects and Targets of Visitor Management

Visitor Management Strategy for Individual Component Parts (Form C)

Former Shuseikan (Component part 2-1)

I. Trend in daily visitors (Of Former Shuseikan visitors, number visiting Sengan-en)

Number of visitors (year-long total)	FY 2014	441,144	FY 2015	485,214	FY 2016	419,185	FY 2017	512,737	FY 2018	698,894
Number of visitors (daily peak)	FY 2014	3,762	FY 2015	4,205	FY 2016	3,308	FY 2017	3,379	FY 2018	6,579

II. Structure of Visitor Management Strategy for Individual Component Part

Visitor Management Strategy for Individual Component Part

(1) Subject	(2) Visitor management vision (targets)		(3) Management indicators *Select or add suitable indicators	(4) Setting of target levels			(5) Identification and implementation of measures			
			Indicators ☆: Common	Current state	Targets	Method of measuring/calculating indicators *Making use of quantitative, qualitative, and visitor satisfaction surveys; making use of separate surveys, etc.	(a) Current state	(b) Issues	(c) Directionality of response	(d) Methods and measures
Component part (A)	Physical damage No harm to land and materials of component part	1. The facilities and equipment are in place for physically protecting the component part	☆Number of close calls	0 incidents/year	0 incidents/year	Monitoring method: Inspection patrol records, etc. of site owner/administrator firm and of commissioned management company, etc. Targets: 0 incidents	➢ Erecting of fencing around the site of the reverbatory furnace and Sengan-en Goten to prevent entry ・Fencing is erected to prevent entry into places visitors are not allowed to go.	➢ Effectively warning visitors ・There is a lack of clear warnings to visitors, including those from other countries, not to enter off-limits areas, etc.	➢ Posting of no-entry warning signs ・No-entry warning plates and similar warnings will be put up to notify visitors that entry to Goten from the site of the reverbatory furnace and the forecourt is prohibited.	➢ Posting of no-entry warning signs for visitors including those from other countries
			☆Whether there are facilities/equipment for separation between visitors and the component part	Yes	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes				➢ Determining status of the component part by inspection patrols
		2. The operational arrangement for this purpose is in place	・Number of inspection patrols	2,535 times/year	2,535 times/year	Monitoring method: Inspection patrol records of site owner/administrator firm and of commissioned management company, etc. Targets: Yes	➢ Assign employees of site owner/administrator firm or of commissioned management company ・Employees or commissioned management company personnel are assigned as managers at Sengan-en, the Former Shuseikan Machinery Factory, and the Former Foreign Engineers' Residence (Engineers' Residence).	➢ Determining status of the component part by inspection patrols, etc. ・Site patrols are conducted within the normal scope of management and administration, but inspection patrols as circumstances demand are needed for determining whether there is damage or other problems.	➢ Conservation of the component part by inspection patrols ・Patrols of the component part as circumstances demand will keep track of the status, including whether there is damage, and also prevent physical damage in advance.	➢ (Determining status of the component part by inspection patrols)
			・Monitoring performed	1 time/year	1 time/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes			➢ Performing monitoring of component part ・Detailed monitoring of the elements of the component part will be performed once a year.	➢ Conducting detailed monitoring of the elements of the component part
Component part (A) / Surrounding environment (B)	-1 Safety and security Visitors' feeling of safety and security is sufficient	1. The facilities and equipment are in place for ensuring the safety and security of visitors	☆Whether there are facilities/equipment for separation between visitors and the component part	Yes	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Achieving a safe viewing environment for visitors ・To ensure visitor safety, the number of people allowed at one time in the Engineers' Residence, a wooden structure, is limited to 60, and the number allowed into Sengan-en Goten at one time is limited to 50.	➢ Achieving a safe viewing environment for visitors in areas not open to the public ・As the excavation surveys progress and areas not yet open to the public are readied, a safe viewing environment for visitors must be ensured.	➢ Providing a safe viewing environment for visitors in areas not open to the public ・As the excavation surveys progress and areas not yet open to the public are readied, a safe and secure viewing environment for visitors will be provided, looking at level differences on the grounds and vehicle flow lines, etc.	➢ Providing a safe viewing environment for visitors in areas not open to the public
			・Preparing a viewing environment for areas not open to the public	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes				
		2. The operational arrangement for this purpose is in place	・Number of inspection patrols	2,535 times/year	2,535 times/year	Monitoring method: Inspection patrol records of site owner/administrator firm and of commissioned management company, etc. Targets: Yes	➢ Assign employees of site owner/administrator firm or of commissioned management company ・Employees or commissioned management company personnel are assigned as managers at Sengan-en, the Former Shuseikan Machinery Factory, and the Former Foreign Engineer's Residence, looking after visitor safety.	➢ Determining status of visitors by inspection patrols, etc. ・In addition to controlling visitor numbers at facility entrances, the safety of visitors must be ensured by patrolling as circumstances demand.	➢ Ensuring safety of visitors by inspection patrols, etc. ・By continuing to control visitor numbers at facility entrances and conducting patrols of the component part as needed, efforts will be made to ensure visitor safety.	➢ Ensuring safety of visitors by visitor control and inspection patrols

	2 Promotion of understanding Visitors' feeling of satisfaction is sufficient	1. The facilities and equipment are in place for promoting and deepening understanding by visitors	・Provision of guidance facility	2 places	3 places	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan	➢ Establishment of World Heritage guidance facility ・Displays and explanations giving an overview of the Sites of Japan's Meiji Industrial Revolution and details of the Shuseikan Enterprise are provided mainly in the Engineers' Residence and Machinery Factory.	➢ Inadequacy of guidance functions ・The existing guidance facilities do not provide sufficient information to visitors about the Outstanding Universal Value of the Sites of Japan's Meiji Industrial Revolution or the role of Shuseikan.	➢ New guidance facility provision ・To provide information about the Outstanding Universal Value of the Sites of Japan's Meiji Industrial Revolution, the role of Shuseikan, and the industrial systems, a guidance facility will be built at a suitable location near Sengan-en reception area, and exhibits will be enhanced in the Former Foreign Engineers' Residence.	➢ Provision of a new World Heritage guidance facility near the Sengan-en reception area, the starting point for visitor flow lines ➢ Enhancement of World Heritage exhibits in the Former Foreign Engineers' Residence
			・Enhancement of virtual reality/applications	None	1 time	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes				
							➢ Installing guidance and explanatory signs with a standard design for all of Shuseikan ・Guidance and explanatory signs with a standard design for the Shuseikan site are installed. ➢ World Heritage Plaque installation ・A World Heritage Plaque was installed near the entrance to the Former Shuseikan Machinery Factory.	➢ Enhancing contents of guidance and explanatory signs, pamphlets, etc. ・Since there are places not yet open to the public and underground archaeological remains that have not yet been excavated for surveys, the guidance and explanatory signs, pamphlets and other materials will need to be updated based on the survey results.	➢ Creation and updating of guidance and explanatory signs, pamphlets, etc. ・Timed to the progress of excavation surveys and placing of planar markers indicating locations and scale of underground archaeological remains, guidance and explanatory signs will be updated to provide information including the role of each of the remains in the industrial system, and relation to other remains.	➢ New installation and updating of guidance and explanatory signs based on excavation survey results
							➢ Creation of pamphlets, applications, etc. ・A guidebook and maps, etc. introducing the component parts of the Shuseikan site are distributed, and applications using virtual reality (VR) and augmented reality (AR) are offered, with multi-language support. ➢ Lending of tablets, etc. ・Tablets and audio guidance devices are lent to those visiting Sengan-en.	➢ Enhancing contents of VR and AR applications ・Applications are currently available for the first phase of the Shuseikan Enterprise, but information about phase two will need to be provided to visitors to promote their understanding.	➢ Enhancing contents of VR and AR applications ・Introductions to the functions of each of the facilities in phase two of the Shuseikan Enterprise, and computer graphics videos, etc., will be produced for providing information.	➢ Enhancing content of VR and AR applications
		2. The operational arrangement for this purpose is in place	・Holding of guide training sessions	5 times/year	5 times/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Assignment of guides ・At Sengan-en, employees of the site owner/administrator firm are stationed at all times as paid guides; while at the Former Foreign Engineers' Residence, volunteer guides are assigned on weekends and holidays.	➢ Provision of guide training opportunities ・Opportunities to gain knowledge about the Sites of Japan's Meiji Industrial Revolution and know-how fin guiding must be provided in support of on-going guide services.	➢ Holding of regular guide training ・Training sessions about the Sites of Japan's Meiji Industrial Revolution and Shuseikan Enterprise will be held regularly, aimed at raising guide skills and developing new guides by having them acquire the knowledge and know-how required for guide services.	➢ Holding of regular guide training sessions
	3 Hospitality The comfort of visitors is sufficient	1. The facilities and equipment are in place for promoting enjoyment by visitors	・Renewal of administrative and convenience facilities	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan	➢ The site owner/administrator provides parking areas for passenger cars and large buses ・These are located at Sengan-en, the Former Shuseikan Machinery Factory, and the Former Foreign Engineers' Residence.	➢ Parking space provision ・When planar markers are placed based on the excavation survey results, less space will be available for parking.	➢ Obtaining replacement parking areas ・When planar marking on the remains is performed, the best method will be selected, such as finding alternative spaces, and will be implemented.	
							➢ Installing eating and shopping facilities ・Restaurants and shops at Sengan-en have been refurbished, while a book-selling area has been set up at the Machinery Factory. ➢ Installation of toilet facilities ・Toilets are being installed or refurbished at each of the facilities, paying attention to the landscape.	➢ Deterioration of toilet and other facilities ・As the toilets and administrative building on the site of the Engineers' Residence have deteriorated, the visitor accommodation environment will need to be upgraded.	➢ Renewal of administrative and convenience facilities ・At the Former Foreign Engineers' Residence, administrative and convenience facilities such as administrative buildings, toilets, and pumps will be concentrated in a suitable place and refurbished with the landscape in mind.	➢ Renewal of administrative and convenience facilities at the Former Foreign Engineers' Residence

		2. The operational arrangement for this purpose is in place	・Patrolling and speaking to visitors to find out their needs	Yes	Yes	Monitoring method: Records of site owner/administrator firm and of commissioned management company, etc. Targets: Yes	➢ Management and operation by site owner/administrator firm and commissioned management company ・Employees or commissioned management company personnel are posted at Sengan-en, the Former Shuseikan Machinery Factory, and the Former Foreign Engineer's Residence, helping visitors while seeking to determine their needs and working for improvements as necessary.	➢ Accurate needs determination through patrols, etc. and carefully considered response ・To determine the precise needs of visitors, a carefully considered response by employees or commissioned management company staff is necessary.	➢ Carefully considered response to needs through patrols, talking with visitors, etc. ・The needs of visitors will be determined more precisely through patrols, talking with visitors, etc., followed up by improvements to the visitor accommodation environment.	➢ Patrolling and speaking to visitors to find out their needs
Visitors (C)	A state in which visitors feel safety, security, comfort, and a sense of satisfaction, spend a sufficient amount of time at the component part to understand its contribution to the Outstanding Universal Value, and are motivated to visit again			Current State	Targets	Monitoring method: Similar satisfaction surveys as conducted in the past year					
			☆Satisfaction	32.4%	52.2%	Targets: Attain maximum position					
			☆Time spent	3.1%	3.1%	Targets: Status quo maintained					
			☆Understanding Q14	12.1%	5.4%	Targets: Reduce by half from current value					
			Q15	13.0%	6.1%	Targets: Reduce by half from current value					
			☆Sparking of interest	24.4%	39.8%	Targets: Attain maximum position					
			☆Intention to visit again Q18	12.4%	23.4%	Targets: Attain maximum position					
			Q22	18.7%	20.8%	Targets: Attain average value					
			☆Percentage of problems indicated ☆Crowding	2.7%	2.5%	Targets: Attain average value					
			☆Damage	0.5%	0.0%	Targets: Reduce percentage of problems indicated to 0					
			Lack of entertainment value	2.2%	1.1%	Targets: Attain maximum position					
			Food facilities	3.2%	3.1%	Targets: Status quo maintained					
			Toilet provision, etc.	4.6%	4.4%	Targets: Status quo maintained					

Relationship between Visitor Management Strategy and the Subjects and Targets of Visitor Management

Terayama Charcoal Kiln (Component part 2-2)

I. Trend in daily visitors (Data since FY 2015, weekends and holidays only)

Number of visitors (year-long total)	FY 2014	–	FY 2015	5,148 (July-November, March)	FY 2016	3,658 (April-November, March)	FY 2017	2,996 (April-November, March)	FY 2018	2,977 (April-November, March)
Number of visitors (daily peak)	FY 2014	–	FY 2015	298	FY 2016	180	FY 2017	124	FY 2018	148

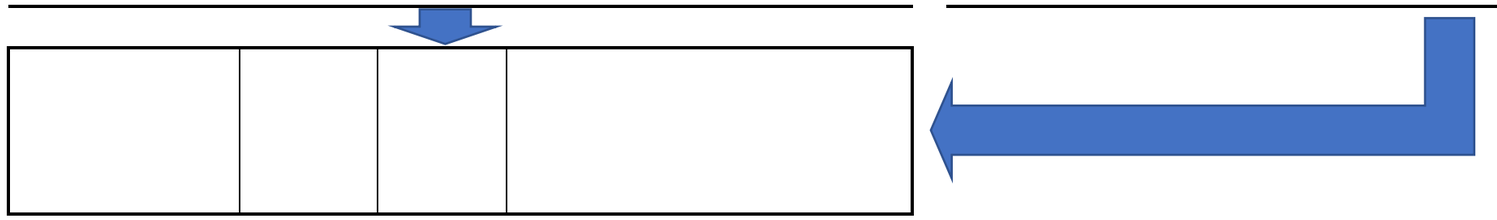
II. Structure of Visitor Management Strategy for Individual Component Part

Visitor Management Strategy for Individual Component Part

(1) Subject	(2) Visitor management vision (targets)		(3) Management indicators *Select or add suitable indicators	(4) Setting of target levels			(5) Identification and implementation of measures			
			Indicators ☆: Common	Current state	Targets	Method of measuring/calculating indicators *Making use of quantitative, qualitative, and visitor satisfaction surveys; making use of separate surveys, etc.	(a) Current state	(b) Issues	(c) Directionality of response	(d) Methods and measures
Component part (A)	Physical damage No harm to land and materials of component part	1. The facilities and equipment are in place for physically protecting the component part					·	·	·	
		2. The operational arrangement for this purpose is in place								
Component part (A) / Surrounding environment (B)	-1 Safety and security Visitors' feeling of safety and security is sufficient	1. The facilities and equipment are in place for ensuring the safety and security of visitors								
		2. The operational arrangement for this purpose is in place								
	-2 Promotion of understanding Visitors' feeling of satisfaction is sufficient	1. The facilities and equipment are in place for promoting and deepening understanding by visitors								
		2. The operational arrangement for this purpose is in place								
	-3 Hospitality The comfort of visitors is sufficient	1. The facilities and equipment are in place for promoting enjoyment by visitors								
		2. The operational arrangement for this purpose is in place								

The "II. Individual Component Part Visitor Management Strategy" for Terayama Charcoal Kiln is under reconsideration following the effects of damages due to heavy rains in June and July, 2019. (Reconsideration includes future measures in the case of heavy-rain damage)

② **Visitors (C)**	A state in which visitors feel safety, security, comfort, and a sense of satisfaction, spend a sufficient amount of time at the component part to understand its contribution to the Outstanding Universal Value, and are motivated to visit again



Relationship between Visitor Management Strategy and the Subjects and Targets of Visitor Management

Visitor Management Strategy for Individual Component Parts (Form C)

Sekiyoshi Sluice Gate (Component part 2-3) (Data since FY 2015, weekends and holidays only)

I. Trend in daily visitors

Number of visitors (year-long total)	FY 2014	–	FY 2015	6,955 (July-November, March)	FY 2016	5,765 (April-November, March)	FY 2017	4,840 (April-November, March)	FY 2018	5,974 (April-November, March)
Number of visitors (daily peak)	FY 2014	–	FY 2015	253	FY 2016	245	FY 2017	163	FY 2018	174

II. Structure of Visitor Management Strategy for Individual Component Part

Visitor Management Strategy for Individual Component Part

(1) Subject	(2) Visitor management vision (targets)		(3) Management indicators *Select or add suitable indicators	(4) Setting of target levels			(5) Identification and implementation of measures			
			Indicators ☆: Common	Current state	Targets	Method of measuring/calculating indicators *Making use of quantitative, qualitative, and visitor satisfaction surveys; making use of separate surveys, etc.	(a) Current state	(b) Issues	(c) Directionality of response	(d) Methods and measures
Component part (A)	Physical damage No harm to land and materials of component part	1. The facilities and equipment are in place for physically protecting the component part	☆Number of close calls	0 incidents/year	0 incidents/year	Monitoring method: Inspection patrol records, etc. of site owner/administrator, etc. Targets: 0 incidents	➢ Thinning and pruning of trees on slopes ・Trees on the slopes are trimmed and pruned as needed for preventing damage to the component part from landslides, etc.	➢ Thinning and pruning of trees on slopes ・Thinning and pruning of trees on slopes will continue to be necessary.	➢ Thinning and pruning of trees on slopes ・Trees on the slopes will continue to be trimmed and pruned as needed for preventing damage to the component part from landslides, etc.	➢ Vegetation management in the area around the component part
			☆Whether there are facilities/equipment for separation between visitors and the component part	Yes	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes				➢ Determining status of the component part by inspection patrols, etc.
			・Vegetation management in the surrounding area	2 times/year	3 times/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes				
		2. The operational arrangement for this purpose is in place	・Number of inspection patrols	118 times /year	130 times /year	Monitoring method: Inspection patrol records, etc. of site owner/administrator, etc. Targets: Yes	➢ Patrols and guide assignment by site owner/administrator ・Under current arrangements, employees of the city as owner/administrator of the site conduct patrols as circumstances demand, assign volunteer guides on weekends and holidays, and receive reports on the site status.	➢ Determining status of the component part by inspection patrols, etc. ・Patrols, etc. must continue to be carried out as needed for keeping track of the site status.	➢ Conservation of the component part by inspection patrols, etc. ・Patrols of the component part will be carried out as needed to keep track of the status, including whether there is damage, and also to prevent physical damage in advance.	➢ (Determining status of the component part by inspection patrols, etc.)
			・Monitoring performed	1 time/year	1 time/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes			➢ Performing monitoring of component part ・Detailed monitoring of the elements of the component part will be performed once a year.	➢ Conducting detailed monitoring of the elements of the component part
Component part (A) / Surrounding environment (B)	-1 Safety and security Visitors' feeling of safety and security is sufficient	1. The facilities and equipment are in place for ensuring the safety and security of visitors	☆Whether there are facilities/equipment for separation between visitors and the component part	Yes	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Achieving a safe viewing environment for visitors ・Safety of visitors is achieved by provisional installation of fencing (guard wall) along the river side of the access route to the component part to prevent falling, and by thinning trees, etc. on the slopes.	➢ Achieving a safe viewing environment for visitors ・To ensure safety of the viewing environment for visitors, it will be necessary to upgrade to a safer guard wall and pave the tour route surface, as well as monitoring the viewing environment at appropriate times and thinning trees on the slopes as needed.	➢ Creating a safe viewing environment for visitors ・To ensure safety of the viewing environment for visitors, the guard wall will be upgraded to a safer one, the tour route surface will be paved, and a barrier-free access route will be aimed for, while continuing to thin trees on the slopes.	➢ Creating a safe viewing environment for visitors by erecting a guard wall, and by paving the route and making it barrier-free (FY 2018)
			・Tour route provision	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan				
		2. The operational arrangement for this purpose is in place	・Number of inspection patrols	118 times /year	130 times /year	Monitoring method: Inspection patrol records, etc. of site owner/administrator, etc. Targets: Yes	➢ Patrols and guide assignment by site owner/administrator ・Under current arrangements, employees of the city as owner/administrator of the site conduct patrols as circumstances demand, assign volunteer guides on weekends and holidays, and receive reports on the site status.	➢ Determining status of tour routes by inspection patrols, etc. ・Patrols must continue to be carried out as needed for keeping track of the tour route status and ensuring visitor safety.	➢ Ensuring safety of visitors by inspection patrols, etc. ・Patrols of the component part will continue to be carried out as needed, and the status of tour routes, etc. will be monitored with the cooperation of volunteer guides and the local neighborhood association, endeavoring to ensure visitor safety.	➢ Determining status of the component part by inspection patrols, etc.

	-2 Promotion of understanding Visitors' feeling of satisfaction is sufficient	1. The facilities and equipment are in place for promoting and deepening understanding by visitors	・Provision of information booth ・World Heritage Plaque installation ・Updating of guidance and explanatory signs ・Planar marking on underground archaeological remains	None None None None	Yes Yes Yes Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan	➢ Establishment of World Heritage guidance facility ・Exhibits and explanations giving an overview of the Sites of Japan's Meiji Industrial Revolution and details of the Shuseikan Enterprise including the Sekiyoshi Sluice Gate are provided mainly in the Former Shuseikan Machinery Factory (current Shokoshuseikan Museum) and in the Former Foreign Engineers' Residence. ➢ Installing guidance and explanatory signs with a standard design for all of Shuseikan ・Guidance and explanatory signs with a standard design for the Shuseikan site are installed. ➢ Creation of pamphlets, applications, etc. ・A guidebook and maps, etc. introducing the component parts of the Shuseikan site are distributed, and applications using virtual reality and augmented reality are offered, with multi-language support.	➢ Inadequacy of guidance functions ・The existing guidance facilities do not provide sufficient information to visitors about the Outstanding Universal Value of the Sites of Japan's Meiji Industrial Revolution or the role of the Sekiyoshi Sluice Gate. ➢ Enhancing contents of guidance and explanatory signs, pamphlets, etc. ・The guidance and explanatory signs, pamphlets and other materials will need to be updated based on the results of surveys, including excavation surveys and literature surveys. ➢ Making clear the value of underground archaeological remains ・Efforts must be made to show visitors the value of the old sluice gate directly under the tour route to promote their understanding of the remains.	➢ New guidance facility provision ・To provide information about the Outstanding Universal Value of the Sites of Japan's Meiji Industrial Revolution, the role of Shuseikan, and the industrial systems, a guidance facility will be built at a suitable location near Sengan-en reception area, and exhibits will be enhanced in the Former Foreign Engineers' Residence. ➢ Provision of a new information booth ・By locating an information booth in the open space along the touring route, visitor understanding of the Outstanding Universal Value of the Sites of Japan's Meiji Industrial Revolution and the role of Shuseikan will be promoted. ➢ World Heritage Plaque installation ・A World Heritage Plaque will be installed near the open space along the tour route. ➢ Updating of guidance and explanatory signs, pamphlets, etc. ・Based on the results of excavation surveys and literature surveys, guidance and explanatory signs will be updated to provide information including the water utilization system such as the damming method. ➢ Planar marking on underground archaeological remains ・To provide information about the old waterway remains under the tour route, planar marking will be provided on the surface of the tour route.	➢ Provision of a new guidance facility near the Sengan-en reception area, the starting point for visitor flow lines ➢ Provision of information booth (FY 2018) ➢ World Heritage Plaque installation (FY 2018) ➢ Updating of guidance and explanatory signs based on excavation survey results ➢ Marking on tour route, etc. to show estimated position of old waterway remains (FY 2018)
		2. The operational arrangement for this purpose is in place	・Holding of guide training sessions	5 times/year	5 times/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Assignment of guides ・Volunteer guides are assigned on weekends and holidays.	➢ Provision of guide training opportunities ・Opportunities to gain knowledge and know-how about the Sites of Japan's Meiji Industrial Revolution and Shuseikan Enterprise must be provided in support of on-going guide services.	➢ Holding of regular guide training ・Training sessions about the Sites of Japan's Meiji Industrial Revolution and Shuseikan Enterprise will be held regularly, aimed at raising guide skills and developing new guides by having them acquire the knowledge and know-how required for guide services.	➢ Holding of regular guide training sessions
	-3 Hospitality The comfort of visitors is sufficient	1. The facilities and equipment are in place for promoting enjoyment by visitors	・Parking area and toilet provision ・Whether food and drink facilities are provided	None Yes	Yes Yes	Monitoring method: Information-gathering by site owner/administrator, etc. Targets: Yes	➢ Providing provisional parking space and toilets ・Provisional parking space and temporary toilets are provided near the component part.	➢ Plans for parking area and toilets, etc. based on visitor trends, etc. ・The parking areas and toilets are temporary facilities, and eating and shopping facilities in the vicinity are inadequate.	➢ Provision of parking areas and toilets, etc. based on visitor trends, etc. ・Considering the expected visitor numbers, parking spaces and toilets will be provided at a suitable location near the Sekiyoshi Sluice Gate, and other steps will be taken to improve the visitor accommodation environment.	➢ Improvement of the visitor accommodation environment such as by provision of parking areas, toilets, and eating and shopping functions (FY 2019)

		2. The operational arrangement for this purpose is in place	・Patrolling and speaking to visitors to find out their needs	Yes	Yes	Monitoring method: Inspection patrols, etc. by site owner/administrator, etc. Targets: Yes	➢ Management and operation by site owner/administrator ・Employees of the city as owner/administrator of the site conduct patrols as circumstances demand and assign volunteer guides on weekends and holidays, helping visitors while seeking to determine their needs and working for improvements as needed.	➢ Needs determination and response by employee/guides ・City employees must continue to conduct patrols as appropriate, and to assign volunteer guides on weekends and holidays, endeavoring to determine visitor needs and working for improvements as needed.	➢ Needs determination and response by employee/guides ・City employees will continue to conduct patrols as appropriate, and to assign volunteer guides on weekends and holidays, endeavoring to determine visitor needs and working for improvements as needed.	➢ Needs determination by employee/guides
Visitors (C)	A state in which visitors feel safety, security, comfort, and a sense of satisfaction, spend a sufficient amount of time at the component part to understand its contribution to the Outstanding Universal Value, and are motivated to visit again			Current State	Targets	Monitoring method: Similar satisfaction surveys as conducted in the past year				
			☆Satisfaction	48.5%	52.2%	Targets: Attain maximum position				
			☆Time spent	23.0%	10.5%	Targets: Attain average value				
			☆Understanding Q14	6.5%	3.2%	Targets: Reduce by half from current value				
			Q15	6.5%	3.2%	Targets: Reduce by half from current value				
			☆Sparking of interest	29.0%	39.8%	Targets: Attain maximum position				
			☆Intention to visit again							
			Q18	17.5%	23.4%	Targets: Attain maximum position				
			Q22	30.5%	37.5%	Targets: Attain maximum position				
			☆Percentage of problems indicated ☆Crowding	0.5%	0.5%	Targets: Status quo maintained				
			☆Damage	0.0%	0.0%	Targets: Status quo maintained				
			Lack of entertainment value	3.5%	1.7%	Targets: Reduce by half from current value				
			Food facilities	5.5%	2.7%	Targets: Reduce by half from current value				
			Toilet provision, etc.	25.5%	12.7%	Targets: Reduce by half from current value				

Relationship between Visitor Management Strategy and the Subjects and Targets of Visitor Management

Appended Materials 1 Visitor Management Strategy for Individual Component Parts (Form C)

Nirayama Reverbatory Furnaces (Component part 3-1)

I. Trend in daily visitors

Number of visitors (year-long total)	FY 2014	107,159	FY 2015	726,114	FY 2016	426,783	FY 2017	284,035	FY 2018	211,279
Number of visitors (daily peak)	FY 2014	1,096	FY 2015	5,500	FY 2016	3,264	FY 2017	2,650	FY 2018	2,369

II. Structure of Visitor Management Strategy for Individual Component Part

Visitor Management Strategy for Individual Component Part

(1) Subject	(2) Visitor management vision (targets)		(3) Management indicators *Select or add suitable indicators	(4) Setting of target levels			(5) Identification and implementation of measures			
			Indicators ☆: Common	Current state	Targets	Method of measuring/calculating indicators *Making use of quantitative, qualitative, and visitor satisfaction surveys; making use of separate surveys, etc.	(a) Current state	(b) Issues	(c) Directionality of response	(d) Methods and measures
Component part (A)	Physical damage No harm to land and materials of component part	1. The facilities and equipment are in place for physically protecting the component part	☆Number of close calls	0 incidents/year	0 incidents/year	Monitoring method: Operational reporting Targets: 0 incidents	➢ Two security cameras have been installed inside and near the component part. ➢ Fencing has been erected around the component part and around the reverbatory furnaces.	➢ Security camera coverage does not extend to the entire component part.	➢ Equipment will be enhanced, including the installation of additional security cameras. ➢ Proper maintenance will be carried out including the fencing around the component part and around the reverbatory furnaces.	➢ Additional security camera installation ➢ Proper maintenance including the fencing around the component part and around the reverbatory furnaces ➢ Assignment of guard staff/guides ➢ Conducting night patrols through public-private collaboration (city/blue-light patrols/fire brigade)
			☆Whether there are facilities/equipment for separation between visitors and the component part	Yes	Yes	Monitoring method: Operational reporting Targets: Yes				
			・Additional security camera installation	2	3	Monitoring method: Report on Operations Targets: Yes				
		2. The operational arrangement for this purpose is in place	・Number of guard staff/guides	5/day	5/day	Monitoring method: Report on Operations Targets: Status quo maintained	➢ Arrangements have been achieved for surveillance of the area inside the component part and the surroundings during opening hours and for reporting to the city. ➢ Local guides conduct surveillance inside the component part. ➢ During opening hours, personnel inside the guidance facility constantly monitor images from security cameras.	➢ Crime prevention arrangement outside opening hours is inadequate.	➢ Strengthen the crime prevention arrangement outside opening hours such as by instituting night patrols.	➢ (Assignment of guard staff/guides) ➢ (Conducting night patrols through public-private collaboration (city/blue-light patrols/fire brigade))
			・Number of night patrols	0 times/year	12 times/year	Monitoring method: Inspection patrol records, etc. Targets: Yes				
Component part (A) / Surrounding environment (B)	-1 Safety and security Visitors' feeling of safety and security is sufficient	1. The facilities and equipment are in place for ensuring the safety and security of visitors	☆Whether there are facilities/equipment for separation between visitors and the component part	Yes	Yes	Monitoring method: Report on Operations Targets: Yes	➢ Fencing has been erected around the component part and around the reverbatory furnaces.		➢ Proper maintenance will be carried out including the fencing around the component part and around the reverbatory furnaces.	➢ Proper maintenance including the fencing around the component part and around the reverbatory furnaces
			・Number of surveys of parking area use status	2 times/year	2 times/year	Monitoring method: Report on Implementation Targets: Status quo maintained	➢ Surveys to date have confirmed that the current parking area capacity is sufficient.	➢ Parking area surveys must continue to be conducted and the results verified to determine that there is sufficient capacity. ➢ In the case of large-scale events, due consideration must be given in advance to such matters as	➢ Parking area surveys will continue to be conducted and the results verified to determine that there is sufficient capacity, and necessary measures will be taken. ➢ In the case of large-scale events, due consideration will be given in advance to such matters as	➢ Conducting surveys of parking area use

							➢ With the opening of a guidance facility next to the component part, a temporary shelter has been made available in case of thunderstorms, etc.	guidance to arriving vehicles, and appropriate measures must be taken.	guidance to arriving vehicles, and appropriate measures will be taken.	
		2. The operational arrangement for this purpose is in place	・Number of fire drills conducted	1 time/year	1 time/year	Monitoring method: Report on Implementation Targets: Status quo maintained	➢ Joint fire drills are conducted with related agencies.		➢ Joint fire drills will be held with related agencies.	➢ Conducting of fire drills
			・Number of parking area guides assigned	2/day	2/day	Monitoring method: Report on Operations Targets: Status quo maintained	➢ A collaboration arrangement has been achieved with guidance facility staff and local guides.	➢ The collaboration arrangement with guidance facility staff and local guides must be maintained and strengthened.	➢ The collaboration arrangement with guidance facility staff and local guides will be maintained and strengthened.	
							➢ Two parking area guides are on duty at all times.	➢ The assignment of parking area guides must be maintained.	➢ The assignment of parking area guides will be continued.	➢ Assignment of parking area guides
	-2 Promotion of understanding Visitors' feeling of satisfaction is sufficient	1. The facilities and equipment are in place for promoting and deepening understanding by visitors	・Introduction of common exhibits in guidance facilities (FY 2029 and after)	None	Yes	Monitoring method: Report on Operations Targets: Yes	➢ A guidance facility has been opened for communication by exhibits, video and other means.	➢ Common exhibits on the Sites of Japan's Meiji Industrial Revolution have not yet been introduced in the guidance facility.	➢ Along with proper operation of the guidance facility, common exhibits will be introduced.	➢ Introduction of common exhibits in guidance facilities (FY 2029 and after)
			・Repair and new installation of explanatory signs (FY 2018)	Deteriorated or lacking	Repair and new installation	Monitoring method: Report on Operations Targets: Yes		➢ Explanatory signs in the area designated as Designated Historic Site are deteriorated or lacking.	➢ Repair and new installation of explanatory signs will be carried out on the Designated Historic Site.	➢ Repair and new installation of explanatory signs (FY 2018)
			・Guidance sign installation	None	Yes	Monitoring method: Report on Operations Targets: Yes	➢ To enable touring of the entire river zone, land north of the river zone has been developed into the Northeast Park and opened to visitors.	➢ Most visitors do not go to the Northeast Park.	➢ Facilities (guidance signs) will be installed to guide visitors to the Northeast Park.	➢ Guidance sign installation
		2. The operational arrangement for this purpose is in place	・Assignment of local guides	5/day	5/day	Monitoring method: Report on Operations Targets: Status quo maintained	➢ At least five local guides provide services at all times.	➢ Local guides are advancing in age.	➢ Efforts will be made to develop new local guides.	➢ Assignment of local guides
			・Holding of local guide development courses	Yes	Yes	Monitoring method: Report on Operations Targets: Yes	➢ Local guides take part in guide training sponsored by the World Heritage Council.	➢ Guide capability must be improved by ongoing participation in guide training, etc.	➢ Ongoing participation in guide training, etc. will be encouraged.	➢ Holding of local guide development courses
			・Holding of local guide training sessions	Yes	Yes	Monitoring method: Report on Operations Targets: Yes				➢ Holding of local guide training sessions
	-3 Hospitality The comfort of visitors is sufficient	1. The facilities and equipment are in place for promoting enjoyment by visitors	・Holding of light-up events	Yes	Yes	Monitoring method: Report on Operations Targets: Yes	➢ Light-up events, hands-on casting experience, and other events are held.	➢ When light-up events are held, the guidance center and component part are not open.	➢ Various events are held in collaboration with related groups. ➢ When light-up events are held, the guidance center and component part will be opened.	➢ Holding of light-up events, hands-on casting experience, and other events ➢ Opening building at night
			・Providing hands-on casting experience	Yes	Yes	Monitoring method: Report on Operations Targets: Yes				
			・Putting on various other events	Yes	Yes	Monitoring method: Report on Operations Targets: Yes				
			・Opening building at night	None	Yes	Monitoring method: Report on Operations Targets: Yes				
		2. The operational arrangement for this purpose is in place	・Obtaining the staffing, etc. for night opening	None	Yes	Monitoring method: Report on Operations Targets: Yes	➢ When light-up events are held, the guidance center and component part are not open.	➢ The staffing and physical environment must be obtained so that when light-up events are held, the guidance center and component part can be opened.	➢ The staffing and physical environment will be obtained so that when light-up events are held, the guidance center and component part can be opened.	➢ Obtaining the staffing, etc. for night opening

Visitors (C)	A state in which visitors feel safety, security, comfort, and a sense of satisfaction, spend a sufficient amount of time at the component part to understand its contribution to the Outstanding Universal Value, and are motivated to visit again

	Current State	Targets	Monitoring method: Similar satisfaction surveys as conducted in the past year
☆Satisfaction	32.2%	33.8%	Targets: Attain average value
☆Time spent	0.0%	0.0%	: Status quo (zero) maintained
☆Understanding Q14	5.1%	3.8%	: Status quo maintained
Q15	5.1%	3.8%	: Status quo maintained
☆Sparking of interest	16.9%	24.4%	: Attain average value
☆Intention to visit again			
Q18	8.5%	13.2%	: Attain average value
Q22	15.3%	20.8%	: Attain average value
☆Percentage of problems indicated Crowding	0.0%	0.0%	: Status quo (zero) maintained
Damage	0.0%	0.0%	: Status quo (zero) maintained
Toilet provision, etc.	5.1%	3.8%	: Status quo maintained

Relationship between Visitor Management Strategy and the Subjects and Targets of Visitor Management

Visitor Management Strategy for Individual Component Parts (Form C)

Hashino Iron Mining and Smelting Site (Component part 4-1)

I. Trend in daily visitors

Number of visitors (year-long total)	FY 2014	6,036	FY 2015	43,316	FY 2016	17,181	FY 2017	9,865	FY 2018	10,622
Number of visitors (daily peak)	FY 2014	407	FY 2015	1,099	FY 2016	555	FY 2017	285	FY 2018	573

II. Structure of Visitor Management Strategy for Individual Component Part

Visitor Management Strategy for Individual Component Part

(1) Subject	(2) Visitor management vision (targets)		(3) Management indicators *Select or add suitable indicators	(4) Setting of target levels			(5) Identification and implementation of measures			
			Indicators ☆: Common	Current state	Targets	Method of measuring/calculating indicators *Making use of quantitative, qualitative, and visitor satisfaction surveys; making use of separate surveys, etc.	(a) Current state	(b) Issues	(c) Directionality of response	(d) Methods and measures
Component part (A)	Physical damage No harm to land and materials of component part	1. The facilities and equipment are in place for physically protecting the component part	☆Number of close calls ☆Whether there are facilities/equipment for separation between visitors and the component part	0 incidents/year Yes	0 incidents/year Yes	Monitoring method: Inspection patrol records, etc. Target: 0 (zero) incidents Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Urging caution by use of pictograms on guidance signs, etc. ➢ Provision of route indicators	➢ Tour routes are not clear ➢ Tour paths have not been improved.	➢ Development for clarifying tour routes	➢ In addition to providing tour routes, signs will be installed indicating the routes. ➢ Everyday management by managers
		2. The operational arrangement for this purpose is in place	・Number of inspection patrols ・Number of guard staff	1 time/day, 1 person (April-December)	1 time/day, 1 person (April-December)	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan	➢ Everyday management by managers ・Kamaishi City consigns everyday management to the Hashino-cho Promotion Council who keeps track of visitor numbers, and patrols inside the part of the site open to the public.	➢ Advancing age of managers	➢ Development of managers ➢ Obtaining revenue, etc. by managers	➢ (Everyday management by managers) ➢ Urging participation in Sites of Japan's Meiji Industrial Revolution interpretation workshops ➢ Conducting regular training (visiting lectures by city employees, etc.)
Component part (A) / Surrounding environment (B)	-1 Safety and security Visitors' feeling of safety and security is sufficient	1. The facilities and equipment are in place for ensuring the safety and security of visitors	☆Whether there are facilities/equipment for separation between visitors and the component part	Yes	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Grass cutting and removal of obstructing trees ➢ Temporary toilets are installed near the great gate (the entrance to the component part).	➢ Impacts on safety of visitors: The frequency of bear sightings in the area is increasing. ➢ The toilets closest to the component part are temporary. ・Management of temporary toilets in winter (freezing, snow removal at entrance)	➢ Preventing encounters with bears by broadening the view from the area open to the public ➢ Study installation of permanent toilets near the component part.	➢ Trimming of trees ➢ Will deal with the question of whether to build facilities in the vicinity of the component part upon careful review.
		2. The operational arrangement for this purpose is in place	・Number of inspection patrols ・Number of guard staff	1 time/day, 1 person (April-December)	1 time/day, 1 person (April-December)	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan	➢ Everyday management by managers ・Kamaishi City consigns everyday management to the Hashino-cho Promotion Council conducts who patrols in the vicinity of the component part.	➢ Obtaining staff for preventing freezing of toilets and removing snow during winter months	➢ Will study installation of permanent toilets (highest priority will be making sure water purification tank and well do not impact the component part; will obtain staff for snow removal)	➢ Will deal with the question of whether to build facilities in the vicinity of the component part upon careful review.
	2 Promotion of understanding Visitors' feeling of satisfaction is sufficient	1. The facilities and equipment are in place for promoting and deepening understanding by visitors	・Opening of visitor center ・Enhancing pamphlet ・Enhancing guide services, etc.	Yes/None 1 pamphlet/person A more detailed pamphlet can be purchased.	Yes Of which 1 pamphlet/person A more detailed pamphlet can be purchased.	Monitoring method: Reflect implementation status of relevant plans for provision of tourism facilities, etc. Targets: Items defined in relevant plans for provision of tourism facilities, etc.	➢ At the Hashino Iron Mining and Smelting Site Information Center, panels and videos give an overview of the Sites of Japan's Meiji Industrial Revolution and the component part.	➢ The visiting time tends to be shortened due to the long time required to get to and from the component part.	➢ Explanations of the Sites of Japan's Meiji Industrial Revolution at the Hashino Iron Mining and Smelting Site Information Center will be enhanced.	➢ After installation of exhibits common to the Sites of Japan's Meiji Industrial Revolution, if information space cannot be obtained for this site, will deal with the question of whether to build facilities in the vicinity

						➢ At the site of the blast furnaces and management office site, signs explaining the remains are provided. ➢ Two types of materials are available for distribution to visitors, a simple leaflet (for free) and a more detailed pamphlet (for purchase).	➢ It is difficult for visitors to gain an understanding of the steel-making processes, since all that remains on the site are piled-up stones and stone walls.	➢ Digital content will be used to provide visual and auditory information, helping toward understanding of the functions of the remains on the site.	of the component part upon careful review. ➢ Use VR and AR to reproduce the blast furnace, and put planar markers indicating locations and scale of underground remains.
		2. The operational arrangement for this purpose is in place	・Assignment of explainers (including volunteer guides)	Yes	Yes	Monitoring method: Reflect implementation status of relevant plans for provision of tourism facilities, etc. Targets: Items defined in relevant plans for provision of tourism facilities, etc.	➢ One volunteer guide is always stationed in the Information Center. Voice guidance pens giving detailed explanations of the remains (multiple languages; for a charge) are also available.	➢ Advancing age of guides	➢ Develop new guides ➢ Obtain revenue, etc. by guides	➢ Urging participation in Sites of Japan's Meiji Industrial Revolution interpretation workshops ➢ Conducting regular training (visiting lectures by city employees, etc.)
	-3 Hospitality The comfort of visitors is sufficient	1. The facilities and equipment are in place for promoting enjoyment by visitors	・Whether food and drink facilities are provided ・Whether toilets are provided	None Yes	Under study Yes	Monitoring method: Reflect implementation status of relevant plans for provision of tourism facilities Targets: Items defined in relevant plans for provision of tourism facilities	➢ Hashino Iron Mining and Smelting Site Information Center was opened in 2013. ➢ Parking areas were opened in 2013 and 2014. ➢ Since 2015, a shuttle bus has been in operation between JR Kamaishi Station and the Hashino Iron Mining and Smelting Site.	➢ Shuttle bus users are few.	➢ Change shuttle bus route and times ➢ Publicize the shuttle bus (website, fliers, posters)	➢ After the Sanriku Railway resumes operation, will change bus terminal station from Kamaishi to Unosumai Station, cutting distance from 35 to 25 km.
		2. The operational arrangement for this purpose is in place	・Whether there is a management and administration entity	Yes	Yes	Monitoring method: Reflect implementation status of relevant plans for provision of tourism facilities Targets: Items defined in relevant plans for provision of tourism facilities	➢ A shopping booth was installed in the parking area in FY 2016. ➢ When crowding is expected such as for events, traffic directors are assigned near the parking areas.	➢ There are no permanent places to buy food and drinks or souvenirs in the area. ➢ There are no vendors.	➢ Construction of a facility where goods can be sold will be studied. ➢ Solicit vendors	➢ Construction of a facility where goods can be sold will be studied. ・Items for study (1) Scale of shop building (2) Shopping needs (3) Obtaining vendors

Visitors (C)	A state in which visitors feel safety, security, comfort, and a sense of satisfaction, spend a sufficient amount of time at the component part to understand its contribution to the Outstanding Universal Value, and are motivated to visit again		Current State	Targets	Monitoring method: Similar satisfaction surveys as conducted in the past year Targets: (Attain) average value, (Attain, maintain) maximum position, Reduce percentage of problems indicated to 0 (zero)
		☆Satisfaction	26.8%	%	
		☆Time spent	2.4%	%	
		☆Understanding Q14	4.9%	%	
		Q15	7.9%	%	
		☆Sparking of interest	24.4%	%	
		☆Intention to visit again	4.9%	%	
		Q18	21.3%	%	
		Q22	0.0%	%	
		☆Percentage of problems indicated ☆Crowding	0.0%	%	
			11.6%	%	

		☆Damage	21.3%	%	
		Lack of entertainment value	0.6%	%	
		Food facilities			
		Toilet provision, etc.			

Relationship between Visitor Management Strategy and the Subjects and Targets of Visitor Management

Appended Materials 1 Visitor Management Strategy for Individual Component Parts (Form C)

Mietsu Naval Dock (Component part 5-1)

I. Trend in daily visitors

Number of visitors (year-long total)	FY 2014	38,038	FY 2015	181,280	FY 2016	124,730	FY 2017	97,852	FY 2018	112,491
Number of visitors (daily peak)	FY 2014	3,204	FY 2015	2,050	FY 2016	2,269	FY 2017	1,224	FY 2018	2,653

II. Structure of Visitor Management Strategy for Individual Component Part

Visitor Management Strategy for Individual Component Part

(1) Subject	(2) Visitor management vision (targets)		(3) Management indicators *Select or add suitable indicators	(4) Setting of target levels			(5) Identification and implementation of measures			
			Indicators ☆: Common	**Current state**	**Targets**	**Method of measuring/calculating indicators *Making use of quantitative, qualitative, and visitor satisfaction surveys; making use of separate surveys, etc.**	**(a) Current state**	**(b) Issues**	**(c) Directionality of response**	**(d) Methods and measures**
Component part (A)	Physical damage No harm to land and materials of component part	1. The facilities and equipment are in place for physically protecting the component part	☆Number of close calls	0 incidents/year	0 incidents/year	Monitoring method: Patrols Targets: 0 incidents	➢ Protection of the property by earth covering ・To prevent deterioration of underground archaeological remains, they are not left exposed but are reburied. ➢ Protection of property by embankments ・River embankments prevent inflow of water into the property ➢ Monitoring of water levels and terrain changes ・City employees check for abnormalities based on Hayatsue River water level data. Changes in the terrain are checked for by visual inspection. ➢ Security camera installation ・A security camera on the third floor of the Memorial Museum is used to constantly monitor for problems. Installation of a security camera also helps prevent deliberate damage to the property.	➢ Monitoring of underground archaeological remains ・Of the elements comprising the substantial value as a World Heritage, the geographical features of the inlet can be confirmed visually, but the preservation status of elements buried underground, such as the dry dock embankment remains, cannot be confirmed visually.	➢ Installation of monitoring devices ・Rather than relying only on visual inspection, use of devices that can monitor the status of underground water, which may affect preservation of the underground remains, will be implemented on a trial basis.	➢ Establishment of monitoring methods ・Monitoring methods to be used in the future will be studied based on the results of testing underground water monitoring by device use. ➢ Everyday inspections performed by city employees
			☆Whether there are facilities/equipment for separation between visitors and the component part	Yes	Yes	Monitoring method: Patrols Targets: Yes				
			・Whether monitoring devices are used	None	Yes	Monitoring method: Patrols Targets: Yes				
		2. The operational arrangement for this purpose is in place	・Number of inspection patrols	1 time/month, 1 person	1 time/month, 1 person	Monitoring method: Inspection patrol records Targets: 1 time/month, 1 person	➢ City employees ・City employees check visually for abnormalities.			➢ (Everyday inspections performed by city employees)
			・Monitoring frequency	Daily	Daily	Monitoring method: Monitoring records Targets: Daily	➢ City employees ・City employees check public data for abnormalities in the Hayatsue River water level. ・Monitoring of underground water status using devices will be carried out on a trial basis.	➢ Analysis of results ・City employees are unable to analyze data collected using monitoring devices.	➢ Analysis of results by a professional service ・A professional service will be commissioned to perform analysis of the collected data.	➢ Establishment of a monitoring operational arrangement ・Based on the analysis results by the professional service, the future operational arrangement for monitoring will be studied.
Component part (A) / Surrounding environment (B)	-1 Safety and security Visitors' feeling of safety and security is sufficient	1. The facilities and equipment are in place for ensuring the safety and security of visitors	☆Whether there are facilities/equipment for separation between visitors and the component part	Yes	Yes	Monitoring method: Patrols Targets: Yes	Provision of crosswalks ➢ Crosswalks are provided at roads crossed when going from the guidance facility (Tsunetami Sano Memorial Museum) to the historic site. ➢ Ramp provision ・Ramps are provided giving wheelchair users access inside the historic site. ➢ Road sign installation ・Road signs giving directions to the historic site have been	➢ Pedestrian safety measures ・Pedestrian safety measures must be taken along the way from the newly relocated parking area to the guidance facility. ➢ Review of road signs ・Since traffic access will change with the opening of the Ariake Sea coastal road (running along the outer side	➢ Ensuring pedestrian safety ・To ensure safety of pedestrians going from the newly relocated parking area to the guidance facility, flow lines will be set, and guidance signs erected. ➢ Review of road signs ・The contents of road signs will be verified before the Ariake Sea coastal road is opened.	➢ Setting flow lines and erecting guidance signs, etc. ・Safe flow lines will be set and guidance signs erected as needed before the relocation of the parking area is completed. ➢ Installation of suitable road signs ・Road signs will be installed and maintained properly as necessary, working with the
			・Erecting signs showing the way from the newly relocated parking area to the guidance facility	None	Yes	Monitoring method: Patrols Targets: Yes (The necessary numbers are installed and properly managed)				
			・Road sign installation	Yes	Yes	Monitoring method: Patrols Targets: Yes				

			・Whether warning signs and protective fencing are installed	Yes	Yes	Monitoring method: Patrols Targets: Yes	installed on roads in the vicinity. ➢ Installation of warning signs and protective fencing ・Warning signs and fencing are installed to prevent people from falling into the river.	of the buffer zone), it may be necessary to review the current road signs.		relevant parties. ➢ Maintenance of warning signs and protective fencing
		2. The operational arrangement for this purpose is in place	・Number of inspection patrols	1 time/day, 1 person	1 time/day, 1 person	Monitoring method: Inspection patrol records Targets: 1 time/day, 1 person (Inspections are to be performed each day the guidance facility is open.)	➢ Patrols by city employees ・The patrols confirm whether there are any problems with signs or erection of protective fencing.			➢ Everyday inspections performed by city employees
			・Assignment of guidance staff	Yes	Yes	Monitoring method: Year-long assignment schedule Targets: Yes	➢ Deployment of guidance staff (guards) ・Personnel are assigned to guide vehicles and pedestrians in the vicinity of the site.	➢ Review of guidance methods ・Guidance methods will need to be reviewed with the change in flow lines after parking area relocation.	➢ Review of guidance methods ・Review the guidance methods based on the new visitor flow lines resulting from parking area relocation and guidance facility provision.	➢ Establishment of guidance methods ・Guards will be deployed for the time being, but changing over to other safety measures will be considered as the situation demands.
	-2 Promotion of understanding Visitors' feeling of satisfaction is sufficient	1. The facilities and equipment are in place for promoting and deepening understanding by visitors	・Opening of visitor center	Yes	Yes	Monitoring method: Project progress report Targets: To be opened during FY 2021	➢ Guidance facility and historic site ・Mietsu Time Cruise has been introduced as digital content using virtual reality devices and high-definition video, visually conveying the appearance of the Mietsu Naval Dock in its heyday.	➢ Guidance facility and historic site ・There are some exhibits (including explanatory signs) that do not reflect the latest excavation survey results, and presentation of accurate information to visitors is inadequate. *Existing facilities, etc. are at the provisional readiness stage. Work has begun toward full-scale improvement.	➢ Integrated presentation of guidance facility and historic site ・Visualization of the underground archaeological remains and other aspects will be aimed for through upgrading of the historic site (outdoors) and guidance facility (indoors) using digital technology to achieve an integrated presentation.	➢ Renewal of guidance facilities
			・Explanations at historic site	Yes	Yes	Monitoring method: Reflect implementation status of Mietsu Naval Dock Conservation, Restoration, Presentation, and Public Utilization Plan Targets: Yes	➢ Guidance facility (indoors) ・At the Mietsu Naval Dock information area, display of panels and models presenting an overview of the Mietsu Naval Dock and conveying its value, and presentation of the results of excavation surveys. ・For component parts outside the Saga Area, display pamphlets.	➢ Guidance facility (indoors) ・Exhibit space is insufficient and flow lines overlap. ・Explanation of the overall Sites of Japan's Meiji Industrial Revolution is inadequate.	➢ Upgrading of guidance facility (indoors) ・Before readying the historic site (outdoors), the guidance facility will be upgraded making use of the Tsunetami Sano Memorial Museum. Following on basic designing carried out in FY 2018, an opening date in FY 2021 will be aimed for.	
							➢ Historic site (outdoors) ・Installation of planar marking on underground archaeological remains indicating their location and scale, and photo panels and explanatory signs. ・World Heritage Plaque installation	➢ Historic site (outdoors) ・The current explanatory functions do not adequately provide concrete information.	➢ Upgrading of historic site (outdoors) ・After the guidance facility has been readied, outdoor displays will be developed that promote visitor understanding.	➢ Historic site upgrading following completion of excavation surveys
		2. The operational arrangement for this purpose is in place	・Assignment of guides	Yes	Yes	Monitoring method: Whether there are Tsunetami Sano Memorial Museum volunteer staff Targets: Yes	➢ Assignment of guides ・Tsunetami Sano Memorial Museum staff and guides show and explain the museum exhibits and component part. In addition, training sessions are held, and efforts are made to raise the skills of guides.	➢ Inconsistency in guide content ・Although training sessions are held, each of the guides tends to present different information. Moreover, the guides are growing older, making it urgent to develop successors.	➢ Enhancement of guide content and staffing ・Guide training sessions will need to continue being held and efforts made to raise the skills and consistency of content. Also, by actively urging participation in history lectures and events of various kinds, it will be aimed to acquire new guides. The optimal number of guides will be determined after the number of visitors has stabilized.	➢ Holding of training sessions ➢ Preparing a new guide text after completion of integrated exhibits ➢ Recruiting new guides
	-3 Hospitality The comfort of visitors is sufficient	1. The facilities and equipment are in place for promoting enjoyment by	・Enhancement of multi-lingual support on exhibit panels, explanatory	Yes	Yes	Monitoring method: Reflect implementation status of Mietsu Naval Dock Conservation, Restoration, Presentation and Public	➢ Installation of actual-size panels ・Panels giving a sense of the scale of the reburied remains are installed in the Mietsu Naval Dock information area.	➢ Multi-language support ・Multi-language support on information search panels and explanator videos in the Mietsu Naval Dock information area is not	➢ Upgrading of guidance facility ・Through use of digital technology, further enhancement of experiential content, multi-language	➢ Multi-language support ➢ Enhancement of digital content

		visitors	videos, etc. ・Enhancement of digital content	Yes	Yes	Utilization Plan Targets: Yes Monitoring method: Reflect implementation status of Mietsu Naval Dock Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Mietsu Time Cruise ・Virtual reality devices are used to convey visually to visitors the way things were when the Mietsu Naval Dock was in operation. Multi-language and subtitle support is also provided.	adequate.	support and other means, facilities will be upgraded to increase visitor enjoyment.	
		2. The operational arrangement for this purpose is in place	・Whether there are guides and expert staff	Yes	Yes	Monitoring method: Guidance facility staffing levels Targets: Yes	➢ Staff and guides ・Guidance is provided in accordance with visitor wishes.	➢ Advancing age of guides, staffing levels ・The guides are growing older, making it urgent to develop successors. Moreover, in tourism seasons with many visitors, tour groups often ask for a guide; but on some days such requests cannot be met readily with the current staffing levels.	➢ Enhancement of guide services ・Calling for participants in history lectures and events of various kinds, it will be aimed to acquire new guides. The optimal staffing levels will be determined after the number of visitors has stabilized.	➢ Recruiting new guides

			Current State	Targets	
Visitors (C)	A state in which visitors feel safety, security, comfort, and a sense of satisfaction, spend a sufficient amount of time at the component part to understand its contribution to the Outstanding Universal Value, and are motivated to visit again	☆Satisfaction	31.5%	33.8%	Monitoring method: Similar satisfaction surveys as conducted in the past year Targets: Attain average value
		☆Time spent	3.3%	3.2%	Targets: Status quo maintained
		☆Understanding Q14	21.2%	12.6%	Targets: Attain average value
		Q15	21.0%	15.17%	Targets: Attain average value
		☆Sparking of interest	21.2%	24.4%	Targets: Attain average value
		☆Intention to visit again	11.8%	13.2%	Targets: Attain average value
		Q18	19.7%	20.8%	Targets: Attain average value
		Q22	0.2%	0.2%	Targets: Status quo maintained
		☆Percentage of problems indicated Crowding	0.0%	0.0%	Targets: Reduce percentage of problems indicated to 0 (zero)
		Damage	2.8%	2.4%	Targets: Status quo maintained
		Lack of entertainment value	0.7%	0.5%	Targets: Status quo maintained
		Toilet provision, etc.			

Relationship between Visitor Management Strategy and the Subjects and Targets of Visitor Management

Appendix 1　Visitor Management Strategy for Individual Component Parts (Form C)

Kosuge Slip Dock (Component part 6-1)

I. Trend in daily visitors

Number of visitors (year-long total)	FY 2014	987	FY 2015	13,345	FY 2016	6,846	FY 2017	4,937	FY 2018	4,420
Number of visitors (daily peak)	FY 2014	–	FY 2015	–	FY 2016	154	FY 2017	95	FY 2018	31

II. Structure of Visitor Management Strategy for Individual Component Parts

Visitor Management Strategy for Individual Component Parts

(1) Subject	(2) Visitor management vision (targets)		(3) Management indicators *Select or add suitable indicators	(4) Setting of target levels			(5) Identification and implementation of measures			
			Indicators ☆: Common	Current state	Targets	Method of measuring/calculating indicators *Making use of quantitative, qualitative, and visitor satisfaction surveys; making use of separate surveys, etc.	(a) Current state	(b) Issues	(c) Directionality of response	(d) Methods and measures
Component parts (A)	Physical damage No harm to land and materials of component part	1. The facilities and equipment are in place for physically protecting the component part	☆Unsafe incidents ☆Existence of facilities /equipment for separation between visitors and the component part	0 incidents/year Yes (other than 9:00–16:00 Sat/Sun/holidays)	0 incidents/year Yes	Monitoring method: Guide activity records Targets: 0 times Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Targets: Yes	➢ Establishment of areas not open to the public ・The slip dock, including the exterior of the engine house, the shipway, and the rails, are always open to the public, but the right and left bank are still used for industrial purposes, so that area, which includes the yard, parking lot, and factory facilities, is basically closed to the public. The interior of the engine house is only open on weekends and holidays, when volunteer guides are present on site.	➢ Review and specification of tour route ・Because it is not clearly indicated which areas are open to the public and which are not, visitors sometimes walk around outside of the areas where the guides direct them.	➢ Setting of tour route ・Tour route will be set, and guide signs will be installed to clearly indicate the basic tour route and points of interest.	➢ Set tour route. ・Install guide signs to clearly indicate the basic tour route and points of interest, and provide guidance so that visitors do not enter areas other than those open to the public. ➢ Display rules such as the tour route and restricted areas.
		2. The operational arrangements for this purpose are in place	・Existence of monitoring system for times when site is unattended	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Targets: Yes	➢ Facilities managed by local volunteer guides ・In addition to deploying volunteer guides at the site on weekends and holidays, guards are also deployed during the tourist seasons when larger numbers of visitors are expected.	➢ Review of monitoring system ・Because the site is unattended on weekdays and from nighttime to early morning on weekends and holidays (when guides are not present), crime and fire prevention measures are needed.	➢ Strengthening of monitoring system ・Based on a cost-benefit analysis, the appropriate monitoring system should be adopted, such as the installation of surveillance cameras.	➢ As a crime and fire prevention measure, consider installing surveillance cameras for times when the site is unattended.
Component part (A) / Surrounding environment (B)	1 Safety and security Visitors' feeling of safety and security is sufficient	1. The facilities and equipment are in place for ensuring the safety and security of visitors	☆ Existence of facilities /equipment for separation between visitors and the component part	Yes (other than 9:00–16:00 Sat/Sun/holidays)	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Targets: Yes	➢ Utilization of public transport ・Because there are no parking spaces, visitors are encouraged to use public transportation to access the property.	➢ Review of tour route ・Because there is only one entrance, the flow of visitors overlaps with the flow of commercial vehicles. ・The fence is corroding and will need to be replaced in the near future for scenic and safety reasons.	➢ Installation of guide signs and replacement of fence ・Guide signs will be installed to address the safety of both visitors and the vehicles of business-related drivers. ・The deteriorating fence will be replaced.	➢ Set tour route. ➢ Install guide signs to clearly indicate the basic tour route and points of interest, and provide guidance so that visitors do not enter areas other than those open to the public. ➢ Display rules such as the tour route and restricted areas. ➢ Replace the deteriorating fence.
		2. The operational arrangements for this purpose are in place	・Existence of emergency contact network comprised of relevant individuals	None	Yes	Monitoring method: Contact network Targets: Yes	➢ Deployment of local volunteer guides ・Local volunteer guides are deployed during the day on weekends and holidays, and they provide safety guidance to visitors.	➢ Development of monitoring system ・There is a need to establish a system for operation management and business promotion that brings together the owners of the site, government agencies, experts, and local residents.	➢ Development of cooperation with private industry ・On weekdays and other times when it is not possible to deploy guards and volunteer guides, a system will be put in place for Mitsubishi affiliates to respond in an emergency and for contacting the owners of the property, Mitsubishi, and the city of Nagasaki.	➢ Establish a communication system such as a contact network to strengthen cooperation among Mitsubishi, its affiliates, the city of Nagasaki, and the guides to be prepared for an emergency.

	2 Promotion of understanding Visitors' feeling of satisfaction is sufficient	1. The facilities and equipment are in place for promoting and deepening understanding by visitors	・Existence of facilities that simulate the experience of being at the site when it was operational	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization and related facility provision plans, etc. Targets: Yes	➢ Establishment of educational facilities ・There are explanatory boards for the remains; remains signposts; signposts for officially designated Historic Sites, Places of Scenic Beauty, and Natural Monuments; and information boards. ➢ Establishment of facilities to provide information ・Related facilities are the Mitsubishi Heavy Industries Nagasaki Shipyard & Machinery Works Historical Museum and the Former Mitsubishi No. 2 Dock House within the Glover Gardens. ➢ Installation of signage ・As a means of conveying information during hours when guides are not available to provide explanations, including weekdays, early mornings, and nights, Signage is being used to introduce and explain the Sites of Japan's Meiji Industrial Revolution.	➢ Review of information and explanations ・Current explanatory boards are not sufficient to promote a full understanding of the Kosuge Slip Dock. ・There is no explanation of the position of the Nagasaki area and the Kosuge Slip Dock within the World Heritage site as a whole, nor is there an explanation of each constituent element—the engine house, hauling equipment, slip dock, stone masonry, etc. and the hauling mechanism. ・There is a need for a basic explanation of the value and of the overview and changes to the World Heritage and the Kosuge Slip Dock, as well as of the hauling mechanism, etc. ➢ Utilization of facilities to provide information ・At the related facilities to provide information, there are limited displays related to the Kosuge Slip Dock, and there has not been effective cooperation to date between those facilities and the on-site tours and guides. ➢ Updating of Signage ・Further improvements are needed to the system for providing information using the previously installed Wi-Fi. ➢ Consideration of opening and utilization of the engine house ・Consideration should be given to utilizing the actual remains when offering explanations.	➢ Improvement of information and explanatory facilities ・The existing information and explanations will be reviewed and new information and explanatory facilities will be installed. ➢ Improvement of facilities to provide information ・Displays related to the Kosuge Slip Dock will be placed in the related facilities to provide information, the understanding of the role played by the Slip Dock will be deepened, and effective collaboration will be carried out with the on-site tour and guides. ➢ Improvement of Signage ・The content of the Signage will be improved, utilizing digital videos and other means to allow visitors to visualize the hauling of boats onto the docks as part of the clarification and explanation of the industrial system. ➢ Opening and utilization of the engine house ・If the safety of the facility is ensured based on an evaluation of earthquake resistance, interior panel displays will be conducted or ways to allow visitors to view the interior of the house from outside will be considered. ➢ Utilization of technologies such as 3D measurement data as well as CG, AR, VR, etc. ・Visitors will be able to use Wi-Fi and their mobile phones to access videos that convey the image of how the hauling machinery such as the boiler and gear equipment worked and how a ship was hauled at the slip dock.	➢ Install new information and explanatory facilities along the tour route. ➢ Improve displays in related facilities and devise ways to produce synergistic effects with the on-site tours and the guide explanations. ➢ Consider new ways to open the engine house to the public and utilize it. ➢ Use technologies such as 3D measurement data as well as CG, AR, VR, etc., to allow guests to visualize how a ship was hauled, etc.
		2. The operational arrangements for this purpose are in place	・Training sessions for docents (including volunteer guides) ※Sessions are held in the city of Nagasaki and training covers the Nagasaki area.	1 time / year	1 time / year	Monitoring method: Reflect calendar and implementation status of events Targets: At least once per year	➢ Implementation of volunteer guide services ・On Saturdays, Sundays, and holidays, volunteers from the local community association serve as guides. Depending on the nature and route of the visitors, the content of the explanations is adjusted and so people have expressed a high degree of satisfaction with their visits.	➢ Cooperation with relevant parties ・There is a need to establish a system for operation management that brings together the owners of the site, government agencies, experts, and local residents. ➢ Understanding the latest information ・In order to appropriately disseminate information, there is a need to cooperate with Mitsubishi Heavy Industries Nagasaki Shipyard & Machinery Works Historical Museum as well as Nagasaki Prefecture, Nagasaki City, universities, experts, and	➢ Cooperation with relevant parties ・A collaborative system will be established for owners of the site, government agencies, and local volunteer guides.	➢ Provide training for docents (including the volunteer guides). ➢ Cultivate the guides. ➢ Establish a system for collaboration among the owners of the site, guides, government agencies, and experts. ➢ Understand the latest information. ➢ Provide guides with the latest information.

							others, and to constantly gather and assess the latest information. ➢ Provision of information to local volunteer guides ・Because local volunteer guides take turns to serve as guides on weekends and holidays, there is a need to create opportunities to consistently convey new information to them.		
	3 Hospitality The comfort of visitors is sufficient	1. The facilities and equipment are in place for promoting enjoyment by visitors	・Existence of facilities that simulate the experience of being at the site when it was operational	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan and plans for provision of tourism facilities, etc. Targets: Yes	➢ Installation of Signage ・As a means of conveying information during hours when guides are not available to provide explanations, including weekdays, early mornings, and nights, Signage is being used to introduce and explain the Sites of Japan's Meiji Industrial Revolution.	➢ Updating of Signage ・Further improvements are needed to the system for providing information using the previously installed Wi-Fi. ➢ Consideration of opening and utilization of the engine house ・Consideration should be given to utilizing the actual remains when offering explanations.	➢ Improvement of Signage ・The content of the Signage will be improved, utilizing digital videos and other means to allow visitors to visualize the hauling of boats onto the docks as part of the clarification and explanation of the industrial system. ➢ Opening and utilization of the engine house ・If the safety of the facility is ensured based on an evaluation of earthquake resistance, interior panel displays will be conducted or ways to allow visitors to view the interior of the house from outside will be considered. ➢ Utilization of technologies such as 3D measurement data as well as CG, AR, VR, etc. ・Visitors will be able to use Wi-Fi and their mobile phones to access videos that convey the image of how the hauling machinery such as the boiler and gear equipment worked and how a ship was hauled at the slip dock.	➢ Update the Signage content. ➢ Reconsider the way in which the engine house is open to and utilized by the public. ➢ Use technologies such as 3D measurement data as well as CG, AR, VR, etc. to allow guests to visualize how a ship was hauled, etc.
		2. The operational arrangements for this purpose are in place	・Existence of management and operating body for those facilities that simulate the experience of being at the site when it was operational	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan and plans for provision of tourism facilities, etc. Targets: Yes	➢ Public access to the interior of the engine house ・On weekends and holidays, the interior of the engine house is open for the public to visit when accompanied by local volunteer guides or other person approved by responsible managers. ➢ Implementation of volunteer guide services ・On Saturdays, Sundays, and holidays, volunteers from the local community association serve as guides. Depending on the nature and route of the visitors, the content of the explanations is adjusted and so people have expressed a high degree of satisfaction with their visits.	➢ Cooperation with relevant parties ・There is a need to establish a system for operation management that brings together the owners of the site, government agencies, experts, and local residents. ➢ Understanding the latest information ・In order to appropriately disseminate information, there is a need to cooperate with Mitsubishi Heavy Industries Nagasaki Shipyard & Machinery Works Historical Museum as well as Nagasaki Prefecture, Nagasaki City, universities, experts, and others, and to constantly gather and assess the latest information. ➢ Provision of information to local volunteer guides ・Because local volunteer guides take turns to serve as guides on weekends and holidays, there is a need to create opportunities to consistently convey new information to them.	➢ Cooperation with relevant parties ・A collaborative system will be established for owners of the site, government agencies, and local volunteer guides.	➢ Establish a system for collaboration among the owners of the site, guides, government agencies, and experts. ➢ Understand the latest information. ➢ Provide guides with the latest information.

Visitors (C)	A state in which visitors feel safety, security, comfort, and a sense of satisfaction, spend a sufficient amount of time at the component part to understand the value, and are motivated to visit again

	Current State	Targets	Monitoring method: Similar satisfaction surveys as conducted in the past year
☆Satisfaction	50.0%	50.0%	
☆Time spent	20.3%	10.5%	Targets: Attain average value, attain and maintain maximum value, reduce percentage of problems indicated to 0 (zero)
☆Understanding			
(Entire site)	2.3%	2.3%	
(Individual component part)	2.3%	2.3%	
☆Sparking of interest	39.8%	39.8%	
☆Intention to visit again			
(Relevant component part)	21.1%	21.1%	
(Other component parts)	37.5%	37.5%	
☆Percentage of problems indicated (Crowding)	2.3%	2.3%	
(Damage)	0.8%	0.3%	

Relationship between Visitor Management Strategy and the Subject and Targets of Visitor Management

Appendix 1　Visitor Management Strategy for Individual Component Parts (Form C)

Takashima Coal Mine (Component part 6-6)

I. Trend in daily visitors

Number of visitors (year-long total)	FY 2014	800	FY 2015	1,512	FY 2016	2,933	FY 2017	−	FY 2018	907
Number of visitors (daily peak)	FY 2014	−	FY 2015	−	FY 2016	150	FY 2017	19	FY 2018	14

II. Structure of Visitor Management Strategy for Individual Component Parts

Visitor Management Strategy for Individual Component Parts

(1) Subject	(2) Visitor management vision (targets)		(3) Management indicators *Select or add suitable indicators	(4) Setting of target levels			(5) Identification and implementation of measures			
			Indicators ☆: Common	Current state	Targets	Method of measuring/calculating indicators *Making use of quantitative, qualitative, and visitor satisfaction surveys; making use of separate surveys, etc.	(a) Current state	(b) Issues	(c) Directionality of response	(d) Methods and measures
Component parts (A)	Physical damage No harm to land and materials of component part	1. The facilities and equipment are in place for physically protecting the component part	☆Unsafe incidents ☆Existence of facilities /equipment for separation between visitors and the component part	9 incidents/year None	0 incidents/year Yes	Monitoring method: Inspection patrol records, etc. Target: 0 (zero) incidents Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes ※Gain approval based on talks with neighboring residents	➢ Soil cover for underground archeological remains ・Underground remains found during excavation and research have been covered again with soil and preserved underground. In order to appropriately convey those underground remains to visitors, full-scale vertical photographs of the remains were printed onto a ceramic panel installed aboveground.	➢ Crime & disaster prevention measures ・Because there is no fencing or other barrier, visitors can freely enter at any time. ・Since it is unmanned, measures are needed to prevent crime or disasters.	➢ Soil cover for underground archeological remains ・Following future excavations, the site will certainly be filled in again to prevent damage to the remains. ➢ Setting of tour route ・To ensure that visitors can envisage what the Takashima Coal Mine and nearby related sites were like at the time they were in operation, and can understand the role they played, tour routes will be established for each stage of the restoration and public usage phases, and entry will be restricted into locations other than those where the remains are explained via displays, etc.	➢ Conduct soil cover for underground remains ➢ Set tour route and control entry to other locations through displays, etc. ➢ Consider surveillance camera and other anti-crime, anti-disaster measures.
		2. The operational arrangements for this purpose are in place	・Cooperation with relevant organizations	Yes	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan	➢ Development of organizational framework ・Within the city of Nagasaki, the necessary personnel have been deployed in divisions such as cultural property, tourism, community center, world heritage, study of Nagasaki, municipal property, landscape planning, and urban planning, and they are working cooperatively. ➢ Cooperation with relevant organizations ・Working in cooperation with owners, local citizens, relevant organizations, the Agency for Cultural Affairs, the Cabinet Secretariat, government agencies related to World Heritage, as well as experts and research institutes in various fields in Japan and overseas, we are receiving the necessary guidance, advice, and support as we manage this historic site.	➢ Cooperation with relevant organizations ・Ongoing research is needed on conservation, to be undertaken in cooperation with universities and research institutes in Japan and overseas. ➢ Human resource development ・There is a need to train personnel to handle information dissemination	➢ Participation of local community ・In terms of daily maintenance and repairs, the involvement of the local community, including volunteer guides, local residents, universities, and local businesses will be encouraged as much as possible. ➢ Cooperation with relevant organizations ・Coordination will be done to ensure that all relevant parties understand the value of the property as world heritage. Relevant parties closely collaborate and conduct management and conservation. The city of Nagasaki will check and evaluate whether the frameworks for cooperation with related individuals and institutions are sufficient. ➢ Publication of plans and other information to promote understanding ・All research results, including excavation surveys, as well as information on the city of	➢ Use opportunities such as conferences, events, trainings, etc., to promote the engagement of relevant parties (guides, local residents, universities, businesses) in the daily maintenance and management and repairs in order to encourage understanding of the management and conservation of the site as world heritage. ➢ Release to the public all research results, including excavation surveys, as well as information on the city

								➢ Initiatives by private organizations ・NPOs, local community associations, and volunteer guides are working on conservation efforts and public awareness initiatives. ➢ Safety measures during disasters ・If a disaster occurs, or if a disaster is expected to occur, measures will be taken to ensure the safety of visitors and to preserve the site. If a disaster such as a natural disaster occurs, the status of the property will be assessed quickly.	and survey, as well as personnel with advanced knowledge in preservation and coal mining. ➢ Support for private organizations ・A system is needed to provide opportunities to learn about the value of the property, to provide opportunities to accurately share information on the status and plans for conservation and utilization, and to continuously support local resident guides and the activities of private businesspeople.	Nagasaki's initiatives and plans related to conservation and utilization, will be released to the public with the aim of promoting understanding of the value of the site as world heritage and of the management and maintenance required to protect it. ・An annual check will be carried out of whether conservation and management are being adequately conducted, whether the relevant parties are exchanging information and opinions appropriately, and whether cooperative frameworks are functioning well, such as frameworks for asking the expert committee for guidance and advice as needed. These checks and evaluations will be summarized and reported upon in the annual report. ➢ Control through bus loops and visitor flows ・Through adjustments to the service status of bus loops on the island and on-site visitor controls, the appropriate number of visitors will be maintained, and by controlling the flow of visitor traffic, the impact on the remains will be limited.	of Nagasaki's initiatives and plans, etc. ➢ Control onsite flow of visitors.
Component part (A) / Surrounding environment (B)	-1 Safety and security Visitors' feeling of safety and security is sufficient	1. The facilities and equipment are in place for ensuring the safety and security of visitors	☆ Existence of facilities /equipment for separation between visitors and from the component parts ・ Installation of fall prevention fences and handrails in visitor spaces and passageways	None Yes	Yes Yes	Monitoring method: : Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes ※Gain approval based on talks with neighboring residents Monitoring method: : Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Installation of information boards ・Information boards are installed in a number of locations within the island. ➢ Direction signs to related facilities ・There are signs indicating the directions from the ferry terminal to the Hokkei Pit (Takashima Coal Mine remains) and related facilities near the site such as the Glover's Secondary Residence. ➢ Maintenance of transport methods ・From the Takashima harbor, visitors can take a loop bus, rental car, or rental bicycle. ➢ Installation of ramps and handrails ・Entrance ramps and handrails have been installed.	➢ Lack of multi-lingual guide signs ➢ Relocation of ramps and handrails ・After considering the way it is presented, thought will be given to shifting the entrance ramp.	➢ Installation of guide signs ・Signs will be installed to guide visitors to nearby facilities. Explanatory signs will feature old photographs and simple content, and using a uniform design and scale that is in keeping with the landscape, methods will also be used to address the needs of people with disabilities and foreign visitors. ➢ Route markers ・The pavement will be marked to indicate the route and guide visitors in keeping with the appropriate tour flow. ➢ Improvement of management and public facilities ・In the area adjacent to the remains of Glover's Secondary Residence, a visitor parking lot, bicycle	➢ Adopt methods to make guide signs accessible for people with disabilities and foreigners. ➢ Mark the route. ➢ Consider installation of parking spaces, toilets, and benches near the remains of the Glover's Secondary Residence.

									parking lot, toilets, and benches will be installed. ➢ Safety measures ・Measures will be taken to prevent the collapse of the western cliff face. ・Measures will be taken to prevent the sediment deposition. ➢ Development of skills of relevant individuals ・In order to respond to the increasingly diverse visitors, training will be held in such areas as communication skills, hospitality techniques, Japanese and foreign cultures and languages, and so on in response to the capacity and skills of the guides. In addition, emergency evacuation drills will be held with the goal of ensuring the safety of visitors.	➢ Possibility of collapse of western cliff face an issue	➢ Take measures to prevent the collapse of the western cliff face. (2025–) ➢ Consider surveillance cameras and other crime and disaster prevention measures. ➢ Implement training to be able to respond to increasingly diverse visitors. ➢ Conduct evacuation guidance training.
		2. The operational arrangements for this purpose are in place	・Cooperation with relevant organizations	Yes	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan	➢ Measures during disasters ・If a disaster occurs, or if a disaster is expected to occur, measures will be taken to ensure the safety of visitors and to preserve the site. ➢ Development of organizational framework ・Within the city of Nagasaki, the necessary personnel have been deployed in divisions such as cultural property, tourism, community center, world heritage, study of Nagasaki, municipal property, landscape planning, and urban planning, and they are working cooperatively. ➢ Cooperation with relevant organizations ・Working in cooperation with owners, local citizens, relevant organizations, the Agency for Cultural Affairs, the Cabinet Secretariat, government agencies related to World Heritage, as well as experts and research institutes in various fields in Japan and overseas, we are receiving the necessary guidance, advice, and support as we manage this historic site. ➢ Initiatives by private organizations ・NPOs, local community associations, and volunteer guides are working on conservation efforts and public awareness initiatives.	➢ Safety measures during disasters If a disaster occurs, or if a disaster is expected to occur, measures are needed to ensure the safety of visitors and to preserve the site.	➢ Safety measures during disasters If a disaster occurs, or if a disaster is expected to occur, measures will be taken to ensure the safety of visitors and to preserve the site.	➢ Maintain strong cooperation with relevant institutions to ensure that measures are implemented immediately in order to maintain the safety of visitors and preserve the site if an accident, disaster, or other emergency occurs.
	2 Promotion of understanding Visitors' feeling of satisfaction is sufficient	1. The facilities and equipment are in place for promoting and deepening understanding by visitors	・Training sessions for docents (including volunteer guides) ※Sessions are held in the city of Nagasaki and training covers the Nagasaki area. ・Site displays (not including 2025–)	1 time / year None	1 time / year Yes	Monitoring method: Reflect calendar and implementation status of events Targets: At least once per year Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan and plans for provision of tourism facilities, etc.	➢ Installation of guidance facilities ・The Takashima Coal Museum, which was opened in 1988 as a facility to introduce the Takashima Coal Mine, features photographs that	➢ Guidance to the property ・A proactive way is needed to guide visitors from the Takashima Coal Museum to the Takashima Coal Mine. ➢ Dissemination of information in the guidance facilities ・There is insufficient dissemination of information at the Takashima Coal Museum of the value of the	➢ Guidance to the property ・Access to the island will be improved to proactively guide visitors from the Takashima Coal Museum to the Takashima Coal Mine. ➢ Improvement of guidance facilities ・The Takashima Coal Museum will be placed as the core facility for providing information on the Takashima Coal Mine, and its displays	➢ Review and reconsider boat and bus transport in order to guide visitors from the Takashima Coal Museum to the property. ➢ Improve displays and explanations at the Takashima Coal Museum. ➢ Install boards explaining the

			・Installation of markings of assumed location of buildings and tram rail remains based on old photographs (not including 2025–)	None	Yes	Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan and plans for provision of tourism facilities, etc. Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan and plans for provision of tourism facilities, etc. Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan and plans for provision of tourism facilities, etc.	depict the history of Takashima as it developed along with the coal mine. It also has displays of the equipment used at the mine, a model that shows the mine shafts at that time, mine carts and other heavy machinery, the clothing worn by the miners, and so on. Information and explanatory boards are installed that show the various remains on the island. In addition, there is a model of Hashima (1/100th scale) outside. ➢ Installation of World Heritage Plaque ・The commemorative World Heritage Plaque was installed. ➢ Installation of explanatory boards ・Installing explanatory boards that offer an overview of the remains. ➢ Installation of diorama ・Installing a diorama that allows visitors to visually understand the overview of the remains. ➢ Installation of ceramic panel photographs of underground remains ・In order to allow visitors to visualize what the site looked like before the remains were re-buried, ceramic photo panels are being installed. ➢ Installation of historic site signpost ・Installing a signpost to indicate that the property is a historic site. ➢ Dissemination through other media ・Information is being made available to the public through a leaflet (4 languages) and through websites: “Takashima Kanko Nabi,” “Atto Nagasaki,” and “Nagasaki-shi Sekai Isan Suishinshitsu Homepage.” ➢ Install Signage ・Information can be accessed on mobile devices.	Takashima Hokkei Pit (part of the Takashima Coal Mine), and so a better way to convey that value is needed. ➢ Effective conveyance ・Because the coal mine facilities cannot be ascertained aboveground, an effective method is needed to convey the location of facilities at the time they were in use and the mining system. ➢ Renewal of Signage ・Signage, which allows visitors to access information on their mobile devices that lets them learn about the history of the site and the value of this world heritage, must be properly updated with the latest information.	and explanations of other coal mines in Japan and of the “Sites of Japan’s Meiji Industrial Revolution” will be improved. Connecting the historical nature of the sites from the Takashima Hokkei Pit to the Nakanoshima Coal Mine and the Hashima Coal Mine, the museum will clarify the excavation process of the coal mining industry’s production process. ➢ Effective conveyance ・Boards explaining the underground remains, explanatory boards that show the assumed location of related remains based on photographic and other evidence, and guide signs pointing to nearby facilities will be installed. Explanatory boards will feature old photographs and simple content, and using a uniform design and scale that is in keeping with the landscape, methods will also be used to address the needs of people with disabilities and foreign visitors. ➢ Development of a tour route ・A board explaining the mining-related remains and guide signs to the nearby facilities will be installed, and a Takashima Coal Mine Guided Course will be set that connects the Takashima Coal Museum and the related sites (all of Takashima, the viewing point for the Hashima and Nakanoshima Coal Mines, etc.）in historical order. ➢ Creation of a viewing plaza ・Create a viewing plaza where explanatory boards and such can be placed in a way that allows visitors to view the facilities from the same angles as are shown in old photographs. ➢ Renewal of Signage ・Signage, which allows visitors to access information on their mobile devices that lets them learn about the history of the site and the value of this world heritage, will be properly updated with the latest information. ➢ Use of 3D, VR, and other technologies ・Actively use 3D, VR, and other technologies to provide visual content that gives visitors a real sense of what the site looked like when it was operational. ➢ Improvements to pamphlet, website, etc. ・The pamphlets, website, and other media will be improved in order to disseminate information on the overall Takashima Coal Mine sites in a way that lets visitors understand the individual remains of the mines and their relationship to one another.	underground remains, explanatory boards that show the assumed location of related remains based on photographic and other evidence, and guide signs pointing to nearby facilities. ➢ Consider establishing a “Takashima Coal Mine Guided Course" that connects the Takashima Coal Museum and the related sites. ➢ Install explanatory boards, etc., that enable visitors to view the site from the same angle as old photographs. ➢ After disposing of the village wastewater treatment facility, consider repurposing the relevant building as a visitor learning facility and a rest area. (2029–) ➢ Create a tour route that leads visitors to the old coal loading port, the Glover’s Secondary Residence, etc. ➢ Install guide signs that are marked in the pavement along the roads in keeping with the appropriate tour flow. ➢ In order to allow visitors to imagine how the site looked when the mine was operational, secure the view between the property and the old coal loading port. (2029–) ➢ Properly update Signage with the latest information. ➢ Use 3D, VR, and other digital technology. ➢ Periodically review contents of pamphlets, websites, and other forms of information dissemination.

								➢ Deliberations on removing unnecessary items ・Because of the "village wastewater treatment facility," which is unrelated to the mining facility, it is not possible to visually convey to visitors the system for transporting coal to the loading port.	➢ Effective use of space created after removing unnecessary items ・After disposing of the village wastewater treatment facility, the relevant building will be repurposed as a visitor learning facility where guests can learn about the Takashima Coal Mine and the mining system, and as a rest area. Also, a new tour route will be created that leads visitors to the old coal loading port on the north side. ➢ Installation of guide signs ・Guide signs will be marked in the pavement along the roads in keeping with the appropriate tour flow. ➢ Securing of views ・In order to provide views that allow visitors to compare the current site with old photographs and envision the entire mining system—mining the coal, transporting to the port, and loading it onto ships—after the use of the village wastewater treatment facility has been discontinued it will be removed and the view between the Takashima Hokkei Pit and the old coal loading port will be secured. ➢ Creation of new tour route ・In order to expand the image for visitors, a new tour route will be created that will guide them along a path where they can view the site from the same perspective as seem in old photographs and that will guide them to the old coal loading port. ➢ Guide to the property ・A visitor route will be created that connects the Takashima Hokkei Pit, the old coal loading port, the Glover's Secondary Residence, and so on.	
		2. The operational arrangements for this purpose are in place	・Deployment of docents (including volunteer guides)	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan and plans for provision of tourism facilities, etc. Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan and plans for provision of tourism facilities, etc.	➢ Development of organizational framework ・Within the city of Nagasaki, the necessary personnel have been deployed in divisions such as cultural property, tourism, community center, world heritage, study of Nagasaki, municipal property, landscape planning, and urban planning, and they are working cooperatively. ➢ Cooperation with relevant organizations ・Working in cooperation with owners, local citizens, relevant organizations, the Agency for Cultural Affairs, the Cabinet Secretariat, government agencies related to World Heritage, as well as experts and research institutes in various fields in Japan and overseas, we are receiving the necessary guidance, advice, and support as we manage this historic site. ➢ Initiatives by private organizations	➢ Cooperation with relevant organizations ・In order to utilize Takashima Coal Mine as a resource for study and research, while at the same time working in cooperation with coal mine sites in other regions, such as the Ikeshima Coal Mine, to disseminate information, cooperation is needed not only with the Nagasaki Museum of History and Culture (operated by Nagasaki Prefecture and Nagasaki City), but also museums and survey institutes in other areas. ➢ Support for private organizations	➢ Participation of local community ・With regard to the content of the explanations offered by the local resident volunteer guides, by considering not only the results of survey conducted to date but also content developed in cooperation with local residents, the explanations will be improved to be more unbiased, precise, and easy to understand, which will further raise the interest of the local residents. In addition, in order to foster greater affinity for the local resources, the participation of local residents will be encouraged in the setting of guide courses conducted at the Takashima Coal Mine and Takashima Coal Museum and in the planning of the new tour route. ➢ Cooperation with universities ・We will continue to carry out joint survey to utilize the expertise of universities. ➢ Participation of local business	➢ Encourage participation of local residents when planning the new tour route. ➢ Provide training for docents (including volunteer guides). ➢ Carry out joint survey to utilize the expertise of universities. ➢ Cultivate guides.

							・NPOs, local community associations, and volunteer guides are working on conservation efforts and public awareness initiatives.	・A system is needed to provide opportunities to learn about the value of the property, to provide opportunities to accurately share information on the status and plans for conservation and utilization, and to continuously support local resident guides and the activities of private businesspeople. ➢ Human resource development In order to continuously implement site utilization and information dissemination in the future, there is a need to train personnel to handle information dissemination and survey, as well as personnel with advanced knowledge in preservation and coal mining.	・Assistance will be provided to train tour guides with the goal of strengthening cooperation with local businesses.	
	-3 Hospitality The comfort of visitors is sufficient	1. The facilities and equipment are in place for promoting enjoyment by visitors	・Use of 3D, VR, and other technologies	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan and plans for provision of tourism facilities, etc. Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan and plans for provision of tourism facilities, etc.	➢ Installation of Signage ・Information can be accessed on mobile devices.	➢ Renewal of Signage ・Signage, which allows visitors to access information on their mobile devices that lets them learn about the history of the site and the value of this world heritage, must be properly updated with the latest information.	➢ Renewal of Signage ・Signage, which allows visitors to access information on their smartphones that lets them learn about the history of the site and the value of this world heritage, will be properly updated with the latest information. ➢ Use of 3D, VR, and other technologies ・Actively use 3D, VR, and other technologies to provide visual content that gives visitors a real sense of what the site looked like when it was operational. ➢ Creation of new tour route ・In order to expand the image for visitors, a new tour route will be created that will guide them along a path where they can view the site from the same perspective as seem in old photographs and that will guide them to the old coal loading port. ➢ Development of visitor route ・A visitor route will be created that connects the Takashima Hokkei Pit, the old coal loading port, the Glover's Secondary Residence, and so on. ➢ Installation of rest facilities ・Rest facilities will be installed, avoiding the areas surrounding the remains. ➢ Creation of viewing space ・On the site of the village wastewater treatment facility, a viewing space will be installed with a diorama and explanatory board. ➢ Improvements to surrounding areas ・The site of the pool that was adjacent to the Glover's Secondary Residence will be turned into a park, and using the existing park and fishing port facilities, a visitor parking lot, bicycle parking lot, rest facility, toilets, and benches will be installed.	➢ Properly update Signage with the latest information. ➢ Use 3D, VR, and other digital technology. ➢ Create a new tour route. ➢ Consider the creation of a visitor route that connects the Takashima Hokkei Pit, the old coal loading port, the Glover's Secondary Residence, and so on. ➢ Consider installation of rest facilities. ➢ Consider creation of a viewing space. ➢ Turn the site adjacent to the Glover's Secondary Residence into a park.

		2. The operational arrangements for this purpose are in place	・Deployment of docents (including volunteer guides)	None	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan and plans for provision of tourism facilities, etc. Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan and plans for provision of tourism facilities, etc.	➢ Development of organizational framework ・Within the city of Nagasaki, the necessary personnel have been deployed in divisions such as cultural property, tourism, community center, world heritage, study of Nagasaki, municipal property, landscape planning, and urban planning, and they are working cooperatively. ➢ Cooperation with relevant organizations ・Working in cooperation with owners, local citizens, relevant organizations, the Agency for Cultural Affairs, the Cabinet Secretariat, government agencies related to World Heritage, as well as experts and research institutes in various fields in Japan and overseas, we are receiving the necessary guidance, advice, and support as we manage this historic site. ➢ Free access ・There is no financial burden on visitors.	➢ Cooperation with relevant organizations ・In order to utilize Takashima Coal Mine as a resource for study and research, while at the same time working in cooperation with coal mine sites in other regions, such as the Ikeshima Coal Mine, to disseminate information, cooperation is needed not only with the Nagasaki Museum of History and Culture (operated by Nagasaki Prefecture and Nagasaki City), but also museums and survey institutes in other areas ➢ Human resource development ・In order to continuously implement site utilization and information dissemination in the future, there is a need to train personnel to handle information dissemination and survey, as well as personnel with advanced knowledge in preservation and coal mining.	➢ Participation of local community ・With regard to the content of the explanations offered by the local resident volunteer guides, by considering not only the results of survey conducted to date but also content developed in cooperation with local residents, the explanations will be improved to be more unbiased, precise, and easy to understand, which will further raise the interest of the local residents. In addition, in order to foster greater affinity for the local resources, the participation of local residents will be encouraged in the setting of guide courses conducted at the Takashima Coal Mine and Takashima Coal Museum and in the planning of the new tour route.	➢ Share information with guides and other relevant parties about conservation of the property, survey findings, etc.

Visitors (C)	A state in which visitors feel safety, security, comfort, and a sense of satisfaction, spend a sufficient amount of time at the component part to understand the value, and are motivated to visit again		Current State	Targets	Monitoring method: Similar satisfaction surveys as conducted in the past year Targets: Attain average value, attain and maintain maximum value, reduce percentage of problems indicated to 0 (zero)
		☆Satisfaction	17.5%	33.8%	
		☆Time spent	48.3%	10.5%	
		☆Understanding			
		(Entire site)	8.4%	8.4%	
		(Individual component part)	9.8%	9.8%	
		☆Sparking of interest	27.3%	27.3%	
		☆Intention to visit again			
		(Relevant component part)	15.4%	15.4%	
		(Other component parts)	29.4%	29.4%	
		☆Percentage of problems indicated (Crowding)	0.7%	0.7%	
		(Damage)	0.0%	0.0%	

Relationship between Visitor Management Strategy and the Subject and Targets of Visitor Management

Appendix 1　Visitor Management Strategy for Individual Component Parts (Form C)

Hashima Coal Mine (Component part 6-7)

I. Trend in daily visitors

Number of visitors (year-long total)	FY 2014	191,881	FY 2015	286,936	FY 2016	265,555	FY 2017	291,665	FY 2018	187,455
Number of visitors (daily peak)	FY 2014	–	FY 2015	–	FY 2016	1,282	FY 2017	1,403	FY 2018	1,408

II. Structure of Visitor Management Strategy for Individual Component Parts

Visitor Management Strategy for Individual Component Parts

(1) Subject	(2) Visitor management vision (targets)		(3) Management indicators *Select or add suitable indicators	(4) Setting of target levels			(5) Identification and implementation of measures			
			Indicators ☆: Common	Current state	Targets	Method of measuring/calculating indicators *Making use of quantitative, qualitative, and visitor satisfaction surveys; making use of separate surveys, etc.	(a) Current state	(b) Issues	(c) Directionality of response	(d) Methods and measures
Component parts (A)	Physical damage No harm to land and materials of component part	1. The facilities and equipment are in place for physically protecting the component part	☆Unsafe incidents ☆Existence of facilities /equipment for separation between visitors and the component part	0 incidents/year Yes	0 incidents/year Yes	Monitoring method: Inspection patrol records, etc. Target: 0 (zero) incidents Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Install fencing to prevent entry into areas other than visitor facilities ・Fencing is installed around the viewing plazas in the visitor facility and along the tour route to prevent people from going outside of the visitor facilities. ➢ Installation of warning signs ・Signs warning that it is forbidden to be on the island without permission have been installed in a number of places around the perimeter of the island. Also, in the viewing plazas for tourists on the island, there is a sign installed that offers several cautions for those using the plazas. ➢ Installation of surveillance cameras ・Using fixed-point cameras, it is possible to check for unusual occurrences on the island.	➢ Limits on tour area ・Because the number of people seeking to land on the island is not expected to decrease, there is a need for continued control of the number of people allowed on the island at one time and the length of time they can stay. ➢ Management & maintenance of visitor facilities ・Because the site is on the ocean, there is a strong possibility of damage from typhoons and other natural disasters, natural deterioration occurs at a relatively fast pace, and all materials and equipment for repairs must be brought in by boat, which makes the cost of managing and maintaining the visitor facilities, including protective fencing, quite high.	➢ Limits on tour area ・When people land on the island, they will be guided only to the production facility zone so that they can understand the way the Hashima Coal Mine was when it was in operation, the role that it played, and so on. The impact on the facility will be contained by prohibiting entry to areas outside of the tour route. ➢ Tour area public facilities ・Considering the impact on the remains and the fact that it is situated on an island in the sea, and given that a short time on the island is adequate, there are no plans to install rest areas, toilets, benches, or lighting for visitors.	➢ Limit the impact on the remains by continuing to limit the tour area.
		2.The operational arrangements for this purpose are in place	・Rules restricting access to site and time spent at site	Yes	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan	➢ Limiting of areas where entrance is permitted ・Rules have been established to prevent entry to areas other than the visitor facilities under the “Ordinance on limiting access to Hashima,” and landings on the island are restricted to the visitor facilities created by the city of Nagasaki. The number of passengers on tour boats used to bring tourists to the island is limited to 20–222 people per boat, each company can operate two trips per day, and visitors can spend no more than one hour on the island. ➢ Daily inspections ・The local fishery	➢ Crime & disaster prevention measures ・This is fundamentally an unmanned facility, but there is a system in place for the local fishery cooperative and companies that operate tour boats to quickly notify the city of Nagasaki if they discover any intruders on the island or any abnormalities in the constituent elements of the site. ➢ Human resource development ・In order to utilize this property as a resource for study and research and to steadily disseminate information in cooperation with the remains of coal mines in	➢ Controls on operation of landing tour boats ・For the island as a whole, by using the ordinance properly and controlling the operational conditions for tour boats to the island, the appropriate number of visitors who land on the island will be maintained and the impact on the remains will be limited. ➢ Daily management & maintenance ・By involving volunteer guides, local residents, universities, and local businesses, it will raise interest and lead to human resource development. Also, it will decrease the cost burden. ➢ Surveying the site in cases of unusual	➢ Continue to control landings on the island by tour boats. ➢ Create a mechanism for rapid,

							cooperative has been asked to conduct daily inspections of the Hashima Coal Mine, and there is a system in place for them to quickly notify the city of Nagasaki of any natural disaster or deterioration. ➢ Development of an organizational framework ・Within the city of Nagasaki, the necessary personnel have been deployed in divisions such as cultural property, tourism, community center, world heritage, study of Nagasaki, municipal property, landscape planning, and urban planning, and they are working cooperatively. ➢ Cooperation with relevant organizations ・Working in cooperation with owners, local citizens, relevant organizations, the Agency for Cultural Affairs, the Cabinet Secretariat, government agencies related to World Heritage, as well as experts and research institutes in various fields in Japan and overseas, we are receiving the necessary guidance, advice, and support as we manage this historic site.	other areas, there is a need to train personnel to handle information dissemination and survey, as well as personnel with advanced knowledge in the areas of structural preservation and coal mining. Also, there needs to be a system for providing ongoing support for the local resident guides and private businesspeople who are conveying information to the tourists who visit the property, including providing opportunities for them to learn about the value of the property and opportunities to convey accurate information to them about the status of and plans for conservation and utilization of the site.	weather or disasters ・If a natural disaster or other event occurs, efforts will be made to quickly assess the status of the remains. ➢ Response at times of disaster or when there is the potential for a disaster to occur ・If a disaster strikes, or if there is the risk of a disaster occurring, measures will be carried out to ensure the safety of visitors and the preservation of the remains. ➢ Development of an organizational framework ・Within the city of Nagasaki, the necessary personnel have been deployed in divisions such as cultural property, tourism, community center, world heritage, study of Nagasaki, municipal property, landscape planning, and urban planning, and they are working cooperatively. ➢ Cooperation with relevant organizations ・Working in cooperation with owners, local citizens, relevant organizations, the Agency for Cultural Affairs, the Cabinet Secretariat, government agencies related to World Heritage, as well as experts and research institutes in various fields in Japan and overseas, we are receiving the necessary guidance, advice, and support as we manage this historic site.	cooperative response by owners, tour boat companies, fishermen, and all relevant parties within the Nagasaki City government in case of a disaster or unusual conditions, or if there is the risk of a disaster or unusual conditions occurring. ➢ Secure the posts and personnel needed in the Nagasaki municipal government for conservation and public utilization.
Component parts (A) / Surrounding environment (B)	1 Safety and security Visitors' feeling of safety and security is sufficient	1. The facilities and equipment are in place for ensuring the safety and security of visitors	☆Existence of facilities /equipment for separation between visitors and the component part	Yes	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Install fencing to prevent entry into areas other than visitor facilities ・Fencing is installed around the viewing plazas in the visitor facilities and along the tour route to prevent people from going outside of the visitor facilities.	➢ Management & maintenance of visitor facilities ・Because the site is on the ocean, there is a strong possibility of damage from typhoons and other natural disasters, natural deterioration occurs at a relatively fast pace, and all materials and equipment for repairs must be brought in by boat, which makes the cost of managing and maintaining the visitor facilities, including protective fencing, quite high.	➢ Improvement of visitor facilities ・A new tour route will be created using minimal space. Also, the appropriate management and maintenance will be undertaken, including improvements to the visitor facilities overall. ➢ Tour area public facilities ・Considering the impact on the remains and the fact that it is situated on an island in the sea, and given that a short time on the island is adequate, there are no plans to install rest areas, toilets, benches, or lighting for visitors.	➢ Continue to maintain the visitor facilities, including protective fencing, and respond quickly and appropriately if a disaster strikes or if natural deterioration occurs.
		2. The operational arrangements for this purpose are in place	・ Deployment of safety guides	Yes	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan	➢ Limiting of areas where entrance is permitted ・Rules have been established to prevent entry to areas other than the visitor facilities under the "Ordinance on limiting access to Hashima," and landings on the island are restricted to the visitor facilities created by the city of Nagasaki. ➢ Deployment of safety	➢ Deployment of safety guides when visitors are on the island ・There is a need for continued safety guidance for visitors. ➢ Ways to respond to increasingly diverse visitors ・In order to respond to the increasingly diverse visitors, training will be held in such areas as	➢ Response at times of disaster or when there is the potential for a disaster to occur ・If a disaster strikes, or if there is the risk of a disaster occurring, measures will be carried out to ensure the safety of visitors and the preservation of the remains.	➢ ・Create guidelines, procedures, etc., for responding to disasters and natural deterioration.

							guides when visitors are on the island ・The staff of boat companies that operate the tour boats that land on the island are providing safety guidance to visitors. ➢ Development of an organizational framework ・Within the city of Nagasaki, the necessary personnel have been deployed in divisions such as cultural property, tourism, community center, world heritage, study of Nagasaki, municipal property, landscape planning, and urban planning, and they are working cooperatively. ➢ Cooperation with relevant organizations ・Working in cooperation with owners, local citizens, relevant organizations, the Agency for Cultural Affairs, the Cabinet Secretariat, government agencies related to World Heritage, as well as experts and research institutes in various fields in Japan and overseas, we are receiving the necessary guidance, advice, and support as we manage this historic site.	communication skills, hospitality techniques, Japanese and foreign cultures and languages, and so on in response to the capacity and skills of the guides. In addition, emergency evacuation drills will be held with the goal of ensuring the safety of visitors. ➢ Human resource development ・In order to utilize this property as a resource for study and research and to steadily disseminate information in cooperation with the remains of coal mines in other areas, there is a need to train personnel to handle information dissemination and survey, as well as personnel with advanced knowledge in the areas of structural preservation and coal mining. Also, there needs to be a system for providing ongoing support for the local guides and private businesspeople who are conveying information to the tourists who visit the property, including providing opportunities for them to learn about the value of the property and opportunities to convey accurate information to them about the status of and plans for conservation and utilization of the site.	➢ Development of an organizational framework ・Within the city of Nagasaki, the necessary personnel have been deployed in divisions such as cultural property, tourism, community center, world heritage, study of Nagasaki, municipal property, landscape planning, and urban planning, and they are working cooperatively. ➢ Cooperation with relevant organizations ・Working in cooperation with owners, local citizens, relevant organizations, the Agency for Cultural Affairs, the Cabinet Secretariat, government agencies related to World Heritage, as well as experts and research institutes in various fields in Japan and overseas, we are receiving the necessary guidance, advice, and support as we manage this historic site. ➢ Capacity-building for relevant actors ・In order to respond to the increasingly diverse visitors, training will be held in such areas as communication skills, hospitality techniques, Japanese and foreign cultures and languages, and so on in response to the capacity and skills of the guides. In addition, emergency evacuation drills will be held with the goal of ensuring the safety of visitors.	➢ ・Secure the posts and personnel needed in the Nagasaki municipal government for conservation and public utilization. ➢ ・Create a mechanism for a rapid, cooperative response by owners, tour boat companies, fishermen, and all relevant parties within the Nagasaki City government in case of a disaster or unusual conditions, or if there is the risk of a disaster or unusual conditions occurring. ➢ ・Communicate closely with relevant organizations and work together to share information.
	2 Promotion of understanding Visitors' feeling of satisfaction is sufficient	1. The facilities and equipment are in place for promoting and deepening understanding by visitors	・Existence of guides	Yes	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and relevant plans for provision of tourism facilities, etc. Targets: Items defined in	➢ Installation of guidance facilities ・Takashima Coal Museum: Founded in 1988 as a facility to introduce the remains of the Takashima Coal Mine, the museum features photographs that depict the history of	➢ Effective conveyance ・Because it is hard to fully convey the history behind the Hashima Coal Mine, its world heritage value, and other aspects onsite, there is a need to come up with effective methods to explain those aspects of	➢ Information and explanations provided by guides ・In light of Hashima's special landscape, no new explanatory signs will be installed. The guides will provide information and explanations.	➢ ・Continue to have guides provide information and explanations.

					Conservation, Restoration, Presentation and relevant plans for provision of tourism facilities, etc.	Takashima as it developed along with the coal mine. It also has displays of the equipment used at the mine, a model that shows the mine shafts at that time, mine carts and other heavy machinery, the clothing worn by the miners, and so on. Information and explanatory boards are installed that show the various remains on the island. In addition, there is a model of Hashima (1/100th scale) outside. ・Nagasaki City Gunkanjima Museum: After first opening in 2003, the museum was renovated in 2009 to coincide with the start of sightseeing tours that land on Gunkanjima, and in 2016 it moved to a nearby public facility and expanded the content of its displays. ・Through exhibits that feature panels, photographs, and models, it introduces the value and historic landscape of the Hashima Coal Mine as part of the World Heritage "Sites of Japan's Meiji Industrial Revolution," the history of the mine, the changes in the landfill, life on Hashima, and so on. It also shows the current state of Hashima using the latest 4K video. ➢ Installation of World Heritage Plaque ・A World Heritage Plaque was installed at viewing plaza no. 1. ➢ Install aerial photographs ・At viewing plaza no. 1, aerial photographs have been installed that provide a bird's-eye view of Hashima Island as a whole. ➢ Dissemination through other media ・A leaflet (in 4 languages) is being distributed to users of sightseeing boats. In addition, information is also being made available to the public through websites: "Takashima Kanko Nabi," "Atto Nagasaki," "Gunkanjima (Hashima)," and "Nagasaki-shi Sekai Isan Suishinshitsu Homepage."	the property. ・Also, since much of the production facilities—such as the remains of the mine shaft scaffolding—has been lost, there is a need to devise a way to effectively convey the location of the facilities during that time period and the mining system that was used. Moreover, in order to effectively convey to visitors the history and value of the property as a whole and the place of the component parts, in conjunction with tours of the mining facilities, a mechanism is needed to provide learning opportunities at the Takashima Coal Museum, Nagasaki City Gunkanjima Museum, the Former Mitsubishi No.2 Dock House, and at other remains of coal mines in Nagasaki, including the Nakanoshima Coal Mine, the Ikeshima Coal Mine, and so on.	➢ Use of digital technology ・In all of the viewing plazas, 3D, VR and other technologies will be used to allow visitors to use their mobile devices to visually experience what the entire production system was like when the site was operating. ➢ Improvements to tour route ・A new tour route will be created using minimal space that allows visitors to envision the mining system. ➢ Publication of survey records ・In order to allow visitors to understand the process from the formation of the island for undersea coal mining through to the closing of the mine, and the place that the Hashima mine holds in the history of the development and decline of the coal industry, the records of the remains and relics that were excavated during the underground archaeological survey will certainly be organized and the results will be made available to the public in the Takashima Coal Museum and the Nagasaki City Gunkanjima Museum.	➢ ・Introduce digital technology to let visitors visually experience what the entire production system was like when the site was operating. ➢ ・Create a tour route that lets visitors envision the mining system. (2029–) ➢ ・Organize survey records and make them public at relevant facilities.

		2. The operational arrangements for this purpose are in place	・Training sessions for docents (including volunteer guides) ※Sessions are held in the city of Nagasaki and training covers the Nagasaki area.	1 time / year	1 time / year	Monitoring method: Reflect calendar and implementation status of events Targets: At least once per year	➢ Deployment of guides when visitors are on the island ・The staff of boat companies that operate the sightseeing boats that land on the island serve as guides for visitors at the three viewing plazas. ➢ Development of an organizational framework ・Within the city of Nagasaki, the necessary personnel have been deployed in divisions such as cultural property, tourism, community center, world heritage, study of Nagasaki, municipal property, landscape planning, and urban planning, and they are working cooperatively. ➢ Cooperation with relevant organizations ・Working in cooperation with owners, local citizens, relevant organizations, the Agency for Cultural Affairs, the Cabinet Secretariat, government agencies related to World Heritage, as well as experts and research institutes in various fields in Japan and overseas, we are receiving the necessary guidance, advice, and support as we manage this historic site.	➢ Providing information when the island is not accessible ・There is no other way for visitors to get to Hashima other than by boat, and by establishing standards such as requiring that tour boats coming to the island be under 100 tons in weight, for example, the city of Nagasaki is keeping the number of visitors to appropriate levels. ・For that reason, there are times, such as during storms, when it is not possible to land on the island, and so there is a need to devise ways to provide information that do not require landing on the island in person. ➢ Cooperation with relevant organizations ・In order to utilize the Takashima Coal Mine as a resource for study and research, while at the same time working in cooperation with coal mine sites in other regions, such as the Ikeshima Coal Mine, to disseminate information, cooperation is needed not only with the Nagasaki Museum of History and Culture (operated by Nagasaki Prefecture and Nagasaki City), but also museums and survey institutes in other areas. ➢ Human resource development ・In order to utilize this property as a resource for study and research and to steadily disseminate information in cooperation with the remains of coal mines in other areas, there is a need to train personnel to handle information dissemination and survey, as well as personnel with advanced knowledge in the areas of structural preservation and coal mining. Also, there needs to be a system for providing ongoing support for the local guides and private businesspeople who are conveying information to the tourists who visit the property, including providing opportunities for them to learn about the value of the property and opportunities to convey accurate information to them about the status of and plans for conservation and utilization of the site.	➢ Development of an organizational framework ・Within the city of Nagasaki, the necessary personnel have been deployed in divisions such as cultural property, tourism, community center, world heritage, study of Nagasaki, municipal property, landscape planning, and urban planning, and they are working cooperatively. ➢ Cooperation with relevant organizations ・Working in cooperation with owners, local citizens, relevant organizations, the Agency for Cultural Affairs, the Cabinet Secretariat, government agencies related to World Heritage, as well as experts and research institutes in various fields in Japan and overseas, we are receiving the necessary guidance, advice, and support as we manage this historic site. ➢ Human resource development ・Technical and economic support will be given to cooperative groups for community revitalization, volunteer groups, and other activity-based groups and local communities in order to educate guides and train people involved in survey and restoration work, for example. In terms of capacity-building for relevant individuals, various programs will be carried out, including training for Nagasaki municipal government staff, volunteer clean-up activities and training for local businesspeople, training for tour guides, and lectures hosted by the cultural property division.	➢ ・Secure the posts and personnel needed in the Nagasaki municipal government for conservation and public utilization. ➢ ・Communicate closely with relevant organizations and work together to share information. ➢ ・Provide training to docents (including volunteer guides). ➢ ・Cultivate guides.

	3 Hospitality The comfort of visitors is sufficient	1. The facilities and equipment are in place for promoting enjoyment by visitors	・ Provision of information-disseminating devices that allow visitors to experience what the site was like when it was in operation and what other relevant locations outside the visitor area are like	No	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and relevant plans for provision of tourism facilities, etc. Targets: Items defined in Conservation, Restoration, Presentation and relevant plans for provision of tourism facilities, etc.	➢ Use of guide app ・Visitors can use the Japan's Meiji Industrial Revolution Guide Application Passport on their mobile devices to further enjoy the property and deepen their understanding at the same time.	➢ Effective conveyance ・Because it is hard to fully convey the history behind the Hashima Coal Mine, its world heritage value, and other aspects onsite, there is a need to come up with effective methods to explain those aspects of the property. ・Also, since much of the production facilities—such as the remains of the mine shaft scaffolding—has been lost, there is a need to devise a way to effectively convey the location of the facilities during that time period and the mining system that was used. Moreover, in order to effectively convey to visitors the history and value of the property as a whole and the place of the component parts, in conjunction with tours of the mining facilities, a mechanism is needed to provide learning opportunities at the Takashima Coal Museum, Nagasaki City Gunkanjima Museum, the Former Mitsubishi No.2 Dock House, and at other remains of coal mines in Nagasaki, including the Nakanoshima Coal Mine, the Ikeshima Coal Mine, and so on.	➢ Information and explanations provided by guides ・In light of Hashima's special landscape, no new explanatory signs will be installed. The guides will provide information and explanations. ➢ Use of digital technology ・In all of the viewing plazas, 3D, VR and other technologies will be used to allow visitors to use their mobile devices to visually experience what the entire production system was like when the site was operating. ➢ Improvements to tour route ・A new tour route will be created using minimal space that allows visitors to see the mining system.	➢ ・Continue to have guides provide information and explanations. ➢ ・Introduce digital technology to let visitors visually experience what the entire production system was like when the site was operating. ➢ ・Create a tour route that lets visitors envision the mining system. (2029–)

		2. The operational arrangements for this purpose are in place	・ Existence of administrative/operating body for information-disseminating equipment	No	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and relevant plans for provision of tourism facilities, etc. Targets: Items defined in Conservation, Restoration, Presentation and relevant plans for provision of tourism facilities, etc.	➢ Response when the island is not accessible ・The Gunkanjima Museum is being improved to provide a deeper understanding of the site to those who are unable to take a tour boat to the island and those passengers who are unable to disembark at the island due to poor weather or other reasons. ➢ Development of an organizational framework ・Within the city of Nagasaki, the necessary personnel have been deployed in divisions such as cultural property, tourism, community center, world heritage, study of Nagasaki, municipal property, landscape planning, and urban planning, and they are working cooperatively. ➢ Cooperation with relevant organizations ・Working in cooperation with owners, local citizens, relevant organizations, the Agency for Cultural Affairs, the Cabinet Secretariat, government agencies related to World Heritage, as well as experts and research institutes in various fields in Japan and overseas, we are receiving the necessary guidance, advice, and support as we manage this historic site.	➢ Providing information when the island is not accessible ・There is no other way for visitors to get to Hashima other than by boat, and by establishing standards such as requiring that tour boats coming to the island be under 100 tons in weight, for example, the city of Nagasaki is keeping the number of visitors to appropriate levels. ・For that reason, there are times, such as during storms, when it is not possible to land on the island, and so there is a need to devise ways to provide information that do not require landing on the island in person.	➢ Development of an organizational framework ・Within the city of Nagasaki, the necessary personnel have been deployed in divisions such as cultural property, tourism, community center, world heritage, study of Nagasaki, municipal property, landscape planning, and urban planning, and they are working cooperatively. ➢ Cooperation with relevant organizations ・Working in cooperation with owners, local citizens, relevant organizations, the Agency for Cultural Affairs, the Cabinet Secretariat, government agencies related to World Heritage, as well as experts and research institutes in various fields in Japan and overseas, we are receiving the necessary guidance, advice, and support as we manage this historic site. ➢ Human resource development ・Technical and economic support will be given to cooperative groups for community revitalization, volunteer groups, and other activity-based groups and local communities in order to educate guides and train people involved in survey and restoration work, for example. In terms of capacity-building for relevant individuals, various programs will be carried out, including training for Nagasaki municipal government staff, volunteer clean-up activities and training for local businesspeople, training for tour guides, and lectures hosted by the cultural property division.	➢ ・Secure the posts and personnel needed in the Nagasaki municipal government for conservation and public utilization. ➢ ・Communicate closely with relevant organizations and work together to share information. ➢ ・Provide training to docents (including volunteer guides). ➢ ・Cultivate guides.

Visitors (C)	A state in which visitors feel safety, security, comfort, and a sense of satisfaction, spend a sufficient amount of time at the component part to understand the value, and are motivated to visit again		Current State	Targets	Monitoring method: Similar satisfaction surveys as conducted in the past year Targets: Attain average value, attain and maintain maximum value, reduce percentage of
		☆Satisfaction	52.2%	52.2%	
		☆Time spent	2.2%	2.2%	
		☆Understanding (Entire site)	1.8%	1.8%	

		(Individual component part)	2.6%	2.6%	problems indicated to 0 (zero)
		☆Sparking of interest ☆Intention to visit again	37.9%	39.8%	
		(Relevant component part)	11.4%	13.2%	
		(Other component parts)	18.0%	20.8%	
		☆Percentage of problems indicated			
		(Crowding)	12.9%	2.5%	
		(Damage)	0.0%	0.0%	

Relationship between Visitor Management Strategy and the Subject and Targets of Visitor Management

Appendix 1　Visitor Management Strategy for Individual Component Parts (Form C)

Former Glover House and Office (Component part 6-8)

I. Trend in daily visitors

Number of visitors (year-long total)	FY 2014	1,035,796	FY 2015	1,221,243	FY 2016	987,822	FY 2017	996,075	FY 2018	348,523
Number of visitors (daily peak)	FY 2014	–	FY 2015	–	FY 2016	7,631	FY 2017	10,086	FY 2018	3,523

II. Structure of Visitor Management Strategy for Individual Component Parts

Visitor Management Strategy for Individual Component Parts

(1) Subject	(2) Visitor management vision (targets)		(3) Management indicators *Select or add suitable indicators	(4) Setting of target levels			(5) Identification and implementation of measures			
			Indicators ☆: Common	Current state	Targets	Method of measuring/calculating indicators *Making use of quantitative, qualitative, and visitor satisfaction surveys; making use of separate surveys, etc.	(a) Current state	(b) Issues	(c) Directionality of response	(d) Methods and measures
Component parts (A)	Physical damage No harm to land and materials of component part	1. The facilities and equipment are in place for physically protecting the component part	☆Unsafe incidents ☆Existence of facilities /equipment for separation between visitors and the component part (Time during which facilities are closed)	46 incidents/year Yes	0 incidents/year Yes	Monitoring method: Inspection patrol records, etc. Target: 0 (zero) incidents Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Establishment of areas where entrance is restricted ・A portion of the interior of the building is not open to the public and entrance is restricted.	➢ Review of tour routes and methods ・There has been deterioration and wear on the building because of the method of making the site accessible to the public, where visitors are allowed to walk around the building freely, and therefore a review is needed of that method of making the site open to the public. ・Because the fittings are regularly open to the public, wind and rain have affected the building, causing peeling of the wallpaper on walls and ceilings, and so consideration should be given to such measures as limiting the entrances and exits to the building and rethinking the tour route.	➢ Establishment of new rules for visitors ・As the number of visitors is expected to rise in the future, the following rules will be established to manage visitors to the Former Glover House and Office. ① There will be only one entrance and one exit. ② A tour course will be determined and guide signs will be installed in the rooms. ③The appropriate air conditioning equipment will be installed. ④ In order to carry out cleaning and repairs, certain times and rooms will be designated as closed to the public.	➢ Establish new rules for visitors.
		2. The operational arrangements for this purpose are in place	・Establishment of times or rooms closed to the public for repairs and cleaning	No	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan	➢ Management by designated administrator ・The designated administrator who is commissioned by the city of Nagasaki to manage the Glover Garden is conducting the cleaning of the building, maintenance inspections, and external landscape maintenance such as flowerbed and trees in daily tasks, and is training employees assigned to daily tasks.	➢ Review of maintenance frequency and methods ・Because the property is open year-round, it is impossible to secure time to carry out maintenance repairs on the buildings, and so the method of managing cleaning and maintenance should be reconsidered.	➢ Installation of air conditioning equipment to minimize deterioration ・In addition to installing air conditioning equipment to keep deterioration within the buildings to a minimum, adequate time should be allowed for cleaning the interiors as well by rethinking the tour route.	➢ Consider installation of air conditioning equipment. ➢ Designate the appropriate frequency and time for maintenance.
Component parts (A) / Surrounding environment (B)	1 Safety and security Visitors' feeling of safety and security is sufficient	1. The facilities and equipment are in place for ensuring the safety and security of visitors	☆Existence of facilities /equipment for separation between visitors and the component part (Time during which facilities are closed)	Yes	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Review of design of information and explanatory boards ・There are multiple types of information and explanatory boards that have been installed over time since the initial opening of the Glover Gardens. ➢ Tree management ・There are still sago palms, soapberry trees, and other	➢ Review of design of information and explanatory boards ・The design of the information and explanatory boards needs to be unified. ➢ Tree management ・The trees have grown very large, and as a result, the	➢ Installation of information and explanatory boards with unified logo/design ・Guide signs will be consolidated and swapped out for signs with a unified design that allows for universal design and four languages (Japanese, English, Chinese, Korean). Explanatory and guide signs will be designed in a way that does not obstruct the landscape. ➢ Pruning and felling of trees along the guide path and ensuring a barrier-	➢ Replace explanatory and guide signs. ➢ Cut down or prune trees along the tour

							trees growing at the Former Glover House and Office and in the buffer zone that are thought to have been in existence since the time period when Glover was active in Nagasaki. ➢ Ensuring of barrier-free guidance for visitors to the Glover Garden ・In order to safely lead visitors up the hill and to direct them in turn from the Former Mitsubishi No. 2 Dock House that serves as a guidance facility to the Former Glover House and Office, two barrier-free moving walkways are installed in the Glover Garden.	view toward the port of Nagasaki that is seen from the garden of the Glover House and Office is different than it was in 1864, and so there is a need to restore the landscape closer to what it was in the past. ➢ Ensuring of barrier-free access ・There are different levels in some areas of the stone pavement of the garden path, the entryways to the Former Glover House and Office, and the building interiors, and these need to be made barrier free in a way that does not impinge on the authenticity of the site.	free path ・Trees that are obstructing the views must be pruned or taken down. In order to maintain the value of this component part and bring it closer to its condition during the time when Glover was residing there, trees that fall into the following categories will be subject to pruning, replanting, or taking down: ① Those that have a harmful impact on building maintenance management. ② Those that are clearly inconsistent with the garden as it was during Glover's era. ③ Those that adversely affect the ability to appreciate the exterior of the Former Glover House and Office. ④ Those that obstruct the view of the port of Nagasaki from the front yard of the Former Glover House and Office. ➢ Creating barrier-free guide path ・Those parts of the Former Glover House and Office and the Glover Garden that are not yet barrier free will be modified to allow barrier-free access to the extent possible without damaging the value of the property and the landscape.	route that obstruct views or present a safety hazard. ➢ Modify areas that are not yet barrier free to allow barrier-free access to the extent possible without damaging the value of the property and landscape.
		2. The operational arrangements for this purpose are in place	・Existence of a process to ensure the safety of visitors in case of an emergency at the property or in the surrounding environment	Yes	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan	➢ Deployment of guards ・In addition to conducting inspection patrols of the component parts and surrounding environment, guards provide safety guidance for the visitors.	➢ Cooperation between the designated administrator and the owner (city of Nagasaki) ・If unusual conditions are discovered during the inspection patrols of the component parts and surrounding environment that require repair or remedial construction, the designated administrator in the case of repairs and the city/owner in the case of remedial construction must determine the appropriate methods, and so there are cases that require a good deal of time to resolve.	➢ Clarification of roles of the designated administrator and the owner (city of Nagasaki) and speeding up of processes ・The division of labor and the procedural flow should be clarified in advance in preparation for any repairs or renovations that may be needed.	➢ Establish procedural flow to ensure visitor safety in the case of unusual conditions at the property or surrounding environment.
	Promotion of understanding Visitors' feeling of satisfaction is sufficient	1. The facilities and equipment are in place for promoting and deepening understanding by visitors	・Installation of household furniture and other furnishings that are appropriate to facilities at the time period	No	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan and relevant facility provision plans, etc. Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan and relevant plans for provision of tourism facilities, etc.	➢ Installation of guidance facilities ・A panel display and video system on the first floor of the Former Mitsubishi No. 2 Dock House provides an explanation of World Heritage. ➢ Displays in the Former Glover House and Office ・In addition to the display of furnishings and such in the living spaces of the Former Glover House and Office that are open to the public, there are panels and materials on display in some of the rooms.	➢ Review of contents and methods of the explanations of the property ・There is insufficient explanation of how the Former Glover House and Office fit within the context of the World Heritage and the settlement, or of Glover's role in modern Nagasaki history. ・The displays do not reflect recent survey results and have not been updated, so there is a need to promote and publicize the findings of those surveys efforts. ・The display and utilization of the site for amusement is occurring, but its value as an important cultural property and as World Heritage are not adequately conveyed to visitors, and thus the content of displays must be reviewed.	➢ Revisions to contents and methods of the explanations ・In the Former Glover House and Office and the front yard, panels featuring old drawings and photographs of the settlement, a replica of the cannon shown in old photographs, and other items will be installed. ・Household furniture, other furnishings, and equipment will match the relevant time period. In the stables and barn, and in the storage shed, a display will reenact how items were used at that time based on survey. ・Explanatory panels and digital video equipment will be installed to introduce Glover's work and how he lived. ・In order to accurately convey to visitors the positional relationship between the Former Glover House and	➢ Consider recreating the front yard and Japanese garden based on old photographs. ➢ Install explanatory panels and digital video equipment within the house. ➢ Install appropriate household furniture and other furnishings to facilities at the time period. ➢ Display panels inside the house and in the front yard using old drawings and photographs. ➢ Restore the site to its original state, displaying a replica cannon, etc.

							➢ Introduction of audio tour covering the Glover Garden as a whole ・Audio guide devices are available to rent that allow visitors to hear explanations of the facilities in multiple languages.	・Because the shape and design of signage is not uniform, it lacks a sense of unity and duplicate signs are obstructing the views.	Office and the Mitsubishi Heavy Industries' Nagasaki Shipyard, as well as the authenticity of the location of the Former Glover House and Office, panels will be installed in the interior of the residence and the front yard using old drawings and photographs.	
		2. The operational arrangements for this purpose are in place	・Training sessions for docents (including volunteer guides) ※Sessions are held in the city of Nagasaki and training covers the Nagasaki area.	1 time / year	1 time / year	Monitoring method: Reflect calendar and implementation status of events Targets: At least once per year	➢ Deployment of curators and professional engineers ・The designated administrator commissioned by the city of Nagasaki is deploying curators and professional engineers, operating and maintaining the facilities, and carrying out educational initiatives and survey.	➢ Review of personnel structure ・There is a need to develop personnel who can handle information dissemination and survey, as well as personnel who have advanced knowledge regarding preservation and public utilization of structures.	➢ Human resource development ・To develop human resources, training sessions will be held at least once a year for Nagasaki Saruku's guides and administrators in order to promote greater understanding. ➢ Training of experts who can hand down the World Heritage value ・In addition to deploying personnel who have advanced knowledge regarding preservation and public utilization of structures as designated administrator, organizations, conferences, and study groups will be created to share information with local businesses and research institutions.	➢ Provide training for docents (including volunteer guides). ➢ Cultivate guides. ➢ Deploy personnel with advanced knowledge as designated administrator and create opportunities to share information with local businesses and research institutions.
	3 Hospitality The comfort of visitors is sufficient	1. The facilities and equipment are in place for promoting enjoyment by visitors	・Participation in conferences and other events related to the use of the Former Glover House and Office	Yes	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan and relevant plans for provision of tourism facilities, etc. Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan and relevant plans for provision of tourism facilities, etc.	➢ Garden illuminated during a limited time period ・During a set time period, the buildings in the Garden are lit up, and a roughly 300,000-bulb display has been installed. ➢ Projection mapping is done during a limited time period ・During the garden's nighttime hours, projection mapping is used to explain Nagasaki's history from the end of the Edo period through the Meiji period— centered on the life and former residence of Glover—in a way that is easy for visitors to understand at the Former Glover House and Office.	➢ Review of lighting method for decorative lighting ・The light from decorative lighting is obscuring the illumination of the Former Glover House and Office, etc., as well as the lighting of the giant cantilever crane, so there is a need to coordinate the hues, heights, and quantity of light. ・Because the wiring for the lighting is obstructing the view during the daylight hours of operation, the color of the wiring and the way in which it is installed must be reviewed.	➢ Review of lighting method for decorative lighting ・Given that there are illumination-related events held in downtown Nagasaki, coordination should be carried out between the event coordinating committee, the designated administrator, and the city of Nagasaki. Within the Glover Garden, in addition to limiting the scope of the lighting installation, certain rules should be set, such as lowering the height of the lighting, in order to ensure that the value of the component parts and cultural property are not lost.	➢ Consider the balance of decorative lights.
		2. The operational arrangements for this purpose are in place	・Existence of administrative/operating body	Yes	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan and relevant plans for provision of tourism facilities, etc. Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan and relevant plans for provision of tourism facilities, etc.	➢ Nighttime hours held during a limited time period ・From mid-July to December 25 and other periods, the park is open to the public at night on a regular basis.	➢ Rethinking of park hours ・A clearer understanding is required of the needs of visitors regarding the hours during which the park is open to the public—including the current night-time hours offered on a regular basis—and the entrance fees.	➢ Drawing visitors in cooperation with the neighboring Oura Cathedral ・In order to encourage visitors at the nearby Oura Cathedral (a component part of the World Heritage site "Hidden Christian Sites in the Nagasaki Region") to come to the Former Glover House and Office, the garden's hours and timing of the illumination of decorative lighting will be coordinated, an accessway will be improved, and events will be held.	➢ Understand facility operating policies—including with regard to decorative lighting—at related organizations.

Visitors (C)	A state in which visitors feel safety, security, comfort, and a sense of satisfaction, spend a sufficient amount of time at the component part to understand the value, and are motivated to visit again	☆Satisfaction ☆Time spent ☆Understanding (Entire site) (Individual component part) ☆Sparking of interest ☆Intention to visit again (Relevant component part) (Other component parts) ☆Percentage of problems indicated (Crowding) (Damage)	Current State 28.0% 5.3% 25.3% 33.9% 17.5% 12.3% 15.0% 1.1% 0.6%	Targets 33.8% 2.9% 12.6% 15.17% 24.4% 13.2% 20.8% 0.8% 0.3%	Monitoring method: Similar satisfaction surveys as conducted in the past year Targets: Attain average value, attain and maintain maximum value, reduce percentage of problems indicated to 0 (zero)

Relationship between Visitor Management Strategy and the Subject and Targets of Visitor Management

Miike Coal Mine: Miyanohara Pit・Coal Railway (Component part 7-1)

Appendix 1　Visitor Management Strategy for Individual Component Parts (Form C)

I. Trend in daily visitors

Number of visitors (year-long total)	FY 2014	2,835	FY 2015	72,849	FY 2016	33,723	FY 2017	28,300	FY 2018	22,965
Number of visitors (daily peak)	FY 2014	650	FY 2015	1,925	FY 2016	2,224	FY 2017	1,768	FY 2018	1,737

II. Structure of Visitor Management Strategy for Individual Component Parts

Visitor Management Strategy for Individual Component Parts

(1) Subject	(2) Visitor management vision (targets)		(3) Management indicators *Select or add suitable indicators	(4) Setting of target levels			(5) Identification and implementation of measures			
			Indicators ☆: Common	Current state	Targets	Method of measuring/calculating indicators *Making use of quantitative, qualitative, and visitor satisfaction surveys; making use of separate surveys, etc.	(a) Current state	(b) Issues	(c) Directionality of response	(d) Methods and measures
Component parts (A)	Physical damage No harm to land and materials of component part	1. The facilities and equipment are in place for physically protecting the component part	☆Unsafe incidents ☆ Existence of facilities /equipment for separation between visitors and the component part	Miyanohara Pit 0 incidents/year Yes Coal Railway 0 incidents/year No	Miyanohara Pit 0 incidents/year Yes Coal Railway 0 incidents/year Yes	Monitoring method: Inspection patrols by guides/monitors Targets: 0 (zero) incidents Monitoring method: Hold regular meetings of city and guides Targets: 1 time/month	➢ The Miyanohara Pit is a public facility and so there are guides from the Silver Human Resource Center stationed there at all times during operating hours and the site is locked when the facility is closed. ➢ Currently, the Coal Railway is accessible to the public at all times, and dangerous locations are marked with warning signs or partitions have been installed to prevent entry. In addition, municipal employees patrol the site daily, and inspections of the property and elements are conducted when weeding and cleaning are carried out, while a communication system is in place. However, there are no facilities or equipment to preserve the property as a whole from damage. The area of the Miyanohara Pit and Coal Railway combined is vast, covering approximately 90,000 m^2 just in the city of Omuta.	➢ The daily management of the buildings and structures within the grounds of the Miyanohara Pit is generally being taken care of, but because of the large scope of the property, there is a need in the long term to consider methods for preserving the environment and landscape, including weeding, cleaning, etc. ➢ The Coal Railway traverses prefectural and municipal roads and rivers, but the bridges, bridge piers, etc. that are crossing those features are deteriorating, and they need to be inspected and repaired. Also, although patrols are conducted daily along with weeding and cleaning tasks, because of the large scope of the property, there is a need to consider effective methods for preserving the landscape. Also, there are no security facilities for the property as a whole.	➢ For the time being, the basic approach to the Miyanohara Pit is to maintain it in its current condition, and the site will continue to be monitored while considering future methods to conserve the landscape. ➢ Bridge inspections and repairs will be carried out on the Coal Railway. Security strategies will also be considered.	➢ At the Miyanohara Pit, for the time being, take the basic approach of maintaining it in its current condition and continue to monitor the site, while ascertaining the condition of the property in advance to preemptively avoid physical damage. ➢ At the Coal Railway, conduct a survey investigation in FY2018–2020 within the context of the site improvement plan to understand the current conditions of the site, and from FY2021, immediately carry out inspections and repairs of each bridge and bridge pier. Aim to install security equipment for the property as a whole.

		2. The operational arrangements for this purpose are in place	・Number of patrols ・Number of monitors, etc. ・Holding of emergency drills	Miyanohara Pit 359 times/year, 359 people 1 time/year Coal Railway 180 times/year, 180 people 0 times/year	Miyanohara Pit 359 times/year, 359 people 1 time/year Coal Railway 180 times/year, 180 people 0 times/year	Monitoring method: Inspection patrols by guides/monitors Targets: Patrols are carried out every time the facility is open Monitoring method: Hold regular meetings of city and guides Targets: 1 time/month	➢ The Miyanohara Pit is a facility that is open to the public free of charge and is managed and operated on a daily basis by the city and the guides, and during operating hours, there is a guide/monitor present at all times. ➢ Changes in the condition of the property and other issues are being addressed while maintaining close communication with the national and prefectural governments.	➢ While daily management of the buildings and structures within the Miyanohara Pit grounds is being carried out, because of the large scope of the property, there is a need to consider a more efficient and effective management system.	➢ While maintaining the current system for the daily management of the buildings and structures within the Miyanohara Pit grounds, methods of landscape preservation for the truly vast scope of this property into the future will be considered.	➢ Maintain the current system for daily management at the Miyanohara Pit for now, and at the same time create a manual for more efficient and effective management, create a long-term plan, and also annually secure budget for maintenance and management.
							➢ At the Coal Railway, municipal employees are carrying out weeding and cleaning work while at the same time conducting daily inspection patrols, and a communication system is in place.	➢ Because the Coal Railway property is vast, and given that it includes bridges and other structures that traverse prefectural and municipal roads and rivers, it is difficult to comprehensively manage every nook and cranny of the property under the current system. A more efficient and effective management system must be considered. Also, although efforts are being made to cooperate with stakeholders and local conservation councils, the continuity when there are personnel changes has been insufficient.	➢ At the Coal Railway, personnel system for administering the vast property and a long-term plan for its maintenance and management in the future will be considered. Thought must also be given to educating related businesses, including stakeholders.	➢ At the Coal Railway, maintain the current system for daily management for now, and at the same time create a manual for more efficient and effective management, create a long-term plan, and also annually secure budget for maintenance. ・Also, carry out regular communications and information-sharing with stakeholders.
Component parts (A) / Surrounding environment (B)	-1 Safety and security Visitors' feeling of safety and security is sufficient	1. The facilities and equipment are in place for ensuring the safety and security of visitors	☆ Existence of facilities /equipment for separation between visitors and the component part	Miyanohara Pit Yes Coal Railway No	Miyanohara Pit Yes Coal Railway Yes	Monitoring method: Inspection patrols by monitors Targets: 0 (zero) incidents Monitoring method: Hold regular meetings with monitors Targets: 1 time/month	➢ With regard to those structures, etc., within the Miyanohara Pit visitor area where safety measures are undeveloped, simple barricades and no-entry signs have been installed, and along with drawing attention to the danger, access is restricted to those spots that are by all means dangerous.	➢ The property as a whole was built during the late Meiji Era, and so it is gradually deteriorating day by day, requiring that close attention be paid to ensuring visitor safety. However, there are some parts where preserving the OUV and ensuring visitor safety are not compatible (e.g., barrier-free access).	➢ In order to deepen the understanding of the property, the public area of the Miyanohara Pit will be expanded, and within that context, planned improvements for safety measures (repair, reinforcement, partition, etc.) will be carried out based on the Miike Coal Mine Conservation, Restoration, Presentation and Public Utilization Plan.	➢ Carry out development of the Miyanohara Pit property based on the Miike Coal Mine Conservation, Restoration, Presentation and Public Utilization Plan. In that context, also tackle visitor safety measures and aim to implement safer and easy-to-understand improvements.
							➢ Currently, the Coal Railway is accessible to the public at all times, and areas where safety measures are undeveloped or dangerous locations are marked with warning signs or barricades, etc., have been installed to prevent entry, and there are warnings and restrictions on access. From FY2018, based on the Miike Coal Mine Conservation, Restoration, Presentation and Public Utilization Plan, work is being done on safety measure improvements aimed at expanding the area open	➢ There is a similar issue at the Coal Railway in terms of compatibility between the deterioration of the site and the need to ensure visitor safety. There is a need to steadily carry out improvements in keeping with the improvement schedule, utilizing budget from national subsidy programs, but that should be reconciled within the overall budget needed for improvements.	➢ Similarly, based on the Plan, safety fencing, partitions, etc., will be improved at the Coal Railway.	➢ Carry out development at the Coal Railway based on the above-noted Plan. In that context, also tackle visitor safety measures and aim to implement safer and easy-to-understand improvements. Also, given that the above-noted Plan extends over the long term and requires certain and constant financial resources, work to secure funds from national subsidy, etc.

						to the public.			
		2. The operational arrangements for this purpose are in place	・Number of patrols ・Number of monitors, etc.	Miyanohara Pit 359 times/year, 359 people Coal Railway 180 times/year, 180 people	Miyanohara Pit 359 times/year, 359 people Coal Railway 180 times/year, 180 people	Monitoring method: Reflect implementation status of site improvement plan Targets: Items defined in site improvement plan	➢ The Miyanohara Pit is a facility that is open to the public free of charge and is managed and operated on a daily basis by the city and the guides, and during operating hours, there is a guide/monitor present at all times.	➢ Everyday visitor safety measures are being carried out at the Miyanohara Pit, and overall are being managed appropriately.	➢ While maintaining the current management/operation of the Miyanohara Pit for the time being, ways to ensure visitor safety will be considered based on the Miike Coal Mine Conservation, Restoration, Presentation and Public Utilization Plan.	➢ While maintaining the current management/operation of the Miyanohara Pit, improve the safety by carrying out the site improvement plan and review the management system based on trends in the number of visitors.
							➢ At the Coal Railway, municipal employees are carrying out weeding and cleaning work while at the same time conducting daily inspection patrols, and a communication system is in place.	➢ Minimal safety measures are being devised for the limited public areas of the Coal Railway (setting areas where entry is prohibited, installing warning signs, etc.), but there has been inadequate monitoring of the entire, broad property.	➢ While maintaining the current management/operation of the Coal Railway for the time being, based on the above-mentioned Plan, efforts will be made to expand the area open to the public while also strengthening the safety measures (setting areas where entry is prohibited, installing warning signs, etc.) as needed.	➢ While maintaining the current management/operation of the Coal Railway, improve the safety by carrying out the site improvement plan and review the management system based on trends in the number of visitors.
	2 Promotion of understanding Visitors' feeling of satisfaction is sufficient	1. The facilities and equipment are in place for promoting and deepening understanding by visitors	・Establishment of visitor center ・Improvement of guides, etc.			Monitoring method: Reflect implementation status of relevant site improvement plan, etc. Reflect implementation status of site improvement plan Targets: Items defined in relevant site improvement plan, etc. Items defined in site improvement plan	➢ The appropriate explanatory signs have been installed to explain the content of the buildings and other facilities within the Miyanohara Pit property.	➢ Although explanatory signs are installed within the Miyanohara Pit facilities, there are many cases when they are not functioning adequately due to issues with the tour route, etc. Also, because there is no visitor center, there has been insufficient construction of a common World Heritage display.	➢ The creation of a visitor center at the Miyanohara Pit will be considered, based on the Miike Coal Mine Conservation, Restoration, Presentation and Public Utilization Plan.	➢ Based on the Miike Coal Mine Conservation, Restoration, Presentation and Public Utilization Plan, create a visitor center at the Miyanohara Pit and enhance the common World Heritage display.
							➢ On days when the property is open, tours are carried out by facility guides. Using Signage, an audio guide system (in English, Chinese, and Korean) is available that can be used with a smartphone or tablet, and tablets are loaned out at the facility free of charge.	➢ While there are satisfactory personnel for guides, because people are becoming elderly, there is a fear that there will be a lack of successors.	➢ In addition to of course human resource development for guides, initiatives will also be developed to secure personnel.	➢ As a guide organization, create a mechanism for securing personnel.
							➢ The appropriate explanatory signs have been installed to explain the content of the Coal Railway property.	➢ At the Coal Railway, there is no other guide function provided other than the explanatory signs.	➢ Based on the above-mentioned Plan, not only explanatory signs but also the creation of a promenade and the securing of new means of transport will be considered. ➢ Expansion of the guide services, such as guided tours at fixed times, will be considered.	➢ At the Coal Railway, steadily implement the above-mentioned Plan. Work to improve the skills of guides, and create a mechanism for guiding Coal Railway as well.

		2. The operational arrangements for this purpose are in place	・Deployment of docents (including volunteer guides)	Miyanohara Pit 20 people Coal Railway No	Miyanohara Pit 30 people Coal Railway 5 people	Monitoring method: Reflect implementation status of relevant plans for provision of tourism facilities, etc. Targets:：Items defined in relevant plans for provision of tourism facilities, etc.	➢ During operating hours, facility guides are regularly offering tours of the Miyanohara Pit. Guide system explanations and loaner tablets are available at all times. ➢ Also, to correctly convey the World Heritage value, training sessions are being held each year for facility guides and city employees. ➢ There are no guides at the Coal Railway.	➢ The guides at the Miyanohara Pit possess adequate skills, but it is possible that fiscal circumstances at the local government could result in an inadequate posting of personnel. ➢ Although training sessions are held annually for relevant persons, it has not led to an improvement in skill levels. ➢ Since there are no guides at the Coal Railway, it is difficult to explain the value to visitors.	➢ Efforts will be made to secure the funding needed to ensure a certain number of guide personnel for the Miyanohara Pit. ➢ Efforts will be made not only to improve the skills of guides, but also to recruit new guides, promote exchanges with guides from other Sites of Japan’s Meiji Industrial Revolution, etc. ➢ While it would be difficult to have guides permanently stationed at the Coal Railway, using them when events or functions are being held will be considered.	➢ Secure the funding needed annually to ensure a certain number of guides for the Miyanohara Pit. ➢ Hold guide training sessions held in the areas by the World Heritage Council for the Sites of Japan's Meiji Industrial Revolution and carry out exchanges among guides within the Miike area. ➢ At the Coal Railway, hold events and functions several times per year and use the opportunity to explain the value of the site.
	-3 Hospitality The comfort of visitors is sufficient	1. The facilities and equipment are in place for promoting enjoyment by visitors	・Existence of dining facility ・Existence of toilets, etc.	Miyanohara Pit Yes Yes Coal Railway No No	Miyanohara Pit Yes Yes Coal Railway Yes No	Monitoring method: Reflect implementation status of relevant plans for provision of tourism facilities Targets:：Items defined in relevant plans for provision of tourism facilities	➢ There is commercial space (combined with a dining space) in the grounds of the Miyanohara Pit, which sells local specialties and souvenirs. ➢ Each fall, a Coal Mine Festival is held to sell products and promote understanding of the property, and it draws many visitors. ➢ There are no dining facilities, toilets, etc., on the Coal Railway property. ➢ Each fall, a Coal Mine Festival is held to sell products and promote understanding of the property, and it draws many visitors.	➢ The commercial space at the Miyanohara Pit is temporary construction, and the level of the products and services offered needs to be improved. ➢ The holding of a regular event in the fall has become customary, but there is a need to expand events and functions in other seasons as well. ➢ In the future, the minimal level of convenience facilities (e.g., toilets and parking) will be needed at the Coal Railway.	➢ Based on the Miike Coal Mine Conservation, Restoration, Presentation and Public Utilization Plan, improvement of the dining facility at the Miyanohara Pit will be considered. ➢ There is a need to consider plans for events throughout the year that are organized around themes, for example. ➢ At the Coal Railway, consideration will be given to installing toilets, etc., in conjunction with the creation of a promenade, etc.	➢ Based on the Miike Coal Mine Conservation, Restoration, Presentation and Public Utilization Plan, create a dining/guidance facility (visitor center) in the parking lot at the Miyanohara Pit. To do so, utilize the national subsidy programs, etc., to annually secure the budget for this. ➢ Connect multiple Meiji Industrial Revolution sites in Omuta and Arao through the Coal Mine Festival and hold annual events to promote broader public access to the properties and encourage understanding of the history of the mines. ➢ At the Coal Railway, create a promenade based on the Miike Coal Mine Conservation, Restoration, Presentation and Public Utilization. Also, utilize the national subsidy programs, etc., and annually secure the budget for this.
		2. The operational arrangements for this purpose are in place	・Existence of administrative/operating body	Miyanohara Pit Yes Coal Railway Yes	Miyanohara Pit Yes Coal Railway Yes	Monitoring method: Reflect implementation status of relevant plans for provision of tourism facilities Targets:：Items defined in relevant plans for provision of tourism facilities	➢ A contract has been signed with a private business owner who manages and operates a product space at the Miyanohara Pit. ➢ Also, an executive committee has been formed by the cities of Omuta and Arao and private businesses, which carries out a Coal Mine Festival on November 3 every year.	➢ In terms of dining facilities at the Miyanohara Pit, there is a need for the city and private organizations to work together to strengthen the hospitality services. ➢ Also, greater cooperation is needed with local residents and organizations to use the November 3 Coal Mine Festival to promote regional development.	➢ At the Miyanohara Pit, in conjunction with development carried out under the Miike Coal Mine Conservation, Restoration, Presentation and Public Utilization Plan, a survey of visitor satisfaction and other initiatives will be carried out, while at the same time, the city–private sector functions will be strengthened in order to expand the content of the dining facility.	➢ At the Miyanohara Pit, conduct a survey of visitors in conjunction with development carried out under the Miike Coal Mine Conservation, Restoration, Presentation and Public Utilization Plan, and work together with private organizations to aim for improved public utilization of the site. ➢ Manage the Coal Mine

							➢ The Coal Railway is directly managed and operated by the city, but there are no sales facilities, toilets, etc.	➢ Because the Coal Railway covers a vast area, it presents difficulties in terms of operating and managing the site.	➢ Throughout the year, the executive committee will systematically work on carrying out the Coal Mine Festival. ➢ At the Coal Railway, in conjunction with development carried out under the Miike Coal Mine Conservation, Restoration, Presentation and Public Utilization Plan, the operational/management system will be considered.	Festival executive committee throughout the year to ensure its effectiveness. ➢ At the Coal Railway, in conjunction with development and improvements carried out under the Miike Coal Mine Conservation, Restoration, Presentation and Public Utilization Plan, search for a better management system and aim to outsource management and operations integrated with Miyanohara Pit to a private organizations.
Visitors (C)	A state in which visitors feel safety, security, comfort, and a sense of satisfaction, spend a sufficient amount of time at the component part to understand the value, and are motivated to visit again		Current State ☆Satisfaction 50.9% ☆Time spent 0.0% ☆Understanding 1.8% ☆Sparking of interest 33.3% ☆Intention to visit again 19.3% ☆Percentage of problems indicated 0.0%	Targets 52.2% 0.0% 0.0% 39.8% 23.4% 0.0%	Monitoring method: Similar satisfaction surveys as conducted in the past year Targets: Attain average value, attain and maintain maximum value, reduce percentage of problems indicated to 0 (zero)				

Appendix 1　Visitor Management Strategy for Individual Component Parts (Form C)

Miike Coal Mine: Manda Pit (Component part 7-1)

I. Trend in daily visitors

Number of visitors (year-long total)	FY 2014	31,345	FY 2015	113,112	FY 2016	55,590	FY 2017	45,765	FY 2018	39,956
Number of visitors (daily peak)	FY 2014	2,645	FY 2015	2,754	FY 2016	9,000	FY 2017	10,620	FY 2018	10,620

II. Structure of Visitor Management Strategy for Individual Component Parts

Visitor Management Strategy for Individual Component Parts

(1) Subject	(2) Visitor management vision (targets)		(3) Management indicators *Select or add suitable indicators	(4) Setting of target levels			(5) Identification and implementation of measures			
			Indicators ☆: Common	Current state	Targets	Method of measuring/calculating indicators *Making use of quantitative, qualitative, and visitor satisfaction surveys; making use of separate surveys, etc.	(a) Current state	(b) Issues	(c) Directionality of response	(d) Methods and measures
Component parts (A)	Physical damage No harm to land and materials of component part	1. The facilities and equipment are in place for physically protecting the component part	☆Unsafe incidents ☆ Existence of facilities /equipment for separation between visitors and the component part	Manda Pit 0 incidents/year Yes Coal Railway 0 incidents/year Yes	Manda Pit 0 incidents/year Yes Coal Railway 0 incidents/year Yes	Monitoring method: Inspection patrols by monitors Targets: 0 (zero) incidents Monitoring method: Hold regular meetings with designated administrator Targets: 1 time/month	➢ The designated administrator is stationed at the Manda Pit at all times during operating hours, and a security company's unmanned surveillance system has been installed for times when the site is closed. ➢ At the Coal Railway, dangerous locations are marked with warning signs or partitions have been installed to prevent entry, but there are no facilities or equipment to preserve the property as a whole from damage. ➢ The area of the Manda Pit and the Coal Railway combined is vast, covering approximately 13 ha just in the city of Arao.	➢ The daily management of the buildings and structures within the grounds of the Manda Pit is generally being taken care of, but because of the large scope of the property (particularly the area outside the designated administration district), there is a need in the long term to consider methods for preserving the landscape, including weeding, cleaning, etc. ➢ The Coal Railway traverses national, prefectural, and municipal roads as well as the JR Kagoshima Line, but the bridges, etc., that are crossing those features are deteriorating, and they need to be inspected and repaired. Also, although patrols are conducted daily along with weeding and cleaning tasks, because of the large scope of the property, there is a need to consider effective methods for preserving the landscape. Also, there are no security facilities for the property as a whole.	➢ For the time being, the basic approach to the Manda Pit is to maintain it in its current condition, and the site will continue to be monitored while considering future methods to conserve the landscape. ➢ Bridge inspections and repairs will be carried out quickly on the Coal Railway. While the inspections of the JR overpass, which has not yet been designated as a historic site, must be conducted by the city alone for the time being, the goal should be to have it named a national historic site in order to secure future funding. Discussions with JR Kyushu on historic site designations will continue. Also, security measures will be considered.	➢ For the time being, maintain the Manda Pit in its current condition as the basic approach and continue to monitor the site while considering future methods to conserve the landscape. ➢ In addition to carrying out immediate inspections and repairs to the bridge portions of the Coal Railway from FY2019, aim to quickly have those parts that are not yet designated as national historic sites (e.g., JR overpass) receive that designation. Also, aim to install security equipment for the property as a whole.

		2. The operational arrangements for this purpose are in place	・Number of patrols ・Number of monitors, etc. ・Holding of emergency drills	Manda Pit 312 times/year, 312 people 1 time/year Coal Railway 12 times/year, 50 people 0 times/year	Manda Pit 312 times/year, 312 people 1 time/year Coal Railway 12 times/year, 50 people 0 times/year	Monitoring method: Inspection patrols by monitors Targets: Patrols are carried out every time the facility is open Monitoring method: Hold regular meetings of city and designated administrator Targets: 1 time/month	➢ The daily operation and management of the Manda Pit, as a facility that is open to the public for a fee, is handled by the designated administrator and a monitor is stationed there during operating hours. Also, a security company's unmanned surveillance system has been installed for times when the site is closed. ➢ At the Coal Railway, municipal employees patrol the site daily. Also, a system has been established to have the Silver Human Resource Center, which has been commissioned to carry out weeding and cleaning, report any anomalies they find during that process as needed.	➢ The daily management of the buildings and structures within the grounds of the Manda Pit is generally being taken care of by the designated administrator. However, because of the large scope of the property (particularly the area outside the designated administration district), there is a need in the long term to consider methods for preserving the landscape, including weeding, cleaning, etc. ➢ At the Coal Railway, the bridge portions that traverse national, prefectural, and municipal roads as well as the JR Kagoshima Line were checked onsite by an expert who indicated that nearly all bridges, etc., are deteriorating, and that they need to be inspected and repaired. Accordingly, there is a need to determine the methods and secure funding for immediate inspections and repairs. Also, it is anticipated that due to the aging of its workers, in the near future the Silver Human Resource Center, which has been commissioned to carry out weeding and cleaning, will no longer be able to handle this work.	➢ While continuing to leave current daily management of the buildings and structures at the Manda Pit to the designated administrator, methods will be considered to conserve the landscape of this vast property (particularly the area outside the designated administration district) into the future. ➢ At the Coal Railway, immediate inspection and repairs will be carried out on the bridge portions that traverse national, prefectural, and municipal roads as well as the JR Kagoshima Line. ・Also, in anticipation that the workers from the Silver Human Resource Center, which has been commissioned to carry out weeding and cleaning, will no longer be able to handle this work due to aging, etc., there is a need to decide right away on methods for landscape preservation in the future.	➢ While continuing to leave daily management of the buildings and structures at the Manda Pit to the current designated administrator, consider methods to conserve the landscape of this vast property (particularly the area outside the designated administration district) into the future. ➢ From FY2019, bridge inspections and repairs are scheduled to be carried out using national subsidies. Continue discussions with JR Kyushu on national historic site designation for the JR overpass. ➢ In regard to weeding and cleaning, consider potential methods for continued, efficient landscape preservation.
Component parts (A) / Surrounding environment (B)	-1 Safety and security Visitors' feeling of safety and security is sufficient	1. The facilities and equipment are in place for ensuring the safety and security of visitors	☆ Existence of facilities /equipment for separation between visitors and the component part	Manda Pit Yes Coal Railway Yes	Manda Pit Yes Coal Railway Yes	Monitoring method: Inspection patrols by monitors Targets: 0 (zero) incidents Monitoring method: Hold regular meetings with designated administrator Targets: 1 time/month	➢ At the Manda Pit, a visitor facility called Manda Pit Station has been created. Also, within the visitor areas, barricades and no-entry signs have been installed in buildings and other structures to restrict access where safety measures are undeveloped. ➢ In terms of the areas of the Coal Railway where there is limited public access, the minimum safety measures are being taken, such as setting areas where entry is prohibited and installing warning signs.	➢ Based on the Miike Coal Mine Conservation, Restoration, Presentation and Public Utilization Plan, work has begun to develop safety measures aimed at expanding the area open to the public at the Manda Pit, but because of the issue of securing national subsidies and other funding, all can't be done in the short term. ➢ The situation is the same in regard to the Coal Railway. Along with the construction that will be undertaken to repair buildings with the view of expanding the areas open to the public, there is a need	➢ Based on the Miike Coal Mine Conservation, Restoration, Presentation and Public Utilization Plan, the development of planned safety measures (repairs, reinforcements, partitions, etc.) will be undertaken at the Manda Pit with the goal of expanding the area open to the public. ➢ Similarly, at the Coal Railway, safety fencing, partitions, and other improvements will be done. Improvements have begun to make all lines of the Coal Railway open to the public. The development of the Manda	➢ Consider strengthening safety measures (repairs, reinforcements, partitions, and other improvements) to accompany the expansion of public access at the Manda Pit based on the Miike Coal Mine Conservation, Restoration, Presentation and Public Utilization Plan. ➢ With regard to the Coal Railway, strengthen safety measures (safety fencing, partitions, and other improvements) from FY2018. ➢ Also, in order to enable urgent work to be undertaken in any case,

							to ensure visitor safety. This needs to be done steadily, in keeping with the development schedule.	Pit facilities and the Coal Railway will steadily move forward.	make efforts to secure national subsidies or other funding.
		2. The operational arrangements for this purpose are in place	・Number of patrols ・Number of monitors, etc.	Manda Pit 312 times/year, 312 people Coal Railway 0 times/year, 0 people	Manda Pit 312 times/year, 312 people Coal Railway 0 times/year, 0 people	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan	➢ The daily operation and management of the Manda Pit, as a facility that is open to the public for a fee, is handled by the designated administrator and a monitor is stationed there during operating hours. At dangerous locations, monitors are there to warn people at all time and are providing safe guidance to visitors.	➢ Measures for the daily safety of visitors to the Manda Pit are conducted by the designated administrator and are generally implemented appropriately.	➢ While maintaining the current daily management of the Manda Pit by the designated administrator for the time being, we will work with the designated administrator to consider how to ensure the safety of future visitors as we look to expand the area that is open to the public.	➢ Maintain the current daily management of the Manda Pit by the designated administrator for the time being, and implement new visitor safety measures when the public areas of the site are expanded.
							➢ At the Coal Railway, municipal employees patrol the site daily, but they are not posted there at all times. For the Manda Pit, the Arao Sightseeing Association, which is the designated administrator for it, is in charge of daily management. The Coal Railway is directly administered by the city of Arao.	➢ In areas of the Coal Railway where there is limited public access, the minimum safety measures have been taken (e.g., setting areas where entry is prohibited and installing warning signs), but there is no equipment that can operate the entire vast area.	➢ At the Coal Railway, along with expanding the public areas of the site, safety measures (e.g., setting areas where entry is prohibited and installing warning signs) will be strengthened as needed and consideration will be given to installing a mechanical security system, etc., in the future.	➢ At the Coal Railway, along with expanding the public areas of the site,, strengthen safety measures (e.g., setting areas where entry is prohibited and installing warning signs) as needed from FY2018, and consider installation of a mechanical security system, etc.
	2 Promotion of understanding Visitors' feeling of satisfaction is sufficient	1. The facilities and equipment are in place for promoting and deepening understanding by visitors	・Establishment of visitor center ・Improvement of guides, etc.	Yes	Yes	Monitoring method: Reflect implementation status of relevant plans for provision of tourism facilities, etc. Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plans Targets: Items defined in relevant plans for provision of tourism facilities, etc. Items defined in Conservation, Restoration, Presentation and Public Utilization Plans	➢ The appropriate explanatory signs have been installed to explain the content of the buildings and other facilities within the Manda Pit facilities. Manda Pit Station, which functions as a visitor center, has been opened, and there are displays including a diorama of the Manda Pit at the peak of its operations, photos from the time of its opening, tools used at the coal mine, etc. On days when the property is open, tours are carried out by facility guides. Using Signage, an audio guide system (in English, Chinese, and Korean) is available that can be used with a smartphone or tablet, and tablets are loaned out at the facility free of charge.	➢ Although explanatory signs are installed within the Manda Pit facilities, there are many cases where they are not functioning adequately due to issues with the tour route, etc. It has been 10 years since Manda Pit Station was set up as a visitor center, and there is a need to change the displays, including the common World Heritage display. Also, although regular guided tours are being conducted, it is difficult to handle group tours. Although digital content (guide system) has been introduced, the actual usage by visitors is inadequate.	➢ The area open to the public at the Manda Pit will be expanded based on the Miike Coal Mine Conservation, Restoration, Presentation and Public Utilization Plan in order to promote understanding of the coal production system among visitors. Changes to the displays in Manda Pit Station will be considered. Also, the way in which guided tours are operated (time, frequency, etc.) will be rethought and efforts will be made to promote utilization of digital content (guide system).	➢ At the Manda Pit, with an eye toward expanding the areas accessible to the public from FY2018 based on the Miike Coal Mine Conservation, Restoration, Presentation and Public Utilization Plan, carry out repair work on buildings, development of the historic sites, etc. With regard to the display changes at Manda Pit Station, in addition to the cost design, consider means to secure funding. Also, rethink the way in which guided tours are operated (time, frequency, etc.) and work to promote utilization of digital content (guide system).
							➢ Explanatory signs have been installed on the old platforms of the Coal Railway.	➢ There are no guide functions provided at the Coal Railway other than the explanatory signs.	➢ Efforts will be made to improve the guide functions at the Coal Railway beyond the explanatory signs.	➢ At the Coal Railway, consider guidance methods other than explanatory signs (e.g., Internet-based guide systems).
		2. The operational arrangements for this purpose are in place	・Deployment of docents (including volunteer guides)	Yes 23 people	Yes 30 people	Monitoring method: Reflect implementation status of relevant plans for provision of tourism facilities, etc. Targets: Items defined in relevant plans for provision of tourism facilities, etc.	➢ At the Manda Pit, the facilities guides, including a former coal miner, conduct six guided tours (including Manda Pit Station) a day, once every hour from 10 a.m. to 3 p.m. on days when	➢ Although guided tours are being offered at the Manda Pit, there are individual differences in the content of the explanation, the length of the tour, etc. Although the guide	➢ In light of the expansion of the public areas of the Manda Pit, the content, methods, etc., of the guided tours will be rethought. With regard to the guide system, efforts will be made to make people fully	➢ Rethink the content, methods, etc., of the guided tours at the Manda Pit in light of the expansion of the public areas of the site. Work to make people fully aware of the guide

						the site is open. The audio guide system explanations and the free loan of tablets are available at all times.	system is available, awareness among visitors is not sufficient and therefore utilization has been low.	aware of its availability and at the same time improve user-friendliness.	system, and at the same time improve user-friendliness.
						➢ Also, to correctly convey the World Heritage value to visitors, annual training sessions are being held in Arao for the Manda Pit designated administrator, facility guides, monitors, and city employees.	➢ Although training sessions are held annually for relevant persons, it has not led to an improvement in skill levels.	➢ Efforts will be made to improve the skills of guides through local guide training sessions as well as through exchanges with guides from other areas.	➢ In addition to guide training sessions in the areas held by the World Heritage Council for the Sites of Japan's Meiji Industrial Revolution, exchanges are also being carried out among guides through the Miike Area Omotenashi Promotion Council, which was jointly established in FY2016 with the cities of Omuta and Uki.
						➢ There are no docents (volunteer guides, etc.) at the Coal Railway.	➢ Since there are no docents (volunteer guides, etc.) at the Coal Railway, it is difficult for visitors to understand it.	➢ While it would be difficult to have guides permanently stationed at the Coal Railway, temporarily deploying them when events or functions are being held will be considered. Also, introduction of the guide system will be considered.	➢ At the Coal Railway, while it would be difficult to have guides permanently stationed there, consider deploying them when events and functions are held. Consider introducing a guide system.
	-3 Hospitality The comfort of visitors is sufficient	1. The facilities and equipment are in place for promoting enjoyment by visitors	・Existence of dining facility ・Existence of toilets, etc.	Yes Yes	Yes Yes	Monitoring method: Reflect implementation status of relevant plans for provision of tourism facilities, etc. Targets: Items defined in relevant plans for provision of tourism facilities, etc.	➢ At the Manda Pit, in November 2018, a commercial space (combined with a dining space) was created on adjacent land, which sells local specialties and souvenirs.	➢ At the Manda Pit, a commercial space (combined with a dining space) opened on adjacent land, which sells local specialties and souvenirs, but the level of the products and services offered needs to be improved.	➢ Because there is a certain facility available at the Manda Pit, a survey of visitor needs will be conducted and expansion of equipment will be considered if needed.	➢ Because there is a certain facility available at the Manda Pit, conduct a survey of visitor needs and consider expansion of the equipment as needed.
						➢ Every spring and fall, events for the general public are held that include the sale of products and stage events, and these draw large numbers of visitors to the Manda Pit.	➢ The holding of regular events in the spring and fall has become customary, but there is a need to expand events and functions in other seasons as well.	➢ Also, there is a need to consider plans for events throughout the year that are organized around themes, for example.	➢ Also, from FY2019, it is expected that plans for events will be implemented throughout the year organized around themes, etc.
						➢ There are currently no facilities at the Coal Railway.	➢ In the future, consideration is needed of developing the minimal level of convenience facilities (e.g., toilets and parking) at the Coal Railway.	➢ At the Coal Railway, in light of the development of a promenade, for example, based on the Miike Coal Mine Conservation, Restoration, Presentation and Public Utilization Plan, while considering the development of the minimal level of convenience facilities, thought should also be given to walking events and such.	➢ At the Coal Railway, in light of the development of a promenade, etc., based on the Miike Coal Mine Conservation, Restoration, Presentation and Public Utilization Plan, consider developing the minimal level of convenience facilities, and think about holding walking events and such.
		2. The operational arrangements for this purpose are in place	・Existence of administrative/operating body	Yes	Yes	Monitoring method: Reflect implementation status of relevant plans for provision of tourism facilities, etc. Targets: Items defined in relevant plans for provision of tourism facilities, etc.	➢ At the Manda Pit, the designated administrator for both the Manda Pit and Manda Pit Station, the Arao Sightseeing Association, opened a commercial facility (Marugoto Arao Bussankan) at its own expense in November	➢ At the Manda Pit, there is a visitor center (Manda Pit Station) and a commercial facility (Marugoto Arao Bussankan). Looking ahead, there is a need for the two facilities to work together to strengthen	➢ While asking visitors to the Manda Pit for their opinions, plans will be made to improve Manda Pit Station and Marugoto Arao Bussankan.	➢ Since the commercial facility at the Manda Pit just opened, for the time being, observe the response of visitors. Consider responding to the feedback from visitors as appropriate.

						2018 and is running that.	their hospitality services.		
						➢ Also, as designated administrator, holds the Manda Pit Citizens Festival (April 29) in cooperation with local residents and the Manda Pit Festival (November 3) in cooperation with the city, etc., with stage performances, food booths, and more, which are expected to draw large numbers of visitors each year.	➢ There is also a need for the designated administrator and the city to work together to carry out events and other mechanisms throughout the year for the enjoyment of the visitors.	➢ Also, the designated administrator and the city will work together to carry out events and other mechanisms throughout the year for the enjoyment of the visitors.	➢ Also, from FY2019, the designated administrator and the city will work together to carry out events and other mechanisms throughout the year for the enjoyment of the visitors.
						➢ Although there are no regular events at the Coal Railway, there are occasional events such as walking events held by NPOs.	➢ Because the Coal Railway covers a vast site, there is a need to consider installing convenience facilities for visitors along with the development of a promenade, etc., that will allow visitors to tour the entire site.	➢ At the Coal Railway, in conjunction with the development of a promenade, etc., to be carried out under the Miike Coal Mine Conservation, Restoration, Presentation and Public Utilization Plan, the operational/management system will be considered. ➢ Moreover, there is a need to find ways to develop human resources who can implement community development utilizing local resources.	➢ Consider the operational/management system at the Coal Railway in conjunction with the development of a promenade, etc., to be carried out under the Miike Coal Mine Conservation, Restoration, Presentation and Public Utilization Plan. ➢ From FY2018, a research project is being conducted in collaboration with University of Fukuoka and others in order to train people who will become leaders who can work on community development utilizing the Manda Pit and other resources.

Visitors (C)	A state in which visitors feel safety, security, comfort, and a sense of satisfaction, spend a sufficient amount of time at the component part to understand the value, and are motivated to visit again		Current State	Targets	Monitoring method: Similar satisfaction surveys as conducted in the past year Targets: Attain average value, attain and maintain maximum value, reduce percentage of problems indicated to 0 (zero)
		☆Satisfaction	50.9%	52.2%	
		☆Time spent	0.0%	0.0%	
		☆Understanding	1.8%	0.0%	
		☆Sparking of interest	33.3%	39.8%	
		☆Intention to visit again	19.3%	23.4%	
		☆Percentage of problems indicated	0.0%	0.0%	

Miike Port (Component part 7-1)

Appendix 1　Visitor Management Strategy for Individual Component Parts (Form C)

I. Trend in daily visitors

Number of visitors (year-long total)	FY 2014	–	FY 2015	33,244	FY 2016	25,386	FY 2017	24,982	FY 2018	22,892
Number of visitors (daily peak)	FY 2014	–	FY 2015	–	FY 2016	5,289	FY 2017	6,866	FY 2018	6,649

II. Structure of Visitor Management Strategy for Individual Component Parts

Visitor Management Strategy for Individual Component Parts

(1) Subject	(2) Visitor management vision (targets)		(3) Management indicators *Select or add suitable indicators	(4) Setting of target levels			(5) Identification and implementation of measures			
			Indicators ☆: Common	Current state	Targets	Method of measuring/calculating indicators *Making use of quantitative, qualitative, and visitor satisfaction surveys; making use of separate surveys, etc.	(a) Current state	(b) Issues	(c) Directionality of response	(d) Methods and measures
Component parts (A)	Physical damage No harm to land and materials of component part	1. The facilities and equipment are in place for physically protecting the component part	☆Unsafe incidents ☆ Existence of facilities /equipment for separation between visitors and the component part	— Yes	— Yes		➢ The component site is a port that is currently operating, and thus the majority of the scope of the property is not open to the general public.		➢ The industrial activity will continue and port functions will be maintained. ➢ With regard to locations where visitor access would interfere with port activities, access will continue to be restricted, and as a rule, those areas will not be opened to the public.	➢ The industrial activity will continue and port functions will be maintained. ➢ With regard to locations where visitor access would interfere with port activities, access will continue to be restricted, and as a rule, those areas will not be opened to the public.
		2. The operational arrangements for this purpose are in place	・Number of patrols ・Number of monitors, etc.	— —	— —					
Component parts (A) / Surrounding environment (B)	-1 Safety and security Visitors' feeling of safety and security is sufficient	1. The facilities and equipment are in place for ensuring the safety and security of visitors	☆ Existence of facilities /equipment for separation between visitors and the component part	Yes	Yes		➢ The component site is a port that is currently operating, and thus the majority of the scope of the property is not open to the general public.	➢ There are few locations where it is possible for visitors to come in direct contact with the component parts of the property. The parking lot set up at the observation deck is a temporary facility. Ongoing development is needed.	➢ The main features are sightseeing at the Miike Port observation deck and the Miike Lock Gates viewing point. ➢ Information will be disseminated using such facilities as the Old Nagasaki Customs House Miike Branch Office and the Mikawa Pit.	➢ The main features are sightseeing at the Miike Port observation deck and the Miike Lock Gates viewing point. ➢ Information will be disseminated using such facilities as the Old Nagasaki Customs House Miike Branch Office and the Mikawa Pit.
		2. The operational arrangements for this purpose are in place	・Number of patrols ・Number of monitors, etc.	— —	— —					
	-2 Promotion of understanding Visitors' feeling of satisfaction is sufficient	1. The facilities and equipment are in place for promoting and deepening understanding by visitors	・Establishment of visitor center ・Improvement of pamphlet ・Improvement of guides, etc.	— 1 —	— 1 —					

		2. The operational arrangements for this purpose are in place	・Deployment of docents (including volunteer guides)	—	—				
	-3 Hospitality The comfort of visitors is sufficient	1. The facilities and equipment are in place for promoting enjoyment by visitors	・Existence of dining facility ・Existence of toilets, etc.	— —	— —				
		2. The operational arrangements for this purpose are in place	・Existence of administrative/operating body	—	—				

Visitors (C)	A state in which visitors feel safety, security, comfort, and a sense of satisfaction, spend a sufficient amount of time at the component part to understand the value, and are motivated to visit again	Current State	Targets	Monitoring method: Similar satisfaction surveys as conducted in the past year
		☆Satisfaction 38.5%	38.5%	Target: Maintain current status
		☆Time spent 23.1%	23.1%	Target: Maintain current status
		☆Understanding 15.4%	0.0%	Target: Reduce percentage of problems indicated to 0 (zero)
		☆Sparking of interest 23.1%	24.4%	Target: Attain average value
		☆Intention to visit again 0.0%	13.2%	Target: Attain average value
		☆Percentage of problems indicated 0.0%	0.0%	Target: Reduce percentage of problems indicated to 0 (zero)

Relationship between Visitor Management Strategy and the Subject and Targets of Visitor Management

Misumi West Port (Component part 7-2)

Appendix 1　Visitor Management Strategy for Individual Component Parts (Form C)

I. Trend in daily visitors

Number of visitors (year-long total)	FY 2014	329,458	FY 2015	516,985	FY 2016	311,874	FY 2017	292,828	FY 2018	229,916
Number of visitors (daily peak)	FY 2014	1,168	FY 2015	1,935	FY 2016	1,479	FY 2017	1,069	FY 2018	6,649

II. Structure of Visitor Management Strategy for Individual Component Parts

Visitor Management Strategy for Individual Component Parts

(1) Subject	(2) Visitor management vision (targets)		(3) Management indicators *Select or add suitable indicators	(4) Setting of target levels			(5) Identification and implementation of measures			
			Indicators ☆: Common	Current state	Targets	Method of measuring/calculating indicators *Making use of quantitative, qualitative, and visitor satisfaction surveys; making use of separate surveys, etc.	(a) Current state	(b) Issues	(c) Directionality of response	(d) Methods and measures
Component parts (A)	Physical damage No harm to land and materials of component part	1. The facilities and equipment are in place for physically protecting the component part	☆Unsafe incidents	0 incidents/year	0 incidents/year	Monitoring method: Inspection patrol records, etc. Target: 0 (zero) incidents	➢ Installation of warning signs ・ Signs are installed to indicate proper manners, etc., when using the site. ➢ Machine-based surveillance ・ Five surveillance cameras are installed.	➢ Diverse visitors ・ Many visitors come to the site to fish, and they leave trash and do not demonstrate proper manners, etc. Also, there are warning signs that are deteriorating and need to be replaced.	➢ Publicizing the site among visitors ・ Appeals will be made for improved manners through the use of notices at the guidance center, pamphlets, etc., while at the same time, a unified design will be used when replacing warning signs.	➢ Replace warning signs
			☆ Existence of facilities /equipment for separation between visitors and the component part	Yes	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes				
			・Sign renewal	No	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan		➢ Clarification of tour route ・ Within the Misumi West Port, the tour route is not clearly indicated.	➢ Setting tour route ・ The tour route will be set and efforts will be made to guide visitors.	➢ Set tour route
			・ Establishment of tour route	No	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan				
		2. The operational arrangements for this purpose are in place	・ Holding of liaison meetings	Yes	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan	➢ Management by designated administrator, etc. ・ The property's prefectural and city lands are managed and regularly cleaned by the designated administrator and others.	➢ Management by designated administrator, etc. ・ Although the site is being managed by the designated administer and others, due to the large scope of the property and the fact that it includes privately owned land as well, it is difficult to cover the entire site.	➢ Holding of liaison meetings ・ Along with improving the system for the designated administrator and others, efforts will be made to create a management system in cooperation with local residents, tour guides, and community organizations. ➢ Ongoing work ・ Monitoring and survey work will continue to be implemented, and depending on the degree of degradation or damage, repairs will be implemented.	➢ Hold liaison meetings
			・ Existence of plans/implementation	Yes	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan				➢ Plan & implement surveys, repairs, etc.
Component parts (A) / Surrounding environment (B)	-1 Safety and security Visitors' feeling of safety and security is sufficient	1. The facilities and equipment are in place for ensuring the safety and security of visitors	☆ Existence of facilities /equipment for separation between visitors and the component part	Yes	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Yes	➢ Establish sightseeing course ・ There are portions of the sidewalk along Japan National Route 57 that are narrow, and although it is currently a quiet residential area, many cars travel along there at high speeds, and thus from the perspective of placing priority	➢ Parking during events ・ At Misumi West Port, many of those who come to fish are using part of the parking lot, but there has been no shortage of parking spaces during normal times. However, there are parking shortages when events are held.	➢ Use of public transportation ・ Efforts will be made to advise visitors to use the Misumi East Port parking lot or to use public transportation if there is a lack of parking due to events, etc.	
			・ Existence of completed development	No	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration,				

						Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan	on traffic safety and the peaceful lives of local residents, the current sightseeing course avoids Route 57, the highway overpass, the town layout, and so on, focusing instead on the port area. ➢ Machine-based surveillance ・ Five surveillance cameras are installed.		➢ Development of green areas and open spaces ・ In order to improve the safety and accessibility for local residents and visitors, improvements will be made to open spaces, the guided route, and parking lots.	➢ Develop green areas and open spaces
		2. The operational arrangements for this purpose are in place	・ Holding of liaison meetings	Yes	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan	➢ Management by designated administrator, etc. ・ The property's prefectural and city lands are managed and regularly cleaned by the designated administrator and others.	➢ Management by designated administrator, etc. ・ Although the site is being managed by the designated administrator and others, due to the large scope of the property and the fact that it includes privately owned land as well, it is difficult to cover the entire site.	➢ Holding of liaison meetings ・ Along with improving the system for the designated administrator and others, efforts will be made to create a management system in cooperation with local residents, tour guides, and community organizations.	➢ Create a management system
	-2 Promotion of understanding Visitors' feeling of satisfaction is sufficient	1. The facilities and equipment are in place for promoting and deepening understanding by visitors	・ Existence of new installations or renovations	No	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan	➢ Installation of guidance facility ・ In order to increase understanding of World Heritage, guidance equipment has been set up within Ryujokan, showing the positions, names, and photos of the 23 component parts and also introducing them through the use of a video. ➢ Installation of World Heritage Plaque ・ The World Heritage Plaque has been installed near the entrance to the guidance facility.	➢ Content of explanations ・ The explanations are very simple, and there is insufficient description of the position of the Misumi West Port, for example, within the Sites of Japan's Meiji Industrial Revolution. ・ Improved explanations are also needed related to the connection between the Mitsui Miike Coal Mine and Miike Port, and to the transport and storage of coal in the Misumi area.	➢ Enhancement of guidance facility and explanations ・ There is a need for efforts to guide visitors based on a clarification of the role/theme of each facility. Also, along with positioning the Ryujokan and Urashimaya buildings as the initial facilities to receive visitors arriving at Misumi West Port and providing guidance on the component part as a whole, pamphlets and maps will be distributed, and the necessary information will be provided for subsequent walking tours or guided tours. ・ The commentary of guided tours that currently focus primarily on explaining Misumi West Port will be developed into an explanatory system to allow for adequate description of the World Heritage value of the site as a whole and the structure of the coal industry system.	➢ Add and replace information and explanatory boards
		2. The operational arrangements for this purpose are in place	• Number of times held	1 time/year	1 time/year	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan	➢ Uki City Tourism & Produce Association serves as the liaison and provides tour guides for visitors, centered on the port area.	➢ Following the site's inscription, the tour guide personnel increased, but there is a need to secure additional human resources and improve the quality of their services. ・ The focus of the explanations that guides provide to visitors is limited to the wharfs and to some of the structures that are designated as cultural properties. The current explanatory system does not adequately convey the World Heritage value of the site as a whole or the structure of the industrial system.	➢ We will convene and participate in observation workshops on guides at other sites and efforts will be made to develop new guides and improve the quality of guides. ・ The tourism departments of the cities of Omuta, Arao, and Uki in Miike Area have established the Miike Area Omotenashi Promotion Council, which is creating pamphlets, conducting guide training, considering the guide system, and so on.	➢ Hold observation workshops on guides at other sites
	-3 Hospitality The comfort of visitors is sufficient	1. The facilities and equipment are in place for promoting enjoyment by visitors	・ Existence of utilization	No	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan	➢ Cooperation with JR Kyushu, etc. ・There are regular lines that connect the JR Kyushu "Take the A-Train" limited express line with the ports of Misumi, Matsushima, and Hondo, and with the cruise that circles the Amakusa Gokyo (Five Bridges of Amakusa).	➢ Decrease in visitors ・ At the time of the World Heritage inscription, there were 510,000 visitors, but due in part to the impact of the Kumamoto earthquake, that number has decreased to 310,000 in FY2016 and 290,000 in FY2017. ・ Also, we are not yet attracting tourists who are traveling to the Amakusa area.	➢ Utilization of the floating pier through development of green areas and open spaces ・ Deliberations will be conducted on the potential use of the approach from the sea area to Misumi West Port.	➢ Utilize the floating pier after development of green areas and open spaces

		2. The operational arrangements for this purpose are in place	・Holding of meetings at headquarters or working groups	Yes	Yes	Monitoring method: Reflect implementation status of Conservation, Restoration, Presentation and Public Utilization Plan Targets: Items defined in Conservation, Restoration, Presentation and Public Utilization Plan	➢ Cooperation among local governments ・The tourism departments of the cities of Omuta, Arao, and Uki in the Miike Area have established the Miike Area Omotenashi Promotion Council, which is working to publicize the appeal of the property, raise awareness of it, and expand the number of visitors through tours. ➢ Cooperation with private businesses ・Sightseeing package plans that cover a wide area are being implemented, centered on JR Kyushu and others. Also, a tourism plan for the Miike Area has been proposed by the Miike Area Omotenashi Promotion Council.	➢ Cooperation with neighboring local governments, etc. ・There is a need for further cooperation with the constituent local governments of the Sites of Japan's Meiji Industrial Revolution—Fukuoka Prefecture, Kumamoto Prefecture, Omuta City, and Arao City—as well as with other nearby local governments and tourist organizations.	➢ Cooperation with tourism organizations ・Cooperation is needed with the tourism association of the cities of Uki, Uto, Kami-Amakusa, and Amakusa. An "Amakusa–Uto Peninsula Tourism Federation" composed of the tourism association of above four cities was established and will work to promote further cooperation and tourism on the Amakusa–Uto Peninsula, including Misumi West Port. ➢ Strengthening of management/ operational system ・Efforts will be made to strengthen the management and operational system of the Uki City World Heritage Exchange Headquarters to effectively carry out work based on close cooperation.	➢ Strengthen the management/operational system
Visitors (C)	A state in which visitors feel safety, security, comfort, and a sense of satisfaction, spend a sufficient amount of time at the component part to understand the value, and are motivated to visit again		☆Satisfaction ☆Time spent ☆Understanding Q14 Q15 ☆Sparking of interest ☆Intention to visit again Q18 Q22 ☆Percentage of problems indicated ☆Crowding ☆Damage ☆Lack of toilets or other facilities	Current State 18.2% 11.0% 11.0% 14.9% 14.3% 23.4% 17.5% 0.6% 0.0% 5.2%	Targets 33.8% 10.5% 0.0% 0.0% 24.4% 23.4% 20.8% 0.0% 0.0% 0.0%	Monitoring method: Similar satisfaction surveys as conducted in the past year Attain average value Attain average value Reduce percentage of problems indicated to 0 (zero) Reduce percentage of problems indicated to 0 (zero) Attain average value Maintain maximum value Attain average value Reduce percentage of problems indicated to 0 (zero) Maintain maximum value Reduce percentage of problems indicated to 0 (zero)			

Relationship between Visitor Management Strategy and the Subject and Targets of Visitor Management

Appendix 1　Visitor Management Strategy for Individual Component Parts (Form C)

Imperial Steel Works, Japan (Component part 8-1)

I. Trend in daily visitors

Number of visitors (year-long total)	FY 2014	–	FY 2015	56,771	FY 2016	27,563	FY 2017	21,722	FY 2018	18,958
Number of visitors (daily peak)	FY 2014	–	FY 2015	1,174	FY 2016	830	FY 2017	924	FY 2018	410

II. Structure of Visitor Management Strategy for Individual Component Parts

Visitor Management Strategy for Individual Component Parts

(1) Subject	(2) Visitor management vision (targets)		(3) Management indicators *Select or add suitable indicators	(4) Setting of target levels			(5) Identification and implementation of measures			
			Indicators ☆: Common	Current state	Targets	Method of measuring/calculating indicators *Making use of quantitative, qualitative, and visitor satisfaction surveys; making use of separate surveys, etc.	(a) Current state	(b) Issues	(c) Directionality of response	(d) Methods and measures
Component parts (A)	Physical damage No harm to land and materials of component part	1. The facilities and equipment are in place for physically protecting the component part	☆Unsafe incidents ☆ Existence of facilities /equipment for separation between visitors and the component part	0 incidents/year Yes	0 incidents/year Yes	Monitoring method: Reflect implementation status of the Conservation Management Plan Targets: 0 (zero) incidents Monitoring method: Reflect implementation status of the Conservation Management Plan Targets: Yes	➢ Because the component part is located within a working steelworks, it is not possible to permit unlimited free access to the site, and so the physical impact of visitors is extremely limited.	➢ None in particular.	➢ None in particular.	➢ None in particular.
		2. The operational arrangements for this purpose are in place	・Existence of appropriate management/operation by the corporate owner	Yes	Yes	Monitoring method: Reflect implementation status of the Conservation Management Plan Targets: Yes	➢ Same as above.	➢ None in particular.	➢ None in particular.	➢ None in particular.
Component parts (A) / Surrounding environment (B)	-1 Safety and security Visitors' feeling of safety and security is sufficient	1. The facilities and equipment are in place for ensuring the safety and security of visitors	☆ Existence of facilities /equipment for separation between visitors and the component part ・Existence of parking lot ・Existence of toilets for visitors	Yes Yes Yes	Yes Yes Yes	Monitoring method: Reflect implementation status of the Conservation Management Plan Targets: Yes	➢ In April 2015, the First Head Office Viewing Space (hereafter, "viewing space") was opened as an area where the general visitor could freely view the site. In April 2018, a dedicated parking area and toilets were secured. ➢ An exhibit of the Sites of Japan's Meiji Industrial Revolution was set up at the Kitakyushu Innovation Gallery & Studio (KIGS). KIGS includes restrooms and nearby paid parking.	➢ It is necessary to increase collaboration between the viewing space and KIGS and to make it easier to visit both.	➢ Further expand information guide signs.	➢ Make improvements in phased approach.
		2. The operational arrangements for this purpose are in place	・Deployment of monitors	Yes (3 people)	Yes (3 people)	Monitoring method: Reflect implementation status of the Conservation Management Plan Targets: Yes	➢ The city manages the viewing space. It is open from 9:30-17:00, and safety monitoring staff are permanently stationed there. Security cameras have been installed and images are shared with city hall. ➢ The city manages KIGS.	➢ None in particular.	➢ None in particular.	➢ None in particular.
	-2 Promotion of understanding Visitors' feeling of satisfaction is sufficient	1. The facilities and equipment are in place for promoting and deepening understanding by visitors	・Establishment of visitor center ・Improvement of pamphlets	Yes Various	Yes Various	Monitoring method: Reflect implementation status of the Conservation Management Plan Targets: Yes	➢ Explanatory panels were installed in the viewing space in April 2017, a plaque commemorating all 23 sites in Japanese FY 2016, and a virtual reality (VR) guidance service started in Japanese FY 2017.	➢ Acquiring repeat visitors	➢ Updating of display items.	➢ Make improvements in phased approach.

						➢ At KIGS, nearby the related site Higashida Blast Furnace NO. 1, World Heritage explanatory panels have been installed and videos displayed.			
		2. The operational arrangements for this purpose are in place	・Deployment of docents (including volunteer guides)	Yes (1 person)	Yes (1 person)	Monitoring method: Reflect implementation status of the Conservation Management Plan Targets: Yes	➢ Volunteer tour guides have been deployed (daily at the viewing space and Sundays/holidays at KIGS).	➢ None in particular.	➢ None in particular.	➢ None in particular.
	-3 Hospitality The comfort of visitors is sufficient	1. The facilities and equipment are in place for promoting enjoyment by visitors	・Adoption of digital tools	Yes	Yes	Monitoring method: Reflect implementation status of the Conservation Management Plan Targets: Yes	➢ In March 2018, a guidance service was launched at the viewing space that uses VR (provides visitors with a virtual experience of walking around inside the property). ➢ Events have been held including one where visitors collect stamps placed at different locations on a course.	➢ Measures for rainy weather. ➢ Aqcuiring repeat visitors	➢ Establishment of a rest hut, etc. ➢ Updating of display items..	➢ Make improvements in phased approach.
		2. The operational arrangements for this purpose are in place	・Existence of administrative/operating body	Yes	Yes	Monitoring method: Reflect implementation status of the Conservation Management Plan Targets: Yes	➢ Taken care of by viewing space staff.	➢ None in particular	➢ None in particular.	➢ None in particular.

Visitors (C)	A state in which visitors feel safety, security, comfort, and a sense of satisfaction, spend a sufficient amount of time at the component part to understand the value, and are motivated to visit again		Current State	Targets
		☆Satisfaction Q16	18.0%	30.0%
		☆Time spent Q13	16.2%	16.2%
		☆Understanding Q14	2.7%	0.0%
		Q15	2.7%	0.0%
		☆Sparking of interest Q17	12.6%	24.9%
		☆Intention to visit again Q18	5.4%	30.0%
		Q22	10.8%	80.0%
		☆Crowding	0.0%	0.0%
		☆Fear of damage	0.0%	0.0%

Monitoring method: Similar satisfaction surveys as conducted in the past year
Target: Maintain current status (“somewhat satisfied” or higher)
Target: Maintain current status (About 30 minutes is optimal)
Target: 0 (“I did not understand”)
Target: 0 (“I did not understand”)
Target: National average (“I strongly agree”)
Target: Maintain current status (“somewhat likely to come again” or higher)
Target: Maintain current status (“I would somewhat like to go to other sites” or higher)
Target: Maintain current status
Target: Maintain current status

Relationship between Visitor Management Strategy and the Subject and Targets of Visitor Management

Onga River Pumping Station (Component part 8-2)

Appendix 1　Visitor Management Strategy for Individual Component Parts (Form C)

I. Trend in daily visitors

Number of visitors (year-long total)	FY 2014	0	FY 2015	10,581	FY 2016	7,069	FY 2017	9,716	FY 2018	9,555
Number of visitors (daily peak)	FY 2014	0	FY 2015	920	FY 2016	2,000	FY 2017	1,296	FY 2018	857

II. Structure of Visitor Management Strategy for Individual Component Parts

Visitor Management Strategy for Individual Component Parts

(1) Subject	(2) Visitor management vision (targets)		(3) Management indicators *Select or add suitable indicators	(4) Setting of target levels			(5) Identification and implementation of measures			
			Indicators ☆: Common	Current state	Targets	Method of measuring/calculating indicators *Making use of quantitative, qualitative, and visitor satisfaction surveys; making use of separate surveys, etc.	(a) Current state	(b) Issues	(c) Directionality of response	(d) Methods and measures
Component parts (A)	Physical damage No harm to land and materials of component part	1. The facilities and equipment are in place for physically protecting the component part	☆Unsafe incidents ☆ Existence of facilities /equipment for separation between visitors and the component part	0 incidents/year Yes	0 incidents/year Yes	Monitoring method: Reflect implementation status of the Conservation Management Plan Targets: 0 (zero) incidents Monitoring method: Reflect implementation status of the Conservation Management Plan Targets: Yes	➢ Because the component part is located within a working steelworks, it is not possible to permit unlimited free access to the site, and so the physical impact of visitors is extremely limited.	➢ None in particular.	➢ Sightseeing at the viewing space is the primary measure.	➢ The corporate owner will manage and operate the site
		2. The operational arrangements for this purpose are in place	・Existence of appropriate management/operation by the corporate owner	Yes	Yes	Monitoring method: Reflect implementation status of the Conservation Management Plan Targets: Yes	➢ Managed/operated by the corporate owner. (Not open to the public)	➢ None in particular.	➢ To be discussed among the corporate owner, the city, and other relevant organizations.	➢ The corporate owner will manage and operate the site
Component parts (A) / Surrounding environment (B)	-1 Safety and security Visitors' feeling of safety and security is sufficient	1. The facilities and equipment are in place for ensuring the safety and security of visitors	☆ Existence of facilities /equipment for separation between visitors and the component part ・Existence of visitor parking lot (for standard cars)	Yes No	Yes Yes	Monitoring method: Reflect implementation status of the Conservation Management Plan Targets: Yes Monitoring method: Confirm with manager of planned site Targets: Yes	➢ In July 2015, a temporary viewing space was set up to provide a place where the general visitors could freely view the site, and in March 2017, a permanent viewing space was created. ➢ The widened part of the Onga River embankment is used as a parking lot for sightseeing buses with an advance reservation system.	➢ A visitor parking lot (for regular cars) should be secured.	➢ Visiting the viewing space will be the primary measure, and a visitor parking lot (for regular cars) will be established within the Onga River grounds in a way that gives due consideration to the landscape.	➢ Establish a visitor parking lot (for regular cars)
		2. The operational arrangements for this purpose are in place	・Number of patrols (inspections)	1 time / week	1 time / week	Monitoring method: Report on World Heritage work Targets: Carry out weekly regular inspections	➢ In addition to carrying out accident prevention measures including the installation of fall prevention fencing and fencing to prevent pedestrians from crossing into the road, guards and tour guides are deployed at appropriate times to provide safe guidance for visitors at the viewing space.	➢ None in particular.	➢ Daily inspections of the viewing space will be conducted to prevent damage to the fall prevention fencing, etc.	➢ Conduct daily inspections of the viewing space
	-2 Promotion of understanding Visitors' feeling of satisfaction is sufficient	1. The facilities and equipment are in place for promoting and deepening	・Updating of displays at the Onga River Pumping Station Information Center	1 time / year 13	1 time / year 18	Monitoring method: Confirm with the facility manager Targets: Update display content annually	➢ At the Onga River Pumping Station Information Center, there is a display of materials related to an overview of the Sites of Japan's Meiji Industrial Revolution and	➢ The primary method of traveling between the viewing space and the Onga River Pumping Station Information Center is by foot (20 minutes each way), and so a more	➢ Will update and expand display content at the Onga River Pumping Station Information Center.	➢ Update and expand display content at the Onga River Pumping Station Information Center

		understanding by visitors	・Installation of information (guidance) signs			Monitoring method: Reflect implementation status of the Nakama City Basic Plan for Townscape and Environmental Maintenance Targets: Items defined in the Nakama City Basic Plan for Townscape and Environmental Maintenance	the pumping station. ➢ Installed guidance signs etc. with standardized logo.	convenient method of getting around is needed.	➢ Will work to further expand information (guide) signs.	➢ Install information (guide) signs
		2. The operational arrangements for this purpose are in place	・Participation in training sessions	5 times / year	5 times / year	Monitoring method: Reflect implementation status of the Nakama City Basic Tourism Plan Targets: Items defined in the Nakama City Basic Tourism Plan	➢ Tour guides are deployed at the viewing space to provide explanations to visitors.	➢ The skill of tour guides should be improved in order to help visitors understand the value of the Onga River Pumping Station.	➢ Guide training will be held in order to ensure that guides acquire adequate knowledge and improve their skill level.	➢ Improve guide training
	-3 Hospitality The comfort of visitors is sufficient	1. The facilities and equipment are in place for promoting enjoyment by visitors	・Updating of displays at the Onga River Pumping Station information center ・Expansion of explanatory signs, street furniture, etc., near viewing spaces	1 time / year Yes	1 time / year Yes	Monitoring method: Confirm with the facility manager Targets: Update display content annually Monitoring method: Reflect implementation status of the Nakama City Basic Tourism Plan Targets: Items defined in the Nakama City Basic Tourism Plan	➢ With the cooperation of the owner, limited access to the grounds of the site was granted in November 2016. There are currently no plans for tours within the grounds as it is a working property.	➢ Visitors are unable to come in direct physical contact with the component part.	➢ Working in cooperation with other component parts and relevant properties nearby, efforts will be made to further expand displays of materials on the site and to improve visitor satisfaction while considering tourism methods that are integrated with the Onga River landscape.	➢ Improve display materials, explanatory boards, street furniture, etc., at the Onga River Pumping Station Information Center and the areas around the viewing space
		2. The operational arrangements for this purpose are in place	・Deployment of tour guides.	Yes	Yes	Monitoring method: Reflect implementation status of the Nakama City Basic Tourism Plan Targets: Items defined in the Nakama City Basic Tourism Plan	➢ Tour guides have been deployed at the viewing space, and they provide explanations making use of digital materials such as old photos of the pumping station, images of its interior, and audio of the pump in action.	➢ Visitors are unable to come in direct physical contact with the component part.	➢ Use digital materials and such effectively in order to introduce and explain the parts of the site that are not open to the public.	➢ Further improve the explanations using digital and other materials.

Visitors (C)	A state in which visitors feel safety, security, comfort, and a sense of satisfaction, spend a sufficient amount of time at the component part to understand the value, and are motivated to visit again		Current State	Targets	Monitoring method: Similar satisfaction surveys as conducted in the past year
		☆Satisfaction	36.6%	37.0%	Targets: Maintain current status
		☆Time spent	35.8%	35.0%	Targets: Maintain current status
		☆Understanding			Targets: Maintain current status
		Q14	4.8%	4.8%	Targets: Maintain current status
		Q15	5.8%	5.8%	Targets: Attain average value
		☆Sparking of interest	21.3%	24.9%	Targets: Maintain current status
		☆Intention to visit again			Targets: Maintain current status
		Q18	12.6%	13.8%	Targets: Reduce percentage of problems indicated to 0 (zero)
		Q22	26.9%	26.9%	Targets: Reduce percentage of problems indicated to 0 (zero)
		☆Percentage of problems indicated			Targets: Reduce percentage of problems indicated to 0 (zero)
		☆Crowding	1.0%	0.0%	
		☆Damage	0.0%	0.0%	
		☆Lack of toilets or other facilities	5.4%	0.0%	

Relationship between Visitor Management Strategy and the Subject and Targets of Visitor Management

4 Summary

(How the formulation of Visitor Management Strategy came about and has been characterized)

The Visitor Management Strategy was drawn up in response to Recommendation c) of the decision by the 39th session of the World Heritage Committee.

Recommendation c) seeks that the visitor “carrying capacity” of component parts be defined; but the results of three years of multifaceted surveys do not suggest the possibility of preventing adverse impacts by setting visitor level thresholds. Accordingly, at individual component part, a state in which there is no adverse impact by visitors was defined, and a visitor management strategy was formulated based in the key points of maintaining such a state by means of dynamic processes and constantly monitoring the status of the component part and visitors.

(Contents of Visitor Management Strategy)

The Visitor Management Strategy, in response to the requests in Recommendation c), was drawn up for the purposes of reducing adverse impacts from visitors and promoting understanding of the OUV. Following establishment of the visitor management vision, multiple and varied visitor management indicators were set to grasp its status of realization. These indicators consist of those common to the sites as a whole and those original to individual component parts to address their unique issues.

The Visitor Management Strategy, in addition to indicating these objectives, definitions of ideal state, and current and target values for visitor management indicators, sets out the monitoring methods of the management indicators, measures for rectifying issues, and the division of roles for carrying out the Visitor Management Strategy including comprehensive support by the Cabinet Secretariat. In these ways it is ensured that the Strategy will be implemented during the eight years starting from FY2019 that has been set as the period of the plan.

(Makeup of Visitor Management Strategy)

The Visitor Management Strategy consists of two parts, the strategy common to all component parts and visitor management strategies for individual component parts. The visitor management strategies for individual component parts provide lists of visitor trends for each component part, current and target values for visitor management indicators, monitoring methods, the current state of and issues for visitor management and approach to responding to these issues, and the response procedures and measures.

The Cabinet Secretariat nurtured a common understanding among component part managers regarding the development of visitor management strategies by creating and distributing a manual and holding workshops. Component part managers then accordingly drew up visitor management strategies for their respective component parts.

Visitor management both across all sites and for individual component parts will hereby be carried out according to the Visitor Management Strategy.

Appendix 4

Appendix 5

SITES OF JAPAN'S MEIJI INDUSTRIAL REVOLUTION

Interpretation Audit March & August 2019

Prepared by Barry Gamble & Sarah Jane Brazil, October 2019

INTRODUCTION

There is an obligation to convey the significance of a World Heritage Site to visitors - and to local communities - in order to increase public awareness, enhance understanding of its Outstanding Universal Value (OUV), and to encourage public support in the activities directed at its management and conservation.

This is a progress monitoring report on the implementation of the *Sites of Japan's Meiji Industrial Revolution* World Heritage Site (WHS) Interpretation Strategy 2017. It focusses on the key changes that have occurred since 2017, on how each Area/Component Part is presenting the OUV of the whole WHS, and the connections and historic linkages that exist between them. The report provides comments and recommendations for the ongoing interpretation of this WHS in order to strengthen the interpretive connectivity and consistency between the Areas and their Component Parts and to foster a better appreciation of its OUV.

There has been considerable and positive progress on the WHS interpretation and presentation since the 2017 audit – both remotely (especially the custom-developed maps and phone/tablet-based interpretive resources), and on-site (presentation). It is addressing the complexity and challenges of interpreting a serial WHS, particularly in terms of scale, location, management, access and resources.

This audit provides an overview of how the WHS and its Component Parts is currently presenting its OUV. It highlights that there is a need for a more consistent, cohesive and coordinated approach to connect and present the 23 Component Parts, to communicate the OUV and how they relate to each other. This will be addressed by the completion of the already planned implementation of the overarching interpretation of the singular OUV which will be led by the "common exhibition" being developed for the *Sites of Japan's Meiji Industrial Revolution* Tokyo Centre, opening in 2020.

BACKGROUND

In July 2015, the UNESCO World Heritage Committee inscribed the *Sites of Japan's Meiji Industrial Revolution: Iron and Steel, Shipbuilding and Coal Mining* as a World Heritage Site. As part of this inscription, it was recommended that the Japanese Government give consideration to:

> *Preparing an interpretive strategy for the presentation of the nominated property, which gives particular emphasis to the way each of the sites contributes to OUV and reflects one or more of the phases of industrialisation; and also allows an understanding of the full history of each site.*

In response, the Government of Japan developed an interpretation strategy in 2017. The strategy's development was informed by a comprehensive audit of the WHS and its Component Parts to create a baseline. It also includes an action plan based on issues raised in the audit and advice received following a sites' tour by ICOMOS' President of the International Scientific Committee on Interpretation and Presentation.

Appendix 5

The Strategy was submitted as part of the Government of Japan's State of Conservation Report 2017 to the World Heritage Committee, which:

7. *Further notes that monitoring of the number of visitors is being undertaken systematically for all component sites, and that a visitor management strategy, including carrying capacities, will be formulated in 2018 on the basis of these results; and also requests the State Party to submit this strategy to the World Heritage Centre, once it is completed, for review by the Advisory Bodies;*
8. *Notes furthermore that interpretation is available for all component sites, and that digital communications have been developed, but that further improvements are planned, including Information Centre to be opened;*
9. *Further requests the State Party to provide an update on overall interpretation upon completion of Information Centre;*
10. *Strongly encourages the State Party to take into account best international practices for interpretation strategies when continuing its work on the interpretation of the full history of the property, both during and outside of the period covered by its OUV, and in the digital interpretation materials.* (Decision 42 COM 7B.10)

CURRENT SITUATION

This monitoring report is based on sites visits to each Area in March and August 2019 and meetings which discussed progress to date and shared ideas to further develop the WHS's interpretation and presentation.

The "common exhibition"

- The 2017 Interpretation Strategy and audit recommended the development of consistent content and brand for the presentation of the WHS OUV at each Area. It is a key task of the Strategy. This should also clearly articulate the connections between the component parts and their respective contributions - in a balanced way; as there is often a tendency for sites to (over) emphasize their own achievements in a way that neglects the fundamental (linked) contributions by others. It should also include why the three themes were selected. As informed during the 2019 interpretation audit, this recommendation has a functional working title the "common exhibition".
- The Cabinet Secretariat will provide immediate and clear direction on who is responsible for leading the development and content of the "common exhibition" to provide well defined guidance to all Areas for the presentation of OUV'. It is important to have consistency in content and design and present OUV in a clear, structured and succinct manner. It is further essential that sites provide a suitably large enough, dedicated, area that greets the visitor on arrival and helps them to understand that they are in one serial World Heritage Site, and why it is significant.
- Guidance on the content and design of the "common exhibition" should draw from the widely-consulted and approved texts in the Nomination Document, and existing exemplars from the exhibitions at the Hashino Iron Mining and Smelting Site Information Centre (specifically regarding a model approach for technical and accessible content) and the Hagi Visitor Centre (specifically regarding the successful

approach to design, graphic techniques and a range of diverse and wholly appropriate easily accessible media). Hashino provides well-balanced information on the OUV, which is presented both in its exhibition and brochure that is provided in multiple languages. Hagi's design and presentation of the OUV has been developed to a high standard and is consistent with design and presentation of the nomination document, website, WHS's brochures and road signs.

- A detailed brief, including the content and design informed by the Hashino and Hagi exhibitions, should be developed and provided to all Areas so that the "common exhibition" can be developed and installed at each appropriate facility. The exhibition's design should also be modular to that its installation can be flexible and adapted to fit each Area's available exhibition space, particularly as some facilities have limited space and resources.

Area 1 – Hagi

- Provides an exemplar regarding the successful approach to design, graphic techniques and a range of diverse and wholly appropriate easily accessible media. Interpretation of the overall OUV is provided at the visitor centre (300,000 visitors in 2018), then more specific information is provided at the associated facilities. The amount of spaces allocated for the exhibition of OUV in the museum ought to be the model for all other Areas to follow (although in terms of visitor experience, OUV should be presented first, before the Component Part's specific contribution, and national and/or local stories). It is also important to remember balanced, accurate history, as some storyboards/presentations can become "over-enthusiastic" when relating the achievements of a specific aspect of the site or component part; sometimes to the detriment of others in their equally important contributions.
- Current detailed design development for the new exhibition in the Hagi Museum provides the opportunity to incorporate an object-rich display (in contrast to the interpretation-only visitor centre) that is relevant to each of Hagi's Component Parts and elements. This can be backed by succinct WHS interpretive context and labels; the exhibit fitting seamlessly into the rest of the museum and its current exhibition style.
- Ohitayama Tatara Exhibition Hall provides sufficient interpretation for an introduction to the adjacent site. The archaeological site is supplemented with interpretation boards and a virtual reality facility.

Area 2 – Kagoshima

- It is important to intercept and capitalise on the 600,000 visitors to Sengan-en and the 300,000 to the Shoko-Shuseikan museum (Former Shuseikan Machinery Factory) to present and communicate the WHS OUV and how this area contributes to it. Content should draw from the widely-consulted and approved texts in the Nomination Document.
- Projected earthquake-strengthening of the structure of the Former Shuseikan Machinery Factory presents (as current exhibits will be temporarily removed) an

opportunity to refresh, in particular, the introductory interpretive exhibition at the beginning of the visitor experience. This can assist with the above task.

- In developing the visitor experience in this area, it is important to understand and manage the limitations, and conservation vulnerability, of the Foreign Engineers' Residence. In terms of visitor carrying capacity, only 50 people may be accommodated in the house at any one time. The addition of a new interpretation facility in the vicinity of the site of the demolished apartment block, together with enhancements of the immediate seaward setting of the Foreign Engineers' Residence, will enable a greater capacity for visitors and their management at the site. The ongoing conservation and enhancement work at the Foreign Engineers' Residence are to be commended. It demonstrates the local government's ongoing commitment to the WHS, its obligations and opportunities.
- Based on advice provided at the site visit and subsequent meetings between Kagoshima City and Shimadzu, the new Sengan-en guidance facility is to be called the 'Kagoshima World Cultural Heritage Orientation Centre' which is to be open in October 2019. This Centre will ideally provide the first point of contact to succinctly inform the 600,000 visitors that they are in a WHS and why it is important. It should also "signpost" visitors to the Garden, the Reverberatory Furnace, Former Shuseikan Machinery Factory and the Foreign Engineers' Residence.
- In all developments, it is important to remember balanced, accurate history. Some storyboards/presentations can become "over-enthusiastic" when relating the achievements of a specific aspect of the site or component part; sometimes to the detriment of others in their equally important and often linked contributions.

Area 3 – Niryama

- Izunokuni City's development of the Furnace Visitor Centre (200,000 visitors in 2018) and the ongoing enhancement of the site is to be commended. Since the audit in 2017, the further works undertaken (tree management, new signage, land acquisition, conservation works) provide a more holistic understanding and experience of the site. For example, the now clearer visual connection between the river and the furnaces illustrates the direct relationship between the two elements. These works also embrace other experiences around the site such as the tea plantation and the viewing areas.
- The City's ongoing conservation, management and presentation of the site is an exemplar model that should be shared with the other Areas. It also clearly demonstrates one of the aims of the WH Convention, that is the WHS should have social and economic benefits to the local and broader communities.
- Izunokuni City is proposing to install the "common exhibition" within the visitor centre's entrance area. The visitor will then be able to better understand and experience the engaging and well-designed exhibition on the Component Part and its broader history. Currently, the quality and content of the presentation of overall OUV of the series is not adequate in comparison with the (occasional) over-emphasis of the contribution of the site (Component Part).

- The presentation of the site should also include what, and where, significant events/impacts/achievements relevant to Nirayama were experienced elsewhere in the WHS and beyond. Content should draw from the widely-consulted and approved texts in the Nomination Document. Again, it is important to remember balanced, accurate history, as some presentations can become "over-enthusiastic" when relating the achievements of a specific aspect of the site or component part, sometimes to the detriment of others in their equally important contributions.
- There is the opportunity with the Egawa House for Izunokuni City to enhance its interpretation while also supporting an increase in visitation to the Egawa House (currently around 30,000, with an estimated annual carrying capacity of 50,000); thus extending the overall visitor experience to the area and expanding on the WHS story. However, this will need to be carefully managed to retain the current personable and intimate experience, and ensure that the structures and gardens are not adversely impacted. Around 50,000 visitors seem viable as a manageable and achievable target.
- The new archival facility at the Egawa House provides the opportunity to provide additional educational experiences and materials that could be used for exhibitions etc.
- Izunokuni City is proposing to remove the Heda Shipbuilding Museum from the third tier of the Interpretation Strategy's hierarchy in developing their interpretation plan. There was a discussion that this associative site demonstrates one of the significant impacts of the Nirayama Reverberatory Furnaces' technological achievements and one of the WHS three themes. The museum is not managed by Izunokuni City. The removal of this facility from the heirarchy's third tier will not have an adverse impact on the interpretation of the WHS OUV and its attributes.

Area 4 – Kamaishi

- Since the last audit, key changes and developments at the Hashino Iron Mining Smelting site and Information Centre include the presentation of information with the introduction of new interpretation panels and the updated application (based on augmented reality) to use with mobile devices. Both provide information in more than one language. The Information Centre provides a well-balanced presentation of the WHS OUV, followed by the contribution made by the Component Part and how it links with other relevant Component Parts. Its fuller history is also outlined.
- At the Iron and Steel History Museum (13,000 visitors), ongoing interpretation and presentation includes further developing the exhibition content to clearly demonstrate the connection and links between Niryama, and Yawata, via Kamaishi. It also includes the impacts of the legacy of iron mining and smelting, and its continuous development, until the present day. The museum presents in more than one language, including the furnace sound and light show, exhibition panels and labels, and a guide book.
- At the Former Kamaishi Mine Office site, holistic improvements offer a more diverse experience that provides a wider interpretation and presentation of the site eg new interpretive panels which show how the site operated. This is provided in multiple languages, museum labels, and a guide leaflet.

Appendix 5

- The Kamaishi Historical Material Display provides an appropriate associative understanding of the fuller history of the Area drawing links with the WHS and this Component Part. Labels in English.
- Training for guides and teachers and educational programs which focus on smelting.

Area 5 – Saga

- Ongoing professional work at Mietsu Naval Dock and the associated museum, including excavation archaeology, furthers the interpretation and conservation of the Component Part. This is to be complimented.
- The plans they have developed to inform the development of Mietsu Naval Dock and the museum are to be commended.
- The OUV and linkages with other component parts (especially those in Nagasaki where there are very close historic relationships) will be essential in these developments. Great care must be taken to achieve balanced, accurate (evidenced) history, as some storyboards/presentations can become "over-enthusiastic" when relating the achievements of a specific aspect of the site or component part; sometimes to the detriment of others in their equally important contributions. Content and story should draw from the widely-consulted and approved texts in the Nomination Document.

Area 6 - Nagasaki

- It is appropriate for the proposed 'Nagasaki Area Centre' to be located in the Former Mitsubishi No 2 Dock House in Glover Park to present the "common exhibition". This facility will optimize the existing catchment of over one million annual visitors. Together with other buildings and the spacious grounds in the park adjacent to Glover House, it is easily able to accommodate large numbers.
- An interpretation plan for the Glover House should be being developed in parallel with the current conservation works which are due to be completed within two years. We look forward to providing ongoing advice for the design and interpretive development of these two places.
- There is some merit in considering parallel planning with the proposed developments in Nagasaki and Saga as their content and timescales are to a degree overlapping.
- The Nagasaki Shipyard Museum clearly interprets and presents the history of the shipyard and its role as part of the overall WHS. There is the opportunity to increase the visitation to the facility. However, as the site is still operational, access will need to be managed by the company.
- The Takashima Coal Mining Museum should further embrace its association with the WHS by introducing greater visibility in branding, including further relevant interpretive content and raising its profile and visitor numbers through networking with other Component Parts in the Nagasaki Area. The World Cultural Heritage Division could provide advice to achieve this.

Area 7 – Miike

- The principal interpretation centre, Omuta Coal industry and Science Museum, is currently redeveloping its exhibitions. The proposed location for the "common exhibition" within the entrance area is appropriate. From here, it will be a straightforward task of interpretation planning to reorganize and re-present the first section of the galleries to introduce Miike's contribution to OUV, and that of its Component Parts and various elements. There are already good exhibits on a number of these that will require little modification.
- The museum has the opportunity to become a world class coal mining interpretive centre as, not only is it located next to a key coal mining Component Part of a WHS, it contains innovatively displayed and highly impressive working exhibits of large-scale coal mining equipment (albeit more recent technology). To achieve this goal, it is recommended that a study tour is undertaken of some European coal mines such as the recently inscribed World Heritage sites in France and Belgium, Big Pit in Wales (part of Blaenavon WHS in the UK), and the German Mining Museum in Bochum (Germany) that has just had a major redevelopment of its galleries.
- The Nagasaki Customs House is awaiting further interpretive developments. A word of advice given on site was that the installation of facilities or structures close to the building should be given greater consideration as to their location (e.g. new visitor toilet).
- Mikawa Pit is the last production section to exploit the Miike Coalfield (from 1945), even mining under the Ariake Sea. Presentation of this associated site enhances the 'full history' of the Component Part by its focus on the social theme with the labour strike, coalmine disaster, and labour issues including prisoners of war working in the mine. Along with the Mitsui Manato Club (dating from 1907; contemporary with Miike Port) with which it is connected by a short pathway, it provides the opportunity to enhance the visitor offering within the area and to create positive social and economic impacts.
- The opportunity to open up the railway line to connect the Pits to the Port offers both economic potential and the ability to fulfil a critical interpretive aspect on the how the Area functioned and why it is significant. It could also provide a critical attraction to draw visitors to Miike and link its key elements in a single visitor experience that would further encourage perhaps an overnight stay.
- Misumi West Port is currently presenting out of date and poor quality interpretation and needs to address its presentation and exhibitions in relation to the WHS as soon as possible. There has been no significant change to this infrastructure since the 2017 audit. The exterior interpretation panels pre-date the WHS inscription and some of Ryujokan's exhibitions are in poor condition and quality and are presented with an unacceptable "temporary" appearance. The site visit discussed the WHS responsibility to engage with and to reveal to the community and visitors the OUV of the WHS and the contribution of Miike and Misumi West Port to this. There was an assurance that a permanent exhibition is currently being designed and developed, due to open in four years following earthquake strengthening of the building. However, there was also a financial commitment to update the exterior panels and to install a temporary exhibition within the Ryijokan of a more appropriate standard (both in content and design) within the next year.

Appendix 5

Area 8 – Yawata

- The First Head Office's conservation works are to be commended. When they are completed in 2020, it will provide a fitting facility to present its contribution to the WHS and that of the Component Part - even though access will (at least for the time being) be limited due to its location within the operational site.
- The First Head Office observatory space has enhanced its visitor experience with the introduction of a virtual reality experience that provides interpretation of the WHS and also the history of this Component Part. There is an early stage proposal to develop a tunnel from the observatory to the First Head Office which would provide safe and controlled physical access to a secured area within this operational site which has necessary restricted access.
- The Innovation Gallery is an appropriate publicly accessible cultural facility that serves as a visitor centre to accommodate the future "common exhibition".
- The Onga River Pumping Station interpretation is to be commended. It clearly states the significance of the Component Part and its contributions and relationships to other Component Parts and the overall OUV of the WHS.

RECOMMENDATIONS

The following recommendations are made to continue to build on the WHS ongoing interpretive development that has been implemented since inscription in 2015. They also aim to strengthen the interpretive connectivity and consistency between the Component Parts in order to foster a better appreciation of this WHS and its Outstanding Universal Value.

1. The content, design and development of the "common exhibition" must be undertaken as a priority and installed in each Area (in appropriate respective Component Parts) as soon as possible. Adequate resources, particularly relevant expertise and funding, and a suitable size of space and location (in terms of visitor arrival), need to be provided to achieve this.
2. Continue the development of the interpretation plans as they are a key tool, based on best international practices, that will guide how each Area and their Component Parts contribute to the OUV and allow an understanding of their full history. This will make sure that there is a consistent, cohesive and coordinated approach to connect and present the 23 Component Parts to communicate OUV and how they relate to each other. The plans are not required to be submitted to the World Heritage Committee.
3. The Government of Japan provides an update on the WHS overall interpretation when the Tokyo Centre is completed (Decision 42 COM 7B.10). This update should report on progress against the nine key steps in the interpretation strategy.
4. The development of the visitor management strategy (as indicated in the decision of the WH Committee) should be progressed as a priority. This is important as it should inform the ongoing decision-making for the interpretation and presentation of the WHS, such as discussed at Kagoshima. Management of visitors is important to the protection of WHS values and attributes as well as contributing to a sustainable, engaging and quality experience. See http://whc.unesco.org/sustainabletourismtoolkit/guides/guide-8-managing-visitor-

behaviour

5. The audit clearly demonstrated that there are highly experienced and professional curatorial and interpretation personnel delivering Area interpretation in accordance with best practices. World Heritage Cultural Division Directors and site managers should continue to meet regularly to discuss and share practices and resources, particularly to ensure consistent content and standards for interpretation across the WHS.
6. All Areas and their Component Parts should embrace the use of the WH logo in all platforms (e.g. signage and brochures) to celebrate and capitalise on the opportunities that being a WHS provides.
7. The authenticity and accuracy of information is very important, and the Nomination Document provides a consulted, balanced and approved story that is backed by extensive research and evidence. Any discrepancies in information should be able to be rectified with the agreed themes and key messages within each Area's interpretation plans.
8. The "third tier" of facilities (associated sites/facilities) identified in the Interpretation Strategy are to be included as locations on the maps currently being developed by the NCIH. These sites do not require additional WHS interpretation, nor do they require to be reported to UNESCO in the Area interpretation plans (other than they are located as map points). They are peripheral to the theme of the WHS, but are nonetheless important visitor sites and attractions.
9. A final monitoring mission should be undertaken within two years to ensure that all the Interpretation Strategy 2017 key steps are complete.

Appendix 5

Sites of Japan's Meiji Industrial Revolution: Iron and Steel, Shipbuilding and Coal Mining
Partial Revision of the Hagi City Landscape Plan
(The control method for the buffer zone of Area 1 Hagi)

Summary

This is the Heritage Impact Assessment (HIA) Report created by Hagi City in regard to partial revision of the Hagi City Landscape Plan for the buffer zone of Area 1 Hagi, a component part of the World Heritage Sites of Japan's Meiji Industrial Revolution: Iron and Steel, Shipbuilding and Coal Mining.

Hagi City is considering partially revising the Hagi City Landscape Plan, which serves as the control method for the buffer zone of Area 1. The revisions are designed to create finer subdivisions within the buffer zone based on the particular nature and use of each so as to simultaneously protect the historical landscape while encouraging vibrancy by promoting commerce and industry. The specific content of the revisions would comprise clarification of a dedicated commercial area within a part of the buffer zone and partial revision of building height regulations solely within that area and along the bypass.

The relevant component parts included in the Area 1 Hagi would be Hagi Castle Town (1-4) and Shokasonjuku Academy (1-5). The attributes which convey the outstanding universal value (OUV) of these two parts are, in the case of Hagi Castle Town, the layout of the town and the castle ruins, and, in the case of Shokasonjuku Academy, small wooden buildings, so the revisions would not have any direct impact on them.

In addition, there is currently no concrete development schedule. The partial revisions to the Landscape Plan are intended to ensure the sustainability of regional economic development in Hagi City as well as the handing-on of elements (attributes) representing OUV to the coming generation.

Hagi City and component part manager will continue to engage in periodic observation through landscape monitoring to ascertain the impact on the surrounding views caused by the partial revision of height regulations. If specifically requested, the City is also prepared to compile and report annual landscape monitoring results. Hagi City remains committed to controlling the landscape in the buffer zone through appropriate operation of the Hagi City Landscape Plan.

1. Introduction

(1) This HIA addresses Hagi Castle Town (1-4) and Shokasonjuku Academy (1-5) as component parts of the Sites of Japan's Meiji Industrial Revolution: Iron and Steel, Shipbuilding and Coal Mining inscribed as World Heritage in July 2015 (Figure 1).
(2) In preparing the HIA, reference was made to items laid down in the World Heritage Conservation Management Plan (CMP) and the views of Japanese and international experts.
(3) The main agent in preparation of the HIA was Hagi City.

Appendix 6

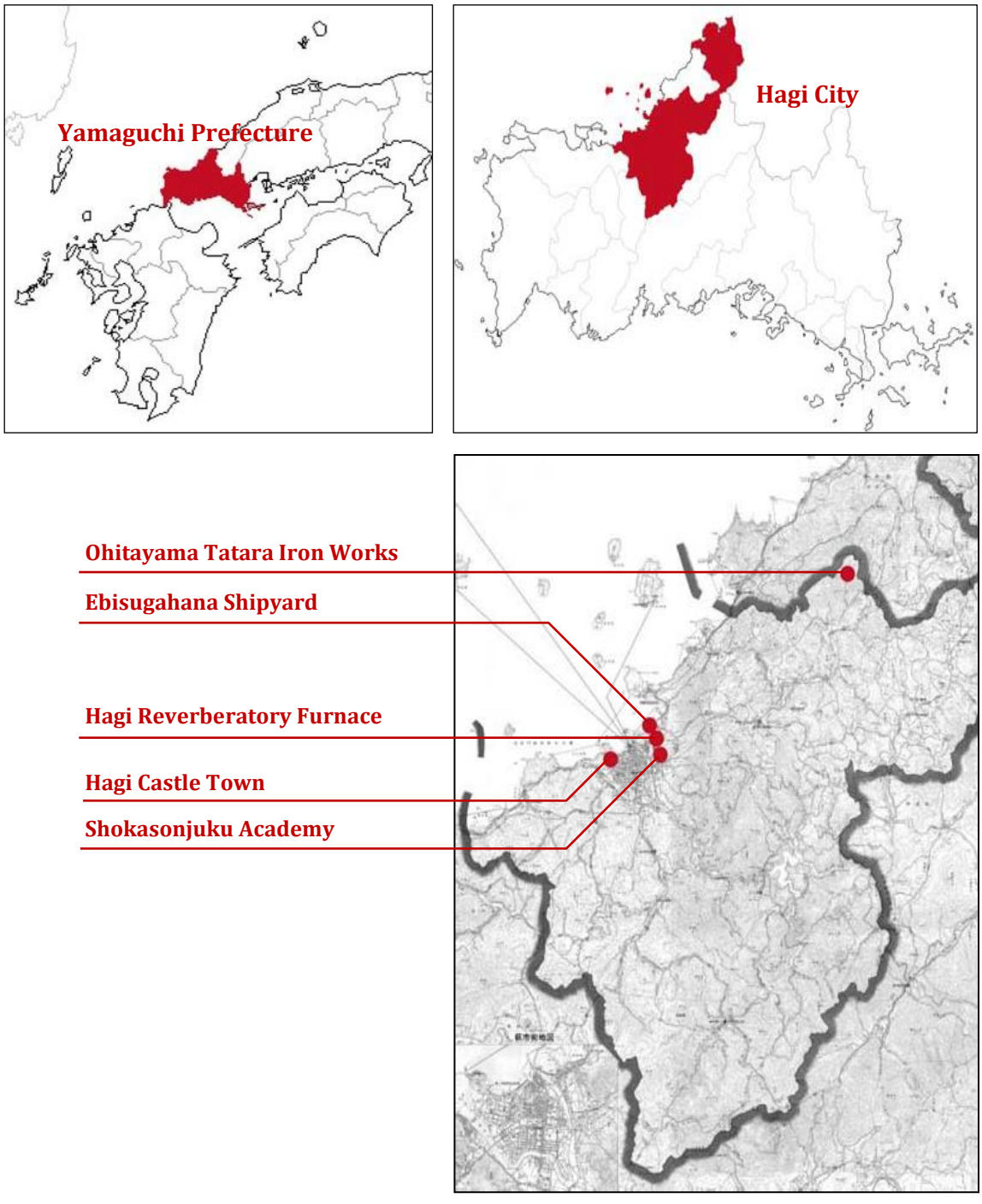


Figure 1: Map of Area 1 Hagi

2. Overview

(1) Hagi City created the Hagi City Landscape Plan in 2007 pursuant to the Landscape Act in order to create a good landscape within the city area. It also formulated the Hagi City Landscape Ordinance, which lays out guidelines for the creation of the Landscape Plan as well as the necessary matters in terms of operation of the Landscape Act.

(2) Hagi City is a regional city with a population of just under 50,000 people. While it is blessed with a rich natural environment and history, location almost entirely in a mountainous area has meant a weak industrial base, and the city has recently been experiencing a rapid population decline and inversion of the age pyramid. To address these problems, the city has been developing various programs with a focus on stimulating the regional economy. A series of considerations have also been conducted to enable the city to fulfill its responsibilities from both a world and a historical perspective to protect component parts and their buffer zones even as it addresses regional economic stimulation. Partial revision of the Hagi City Landscape Plan would be approached as an initiative seated within the context of this basic stance.

(3) Content of issue

(a) Building height regulations

The current regulations (noted in the Hagi Proto-industrial Heritage Conservation Management Plan) are indicated in Appendix 1, with the draft partial revisions attached as Appendix 2. Specifically, the maximum height of buildings would be changed from 16 meters to 20 meters in the commercial area established within the Hagi Castle Town buffer zone, and from 13 meters to 16 meters within 10 meters of either side of the bypass road (the Hijiwara-Shinkawa Line and Oya-Hijiwara Line).

(b) Commercial area

Commercial district in the City Plan and neighboring commercial districts (see Appendix 3: General Vision of Hagi City Planning)

Reasoning behind the selected heights in the Hagi City Landscape Plan

• 10m regulation

Because, pursuant to Article 55 of the Building Standards Act, the building height for the Category 1 Low-rise exclusive residential district as designated in the Hagi City Town Planning Decision is set at 10m

• 13m regulation

Based on the height of black pines as a distinctive element of the cityscape as well as the power poles installed throughout the urban area, and taking into account harmonization with existing low-rise buildings in the urban area

• 16m regulation

A study of existing medium-to-high-rise buildings in the city revealed that most buildings downtown are 16 meters or less in height, with this accordingly identified as the height that does not interrupt the view from downtown to the mountain skyline or to the landmark of Mt. Shizuki.

• 20m and 30m regulations

Set taking into account existing high-rise buildings of around 20 meters high (five-storied prefectural housing) and around 30 meters high (nine-storied apartment buildings) in the city

Appendix 6

3. OUV of the World Heritage property

(1) The Outstanding Universal Value (OUV) of the Sites of Japan's Meiji Industrial Revolution: Iron and Steel, Shipbuilding and Coal Mining is as follows (excerpt from the Statement of Outstanding Universal Value in the World Heritage Committee Decision):

> A series of industrial heritage sites, focused mainly on the Kyushu-Yamaguchi region of south-west of Japan, represent the first successful transfer of industrialization from the West to a non-Western nation. The rapid industrialization that Japan achieved from the middle of the 19th century to the early 20th century was founded on iron and steel, shipbuilding and coal mining, particularly to meet defence needs. The sites in the series reflect the three phases of this rapid industrialisation achieved over a short space of just over fifty years between 1850s and 1910.
>
> The first phase in the pre-Meiji Bakumatsu isolation period, at the end of Shogun era in the 1850s and early 1860s, was a period of experimentation in iron making and shipbuilding. Prompted by the need to improve the defences of the nation and particularly its sea-going defences in response to foreign threats, industrialisation was developed by local clans through second hand knowledge, based mostly on Western textbooks, and copying Western examples, combined with traditional craft skills. Ultimately most were unsuccessful. Nevertheless this approach marked a substantial move from the isolationism of the Edo period, and in part prompted the Meiji Restoration.
>
> The second phase from the 1860s accelerated by the new Meiji Era, involved the importation of Western technology and the expertise to operate it; while the third and final phase in the late Meiji period (between 1890 to 1910), was full-blown local industrialization achieved with newly-acquired Japanese expertise and through the active adaptation of Western technology to best suit Japanese needs and social traditions, on Japan's own terms. Western technology was adapted to local needs and local materials and organised by local engineers and supervisors.

(2) Of the three phases reflecting the OUV of the Sites of Japan's Meiji Industrial Revolution: Iron and Steel, Shipbuilding and Coal Mining, five component parts in this Area belong to the first stage. Two of these are Hagi Castle Town and Shokasonjuku Academy. Hagi Castle Town was systematically built in the 17th century, and comprises three districts: Ruins of the Castle, the District of the Upper Class Samurai, and the District of the Merchant Class. The division of samurai and merchant residences into different districts reflects the traditional class system of feudal Japan. Shokasonjuku Academy was a private school that produced many key figures of the Meiji Restoration and the Meiji era.

(3) The attribute conveying the OUV of the component part Hagi Castle Town (1-4) is the original castle town layout as systematically constructed back in feudal times, and includes a hierarchical space comprised of the castle ruins, moats, roads, and class-delineated residential districts. The attribute conveying the OUV of Shokasonjuku Academy (1-5) is the small wooden buildings in which the private school was housed. The conservation management of these is laid out as follows in the CMP:

• Protection of the component parts by the Law for the Protection of Cultural Properties

All Elements of Hagi Castle Town and Shokasonjuku Academy are conserved by designation as a Historic Site or selection as Important Preservation District for Groups of Historic Buildings under the Law for the Protection of Cultural Properties. In the site designated as a Historic Site, such acts that change the present condition and impact conservation are restricted. Also, the Law for the Protection

of Cultural Properties (the "Law") has a system in which the person who caused loss or damage or the like by changing the present condition, etc., shall be treated by the orders for return to original state and penalties, etc. It is necessary to obtain permission of the Commissioner of the Agency for Cultural Affairs under the Law and the Commissioner of the Agency may order the person who committed any act impacting conservation without permission for restoration to the original condition. In the Important Preservation District for Groups of Historic Buildings, an act that changes the present condition and impacts conservation are restricted by the Ordinance for conservation of the Preservation District for Groups of Historic Buildings in Hagi City under the Law. Not only for historic buildings which are considered to maintain the features of the historic buildings group of the district of the upper class samurai but also for general buildings in the Preservation District unified with those historic buildings, it is necessary to obtain the permission of the Mayor and the Board of Education of Hagi City under the Ordinance for any changes to the present condition, which change the appearances and if any change was made without permission, penalties may be imposed on the person under the Ordinance. Through such protective measures, the elements of Hagi Castle Town and Shokasonjuku Academy, which are the component parts contributing to the Outstanding Universal Value, are preserved in the condition at the time of World Heritage inscription.

• Protection of the property by the Road Act

Ruins of the Castle, District of the Upper Class Samurai, District of the Merchant Class which constitute Hagi Castle Town are connected with Onari-Michi where the Load of Hagi (Choshu) Clan accompanied with his subordinates passed through for Sankin-Kotai. Onari-Michi is now a Prefectural Road and a City Road. Since Yamaguchi Prefecture and Hagi City will continue to protect that element for sustaining its present state under the Road Act, the elements of Hagi Castle Town which is the component part contributing to the Outstanding Universal Value are preserved in the condition at the time of World Heritage inscription.

(4) Regulations in relation to the buffer zone are laid down as follows in the CMP.

• Hagi Castle Town

The buffer zone of Hagi Castle Town is mostly comprised of an urban district, rivers, forests and sea area. The buffer zone is controlled by combination of the Hagi City Landscape Plan under the Landscape Act and Natural Parks Act. An overview of the control method under respective laws and the subjects, etc., to be conserved are as follows.

(a) Landscape control under the Landscape Act

Within the buffer zone, the portion other than the water surface shall be protected as the general landscape plan district and focused landscape planning district under Hagi City Landscape Planning (Figure 2). In the general landscape planning district, new construction of buildings, etc., and development, etc., exceeding a certain scale and in the focused landscape planning district, all new construction of buildings, etc., and development, etc., are restricted in accordance with the landscape formation standards, except for maintenance acts, etc. The height of buildings is also restricted. The Matsumoto River and the Hashimoto River on the both sides of the delta are positioned as important landscape rivers and the major rivers in the delta are positioned as quasi-important landscape rivers (Figure 3), where new construction, etc., of structures shall require permission for occupation and their shapes, designs and colors are restricted. All national roads, most Prefectural roads and major city roads in the buffer zone are positioned as important landscape roads, which shall require permission for occupation for new construction, etc., of structures and their shapes, designs and colors are restricted. Through these measures, the value of the component part shall not be impaired by construction of large-scaled buildings and development in the buffer zone, and an appropriate landscape will be protected.

Appendix 6

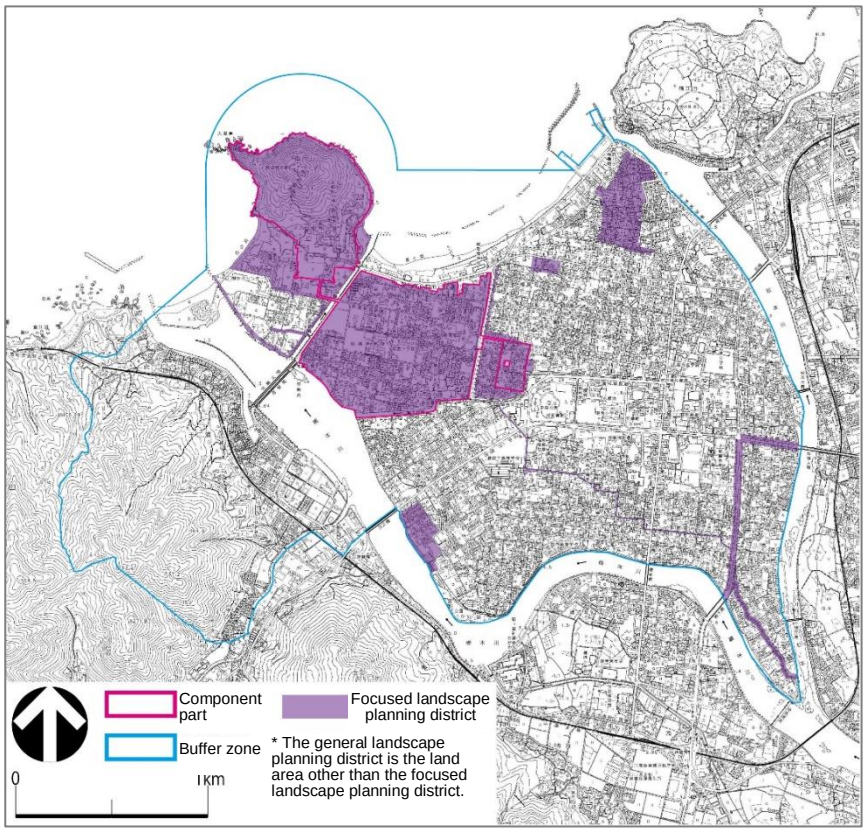


Figure 2:
Focused and general landscape planning districts in the Hagi City Landscape Plan

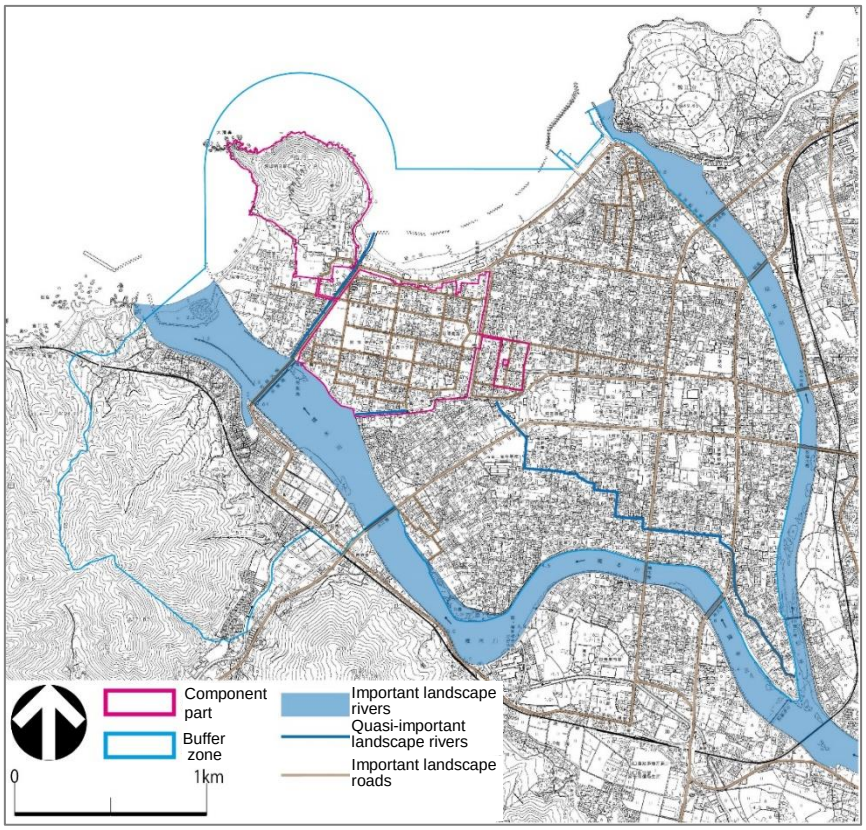


Figure 3:
Important landscape rivers, quasi-important landscape rivers, and important

(b) Protection of the Natural Environment under the Natural Parks Act

Within the buffer zone, the sea surface and part of the forests on the western side are conserved as an ordinary area and a category 2 special area of the Kitanagato Coastal National Park under the Natural Parks Act. In the ordinary area, new construction, etc., of structures and changes in land shape, etc., exceeding certain standards are restricted and in the category 2 special area, new construction, etc., of structures and development of land and changes in roof colors, etc., are restricted. Through the above measures, a good natural environment is maintained without impairing the landscape at the time of construction of the component part with regard to the sea surface and forests in the buffer zone.

• Shokasonjuku Academy

The buffer zone of Shokasonjuku Academy is within the premises of the Shoin Shrine. The buffer zone shall be controlled by Hagi City Landscape Plan under the Landscape Act. An overview of the control method under the respective laws is as follows.

(a) Conservation of good landscapes under the Landscape Act

All of the buffer zone shall be controlled as the focused landscape planning district under Hagi City Landscape Plan. In the focused landscape planning district, new construction, etc., of all buildings and changes in the characteristics of the land exceeding a certain space are restricted in accordance with the landscape formation standards. The height of buildings is also restricted. Through these measures, the value of the component part shall not be impaired by construction of large-scaled buildings and development in the buffer zone, and an appropriate landscape will be maintained.

4. Assessment of overall impact

(1) Because there will no change to height regulations within the boundary of the Hagi Reverberatory Furnace and the Ebisugahana Shipyard component parts and their buffer zones, there will be no impact on elements (attributes) contributing to the OUV or on views.

In particular, despite revision of building height restrictions from 16 meters to 20 meters in part of the Hagi Reverberatory Furnace buffer zone, the partial revision will have no substantial impact on views, because the partial revision's area is limited to the bypass road (Hijiwara-Shinkawa line) and the area within 10 meters on both sides of the road where building height is already set at 20 meters in its surrounding area.

(2) In the case of the Hagi Castle Town buffer zone, the area where the height regulations will be changed is a substantial distance from the component part. The view at the nearest point from the component part to that area (shown in Appendix 4-7) suggests that there will be no impact on elements (attributes) contributing to the OUV. The views from the observation points designated for monitoring the Hagi Castle Town landscape as well as views of the surrounding mountain skyline (shown in Appendices 4-5 and 4-6) should therefore not be substantially impacted by the change to a 20-meter building height.

(3) Height regulations will not be changed for the Shokasonjuku Academy buffer zone, but will change for the western area outside the buffer zone. An additional study was therefore undertaken on the view to the west (see Appendix 4-8), which revealed that because of the thick trees on the western side of Shokasonjuku Academy, there will be no impact on the view.

(4) The partial revision of height restrictions is primarily geared to the establishment and clarification of a commercial area and revitalization of the area along the bypass road based on the decision that regional economic revitalization is needed to halt rapid population decline and age pyramid inversion. The scope of the commercial area will be restricted to the commercial district and neighboring commercial districts in the City Plan. The revisions are designed to create finer subdivisions within the buffer zone based on the particular nature and use of each so as to simultaneously protect the historical landscape while encouraging vibrancy by promoting commerce and industry, thereby addressing urgent challenges facing Hagi City while also minimizing the impact on the landscape. Going ahead, buffer zones will continue to be designated as focused landscape planning districts or general landscape planning districts, with restrictions placed in line with the landscape formation standards in the Hagi Landscape Plan on all new building construction and development activity in the focused landscape planning district, with the exception of maintenance activity, and on all new construction of buildings and development activity over a certain scale in general landscape planning districts. Aside from restrictions in the landscape formation standards, regulations will also continue to be placed on building coverage and the floor area ratio for City Plan use districts. Land in the commercial area is currently so subdivided that the amount of land held by each landowner is too small in almost all cases to erect a large building, so it is unlikely that this will result in irredeemable change to the current state such as a string of buildings of over 16 meters being built.

5. Management process

(1) As noted above, Hagi City, landowners of the component part and the buffer zone, and related institutions have engaged in detailed and scrupulous consultations and considerations on the impact of partial revisions to building height restrictions on component parts and the landscape.

(2) Under the governance system (the General Principles and Strategic Framework for Conservation and Management) for the Sites of Japan's Meiji Industrial Revolution: Iron and Steel, Shipbuilding and Coal Mining, Local Conservation Councils are set up for each area. For this area too, the Hagi Conservation Council has been set up to exchange information and views and make decisions on the conservation management of component parts.

This HIA was discussed at the Hagi Conservation Council meeting held on May 14, 2018, and compiled after subsequent interviews with Council members, etc..

The Hagi Conservation Council assesses the partial revisions to building height restrictions as follows:

The partial revisions to the Landscape Plan have arisen in the process of addressing challenges facing Hagi City, and are not directly aimed at relaxing regulations in the buffer zone. They have therefore been compiled to address said challenges while minimizing the negative impact on the landscape in the buffer zone. Ensuring the sustainability of the area in which component parts are located is essential in maintaining good conservation in the component parts.

Hagi City and component part managers will need to continue monitoring the landscape and views in the buffer zones for Hagi Castle Town and Shokasonjuku Academy. The City should also continue with landscape control through appropriate operation of the Hagi City Landscape Plan.

(3) Along with the above procedures, the city is promoting openness such as by holding discussion meetings by the Hagi Landscape Council and concerned City Council members as well as public hearings for residents.

As a result, while the initial proposal on the scope of the height restriction revision called for application to the entire delta and its surrounding areas in the buffer zone, efforts to narrow this scope were made in the study stage, such as limiting it to the commercial districts and areas along the bypass roads.

This result shows that the approach to conservation and management in the Strategic Framework, of holding repeated open and frank discussions among the people involved, proved to be sufficiently effective.

(4) Hagi City will continue to share information and consult fully with component part managers in relation to buffer zone conservation. Where necessary, advice can also be sought from the Industrial Heritage Expert Committee, which operates under government (Cabinet Secretariat) auspices (Figure 4).

(5) The government departments concerned asked for the advice of overseas experts and others regarding this matter. Based on the advice received, photo montages from various angles were created and used in assessing the impact. The results of the impact assessments, including those of photo montages from additional angles, are given in Appendices 4-1 to 4-8.

(6) Based on the Conservation, Restoration, Presentation and Public Utilization Plan that Hagi city established in 2017, the city prepares monitoring chart for related information that has been comprehensively and systematically collected, and regularly keeps track of the state of the component parts and the buffer zones. Each fiscal year, the city summarizes the monitoring results in an annual report, and after obtaining confirmation and approval by the Hagi Conservation

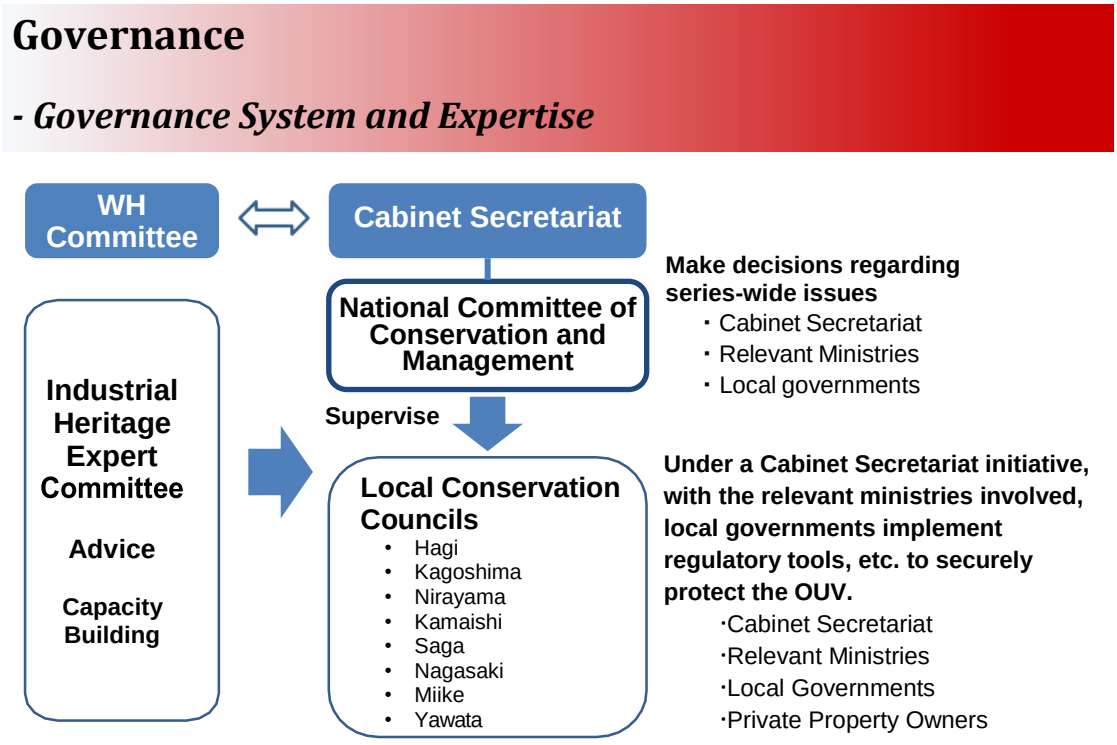


Figure 4: Governance system under the General Principles and Strategic Framework for Conservation and Management

Council, reports to the “Sites of Japan’s Meiji Industrial Revolution” National Committee of Conservation and Management.

6. Conclusion

(1) The partial revisions to the Landscape Plan will not have an immediate negative impact on the OUV, integrity or authenticity of the Sites of Japan’s Meiji Industrial Revolution: Iron and Steel, Shipbuilding and Coal Mining.

(2) A mechanism for regular and ongoing monitoring by Hagi City and component part managers is in place to investigate whether the views from component parts are being affected, and there is also a system for landscape control and prevention of unorganized development.

(3) While the city is to make an announcement to the public about the revision after submitting this report, there are no plans to construct new buildings of more than 16 meters in height at this stage. Should such plans emerge, the impact on the landscape, etc. will be ascertained beforehand. If even the slightest potential impact is identified, cooperation will be sought through a prior consultation stage between the city and the developer. In order to mitigate any impact to the greatest extent possible, this consultation stage will precede the developer's official submission of notification to the city for construction.

(4) Periodic observation will be continued through landscape monitoring to ascertain the impact on the surrounding views caused by the partial revision of height regulations. If specifically requested, the City is also prepared to compile and report annual landscape monitoring results. Hagi City remains committed to controlling the landscape in the buffer zone through appropriate operation of the Hagi City Landscape Plan.

(5) As explained above, the risk to World Heritage through these partial revisions has been successfully minimized.

REFERENCE

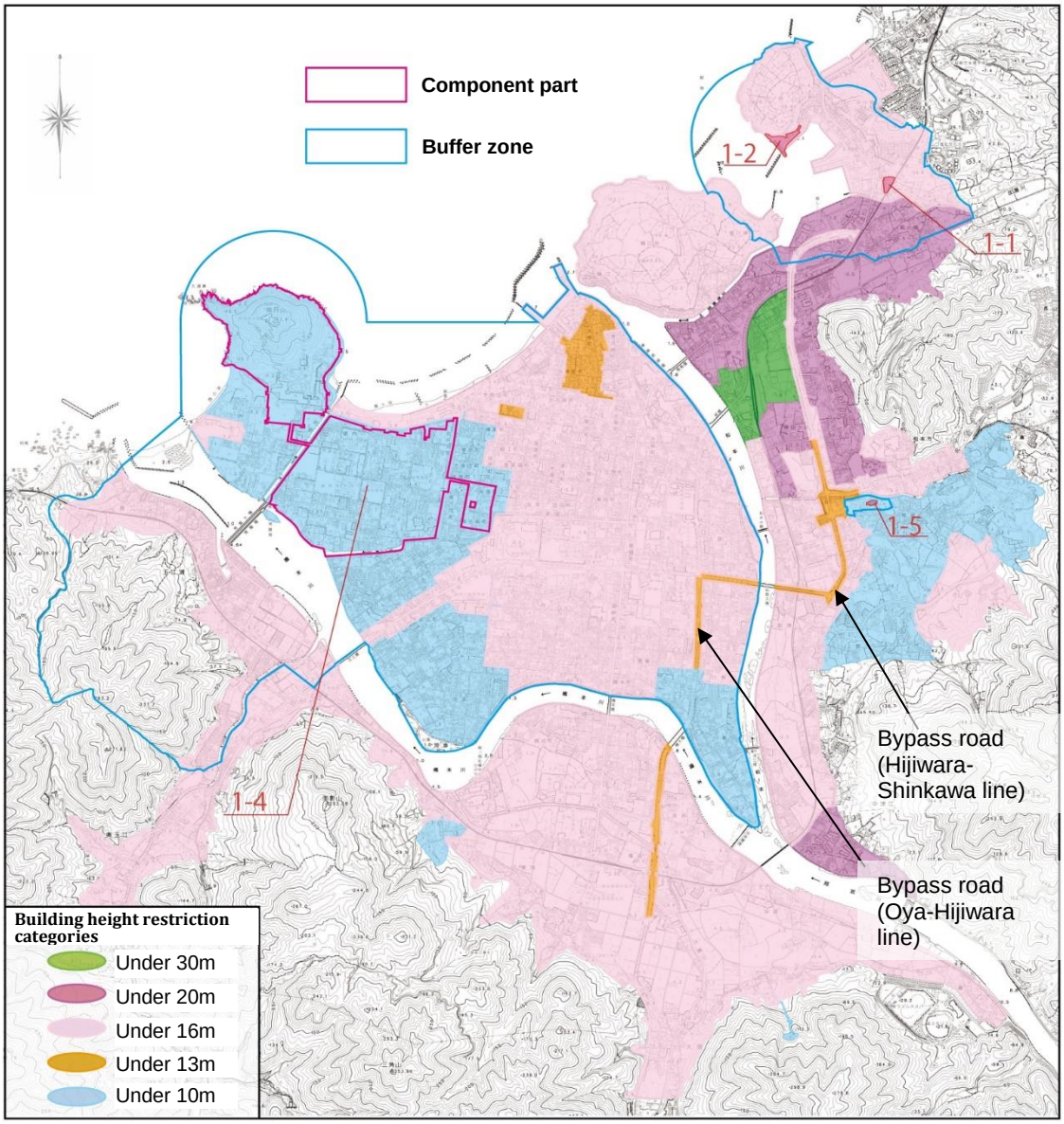
1. Process to date

- June 2017
  Revitalization of the regional economy is announced as a municipal administrative policy, requiring partial revision of the Hagi City Landscape Plan to establish a commercial area, etc.
- The municipal section in charge of the landscape subsequently launches considerations on revision of the Hagi City Landscape Plan.
- February 2018
  Hagi City Landscape Council meeting (outline of the partial revisions to the Hagi City Landscape Plan)
- March 2018
  Views of members of the Committee for Restoration of Hagi Castle Town and Other Historic Sites sought (partial revision of buffer zone regulations)
- March 2018
  Explained the landscape plan partial revisions to the Hagi City Council (1st time)
- May 2018
  Hagi Conservation Council meeting (partial revision of buffer zone regulations)
- July 2018
  Hagi City Landscape Council meeting (explanation of partial revisions to the Landscape Plan)
- July–September 2018
  Briefings for and interviews with local residents of partial revision of the Landscape Plan, briefings for and interviews with related groups
- September 2018
  Explained the landscape plan partial revisions to the Hagi City Council (2nd time)
- October–November 2018
  Public inspection and public hearing implemented on partial revision of the Hagi City Landscape Plan, interviews held with the Hagi City Planning Council
- November 2018
  Compilation of the final draft partial revision of the Landscape Plan; the Hagi City Landscape Council meeting (explanation of the final draft partial revision to the Landscape Plan)
- December 2018
  Explanation of the final draft partial revision of the Landscape Plan to the City Council (3rd time)
- December 2018
  Hearing opinion from the Industrial Heritage Expert Committee.
- January 31, 2019
  Official announcement of partial revisions to the Landscape Plan will be made by the Mayor.

Appendix 6

Appendix 1

Building Height Regulations in the Hagi City Landscape Plan (Current)

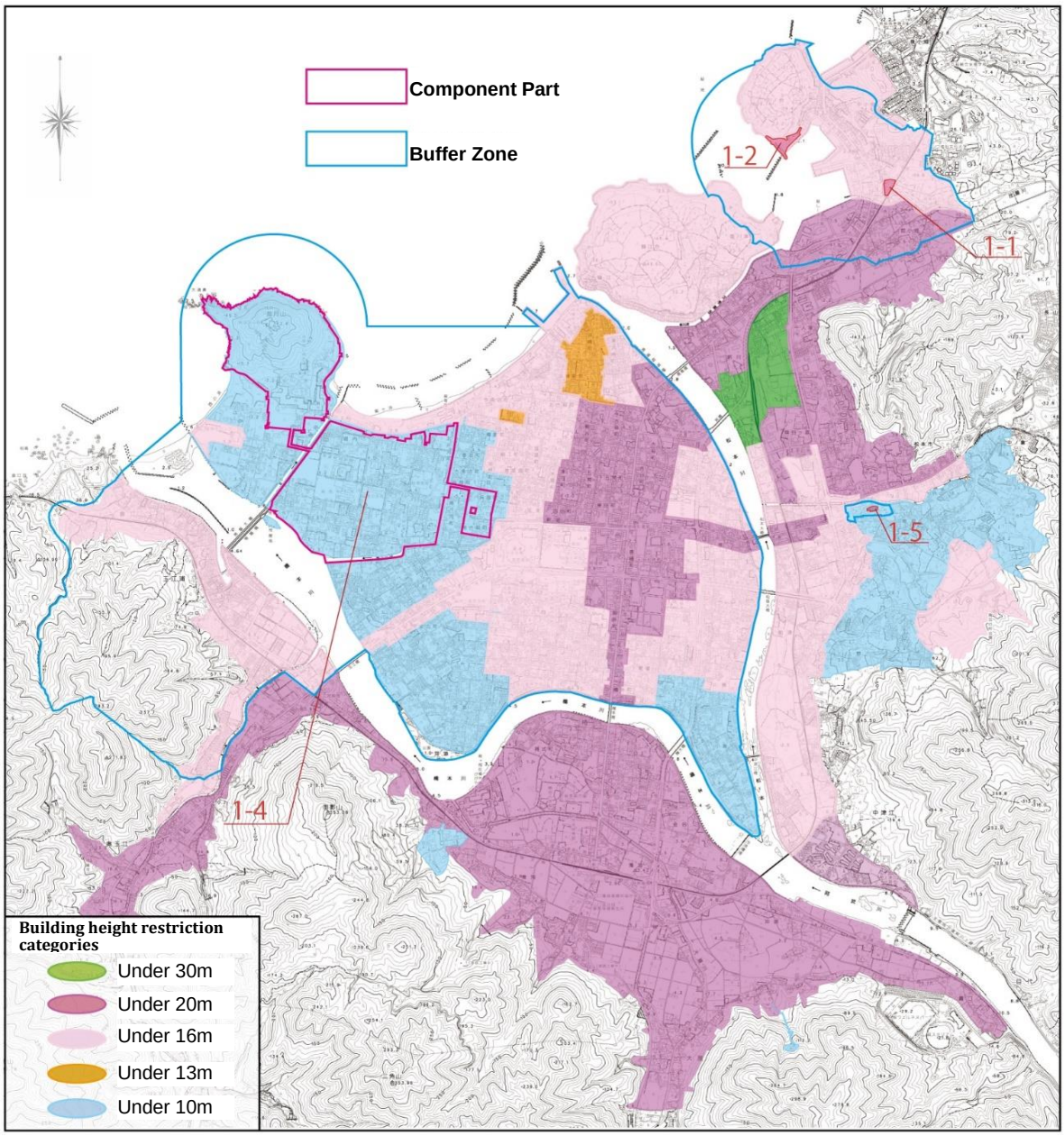


1-1 Hagi Reverbatory Furnace
1-2 Ebisugahana Shipyard
1-4 Hagi Castle Town
1-5 Shokasonjuku Academy

1-3 Ohitayama Tatara Iron Works is located outside this map.

Appendix 2

Building Height Regulations in the Hagi City Landscape Plan (Draft Partial Revision)



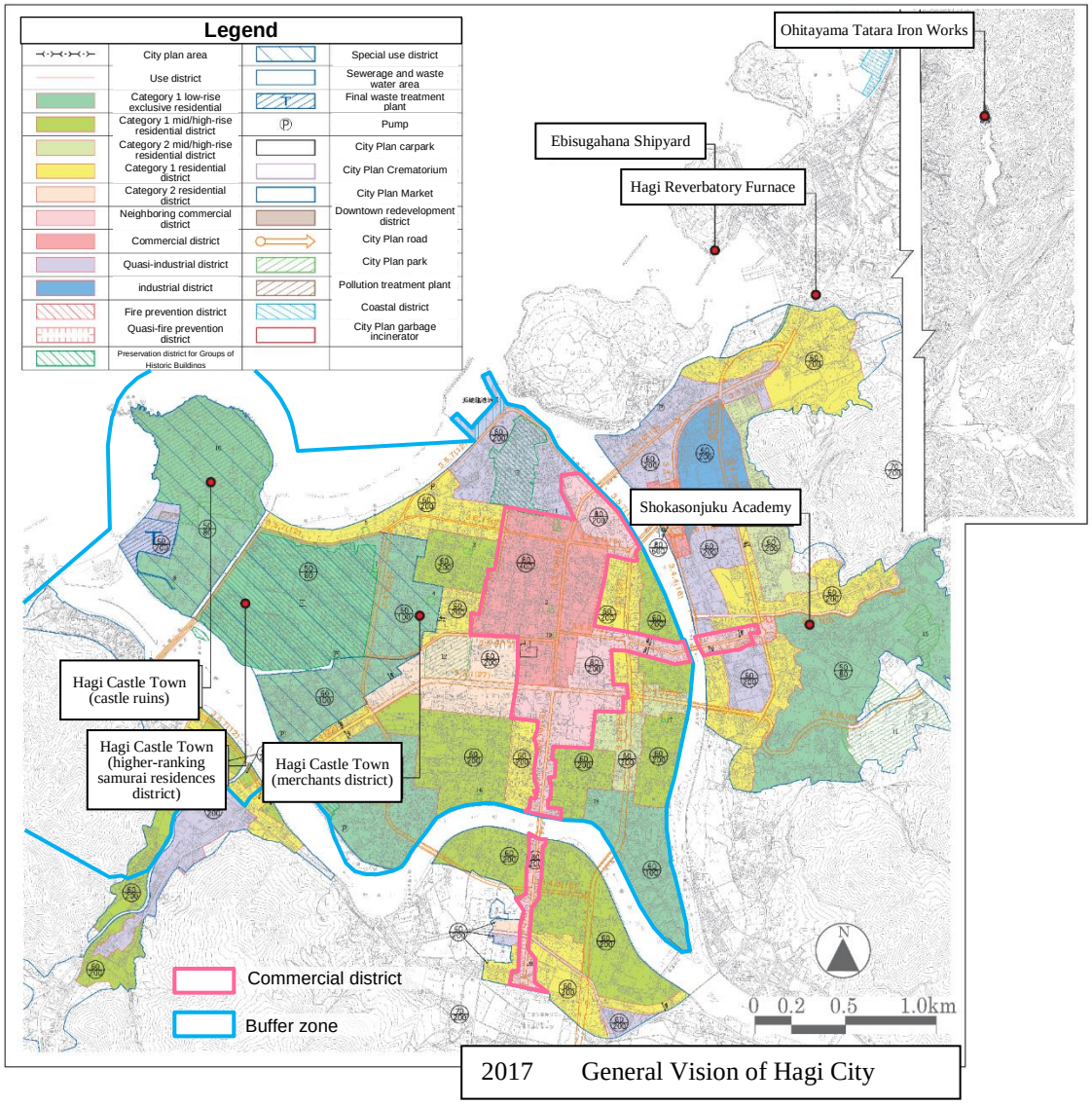
1-1 Hagi Reverbatory Furnace
1-2 Ebisugahana Shipyard
1-4 Hagi Castle Town
1-5 Shokasonjuku Academy

1-3 Ohitayama Tatara Iron Works is located outside this map.

Appendix 6

Appendix 3

General Vision of Hagi City Planning (Use districts)

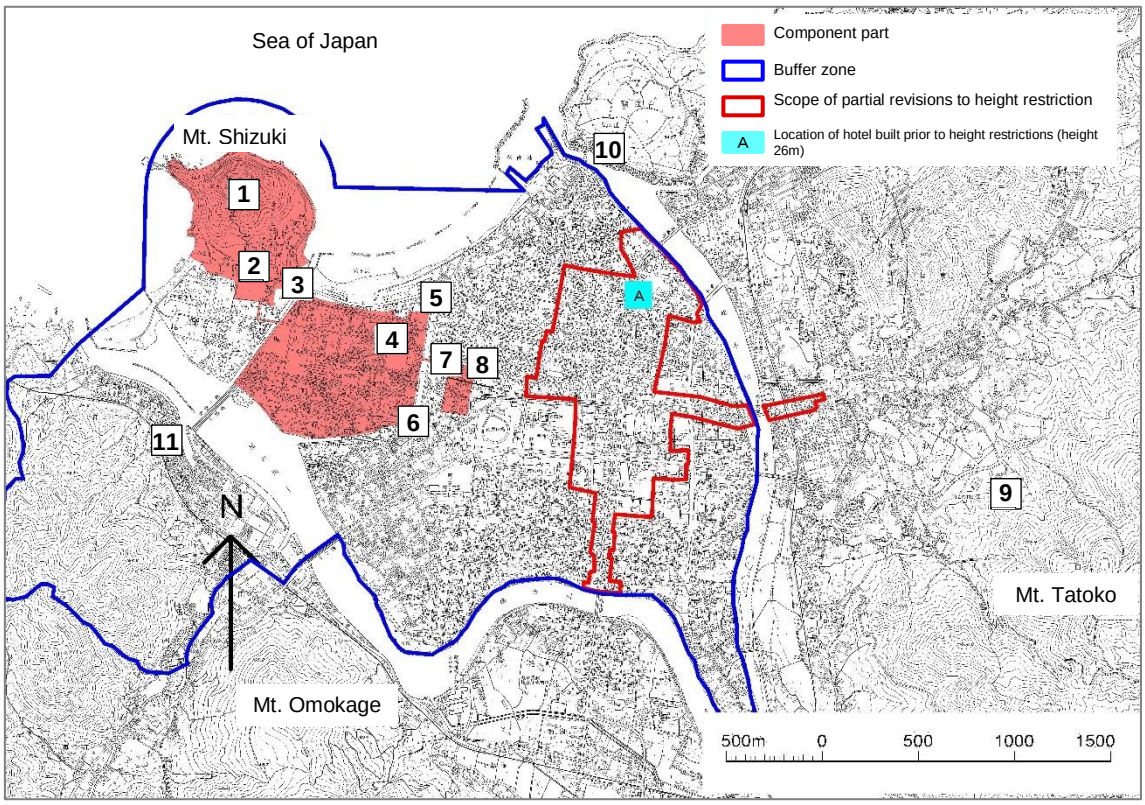


Appendix 4-1

Impact on Buffer Zones

(a) Monitoring of component parts and their buffer zones (establishment of observation points)

A total of 11 observation points have been established in Hagi Castle Town: eight within the component parts (No. 1-8) and three outside (No. 9-11). Landmarks comprise Mt. Shizuki (No. 1, 143 m) inside the component parts, Mt. Tatoko (372.8 m) east of the component parts, and Mt. Omokage (253.1 m) south of the component parts.
* “A” on the map below indicates the location of a hotel (26 m high) built before height regulations were established.



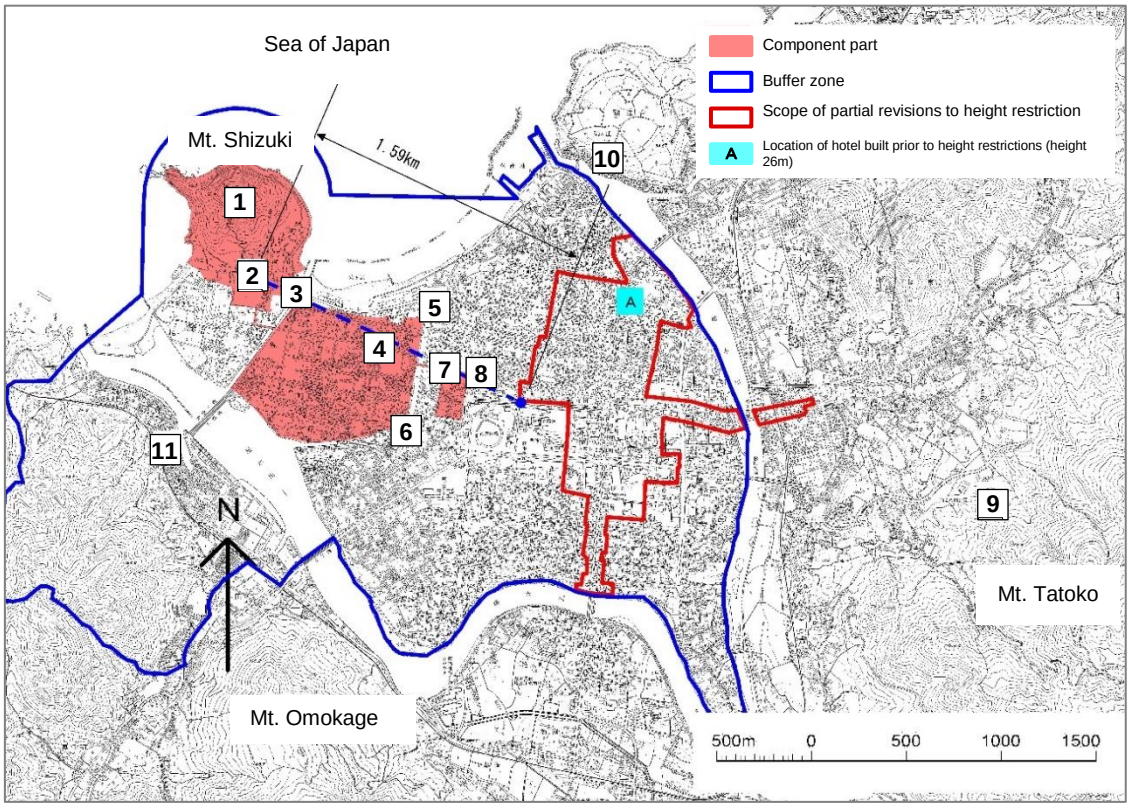
(b) Changes to views from the observation points within and outside the component parts caused by partial revisions to height restrictions
Simulation of views from observation points within and outside the component parts in the direction of areas subject to the partial revisions to height restrictions confirms that there will be no impact on the views.

These simulations are indicated in the pictures below. Yellow lines indicate the current 16-meter regulation, and red lines indicate the height after revision to 20 meters.

Appendix 6

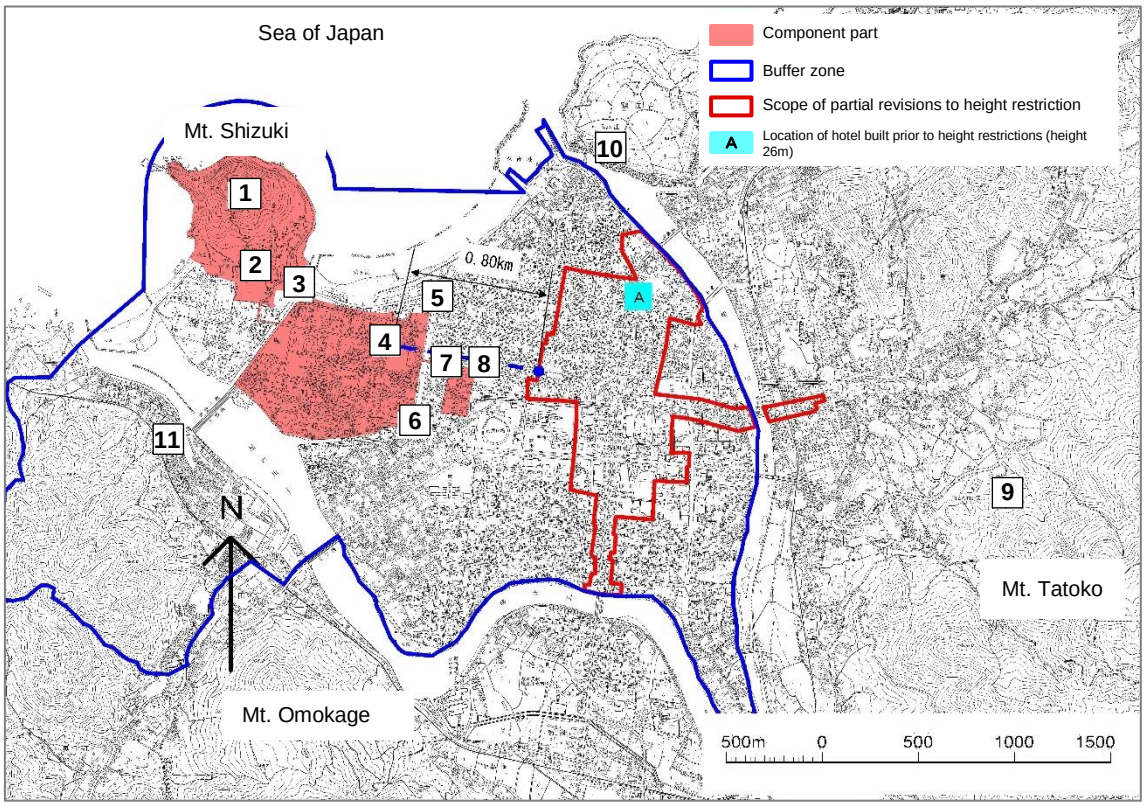
Appendix 4-2

The view southeast from Observation Point No. 2 (Hagi Castle Lookout Tower), indicating the envisaged height if there was a building 1.59 kilometers from the observation point. Because both the 16 m height (the yellow line) and 20 m height (the red line) are virtually obscured by the trees in the foreground, there will be no negative impact on the view.



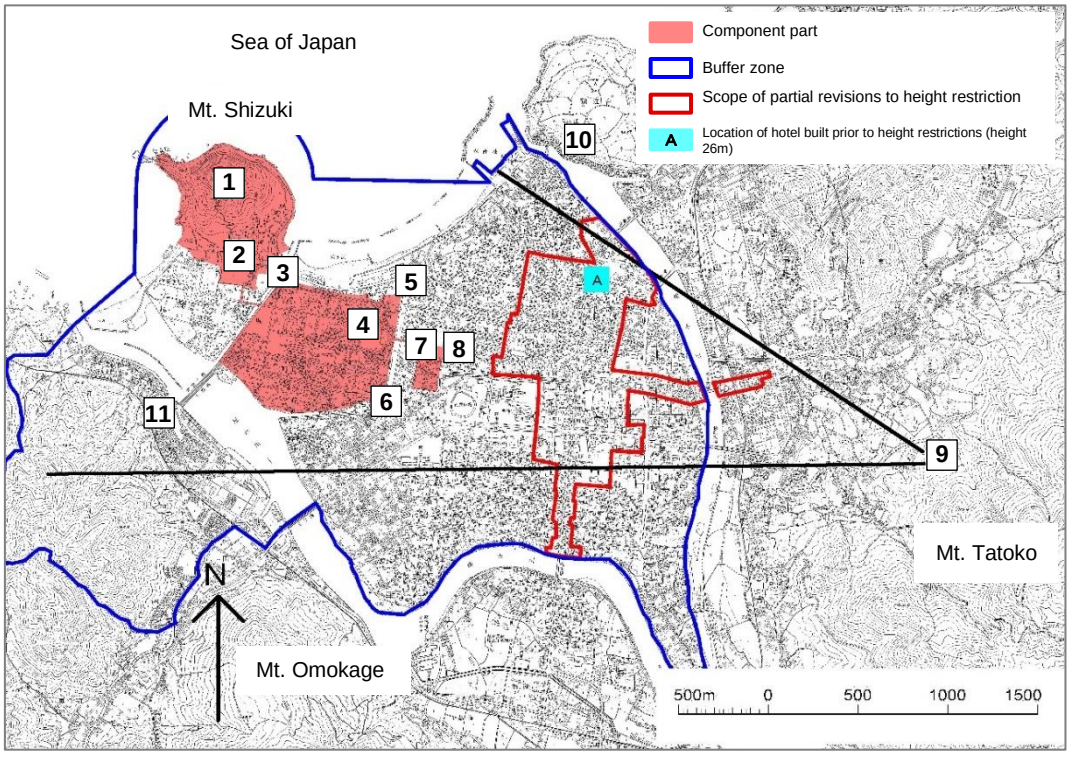
Appendix 4-3

View east from Observation Point No. 4 (Gocho-Yokocho intersection) showing the envisaged height of a building constructed around 800 meters from the observation point. Both the 16 m height (the yellow line) and 20 m height (the red line) show no impact on the view.



Appendix 4-4

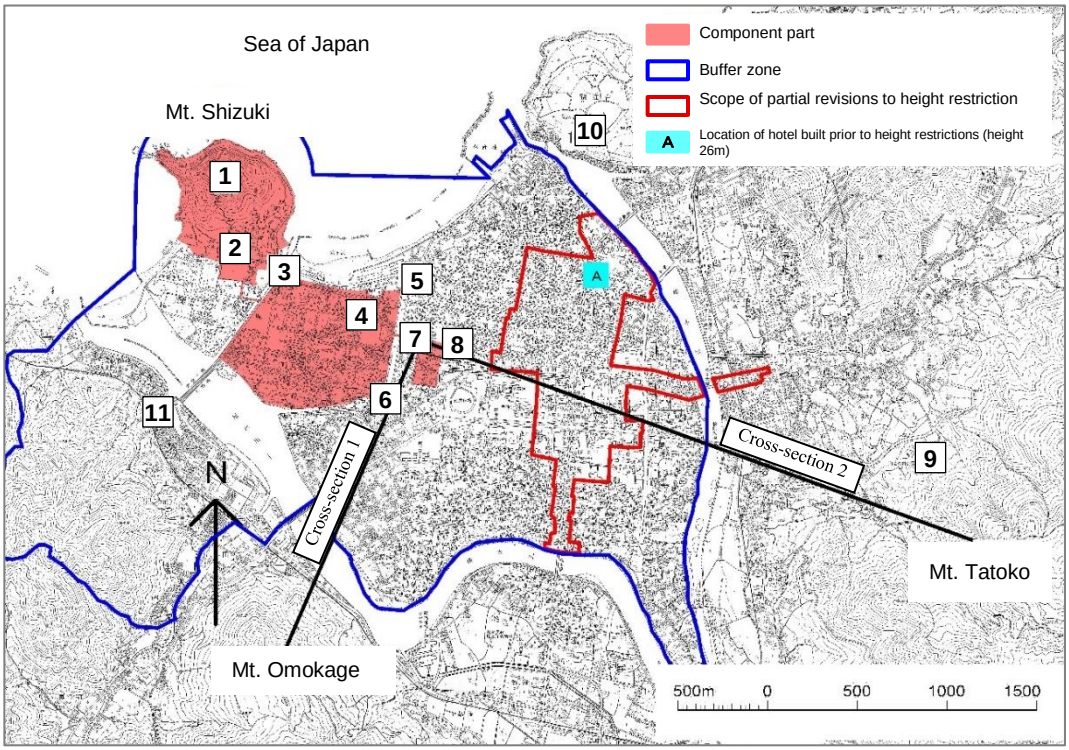
View towards Hagi Castle Town from Observation Point No. 9 (Tōgei no Mura Park Viewpoint). “A” on the map above indicates the location of a hotel (26 m high) built before height regulations were established. The lines indicate the height as seen from Observation Point No. 9 if there were buildings in the commercial area. Both the 16 m height (the yellow line) and 20 m height (the red line) show almost no impact on the view.

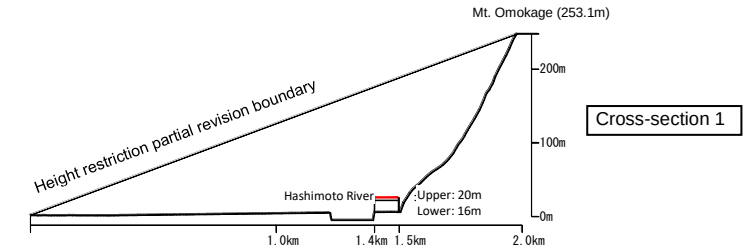


Appendix 4-5

(c) Changes to the view of the surrounding mountain skylines from observation points inside the component parts due to partial revisions to height regulations

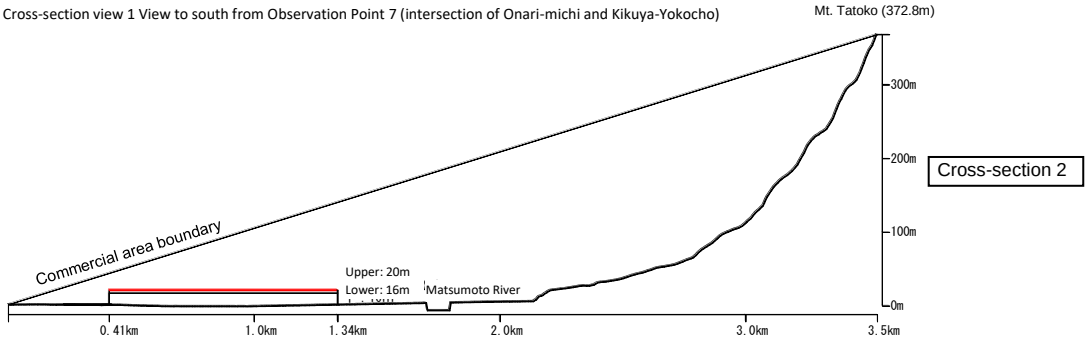
Observation Point No. 7 (intersection of Onari-michi and Kikuya-yokocho) was taken as the view point within the component part. The cross-section view of landmarks Mt. Omokage and Mt. Tatoko from Observation Point No. 7 is shown below. The area subject to height restriction changes is outlined in red. This area is lower than the lines between the observation point and the two mountain tops. There are also in fact already buildings near the observation point that interrupt the view of the mountain tops. The revision to building height regulations will therefore cause almost no change to the current view.





Observation Point No.7 (elevation

Cross-section view 1 View to south from Observation Point 7 (intersection of Onari-michi and Kikuya-Yokocho)



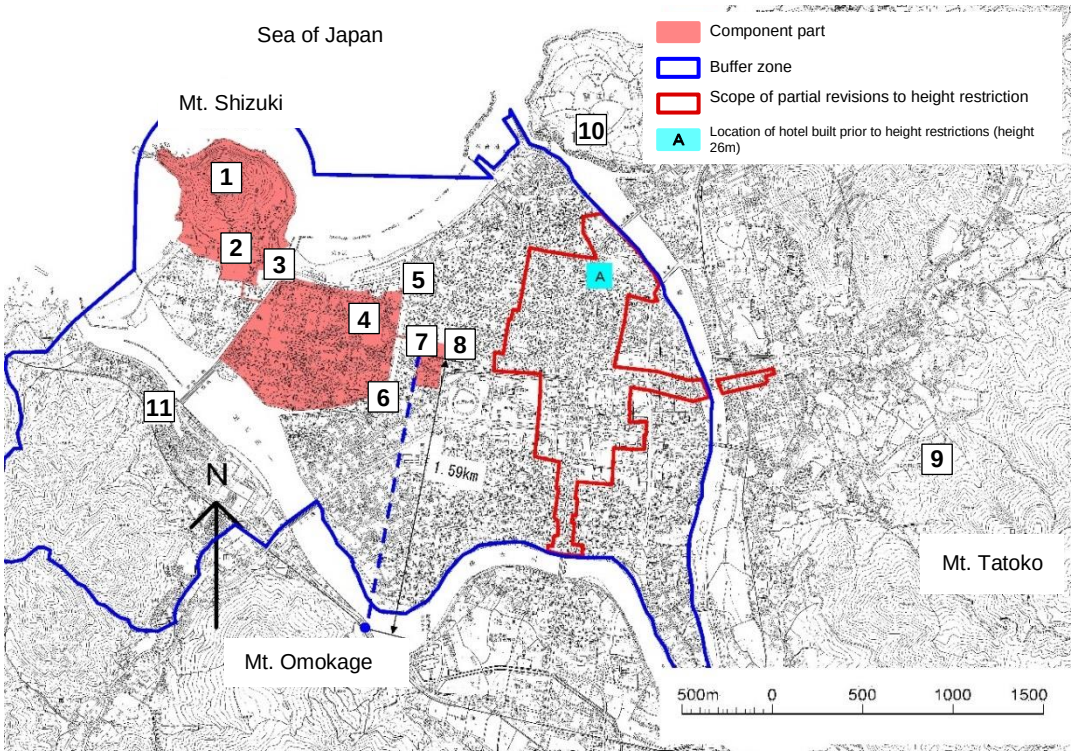
Observation Point 7 (elevation

Cross-section view 2 View to east from Observation Point 7 (intersection of Onari-michi and Kikuya-Yokocho)

Appendix 6

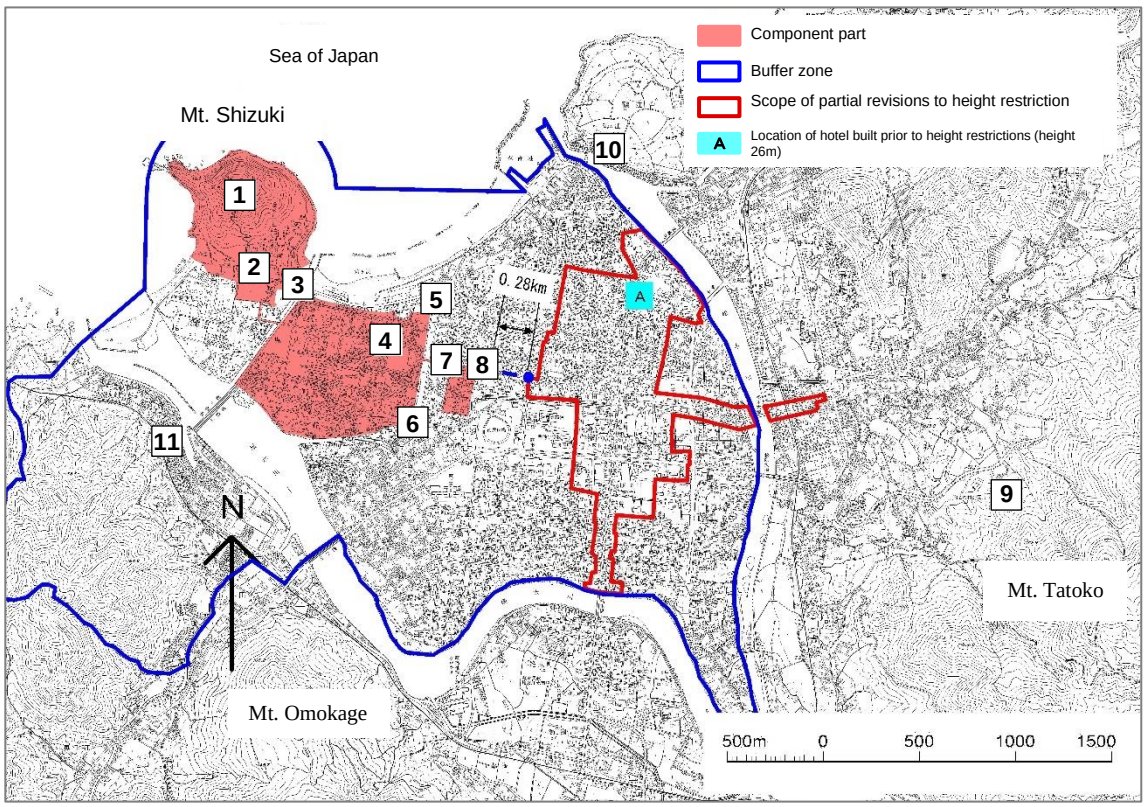
Appendix 4-6

View south (towards Mt. Omokage) from Observation Point No. 7 (intersection of Onari-michi and Kikuya-yokocho)
This shows the envisaged height if there were buildings on the border of the area where the height regulation will be changed from 16 to 20 meters (approx. 1.59 km from the observation point). Both the 16 m height (the yellow line) and 20 m height (the red line) show almost no impact on the view of the surrounding mountain skyline.



Appendix 4-7

View east (towards Mt. Tatoko) from Observation Point No. 8 (intersection of Onari-michi and Edoya-yokocho)
This shows the envisaged height if there were buildings on the border of the commercial area (280 m from the observation point). Both the 16 m height (the yellow line) and 20 m height (the red line) have almost no impact on the view of the surrounding mountain skyline.

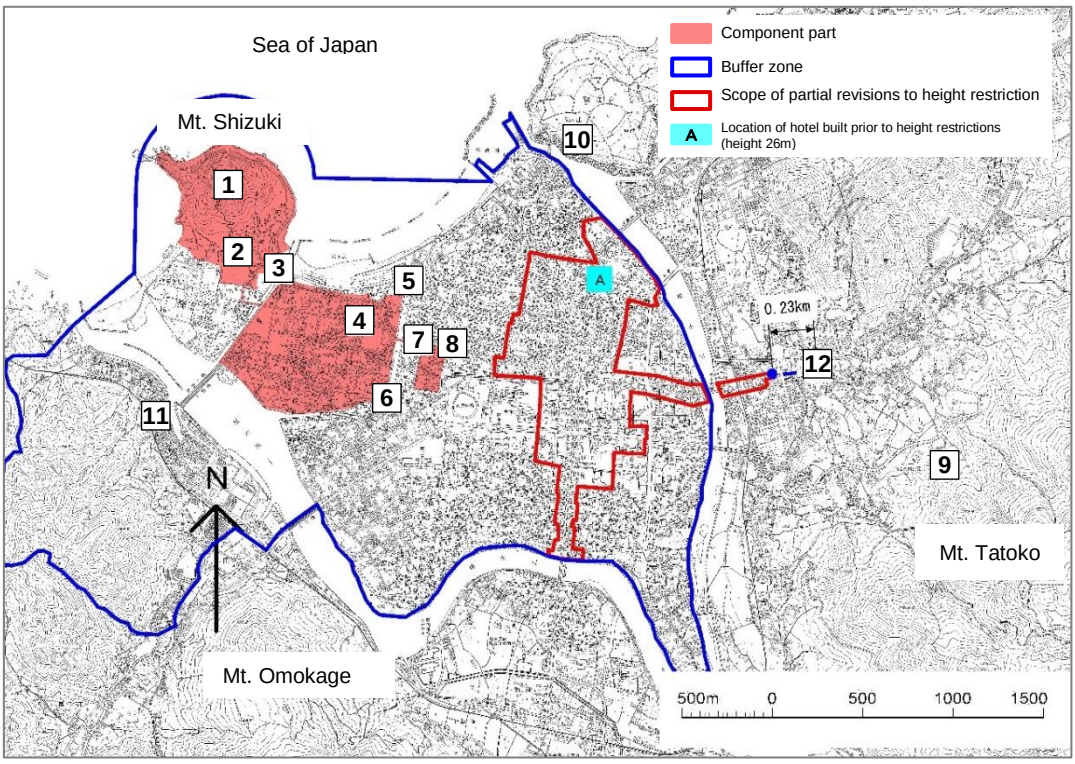


Appendix 6

Appendix 4-8

An additional study was also made on the impact of partial revision of height regulations on the western side outside the buffer zone for Shokasonjuku Academy.

View west from Observation Point No. 12 (on the western side of Shokasonjuku Academy)
This shows the envisaged height if there were buildings on the border of the commercial area (230 m from the observation point). Both the 16 m height (the yellow line) and 20 m height (the red line) are obscured by the trees in the foreground, with no impact on the view from Shokasonjuku Academy.



Assessment of Impact on World Heritage from Building a Concrete Manufacturing Plant in the Buffer Zone of the Mietsu Naval Dock

Summary

This document is a World Heritage Impact Assessment Report created by Saga City, applicable to the building of a new concrete manufacturing plant in the buffer zone of the Mietsu Naval Dock (component part 5-1), a component part of the World Heritage Sites of Japan's Meiji Industrial Revolution: Iron and Steel, Shipbuilding and Coal Mining.

The elements (attributes) representing the Outstanding Universal Value of the Mietsu Naval Dock are the underground archeological remains and the natural terrain in which they are buried. The construction work outside the scope of the component part has no direct impact, and the impact on the landscape as seen from inside the site is kept to a minimum. Discussions between the private business owner and the component part manager (Saga City) will continue to be carried out.

1. Introduction

(1) The subject of this heritage impact assessment is the component part Mietsu Naval Dock (5-1) of the Sites of Japan's Meiji Industrial Revolution: Iron and Steel, Shipbuilding and Coal Mining inscribed on the World Heritage List in July 2015 (Figure 1).

(2) In carrying out the impact assessment, reference was made to the items stipulated in the world heritage conservation and management plan (CMP) and to the views of experts in and outside Japan.

(3) Preparation of the heritage impact assessment is the responsibility of Saga City.

2. Overview of the Development

(1) The private business owner decided to move part of the concrete manufacturing plant currently located to the southern part of the buffer zone to another location in the buffer zone (Figure 2). For the site of the new plant, the private business owner is using a plot of land of which it already had ownership. The plot of land, now used as a materials storage yard, is being expanded through the purchase of an adjacent piece of agricultural land so that a new plant of similar scope to the old one can be built.

a) Development location: Onoshima, Okawa City, Fukuoka Prefecture

b) Site area: Approx. 4,900 square meters

[Area of materials storage yard already owned by the business owner] Approx. 4,100 sq.m

[Area of adjacent agricultural land purchased for expanding the site] Approx. 800 sq.m

c) Facility scale:

[Plant] One plant, 24.25m high, area 5.4m×7.4m

[Cement silos] Two silos, 21. 57m high, 3.35 m in diameter

One silo, 12.57m high, 3.35m in diameter

d) Process: Work began in late March 2018. The work is to be completed by the end of January 2019 with operation scheduled to start in February 2019.

(2) The work is being performed outside the scope of the component part. Both the current plant site and new plant site are located in Okawa City in Fukuoka Prefecture.

(3) As the project involves a change in zoning of agricultural land (approx. 800 sq.m) to a development site, a partial change is made to the protection status as agricultural land in the buffer zone belonging to Okawa City (Figure 3).

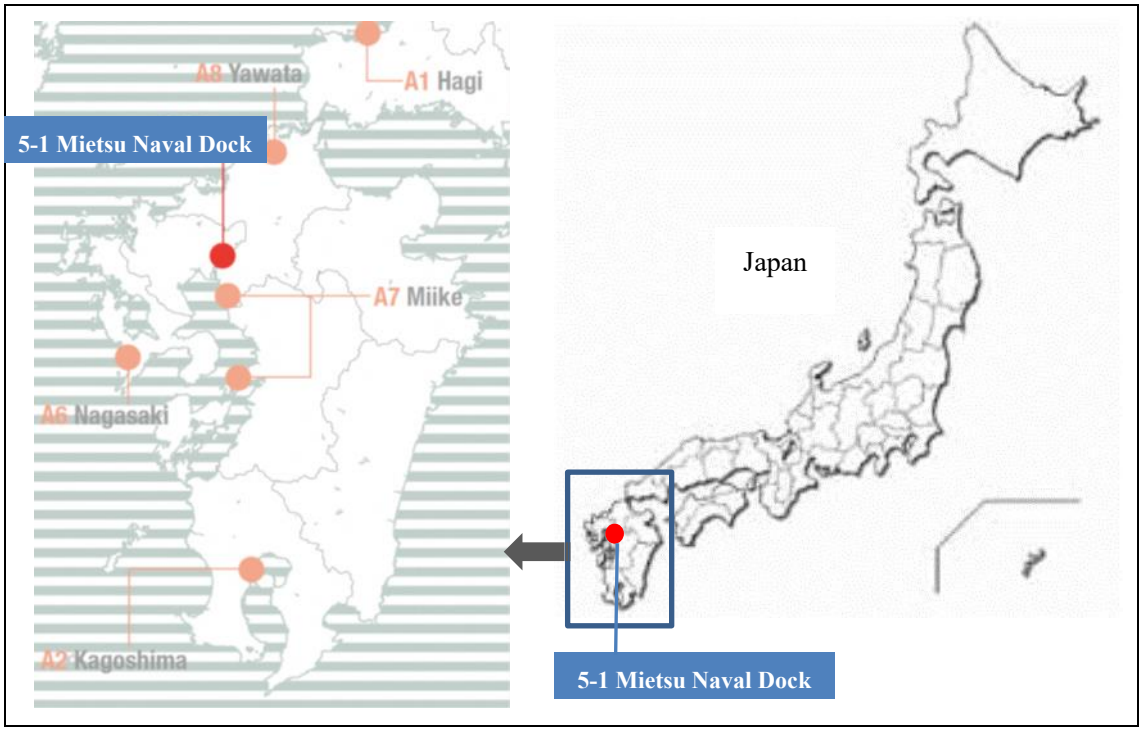


Figure 1. Position of the Saga Area

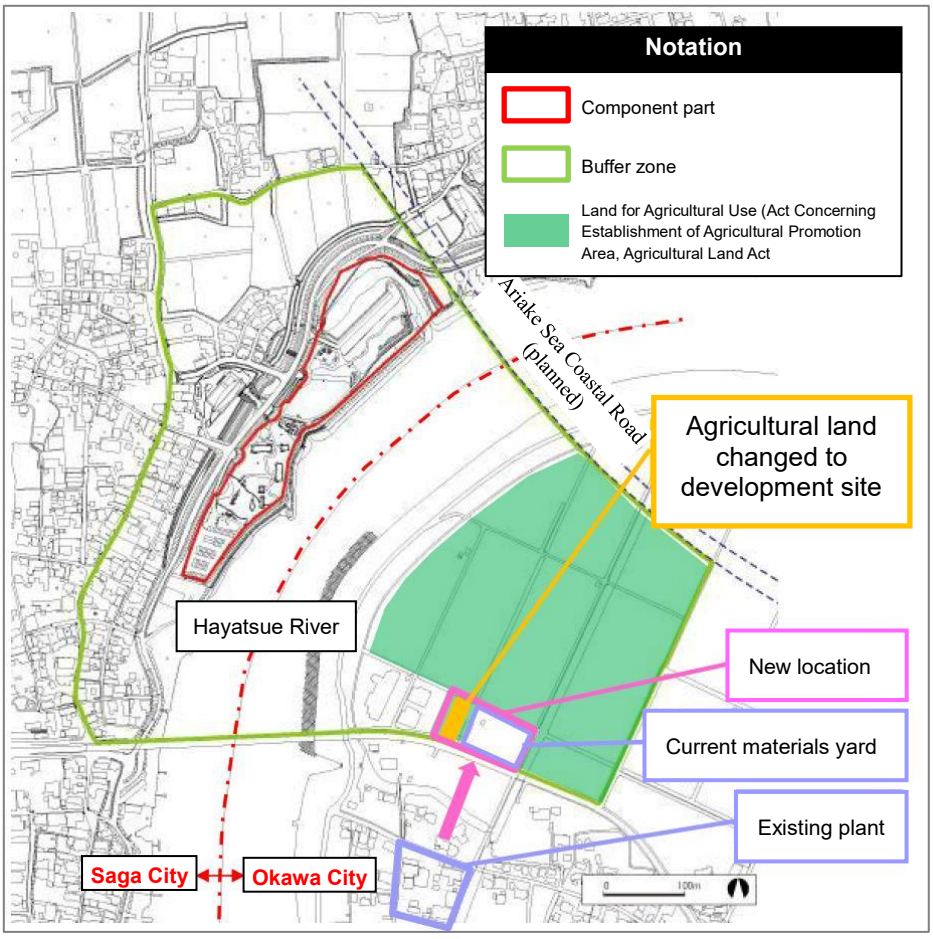


Figure 2. Scope of Component Part, scope of Buffer Zone, and Position of Development Project

Appendix 7

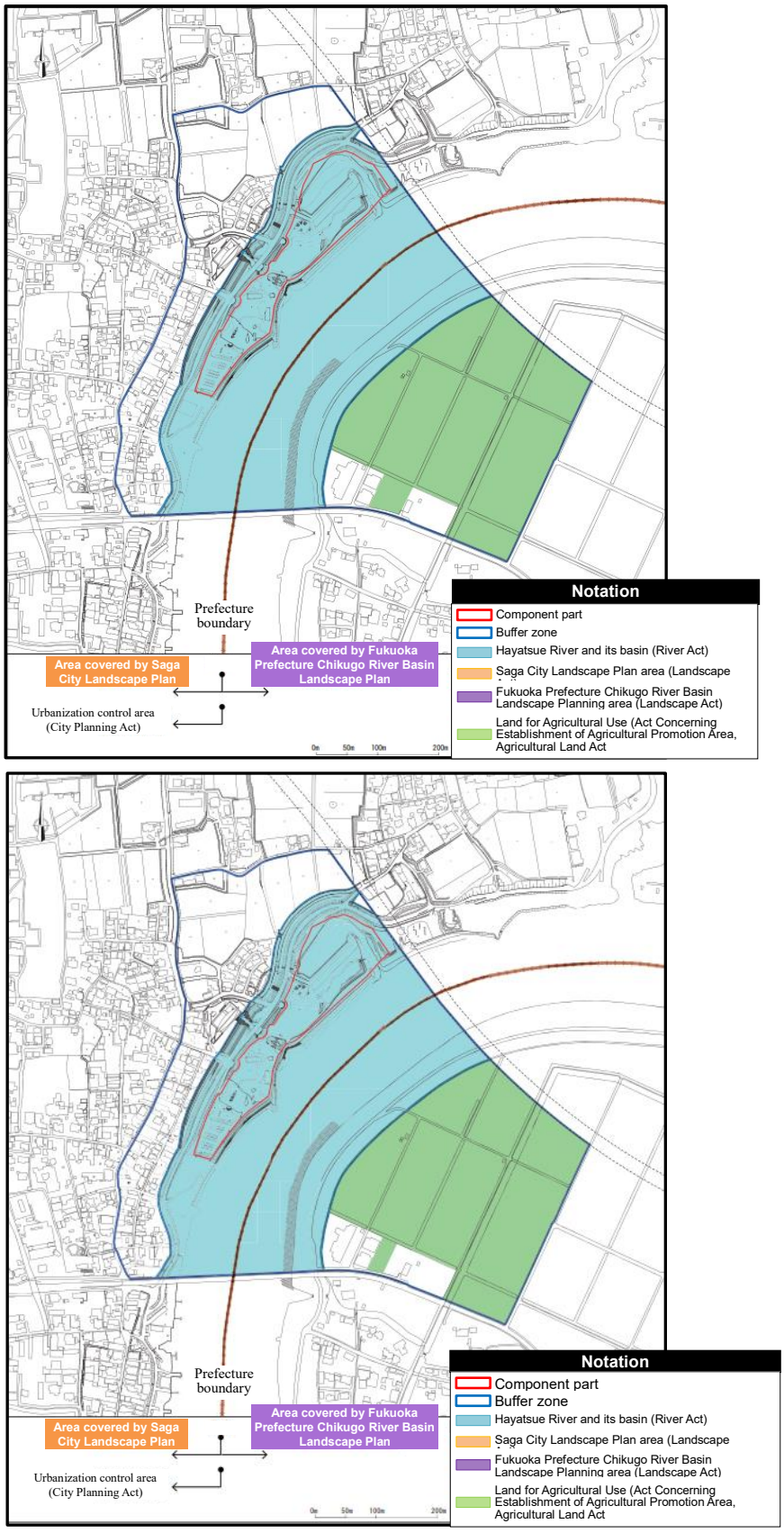


Figure 3. Change in Protection Status of Buffer Zone (upper: before change, lower: after change)

3. Heritage Value

The Outstanding Universal Value of the Sites of Japan's Meiji Industrial Revolution: Iron and Steel Shipbuilding and Coal Mining is as follows. (excerpted from the Statement of Outstanding Universal Value in the World Heritage Committee Decision)

A series of industrial heritage sites, focused mainly on the Kyushu-Yamaguchi region of south-west of Japan, represent the first successful transfer of industrialization from the West to a non-Western nation. The rapid industrialization that Japan achieved from the middle of the 19th century to the early 20th century was founded on iron and steel, shipbuilding and coal mining, particularly to meet defence needs. The sites in the series reflect the three phases of this rapid industrialisation achieved over a short space of just over fifty years between 1850s and 1910.

The first phase in the pre-Meiji Bakumatsu isolation period, at the end of Shogun era in the 1850s and early 1860s, was a period of experimentation in iron making and shipbuilding. Prompted by the need to improve the defences of the nation and particularly its sea-going defences in response to foreign threats, industrialisation was developed by local clans through second hand knowledge, based mostly on Western textbooks, and copying Western examples, combined with traditional craft skills. Ultimately most were unsuccessful. Nevertheless this approach marked a substantial move from the isolationism of the Edo period, and in part prompted the Meiji Restoration.

The second phase from the 1860s accelerated by the new Meiji Era, involved the importation of Western technology and the expertise to operate it; while the third and final phase in the late Meiji period (between 1890 to 1910), was full-blown local industrialization achieved with newly-acquired Japanese expertise and through the active adaptation of Western technology to best suit Japanese needs and social traditions, on Japan's own terms. Western technology was adapted to local needs and local materials and organised by local engineers and supervisors.

(2) As a shipbuilding site in the first phase, the Mietsu Naval Dock consists of remains from the initial phase of industrialization, when repair and building of ships were being carried out through trial and error. These remains include Japan's oldest dry dock, in operation from 1858 to 1871, and where used for training and repair of Western-style ships. The Mietsu Naval Dock was operated based on knowledge and technologies obtained by the Nagasaki Naval Training Institute (defunct) established by the Tokugawa shogunate in 1855 in response to the opening up of Japan's ports by the arrival of Commodore Matthew Perry.

(3) The elements (attributes) representing the Outstanding Universal Value of the Mietsu Naval

Appendix 7

Dock are the underground archeological remains of the dry dock (shipbuilding/repair docks and metal works section), training ground section, and small docks section, along with the natural terrain in which they are buried. The daily maintenance of these is defined as follows in Conservation Management Plan of Mietsu Naval Dock.

[Management by Saga City and Saga City Board of Education]

Elements of the component part that will be conserved and managed date to the period when Mietsu Naval Facility was in operation. These elements provide direct evidence of activities relating to shipbuilding and repair work as part of Saga Clan's goal to modernize through its own independent efforts. They consist of both buried remains and geographical features, each of which is to be maintained and managed as follows.

As the component part has been designated as a National Historic Site based on the Law for the Protection of Cultural Properties, all conservation and management work will comply with the Plan for the National Historic Site Mietsu Naval Facility Site Property Management Plan, which sets out guidelines on dealing with such things as changes to the component part's current state in areas where there are historic remains. In addition to this, all work will be implemented in liaison and coordination with Saga City Board of Education, the site's administrator.

●Buried remains

・Shipbuilding/repair docks and metal works section:
Stone remains, furnace remains (1.2), ditch remains, double–stranded furnace (crucible furnace), scrap pit revetment remains (main dock area), revetment remains (dock entrance area), river side revetment remains, construction soil

・Training ground section: Construction soil

・Small boat docks section: Construction soil, embankment

All buried remains have been secured with a sufficiently thick protective layer of 60 – 100 cm from the current ground surface, and are being maintained and managed so that nothing can harm them. Therefore, as they will continue to be preserved in this good buried state, measures will be taken for conservation and management which seek to maintain their current state. In regard to remains that are made of wood in particular, such as revetment remains, other than for the purpose of surveys, these remains will be left unexposed so as to prevent deterioration.

・Geographical features

・Small boat docks section: Geographical features of inlet

The geographical features of the inlet give insights into the nature of small boat docks in the past. Therefore, in order to preserve this landscape, measures will be taken for conservation and management which seek to maintain their current state on the assumption of the area's ongoing use as a fishing port.

(4) Restrictions in the buffer zones are defined as follows. (Conservation and Management Plan Mietsu Naval Dock, p. 87)

5.4.1 Conditions of the buffer zone that are to be maintained (benchmark of regulation and protection)

The buffer zone contains land use divisions and geographical formations that evoke the landscape when Mietsu Naval Facility was in operation. In order to protect the surrounding area as the appropriate setting as the appropriate setting as seen from the component part, restrictions will be placed on the establishment of structures that obstruct the visibility of this setting.

5.4.2 Regulation and protection policy and overall plan in the buffer zone

In order to maintain the conditions set out in 5.4.1, which aims to protect the component part, conservation measures will be taken along with the setting of appropriate boundaries for the buffer zone.

In order that development activities which take place within the buffer zone do not harm the component part's value, appropriate regulations are to be put in place in accordance with the River Act, the City Planning Act, the Landscape Act, the Act Concerning Establishment of Agricultural Promotion Areas, and the Agricultural Land Act.

4. Assessing Overall Impact of the Development

(1) The construction work for this development project is taking place outside the scope of the component part and does not have any direct adverse impact on the integrity or authenticity of the elements (attributes) representing the Outstanding Universal Value of the Mietsu Naval Dock, namely, the underground archeological remains and the natural terrain.

(2) The views from inside the component part are not elements (attributes) representing the Outstanding Universal Value but are subject to the impact assessment. The reason is that preservation of the landscape in the buffer zone is a matter designated for consideration in the Conservation and Management Plan, and this construction work takes place in the buffer zone.

(3) Saga City received information about this development project from Okawa City in April 2017, and since that time has continued, along with Okawa City, to carry on discussions with the private business owner and related parties. The development project itself is being carried out on a

materials storage yard owned by the private business owner since before the component part was inscribed on the World Heritage List and on an adjoining piece of agricultural land (of the minimum necessary area), and is taking place in accordance with the necessary procedures based on relevant laws. Accordingly, while it would have been difficult to stop the project itself, the cooperation of the business owner was obtained in taking measures in execution of the project to minimize to the extent possible any impact on the landscape. These include using beige colors on structures of a certain height to blend in with the surroundings, and limiting sign displays such as the company name on structures to the company logo only and making sure they are as invisible as possible from the Mietsu Naval Dock. Note that these measures were devised in conformity with the landscape formation standards given in the Fukuoka Prefecture Chikugo River Basin Landscape Plan.

(4) Saga City has continued to carry out monitoring of this development pursuant to the Landscape Act since the business owner began the construction work in late March 2018.

(5) Through the process described above, any impact of the change on the views from the Saga City side where the site is located toward Okawa City has been kept to a minimum (Figures 4-1 to 4-3).

Figure 4-1. View from Embankment (West Side of Site) (photographed in May 2017)

Figure 4-2. View from Embankment (West Side of Site) (photographed in January 2019)

Figure 4-3. View from Center of Site (Training Ground Section) (photographed in January 2019)

Appendix 7

5. Management Process

(1) The impact on the component part and on the overall landscape from the concrete manufacturing plant construction, as described above, underwent detailed and careful discussion and study by the private business owner, the component part manager (Saga City), and relevant agencies, etc. The component part manager (Saga City) has also confirmed through discussion with the private business owner that the latter has no plans to expand the plant site.

(2) Local conservation councils have been established for each area in the management structure of the World Heritage Sites of Japan's Meiji Industrial Revolution: Iron and Steel, Shipbuilding and Coal Mining. For this area as well, the Saga Conservation Council has been formed, which exchanges information and views and makes decisions regarding such matters as conservation and management of the component part.

(3) In the Saga Conservation Council, with the participation also of Okawa City, all due sharing of information and discussions will continue to be carried out with the component part manager regarding preservation of the buffer zone. As necessary, the advice of the national government (Cabinet Secretariat) Industrial Heritage Expert Committee (including Working Properties) will also be sought.

(4) Assessment of this development in the Saga Conservation Council took place as follows.

In the construction of the concrete manufacturing plant in the buffer zone, measures were taken with the cooperation of the business owner to minimize any adverse impact on the landscape, such as changing the colors of structures of a certain height. Since the buffer zone overlaps both Saga City (the component part manager) and Okawa City territory, there is all the more need for close information sharing with the concerned parties, including Saga and Fukuoka Prefectures, in endeavoring to conserve the buffer zone.

(5) The assessment by the World Heritage Sites of Japan's Meiji Industrial Revolution: Iron and Steel, Shipbuilding and Coal Mining National Committee of Conservation and Management is similar.

(6) Note that this heritage impact assessment was drawn up after discussions in the meeting of the Saga Conservation Council held January 21, 2019.

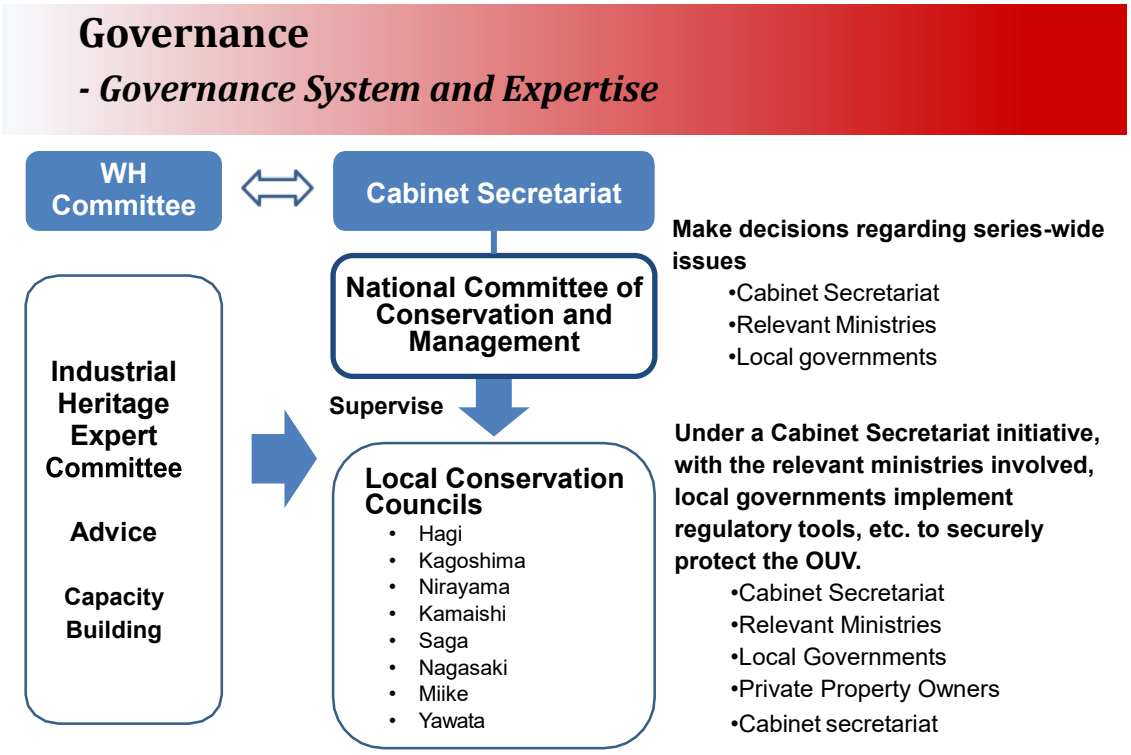


Figure 5: Governance System Defined in the General Principles and Strategic Framework for Conservation and Management

(7) This development project was an occasion for reconfirming the importance of becoming aware of the development plans at an early date and devoting sufficient time to discussions aimed at minimizing the impact on both the developer and the component part manager. This case involved closely sharing information among the governments where the component part and buffer zone are located, namely, Saga City, Okawa City, Saga Prefecture, and Fukuoka Prefecture. It was therefore decided to set up a new Four-Party Cooperative consisting of Saga City as the component part manager, Okawa City, Saga Prefecture, and Fukuoka Prefecture, to strengthen the organizational structure for ongoing conservation of the buffer zone. The buffer zone overlaps Saga City and Okawa City, which have different laws and ordinances relating to conservation of the buffer zone; moreover, there are multiple departments and organizations in each city. For these and other reasons, the Four-Party Cooperative was established to strengthen cooperation across organizations in each city and enhance information sharing between the cities. These improvements made possible early awareness of the development project and sufficient coordination among the parties concerned.

(8) Saga City and Okawa City have decided to cooperate in renewing their request to landowners in the buffer zone to work with them toward preservation of the landscape.

(9) Since the construction work began in late March 2018, Saga City (the site manager) has been monitoring the affected areas as to whether the work has been carried out in line with the matters discussed.

Appendix 7

6. Conclusions

(1) The construction of a concrete manufacturing plant does not have an adverse impact on the OUV, integrity, or authenticity of the World Heritage Sites of Japan's Meiji Industrial Revolution: Iron and Steel, Shipbuilding and Coal Mining.

(2) As for the views from the Mietsu Naval Dock, the construction work is being carried out in a manner that minimizes any impact, based on discussions among the business owner, Okawa City, and the site manager (Saga City); and an organizational structure has been established to continue such consultation and information sharing.

(3) In such ways, the risk to the world heritage from this development project is being kept to a minimum.

Assessment of Impact on World Heritage from Construction Work Near the Mietsu Naval Dock

Summary

This document is a Heritage Impact Assessment (HIA) prepared by Saga City regarding construction work to be carried out by the city on a visitor facility (hereinafter, “Guidance Facility”) in the buffer zone of the Mietsu Naval Dock (component part 5-1), which is a component part of the World Heritage “Sites of Japan’s Meiji Industrial Revolution: Iron and Steel, Shipbuilding, and Coal Mining.”

The elements (attributes) representing the Outstanding Universal Value(OUV) of the Mietsu Naval Dock are the underground archaeological remains and the natural terrain in which they are buried. There is no direct impact from the construction work, which is to take place outside the scope of the component part.

1. Introduction

(1) The subject of this HIA is the component part Mietsu Naval Dock (5-1) of the “Sites of Japan’s Meiji Industrial Revolution: Iron and Steel, Shipbuilding, and Coal Mining” which were inscribed on the World Heritage List in July 2015.

(2) In carrying out the HIA, reference is made to the items stipulated in the World Heritage Conservation Management Plan (CMP) and to the views of experts in and outside Japan.

(3) Preparation of the heritage impact assessment is the responsibility of Saga City.

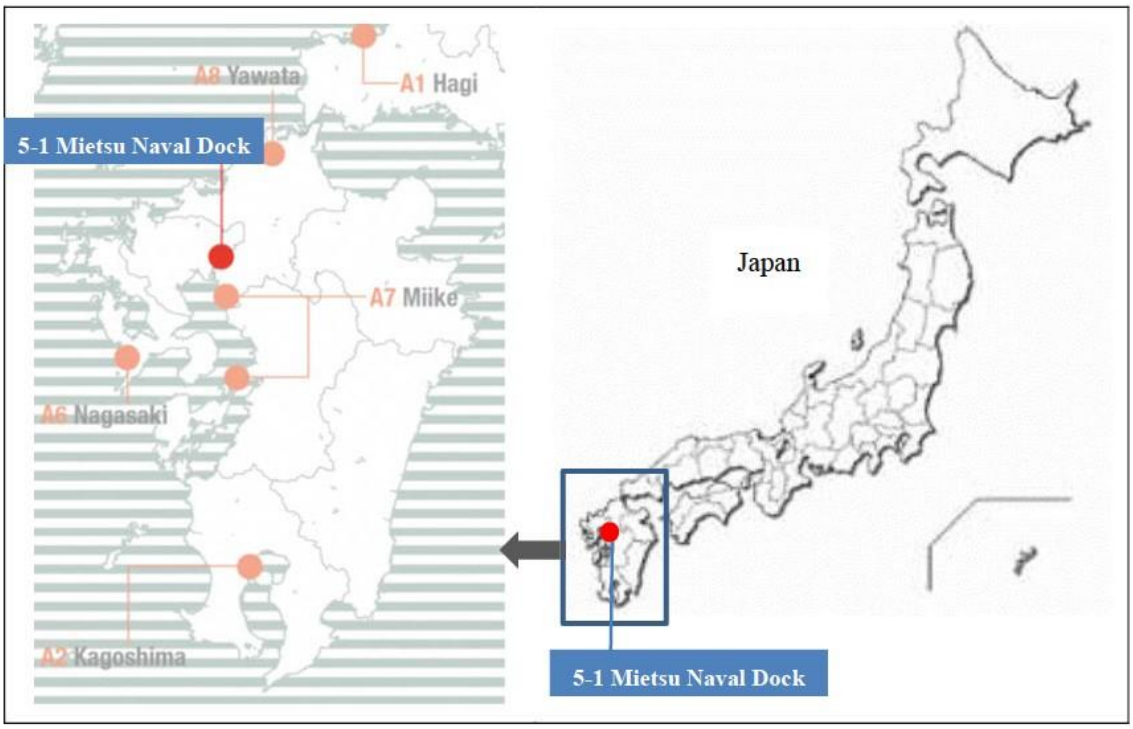


Figure 1. Location of the Saga Area

2. Overview of the construction work near the Mietsu Naval Dock

This work, to be carried out by Saga City inside the boundary of the buffer zone of the Mietsu Naval Dock, consists of two subprojects, each of which is outlined in Table 1.

1) Upgrade of the Mietsu Naval Dock Guidance Facility

2) Mietsu Naval Dock parking area relocation (including construction of the Nakakawasoe Community Centre on adjoining property)

Recommendation h) (Decision 39COM 8B.14) issued at the time the Sites of Japan's Meiji Industrial Revolution: Iron and Steel, Shipbuilding, and Coal Mining were inscribed on the World Heritage List asks for submission of proposals for upgrade or development of visitor facilities, in accordance with Paragraph No. 172 of the "Operational Guidelines for the Implementation of the World Heritage Convention".

As for the parking space currently located on the world heritage property, the World Heritage Conservation and Management Plan indicated that relocation outside the property would be considered from the standpoint of enhancing protection of the property (CMP page 75). Thereafter, Saga City in the Conservation, Restoration, Presentation and Public Utilization Plan for Mietsu Naval Dock adopted in 2017 a plan to provide a new parking area off the property to replace the existing space.

The project for parking area relocation, along with the aspect of strengthening protection of the component part, has the aspect of improving access and tour routes to the Guidance Facility and the component part, and is therefore closely related to Guidance Facility upgrade.

Accordingly, the result of the HIA performed for the construction work near the Mietsu Naval Dock is submitted in accordance with Paragraph No. 172 of the "Operational Guidelines for the Implementation of the World Heritage Convention".

Table 1. Overview of each subproject of the construction work near the Mietsu Naval Dock

	Project name	Description
1)	Upgrade of the Mietsu Naval Dock Guidance Facility	・The project for upgrade of the Guidance Facility is to be carried out for the purpose of providing a centre for clear and accurate communication, including an overview of the entire Sites of Japan's Meiji Industrial Revolution: Iron and Steel, Shipbuilding, and Coal Mining, the Outstanding Universal Value (OUV), the role of the Mietsu Naval Dock, and the results of investigative studies carried out to date. The upgrade project will be carried out along the lines of the Interpretation Strategy submitted to UNESCO by the Cabinet Secretariat. ・The Guidance Facility will be provided by expanding and renovating the Tsunetami Sano Memorial Museum, a facility owned by Saga City and located adjacent to the component part. [Figure 2] ➢ Site layout of the Tsunetami Sano Memorial Museum in its current state [Fig. 3] ➢ External appearance of the Tsunetami Sano Memorial Museum (current state as viewed from the component part) [Fig. 4] ・The policy of Saga City is not to show exposed remains, so as to preserve the

		archaeological remains of the Mietsu Naval Dock. The city therefore plans to provide exhibits in the Guidance Facility explaining the most distinctive aspects, by installing an actual-size model of the revetment remains, and creating videos showing how the dry dock utilized the extreme tidal range of the Hayatsue River, and showing western-style ship repair and shipbuilding operations. ・To study the specific details of Guidance Facility provision, starting in fiscal 2018, Saga City set up a committee made up of scholars in such fields as early modern history, archaeology, and shipbuilding history along with members from related agencies including the Cabinet Secretariat and Agency for Cultural Affairs, and received their guidance and advice. ・An overview of the Guidance Facility provision is as follows. ➢ Three-story steel construction building ➢ Site area: approx. 4,980m^2 (the adjoining city-owned land will be included in the project) ➢ Building area: approx. 1,520 m^2 (including expansion by approx. 150m^2 of the ground floor on the southwest side) ➢ Total floor space: approx. 2,520m^2 ➢ Building height: approx. 15m ➢ Start of work (construction work and preparation of exhibits): March 2020 ➢ Opening date: September 2021 (planned) ➢ Exhibit zoning plan for each floor [Fig. 5]
2)	Mietsu Naval Dock parking area relocation	・The parking space currently located inside the component part will be replaced by a new parking area outside the property, for the purpose of enhancing protection of the component part. ・The land where the new parking area will be provided is north of the component part. [Fig. 2] ・Saga City purchased the land in fiscal 2017, and in fiscal 2018, land formation and provisional paving were carried out. ・An overview of the parking area provision is as follows. ➢ Site area: approx. 3,600m^2 ➢ Capacity: 5 large buses, approximately 90 passenger cars ➢ Start of construction work (landscaping): January 2020 (planned) ➢ Start of use: July 2020 (planned; provisional use is planned for October 2019 and after) ➢ Photo of current state of parking area [Fig. 6] ➢ Plan drawing [Fig. 7] ➢ Artist rendition of completed facility [Fig. 8]

		Nakakawasoe Community Centre construction project	・The Nakakawasoe Community Centre, built in March 1972 as a facility for the local residents of the area where the Mietsu Naval Dock is situated, has deteriorated and will be replaced with a new building. ・A community centre plays a central role in bringing local residents together and promoting lifelong learning. Until provision of the Tsunetami Sano Memorial Museum in 2004, the current Nakakawasoe Community Centre functioned to honor the memory of Tsunetami Sano. The two facilities thus have an inseparable relationship. Accordingly, land next to the site of the new parking area of the Mietsu Naval Dock was obtained for building the new community centre. [Figure 2] ・Saga City purchased the building site in fiscal 2017, and in fiscal 2018, land formation was carried out. ・An overview of the new community centre provision is as follows. ➢ One-story wooden structure ➢ Site area: approx. 3,000m^2 ➢ Building area: Approx. 780m^2 (community centre), approx. 65m^2 (outside storage facility) ➢ Total floor space: Approx. 670m^2 (community centre), approx. 65m^2 (outside storage facility) ➢ Building height (at highest point): Approx. 9.2m (community centre), approx. 4.3m (outside storage facility) ➢ Start of construction work: October 2019 ➢ Start of use: July 2020 (planned) ➢ Plan drawing [Fig. 7] ➢ Artist rendition of completed facility [Fig. 8] ➢ Elevation [Fig. 9]

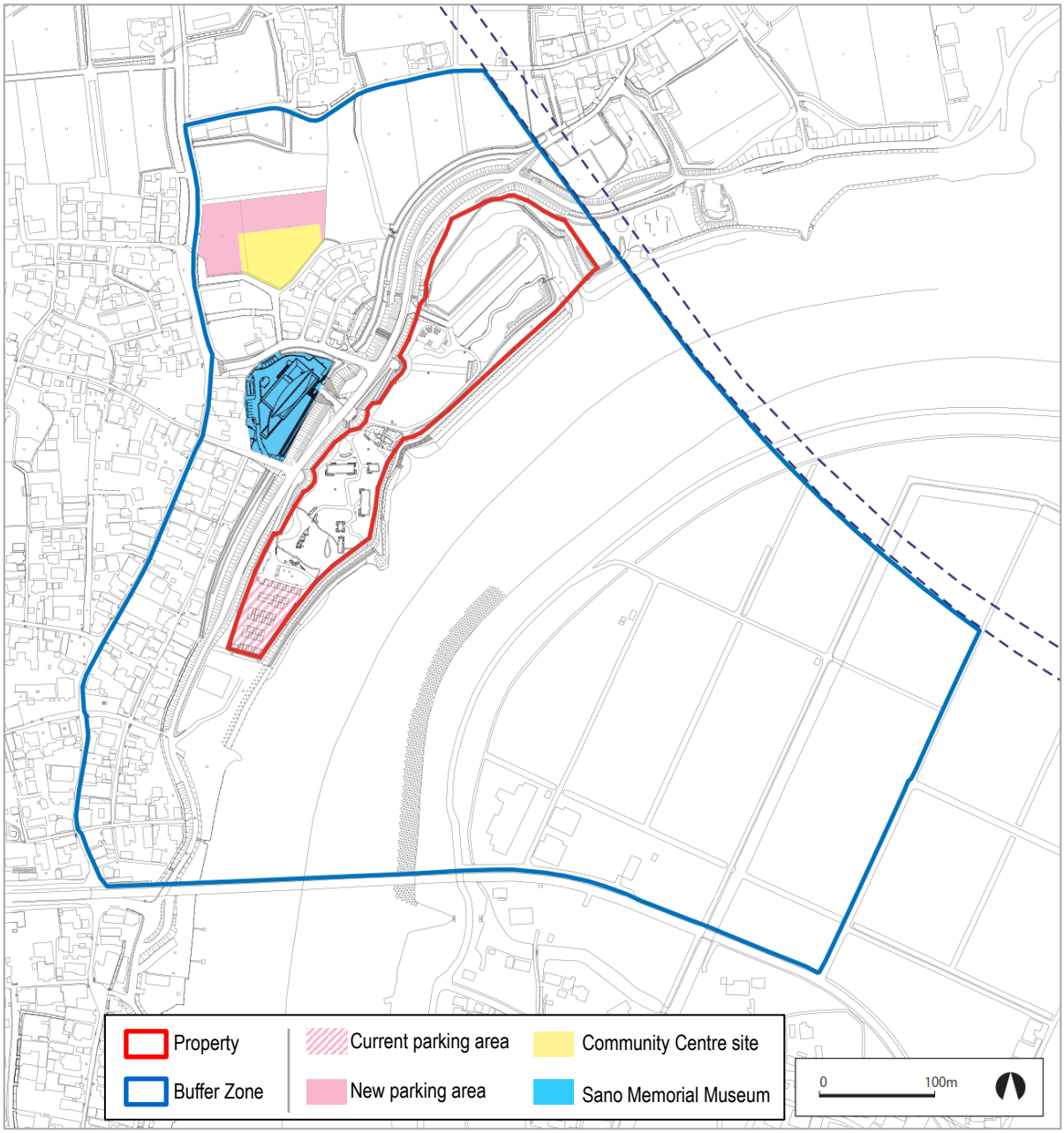


Figure 2.Boundary of component part and buffer zone; project location

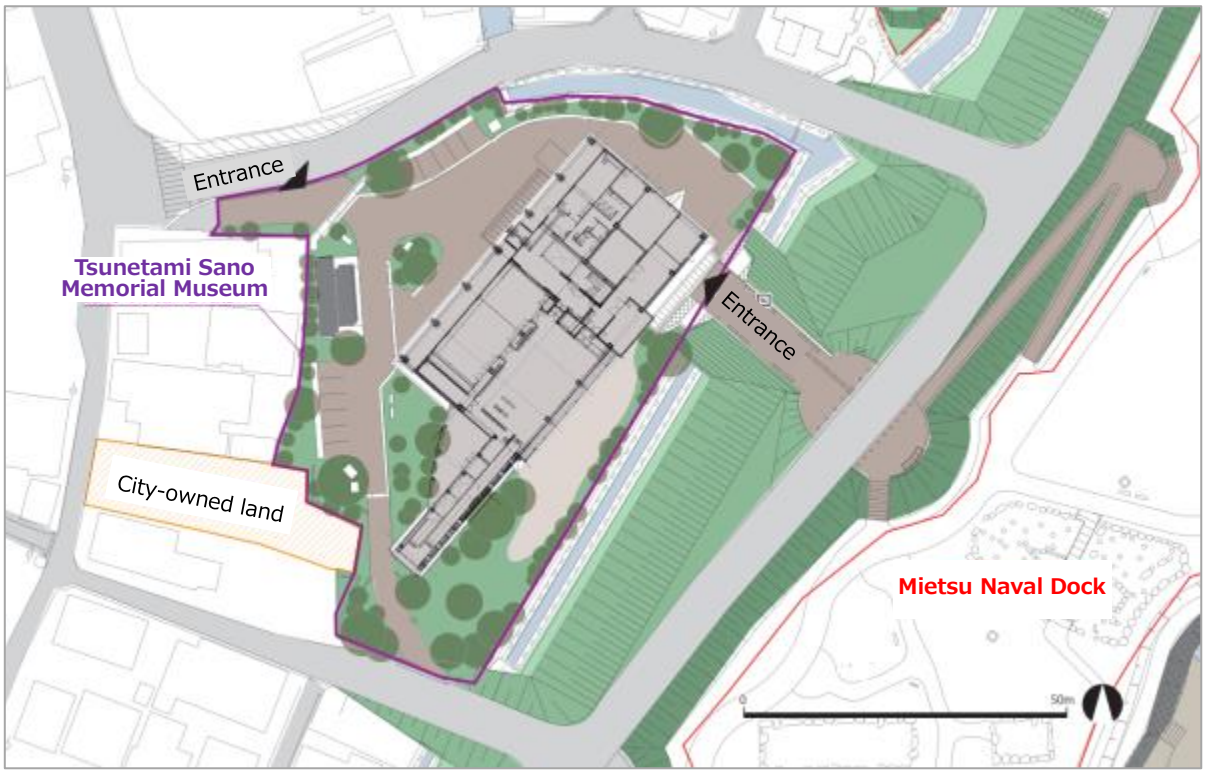


Figure 3. Current site layout of Tsunetami Sano Memorial Museum

Figure 4. External appearance of the Tsunetami Sano Memorial Museum
(current state as viewed from the component part)

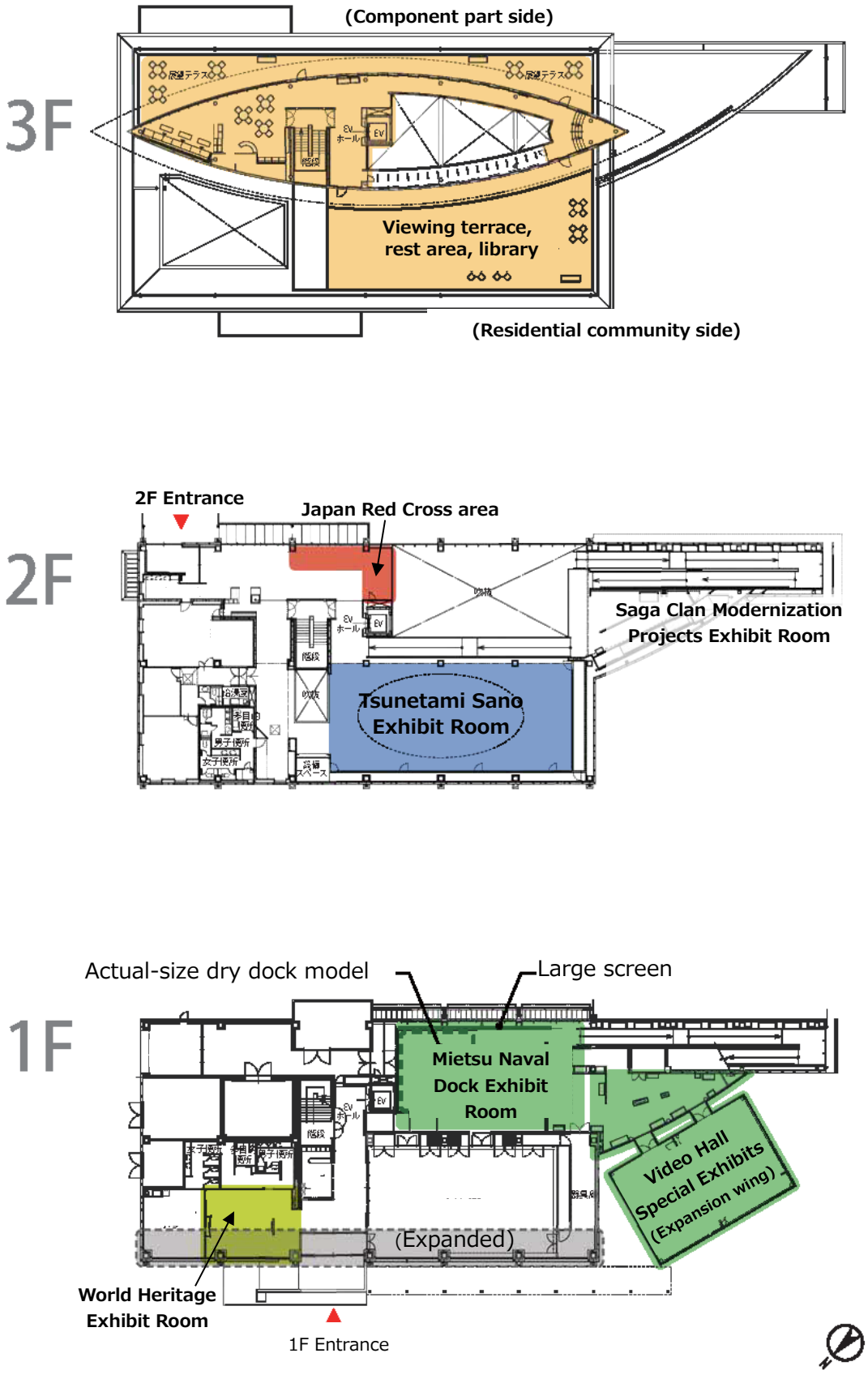


Figure 5. Exhibit zoning plan for each floor [Guidance Facility]

Figure 6. Current state of parking area site

(photographed from road on west side of component part) [taken August 31, 2019]

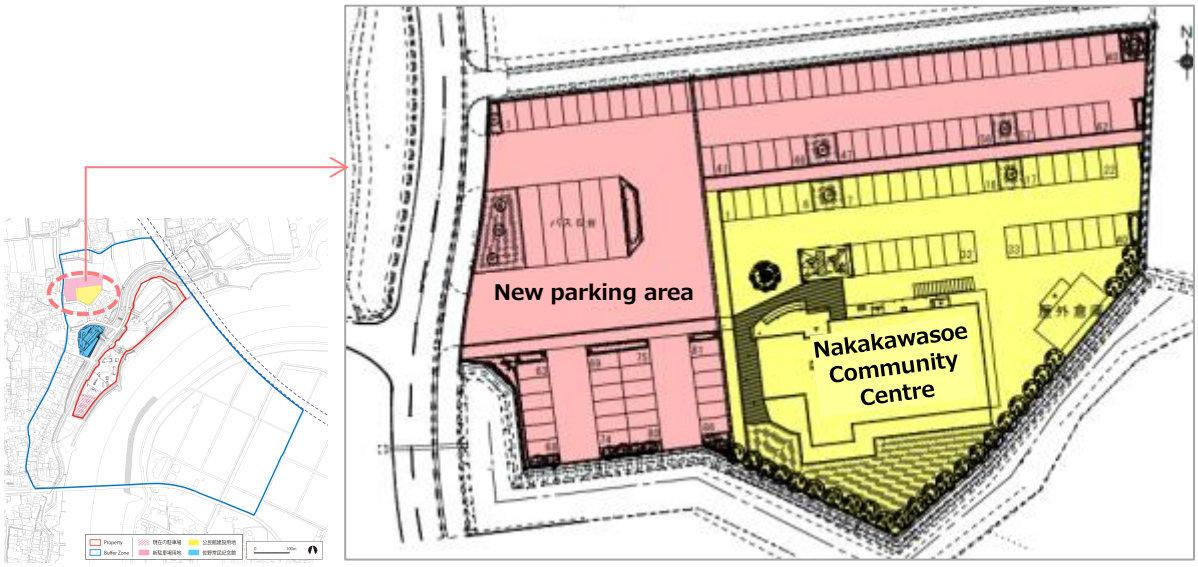


Figure 7. Plan drawing of new parking area (pink) and Nakakawasoe Community Centre (yellow)

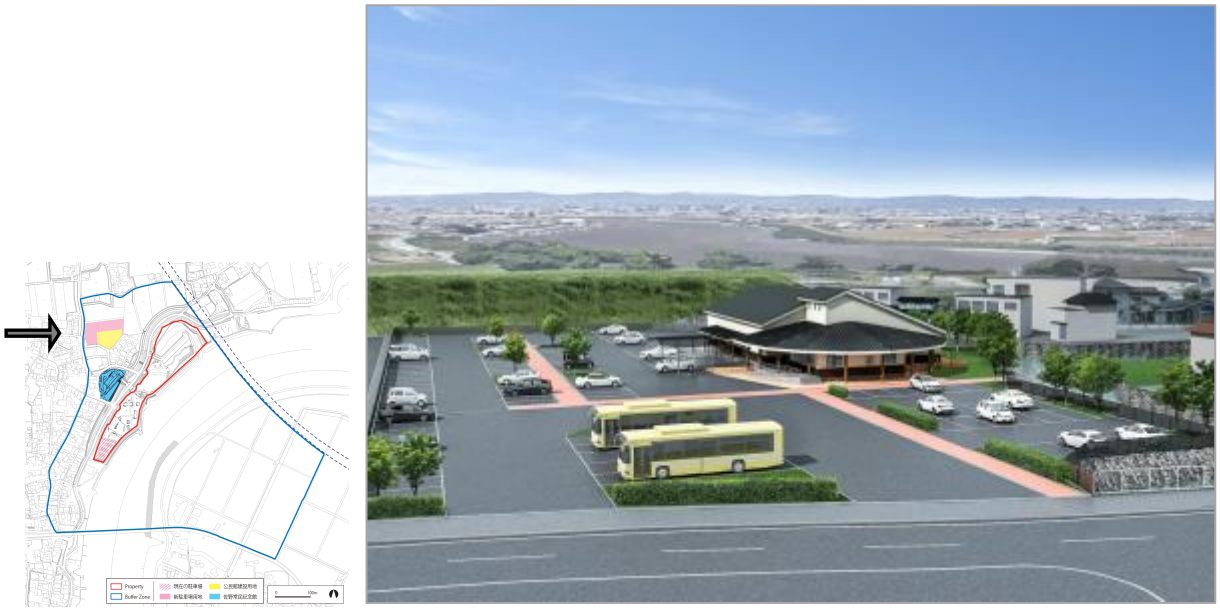


Figure 8. Artist rendition of completed parking area and Nakakawasoe Community Centre (view to east from west side of site)

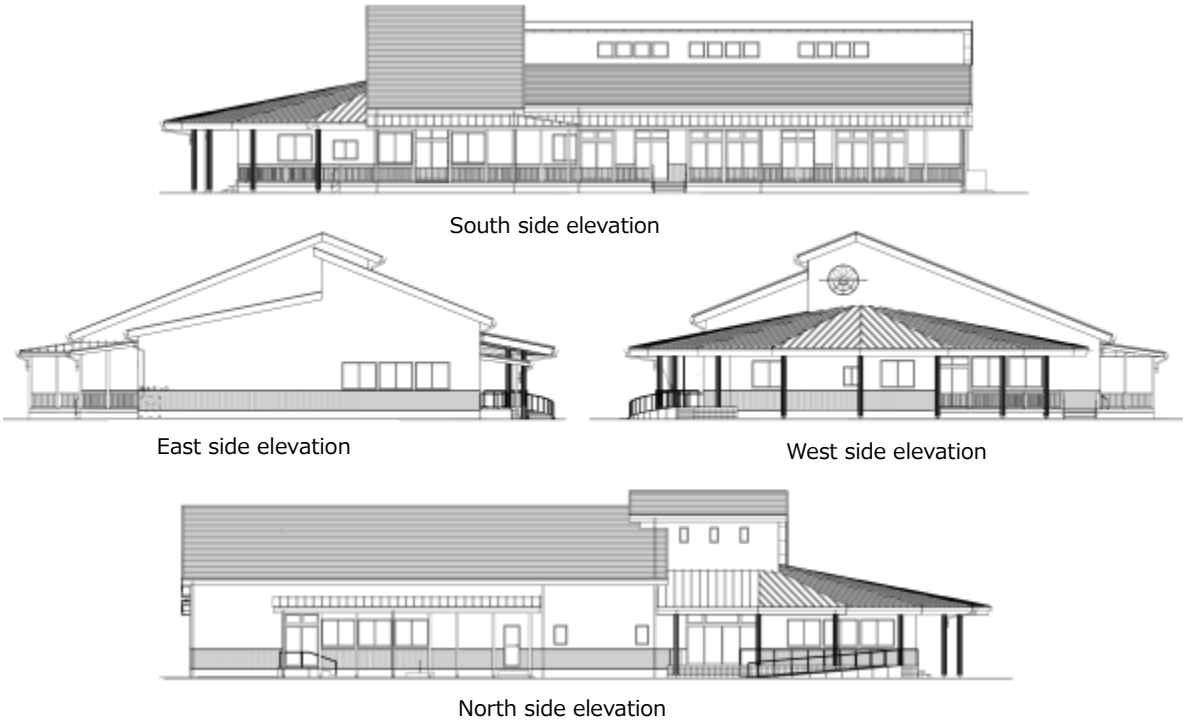


Figure 9. Elevation drawings of Nakakawasoe Community Centre

3. Heritage Value

(1) The Outstanding Universal Value of the “Sites of Japan’s Meiji Industrial Revolution: Iron and Steel, Shipbuilding, and Coal Mining” is as follows (excerpted from the Statement of Outstanding Universal Value in the World Heritage Committee Decision).

A series of industrial heritage sites, focused mainly on the Kyushu-Yamaguchi region of south-west of Japan, represent the first successful transfer of industrialization from the West to a non-Western nation. The rapid industrialization that Japan achieved from the middle of the 19th century to the early 20th century was founded on iron and steel, shipbuilding and coal mining, particularly to meet defence needs. The sites in the series reflect the three phases of this rapid industrialisation achieved over a short space of just over fifty years between 1850s and 1910.

The first phase in the pre-Meiji Bakumatsu isolation period, at the end of Shogun era in the 1850s and early 1860s, was a period of experimentation in iron making and shipbuilding. Prompted by the need to improve the defences of the nation and particularly its sea-going defences in response to foreign threats, industrialisation was developed by local clans through second hand knowledge, based mostly on Western textbooks, and copying Western examples, combined with traditional craft skills. Ultimately most were unsuccessful. Nevertheless this approach marked a substantial move from the isolationism of the Edo period, and in part prompted the Meiji Restoration.

The second phase from the 1860s accelerated by the new Meiji Era, involved the importation of Western technology and the expertise to operate it; while the third and final phase in the late Meiji period (between 1890 to 1910), was full-blown local industrialization achieved with newly-acquired Japanese expertise and through the active adaptation of Western technology to best suit Japanese needs and social traditions, on Japan’s own terms. Western technology was adapted to local needs and local materials and organised by local engineers and supervisors.

(2) As a shipbuilding site in the first phase, the Mietsu Naval Dock consists of remains from the initial phase of industrialization, when repair and building of ships were being carried out through trial and error. They include Japan’s oldest dry dock, in operation from 1858 to 1871, and where used for training and repair of Western-style ships. The Mietsu Naval Dock was operated based on knowledge and technologies obtained by the Nagasaki Naval Training Institute established by the Tokugawa shogunate in 1855, responding to the opening up of Japan’s ports with the arrival of Commodore Matthew Perry. (The Nagasaki Naval Training Institute no longer exists today.)

(3) The elements (attributes) representing the OUV of the Mietsu Naval Dock are the underground archaeological remains of the dry dock (shipbuilding/repair docks and metal works section), training ground section, and small boat docks section, along with the natural terrain in which they are buried. The everyday maintenance of these is defined as follows in the Conservation and Management Plan.

[Management by Saga City and Saga City Board of Education]

Elements of the component part that will be conserved and managed date to the period when Mietsu Naval Facility was in operation. These elements provide direct evidence of activities relating to shipbuilding and repair work as part of Saga Clan’s goal to modernize through its own independent

efforts. They consist of both buried remains and geographical features, each of which is to be maintained and managed as follows.

As the component part has been designated as a National Historic Site based on the Law for the Protection of Cultural Properties, all conservation and management work will comply with the Plan for the National Historic Site Mietsu Naval Facility Site Property Management Plan, which sets out guidelines on dealing with such things as changes to the component part's current state in areas where there are historic remains. In addition to this, all work will be implemented in liaison and coordination with Saga City Board of Education, the site's administrator.

○Buried remains

・Shipbuilding/repair docks and metal works section:

Stone remains, furnace remains (1.2), ditch remains, double–stranded furnace (crucible furnace), scrap pit revetment remains (main dock area), revetment remains (dock entrance area), river side revetment remains, construction soil

・Training ground section: Construction soil

・Small boat docks section: Construction soil, embankment

All buried remains have been secured with a sufficiently thick protective layer of 60 – 100 cm from the current ground surface, and are being maintained and managed so that nothing can harm them. Therefore, as they will continue to be preserved in this good buried state, measures will be taken for conservation and management which seek to maintain their current state. In regard to remains that are made of wood in particular, such as revetment remains, other than for the purpose of surveys, these remains will be left unexposed so as to prevent deterioration.

・Geographical features

・Small boat docks section: Geographical features of inlet

The geographical features of the inlet give insights into the nature of small boat docks in the past. Therefore, in order to preserve this landscape, measures will be taken for conservation and management which seek to maintain their current state on the assumption of the area's ongoing use as a fishing port.

(4) Restrictions in the buffer zones are defined as follows. (CMP, p. 87)

5.4.1 Conditions of the buffer zone that are to be maintained (benchmark of regulation and protection)
The buffer zone contains land use divisions and geographical formations that evoke the landscape when Mietsu Naval Facility was in operation. In order to protect the surrounding area as the appropriate setting as the appropriate setting as seen from the component part, restrictions will be placed on the establishment of structures that obstruct the visibility of this setting.

5.4.2 Regulation and protection policy and overall plan in the buffer zone
In order to maintain the conditions set out in 5.4.1, which aims to protect the component part, conservation measures will be taken along with the setting of appropriate boundaries for the buffer zone.

In order that development activities which take place within the buffer zone do not harm the component

part's value, appropriate regulations are to be put in place in accordance with the River Act, the City Planning Act, the Landscape Act, the Act Concerning Establishment of Agricultural Promotion Areas, and the Agricultural Land Act.

4. Assessing Overall Impact of the Development

(1) The construction work for this development project in the vicinity of the Mietsu Naval Dock is taking place outside the scope of the component part, and does not have any direct adverse impact on the integrity or authenticity of the elements (attributes) representing the OUV of the World Heritage "Sites of Japan's Meiji Industrial Revolution: Iron and Steel, Shipbuilding, and Coal Mining," namely, the underground archaeological remains and the natural terrain in which they are buried.

(2) The equipment in the Guidance Facility will be renovated in line with the three stages of interpretation in the Interpretation Strategy, namely (1) OUV, (2) History of heavy industry, and (3) Interpretation for each of the component parts.

When the renovation is completed, the first place visitors will go to when they enter the building is the World Heritage Exhibit Room. Common exhibits will be installed here, which are planned as standard exhibits for all the component parts in line with the Interpretation Strategy, outlining and explaining the OUV of the Sites of Japan's Meiji Industrial Revolution: Iron and Steel, Shipbuilding, and Coal Mining and the roles of the component parts.

This will greatly contribute to providing visitors with an overview of the Sites of Japan's Meiji Industrial Revolution: Iron and Steel, Shipbuilding, and Coal Mining, and deepening their understanding of how the Mietsu Naval Dock contributes to the OUV, thereby promoting their understanding of the World Heritage value from viewing the exhibits about the site.

According to the results of the questionnaire surveys conducted periodically by Saga City, many visitors say they would like to see the actual Revetment remains (main doc area). However, from the standpoint of protecting the archaeological remains, it has been decided to maintain them in reburied state.

In this renovation project, there are thus plans for making the remains "visible" by displaying actual-size models of some of the remains in the Guidance Facility, as a means of raising visitor satisfaction.

(3) The project for relocation of the Mietsu Naval Dock parking area outside the component part will enhance protection by restricting vehicle entry onto the property. Moreover, locating the new parking area on the north side of the property will improve the visitor access environment to the parking area, clarifying the tour routes to the Guidance Facility and to the component part.

(4) The views from inside the component part are not elements (attributes) representing the OUV, but are subject to the impact assessment. The reason is that conservation of the landscape in the buffer zone is a matter designated for consideration in theCMP, and these development projects take place in the buffer zone.

While Guidance Facility renovation will involve expansion of the building, the plans call for only minimal expansion on the west side of the building, resulting in no change to the building appearance as seen from the component part.

Moreover, all due consideration will be made to harmonizing the appearance of the new community

centre with the surroundings, in coloration, materials, shapes and other aspects. Specifically, the plans are for white and black as the basic colors for the exterior and roof, respectively, while the height of the building (at its highest point) will be nearly the same as that of the surrounding private houses. In the current state, when viewing the planned building site from the component part, since there is an embankment road of a certain height (elevation approximately 6m) between the component part and the building site, only some of the roofs of houses near the embankment can be seen. Accordingly, in the case of the new community centre as well, when viewed from the component part in the direction of the building site, there will be almost no change to the view as seen from the component part, since it will barely be visible as with the surrounding houses (Fig. 10-1 to Fig. 10-4).

Note that these development projects are in conformity with the standards prescribed in the Saga City landscape ordinances.

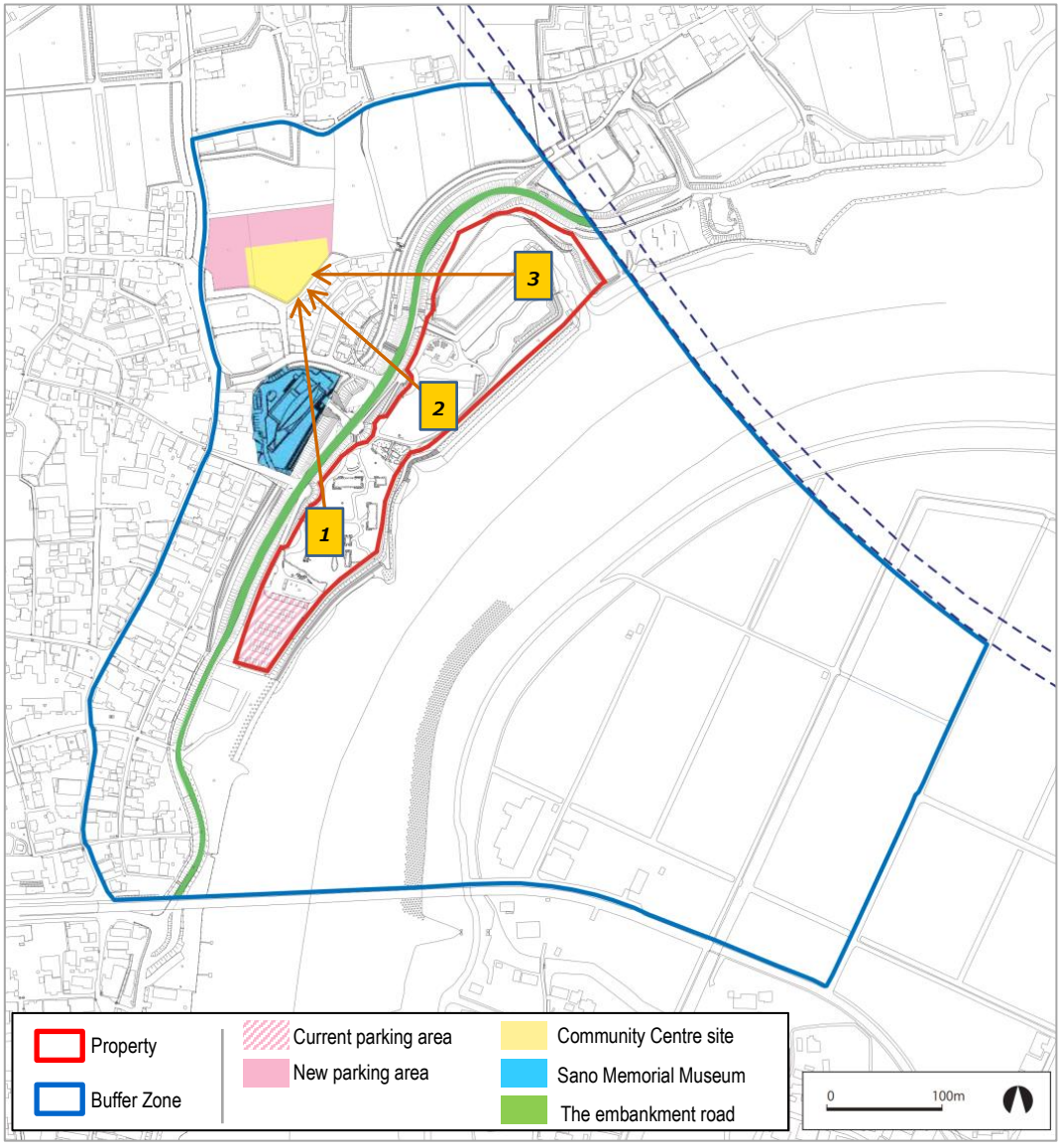


Figure 10-1. View of the proposed site of the Nakakawasoe Community Centre from the component part [viewpoint positions]

Figure 10-2. View from Viewpoint 1 (Shipbuilding/repair docks and metal works section) [photographed August 31, 2019]

Figure 10-3. View from Viewpoint 2 (Training ground section) [photographed August 31, 2019]

Figure 10-4. View from Viewpoint 3 (Small boat docks section) [photographed August 31, 2019]

For Reference: Elevation of each point and straight-line distance to embankment road and building site

	Elevation	Straight-line distance to embankment road	Elevation of embankment road*1	Straight-line distance to building site	Appearance of community centre from each point
Point 1	3.67m	Approx. 50m	6.6m	Approx. 260m	Not visible.
Point 2	3.5m	Approx. 40m	6.3m	Approx. 180m	About the same height as the roofs of houses currently seen across the embankment road, which are partially visible.
Point 3	2.9m	Approx. 65m	6.3m	Approx. 190m	About the same height as the roofs of houses currently seen across the embankment road, which are partially visible.
Planned building site	3.14m				
Community centre building	12.41m (at highest point)				

*The elevation of the embankment road given here is the height when viewed squarely from each point in the direction of the planned building site.

*The elevation of the community centre building is calculated as the height of the highest point of the building (9.27m) from the ground surface after land formation (3.14m).

5. Management Process

(1) In the management structure of the Sites of Japan's Meiji Industrial Revolution, local conservation councils have been established for each area, based on the General Principles and Strategic Framework for Conservation and Management for the Sites of Japan's Meiji Industrial Revolution: Iron and Steel, Shipbuilding, and Coal Mining. For this area as well, the Saga Local Conservation Council has been formed, which exchanges information and views and makes decisions regarding such matters as conservation and management of the component part. As necessary, the advice of the national government (Cabinet Secretariat) Industrial Heritage Expert Committee (including Working Properties) may be also sought.

(2) Saga City has been carrying out these development projects from the early planning stage based on guidance and advice from the Cabinet Secretariat and Agency for Cultural Affairs, and on all due deliberation in a committee of experts and elsewhere.

At the same time, the projects were approved by the Saga Local Conservation Council, which provided the following assessment.

- The Guidance Facility will contribute greatly to overall understanding of the Sites of Japan's Meiji Industrial Revolution: Iron and Steel, Shipbuilding, and Coal Mining and of the contribution of the Mietsu Naval Dock to the OUV.
- Relocating the parking area outside the component part will lead to enhanced protection of the property and will establish an access route from the parking area to the historical and archaeological remains. The resulting flow is expected to deepen the understanding of visitors, who will first further their understanding of the World Heritage and component parts at the Guidance Facility and then go on to visit the historical and archaeological remains.
- The design of the new Nakakawasoe Community Centre takes into account harmony with the surrounding landscape and conforms to the landscape standards prescribed by Saga City. Community centres have a long tradition in Japan and serve an essential role in communities providing residents with a place to gather and endeavor in lifelong learning activities. As one subproject of the larger plan, this community centre is expected to enhance the long-term understanding and participation of residents in regional development activities that utilize the Mietsu Naval Dock, one of the important component parts of the World Heritage.

(3) The assessment by the "Sites of Japan's Meiji Industrial Revolution" National Committee of Conservation and Management is similar.

(4) Note that this HIA was drawn up after discussions in the meeting of the Saga Area Conservation Council held October 2, 2019.

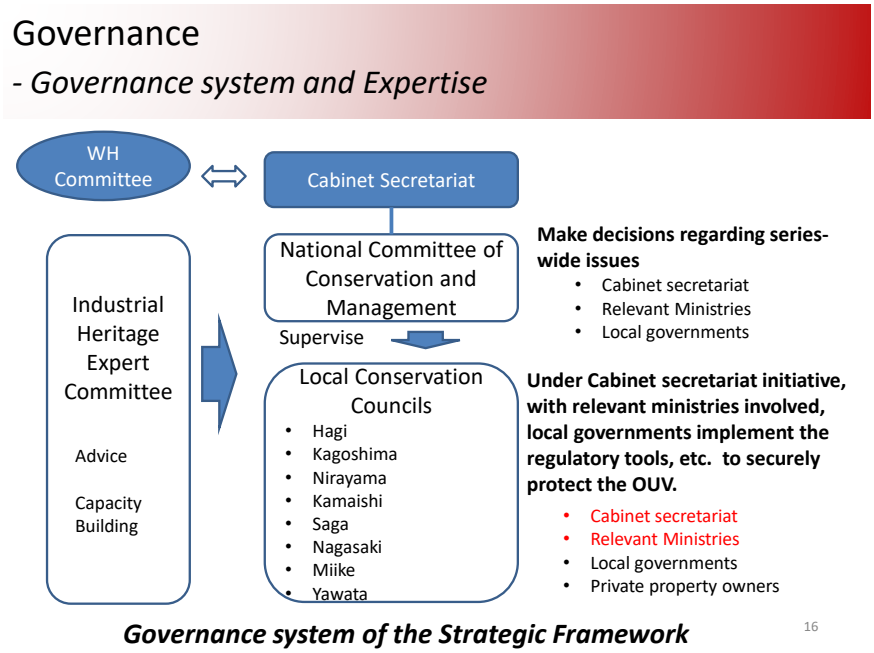


Figure 11. Governance System Defined in the Strategic Framework

(Additional information November 2014)

(5) Since these development projects are led by Saga City as the component part manager, close contact and coordination with related parties will be carried out in the construction work stages and the work will be carried out paying all due care to the impact on the property.

6. Conclusions

The development projects to be carried out by Saga City in the vicinity of the Mietsu Naval Dock, since there are no problems with the assessment of overall impact or in the management process, will not have an adverse impact on the OUV, integrity, or authenticity of the Sites of Japan's Meiji Industrial Revolution: Iron and Steel, Shipbuilding, and Coal Mining, and will contribute greatly to enhancing protection of the property and to furthering understanding of the Mietsu Naval Dock as a contributing element.

Appendix 8

"Sites of Japan's Meiji Industrial Revolution: Iron and Steel, Shipbuilding and Coal Mining" (No.1484)

Status of Damages Caused by Heavy Rain at the Terayama Charcoal Kiln (Component Part 2-2) and Future Measures

The Terayama Charcoal Kiln (Kagoshima City, Kagoshima Prefecture), Component Part 2-2 of the "Sites of Japan's Meiji Industrial Revolution: Iron and Steel, Shipbuilding and Coal Mining" was damaged in a landslip caused by heavy rains between June 27 and July 1, 2019. The following report will be submitted to the UNESCO World Heritage Centre on the status of the damages and measures to be taken in future.

Further, we will continue to provide additional information regarding the progress of the restoration measures as necessary.

1. Overview of the Component Part

(1) Name and Location

Name: "Sites of Japan's Meiji Industrial Revolution: Iron and Steel, Shipbuilding and Coal Mining" (No.1484)
Location: Kagoshima City, Kagoshima Prefecture

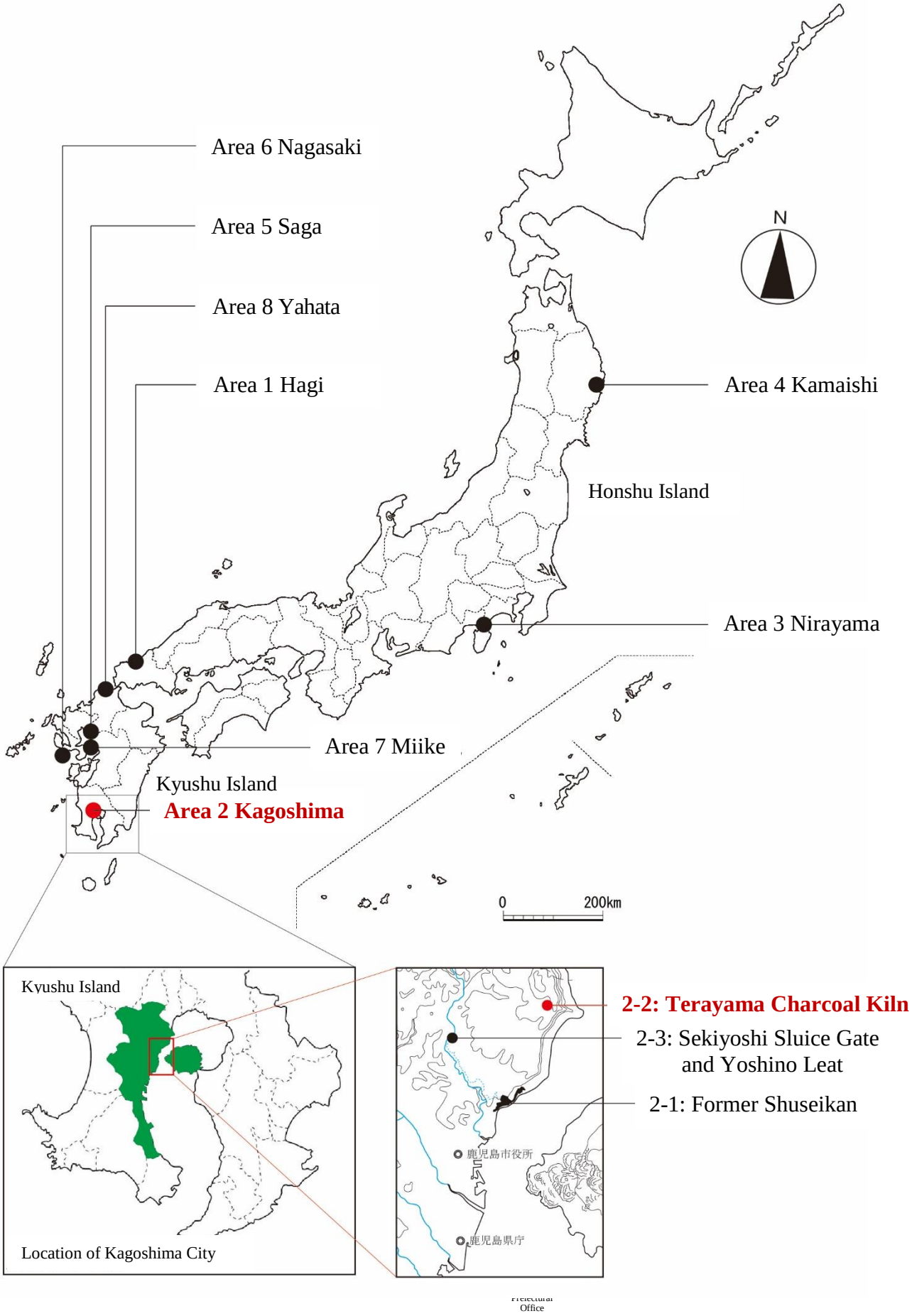
(2) Location and Scale of the Terayama Charcoal Kiln (Component Part 2-2)

Component Part Name	Location	Latitude Coordinates	Longitude Coordinates	Component Part Area (ha)	Buffer Zone Area (ha)
Terayama Charcoal Kiln	Yoshino-cho, Kagoshima City	31° 39′ 42.3″ ~ 45.5″ ~~N~~	130° 36′ 0.6″ ~4.2″ ~~E~~	0.64	2.01

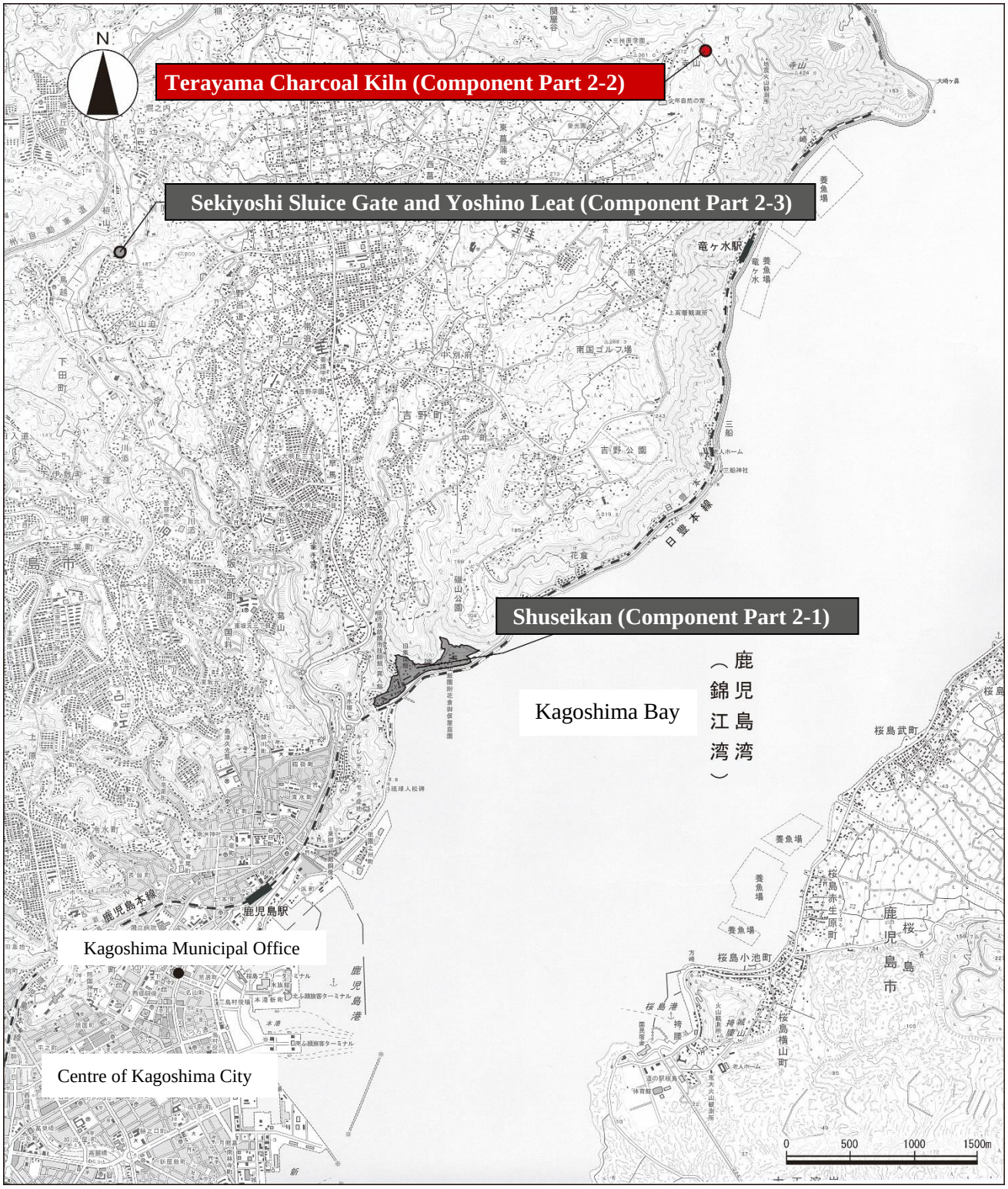
Photo before the disaster of Terayama Charcoal Kiln(photographed Feb. 18, 2019)

Appendix 9

(3) Map of the Kagoshima Area and Component Parts of the "Sites of Japan's Meiji Industrial Revolution"

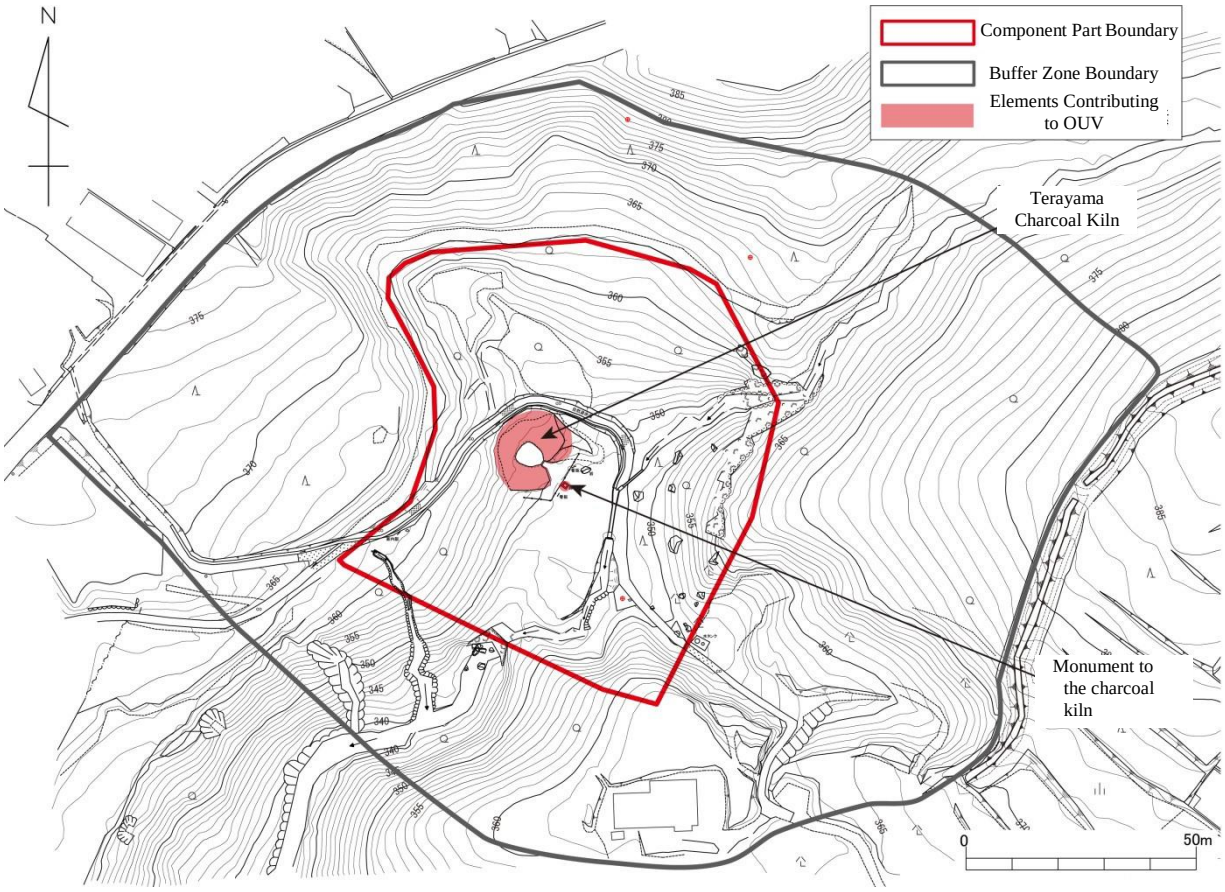


(4) Map of Component Parts in Kagoshima Area



Appendix 9

(5) Terayama Charcoal Kiln (Component Part 2-2) and Buffer Zone Boundaries



(6) Laws and Regulations Applicable to the Component Part and Buffer Zone

Component Part Name	Section	Laws, etc. Concerning Protection				
		Law for the Protection of Cultural Properties (Historic Site)	National Parks Act (Class II Special Zone)	City Planning Act (Terayama Scenic District)	Landscape Act and Kagoshima City Landscape Ordinance (Natural Green Zone)	The Act on Regulation of Housing Land Development (Regulated Area For Housing Land Development)
Terayama Charcoal Kiln	Boundary of Component Part	○	○ *partial	○	○	○
	Boundary of Buffer Zone	—	○	○	○	○

(7) Ownership / Administration of the Component Part and Buffer Zone

Site	Owners / Administrator
Component Part	National University Corporation(Kagoshima University)
	Kagoshima City goverment
	Private Individuals
Buffer Zone	National University Corporation(Kagoshima University)
	Kagoshima Prefectural government
	Kagoshima City government
	Private Individuals

(8) "Sites of Japan's Meiji Industrial Revolution" and the Terayama Charcoal Kiln (Component Part 2-2)

a) Criteria for which the Property was Inscribed

- Criterion (ii)

The Sites of Japan's Meiji Industrial Revolution illustrate the process by which feudal Japan sought technology transfer from Western Europe and America from the middle of the 19th century and how this technology was adopted and progressively adapted to satisfy specific domestic needs and social traditions, thus enabling Japan to become a world-ranking industrial nation by the early 20th century. The sites collectively represents an exceptional interchange of industrial ideas, know-how and equipment, that resulted, within a short space of time, in an unprecedented emergence of autonomous industrial development in the field of heavy industry which had profound impact on East Asia.

- Criterion(iv)

The technological ensemble of key industrial sites of iron and steel, shipbuilding and coal mining, is testimony to Japan's unique achievement in world history as the first non-Western country to successfully industrialize. Viewed as an Asian cultural response to Western industrial values, the ensemble is an outstanding technological ensemble of industrial sites that reflected the rapid and distinctive industrialization of Japan based on local innovation and adaptation of Western technology.

b) The Contribution of the Terayama Charcoal Kiln to the Outstanding Universal Value

The 23 component parts making up the Sites of Japan's Meiji Industrial Revolution included three sites in the Kagoshima Area: the Former Shuseikan, the Terayama Charcoal Kiln, and the Sekiyoshi Sluice Gate. All of these are component parts associated with the Shuseikan Enterprise, a project by which the feudal lord Shimazu Nariakira, looking at Japan as a whole, sought to build up the country as a powerful and wealthy nation through the policies of "Fukoku Kyōhei" (enriching the country and strengthening the military) and "Shokusan Kōgyō" (encouraging new industry).

Of the three developmental phases reflected in the Outstanding Universal Value of the Sites of Japan's Meiji Industrial Revolution, the three component parts located in the city of Kagoshima are heritage sites from the early stages of industrialization that belong to the initial "phase of trial and error experimentation" with regard to the field of iron and steel manufacture, and to both the initial "phase of trial and error experimentation" and the secondary "phase of direct importation of western technology" with regard to the field of shipbuilding.

Of the three, the Terayama Charcoal Kiln was a large kiln built for the mass production of powerful-

firing hard charcoal to supply the fuel needed for the Shuseikan Project. In addition to representing the hard charcoal production system, the site also forms part of the whole Shuseikan industrial system which illustrates the phase of trial and error experimentation in the iron and steel manufacturing field that took place at the Sites of Japan's Meiji Industrial Revolution.

2. Causes and Overview of the Disaster

(1) Basic Information on the Heavy Rains (Source: Kagoshima Local Meteorological Observatory)

Between June 28 and July 4, a seasonal rain front hovered over Kyushu Island, a front that was stimulated when warm and extremely moist air flowed in from the south. In conjunction with this, driving rains fell in localized areas across Kagoshima Prefecture from June 27 to July 3. Total precipitation in the vicinity of the Terayama Charcoal Kiln (Component Part 2-2) appears to have reached between 700 and 800 mm.

3. Principal Damage Sites and Conditions

Damage due to heavy rains occurred on two occasions as described below. For the location and status of the damages, refer to Appendix 1 "Disaster Summary and Photographs."

(1) June 28

Following the heavy rains beginning on June 27, water seeped into the soil behind the masonry surrounding the charcoal kiln site. The masonry, unable to bear the resulting weight, collapsed over a section on the right side (facing) of the kiln site (approx. 2.5m high by 2m wide).

(2) July 1

Heavy rains that continued intermittently from June 27 then caused landslips of approx. 100m long and 30m to 50m wide on a slope northeast of the charcoal kiln site. As a result, a large volume of earth, sand, and fallen trees was carried onto the grounds of the site, and a section of masonry on the left side (facing) of the charcoal kiln site collapsed (approx. 2.5m high by 3.5m wide). In addition, most of the charcoal kiln site was buried in soil by the landslip. The " Monument to the charcoal kiln" was not damaged, however. (See the right photograph of the top on p.7)

4. Impact on Constituent Elements Contributing to the Outstanding Universal Value (OUV) of the World Heritage Site

(1) Damage Status for Constituent Elements Contributing to the OUV

Component Part Name	Constituent Elements Contributing to the OUV	Damage Status
Terayama Charcoal Kiln	Charcoal kiln	June 28 Masonry collapsed over a section on the right side (facing) of the kiln site measuring approx. 2.5m high by 2m wide July 1 A large volume of earth, sand, and fallen trees was carried into the component part, and masonry collapsed over a section on the left side (facing) of the kiln site measuring approx. 2.5m high by 3.5m wide. *Details of the status of the interior of the charcoal kiln site have not yet been confirmed.
	Monument to the charcoal kiln	No problems.

(2) Impact on the Constituent Elements of the Component Part Contributing to the Outstanding Universal Value of the World Heritage Property

While masonry around the charcoal kiln that contributed to the OUV collapsed on two occasions as the result of the recent heavy rain and landslip damage, the stone material that made up the masonry was not washed away from the site, and has all been left behind on the grounds of the component part.

In the past, detailed positional information of the individual stones has been regularly recorded through fixed-point observation and three-dimensional laser scanning to understand the displacement of the masonry at the charcoal kiln site. At the same time, information on the structure and construction methods used for the original charcoal kiln have also been collected via archaeological excavations.

Accordingly, even though the masonry, etc. surrounding the charcoal kiln site was severely affected by the recent damages, the stone materials from the collapsed masonry were not washed away from the

component part, as described in 4. and 5. This means that it will be possible to restore the original masonry to a stable state by collecting the materials and rebuilding the remains of the charcoal kiln site.

Also, because this plan entails taking more measures to mitigate damages than ever before (e.g., by stabilizing the surrounding slopes and improving drainage), the restoration will keep the site in an even more stable condition, leading to the maintenance and strengthening of constituent elements that contribute to the OUV.

5. Future Measures

Future measures for the damaged areas will be divided into two stages: (1) measures to be implemented in the current fiscal year, and (2) full-scale restoration to be implemented from the next fiscal year forward. In addition, the division of roles for related organizations will be as shown in (3).

(1) Immediate Measures

The following items will be implemented as immediate measures anticipated for the current fiscal year, while design and full-scale restoration work will be started from next fiscal year. Even so, plans may change in future as the result of coordination among the parties concerned and further consideration, etc. of the surveys and construction methods.

a) Charcoal Kiln

- Because the large amount of rainwater that flowed out of the gorge north of the charcoal kiln site scoured the surface of the ground in the vestibule in front of the charcoal kiln site, the channel was changed by partially excavating the sediment and laying sandbags. As it is assumed that the path of future landslips due to heavy rains and typhoons will shift, the flow path will be managed appropriately.
- Because the collapsed section of the masonry on the left side (facing) of the charcoal kiln site remains exposed, a flow of rainwater directly into the area runs the risk that the remaining masonry will collapse with sediment outflow. As such, it will be protected with sandbags and tarpaulins.
- In addition to removing the earth, sand, trees, and other debris that have flowed onto the charcoal kiln site, damage to the site will be surveyed and recorded. When doing so, careful attention will be paid so that the remains of the charcoal kiln remains unaffected.
- The position of stone materials from the collapsed masonry will be recorded as they are being picked up by such means as photography or surveying, after which they will be stored in such a way as not to suffer any ill effects.

b) Collapsed Slope Northeast of the Charcoal Kiln

- In order to prevent the inflow of additional sediment from above the collapsed part as well as the erosion of the slope, large sandbags will be placed on the flat area near the northern end of the component part(see (7) Range in Appendix 1). These large sandbags will be colored in consideration of the landscape.
- We will remove the earth, sand, trees, and other debris that has flowed onto the component part, giving due consideration so as not to compromise the OUV.

(2) Full-scale Restoration Work

- As well as a detailed survey to record the state of the damages, a detailed geological survey necessary for the basic design of the full-scale restoration work will be conducted in order to finalize the restoration method.
- In establishing the full-scale restoration method, discussions and examinations from a professional standpoint will be carried out by members of the Kagoshima City Shuseikan District Conservation and Utilization Expert Committee with the guidance and advice of the Agency for Cultural Affairs and the Cabinet Secretariat of the Government of Japan, and views will also be coordinated with overseas experts concerned with industrial heritage.

(3) Division of Roles among the Parties Concerned

To ensure that the conservation and management of the Sites of Japan's Meiji Industrial Revolution is carried out in an integrated manner, local conservation councils have been established in each area, tasked with sharing information with each other and building consensus.

In this case, the points listed below will be confirmed among the relevant organizations that make up the Council for the Management and Preservation of the Shuseikan Area (Member organizations: Cabinet Secretariat, Ministry of Land, Infrastructure, Transport and Tourism, Ministry of the Environment, Kagoshima Prefecture government, Kagoshima Prefectural Education Agency, Shimadzu Limited, Iso Residents' Association, Kagoshima City government, Kagoshima City Board of Education).

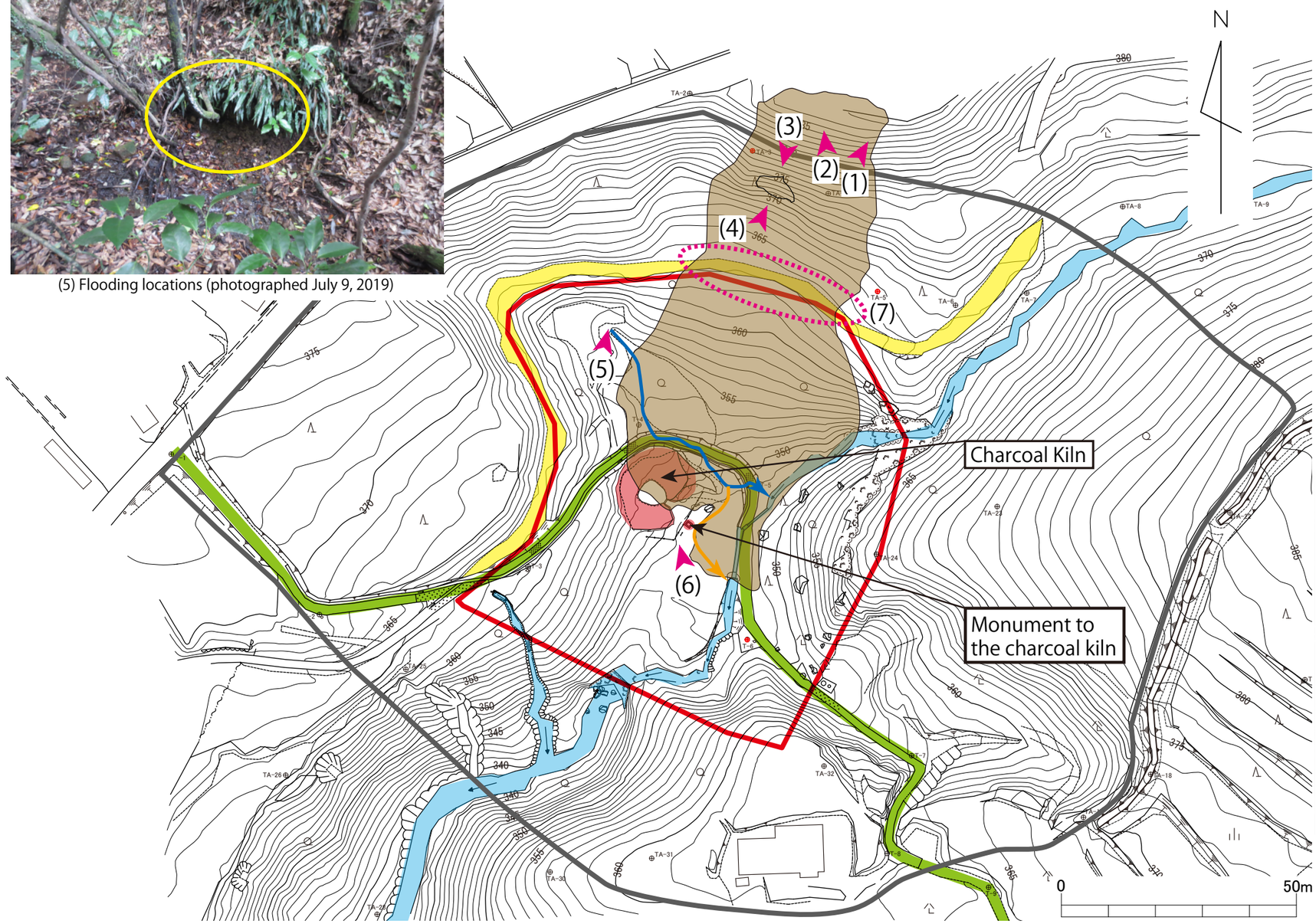
- The municipality of Kagoshima City, as the owner of the historic Terayama Charcoal Kiln site, will work together with relevant organizations to secure financial resources and repair damaged areas on the grounds of the component part.
- Affected areas in the buffer zone will be restored in a steady manner after discussions with the landowner on the scope of restoration, parties responsible for implementation, and cost burdens.
- In the event that other sites affected by the disaster are newly identified in future, discussions will be held on the division of roles among the relevant organizations with regards to restoration.

6. Other Matters

In future, we hope to provide additional information to the UNESCO World Heritage Centre as necessary in line with the progress of restoration.

Appendix 1: Drawings and photos of damage places
(Surveyed and drawn July 9, 2019)

(5) Flooding locations (photographed July 9, 2019)



《 rawing 》

- Component site scope (historic site scope)
- Buffer zone scope
- Elements contributing to OUV
- Rivers
- Misc. road
- Trail
- Extent of mud coverage 7/1
- Water channel occurring after 7/1 (after 7/5)
- Water channel occurring after 7/1 (up to 7/5)

(6) Kiln soon after damage occurred (photographed July 1, 2019)

(1) Upper part 1 of landslide (photographed July 9, 2019)

(2) Upper part 2 of landslide (photographed July 9, 2019)

(3) View from upper part of landslide (photographed July 9, 2019)

(4) Midslope of landslide (photographed July 9, 2019)

PROGRESS STATUS OF PROJECT PROPOSALS CONCERNING THE IMPERIAL STEEL WORKS AND ONGA RIVER PUMPING STATION

PROJECT PROPOSALS FOR THE IMPERIAL STEEL WORKS AND ONGA RIVER PUMPING STATION, COMPONENT PARTS OF THE "SITES OF JAPAN'S MEIJI INDUSTRIAL REVOLUTION: IRON AND STEEL, SHIPBUILDING, AND COAL MINING"

PREFACE

The purpose of this report is to give an update on the project proposals reported in 2017 for the Imperial Steel Works and Onga River Pumping Station, component parts of the "*Sites of Japan's Meiji Industrial Revolution: Iron and Steel, Shipbuilding, and Coal Mining*." While these projects are not regarded as having an adverse impact on the Outstanding Universal Value of these properties, this report is submitted in response to the technical review given by the World Heritage Centre in April 2018, and in accordance with the stipulation in the Operational Guidelines for the Implementation of the World Heritage Convention, Paragraph 172, to notify the World Heritage Committee of possible impacts, including positive ones, on conservation of the Outstanding Universal Value (OUV).

1. PROJECT PROPOSALS PREVIOUSLY REPORTED

These project proposals impact four buildings in two component parts of the *Sites of Japan's Meiji Industrial Revolution: Iron and Steel, Shipbuilding, and Coal Mining*. The work concerns preservation and interpretation of assets inside the steel works, to which entry by the general public is currently restricted.

The two component parts noted above are the Imperial Steel Works and Onga River Pumping Station. The four buildings are the First Head Office, the Former Forge Shop, and the Repair Shop of the Imperial Steel Works, and the Onga River Pumping Station.

Project outline

First Head Office: Interior restoration and conservation was begun in May 2018, and by the end of July 2019, work was completed on the east portion of the ground floor.

Former Forge Shop: Aseismic design was conducted based on the results of the aseismic survey implemented in 2018. Construction methods are being studied that will enable the seismic reinforcement work to be performed in parallel with the building exterior conservation work.

Repair Shop: Aseismic design was conducted based on the results of the aseismic survey implemented in 2018. Construction methods are being studied that will enable the seismic reinforcement work to be performed in parallel with the building exterior conservation work.

Onga River Pumping Station: An additional aseismic survey was conducted, taking into consideration that it is a brick and steel-frame structure, and the aseismic design is currently under study.

2. PROJECT PROGRESS STATUS

First Head Office: Interior restoration (reproduction and conservation) was begun in May 2018, and by the end of July 2019, work was completed on the east portion of the ground floor (approximately one-fourth of the work in terms of total floor space). The remaining work is currently under way, aiming for completion by the end of September 2020.

Former Forge Shop: Aseismic design work was carried out in FY2018 based on the results of the aseismic diagnosis performed in FY2017.

Repair Shop: Aseismic design work was carried out in FY2018 based on the results of the aseismic diagnosis performed in FY2017.

Onga River Pumping Station: An additional aseismic survey was conducted in FY2018, taking into consideration that it is a brick and steel-frame structure.

Conservation and management of the buildings of the Imperial Steel Works are carried out in cooperation with stakeholders, based on the General Principles and Strategic Framework for Conservation and Management formulated by the Cabinet Secretariat. Nippon Steel Corporation (renamed from Nippon Steel & Sumitomo Metal in April 2019), the owner of the property, drew up policies and plans in consultation with experts, and having obtained approval of the Yawata Local Conservation Council (Kitakyushu City and Nakama City, Cabinet Secretariat, etc.), reported the project proposal to the World Heritage Centre jointly with Kitakyushu City and Nakama City ("the municipalities"). Work was begun following a technical review by the Centre. Thereafter, the detailed specifications were decided while consulting with experts on engineering matters involved in the actual construction work. As the work proceeded, progress reports were submitted for approval to the Yawata Local Conservation Council. The reporting and approval process with these institutions will continue as the work is carried out.

Representatives of these institutions, as well as of the owner, Nippon Steel Corporation, are also members of the planning group responsible for drafting this project proposal.

3. SUPPLEMENTARY MATERIALS

3.1 Project description (progress)

These project proposals impact four buildings in two component parts of the *Sites of Japan's Meiji Industrial Revolution: Iron and Steel, Shipbuilding, and Coal Mining*, namely, the First Head Office, the Former Forge Shop, and the Repair Shop of the Imperial Steel Works, and the Onga River Pumping Station. The progress of each of the projects is as follows.

First Head Office: Interior restoration (reproduction and conservation) was begun in May 2018, and by the end of July 2019, work was completed on the east portion of the ground floor (approximately one-fourth of the work in terms of total floor space). The remaining work is currently under way, aiming for completion by the end of September 2020. Regarding public showing of the building, since the Imperial Steel Works is a working property, studies and discussions are being conducted carefully, including ways of avoiding any hindrance to the business activities of the owner. There are many issues for public showing, however. Detailed studies are therefore being conducted concerning methods for public showing within a scope that does not hinder the owner's business activities, and road and land design in the vicinity of the building.

Former Forge Shop: Aseismic design work was carried out in FY2018 based on the results of the aseismic diagnosis performed in FY2017. The design limits the number of columns to be reinforced to the minimum necessary, giving priority to interior reinforcement of the main building for preserving the internal steel frame and exterior appearance, the needs for safety, usability, mitigation of quake damage, and provision of reinforcing methods enabling quick restoration in case of damage. It should be noted also that construction methods are being studied that will enable the seismic reinforcement work to be performed in parallel with the building exterior conservation work (reported previously).

Repair Shop: Aseismic design work was carried out in FY2018 based on the results of the aseismic diagnosis performed in FY2017. The design limits the number of columns to be reinforced to the minimum necessary, giving priority to interior reinforcement of the main building for preserving the internal steel frame and the exterior appearance, the needs for safety, usability of building interior for operations and of the central wing crane[1], mitigation of quake damage, and provision of reinforcing methods enabling quick restoration in case of damage.

Onga River Pumping Station: An additional aseismic survey was conducted in FY2018, taking into consideration that it is a brick and steel-frame structure. The aseismic design is currently under study. The design will take into consideration the outside appearance of the building, safety, and usability of the building for operations.

[1] The cranes in the south and north wings and in the west annex are inoperable; but the existing cranes with high historical value located in the south and north wings will be retained, while the three hoist cranes in the south wing and west annex, which are relatively new and believed to be of little historical value, will be removed to enable continuation of operations in the building. Note also that construction methods are being studied that will enable the seismic reinforcement work to be performed in parallel with the building exterior conservation work (reported previously).

Appendix 10

Note also that construction methods are being studied that will enable the seismic reinforcement work to be performed in parallel with the building exterior conservation work (reported previously).

Repair Shop (view of west side)

Onga River Pumping Station
(view of west side)

3.1.1. First Head Office (from report by Nippon Steel Corporation)

FY2018 project (progress of interior conservation work in First Head Office)

I. Reported matters

This work began in May 2018, after a summary of the plans was reported at the 6th meeting of the Yawata Local Conservation Council on April 24. It is currently being carried out with technical support and supervision by engineering advisors introduced by domestic experts, and while confirming approaches, observing on site, and filing progress reports together with experts in Japan and in the local area. (Details: See 3.1.4)
Since about a year has passed since the work began, reports are given here on the "Current state of progress" that was to have been reported at the last Local Conservation Council meeting, and "Change of specifications for indoor exhibits premised on public showing, as requested by the municipalities."
The detailed progress status has been updated in an interim report to the municipalities. (Reported January 18, 2019)

II. Work progress status

1. Basic policies

(1) As a rule, the exterior (roof, walls) and existing seismic reinforcement members are to be retained as is.

(2) The restoration work is to be based on remaining parts and materials, old photos, old drawings, and the initial First Head Office study report (September 1998, Dr. Hiroshi Katano, Kyushu Institute of Design, Department of Environmental Design). In the case of portions for which such evidence is unclear, reproduction, repair, and conservation will be carried out with reference to examples of buildings from the same era.

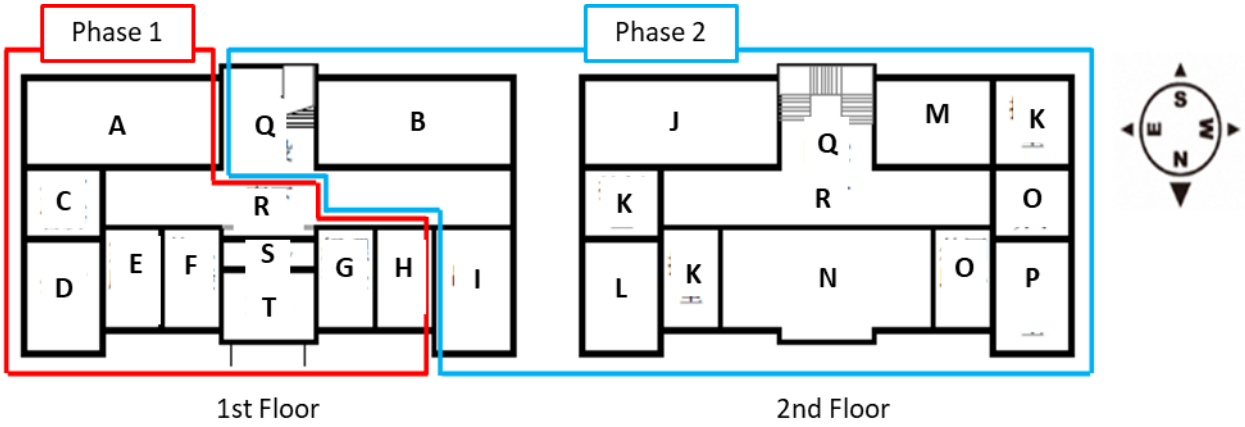
(3) Certain functional measures will be reflected for the sake of readiness for facility maintenance and public utilization (water and condensation measures, facility upkeep, exhibits, safety measures, etc.).

2. Scope of work and construction period

(1) Due to a request from the municipalities for specification changes related to indoor exhibits, it became necessary to include the accounting manager's office and accounting section in the Phase 1 work. The scheduled completion for Phase 1 was therefore changed to July 2019 (originally scheduled for March 2019).

(2) Phase 2 work is currently progressing toward completion in September 2020 as originally planned.

Appendix 10



A: General Affairs Section
B: Procurement Section
C: Director General Secretariat
D: Director General's Office
E: First Reception Room
F: Second Reception Room
G: Accounting Manager's Office
H: Accounting Section
I: Treasurer's Section

J: Drafting Room
K: Engineer's Office
L: Chief Engineer's Office
M: Clark's office
N: Conference Room
O: Foreign Engineer's Office
P: Foreign Consultant Engineer's Office
Q: Staircase R: Corridor
S: Hall T: Entrance

III. Change of specifications for indoor exhibits

In response to a request by the municipalities for indoor exhibits premised on public showing, specification changes were made to the interior conservation work and the following measures are being implemented.
The overall exhibit plans are under further study by the municipalities based on the changed specifications.

Measure	Place	Main specifications	Reason for measure
Making into staff rooms	Accounting Manager's Office	Simple interior finish	Consolidate and conceal electrical equipment and prevent contact with the equipment
	Accounting Section	Simple interior finish	Deployment of permanent administrative staff, measures for sick and injured
	Treasurer's Section	Simple interior finish	Replacement of exhibits, storage of facility administration materials, etc.
Exhibit measures	First Reception Room	Floor opening, earth dredging, installation of lighting under floor and glass guardrail around opening	Display of underfloor foundation arch
	Conference Room	Carpeting	Exhibit reconstructed from old photographs
	Foreign Engineer's Office	Installation of roof frame lighting and arrangement of original flooring pieces	Roof frame, seismic reinforcement, display of floor materials, etc.

	Each room	Installation of electrical outlets embedded in floor	Provision of electric power for exhibits
	Drafting Room	Installation of independent light switches	Operations when using room for seminars, etc.
Safety measures	General Affairs Section, Accounting Section	Installation of air conditioners including outdoor units and new 200V power source	Preventing heat stroke in summer (2 units in general affairs section, 1 in accounting section)
	Around staircase	Installation of, double handrails	Prevent stumbles by visitors

IV. Next steps

While continuing to collaborate with domestic and local experts, work will be carried forward under the guidance of engineering advisors, and progress will be reported at the next Council meeting.

Appendix 10

Completion status of interior conservation work on east side of ground floor in First Head Office (as of August 30, 2019)

Exterior view (north side)

Entrance

Entrance

Entrance hall

Entrance hall

1F east side corridor

1F east side corridor

General Affairs Section

Director General's Office

First Reception Room

Second Reception Room

Appendix 10

3.1.2. Former Forge Shop and Repair Shop (from report by Nippon Steel Corporation)

FY2018 project (aseismic design of Former Forge Shop and Repair Shop)

1. Timeline and objectives

These facilities were found to have inadequate aseismic performance as a result of deterioration surveys in FY2014, building surveys in FY2016, and aseismic diagnosis in FY2017. Accordingly, seismic reinforcement proposals were studied in FY2018 with public funding. While consulting with domestic experts on the study policy and proposed methods of reinforcement, a reinforcement plan was drawn up. A summary of the plan is therefore to be reported to the Council. The detailed plans have been reported to the municipalities. (Reported January 9, 2019)

2. Basic policies

The extent of reinforcement measures is to be kept to the minimum necessary, taking into account how the building is to be used, so as not to harm the value of the historical buildings. While favouring provisional reinforcement, consideration will be made for minimizing quake damage and enabling fast recovery.

(1) Extent of reinforcement

- Priority will be given to reinforcement of the main building for preserving the especially important internal steel frame and the exterior appearance.
- Additional buildings will have their usage limited and will not be included in the scope of reinforcement to the extent third parties do not come near them.
- Measures to prevent collapse and other safety measures will be made for brick exteriors if there is a possibility of random visitors coming near them.

(2) Provisional reinforcement

- Since workers come and go infrequently, the concept of provisional reinforcement will be introduced, and a restorable level aimed for.
  - Restorable level: The level of reinforcement at which, while there is a danger of collapse in the case of seismic ground motion, restoration as a cultural property is possible
  - Safe level: The level of reinforcement at which the structure will not collapse in the case of seismic ground motion
- Provisional reinforcement means that reinforcement members are added each time damage recovery is made, and reinforcement is premised on corrective maintenance.

(3) Minimizing quake damage and enabling fast recovery

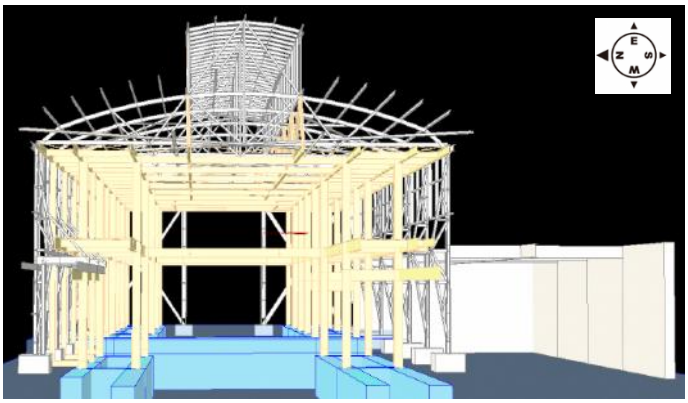
- A reinforcement plan will be drawn up assuming zero as the existing level of aseismic performance. (Existing seismic reserve capacity is for mitigating damage and keeping down restoration cost.)
- A reinforcement method will be readied that enables fast restoration in case of damage from a large quake, etc.

3. Former Forge Shop

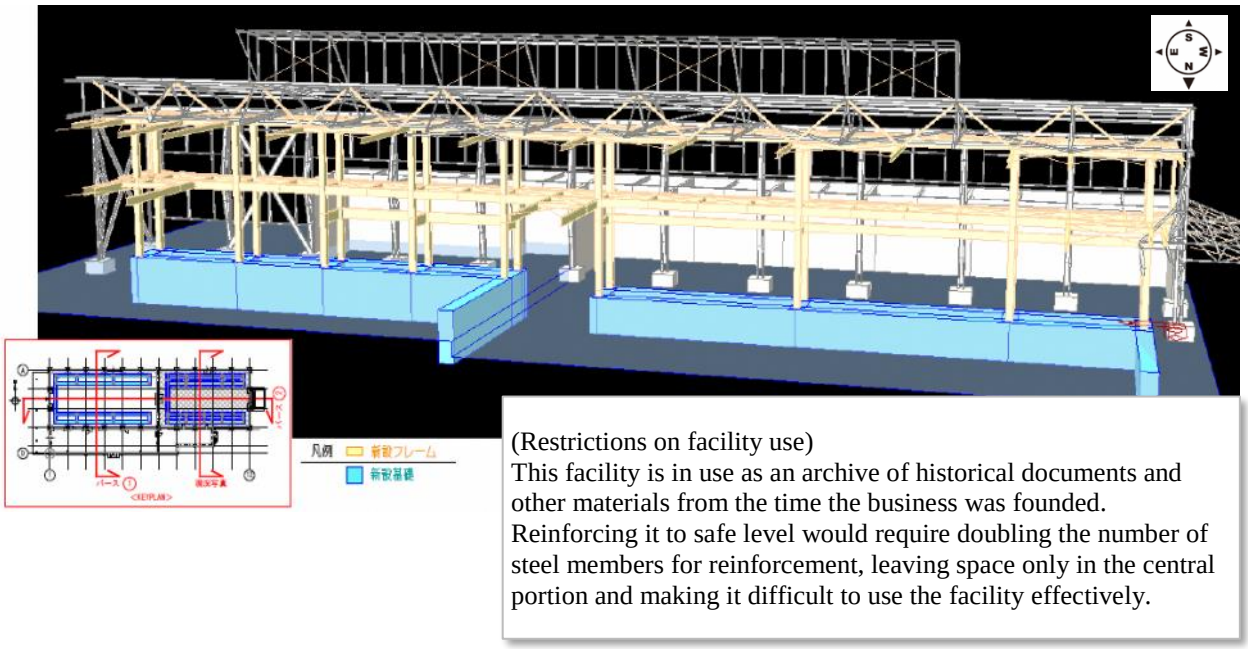
(1) Proposed reinforcement method (Work period: around one year (after relocation of historical materials)

1) Current status photo (west → east)

2) Perspective drawing (west → east)



3) Perspective drawing (overall)



(Restrictions on facility use)
This facility is in use as an archive of historical documents and other materials from the time the business was founded. Reinforcing it to safe level would require doubling the number of steel members for reinforcement, leaving space only in the central portion and making it difficult to use the facility effectively.

Note: The cream and sky blue coloration in the drawings is for making clear the scope of work.

(2) Remaining issues

- Detailed studies of exterior conservation (reported to UNESCO 2017) are under way premised on carrying this out in the same period as seismic reinforcement, from the standpoint of keeping down costs.
- Also under study is relocation of the stored historical materials when the reinforcement is carried out. (Handling of the historical materials is being studied in consultation with the municipalities.)
- Seismic reinforcement (including relocation of historical materials) and exterior conservation are not needed for operations by the private company but are measures for

preservation of World Heritage value. Accordingly, the division of costs is under discussion with the municipalities.

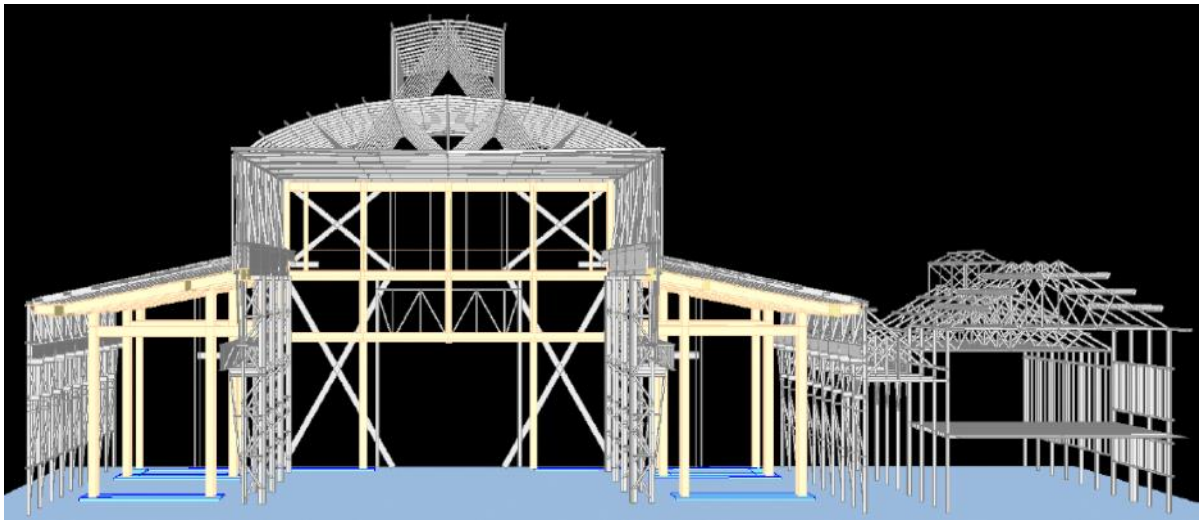
4. Repair Shop

(1) Proposed reinforcement method (Work period: around two years (including measures for obtaining spare materials storage capacity and relocation))

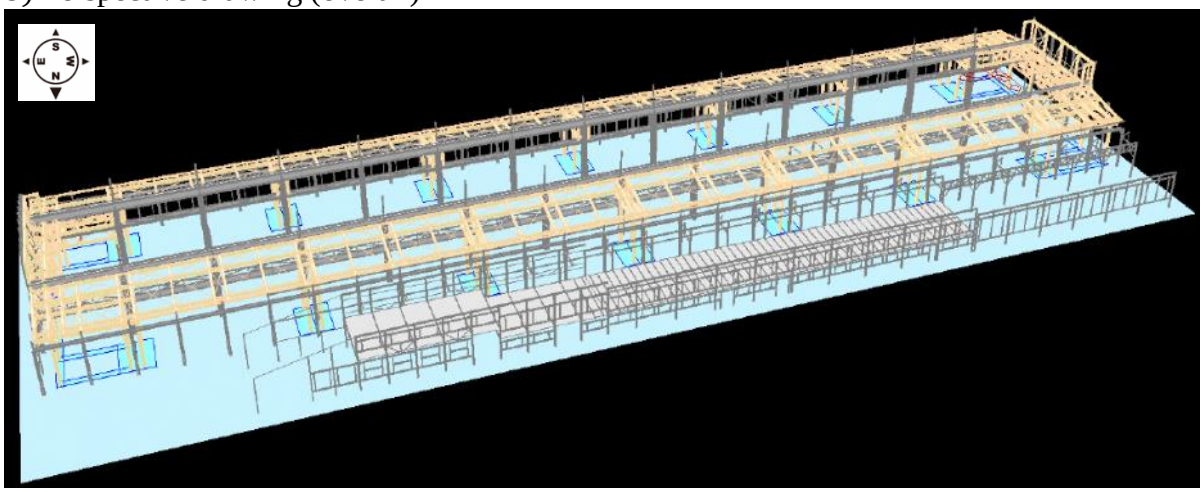
1) Current status photo (east → west)

(Restrictions on facility use)
This facility is in use for offline operations during periodic repairs and as a storage place for spare materials. Reinforcing it to safe level would require doubling the number of steel members for reinforcement, leaving no space for storing spare materials and making it difficult to use the facility effectively.
In the case of this reinforcement proposal as well, measures will be needed such as relocation of spare materials racks interfering with reinforcement members in the north wing and provision of new racks due to inability to use the hoist crane in the south wing. Measures for obtaining storage capacity for spare materials are thus under study.

2) Perspective drawing (east → west)



3) Perspective drawing (overall)



Note: The cream and sky blue coloration in the drawings is for making clear the scope of work.

(2) Remaining issues

- Detailed studies of exterior conservation (reported to UNESCO 2017) are under way premised on carrying this out in the same period as seismic reinforcement, from the standpoint of keeping down costs.
- Installation of steel members for seismic reinforcement will result in a shortage of storage space for spare materials. Measures for securing such space are under study.
- Measures for relocation of spare materials during the seismic reinforcement work period and when work is complete are under study.
- Seismic reinforcement and exterior conservation are not needed for operations by the private company (the building is not used for main operations and workers come and go infrequently) but are measures for preservation of World Heritage value. Accordingly, the division of costs is under discussion with the municipalities.

Appendix 10

3.1.3. Onga River Pumping Station (from report by Nippon Steel Corporation)

FY2018 project (additional aseismic diagnosis of Onga River Pumping Station)

Objectives: A detailed aseismic diagnosis was conducted of the Onga River Pumping Station, for which it was determined that seismic reinforcement is necessary for carrying out conservation of facilities related to the Imperial Steel Works.
Applicable facility: Onga River Pumping Station
Implementation period: April 25, 2018 to March 31, 2019
Diagnosis costs: 8.96 million yen
Division of costs: All paid by private sector
Description of diagnosis: Diagnosis was conducted in accordance with the Guidelines for Assessing Seismic Resistance of Important Cultural Properties (Buildings) (Cultural Properties Department, Agency for Cultural Affairs), with reference to the standards of the Architectural Institute of Japan, including the Standards for Structural Design of Masonry Structures.

Summary of results

- Although the intrinsic energy in the east-west direction exceeds the input energy, Qu/ZW (load resistance when interstitial deformation limit is 1/150) is small, indicating a lack of aseismic performance. In the out-of-plane direction, gable wall deformation is large, and both horizontal bending and perpendicular bending fail to meet the targets, so that reinforcement is necessary.
- In the north-south direction, roof braces will break first of all and not be able to transfer support to the two gabled brick walls, indicating a lack of aseismic performance. In the out-of-plane direction, deformation of the central portion is large, and both horizontal bending and perpendicular bending fail to meet the targets, so that reinforcement is necessary. In addition, eccentricity occurs.
- From the above analysis, in both the east-west and north-south directions, reinforcement is necessary to improve out-of-plane load resistance and reduce out-of-plane buckling.

An overview of the study results is given below.
(Values not meeting the assessment standards are given in red.)

Study method		Evaluation standard value	East-west	North-south
Main frame In-plane direction	Eccentricity	0.30 or less	0.010	0.461
	Study of wall shear force (C0=1.0)	Overall building safety factor 1.0 or above	2.32	1.35
		Single wall safety factor 1.0 or above	1.43	1.13
	Energy conservation property	In seismic ground motion, intrinsic E/input E 1.0 or above	4.36	0.39
		Qu/ZW	0.395	0.564
Out-of-plane direction	Finite element method	Moment safety factor 1.0 or above	Horiz. 0.16 (W463) Perp. 0.23 (W463)	Horiz. 0.04 (W463) Perp. 0.03 (W463)

OK if each safety ratio and intrinsic E/input E safety ratio is 1.0 or above.

***Based on the diagnosis performed in FY2018, aseismic design is scheduled to be carried out in FY2019. Thereafter, the aseismic reinforcement work is to be implemented.**

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3.1.4. Consultations with Experts (from report by Nippon Steel Corporation)

Status of consultations with domestic and local experts and studies with engineering advisors

Since the report to the 6th meeting of the Yawata Local Conservation Council held April 24, 2018, so far six meetings have been held with domestic and local experts for confirming policies and methods for each of the matters being studied, visits have been made to the site, and many discussions have been carried out.

In the interior conservation work on the First Head Office begun in May 2018, engineering advisors introduced by domestic experts took part, biweekly meetings were held, and specifications were decided while conducting on-site surveys and confirming construction methods. This work is now being implemented.

In the case of the studies on seismic reinforcement of the Repair Shop, Former Forge Shop, and Onga River Pumping Station, after confirming the study approach with domestic experts, many consultations were held with domestic experts regarding the proposed reinforcement methods for the Repair Shop and Former Forge Shop. As for the Onga River Pumping Station, additional aseismic diagnosis was completed by engineering advisors introduced by domestic experts, and proposed reinforcement methods will be studied hereafter.

1. Status of consultations with domestic and local experts

1st meeting	11:00 a.m. to 12:00 noon, Friday, August 10, 2018 Consultation with: Domestic expert (Professor, Faculty of Architecture) Agenda: Confirming proposed reinforcement methods for Repair Shop and Former Forge Shop
2nd meeting	1:00 to 2:00 p.m., Wednesday, January 30, 2019 Consultation with: Local expert (university emeritus professor) Agenda: Observing site of interior conservation work in First Head Office
3rd meeting	1:00 to 2:00 p.m., Wednesday, February 13, 2019 Consultation with: Local expert (Industrial Heritage researcher with doctor's degree) Engineering advisor on cultural properties (representative of class 1 registered architects office) Agenda: Observing site of interior conservation work in First Head Office
4th meeting	1:00 to 4:00 p.m., Thursday, April 18, 2019 Consultation with: Local expert (Industrial Heritage researcher with doctor's degree) Engineering advisor on cultural properties (representative of class 1 registered architects office) Agenda: Interim report on progress status of interior conservation work in First Head Office
5th meeting	1:30 to 4:00 p.m., Friday, April 19, 2019 Consultation with: Local expert (university emeritus professor)

Engineering advisor on cultural properties (representative of class 1 registered architects office)

Agenda: Interim report on progress status of interior conservation work in First Head Office

6th meeting

4:00 to 6:00 p.m., Wednesday, April 24, 2019

Consultation with: Domestic expert (Professor, Faculty of Architecture)

Engineering advisor on cultural properties (class 1 architect, executive director)

Agenda: Interim report on progress status of interior conservation work in First Head Office

Report on proposed reinforcement methods for Repair Shop and Former Forge Shop

Report on results of aseismic diagnosis for Onga River Pumping Station

Confirmation of approach to studying seismic reinforcement of Onga River Pumping Station

2. Status of studies with engineering advisors

1) Interior conservation work in First Head Office
Regular meetings: 21 times (dates shown below)

(2018/6/11, 6/21, 7/4, 7/18, 8/1, 8/22, 9/5, 9/19, 10/2, 10/17, 10/31, 11/14, 11/28, 12/12, 12/26, 2019/1/16, 1/30, 2/13, 2/27, 3/19, 4/4)

Observation study meeting: 1 time (2019/1/25 at Mitsui Club, Mojiko Station)
Engineering advisor on cultural properties (representative of class 1 registered architects office)
Agenda: On-site survey, construction method, deciding specifications, recording and reporting, other matters

2) Studying seismic reinforcement of Onga River Pumping Station
Irregular meetings: 3 times (2018/5/22, 7/25, 2019/2/15)
Engineering advisor on cultural properties (class 1 architect, executive director)
Agenda: On-site survey, aseismic diagnosis, method of studying seismic reinforcement, etc.

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4. ASSESSMENT OF POTENTIAL IMPACT ON OUV BY MEANS OF HERITAGE IMPACT ASSESSMENT (HIA)

4.1. Contribution to OUV

All four of the buildings that are objects of these projects are related to the establishment of the Imperial Steel Works, the first fully integrated steel works to be built successfully in Asia. These sites comprise two of the 23 component parts of the World Heritage "Sites of Japan's Meiji Industrial Revolution: Iron and Steel, Shipbuilding, and Coal Mining." These World Heritage sites clearly show the first successful wave of industrialization from the West to a non-Western country, and relate to accomplishments known as the Meiji industrial revolution.

The component parts of Yawata and the Onga River relate to the "iron and steel" aspects of this industrial revolution. Steelmaking took place in these facilities at the time Japan was emerging as an industrial nation in the last stage of the ongoing industrial revolution.

As shown in Table 1, the management plans for these component parts make clear their contribution to the Outstanding Universal Value (OUV) of the properties.

1. Elements of the Imperial Steel Works Indicating Outstanding Universal Value (OUV)

Elements	Contribution to OUV
First Head Office	Demonstrates the adoption and adaptation of Western architectural design and construction techniques in Japan. Reflects the nature of technological exchanges that underpinned the development of Japan's industrial transformation. It also demonstrates (as the headquarters of the Yawata Steel Works) the organizational style adopted by Japanese steel makers to achieve the local development of an integrated steelworks.
Repair Shop	Demonstrates the transfer of German technology, followed very rapidly by the extension of the building in the same style using Japanese-made steel and design skills. This is reflected particularly in the progression of steel framing, the first section being labelled Gutehoffnungshütte (GHH), and subsequent expanded sections labelled with Yawata nameplate.
Former Forge Shop	Reflects one of the original functions of the steelworks, the original foundry function, necessary to the autonomous development of the steelworks, and the subsequent adaptation for materials testing. While its structure has been changed over time, the core building can still be recognized, and the changes it demonstrates echo the continuing expansion and refinement of the steelworks, and the adaptation of transferred technology to meet evolving local needs.
Onga River Pumping Station	Demonstrates the rapid growth of the steelworks and the increasing demand for water for steelmaking purposes. The pumping station is an accomplished "modern" industrial design reflecting the rapid development of design skills within the steelworks based on Western precedents but modified to meet Japanese conditions.

4.2 Potential Impact of the Project Proposals on Outstanding Universal Value (OUV)

The impact of the construction work will be dealt with by interior restoration in the First Head Office, and the same decoration that was implemented in the important period continued since the Meiji era will be applied. In the project, the structure of the building, evidence of the skilful fusion of Japanese and Western architecture, will be restored; and in case it becomes possible to show this to the public, the contribution of this building to the OUV will be enhanced.

Since the building is a working property in a steel works, the municipalities and property owner will carefully study and consult on how the asset will be used and the extent to which it should be shown to the public, within the scope that no hindrance arises to the business activities of the owner.

There will be no adverse impact on the OUV of this asset. Rather there will be positive impacts, from the conservation measures on the building structure and from effectively showing the contribution of the First Head Office building to the OUV.

The seismic reinforcement work on the Repair Shop and Former Forge Shop, along with the building conservation, will make considerations for use of the buildings by the owner as a working property, and their exterior appearance. Such considerations will be efforts not to harm the buildings' contribution to OUV.

Likewise, the seismic reinforcement work on the Onga River Pumping Station, along with the building conservation, will make considerations for use of the building by the owner as a working property, and its exterior appearance. Such considerations will be efforts not to harm the building's contribution to OUV.

4.3 Assessment of Impact on the World Heritage

The project in the First Head Office has two objectives. The first is interior restoration following seismic reinforcement work that has already been completed. The second is conservation of interior shapes and decorations by which the original decoration or important decoration carried out later will be reproduced, with an eye on possible later conversion to an interpretation facility for visitors.

In both cases, it is believed that the OUV will be preserved by this project, while contributing to understanding of its value.

The work on the Former Forge Shop, the Repair Shop, and the Onga River Pumping Station is being conducted to preserve the value of the buildings as world heritages. All the projects, by implementing conservation work to the extent no hindrance arises to the business activities of the owner, so as to maintain the value as a working property, are necessary for receiving proper recognition as showing the contribution to OUV.

The project proposals will by no means narrow the extent of the building value as World Heritage, nor will they reduce the contribution to OUV of the properties. Rather they are a sound foundation for conservation of the buildings and their use hereafter. As for handling of visitors, this is currently being studied and discussed carefully among the local municipalities and the owner.

5. POLICY ON THESE PROJECTS AND MANAGEMENT PLANS AND SYSTEMS

The projects to be implemented this time, in accordance with the *Conservation Management Plan: Imperial Steel Works* (Nippon Steel & Sumitomo Metal, Kitakyushu City, Nakama City, 2014), will be carried out while favourably preserving the component parts and respecting the heritage value of the component parts. Regarding issues affecting the component sites, advice is being sought from specialists with relevant experience in heritage conservation and management, engineering support will be received, and work will be carried out through a process of decision-making in the Local Conservation Council. Records will be kept of substantial modifications to or interventions in the component parts, and of maintenance actions.