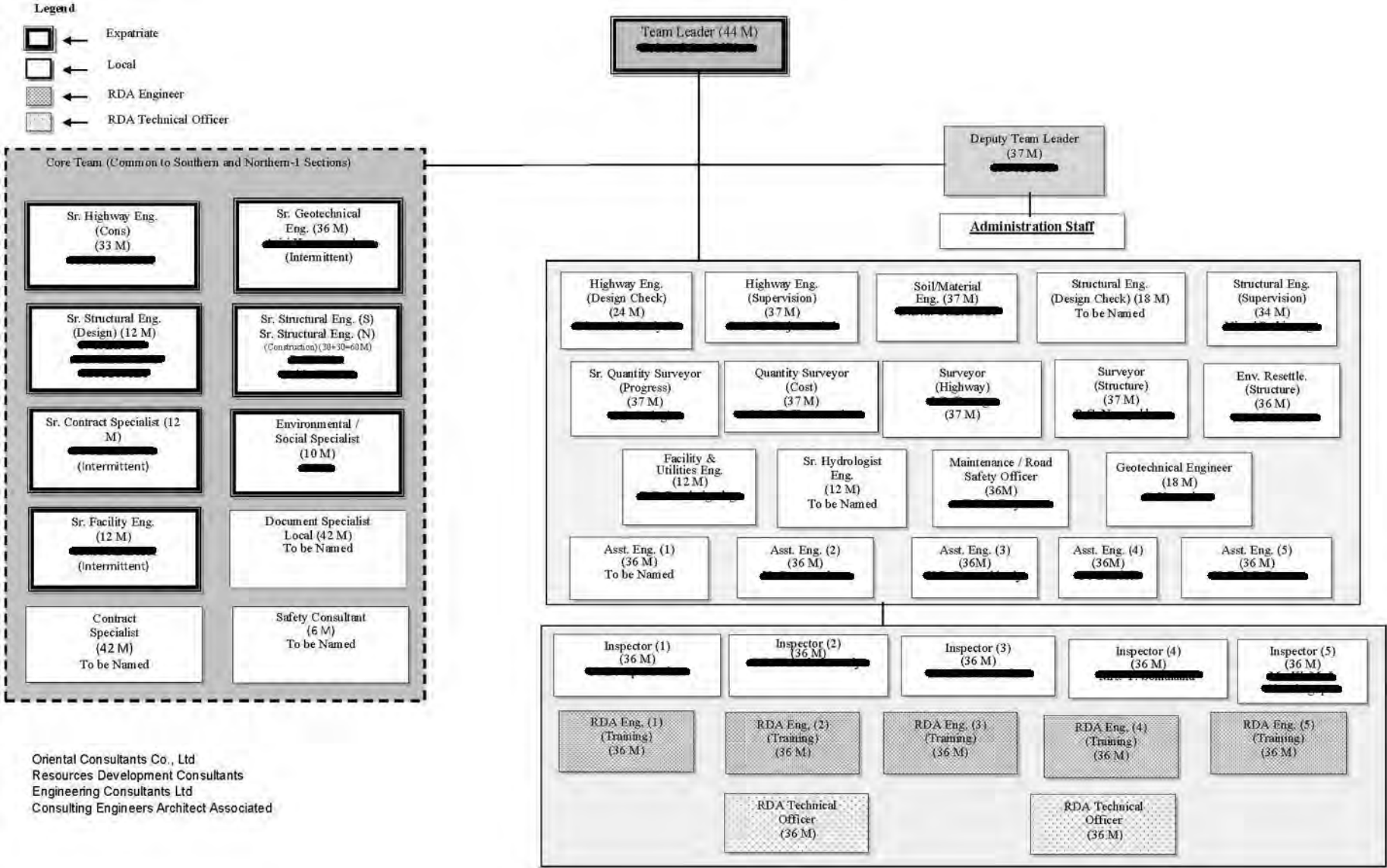






添付資料-3 現場組織図

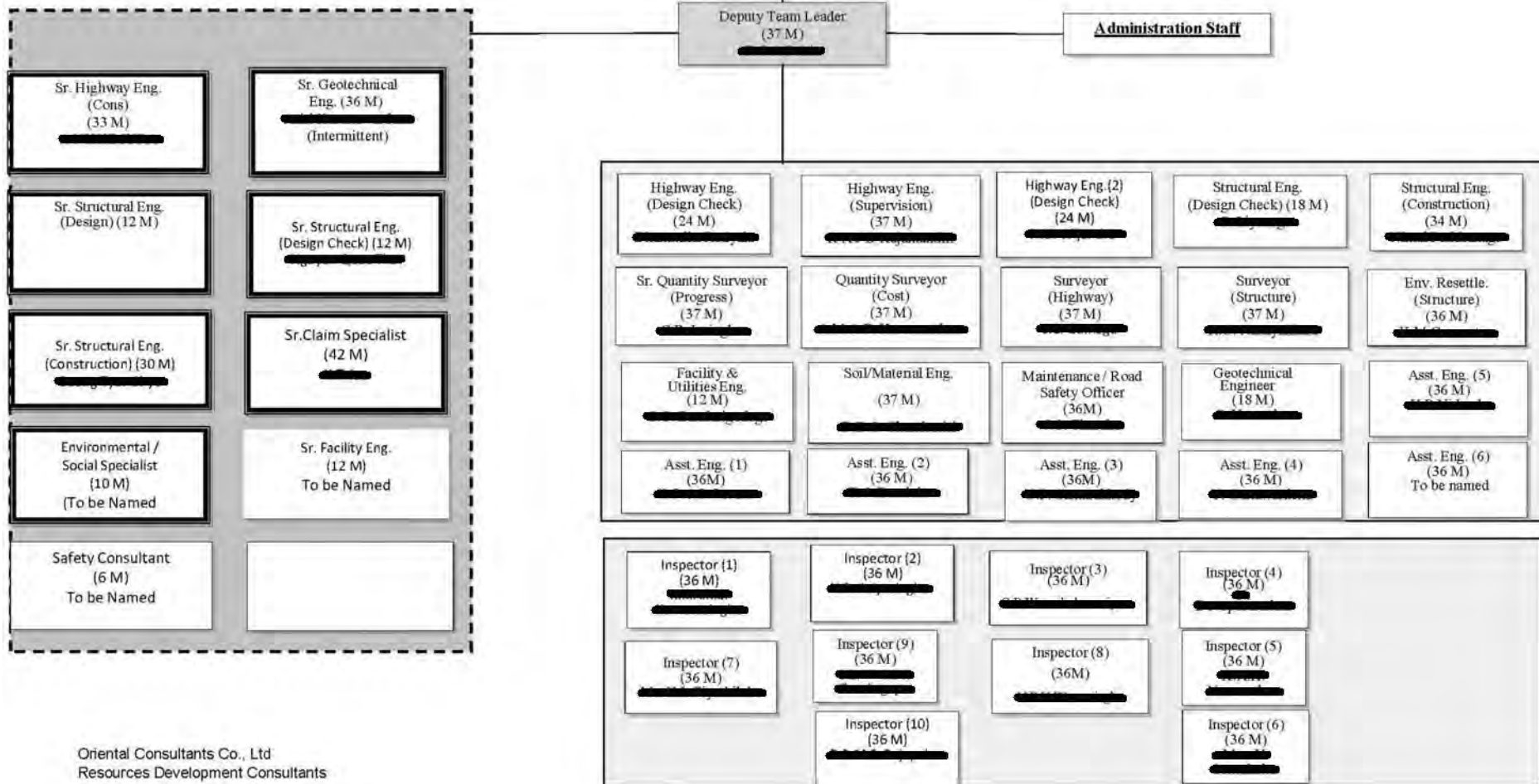
Consultant's Organization (Original)



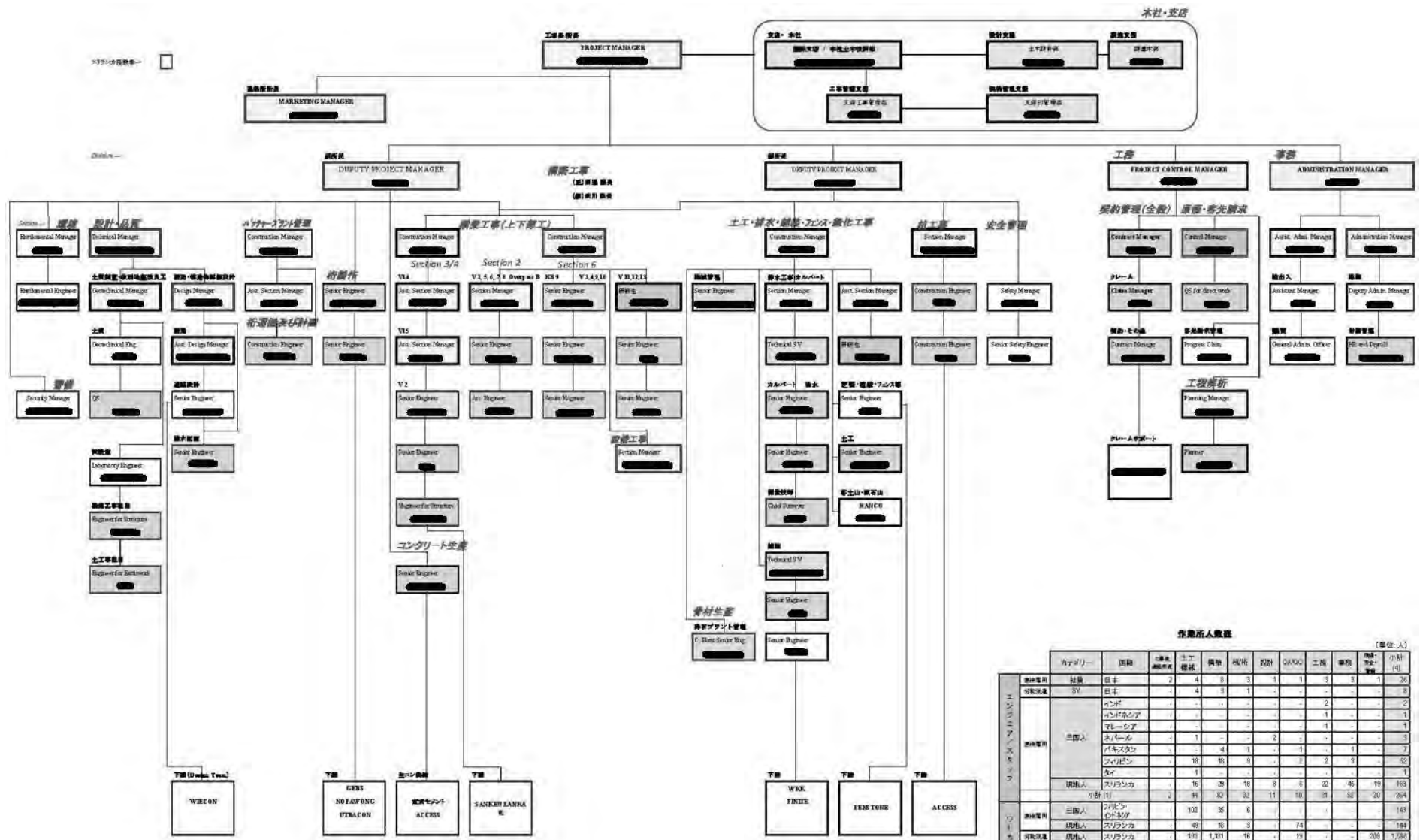
Consultant's Organization (Latest)

Legend

-  ← Expatriate
-  ← Local
-  ← RDA Engineer
-  ← RDA Technical Officer



Contractor's Organization (Original)

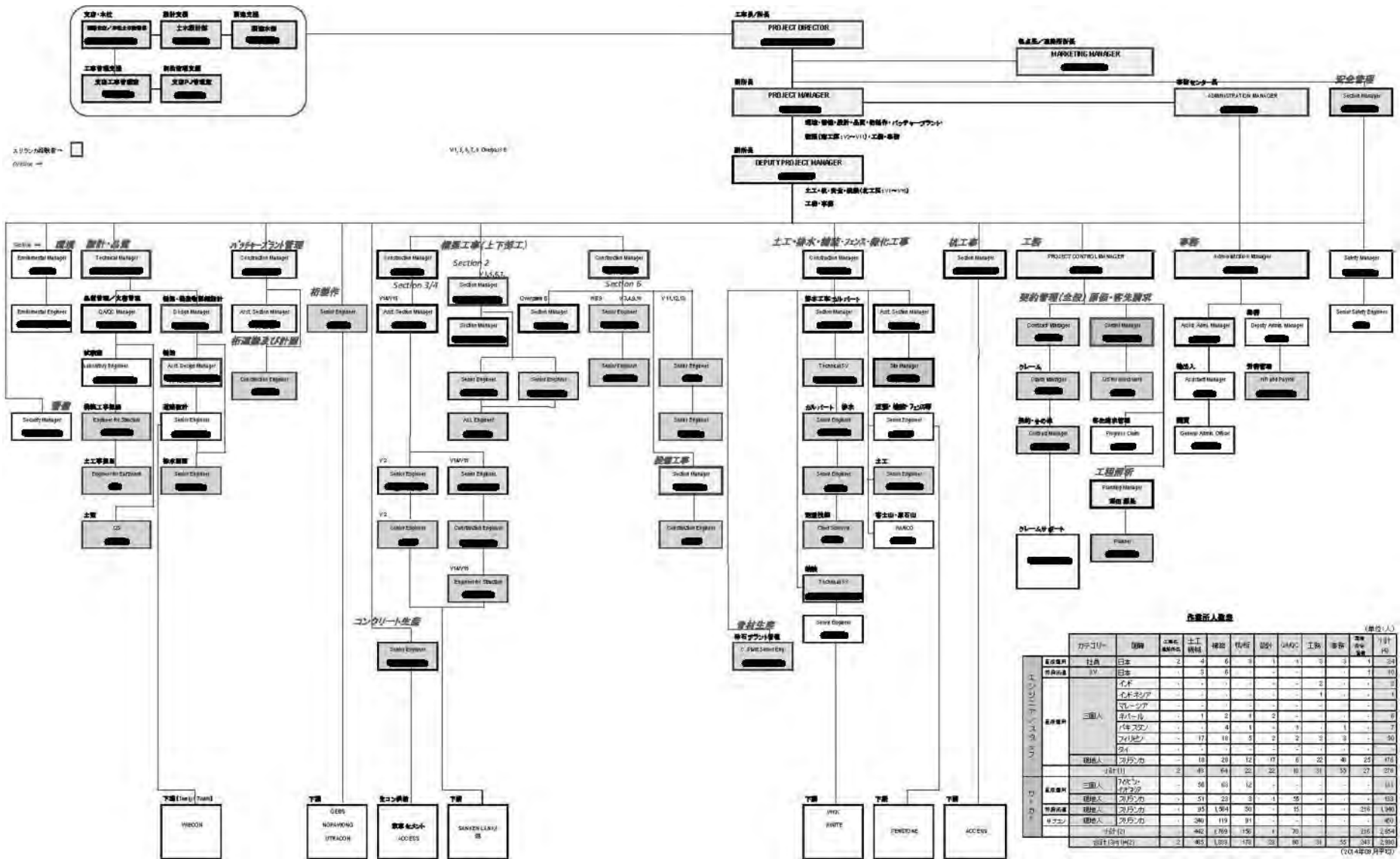


作業所人数表 (単位:人)

作業所	カテゴリー	国籍	人数		設計	S/W	工事	事務	運転	運転	小計	
			日本	外国								
東京支店	現場管理	社長	2	4	0	3	1	1	3	3	1	36
		SV	4	3	1	-	-	-	-	-	-	8
	三井人	インジ	-	-	-	-	-	-	-	-	-	2
		インジ/アジア	-	-	-	-	-	-	-	-	-	1
		マレーシア	-	-	-	-	-	-	-	-	-	1
		ネパール	-	1	-	-	2	-	-	-	-	3
		パキスタン	-	-	4	1	-	-	-	-	-	7
		フィリピン	18	18	9	-	2	2	3	-	-	52
		タイ	1	-	-	-	-	-	-	-	-	1
		現地人	スリランカ	16	28	18	8	6	22	45	19	183
小計 (1)		2	44	42	32	11	18	31	52	20	294	
現場管理	三井人	カネウチ	102	35	0	-	-	-	-	-	-	147
		高木	49	10	3	-	-	-	-	-	-	144
	現地人	スリランカ	192	1,121	16	-	-	-	-	-	-	200
	サマシ	245	200	312	-	-	-	-	-	-	-	757
小計 (2)		539	1,388	337	-	-	-	-	-	-	200	
合計 (1+2)		7	833	1,640	369	11	109	31	52	220	2,680	

(2014年10月平均)

Contractor's Organization (Latest)



添付資料-4 事故報告リスト

ACCIDENT & INCIDENT RECORD AND RELATED DOCUMENTS

No.	Date	Location	Description	Date / Letter No	Method Statement	Monthly Progress Report		Remark
						on that Month	2 month before	
1	1-Feb-13	Ch.16+150 North side of HB-9	Boom moved further the backward uncontrollably and boom main frame broken from the main bottom joint.	06th February 2013. TC-SAF-GEN-020-2464	TC-COB-MS-036-1327	Report No.14 (Feb-2013)	Report No.12 (Dec-2012)	
2	18-Feb-13	V4 P2 Ch. 15+945	25t mobile Crane toppled during lifting work for piring preparation.	20th Feb 2013 TC-SAF-GEN-021-2565	TC-COB-MS-026-1100	Report No.14 (Feb-2013)	Report No.12 (Dec-2012)	
3	11-Oct-13	OB9	Public bus fell down at OB9	11th Dec 2013 TC-SAF-GEN-060-5555	TC-COB-MS-034-1312	Report No.22 (OCT-2013)	Report No.20 (Aug-2013)	
4	4-Dec-13	V-7 (P4)	Whilst correcting the verticality of pier rebar (32mm) of inside the pier reinforcement cylindrical cage Ø 1.7m, 2 workers were injured who were inside the cage due to tilting the whole cage with the workers because of inadequate support	10th December 2013, TC-SAF-GEN-057-5522	TC-COB-MS-042-1617	Report No.24 (Dec-2013)	Report No.22 (OCT-2013)	
5	14-Mar-14	OB-12 Temporary Girder Stock Yard	Whilst Working near the stored Girder, Girder has toppled. 03 workers dead and 02 workers got minor injured.	18 th March 2014 TC-SAF-GEN-082-6576	TC-COB-MS-065-3071 TC-COB-MS-073-3292	Report No.27 (Mar-2014)	Report No.25 (Jan-2014)	
6	2-Jun-14	Mandaranayake Mawatha Diversion	A car belongs to a third party person, had come along the Bandaranayake Mawatha public diversion at Ch.01+300, while passing the first pipe culvert, suddenly the car fallen down with the asphalt layer in to the culvert due to washing out of all the soil underneath the asphalt layer, around the steel pipes which had been laid for the culvert and the Car rested on the steel pipes.	05th June 2014 TC-SAF-GEN-110-7250	TC-COR-GEN-036-3970 TC-CON-GEN-665-7259	Report No.30 (Jun-2014)	Report No.28 (Apr-2014)	
7	20-Jul-14	OB-10 South side Ramp	Whilst transporting a pre-cast girder from girder stock yard at South side of OB- 10 to V15, came along the girder transporting Ramp Road from the direction of south towards north the trailer was slipped and toppled the girder with rear trailer on to the left side and the front cabin section slipped and dragged with the rotating part of the trailer.	21st July 2014 TC-SAF-GEN-121-7679	TC-COB-MS-088-6706	Report No.31 (Jul-2014)	Report No.29 (May-2014)	
8	3-Aug-14	Viaduct 1,Pier 2 at A1Bypass	Whilst carrying out preparation work for bearing plinth on pier head at viaduct 1 pier 2 at A1 Bypass worker named Ajith Prasad Kumara fell off from the pier head in to the water filled pier base depth about 01m. A fellow worker named Shammuganathan who was working with him, has seen the fallen worker was waving his hand sitting on the bank of the pier base excavation. Immediately he has come down, helped him to come out from the water and taken to Ragama Hospital for treatment and the doctors confirmed after examined him and his test reports including X-Rays of skull, chest and abdomen that, his life is out of danger and on our own wish we admitted him to Nawaloka Hospital, Colombo for CT Scan Examination for further confirmation of his condition and doctors confirmed no any internal injuries caused to his head, neck, chest or abdomen after the CT SCAN Examination.	04th Aug 2014 TC-SAF-GEN-122-7797	TC-COB-MS-042-1617	Report No.32 (Aug-2014)	Report No.30 (Jun-2014)	
9	6-Aug-14	V-4 P3-P4	Whilst adjusting the RC panels on the erected girder at V4 P3-P4 LHS. One worker fell down from the space through removed RC panels, in to the muddy ground. Immediately the fallen worker was taken to the Biyagama Hospital and from there he was transferred to the Colombo Accident ward for further medical examination and treatment. After taken X-RAY he has been examined by the doctors and confirms that his left wrist bone and backbone were cracked. CT SCAN examination was done for further confirmation of his condition and doctors confirmed that no any internal injuries caused.	7th Aug 2014 TC-SAF-GEN-123-7825	TC-COB-MS-019-873	Report No.32 (Aug-2014)	Report No.30 (Jun-2014)	

添付資料-5

セミナー資料

Guidance for The Management of Safety for Construction Works in Japanese ODA Projects

November 2014

Japan International Cooperation Agency (JICA)
Landtec Japan Inc. (LTJ)

Chapter 1: General Rules

1.1 Purpose

The Guidance contains the basic policies for safety management, and technical guidance on specific methods for safe execution of works in order to prevent occupational accidents and public accidents on ODA construction projects for public and other facilities.

By fully understanding the Guidance and complying with the regulation therein, Project Stakeholders will be in a position to respect the basic human rights of all parties involved in ODA construction projects. This will help prevent the occurrence of occupational and public accidents by creating a culture of safety, and help realize social development in the recipient country. This is the purpose of the Guidance.

1.2 Scope of Application

The Guidance applies to works for public and other facilities to be constructed with ODA support (including both grants and loans) (hereinafter "ODA Projects").

1.3 Plans for Safety Management

Two plans for the safety management for construction work sites shall be prepared and implemented by the Contractor, namely the "Safety Plan" and "Method Statements on Safety."

1.4 Roles and Responsibilities of Project Stakeholders

The roles and responsibilities of Project Stakeholders (i.e. Employer, Engineer, Contractor, Subcontractor, Workers) specified.

Introduction

Japan's Official Development Assistance Charter was formulated to assure:

• *"Ensuring human safety" by focusing on individuals when implementing safety management on ODA construction works.*

- Establish a safe and health-conscious working environment.
 - minimize the negative impact on the environment.
 - improve efficiency and productivity.
 - enhance the standards of social culture in the recipient country .
 - and greatly encourage their socio-economic advancement.
- The stakeholders should cooperate closely with each other
 - to conduct multifaceted safety management
 - ensuring safety of construction sites
 - safety of the people of the recipient country

• **Respecting the World Human Rights Declaration**

- respect of basic human right
- safety of all people, including third parties, involved in the work

• **ODA construction projects require general management,**

- compliance with the time for completion,
- quality assurance,
- improvement of productivity

• **Promoting "a culture of safety"**

Chapter 1: General Rules (Plans for Safety Management)



	Safety Plan	Method Statements on Safety
When	At the pre-construction stage	At the construction stage
Prepared by	Contractor	Contractor
Role	Basic Plan (basic policies on the general safety management and operation for the entire works at site)	Detailed Plan (specifics for the safe execution of works and safety measures for each type of work)
Items to be incorporated	(1) Basic Policies for Safety Management (2) Internal Organizational Structure for Safety Management (3) Promotion of the PDCA Cycle (4) Monitoring (5) Safety Education and Training (6) Voluntary Safety Management Activities (7) Sharing Information (8) Response to Emergencies and Unforeseen Circumstances	(1) Construction plant and machinery (2) Equipment and tools (3) Materials (4) Necessary qualifications and licenses (5) The order of command for the works (6) Work items (7) Procedure for the execution of the works (8) Foreseeable risks (9) Precautionary measures
Timing of Submission	<ul style="list-style-type: none"> ● at the time specified in the tender/the contract documents ● no later than seven (7) days prior to the commencement of the relevant works 	<ul style="list-style-type: none"> ● prior to commencement of the relevant works according to the execution plans ● Date specified in the contract documents
Reviewed by	Employer, Engineer	Employer, Engineer

Chapter 2: Basic Policies for Safety Management

2.1 Basic Principles of Safety Management

- Basic principle 1: Safety is a top priority
- Basic principle 2: Elimination of causes
- Basic principle 3: Thorough precautions
- Basic principle 4: Thorough compliance with relevant laws and regulations
- Basic principle 5: Thorough prevention of public accidents
- Basic principle 6: Thorough implementation of PDCA cycle for safety management
- Basic principle 7: Thorough sharing of information
- Basic principle 8: Thorough participation of all Project Stakeholders

2.2 Compliance with Relevant Laws and Regulations

Survey and Confirmation of the relevant laws and regulations;
Confirmation of the compliance levels

2.3 PDCA for Safety Management

- "Plan" being the process of establishing the Safety Plan and its Method Statements on Safety,
- "Do" being the specific implementation of the plan thus established,
- "Check" being the observation and confirmation of the safety management process, and
- "Act" being the implementation of improvements to the implemented plans based on the past performance to ensure the continuous development of field site safety standards.

Chapter 3: Contents of the "Safety Plan"

3.3 Internal Organizational Structure for Safety Management

The Contractor shall determine an internal organizational structure to manage safety and prevent accidents at construction sites in accordance with the Basic Policies and the following requirements to:

- (1) Establish an internal organizational structure for safety management.
- (2) Appoint appropriate personnel, including a supervisor responsible for safety management and safety officers, within the internal organizational structure and clarify their respective roles, responsibilities and authority.
- (3) In accordance with any requirements under the contract documents, consider establishing an organization appropriate to manage safety, such as a safety committee, which may be composed of appropriate Project Stakeholders including the Employer, Consultant, and subcontractors.

3.4 Promotion of the PDCA Cycle

The Contractor shall set out the basic principles for promotion of the PDCA Cycle at construction sites in accordance with Clause 2.3 "PDCA for Safety Management".

3.5 Monitoring

The Contractor shall set out the basic principles for monitoring safety management while considering the following requirements:

- (1) Monitoring by the Contractor
- (2) Monitoring of accidents or injuries
- (3) Monitoring near misses

Chapter 3: Contents of the "Safety Plan"

3.1 Composition of the Safety Plan.

- (1) Basic Policies for Safety Management
- (2) Internal Organizational Structure for Safety Management
- (3) Promotion of the PDCA Cycle
- (4) Monitoring
- (5) Safety Education and Training
- (6) Voluntary Safety Management Activities
- (7) Sharing Information
- (8) Response to Emergencies and Unforeseen Circumstances

3.2 Basic Policies for Safety Management

The Contractor shall determine the basic policies for safety management applicable during construction (hereinafter the "Basic Policies") based on the scope of work, the environment where the works are performed, relevant laws and regulations of the recipient country, contract documents and other applicable or documents or data incorporated into the contract.

Chapter 3: Contents of the "Safety Plan"

3.6 Safety Education and Training

The Contractor shall set out the basic principles for education and training on safety to maintain

safety during the construction works and take into account the following requirements:

- (1) Compliance with laws & regulations of the recipient country on education and training on safety.
- (2) Education to all Project Stakeholders (and to all new entrants to the site) on:.
- (3) Education on the Method Statements on Safety for the assigned work.
- (4) Education when changes are made to work
- (5) Education and training for special workers
- (6) Education and training for emergency response personnel
- (7) Education for visitors
- (8) Training for emergencies and unforeseen circumstances
- (9) Activities to promote safety awareness
- (10) Language used for education and training
- (11) Confirmation and recording education and training



3.7 Voluntary Safety Management Activities

- (1) Morning meetings on safety
- (2) Foreseeing hazardous activities
- (3) Tool box meetings
- (4) Safety rota systems
- (5) Regular, monthly and periodic inspections
- (6) Sorting, decluttering and cleaning
- (7) Safety conventions
- (8) Safety patrol
- (9) Near-miss reporting system
- (10) Other activities

Chapter 3: Contents of the "Safety Plan"

3.8 Sharing Information

The Contractor shall set out the basic principles for sharing information necessary to ensure effective safety management while taking into account the following requirements:

- (1) Description of education for new entrants
- (2) Other information necessary to maintain safety

3.9 Response to Emergencies and unforeseen Circumstances

3.9.1 Response to emergencies

The Contractor shall determine the policies for responding to emergencies considered to be caused by accidents whilst taking into account the following requirements:

- (1) The priority of saving human lives
- (2) The establishment of an emergency communication network
- (3) Procedures for responding to emergencies
- (4) Responding to first-aid treatment
- (5) Reporting on accidents and injuries

3.9.2 Responding to unforeseen circumstances

The Contractor shall determine the policy for responding to any unforeseen circumstances considered to be caused by natural disasters such as rainstorms or earthquakes while taking into account the following requirements:

- (1) Emergency evacuation procedures
- (2) The establishment of an emergency communication network system
- (3) Procedures for responding to unforeseen circumstances
- (4) Collection of weather information

Chapter 4: Contents of the "Method Statement on Safety"

4.1 Composition of the "Method Statements on Safety"

4.1.1 Items for inclusion in a "Method Statements on Safety"

The Contractor shall formulate a Method Statements on Safety for each type of work based on the design or documents implementing the design in order to accurately and efficiently undertake work, maintain a safe working environment and prevent any unsafe action by workers. The Contractor shall incorporate the following items in any Method Statements on Safety:

- (1) Construction plant and machinery
- (2) Equipment and tools
- (3) Materials
- (4) Necessary qualifications and licenses
- (5) The order of command for the works
- (6) Work items
- (7) Procedure for the execution of the works
- (8) Foreseeable risks
- (9) Precautionary measures



Chapter 4: Contents of the "Method Statement on Safety"

4.1.2 Method Statements on Safety – Template

A template for a Method Statements on Safety is shown below for guidance. A form different to that below is acceptable as long as it fully satisfies the requirements as set out in Clause 4.1.1 "Items for inclusion in a Method Statements on Safety".

Method Statements on Safety [Enter the type of work or Project name]

(1) Construction plant and machinery	[Enter the specifications and quantity of construction machines to be used in the work.]
(2) Equipment and tools	[Enter the equipment and tools to be used in the work.]
(3) Construction materials	[Enter the specifications and quantities of major materials to be used in the work.]
(4) Necessary qualifications and licences	[Enter the qualifications or licenses necessary for the work.]
(5) Order of command (including names of supervisors)	[Enter the name of supervisors for each section of work.]

(6) Work items	(7) Procedure for the execution of the works	(8) Foreseeable risks	(9) Precautionary measures
[Enter the work items classified into the unit work according to the order in the works schedule.]	[Enter the procedure for the execution of the major work operations for each type of work item.]	[Enter the foreseeable risks for each work item.]	[Enter the countermeasures to prevent the foreseeable risks and the necessary protective gear.]

Chapter 4: Contents of the "Method Statement on Safety"

4.2 Applicable Standards for the "Technical Guidance for Safe Execution of Works"

4.2.1 Technical Guidance for Safe Execution of Works

Technical Guidance for Safe Execution (by the Type of Work) - Chapter 5

- 5.1 Excavation Work
- 5.2 Pile Foundation Work
- 5.3 Formwork and Form Shoring System Work
- 5.4 Reinforcing Bar Work
- 5.5 Concrete Work
- 5.6 Work over Water
- 5.7 Demolition Work
- 5.8 Work where there is danger of oxygen deficiency
- 5.9 Slings Work

Technical Guidance for Safe Execution (by the Type of Accident) - Chapter 6

- 6.1 Measures for Prevention of Fall Accidents
- 6.2 Measures for Prevention of Accidents Involving Flying or Falling Objects
- 6.3 Measures for Prevention of Accidents Involving Collapse of Structures
- 6.4 Measures for Prevention of Accidents Involving Construction Machinery
- 6.5 Measures for Prevention of Explosion Accidents
- 6.6 Measures for Fire Prevention
- 6.7 Measures for Prevention of Public Accidents
- 6.8 Measures for Prevention of Traffic Accidents
- 6.9 Protective Gear

Chapter 4: Contents of the "Method Statement on Safety"

4.2.2 Applicable Standards for the Method Statements on Safety

When any risk specified in Clause 4.1.1(8) "Foreseeable risks" is foreseen, that risk shall be identified with reference to the checklist shown in Clause 4.2.3. The counter measures for those foreseeable risks must comply with the provisions of the corresponding items shown in Chapter 6 "Technical Guidance for Safe Execution (by the Type of Accident)".

- 1) Does the work involve a risk that workers will fall from high places?
→ Clause 6.1 "Measures for Prevention of Fall Accidents".
- 2) Does the work involve a risk that flying or falling objects will hit workers?
→ Clause 6.2 "Measures for Prevention of Accidents involving Flying or Falling Objects".
- 3) Does the work involve a risk that workers will be crushed by the collapse or fall of sediment or structures?
→ Clause 6.3 "Measures for Prevention of Accidents involving Collapse of Structures".
- 4) Does the work involve a risk that workers will be caught or entangled by machines or structures?
→ Clause 6.4 "Measures for Prevention of Accidents involving Construction Machinery".
- 5) Does the work involve a risk of explosion?
→ Clause 6.5 "Measures for Prevention of Explosion Accidents".
- 6) Does the work involve a risk of fire?
→ Clause 6.6 "Measures for Fire Prevention".
- 7) Does the work involve a risk that the general public or any other third party will suffer adverse effects?
→ Clause 6.7.1 "General rules for prevention of third-party accidents".
- 8) Does the work involve a risk that underground facilities, aerial lines, or surrounding facilities will be damaged?
→ Clause 6.7.2 "General rules on preventing accidents relating to underground utilities or facilities" and
→ Clause 6.7.3 "General rules on preventing accidents relating to aerial utilities including aerial lines".
- 9) Does the work involve the risk of traffic accidents?
→ Clause 6.8 "Measures for Prevention of Traffic Accidents".

Chapter 4: Contents of the "Method Statement on Safety"

4.2.4 Applicable Standards for the Technical Guidance for Safe Execution (by the Type of Work)

When the Contractor executes works which are specified in the Technical Guidance for Safe Execution (By the Type of Work), he shall prepare a Method Statements on Safety and conduct the works in accordance with the provisions for each corresponding type of work as specified in the said Technical Guidance. Kinds of work specified by the Technical Guidance for Safe Execution:

- (1) Excavation Work
- (2) Pile Foundation Work
- (3) Formwork and Form Shoring System Work
- (4) Reinforcing Bar Work
- (5) Concrete Work
- (6) Work over water
- (7) Demolition Work
- (8) Work where there is danger of oxygen deficiency
- (9) Slings Work



Chapter 6
Technical Guidance for
Safe Execution
(by the Type of Accident)

Chapter 5: Technical Guidance for Safe Execution (by the Type of Work)

5.1 Excavation Work

- 5.1.1 Key points for the preparation stage
- 5.1.2 Key points for excavation works
- 5.1.3 Key points for cofferdam and timbering

5.2 Pile Foundation Work

- 5.2.1 Key points for the preparation stage
- 5.2.2 Key points for the precast pile foundation work
- 5.2.3 Key points for the cast-in-place pile foundation work

5.3 Formwork and Form Shoring System Work

- 5.3.1 Key points for the preparation stage
- 5.3.2 Key points for the formwork
- 5.3.3 Key points for the form shoring system work

5.4 Reinforcing Bar Work

- 5.4.1 Key points for the preparation stage
- 5.4.2 Key points for the reinforcing bar work

5.5 Concrete Work

- 5.5.1 Key points for the preparation stage
- 5.5.2 Key points for the concrete work

5.6 Work over Water

- 5.6.1 Key points for the preparation stage
- 5.6.2 When working over water

5.7 Demolition Work

- 5.7.1 Key points for the preparation stages
- 5.7.2 At the time of demolition work

5.8 Work where there is danger of oxygen deficiency

- 5.8.1 Key points for the preparation stage
- 5.8.2 Key points for working in places where there is a risk of oxygen deficiency

5.9 Slings Work

- 5.9.1 Key points for slings work



Chapter 5: Technical Guidance for Safe Execution (by the Type of Accident)

6.1 Measures for Prevention of Fall Accidents

- 6.1.1 General rules
- 6.1.2 Scaffolding

6.2 Measures for Prevention of Accidents Involving Flying or Falling Objects

- 6.2.1 General rules
- 6.2.2 Measures for the installation of safety nets
- 6.2.3 Protection against flying or falling objects at work areas with heights or openings
- 6.2.4 Measures for work conducted at different heights
- 6.2.5 Measures for rotating machines

6.3 Measures for Prevention of Accidents Involving Collapse of Structures

- 6.3.1 General rules
- 6.3.2 Measures to prevent the collapse of natural ground
- 6.3.3 Measures to prevent collapse of cargos
- 6.3.4 Measures to prevent the collapse of temporary structures (timbering, forms, form shoring system, scaffolding, etc.)
- 6.3.5 Measures to prevent collapse of structures

6.4 Measures for Prevention of Accidents Involving Construction Machinery

- 6.4.1 General rules
- 6.4.2 Measures for mobile crane work

6.5 Measures for Prevention of Explosion Accidents

- 6.5.1 General rules
- 6.5.2 Measures for storage of explosives
- 6.5.3 Measures for transport of explosives
- 6.5.4 Measures for handling of explosives

Chapter 5: Technical Guidance for Safe Execution (by the Type of Accident)

6.6 Measures for Fire Prevention

6.6.1 General rules

6.7 Measures for Prevention of Public Accidents

6.7.1 General rules for prevention of third-party accidents

6.7.2 General rules on preventing accidents relating to underground utilities or facilities

6.7.3 General rules on preventing accidents relating to aerial utilities including aerial lines

6.8 Measures for Prevention of Traffic Accidents

6.8.1 General rules on construction sites

6.8.2 General rules on public roads

6.9 Protective Gear

6.9.1 General rules

6.9.2 Safety helmet

6.9.3 Safety belts

6.9.4 Protective gear for the eyes and face

6.9.5 Protective gear for ears

6.9.6 Protective gear for hands

6.9.7 Protective gear for feet

6.9.8 Lifebuoy

6.9.9 Respirators

6.9.10 Dust and gas masks



1. Is English version of the Guidance available?

- YES

2. When will the application of the Guidance commence ?

Grant projects:

- *already started.*

Yen Loan Projects:

- *will judge/decide at the project formation stage.*

- *will judge/decide on a project-by-project basis.*

- *will not be retroactively applied to the on-going projects.*

3. In case the Guidance is used as a part of tender documents, what is the priority of each document?

- *It is not envisaged to use the Guidance as a part of tender documents, but to assume the borrower to prepare the tender documents taking account of the local laws and regulations as well as respecting the spirit of the guidance.*



4. If the guidance is not directly used as a part of the tender and/or contract documents, how/where the safety control-related information is incorporated in the documents; SCC, Specification, Employer's requirements or Safety Plan?

- It is assumed the safety control requirements are incorporated in the specification. The significance of the safety plan will remain unchanged.

5. How to state the safety guidance requirements in the minutes of discussions signed by JICA and the borrower at the loan preparation stage? Template for the TOR for DD/CS consultant regarding the safety guidance? / Standard method as to how to deal with the guidance in tender/contract documents? / How to reconcile with local safety & health laws/regulations and/or criminal laws in the borrower's country? / Any influence on the contractor's all risk insurance and/or the DD/CS consultant's professional indemnity insurance?

- JICA will build consensus with the borrower on the following points:

- To include safety requirements with reference to the borrower's local laws/standards and the safety control guidance, and, as necessary, international safety standards such as international organizations' safety guidelines.
- To confirm, at the consultant's review stage, the above requirements are met in the tender documents.

- 6. Are there any differences between STEP and ordinary Yen loan projects in terms of the Guidance?**
 - There are no particular differences.
- 7. Any influence to payments to the contractor regarding the Guidance?**
 - Whether or not conforming with the guidance may not affect payments to the contractor.
- 8. Will incorporation of the guidance requirements into BOQ be obliged?**
 - It is assumed that the expenditures related to the guidance will not be included in BOQ, but be included in indirect expenses in the construction cost.
- 9. Are there any differences between STEP and ordinary Yen loan projects in terms of the guidance?**
 - There are no particular differences between two loan schemes.
 - Dissemination of the guidance will be conducted through safety control seminars by JICA or loan negotiation with the borrower on new projects. In principle, the safety control guidance will be applied to all Yen loan projects.

GUIDANCE FOR THE MANAGEMENT OF SAFETY FOR CONSTRUCTION WORKS IN JAPANESE ODA PROJECTS

November 2014

Japan International Cooperation Agency (JICA)

Landtec Japan Inc.

THAT'S A GOOD IDEA FOR SAFETY! (AND FOR SAFETY AWARENESS, TOO)



Ski Belt (100cm in length)



Workers are wearing Ski Belt while working on the slope

A simple life belt using Ski Belt (urethane foam)

Merit & Effect

1. Ski Belt is well received by the workers because it is simple to use.
2. It does not hinder their work movement.
3. It gives workers a sense of security in case of falling into the water.
4. Workers feel more comfortable with Ski Belt in comparison with the ordinary life jacket because Ski Belt is quite effective in keeping their body temperature normal.
(the rate of heat stroke has greatly reduced since we started using Ski belt.)

THAT'S A GOOD IDEA FOR SAFETY! (AND FOR SAFETY AWARENESS, TOO)



The Device to Hook the Safety Belt



The Device in Use

A Special Device To Hook The Safety Belt In Shoring Work

Merit & Effect

1. The device is quite simple and easy to make.
2. It is handy to carry (light weight) and very easy to set up (horizontally/vertically), and unfasten using a ratchet which is a standard tool for every worker.
3. By using the device, prevention of fall accidents during installation of the main ropes or the handrails was considerably improved.

THAT'S A GOOD IDEA FOR SAFETY! (AND FOR SAFETY AWARENESS, TOO)



Hinges



Hinged Splice Plates

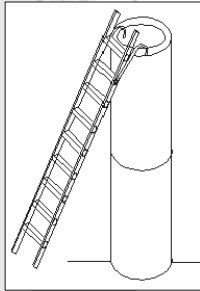
Work Procedure

1. Weld a hinge to the beam and the splice plate at the shop.
2. Lift and set the beam to the planned
3. Rotate the hinge 180 degree around, then insert and fasten the bolts.

Merit & Effect

1. The splice plate is firmly attached to the beam at the shop.
2. The steelworkers can concentrate on inserting bolts and fastening them.
3. Hazardous works such as handling heavy objects on high scaffolding can be eliminated.

THAT'S A GOOD IDEA FOR SAFETY! (AND FOR SAFETY AWARENESS, TOO)



How to use



Metal Fitting for Fixing a Movable Ladder

A Metal Fitting for Fixing a Movable Ladder

Merit & Effect

1. A set of metal fittings is installed on an aluminum ladder using the photograph (see the photograph).
2. The metal fitting is always kept attached to the ladder, and easy to relocate and adjust in accordance with the height of the wall.
3. Climbing up and down the ladder without the help of another worker became much safer.
4. unsafe actions such as climbing up and down unstable and dangerous ladders have been totally eliminated.

THAT'S A GOOD IDEA FOR SAFETY! (AND FOR SAFETY AWARENESS, TOO)



Work on ground



Lifting and installation work

Prefabrication of Floor Deck Plates

Merit & Effect

1. Works for installing small beams and floor deck plates can be performed on the ground.
2. Safety handrails and safety net are installed on the ground, too.
3. Due to the proper working posture for welding, the quality of the work is improved.
4. Because the deck plates are installed on the ground, openings are minimized, thus safety is improved.

THAT'S A GOOD IDEA FOR SAFETY! (AND FOR SAFETY AWARENESS, TOO)



Workers are meditating (for 30 seconds) on the danger of the work for the day.



A designated worker is presenting his KY card.

One-man KY Activity at The Morning Meeting

Activity Procedure

1. Before starting, all workers meditate to predict potential dangers in the work, and to think about proper countermeasures.
2. Each one writes them on a KY card. A few designated persons of the day put the cards on a bulletin board and present them to all workers.

Merit & Effect

1. One-man KY activity makes it possible to self-examine his work without disturbing his work time.
2. One-man KY activity can promote awareness of safety in individuals by promising and vowing his determination in safety to all.

Outer Circular Highway Northern Section 1 Project

Root Cause Analysis of the Accidents



Location Map of Outer Circular Highway Project (Phase 2)



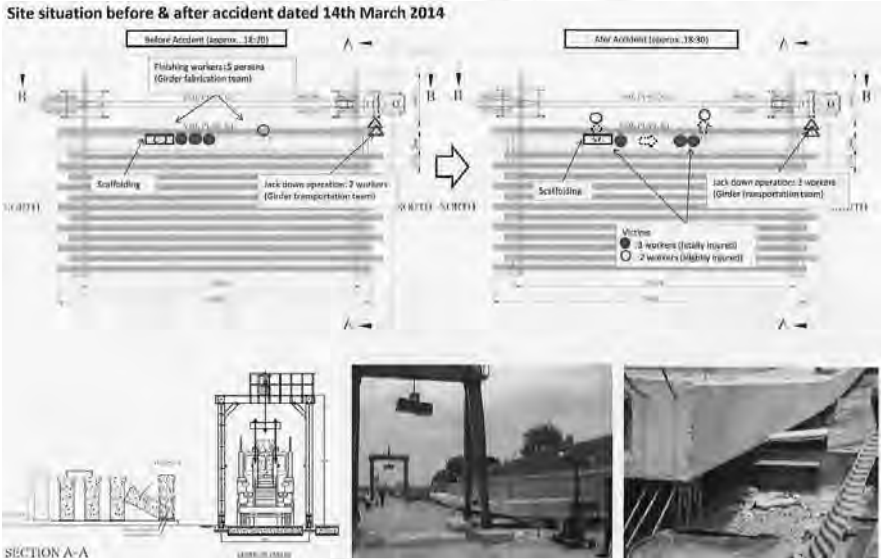
Chronological List of Accidents for Study

Date	Accident Description	Casualty
2013/02/01	A Crane boom broke from the main bottom joint and damaged a house and a vehicle in the vicinity.	Nil
2013/02/18	25t mobile crane toppled during lifting work due to inadequate ground support condition.	Nil
2013/10/11	A public bus fell down at OB9.	2 Injured
2013/12/04	The pier reinforcement cylindrical cage tilted and worker in side were injured.	2 Injured
2014/03/14	While working near the stored girder, the girder toppled.	3 Died 2 Injured
2014/06/02	A car belonging to a third party fell from the top of the pipe culvert.	1 Injured
2014/07/20	While transporting a PC girder, the trailer slipped and girder was toppled.	1 Injured
2014/08/03	A worker fainted and fell from the top of a pier while working with adhesive chemicals.	Nil
2014/08/06	While adjusting RC panel on the erected girder, a worker fell through the opening between the girders.	1 injured

The Accident Caused by the Topped PC Girder

Root Cause Analysis of the Accident

1. Topping of PC Girder(2014/03/14)



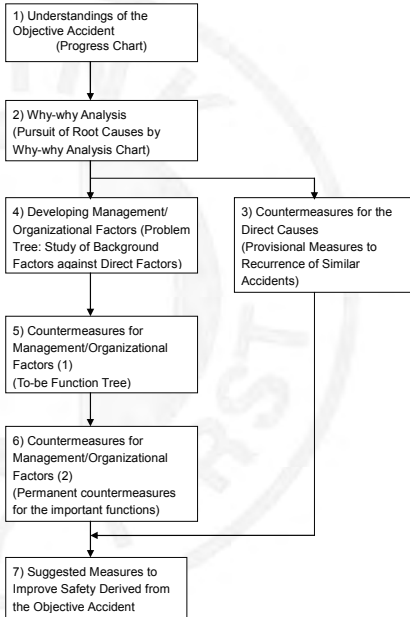
【The Accident】

A root cause analysis for the grave accident in which three workers were fatally injured, occurred on 14th March 2014 at the site of the Outer Circular Highway to the City of Colombo Project is stated in detail hereinafter.

【Outline of the Accident】

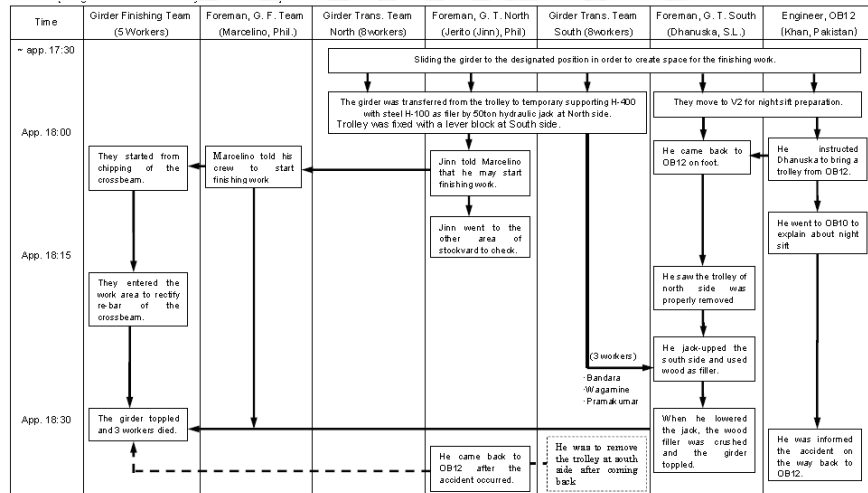
At temporary girder stock yard, after shifting of PC girder (L=35m, H=2m, W=70t) from the trolley to temporary supporting H-400 by using hydraulic jack, wood levelling filler gave away which caused to topple the PC girder. 3 workers of girder finishing work team were died and 2 worker were sustained minor injuries.

Root Cause Analysis and Countermeasure Study Flow



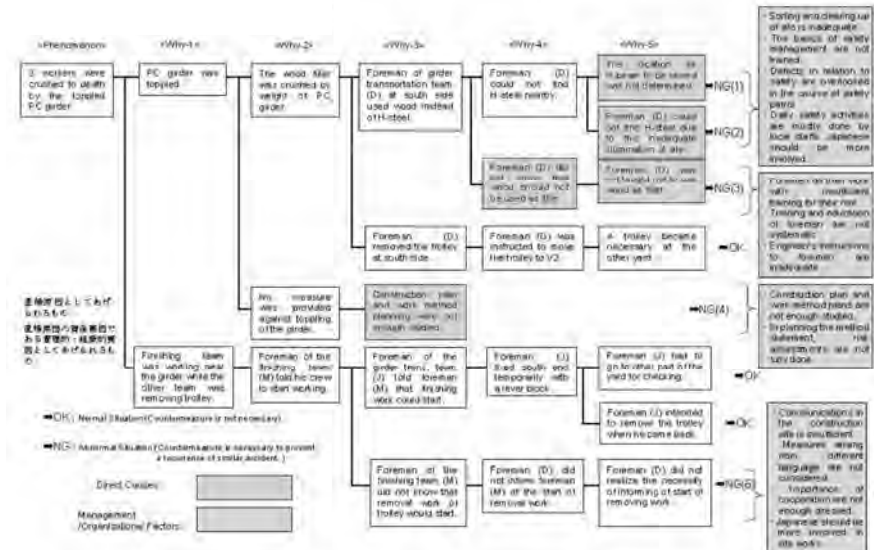
Understandings of the Accident (2014/03/14)

【Time Sequence Chart of the Accident】



Understandings of the Accident(2014/03/14)

Pursuit of Root Causes by the Why-why Analysis Chart



Countermeasures against Direct Cause(2014/03/14)

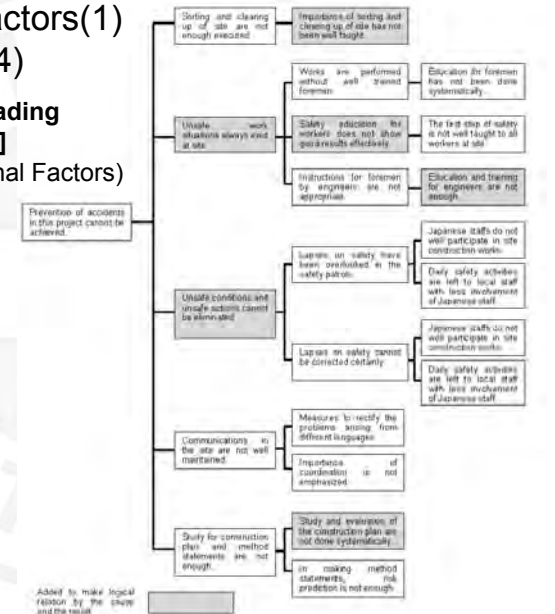
(Provisional countermeasures to prevent recurrences of similar accidents)

Direct Causes derived from Why-why Analysis (shown in yellow in the chart)	Countermeasure 1	Countermeasure 2	Countermeasure 3
1. Foreman (D) who is directly responsible for the accident) did not know that wood should not be used as filler.	Prepare a series of practical method of statement showing every predictable risk and prohibited action.	Explain to and make the foremen fully understand about the work, how to perform and what they never be allowed to do.	
2. The location for H-beams to be stored was not determined.	Keep everything in order in the site and clarify the locations where materials, equipment and tools to be stored.	At the start and the end of the day, foreman shall check the numbers and location of objectives with his crew and record them every day.	
3. Foreman (D) could not find H-steel due to the inadequate illumination at site.	Investigate and act quickly to create safe work environment by providing proper illuminations.	As for achieving safe work environment, recheck the site wholly by various point of view as well as impropriety of illumination.	
4. Construction plan and work method planning were not enough studied.	Not only topping of girder but each work that would contain dangerous factors shall be studied with special care and the result shall be reflected in the construction plan and method statement as well.	At the planning stage of the work, risk assessment shall be practiced, and countermeasures if necessary, shall be included in the plan.	Reliable measures preventing topping of girder shall be planned as quickly as possible and be applied at site.
5. Foreman (D) did not realize the necessity of informing of start of removing work to the finishing team.	Make it a most strict rule that finishing work and others while works which involve dangerous factors such as transporting girder is in progress shall not be done simultaneously.	Foremen must confirm that the site is clear except workers involved in the work directly.	

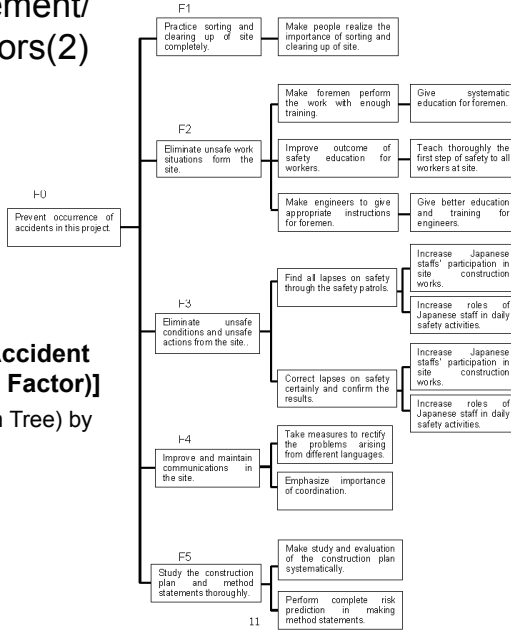
Developing Management/Organizational Factors(1)

(2014/03/14)

[A Problem Tree Leading to the Accident]
(Management/Organizational Factors)



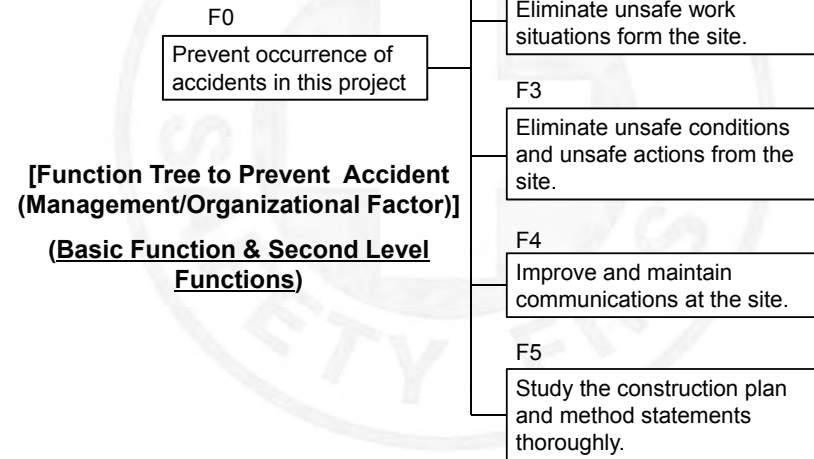
Developing Management/ Organizational Factors(2) (2014/03/14)



[Function Tree to Prevent Accident (Management/Organizational Factor)]

Convert the problems (in Problem Tree) by reversing to functions.

Developing Management/ Organizational Factors(2) (2014/03/14)



[Function Tree to Prevent Accident (Management/Organizational Factor)] (Basic Function & Second Level Functions)

Root Cause Analysis of the Accident

2. Falling from Pier by Passing Out (2014/08/03)

The Accident : Falling from Pier by Passing Out



Top of the Pier

Viaduct 1 Pier No.2 at A1 Bypass



Shed by Tarpaulin



Understandings of the Accident (2014/08/03)

【 Time Sequence Chart of the Accident】

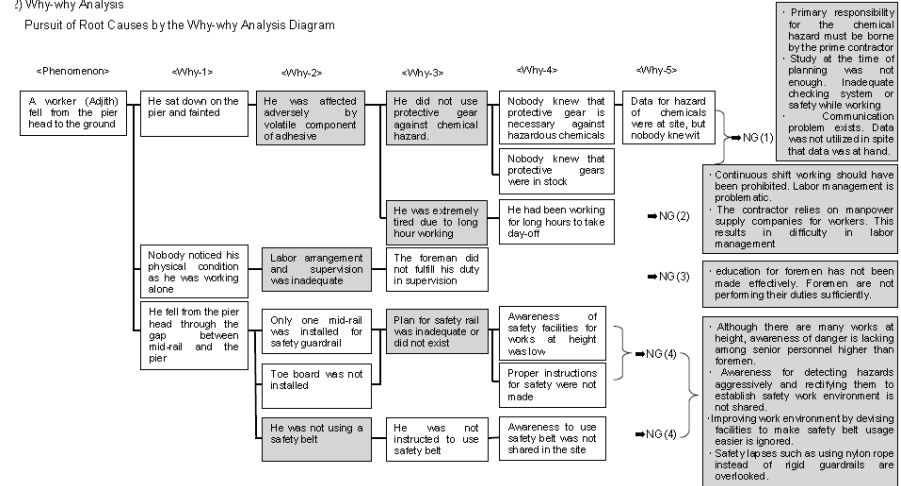
Time	Victim (Ajith)	5 Workers (Day Shift Team)	2 Foremen (Arul, Wasantha)	Several Workers (Night Shift Team)	Night Shift Foreman	Technical Officer (Duminda)	Engineer (Thearidu)
02 August 07:00	The crew started working on the pier head						
19:00	He continued working as he was scheduled working 2shift in a row.	Two foremen and most of workers for day shift left the work area.		The night shift crew stated working for preparation work for bearing plinths.			
App.22:00							
App.23:50							
03 August App.01:55	When he opened the adhesive container he felt irritation						
App.02:35	He went to the shed to drink water. There he fainted and fell			They started cleaning the bearing plinths using compressed air. All workers except the victim moved to right side of the pier.			
	He found himself in the water and cried for help.			One of the workers noticed and went down to assist.			
				At the time of accident, his action was unknown.			
				At the time of accident, he was staying on the ground			

Understandings of the Accident (2014/08/03)

Pursuit of Root Causes by the Why-why Analysis Chart

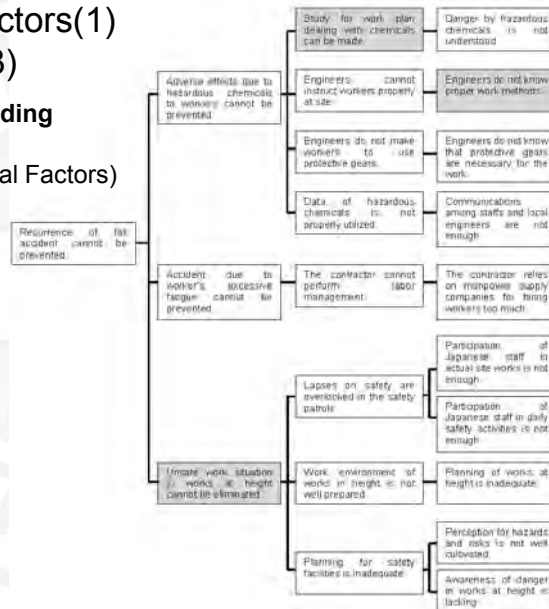
Why-why Analysis

Pursuit of Root Causes by the Why-why Analysis Diagram



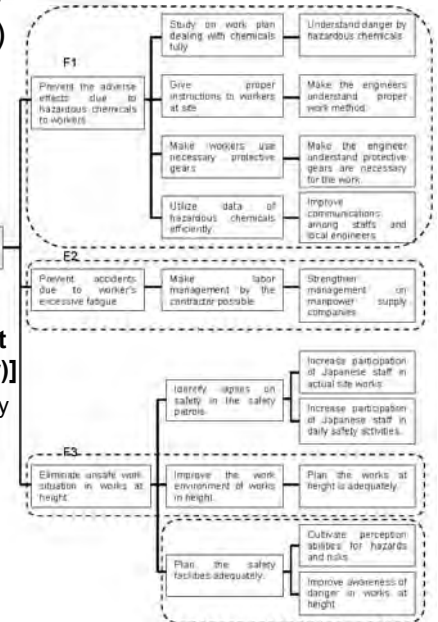
Developing Management/Organizational Factors(1) (2014/08/03)

【A Problem Tree Leading to the Accident】 (Management/Organizational Factors)

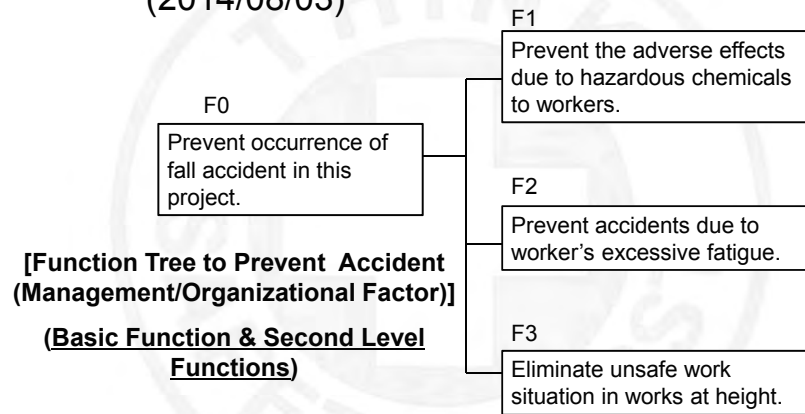


Developing Management/Organizational Factors(2) (2014/08/03)

【Function Tree to Prevent Accident (Management/Organizational Factor)】 Convert the problems (in Problem Tree) by reversing to functions.



Developing Management/ Organizational Factors(2) (2014/08/03)



The Accident : Falling from the Girder



Root Cause Analysis of the Accident

3. Falling from the Girder (2014/08/06)

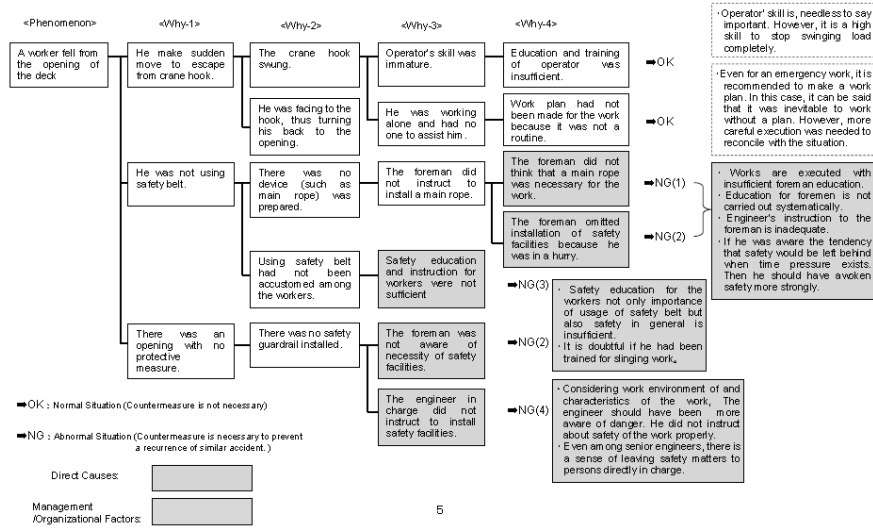
Understandings of the Accident (2014/08/06)

【 Time Sequence Chart of the Accident】

Time	Victim (Ramasamy)	2 workers (Grinding)	Foreman	2 workers (Height Adjustment)	Crane Operator
07:00	Waited on the ground (Reason unknown)	They started working removing RC panel for height adjustment on the deck.			
08:32	He went up to the deck.	They started grinding the removed panels.	Foreman instructed the victim to remove 4 th panel.	They started adjusting work of panels at a separated place.	
(3 minutes to Accident)	He moved to the location to pick up lifting cables		He sent signal to the crane operator.		
	He was going to put the cables to 4 th RC panel.				The operator moved the crane hook to place where 4 th panel was placed.
08:35	He tried to escape from swinging crane hook, and move backward and fell from the opening.				

Understandings of the Accident (2014/08/06)

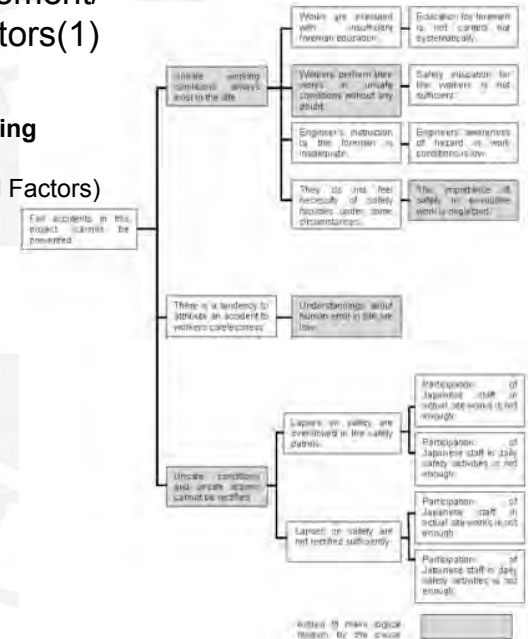
Pursuit of Root Causes by the Why-why Analysis Chart



Developing Management/Organizational Factors(1)

(2014/08/06)

[A Problem Tree Leading to the Accident]
 (Management/Organizational Factors)

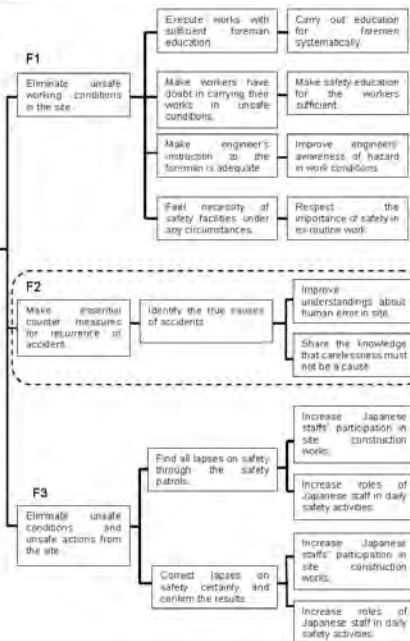


Developing Management/Organizational Factors(2)

(2014/08/06)

[Function Tree to Prevent Accident (Management/Organizational Factor)]

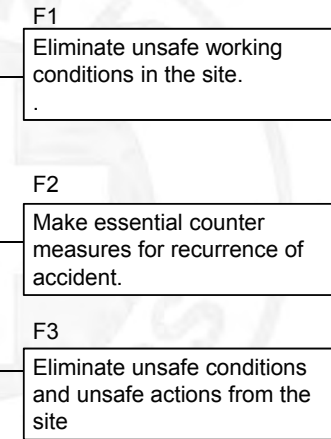
Convert the problems (in Problem Tree) by reversing to functions.



Developing Management/Organizational Factors(2)

(2014/08/06)

[Function Tree to Prevent Accident (Management/Organizational Factor)]
 (Basic Function & Second Level Functions)

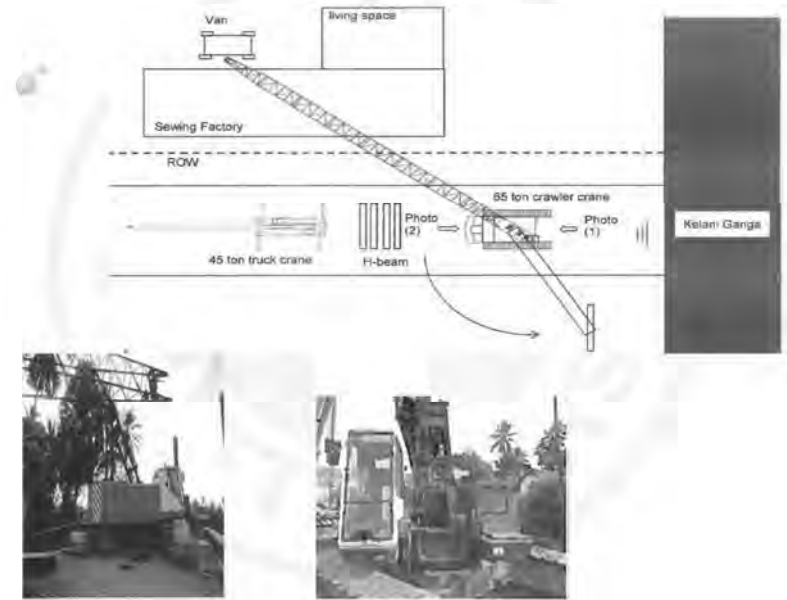


Root Cause Analysis of the Accident

4. Accident Caused by a Broken Boom of the Crane (2013/02/01)

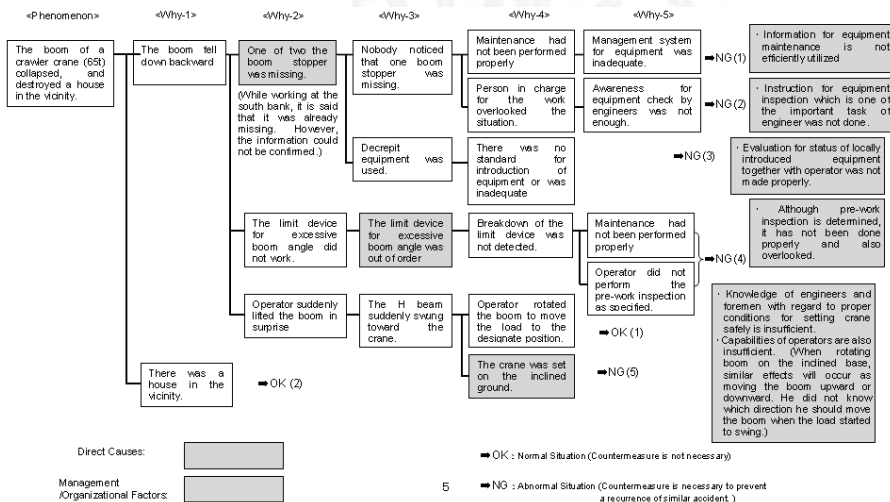


The Accident Caused by a Broken Boom of the Crane



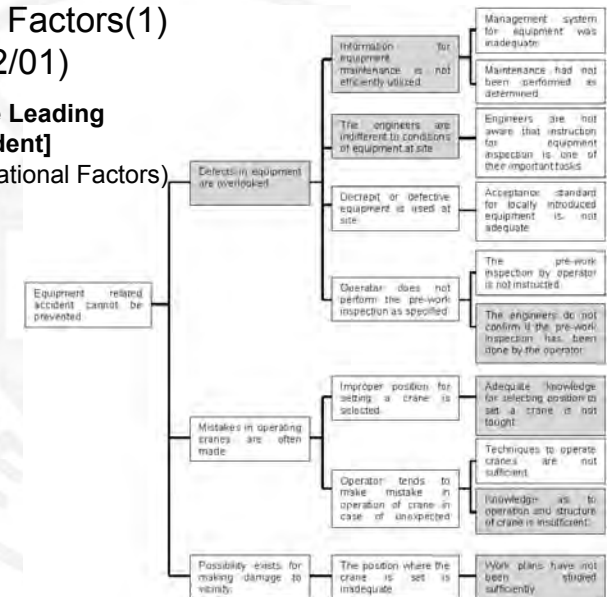
Understandings of the Accident (2013/02/01)

Pursuit of Root Causes by the Why-why Analysis Chart

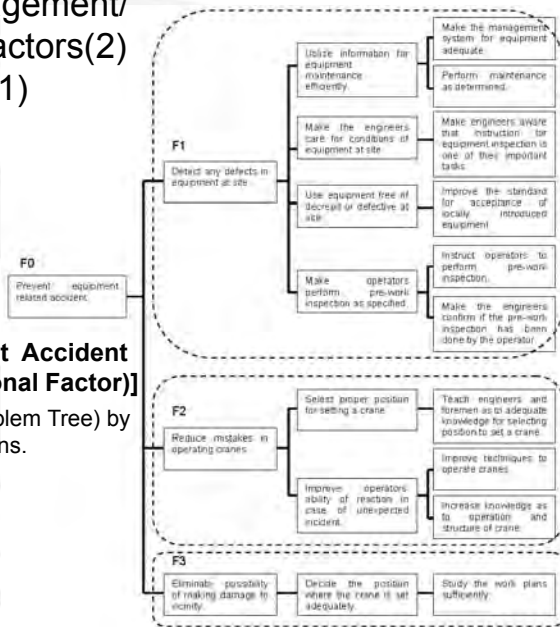


Developing Management/Organizational Factors(1) (2013/02/01)

[A Problem Tree Leading to the Accident] (Management/Organizational Factors)



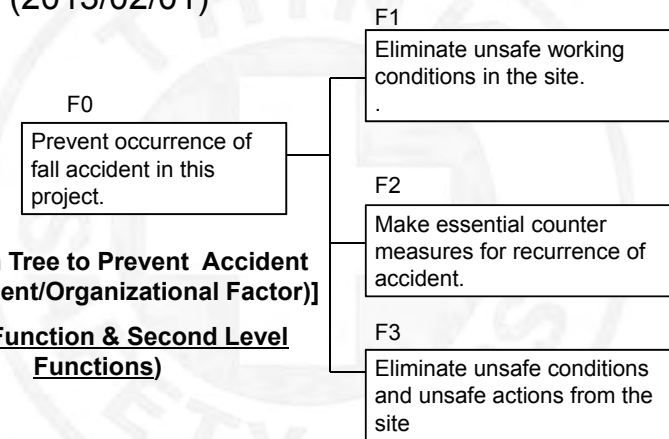
Developing Management/Organizational Factors(2) (2013/02/01)



[Function Tree to Prevent Accident (Management/Organizational Factor)]

Convert the problems (in Problem Tree) by reversing to functions.

Developing Management/Organizational Factors(2) (2013/02/01)



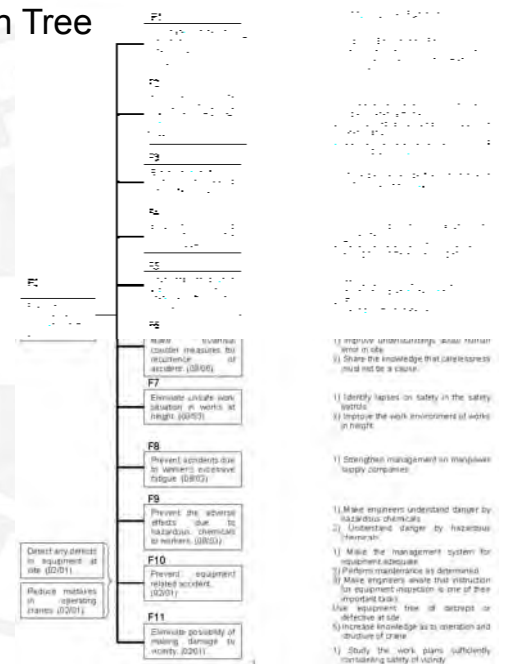
[Function Tree to Prevent Accident (Management/Organizational Factor)] (Basic Function & Second Level Functions)

Outer Circular Highway Northern Section 1 Project

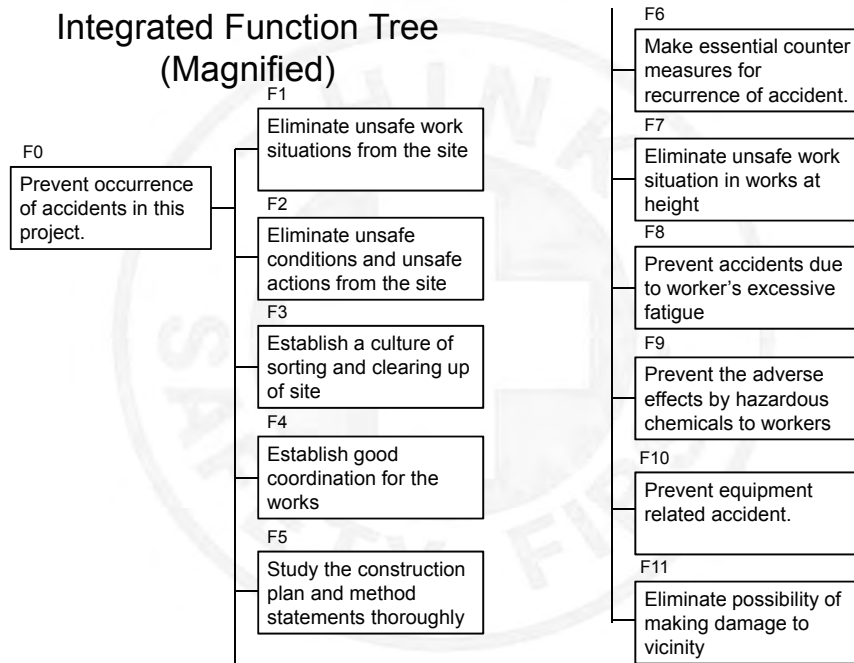
Integrated Analysis of Four Accidents and Recommendations



Integrated Function Tree



Integrated Function Tree (Magnified)



Management/Organizational Factors Derived from 4 accidents in OCH2 Project (1)

Accident	Management Factors	Organizational Factors
Accident by Broken Boom of Crane (2013/02/01)	1) Evaluation system for locally introduced equipment together with operator did not exist. 2) Maintenance of equipment had not been performed properly. 3) There was not a system supervisors could obtain information as to equipment maintenance. 4) Instruction to operators to carry out pre-work inspection was not given nor was it not confirmed.	1) Supervisors and engineers did not think of inspecting themselves the condition of equipment. 2) Knowledge of engineers and foremen regarding setting and operating cranes was not enough.
Accident by Toppling of PC Girder (2014/03/14)	1) Safety patrol did not function; thus, unsafe conditions at site were overlooked. 2) Safety activities were not able to cover whole construction site due to its size. 3) Engineer's instruction to foremen was not sufficient. (Particularly at night shift work.)	1) Importance of good coordination between different work teams was not well recognized. 2) Awareness of sorting and clearing up the site thoroughly was not shared through the site. 3) Awareness for importance of foreman education was low. 4) Awareness of necessity for participating in site works and safety management was not enough. 5) The necessity to include safety plan in the method statement was not recognized.

Management/Organizational Factors Derived from 4 accidents in OCH2 Project(2)

Accident	Management Factors	Organizational Factors
Accident of Falling from Pier by Passing Out (2014/08/03)	1) Work hours of workers at site were not monitored and controlled. 2) Safety measures for works at height are left to supervisors' discretion and were not adequate. 3) There was no safety plan for works using hazardous chemicals.	1) Because of direct hiring system, it was difficult to control manpower supply companies for management of working hours. 2) Awareness of hazard in a work at height prior to start of the work was low.
Accident of Falling from the Girder (2014/08/06)	1) Safety facilities were not enough. 2) Usage of safety gear such as safety belt was not recognized as mandatory by foremen. 3) The foreman did not perform his primary duty of supervision as he was acting as signalman.	1) Awareness for importance of foreman education was low. 2) Among engineers and foremen, awareness of the tendency that accident would increase under time restriction was low.

Management Factors For Safety in OCH2 Project

Management Factors	Significance	Management Factors	Significance
1. Factors in Safety Management at Site		2) The foreman did not perform his primary duty of supervision as he was acting as signalman	◎
1) Safety patrol did not function; thus, unsafe conditions at site were overlooked.	◎	3. Factors in Equipment Management	
2) Safety activities were not able to cover whole construction site due to its size.	○	1) Evaluation system for locally introduced equipment together with operator did not exist.	◎
3) Safety measures for works at height are left to supervisors' discretion and were not adequate.	◎	2) Maintenance of equipment had not been performed properly.	◎
4) Usage of safety gear such as safety belt was not recognized as mandatory by foremen.	◎	3) There was not a system supervisors could obtain information as to equipment maintenance.	○
5) There was no safety plan for works using hazardous chemicals.	○	4) Instruction to operators to carry out pre-work inspection was not given nor was it not confirmed.	○
2. Factors As to Engineers and Foremen		4. Other Factors for Work Execution	
1) Engineer's instruction to foremen was not sufficient. (Particularly at night shift work.)	◎	1) Work hours of workers at site were not monitored and controlled.	○

Organizational Factors For Safety in OCH2 Project

Organizational Factors	Significance	Organizational Factors	Significance
1. Factors As to Safety Awareness and System		3. Factors As to Roles and Abilities of Engineers and Foremen	
1) Awareness of necessity for participating in site works and safety management was not enough.	◎	1) Awareness for importance of foreman education was low.	◎
2) The necessity to include safety plan in the method statement was not recognized.	◎	2) Awareness of hazard in a work at height prior to start of the work was low.	◎
3) Among engineers and foremen, awareness of the tendency that accident would increase under time restriction was low.	○	4. Other Factors for Work Execution	
4) Supervisors and engineers did not think of inspecting themselves the condition of equipment.	○	1) Importance of good coordination between different work teams was not well recognized.	◎
2. Factors As to Hiring System		2) Awareness of sorting and clearing up the site thoroughly was not shared through the site.	◎
1) Because of direct hiring system, it was difficult to control manpower supply companies for management of working hours.	◎	3) Knowledge of engineers and foremen regarding setting and operating cranes was not enough.	○

Recommendation for OHC2 Project Management/Organizational Factor in Safety Management 1

Item	Nos. of Recommendation
1. Awareness of Safety	4
2. Organization for Safety Management	3
3. Safety Plan and Execution	4
4. Safety Management Activities	5
5. Education and Enlightenment of Safety	2
6. Hiring and Management of Labor Force	2
7. Others	2
Total	22

Recommendation for OHC2 Project Management/Organizational Factor in Safety Management 1

Item	Content of Recommendations	Comparison with the Present
1. Awareness of Safety	<p>1) The top management (the Contractor, the Owner and the Consultant) exercises a strong leadership in enhancing safety awareness, and took initiative in acting to materialize the "Safety First" principle.</p> <p>2) Practice an education and enlightenment which agree with the present situation of education and safety awareness level of the local workers' to establish the safety works.</p> <p>3) Establish a structure for the supervisory personnel (foremen and supervisors) who are either foreigner or local can gain professional knowledge from Japanese safety experts in order to improve their ability of foreseeing danger.</p>	

Recommendation for OHC2 Project Management/Organizational Factor in Safety Management 2

Item	Content of Recommendations	Comparison with the Present
1. Awareness of Safety	4) Considering absolutely most of accidents are caused by human errors (the lack of coordination and communication is one of the human errors), enhance understanding of the human errors and work on preventing accidents based on it..	
2. Organization for Safety Management	<p>1) The safety management section must be under the direct control of the Project Director. Give the section strong authorities to instruct other sections for safety improvement.</p> <p>2) Clarify the roles and authorities of the Safety Manager and Safety Officers to pursue compatibility of execution of the project and safety of the works.</p>	<p>1) After March 2014, the safety management organization was reviewed and positioned directly under the Project Director.</p> <p>The safety section was also reinforced with additional safety personnel together with a permanent Japanese safety engineer.</p> <p>A safety expert was also dispatched from Taisei's Tokyo head office in August and has been helping safety management activities effectively.</p>

Recommendation for OHC2 Project Management/Organizational Factor in Safety Management 3

Item	Content of Recommendations	Comparison with the Present
2. Organization for Safety Management	3) The Owner clarifies the principle of safety of the Project. The Consultant establishes the organization for safety management and the system to cooperate with the Contractor's safety management organization to materialize the effective safety activities.	3) The Owner, RDA has a great interest in safety management in the Project designating safety personnel.
3. Safety Plan and Execution	1) Make a concrete and detailed safety plan which agrees with the present situation that many workers are unskilled when studying the Method Statement. In addition, establish the structure in which inspections by the Consultant prior to the start of the work includes inspection of safety measures, and perform inspection as determined. 2) In future STEP projects, the above shall be clearly stipulated in the contract document.	

Recommendation for OHC2 Project Management/Organizational Factor in Safety Management 4

Item	Content of Recommendations	Comparison with the Present
3. Safety Plan and Execution	3) In the study of the above safety plan, involve not only the engineer in charge for the section/work but also foremen to make the plan suitable to the actual work conditions. In addition, this is effective enhance the sense of responsibilities of foremen in their roles. 4) Establish the system of executing and confirming the safety measures as planned. The present Safety Plan is merely a general content, and not a plan to guarantee the safety of a specific work in the specific construction site.	3) Studies of construction methods for the selected six hazardous works have been done involving foremen. An effective result of the education for foremen has been recognized.
4. Safety Management Activities	1) Share the idea that the one of the major purpose of daily site patrol is safety management among all staff and personnel.	

Recommendation for OHC2 Project Management/Organizational Factor in Safety Management 5

Item	Content of Recommendations	Comparison with the Present
4. Safety Management Activities	2) Give the priority to safety measures even if it causes delay of the work in order to establish "Safety First" and practice it in the site. 3) In order to improve the effectiveness of the safety patrol by the Consultant, strengthen coordination and cooperation between the Consultant and the Contractor. 4) Improve daily safety activities such as the morning meeting and the tool box meeting. 5) Make several tens of second of time for the silent prayer at the end of the meeting exemplified above for the safety of the day.	3) These safety activities have been practiced since March 2014.

Recommendation for OHC2 Project Management/Organizational Factor in Safety Management 6

Item	Content of Recommendations	Comparison with the Present
5. Education and Enlightenment of Safety	1) Make much of the education specifically for foremen considering the status of the local work force, perform it systematically. 2) Give the workers an education for basic matters of safety. Make foremen always instruct them through the site work about safety repeatedly. (Usage of safety gears and avoiding unsafe acts, etc.)	1) Although a systematic education program is not available yet, the importance of the education of foremen is well recognized, and is conducted as needed. 2) The basic education of safety for the workers has been conducted; however, it has not been producing affirmative effects.
6. Hiring and Management of Labor Force	1) Due to the situation that subcontractors in this country have not grown enough yet, the direct hiring of work force is inevitable. However, the Contractor has to exercise any necessary management such as the working time of workers to prevent accidents due to excessive fatigue.	1) According to the contract of the manpower supply, the confirmation of the status of workers of their working time is on the Contractor. However, that role has not been done by Taisei so far.

Recommendation for OHC2 Project Management/Organizational Factor in Safety Management 7

Item	Content of Recommendations	Comparison with the Present
6. Hiring and Management of Labor Force	2) Considering the situation of the local workers that there are many unskilled or unqualified workers, provide fundamental/practical education agreeing their skill levels and work environment and work methods.	2) According to the contract of the manpower supply, the education of workers for the safety rules at the site is to be done by the manpower supply companies.
7. Others	<p>1) Make all personnel and workers understand that sorting and clearing up are the fundamental factors to ensure the safety. Promote the movement of sorting and clearing up the site.</p> <p>2) Eliminate defective equipment from the site by evaluate the status of the equipment especially brought in by supplier based on the evaluation standard.</p>	1) Presently the site condition has been improved at the tidiness point of view by designating special team for cleaning. The movement of sorting and clearing up has not initiated yet in this site.

添付資料-6 ODA 建設工事における事故分析 <根本原因分析ガイドブック>

ODA 建設工事における事故分析

<根本原因分析ガイドブック>

～ 目 次 ～

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1. 根本原因分析とは	2
1.1 根本原因分析と建設事故	2
1.2 根本原因分析における組織要因の視点	3
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はじめに

海外で行われている ODA による建設工事において労働災害が頻発しており、事故の頻度や内容は国内工事の場合に比較して憂慮すべき状況にある。その原因として、当事国の様々な事情が影響していることは容易に想像できるが、いかにこの状況を改善していくべきかに真摯な取り組みが求められているのである。

わが国の建設事故・災害の状況を振り返ってみれば、1970 年頃には年間約 2,500 人の死者が出ていた状況から、近年では 350 人レベルにまで減少している。この改善の要因としては次のようなものが挙げられている。

- ・労働安全衛生法等の法規、各種技術基準の整備
- ・安全に作業するための機械、設備、工具等の開発
- ・施工法の確立、省人化、大型化の促進
- ・作業手順の整備
- ・現場安全活動の定着、効果的な安全教育の実施
- ・建設業関係者の安全水準の向上

海外の発展途上国においては、上記要因の多くが未整備、未発達な状態であり、建設事故・災害の撲滅には多くの障害があることは明白であり、実際、各事業現場において事故原因を分析し再発防止対策をとっているにもかかわらず、抜本的な改善には程遠い状況にある。

しかし、我が国においても死者 350 人レベルからはなかなか減少させることができず、ここでも従来行われている分析や対策立案に限界があることが感じられている。それは従来の事故分析、対策立案に不十分な点があり、表面的な原因の除去に重きを置くあまり、根本的な改善を困難にしているからであると考えられる。

このガイドブックでは、根本原因分析手法により事故や災害の原因を深く追及し、直接的な原因の背後にある管理的あるいは組織的な要因に光を当てることで、抜本的な再発防止対策を導き出すことを目的としている。また、対策立案についても、原因に対する裏返しの対策にとどまらず、工事や作業、あるいは現場組織や管理方法のあるべき姿を実現するための方策を抜本的に検討する手法も紹介している。

このガイドブックが、途上国における安全に対する意識改革と建設事故防止に役立つことを願うものである。

(注) 通常、事故のうちで人的被害を伴うものを「災害」というが、本ガイドブックでは人的被害の有無にかかわらず「事故」と称することとする。

1. 根本原因分析とは

1.1 根本原因分析と建設事故

建設事故対策における根本原因分析は、当該事故の直接原因の背後にある管理的／組織的要因を分析し、安全管理活動を改善する処置をとることが目的であり、事実に基づいて以下のことを明らかにすることである。

- (1) 事象の結果：事故、人身災害
- (2) 事象として何が発生したのか：事象の状況、発生経過、緩和させた要因とさらに悪化させた要因を含めて
- (3) 直接要因：事象の発生に関わる人的過誤、技術的プロセスの問題は何か
- (4) 背後要因（間接的要因）：直接要因の背後にある要因として何があったのか（多くは管理的な要因であったりする）
- (5) 組織要因：背後要因の分析を通して抽出される「直接原因の発生を防止できなかった個別のプロセスに関わるシステムの問題点」や「経営全体に関わるシステムの問題点」、あるいは「システムの基礎となる安全文化、組織風土などの問題点」で管理的要因を含む

建設産業を含めて、事故や労働災害は人的要因（不安全な行動）と物的要因（不安全な状態）の接触によって発生する場合がほとんどである。ゆえに事故の分析に当たっては、主としてこれらについて当該事故ではどうであったかに着目して行うことが多い。

しかし多くの場合、これらの原因は直接原因であり、かつ洞察が不十分なときには表面的な原因に留まり、真の原因は認識もされず結果や現象にのみに対応する誤った対策をとることすらある。

その結果、同じような事故が繰り返されたり、真の原因を同じくする事故が違った形で発生することになる。

根本原因分析では、こうした状況を打破することを目指し、直接原因を的確に把握するとともにその背後にある管理的要因や組織的要因を明らかにすることにより、恒久的な再発防止策につなげようとするものである。

1.2 根本原因分析における組織要因の視点

表-1 組織要因とその視点

組 織 要 因		視 点
中間管理要因	建設現場の管理運営に係る要因	「部署レベルの組織運営（目標、戦略、QMSの構築、マニュアルの整備等）」、「ルールへの遵守」、「学習する組織（技術伝承等）」、「人事管理」、「コミュニケーション」、「調達管理（協力会社とのコミュニケーション及び管理）」、「組織構成に係る人的資源管理（役割・責任、選抜・配置、力量、教育訓練）」、「技術管理」、「作業管理」、「変更管理（組織変更時の管理、作業の変更管理等）」、「不適合管理」、「是正処置」、「文書管理」等の不適切さや具体性・実効性がないことが事案に関係するときに組織要因の候補となる。
経営管理要因	本社の経営管理に係る要因	「トップマネジメントのコミットメント」、「組織運営（経営状況、組織構造、組織目標・戦略、本社の意思決定等）」、「人事運営」、「社是やコンプライアンスの標準・基準」、「本社と現場のコミュニケーション」、「自己評価（または第三者評価）」等の不適切さや具体性・実効性がないことが事案に関係するときに組織要因の候補となる。
外部環境要因	当該組織の外部環境に係る要因	「経済状況」、「規制の対応方針」、「外部コミュニケーション」、「世評」等が当該組織に与えた影響が事案に関係するときに組織要因の候補となる。
個人要因	組織・集団を構成する個人（従業員や管理職）の意識、意欲態度等に係る要因	「知識・技能」、「リーダーシップ」、「安全に対する意欲、慎重さ」、「管理の意欲」、「現場作業員への配慮」、「モチベーション、ストレス」の欠陥等の影響が事案に関係するときに組織要因の候補となる。
集団要因	組織の各階層を構成する集団（経営層、部、課、作業チーム等）に係る要因	「集団間・内のコミュニケーション」、「集団の知識・学習」、「集団浅慮や俗人主義的意思決定」等の悪い影響が事案に関係するときに組織要因の候補となる。
組織心理要因	組織（全社、現場、グループ等の各集団レベル）の中に長期にわたり培われ形づくられた思考形態、行動様式として組織構成員の共通の価値観となり、意識、認識、行動となって表れるもの（組織風土）に係る要因	事案に関係するときに組織要因の候補となる。

（出典：「事業者の根本原因分析実施内容を規制当局が評価するガイドライン」（原子力規制委員会）
 参考資料「根本原因分析における組織要因の視点」に加筆）

2. 根本原因分析の進め方

2.1 根本原因分析手法

1) 根本原因分析手法の選択

根本原因分析に用いることができる代表的手法には次の3つがある。

(1) 4M5E マトリックス分析

4M5E 分析手法は、様々な産業分野で用いられている 4M4E 分析手法を改良したもので、作業現場のひとりひとりがヒヤリハットのような軽微な事象を含めたトラブル事象に遭遇したとき、自らが分析して多様な側面からの要因と適切な対策が導き出せるようにした手法である。

4M は、Man (人)、Machine (設備、機器)、Media (環境)、Management (管理) を表し、事象から 4M の分類に従った要因を洗い出す。5M は、Education (教育・訓練)、Engineering (技術・工学)、Enforcement (強化・徹底)、Example (模範・事例)、Environment (環境) を表し、洗い出した要因一つ一つに対策を当てはめていくものである。

分析を専門としない者にも比較的容易に使うことができるが、要因が拡散しがちで論理性に問題がある分析となりやすい欠点がある。

(2) 特性要因図

特性要因図は、特性と要因の関係を系統的に線で結んでツリー状（魚の骨）に表した図であり、QC サークル活動などでよく使われている。分析に参加した人の一方的な意見により、経験から寄与率を決めて原因を特定してしまうこともあり、目星をつける程度の意味合いで使用するのなら良いが、要因を的確に漏れなく分析することは難しい。

分析には、既に発生したトラブルの現場データを収集し、データから要因を推定、列挙して対策を講じる。そのアプローチにはいくつかのタイプがあるが、一般的に要因が拡散し、疑わしい要因すべてを検証する必要がある。

(3) なぜなぜ分析

「なぜ」「なぜ」を繰り返しながら、問題事象を発生させている要因を、思いつきや勘ではなく、規則的に順序良く漏れなく出し切り、その中から事実に基づいて真の原因を絞り込む分析方法である。「もの作り」だけでなく、「業務・事務系」の問題事象に対しても有効な分析方法で、トヨタ自動車の改善活動から始まったとされ、「なぜ」を最大でも 5 回掘り下げれば真の原因にたどり着くことができるとされている。

「なぜなぜ分析」は、その方法が比較的単純で、未経験者にも論理的に考えることが可能で理解しやすいという利点がある。

以上よりこのガイドブックでは「なぜなぜ分析」を使うこととする。

2) なぜなぜ分析の概要

なぜなぜ分析は図に示すように問題事象（問題による結果、現象）に対して、その原因を掘り下げて追及することによって、真の原因を把握し、根本的な問題解決を目指す考え方である。なぜを繰り返す考え方はシンプルであるが、論理性を保ちつつ原因を漏れなく上げていくには、原因特定に関して慎重な姿勢と訓練が必要である。

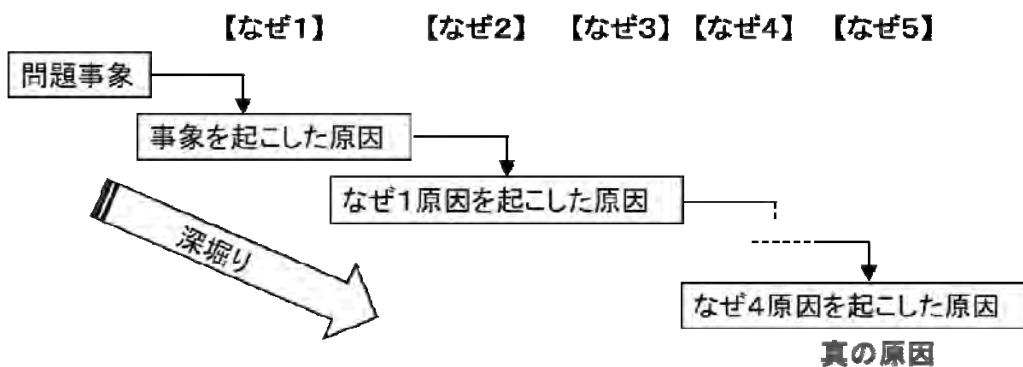
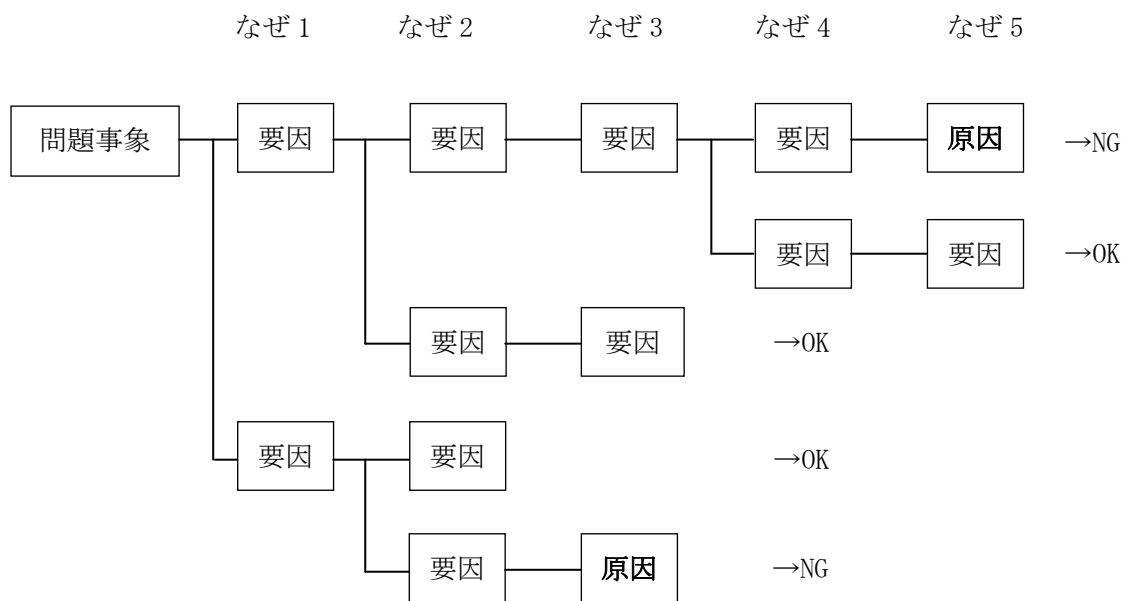


図-1 なぜなぜ分析の考え方



OK：通常状態であり対策の必要なし
 NG：異常であり対策を講じる必要あり

図-2 なぜなぜ分析図のイメージ

○なぜなぜ分析のコツと法則

- (1) 「なぜ」に書く文は、短く簡潔にし、誰でもが同じイメージのできる表現にする
主語は1つ、基本的に「〇〇が〇〇した」と表現し、あいまいな表現は避け具体的な表現を心がける。
- (2) 最初の「なぜ(1)」は、現象の根本的な「要因」からスタートする。
「なぜ(1)」は、その現象を発生させるための、明らかな要因を挙げる。(状況を書くのではなく、問題を引き起こした動作を書くようにする。)
- (3) 「なぜ(1)」には、発生要因と流出要因の両方を挙げる
現象を引き起こした直接要因と、ミスを見逃した直接要因に分けて記載する。
- (4) 逆方向に読み返して、原因と結果の関係になっているかを確認する
それが発生したら必ず上位の現象が発生するのかを確認する。
- (5) その「なぜ」を発生させる「要因」を全て挙げ切る
並列関係にある「なぜ」を漏れなく挙げる
- (6) 「なぜ」には、正常からずれていること(異常)だけを書く
たとえば、「忙しかったから」という理由は、「異常」ではない。ただし、150%以上の負荷が1週間続いたのなら、やはり「異常」といえる。
- (7) 人間の心理的な「要因」は避ける
個人的な話はあげない。まず再発防止策がしっかり打てる設備面や管理のしくみに対して、「なぜ」のほこさきを向ける。
- (8) 再発防止策が打てる「要因」が出てくるまで、「なぜ」を進める
再発防止策につながる「なぜ」が出てくるところまで分析を続ける。

3) VE (Value Engineering) の活用

(1) 問題解決と VE

直接原因あるいは管理的要因、組織的要因が明らかになれば、これらに対して対策を立案することになるが、単純に原因・要因を裏返しにした対策を打ち出してよしとする傾向がある。こうした対策が有効な場合ももちろんあるが、対策の可能性を広く求めて最善案を案出する姿勢が根本的解決には重要なことである。

その際に、VE (Value Engineering) を有効なツールとして使うことができる。

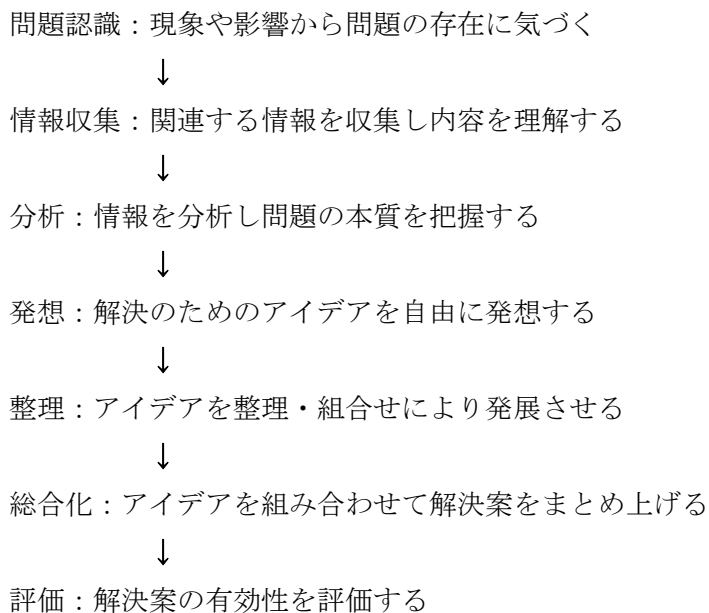
VE は、対象をその本質である機能（目的、役割）でとらえることにより、機能を達成する別の手段をゼロベースで創出する考え方である。

VE は、目的（機能）があり資源が使われているすべてが対象となる。VE ではこの機能と資源のバランスで決まる価値 (Value) を向上することにより問題解決とするが、VE が対象とする創造的問題の解決のためには踏むべきプロセスがある。

創造的問題とは、現実社会の中で発生するほとんどすべての問題であり、特徴としてまず、問題による現象や結果により問題の存在に気づき、その問題の本質を認識するために問題を明確に定義することが重要となる。

そして問題が明確になれば、それに対して解決の手段を広く求めて複数案の中から条件や状況によって決まる相対的な最善案を選択していくことであり、唯一無二の正解は存在しない。

この創造的問題解決のプロセスは、次のようなものである。



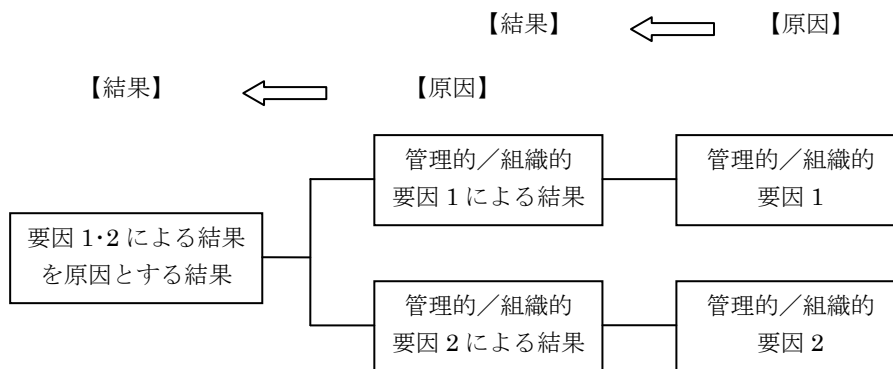
VE の実施手順はこのプロセスを体系的に再現しており、検討を実施するチームにおける最善の解決案の選択を可能とする優れた方法論である。

(2) 根本原因分析における機能分析

VE では対象を機能の集合としてとらえることで本質を理解する。この機能の集合を機能系統図というが、VE では、対象は本来どうあるべきかという「あるべき姿」を描き、その達成を問題解決と考える。

(a) 問題点系統図

根本原因分析においては管理的／組織的要因が明らかになったら、要因が現場においてどのような不具合を引き起こしているかを、原因と結果の論理により問題点系統図にまとめる。



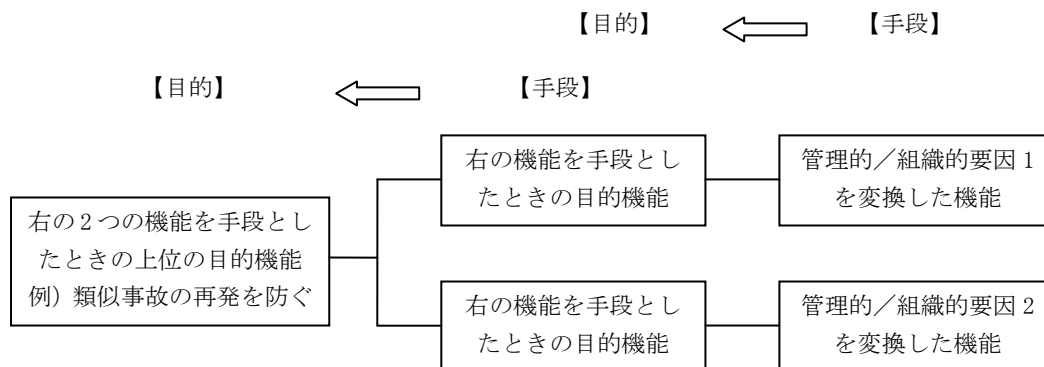
図－3 問題点系統図の考え方

(a) 機能系統図

問題点系統図にある要因や問題現象（通常「～がない」、「～が不十分である」などの否定的表現）の表現を反転させることにより機能表現にすることができる。

- 例) 「安全性を確認する仕組みがない」 → 「安全性を確認する仕組みをつくる」
- 「職長教育が不十分である」 → 「職長教育を充実させる」

変換された機能はそのままで目的と手段の論理によるツリーとなっており、この機能系統図は対象のあるべき姿を表している。機能系統図に示された機能を達成することにより上位の目的機能（基本機能）が達成される。そのためのアイデアを機能に基づいて広く求め、最善の達成手段を創出するのである。



図－4 機能系統図

2.2 根本原因分析と対策検討のフロー

事故の根本原因分析および再発防止対策の立案に至る流れは下図の通りである。

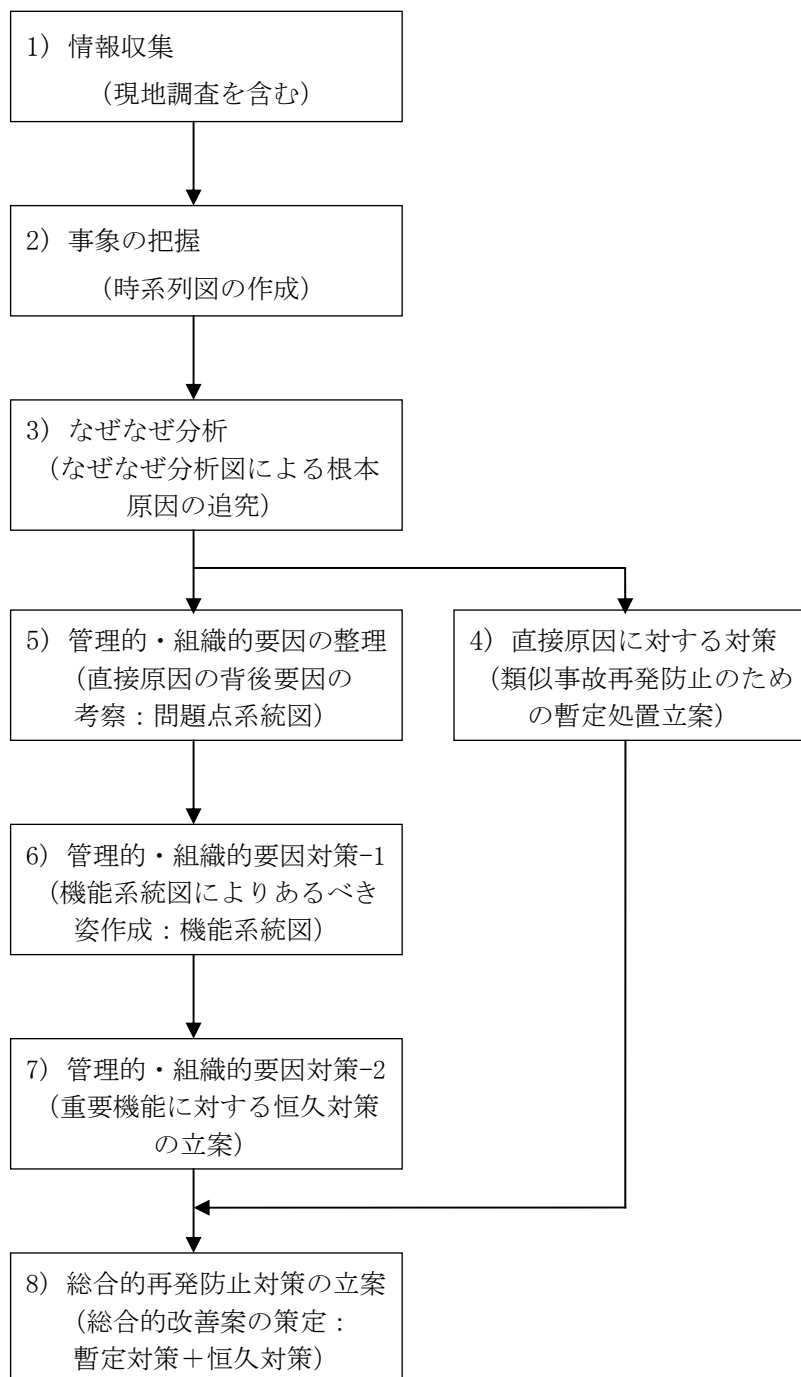


図-5 事故分析と対策検討フロー

2.3 根本原因分析の実施

1) 情報収集と整理

分析に先立って次のような情報を収集・整理し、事故の内容を確実に理解できるようにする。

- (1) 事故の発生状況（写真、説明図、その他）
- (2) 事故発生に至る時間的経過と変化
- (3) 事故前後の現場の状況と変化
- (4) 機械、設備等の状況と変化
- (5) 個々の関係者の行動、人と人の役割関係、コミュニケーションの状況
- (6) 事故関係者、特に目撃者の証言
- (7) その他

2) 事象の把握（時系列図の作成）

情報に基づいて、時間の経過に従って関係者がどのような行動を取り、事故の発生に至ったのかを時系列図にまとめる。

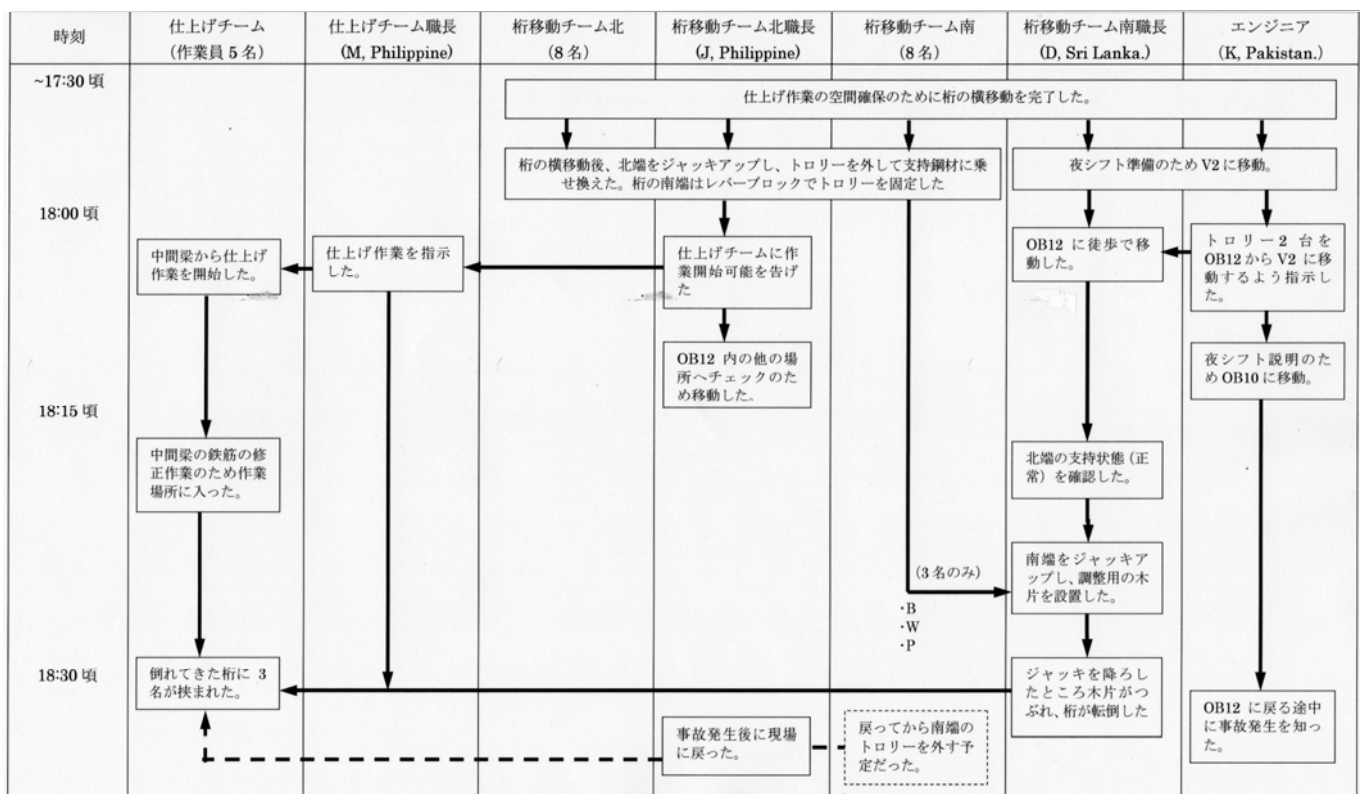


図-6 時系列図例

3) なぜなぜ分析（なぜなぜ分析図による根本原因の追究）

事象がどのような原因によって発生したかを論理的に考察し「なぜ1」を抽出し、その原因（「なぜ1」）がどのような原因により発生したかを考え「なぜ2」とする。これを順次繰り返すことにより、管理的要因、組織的要因が明らかになるまで原因を追究し、なぜなぜ分析図（例参照）を作成する。

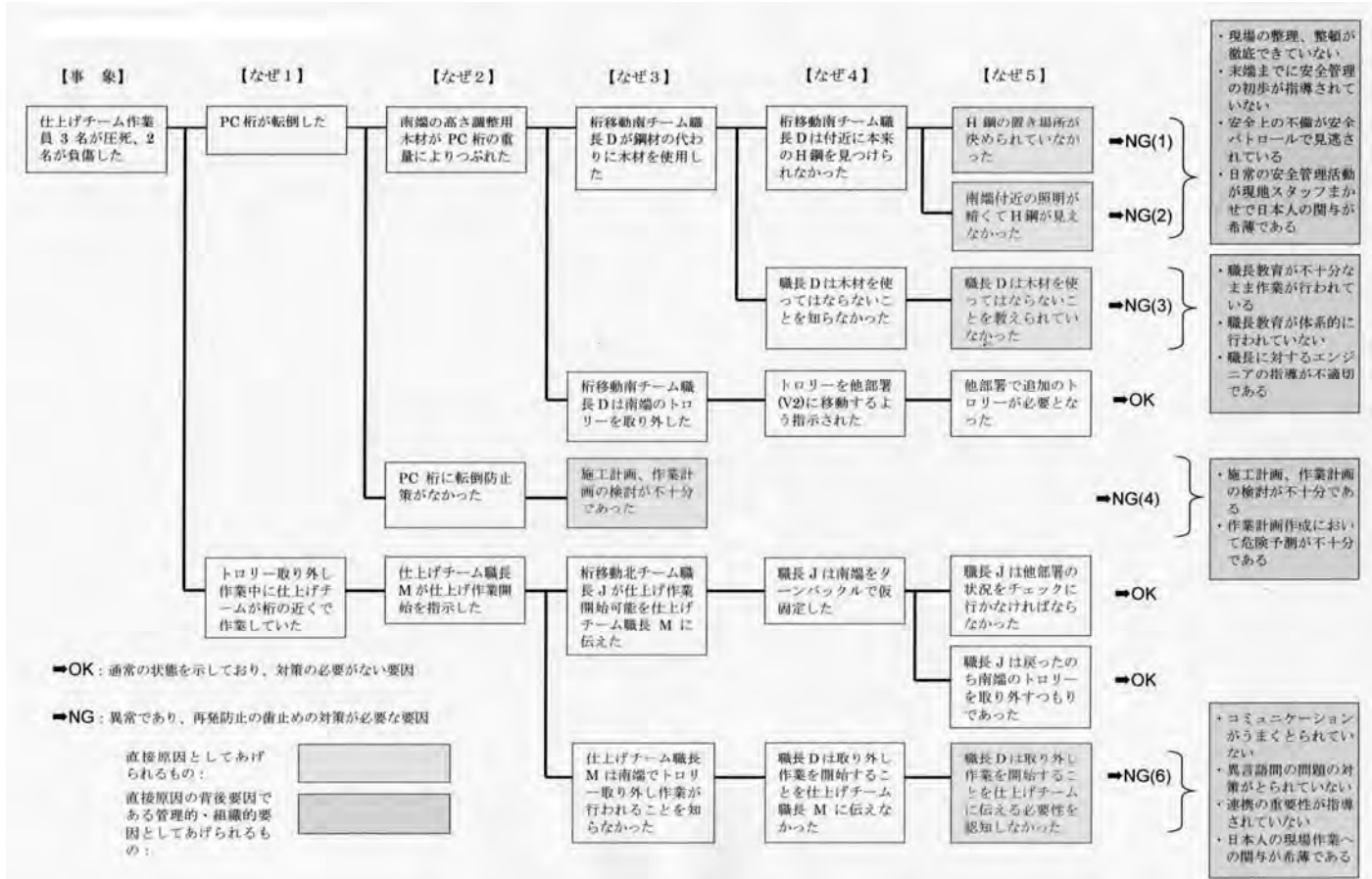


図-7 なぜなぜ分析図例

通常は「なぜ」を5回繰り返せば真の原因に至るとされているが、例の場合のように異常状態（NGとして示されている）が明らかになれば、その状況を発生させたと考えられる管理的要因あるいは組織的要因を考察して記入する。（右端の枠内）

4) 直接原因に対する対策立案（類似事故再発防止のための暫定処置立案）

なぜなぜ分析図より直接原因を特定することが可能となる。ただし事故の表面的な原因のみを直接原因とすると、再発防止に不十分な対策を立ててしまうことが多い。そのため、どのレベルの原因を直接原因とすべきかを慎重に決める必要がある。

直接原因に対する対策は類似事故再発防止のための「暫定措置」との位置づけであり、これのみで将来にわたって再発防止を期するものではないことに留意する必要がある。その意味で恒久的な対策として管理的要因、組織的要因の明確化と恒久対策の立案が重要となるのである。

また、直接原因に対する対策立案では、原因を裏返しただけの対策でよしとする傾向が強く、それが従来の再発防止の活動の問題点であったとも考えられる。なぜなぜ分析図を活用して多面的に対策を考えることが肝要である。

表－2 直接原因に対する対策例（類似工事再発防止の暫定対策）

なぜなぜ分析図で抽出した直接原因（黄色）	対策 1	対策 2	対策 3
1. 職長 D（事故の直接起因者）は高さ調整用に H 鋼の代わりに木材を使用してはならないことを知らなかった	・作業計画書を整備し、危険要素と作業における禁止項目を明記する	・職長に対して作業の内容と進め方、絶対にしてはならないことを確実に伝える	-
2. H 鋼の置き場所が決められていなかった	・現場を常に整理、整頓し機材、工具等の置き場所を明確にする	・作業の開始時、終了時に数量や場所を確認させ、記録に残す	-
3. 南端付近の照明が暗くて H 鋼が見えなかった	・必要な照明を調査し、速やかに作業環境を整備する	・作業環境整備においては照明のみならず、あらゆる角度から再点検する	-
4. 施工計画、作業計画の検討が不十分であった	・桁の転倒ばかりでなく、移送、架設など危険を伴う作業については特に綿密な計画を検討する	・計画時に危険要素の洗い出しをし、リスクアセスメントに基づく対策を盛り込む	・桁の転倒防止方法を検討し、確実な方法で転倒を防ぐ
5. 職長 D は取り外し作業を開始することを仕上げチームに伝える必要性を認知しなかった	・桁の移動時等の危険作業では、仕上げ作業等を同時に行わないことを徹底する	・職長には必ず作業場所周辺に直接の関係者以外がないことを確認させる	-

5) 管理的／組織的要因の整理（直接原因の背後要因の考察：問題点系統図）

事故の直接原因に対してその背後要因として管理的要因、組織的要因があると考えられるが、これらによってどのような結果が発生しているかを追求することが重要である。なぜなぜ分析から得られたこれら要因を原因としてその結果を遡っていくと、多くの場合なぜなぜ分析図を単純に事象に向かったたどることにはならない。

ここでは、原因と結果の論理により順次上位の結果を追求し、問題点系統図を作成して、対象となる事故の発生が防げない理由を考える。

図－8 に問題点系統図の例を示す。

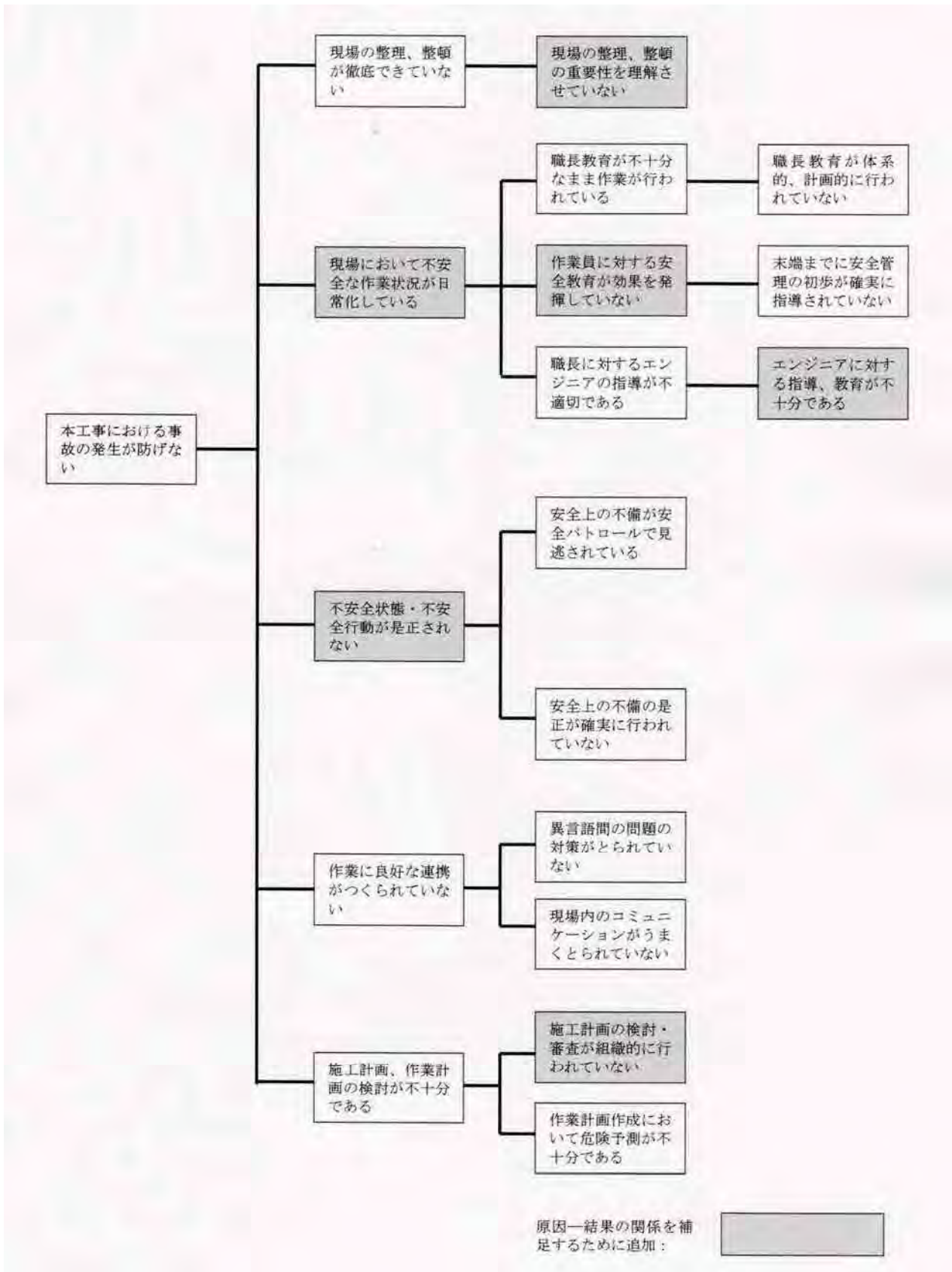


図-8 問題点系統図例

6) 管理的・組織的要因対策-1 (機能系統図によりあるべき姿作成：機能系統図)

問題系統図に示されたそれぞれの問題点の表現を反転させることで、問題点を果たすべき機能に変換することができる。これが機能系統図であり、最上位にある目的を達成するために必要な手段を体系的に表したものと見える。

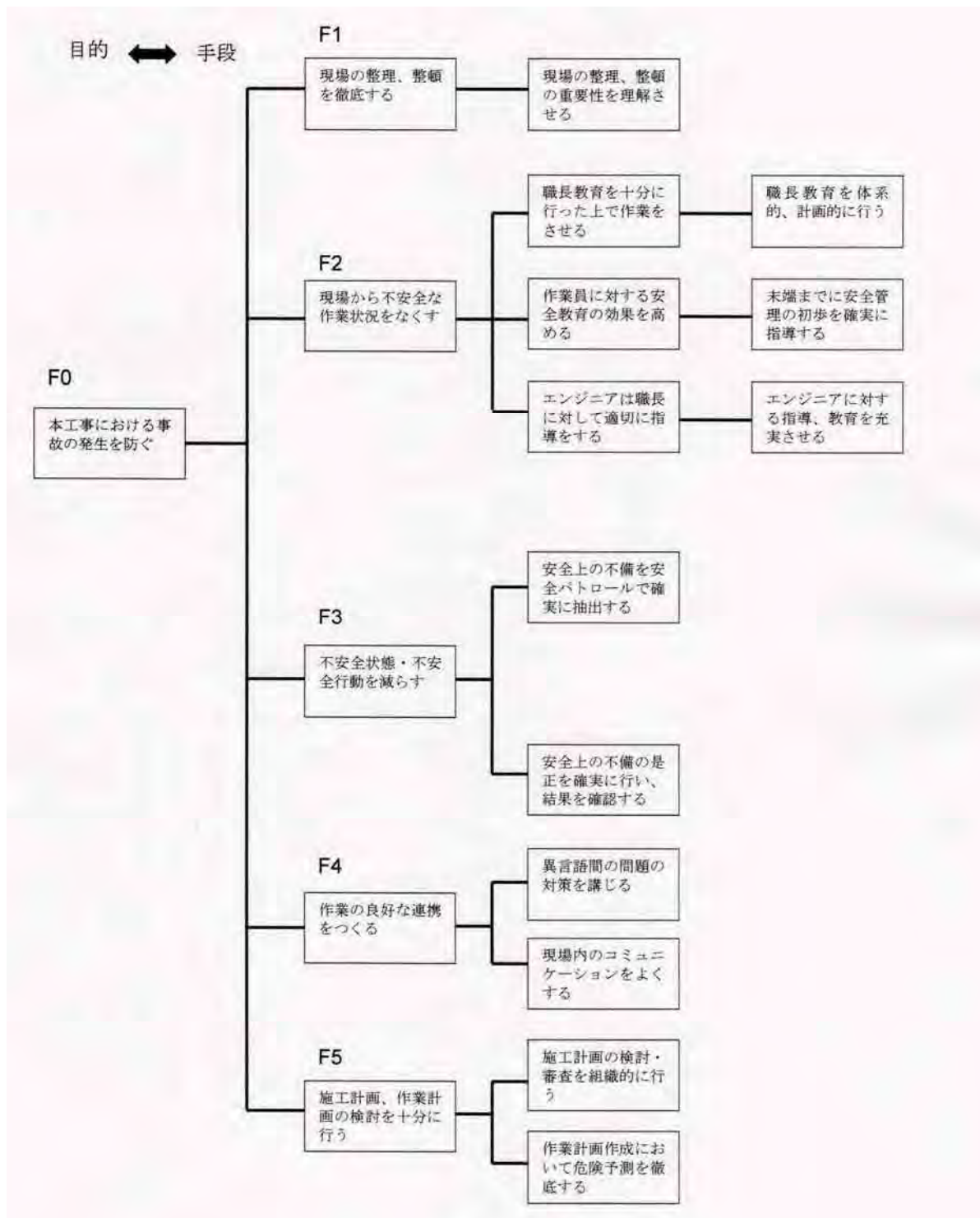


図-9 機能系統図例

7) 管理的・組織的要因対策－2（重要機能に対する恒久対策の立案）

(1) 機能分野の重要度比較

機能系統図においては複数の機能分野（特定の機能を目的としたときに互いに関連の深い機能のまとまり。図 10 に示された F1～F5 が機能分野）があるが、これらの機能を達成することで最も目的的な機能、すなわち基本機能が達成されると期待できる。すべての機能分野に対して対策を立案すればよいが、機能分野には相対的な重要度の差があるのが普通である。何が特に重要な機能であるかを認識することは以後の恒久対策立案において大切な手掛かりとなるとともに、検討の効率化においても効果がある。

重要度の相対的評価には、次の例に示すような強制決定法（Forced Decision）を用いる。

	F1	F2	F3	F4	F5	合計	順位
F1：現場の整理、整頓を徹底する		0	0	1	0	1	4
F2：現場から不安全な作業状況をなくす	3		1	3	1	8	1
F3：不安全状態、不安全行動を減らす	3	0		3	1	7	2
F4：現場内のコミュニケーションをよくする	0	0	0		0	0	5
F5：施工計画、作業計画の検討を十分に行う	1	0	0	3		4	3

(強制決定法)

顧客・使用者の立場から、機能の重要度を一対比較によって相対評価する。

重要度には、属性相互の重要性の程度によりウェイトを持たせる。

(差が大きい：3点、差が小さい：1点)

(2) アイデア発想

アイデア発想にはブレインストーミング法を活用する。実施においては、次の4つの規則を守って機能に基づいて発想するように心がけることが大切である。アイデア発想は、対象機能分野の中の各レベルの機能で考える。

- ① 批判厳禁：判断は後回しにする。他人はもちろん自分のアイデアの批判もしない。
- ② 自由奔放：自由な発想を重視。アイデアの切り口、視点を意識して発想する。
- ③ 量を求む：アイデアは質よりも量が大切。質の高いアイデアは量が出せれば必ず出る。
- ④ アイデアの改善結合：他人のアイデアも積極的に使ってよい。

次表にアイデア発想の例を示す。

表-3 アイデア発想例

重要度	機能分野	アイデア
1	F2：現場から安全な作業状況をなくす	<ul style="list-style-type: none"> ①職長教育が特に重要であることを職員（日本人）・ローカルエンジニア全員が共有する ②職長教育の内容を再検討する ③体系的な職長教育の計画書をつくる ④職員とエンジニアが共同で職長教育の内容を考える ⑤職長に責任感を強く持たせる内容を盛り込む ⑥新規入場者教育を再整備する ⑦定期的に作業員の安全教育を行う ⑧作業内容が変わった場合には必ず作業手順をできるだけ具体的に教える ⑨現場で直接作業を指示するエンジニアの技術を高める機会を持たせる ⑩エンジニアの危険予知能力を高める訓練を実施する ⑪安全パトロールにはエンジニアが必ず同行する ⑫エンジニアは作業開始時には作業手順書を完全に理解し不備を見つけるよう努力する ⑬作業手順書に不備等があった場合は直ちに現場状況に合わせて改善する仕組みをつくる ⑭作業員の安全教育ツールを整備する ⑮日本で使っている教育ツールを調査し、使えるものは現地語に訳すなどする ⑯職長は作業の危険要素を見つけエンジニアに意見具申をすることを現場全体で奨励する ⑰職員は現地のやり方をよしとすることなくエンジニアと問題を共有化し改善する ⑱職員が率先して指差し呼称を行い、エンジニア、職長に広げる
2	F3：不安全状態、不安全行動を減らす	<ul style="list-style-type: none"> ①作業員の服装、装備のチェックはうるさいくらいにする ②安全帯を使用するように現場の環境（親綱の設置、安全帯付け替え頻度の低減の工夫等）を整える ③安全パトロールを抜き打ちでやる ④簡単に直せるものはパトロールチームの目の前で直させる ⑤発注者との安全ミーティングで日本人が積極的に発言し、活動への関与をアピールする ⑥所長以下職員全員は、必ず毎日現場巡視を兼ねて日常安全パトロール（巡視）を行う ⑦日常安全パトロールの際には安全巡視中を示す腕章をつける ⑧安全担当職員は毎日 Safety Engineer の巡視結果の報告を受け、重要なものは直ちに所長に報告する ⑨不安全状態に関しては、Safety Engineer と安全担当職員で是正計画をその日のうちに作成する ⑩是正処置を実施する仕組みと共に、実施を確認報告する仕組みを作る ⑪安全パトロールの際は、各回での重点（複数）項目を明確にして行う ⑫不安全状態の解消についてはその除去のみならず、作業方法の抜本的見直しも考慮する ⑬安全パトロールでの指摘事項の是正状況はその実施と共に、改善結果の評価を行う ⑭不安全行動を指摘された作業員と職長の名前は記録し、回数が多くなった場合には処分を考慮する ⑮KY などに際しては、ローカル任せにせず職員が積極的に発言（通訳可）する ⑯KY などの機会に安全知識や危険予知能力の向上に工夫する ⑰作業開始前ミーティングの最後に黙とうの時間を持ち、安全作業を再度意識する機会をつくる ⑱作業開始前ミーティングで作業員の服装、装備を点検し、不備な作業員には当日の作業を禁止する ⑲職長を対象とした安全大会／安全教育でテーマを与えて発表させる ⑳エンジニアに担当業務の中でどのような安全目標を持って進めるかをミーティングで発表させる

3	F5：施工計画、作業計画の検討を十分に行う	<ul style="list-style-type: none"> ①重点工種を明確にして計画の濃度（深化度）を決める ②安全／危険は施工法、作業方法によって変わることを意識して計画する ③作業計画立案ではリスクアセスメントを活用して行う。 ④危険度が高い工種、作業についてはしっかりとした対策、改善策を考える ⑤施工計画書作成は個人・小グループで完結させず、会社としての組織力を活かすよう進める ⑥施工計画書の内容は二人以上の同種工事経験者の審査を義務づける ⑦施工計画書の審査・承認の仕組みを明確にする ⑧同種工事の施工計画書のデータを整備して活用する ⑨一つだけの同種工事の施工計画書例に頼らない ⑩同種工事における事故例を調べて計画書づくりに反映させる
4	F1：現場の整理、整頓を徹底する	<ul style="list-style-type: none"> ①5S運動をする ②毎朝、毎夕に整理整頓、清掃の時間をつくる ③資機材の置き場所を決める ④整理整頓状況確認の責任者を決める ⑤同確認責任者を持ち回りで指名する ⑥パトロールで整理・整頓状況が良好とされた部署を表彰する ⑦安全は整理、整頓された現場が基本であることを教育する ⑧整理整頓のポスターを数多く掲示する ⑨毎週（毎月）の現場整頓の目標を立てる ⑩作業員が職長に整理、整頓のアイデアを出すことを奨励する ⑪よいアイデアを出した作業員を上司に報告し表彰候補にする ⑫毎月の安全大会で優秀活動を発表する ⑬作業場に整理整頓のための工具等の置き場を整備する ⑭整理整頓の重要性を新規入場者教育で特に強調する
5	F4：現場内のコミュニケーションをよくする	<ul style="list-style-type: none"> ①職員が率先して、作業員を含むすべての現場関係者に挨拶をする ②職員は少なくともすべての職長を名前で呼べるようにする ③職員は英語を解する職長には、積極的に声をかけて話をする ④英語を解さない職長には、フィリピン人などを暫時同行し通訳してでも話をするようにする ⑤職員は片言でも現地語を話せるよう勉強する ⑥作業場や作業チームでの懇親会を開き、職員も積極的に現地人作業員と交わる ⑦機会をとらえて現場経費でパーティーを開く ⑧現地の習慣を理解し尊重することを全職員が心がける ⑨作業員に対しても、仕事ぶりなどがよかったりしたらその場でほめる ⑩作業（員）のよいところを見つけるように心がけ、積極的に満足の意を示す

(3) 概略評価～具体化

a) 概略評価

各機能分野のアイデアを、機能達成可能性、実施容易性（評価の属性は自由に設定してよい）などから概略評価し、機能達成に寄与しないものや実施が極めて困難なものはここで破棄する。一方、可能性等が少しでも期待できるものは次の段階に進める。

b) 具体化

- ・各機能分野のアイデアを整理、組合せをしながら発展させる（具体化候補）

- ・他の機能分野の具体化候補との組合せを考えて総合化することにより代替案（提案）を作成する。
- ・代替案は機能分野ごと、あるいは機能分野をまたいだもの、総合的なものなど自由に立案することができる。

c) 評価～実施計画

- ・同種目的を持った複数の代替案候補がある場合、概略評価において設定した評価項目により相対評価し、より優れた案を選択する。
- ・各提案に対して、具体化・実施計画を作成する。計画は具体的に5W1Hなどで表現し、実施における留意点のほか、実施状況や効果の判定などフォローアップの方法についても記述する。

8) 総合的再発防止対策の立案（総合的改善案の策定：暫定対策＋恒久対策）

前のステップで得られた管理的／組織的要因に対する対策を恒久的改善対策とし、これに4)で立案した暫定対策としての直接原因に対する対策を組み合わせることで、総合的な事故防止対策とする。

なお、分析対象事故が複数あり、その工事現場における事故防止対策を検討する場合には、次の通りに行うことができる。

- (1) 複数の事故の「なぜなぜ分析」を行う。
- (2) それぞれについて問題点系統図、機能系統図を作成する
- (3) 複数の機能系統図を重ね合わせることで統合機能系統図を作成する
- (4) 統合機能系統図の機能分野について重要度評価を行う
- (5) アイデア発想、概略評価、具体化

添付資料-7 JICA 事業実施サイトにおける事故報告フォーム

<別添 2>

JICA 事業実施サイトにおける事故報告フォーム

※第一報は断片的情報で可。追加情報収集を通じてアップデート。

事故報告部署			
報告年月日・時刻（現地時間）			
情報源（例：実施機関・現地報道）			
I. 事業関連情報			
1	国名		
2	事業名（L/A 等 ref. number）		
3	相手国との契約調印年月日		
4	供与限度額（百万円）		
5	事業実施機関名		
6	事業概要と事故発生コンポーネント（例：土木工事●●区間）		
7	事故発生コンポーネントの受注企業・コンサルタント名（国籍、サブ含む）		
II. 事故関連情報			
8	事故概要	(1) 事故発生日時（現地時間）	
		(2) 事故発生場所	
		(3) 事故発生の背景・事故内容（事故の発生に係る各関係者の動きの時系列図、組織図等を添付）	
		(4) 被害規模（人的被害（国籍等詳細情報を可能な限り記載）、物的被害、社会的影響等）	
		(5) 現況（事業継続・中断の情報含む）、緊急対応の進行状況	
9	事故関連報道の有無（有る場合は媒体名・関連記事を添付）		
10	事故に係る関係者対応		
11	事故に対する本機構対応		
12	現地日本公館との情報共有		
III. 事後的フォローアップ情報			
13	事故原因（重大事故については直接原因のみでなく、根本原因の解析も行う）		
14	教訓（事故予防策・対応策の立案検討状況等含）（現場で対応策が確認可能となるよう具体的に記述する）		
15	その他		